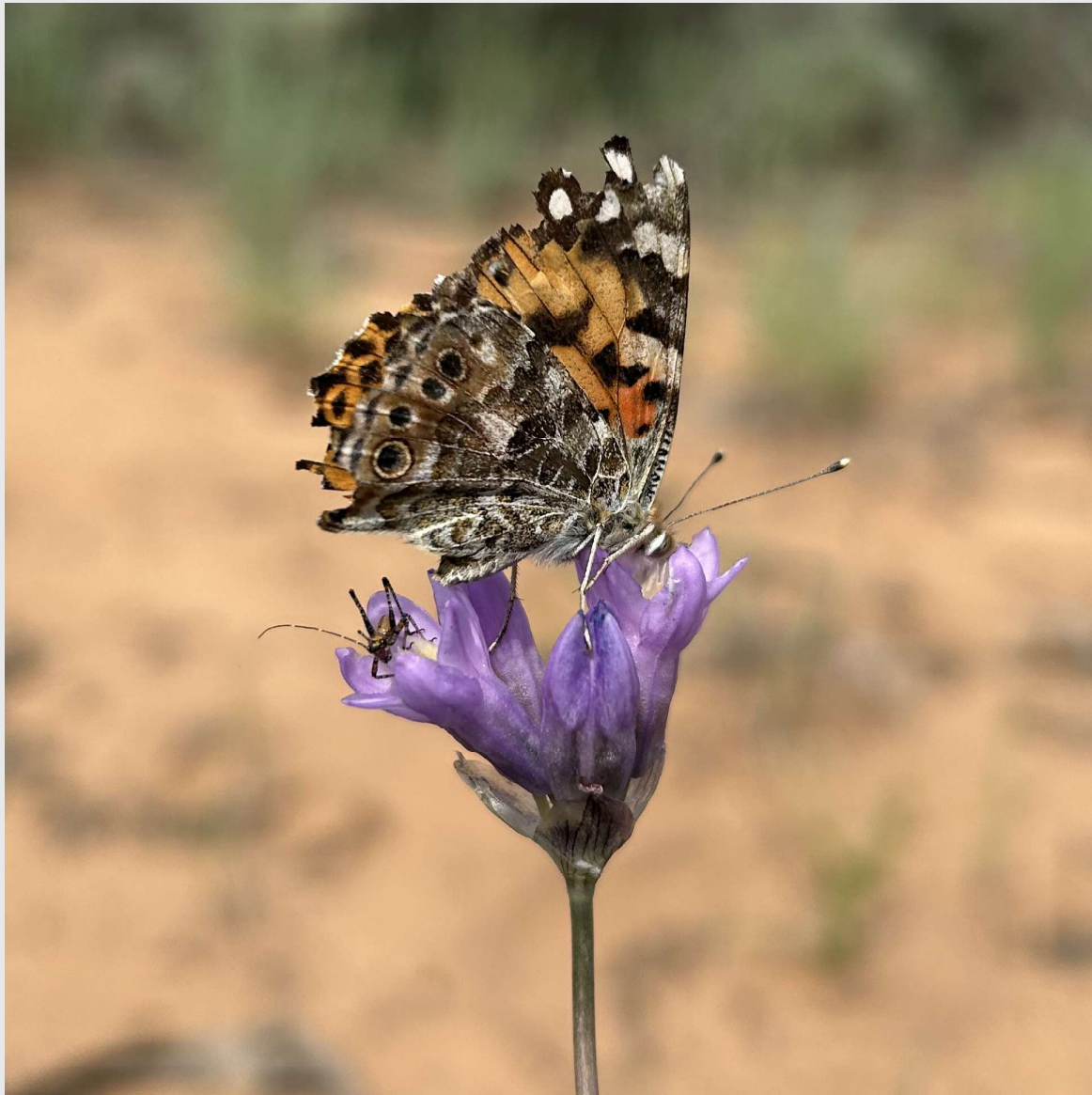


UTAH WATERSHED RESTORATION INITIATIVE

Habitat Monitoring

UTAH BIG GAME RANGE TREND



RANGE TREND PROJECT REPORT

Publication Number 24-09 | Report for Federal Aid Project W-82-R-68

2023 WRI Report

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Bush Katydid (*Scudderia sp.*), Painted Lady (*Vanessa sp.*) and Bluedicks (*Dichelostemma capitatum*)
by Jason Cox (2023)

Performance Report for Federal Aid Project W-82-R-68

Publication No. 24-09

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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-68

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.

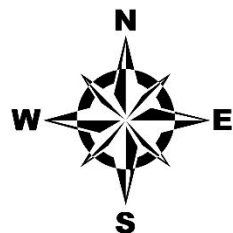
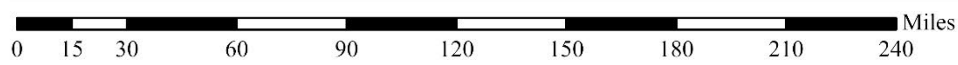
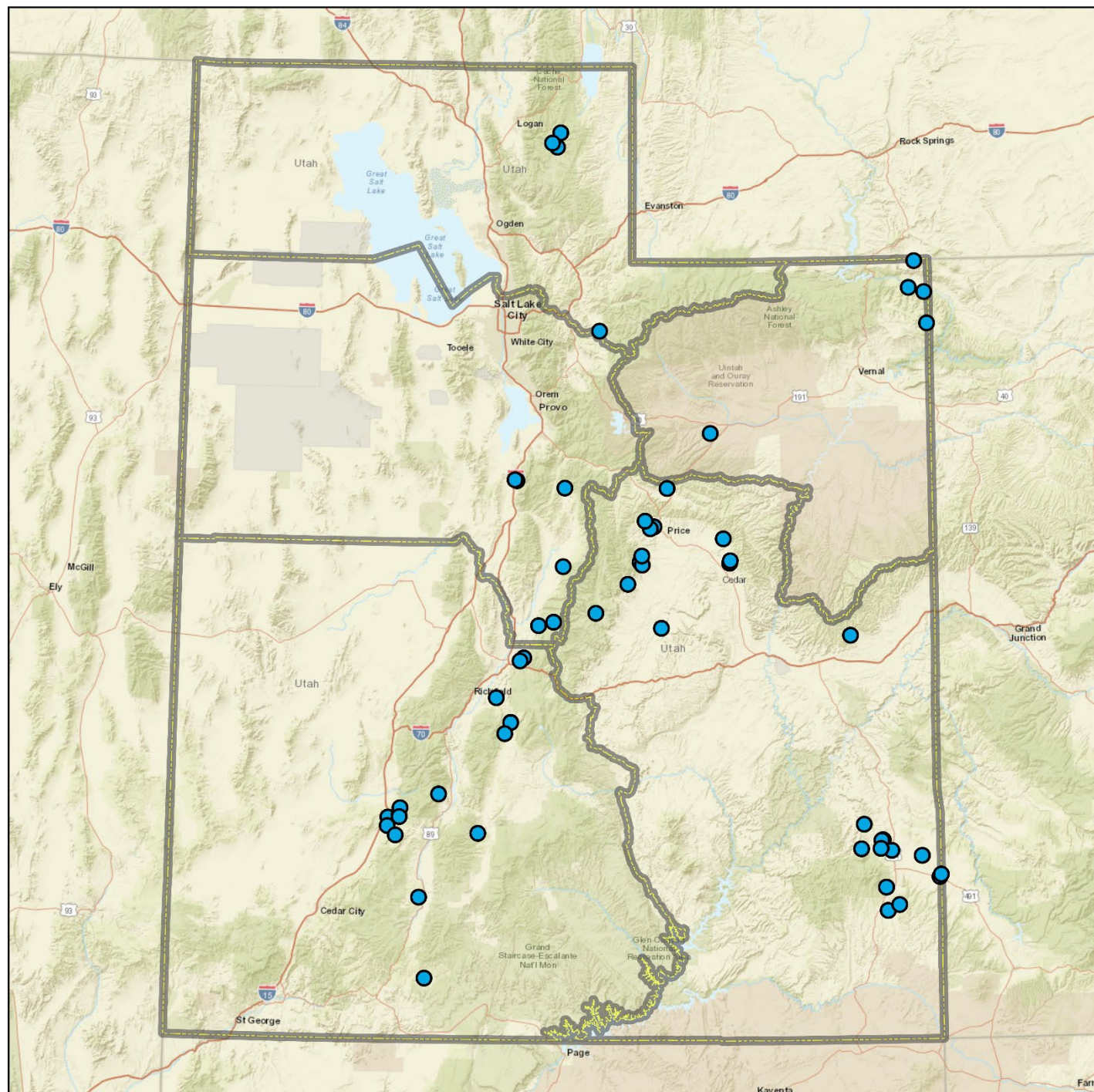
Expected Results or Benefits: Range trend studies in each region will be re-monitored every five years, and vegetation condition and trend assessments will be made for key areas. DWR biologists, land management personnel from the USFS and BLM, and private landowners will use the range trend database 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 2023 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.

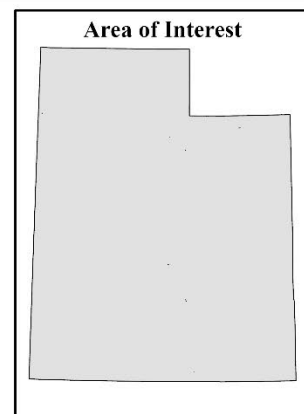
The BLM and USFS offices provided information and/or assistance in completion of the trend studies, which added to the value of this interagency report. Private landowners were cooperative in allowing access to study sites located on their land.

WRI STUDY SITES SURVEYED IN 2023



Study Location

- 2023 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 m² quadrat: A 1/4 m² 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

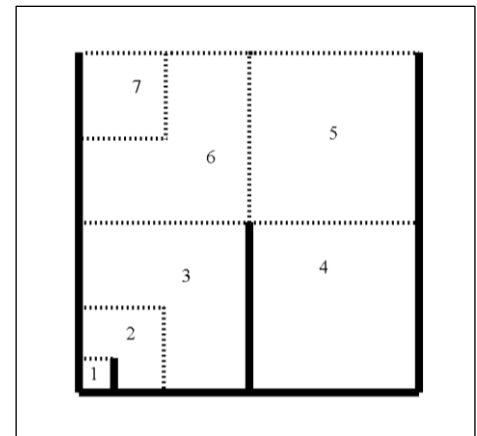


Figure 1 Cover classes of the 1/4 m² sampling quadrat

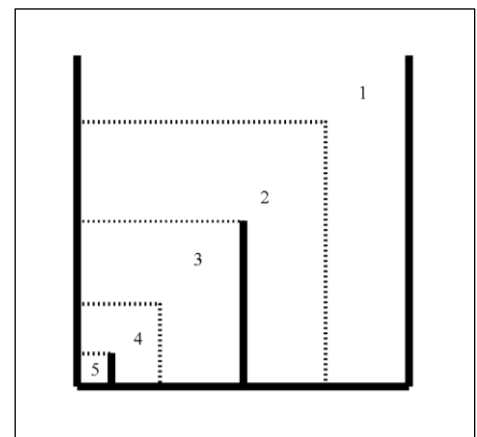


Figure 2 Nested frequency sub-quadrats of the 1/4 m² sampling quadrat

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) 100ft² circular plots that are placed through the study area. These are usually two parallel transects of 25 plots on each side of the vegetation transect which runs 400 feet to 500 feet in length. The number of recent pellet groups for wildlife (usually deer and elk) and pats for cattle are recorded. That number is then converted to days use per acre (hectare) (Neff, 1968). Quadrat frequency of wildlife and livestock droppings is also captured within the 1/4 m² quadrat. Rabbit pellet groups are not included in the pellet group transects but are sampled in quadrat frequency.

Other Information: Management background information, photographs, and knowledgeable plant identification add to the dataset for each site. Management and background information for each site is obtained from the administering agency. Repeat photographs are taken including a general view down and back up the baseline. A close-up of each half-high baseline post further characterizes individual sites. Correct plant identification is critical for a complete and accurate site analysis. Starting in 2016, species identification and classification is reported following the USDA Plant Database taxonomic nomenclature (USDA, NRCS, 2016). Prior to 2015, species identification mostly followed "A Utah Flora" (Welsh et al., 2003). In some cases, most notably *Agropyron sp.* and *Purshia sp.*, the species names used were those found in the Range Trend Study Plant Species List (Giunta, 1983), Intermountain Flora (Cronquist et al., 1977), and the Intermountain Range Plant Names and Symbols (Plummer et al., 1977) and were retained to maintain continuity and alleviate confusion with earlier published reports.

TREND DETERMINATION

The methods described above rely on relative and absolute measurements of plant composition as determined from the frequency, cover, and density data. In addition, estimates of plant vigor, average height and crown diameter, form class, and age class are utilized to characterize shrub populations.

In order to assess and interpret the landscape in a more effective way, trend assessments are no longer formally addressed within the report and have been replaced by the Desirable Components Index (DCI), Woodland Succession Phase models, and State-and-Transition Models that are associated with their Ecological Site as described by the National Resources Conservation Service (NRCS). Using these three methods in conjunction will give land managers a more complete assessment of the area of interest, and what measures, if any, need to be taken in order to improve the ecology of a site.

Desirable Components Index: Range Trend Program personnel created the desirable components index (DCI) as a tool to address condition and/or value of winter ranges for mule deer. This index is meant to be a companion to, not a replacement for, the site-specific range trend assessments that are found in the annual Utah Big Game Range Trend Studies report. This index was designed to score mule deer winter range based upon several important vegetation components (i.e. preferred browse cover, shrub decadence, shrub young recruitment, cover of perennial grasses, cover of perennial forbs, cover of annual grasses, and presence of noxious weeds). Although the index may be useful for assessing habitat for other species (i.e. sage-grouse and elk), the rating system was devised to specifically address mule deer winter range requirements.

This index is used primarily to determine if a particular site has the vegetation components necessary to be good winter range for mule deer. It can also be used to identify areas where habitat restoration projects may be needed and assist land managers in determining possible rehabilitation options. Because it does not take into account factors such as soil stability, hydrologic function, and other environmental factors, it should not be used to assess a sites function and/or condition as typically used by the Federal land management agencies.

Desirable mule deer winter range provides 12-20% of preferred browse cover, 20% or less shrub decadency, and 10% or more of the shrub population is young. The herbaceous understory contains 8-15% perennial grass cover, 5% perennial forb cover, and less than 5% annual grass cover. Based on these criteria, communities are scored in a 100-point scale using the following system:

Preferred Browse (60 points)

(Preferred Browse species are favorable or crucial to deer and are broken into three categories; Highly Preferred, Preferred and Key).

Preferred Browse Cover (30 pts. possible)

- Highly Preferred species = 1.5 points for each 1% of cover, Preferred species = 1.25 points for each 1% of cover and Key species = 1 point for each 1% of cover (maximum 30 points)

Percent Decadence (15 points possible)

- 0.3 points for each 1% under 50% decadence and -0.3 points for each 1% over 50% decadence (maximum 15 points or minimum -15 points)

Percent Young (15 points possible)

- 0.5 points for each 1% of young

Herbaceous Understory (40 points)

Perennial Grass Cover (30 points possible)

- 2 points for each 1% cover

Perennial Forb Cover (10 points possible)

- 2 points for each 1% cover

Annual Grass Cover (-20 points possible)

- -0.75 points for each 1%cover

Noxious Weeds (State List)

- -2 points for each species present

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

Very Low potential scale (Desert Ecological Site)

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

Low potential scale (Semidesert Ecological Site)

> 65	Excellent
45-64	Good
25-44	Fair
10-24	Poor
< 10	Very Poor

Mid-level potential scale (Upland Ecological Site)

> 80	Excellent
79-65	Good
64-50	Fair
49-35	Poor
< 35	Very Poor

High potential scale (Mountain and High Mountain Ecological Site)

> 90	Excellent
89-70	Good
69-55	Fair
54-40	Poor
< 39	Very Poor

Once a DCI score has been determined for a particular site, the score can be compared to previous sample years in order to determine a quality trend and better assess conditions that may need to be addressed within the community for mule deer habitat (i.e. .increasing preferred browse cover, decreasing the decadence to young ratio, increasing perennial herbaceous cover, or control/removal of noxious weeds et cetera).

Woodland Succession: Although pinyon-juniper woodlands are an important community within their own ecotype, sagebrush steppe, mixed shrub, and grassland communities have experienced significant encroachment of pinyon-juniper woodlands. As active encroachment within these communities continues, abiotic and biotic structures and functions are interrupted, which leads to the reduction of wildlife habitat, forage production, and biodiversity. Moreover, encroachment increases fuel load and fire frequency jeopardizing remnant shrub and grass communities to future loss. In an attempt to describe the succession or maturation of pinyon-juniper, phases of succession are presented within the report to aid managers in identifying the progress of infilling on a particular site and what type of input may be necessary for site rehabilitation (Tausch, Miller, Roundy, & Chambers, 2009).

- Phase I: is described as having an open canopy where crown lift is absent, there is active recruitment of young pinyon-juniper trees to the community with low seed production, and an intact shrub understory (Tausch, Miller, Roundy, & Chambers, 2009).
- Phase II: is described by the expansion of the pinyon-juniper canopy where crown lift is absent, there is active recruitment of young pinyon-juniper trees to the community with moderate to high seed production, and a shrub understory that ranges from nearly intact to one that is significantly thinning (Tausch, Miller, Roundy, & Chambers, 2009).
- Phase III: is described by the stabilization of the pinyon-juniper canopy where crown lift is present and lower limbs are dying, recruitment of young trees is limited with low to moderate seed production, and the shrub understory exhibits 75% or greater dead plants throughout the respective population (Tausch, Miller, Roundy, & Chambers, 2009).

State-and-Transition: Ecological sites are individual land types that have the ability to support specific plant species or communities based on the characteristic for their respective land type. Each ecological site therefore has its own potential and responds according to that potential when a site is influenced by natural or anthropomorphic inputs. State-and-Transition modeling attempts to describe an individual ecological site's response to these inputs by dividing the plant communities into states that are comprised of one to multiple community phases and to potentially predict the direction of a community transitioning from one state to another. State-and-Transitions are not trends per se, but rather an illustration of a community's current state in which it has the potential to respond positively or negatively to triggers and thresholds specific to that ecological site. As a tool, State-and-Transition models can provide a way for land managers to interpret a landscape and provide meaningful assessment and monitoring for landscape management. This report identifies each site's potential by supplying the ecological site name and corresponding number, and where available, verifying the provided NRCS state-and-transition models with range trend's quinquennial data, and a description of the transitions between states and phases over the duration of each study. Where not available, state-and-transition models are not referenced, but an attempt is made to describe the transitional processes that have occurred over the duration of a particular study not referenced to a model.

REPORT FORMAT

The first page of the report is the map page, which has a topographic map and a diagrammatic sketch to illustrate the study location. The map page also contains three sections, *Location information*, *Transect Information* and *Directions to Site*, which contain directions, location, and transect setup descriptions. Following the map page, discussions of the study site are addressed by several topics including *Site Information*, *Wildlife Habitat and Vegetation History*, *Site Notes*, *Soils*, *Site Potential*, and “Trend Summary” tables. Site information contains geographic information such as land ownership, allotment, elevation, aspect, slope, and sample dates. *Disturbance History* contains all known disturbances that have occurred on the site. Known seed mixes are listed within the table named “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 1/4m² quadrat to estimate percent quadrat cover. To more accurately estimate canopy cover of trees and shrubs, the line-intercept method is used along each 100-foot belt.

Table 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 ⁱ (crested wheatgrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hordeum jubatum (foxtail barley)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency									
2008	-	-	74	28	-	29	195	9	-	2
2013	124	72	338	35	1	5	123	51	42	13
2017	209	24	282	20	-	26	148	80	38	55
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 ^{ai} (desert madwort)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum shockleyi (Shockley's buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Onobrychis viciifolia ⁱ (sainfoin)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2008	-	-	3	5	3	3	-	-	-	-	12	34	-	24	-	1	77
2013	7	49	9	2	-	1	3	4	6	-	-	23	2	5	21	6	47
2017	-	65	-	2	-	2	7	5	-	3	3	14	-	-	-	-	4
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 ^p (black sagebrush)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Bassia prostrata ^{pi} (forage kochia)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Juniperus osteosperma ⁱ (Utah juniper)	Limanthus pungens (granite prickly phlox)	Opuntia polyacantha (plains pricklypear)	Purshia tridentata ^p (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 (%)				
Artemisia nova^p -- (black sagebrush)									
2008	2800	140	6	32	61	25	20	38	27/46
2013	1180	220	48	53	0	0	0	0	19/35
2017	3260	20	44	55	1	1	0	0	19/38
2022	6360	20	34	65	1	33	12	13	- / -
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2013	4400	3840	80	21	0	1	1	3	32/45
2017	6700	-	47	53	0	12	7	0	29/50
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 (%)	
Populus tremuloides (quaking aspen)								
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' (%)	
Juniperus osteosperma (Utah juniper)							
2008	796	10	15	25	35	15	20.4
2013	21	44	56	-	-	-	4.2
2017	13	80	20	-	-	-	2.4
2022	22	38	63	-	-	-	1.1

2023 BIG GAME RANGE TREND STUDIES - WRI PROJECTS

The following table is a list of big game range trend studies that were read in 2023 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 2023 Wildlife Management Units 22, 24, 25A, 25B, 25C, 27, 28, 29 & 30](#)” 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 #
22-1	Deer Flat	Hand Crew: Lop and Scatter	Deer Flat Lop and Scatter Project	May-June 2017	724	3775
22-5	Bone Hollow	Seeding: Aerial Before	Indian Creek	October 2014	3160	3001
22-5	Bone Hollow	Chaining: Two-Way Ely	Indian Creek	November 2014-February 2015	2790	3001
22-9	Rocks Reseeding	Hand Crew: Lop and Scatter	South Beaver and Little Dog Valley Watershed Imp, Phase I	May 2021-August 2022	2358	5219
22-10	Doubleup Hollow	Seeding: Aerial	Greenville Bench Aerial Seeding	December 2007-January 2008	11048	993
22-11	B Hill	Hand Crew: Lop and Scatter	Project Maintenance - South Beaver Phase II	May-June 2019	6241	4831
22-12	Big Cedar Cove	Chaining: One-Way Ely	Milford Flat Fire Rehabilitation and Contracting	Fall 2007	76454	1218
22-12	Big Cedar Cove	Seeding: Aerial Before	Milford Flat Fire Rehabilitation and Contracting	Fall 2007	76454	1218
22-12	Big Cedar Cove	Seeding: Aerial After	Milford Flat Fire Rehabilitation and Contracting	Fall 2007	76454	1218
22-16	Brady Creek	Hand Crew: Lop and Scatter	Dog Valley Hand Thinning	September-November 2015	9768	3265
22R-3	Marysvale WMA	Hand Crew: Lop and Scatter	Deer Flat Lop and Scatter Project	May-June 2017	724	3775
24-7	Cow Creek	Hand Crew: Lop and Scatter	Cow and Cottonwood Creek Lop and Scatter	November 2011	2100	1794
24-9	Mud Spring	Harrow: One-Way Dixie	Sevier Plateau Dixie Harrow	Fall 2006	500	461
24-9	Mud Spring	Seeding: Seed Unknown	Sevier Plateau Dixie Harrow	Fall 2006	500	461
24-9	Mud Spring	Lop and Scatter: Hand Crew	Powell - Mud Springs Phase I	May-July 2019	7161	4635
25A-1	Triangle Mountain	Harrow: Two-Way Dixie	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	Fall 2005	4079	216
25A-1	Triangle Mountain	Seeding: Broadcast	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	Fall 2005	1600	216
25A-2	Black Mountain	Harrow: Two-Way Dixie	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	Fall 2005	4079	216
25A-10	Cedarless Flat	Hand Crew: Lop and Scatter	Mytoge-Tidwell Sage Grouse Habitat Improvement Phase 1	August 2017-July 2018	7964	3995
25A-11	Forsyth Reservoir	Hand Crew: Lop and Scatter	Mytoge-Tidwell Sage Grouse Habitat Improvement Phase 2	July 2018-June 2021	3504	4604
25A-18	Elk Camp	Hand Crew: Lop and Scatter	Last Chance Habitat Improvement Project Phase 1	2023	6650	5197
25B-2	Horse Valley	Mechanical: Bullhog	Cedar Creek Winter Range Enhancement	Fall 2012	3569	818
25B-5	Polk Creek	Hand Crew: Lop and Scatter	Thousand Lake Habitat Improvement Phase 3 (Proposed)	Fall 2023 or Spring 2024	1220	6563
25B-9	McDonald Basin	Hand Crew: Lop and Scatter	Thousand Lake Habitat Improvement Project Phase 1	June 2021-October 2022	247	5206
25C-4	North Slope	Hand Crew: Lop and Scatter	Teasdale Front Fuels Reduction Treatment Phase 1	June-August 2021	1017	5543
27-9	Buckskin Mountain	Seeding: Aerial Before	Wire Pass/Pine Hollow Fire ESR	December 2020	3015	5498
27-9	Buckskin Mountain	Chaining: Two-Way Ely	Wire Pass/Pine Hollow Fire ESR	December 2020-March 2021	1235	5498
27-9	Buckskin Mountain	Seeding: Aerial After	Wire Pass/Pine Hollow Fire ESR	Spring 2021	3917	5498
27-10	Telegraph Flat	Hand Crew: Lop and Scatter	Five Mile Mountain Habitat Restoration Phase III	Fall 2008-Spring 2009	1043	1169
27-10	Telegraph Flat	Chaining: Two-Way Ely	Jenny Clay Flex Harrow	December 2017-February 2018	1342	3786
27-10	Telegraph Flat	Seeding: Aerial Before	Jenny Clay Flex Harrow	December 2017-February 2018	1342	3786
27-12	Moons Landing	Harrow: Two-Way Chain	Sevy Bench Habitat Improvement Project	November 2020	242	4958

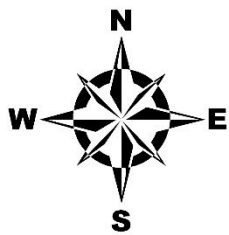
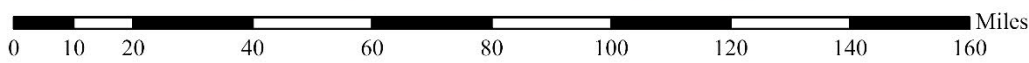
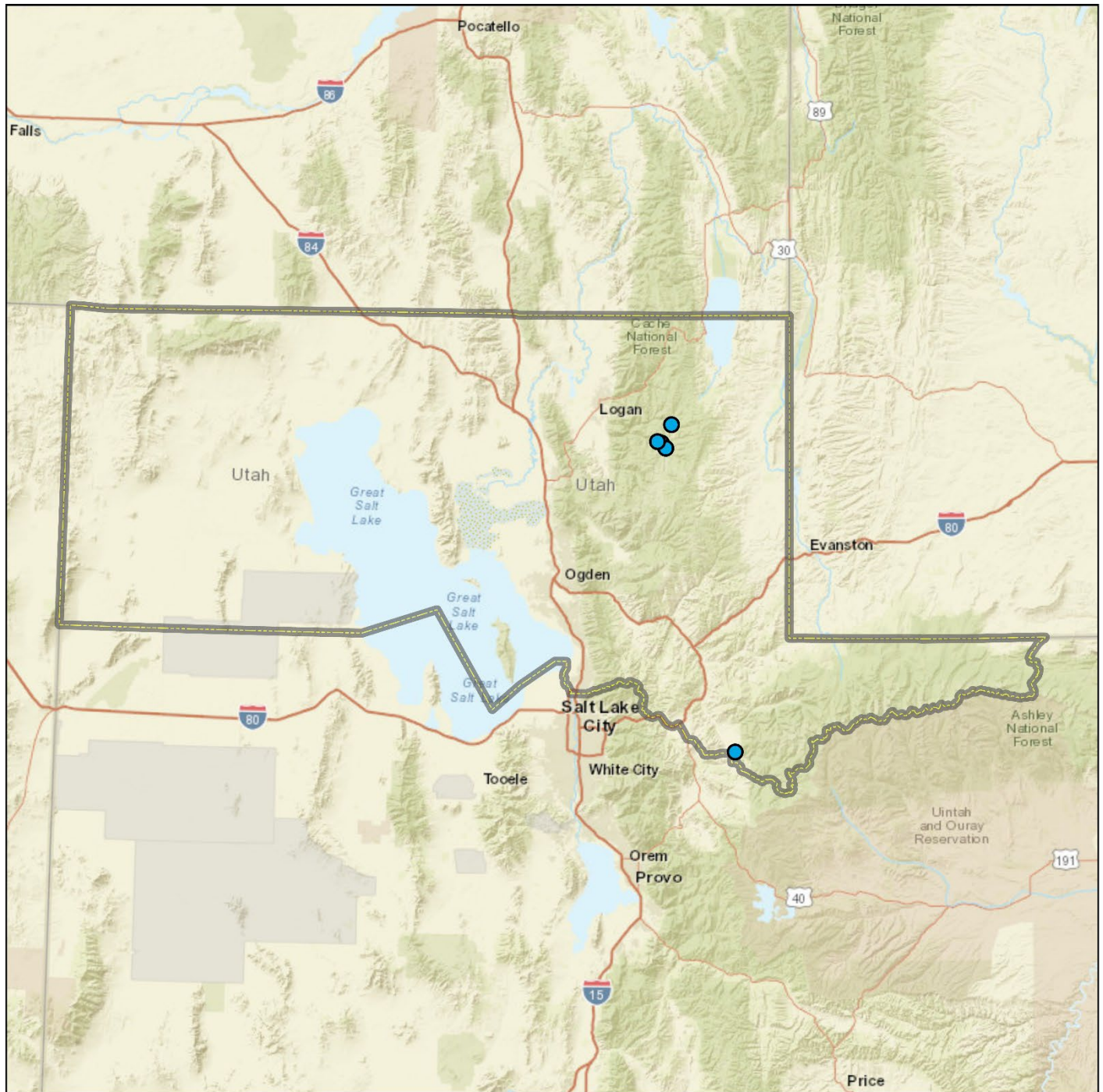
Study #	Study Name	Type	Disturbance Name (If Available)	Date	Acres	WRI Project #
27-12	Moons Landing	Seeding: Aerial Before	Sevy Bench Habitat Improvement Project	October 2020	242	4958
27-13	Heaton	Hand Crew: Lop and Scatter	Sevy Bench Habitat Improvement Project	September 2019-Spring 2020	4406	4958
27-14	Mustang Pond South	Hand Crew: Lop and Scatter	Buckskin Lop and Scatter FY12	September-December 2011	604	2002
27-15	Jeppson Pond	Hand Crew: Lop and Scatter	Buckskin Lop and Scatter	August-December 2008	500	823
27-16	Carly Knoll	Seeding: Aerial Before	UKC - Carly Knoll/Mill Creek	Winter 2015-Spring 2016	548	3279
27-16	Carly Knoll	Seeding: Aerial After	UKC - Carly Knoll/Mill Creek	Winter 2016	548	3279
27-16	Carly Knoll	Mechanical: Bullhog	UKC - Carly Knoll/Mill Creek	Winter 2015-2016	548	3279
28-1	Three Creeks	Seeding: Hopper	Tebbs Hollow/Mud Springs Sagebrush and PJ Treatment	July-September 2006	400	458
28-4	Buckskin Valley	Hand Crew: Lop and Scatter	Little Bear Valley to Fremont Canyon Sagebrush Steppe Habitat Restoration	November 2018-January 2019	4095	4402
28-5	Swayback Knoll	Seeding: Broadcast After	Laub and Cotton Fire Rehab	August-September 2012	43	2469
28-5	Swayback Knoll	Seeding: Browse Seed Planter	Laub and Cotton Fire Rehab	August-September 2012	43	2469
28-8	Grass Valley	Hand Crew: Lop and Scatter	Parowan Front P-Hill	April-September 2022	671	5758
28-11	Elliker Basin	Hand Crew: Lop and Scatter	Parowan Front WMA Arc for Bullhog and Lop and Scatter	Fall 2017-Summer 2018	1674	3435
28-14	Sheep Hollow West	Hand Crew: Lop and Scatter	South Canyon Lop and Scatter	August-October 2014	5390	2987
28-21	South Summit WMA	Hand Crew: Lop and Scatter	Parowan Front (Cottonwood and Summit) Chaining)	July 2014-June 2015	1109	3070
28-21	South Summit WMA	Hand Crew: Lop and Scatter	Parowan Front WMA Arc for Bullhog and Lop and Scatter	September 2017-June 2018	1674	3435
28-23	Threemile Creek	Chaining: Two-Way Ely	Panguitch West Bench Habitat Improvement	September-November 2012	276	2373
28-23	Threemile Creek	Seeding: Aerial Before	Panguitch West Bench Habitat Improvement	September 2012	276	2373
28-23	Threemile Creek	Seeding: Dribbler	Panguitch West Bench Habitat Improvement	September-November 2012	276	2373
28-23	Threemile Creek	Seeding: Aerial After	Panguitch West Bench Habitat Improvement	February 2013	276	2373
28-24	Above Limerock Canyon	Seeding: Aerial Before	South Canyon (Limestone)	November 2015	1694	3264
28-24	Above Limerock Canyon	Mechanical: Bullhog	South Canyon (Limestone)	October 2015-January 2016	1694	3264
28R-19	South Canyon	Mechanical: Bullhog	South Canyon Year 2	October 2011-January 2012	1901	2027
28R-19	South Canyon	Seeding: Aerial Before	South Canyon Year 2	October 2011	1901	2027
29-6	Elephant Butte	Mechanical: Bullhog	Yellowjacket Rosy Canyon (Proposed)	Fall 2023	577	5884
29-6	Elephant Butte	Seeding: Aerial Before	Yellowjacket Rosy Canyon (Proposed)	Fall 2023	577	5884
29-6	Elephant Butte	Harrow: Two-Way Chain	Yellowjacket Rosy Canyon (Proposed)	Fall 2023	577	5884
30-13	Black Ridge	Seeding: Aerial	Pine Valley WCSL GNA with UTDWR, 10 year strategy (Proposed)	Fall 2023-Unknown	3797	6805
30-26	Grassy Flat Ridge	Mechanical: Brush Saw	Pine Valley WCSL GNA with UTDWR, 10 year strategy (Proposed)	Fall 2023-Unknown	918	6805
30-35	Deep Canyon	Handcrew: Lop and Pile	Upper Santa Clara Watershed Restoration and Defensible Fire Space Project Phase I (Proposed)	Fall 2022	43	5588
30-62	North Hills	Chaining: One-Way Ely	Flatt Fire ESR (Proposed)	2022	11211	5844
30-62	North Hills	Seeding: Aerial Before	Flatt Fire ESR (Proposed)	December 2021 - January 2022	11211	5844
30-75	Swett Hills North	Seeding: Aerial Before	Duncan Creek - Final Phase	Fall 2016	998	3563
30-75	Swett Hills North	Mechanical: Bullhog	Duncan Creek - Final Phase	October 2016-May 2017	998	3563

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NORTHERN REGION

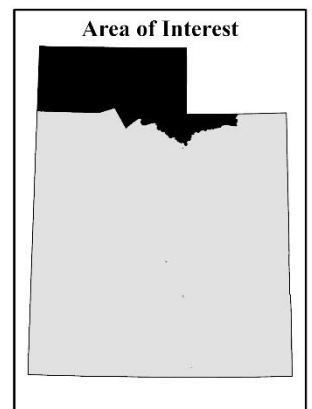


Region Boundaries

 Northern Region

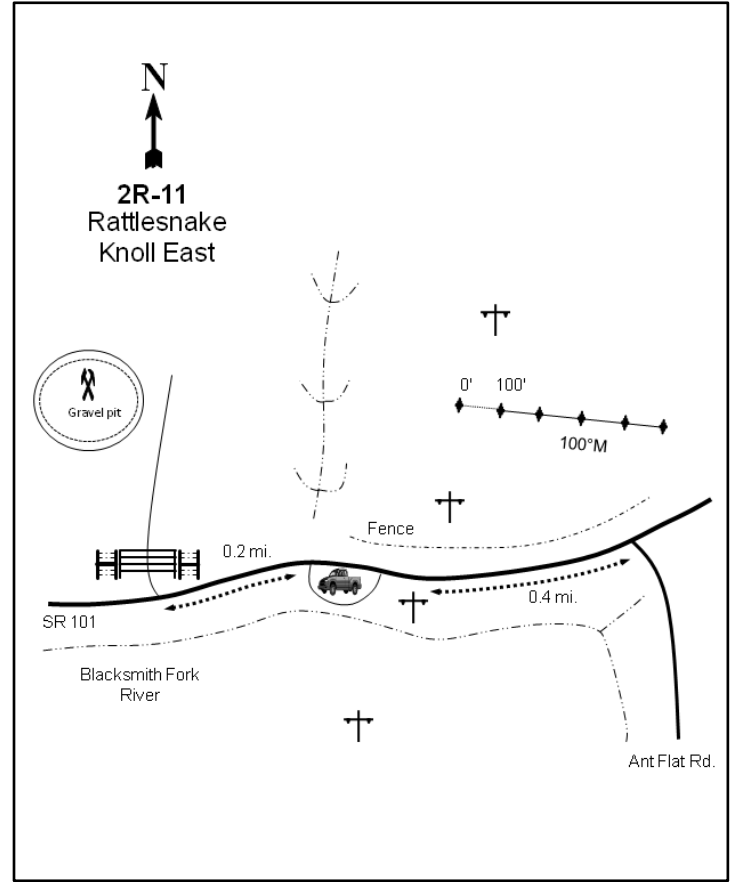
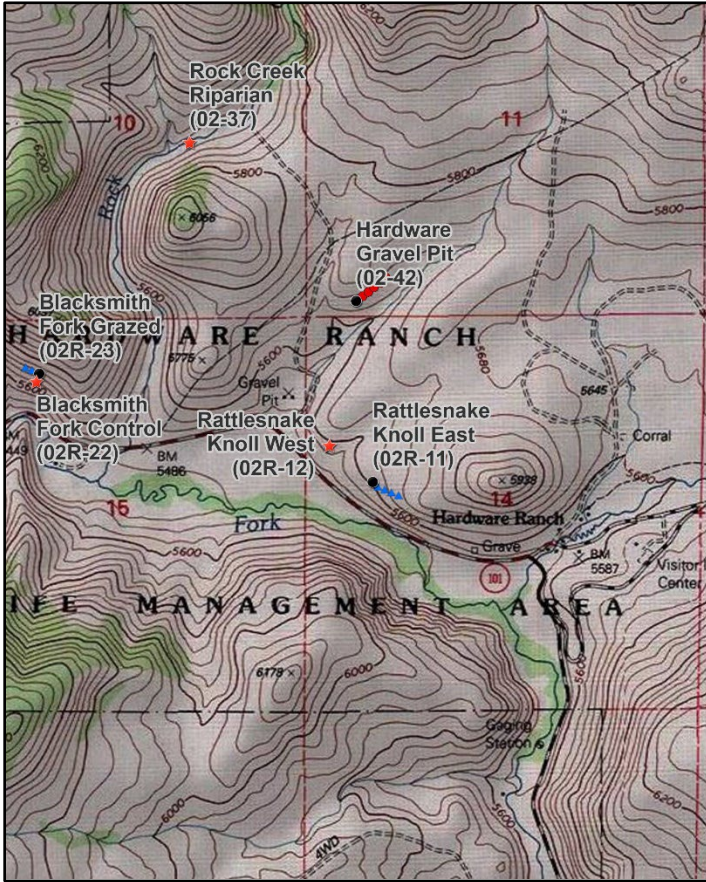
Study Location

 2023 WRI Study Sites



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

RATTLESNAKE KNOLL EAST - STUDY NO. 02R-11



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

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

Transect Information

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

190
85° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
No Rebar

Directions to Site

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

Site Information

Land Ownership
Land Administrator
Allotment
Elevation
Aspect
Slope
Sample Dates

State
UDWR
No data
5,639ft (1,719m)
Southwest
19%
04/15/2005, 07/23/2013, 07/26/2018, 07/25/2023

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

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

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

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

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

Year	Vegetation Type	Woodland Succession
2005	Annual-Perennial Weed/Bitterbrush	Phase I
2013	Annual-Perennial Weed/Bitterbrush	Phase I
2018	Annual-Perennial Weed/Bitterbrush	Phase I
2023	Annual-Perennial Weed/Bitterbrush	Phase I

Site Notes

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

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

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

Site Potential

1981 - 2010 Average Annual Precipitation 20 inches
 NRCS Ecological Site Mountain Shallow Loam (Low Sagebrush)
 NRCS Ecological Site # R047XA442UT
 States and Transitions 2005-2023 - Low Sagebrush/Non-Natives State: Community Phase 2.1

Since study establishment in 2005, the vegetation on this site has fluctuated in an annual-perennial grass and forb state. Cover of the introduced annual grass species cheatgrass (*Bromus tectorum*) and/or field brome (*B. arvensis*) increased between 2005 and 2018, but decreased in 2023. The introduced annual grass and noxious weed species medusahead (*Taeniatherum caput-medusae*) was sampled for the first time in 2018, but was not observed in 2023. Perennial grass cover has shown an increasing trend. However, the introduced species bulbous bluegrass (*Poa bulbosa*) has provided the most cover of any single perennial grass species since 2013, and cover increased significantly between the two most recent sample years (Table 02R-11.10). Perennial forbs have increased in cover, while annual forbs have generally decreased (Table 02R-11.7); the dominant perennial forb in the most recent sample year was mules-ears (*Wyethia amplexicaulis*) and the dominant annual was the undesirable species redstem stork's bill (*Erodium cicutarium*) (Table 02R-11.11). Shrub cover has fluctuated, but has slightly increased overall. Antelope bitterbrush (*Purshia tridentata*) exhibited decreases in both cover and density between 2018 and 2023, but has been a codominant vegetation component in all sample years. Little sagebrush (*Artemisia arbuscula*) has fluctuated in cover, but decreased steadily in density over the study period (Table 02R-11.12, Table 02R-11.13). Both Utah juniper (*Juniperus osteosperma*) and Rocky Mountain juniper (*J. scopulorum*) were both present in low numbers in 2023, placing the site in Phase I of woodland succession (Table 02R-11.4, Table 02R-11.14).

Deer winter range condition on this site has ranged between very poor and poor since 2005. In 2023, deer winter range condition was considered to be very poor to poor. Improvements to winter range could be achieved through efforts that increase preferred browse cover and reproduction; diversifying and increasing cover of perennial grasses and forbs while decreasing cheatgrass would also be beneficial (Table 02R-11.15). Mule deer presence on this site was considered to be high in 2023 according to pellet transect data. Elk presence has remained low throughout the study period (Table 02R-11.9). In winter months, bitterbrush offers a moderate amount of browse, while sagebrush provides a limited amount (Table 02R-11.3; Wambolt, 1996).

Trend Summary Tables

Table 02R-11.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	5.7	0.2	-	6.9	0.3	-
2013	4.7	0.2	-	4.7	0.2	-
2018	6.1	0.8	-	10.4	1.1	-
2023	6.4	0.8	-	8.3	0.4	-

Table 02R-11.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	241	270	430	169	8.1	10.5	25.0	3.9
2013	393	311	347	161	10.5	8.7	5.8	9.3
2018	451	267	335	176	26.5	11.2	11.8	10.4
2023	115	400	213	195	1.7	25.7	3.1	12.8

Table 02R-11.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	15.8	0.7	11.8	2.8	23.2	57.9
2013	11.4	-	24.4	2.1	20.6	43.7
2018	5.4	0.3	44.0	3.2	24.2	60.8
2023	20.0	1.0	18.2	3.4	19.3	45.3

Table 02R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	-	18	4	-
2013	3	6	4	1
2018	-	4	-	1
2023	6	17	4	-
Days Use Per Acre (ha)				
2005	-	42.2 (104.3)	3.4 (8.3)	-
2013	5.1 (12.6)	32.8 (81.1)	7.4 (18.2)	-
2018	0.7 (1.8)	4.0 (9.9)	0.7 (1.7)	-
2023	10.9 (26.9)	69.7 (172.1)	12.1 (29.8)	-

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

GRASS SPECIES	Bromus arvensis ^{ai} (field brome)	Bromus briziformis ^{ai} (rattlesnake brome)	Bromus tectorum ^{ai} (cheatgrass)	Deschampsia danthonioides ^{ai} (annual hairgrass)	Leucopoa kingii (spike fescue)	Pascopyrum smithii (western wheatgrass)	Phleum pratense ⁱ (timothy)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Taeniatherum caput-medusae ^{ai} (medusahead)
year	Nested Frequency													
2005	-	-	241	-	-	1	-	-	139	-	-	179	-	-
2013	144	2	370	-	-	15	-	154	78	3	115	44	-	-
2018	259	38	327	13	11	14	4	153	15	18	108	35	4	14
2023	60	3	54	-	-	3	-	393	24	36	4	13	-	-
year	Average Cover (%)													
2005	-	-	8.1	-	-	0.0	-	-	3.4	-	-	7.1	-	-
2013	0.7	0.0	9.7	-	-	0.1	-	4.3	1.9	0.0	1.5	0.8	-	-
2018	12.6	0.4	12.6	0.6	1.0	0.7	0.0	4.8	0.3	0.8	2.1	1.3	0.2	0.4
2023	1.0	0.0	0.7	-	-	0.0	-	23.8	0.1	1.7	0.0	0.0	-	-

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

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

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Annual Forb ^a (null)	Artemisia ludoviciana (white sagebrush)	Astragalus (milkvetch)	Camelina microcarpa ^{ai} (litlepod false flax)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Crepis acuminata (tapertip hawkbeard)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Epilobium brachycarpum ^a (tall annual willowherb)	Erigeron pumilus (shaggy fleabane)
year	Nested Frequency																
2005	6	23	-	-	427	9	-	-	-	-	-	-	4	-	-	-	-
2013	5	16	-	44	-	10	5	1	80	2	20	19	-	3	10	84	3
2018	3	13	-	65	-	21	3	-	5	0	9	11	-	-	-	34	-
2023	3	9	2	11	-	12	2	-	7	-	1	1	44	-	-	23	-
year	Average Cover (%)																
2005	0.0	0.2	-	-	24.3	0.5	-	-	-	-	-	-	0.0	-	-	-	-
2013	0.0	0.1	-	0.1	-	0.5	0.0	0.0	0.2	0.1	0.1	0.1	-	0.0	0.0	0.2	0.0
2018	0.1	0.1	-	0.2	-	0.3	0.0	-	0.0	0.0	0.0	0.0	-	-	-	0.1	-
2023	0.0	0.0	0.0	0.0	-	0.6	0.1	-	0.0	-	0.0	0.0	0.8	-	-	0.1	-

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

FORB SPECIES	Eriogonum breviceale (shortstem buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Grindelia squarrosa (curlycup gumweed)	Hackelia patens (spotted stickseed)	Lactuca serriola ^{ai} (prickly lettuce)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Madia glomerata ^a (mountain tarweed)	Melilotus officinalis ⁱ (sweetclover)	Microsteris gracilis ^a (slender phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Silene antirrhina ^a (sleepy silene)	Symphotrichum (aster)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency																
2005	-	1	-	-	-	-	-	99	-	-	-	-	-	-	-	-	40
2013	9	4	275	-	3	-	1	58	2	-	-	3	7	14	186	36	46
2018	3	-	308	5	3	5	3	72	-	1	4	-	-	1	6	37	16
2023	21	-	148	-	4	-	-	62	-	3	-	1	6	58	-	44	14
year	Average Cover (%)																
2005	-	0.0	-	-	-	-	-	2.3	-	-	-	-	-	-	-	-	0.6
2013	0.0	0.0	3.9	-	0.0	-	0.0	1.6	0.0	-	-	0.0	0.0	0.0	0.9	0.8	0.3
2018	0.0	-	11.2	0.0	0.0	0.0	0.0	1.9	-	0.0	0.0	-	-	0.0	0.0	1.2	0.1
2023	0.2	-	2.6	-	0.0	-	-	1.4	-	0.0	-	0.0	0.0	0.3	-	0.8	0.1

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

FORB SPECIES	Wyethia amplexicaulis (mule-ears)
year	Nested
2005	60
2013	77
2018	67
2023	79
year	Average Cover (%)
2005	0.9
2013	6.2
2018	6.8
2023	8.8

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

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

SHRUB SPECIES	Artemisia arbuscula ^p (little sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)			
2005	0.3	0.3	-	6.6
2013	0.6	-	0.2	4.1
2018	0.2	-	1.1	10.2
2023	0.4	-	0.4	7.9
year	Quadrat Cover (%)			
2005	0.9	0.2	-	4.8
2013	0.2	-	0.2	4.4
2018	0.5	-	0.8	5.6
2023	0.3	-	0.8	6.1

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

Table 02R-11.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia arbuscula^p -- (little sagebrush)									
2005	1400	-	6	76	19	6	94	0	13/33
2013	400	-	0	85	15	45	50	35	21/42
2018	280	-	0	71	29	0	0	0	43/81
2023	240	100	0	100	0	0	0	0	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2005	800	-	0	85	15	0	0	5	7/17
2013	-	-	-	-	-	-	-	-	38/37
2018	-	-	-	-	-	-	-	-	44/70
2023	-	-	-	-	-	-	-	-	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2005	-	-	-	-	-	-	-	-	- / -
2013	1140	-	12	88	0	2	0	2	20/23
2018	980	-	0	100	0	0	0	0	26/32
2023	1220	-	7	93	0	0	0	0	- / -
Prunus virginiana^p -- (chokecherry)									
2005	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	34/36
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2005	1080	-	0	100	0	0	100	0	51/105
2013	820	-	5	88	7	29	39	29	54/127
2018	1040	-	14	87	0	44	25	0	67/144
2023	940	-	0	94	6	11	85	6	- / -

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

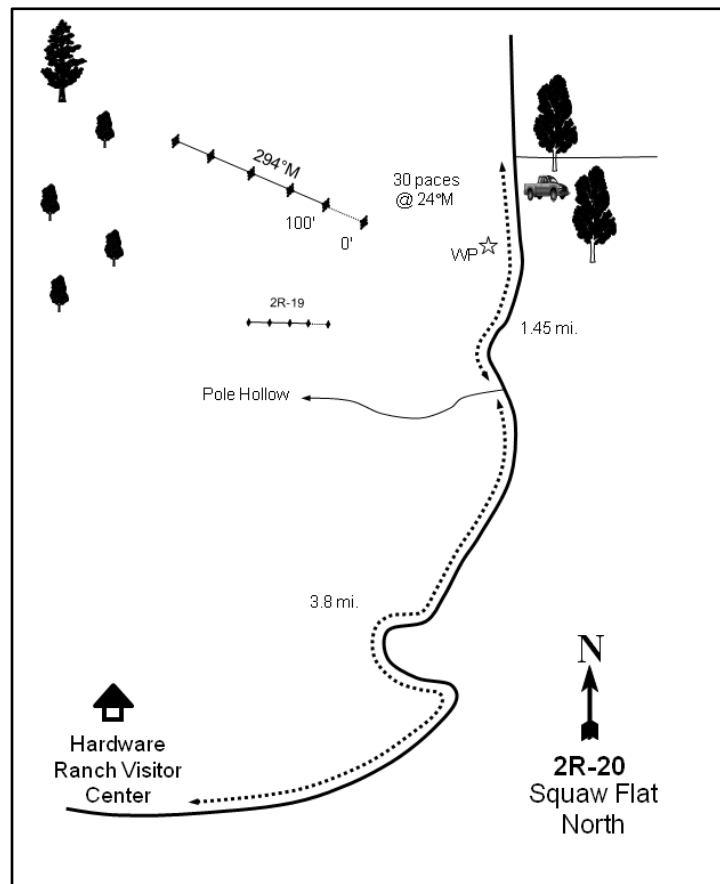
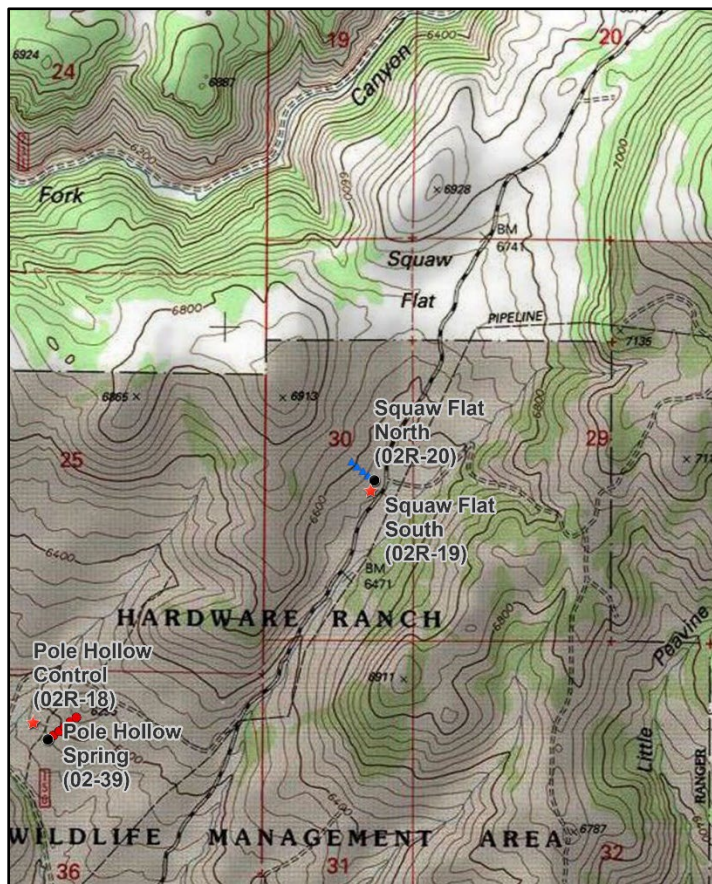
Table 02R-11.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2018	4	-	-	-	-	100	48.0
2023	1	-	-	-	-	100	50.0
Juniperus scopulorum (Rocky Mountain juniper)							
2018	10	-	-	-	-	100	28.0
2023	4	-	33	-	33	33	25.7

Table 02R-11.15 - 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
2005	10.3	14.8	0.1	21.0	-6.1	7.9	0.0	48.0	Poor
2013	6.9	0.0	0.0	8.8	-7.9	10.0	0.0	17.8	Very Poor
2018	15.6	14.8	6.6	12.8	-19.6	10.0	-2.0	38.2	Very Poor-Poor
2023	12.4	13.2	0.0	3.9	-1.3	10.0	0.0	38.1	Very Poor-Poor

SQUAW FLAT NORTH - STUDY NO. 02R-20

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

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

Transect Information

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

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

Directions to Site

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

Site Information

Land Ownership
Land Administrator
Allotment
Elevation
Aspect
Slope
Sample Dates

State
UDWR
No data
6,563ft (2,000m)
East
10-14%
07/13/2006, 07/23/2013, 07/26/2018, 07/26/2023

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Hardware Ranch Juniper Lop and Scatter II	4096	September-October 2017	873
Grazing - Intensive Grazing	Hardware Grazing Project	PDB	April-September 2005	-

Wildlife Habitat and Vegetation History**Table 02R-20.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

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

Year	Vegetation Type	Woodland Succession
2006	Low Sagebrush/Bulbous Bluegrass	Phase I
2013	Low Sagebrush/Bulbous Bluegrass	Phase I
2018	Low Sagebrush/Bulbous Bluegrass	Phase I
2023	Low Sagebrush/Bulbous Bluegrass	Phase I

Site Notes

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

Site Potential

1981 - 2010 Average Annual Precipitation	26 inches
NRCS Ecological Site	Mountain Shallow Loam (Low Sagebrush)
NRCS Ecological Site #	R047XA442UT
States and Transitions	2006-2023 - Low Sagebrush/Non-Natives State: Community Phase Undefined

Since the time of study establishment in 2006, this site has been codominated by little sagebrush (*Artemisia arbuscula*) and the introduced perennial grass species bulbous bluegrass (*Poa bulbosa*). Little sagebrush has exhibited a slight decrease in density since 2006, but cover has increased overall (Table 02R-20.12, Table 02R-20.13). Although dominated by bulbous bluegrass, the perennial grass component has remained moderately diverse. However, species besides bulbous bluegrass and bluebunch wheatgrass (*Pseudoroegneria spicata*) provided notable cover in 2018 and 2023 (Table 02R-20.10). Forbs were also moderately diverse in 2023, but the undesirable (but native) perennial species mules-ears (*Wyethia amplexicaulis*) contributed a vast majority of the forb cover (Table 02R-20.7, Table 02R-20.11). Rocky Mountain juniper (*Juniperus scopulorum*) trees have been present since study establishment with low density (Photos, Table 02R-20.14). This site will likely remain in the current state in the absence of a future disturbance or treatment.

Due to the abundance and diversity of the herbaceous and shrub communities, this site may serve as adequate habitat for summering mule deer. In addition, the sagebrush component could provide browse for elk during the winter months (Table 02R-20.3; Wambolt, 1996). However, pellet transect data shows that both elk and deer presence on this site have remained low since study establishment, and no elk pellet groups were observed in 2023 (Table 02R-20.9).

Trend Summary Tables

Table 02R-20.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	20.7	-	-	22.4	-	-
2013	15.7	-	-	21.0	-	-
2018	19.4	-	-	20.4	-	-
2023	20.6	0.0	-	25.2	0.2	-

Table 02R-20.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	-	456	39	184	-	34.9	0.8	11.0
2013	-	438	39	175	-	24.9	0.2	12.8
2018	6	443	177	212	0.0	39.5	2.5	22.9
2023	-	445	50	213	-	42.4	0.5	21.2

Table 02R-20.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	3.2	1.1	21.4	1.3	26.2	63.3
2013	0.7	0.3	25.2	0.1	26.8	58.6
2018	1.0	0.1	47.4	0.4	26.8	69.3
2023	2.0	0.1	21.8	0.3	22.0	68.7

Table 02R-20.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	2	2	2	-
2013	1	1	1	1
2018	-	1	-	-
2023	3	4	-	-
Year	Days Use Per Acre (ha)			
2006	5.1 (12.6)	2.0 (5.0)	5.3 (13.2)	-
2013	5.8 (14.3)	10.0 (24.8)	6.0 (14.9)	-
2018	0.7 (1.8)	4.0 (9.9)	0.7 (1.7)	-
2023	2.9 (7.2)	3.4 (8.3)	-	-

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

GRASS SPECIES	Achnatherum (needlegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bromus arvensis ^{ai} (field brome)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Hordeum (barley)	Melica bulbosa (oniongrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency												
2006	-	63	-	-	-	0	-	47	401	2	1	139	143
2013	-	69	-	-	6	-	-	1	411	-	3	61	120
2018	38	48	6	-	-	10	3	19	403	15	2	69	157
2023	-	66	-	1	1	6	-	1	422	2	2	9	176
year	Average Cover (%)												
2006	-	1.7	-	-	-	0.0	-	1.4	24.9	0.0	0.0	4.1	2.7
2013	-	0.9	-	-	0.0	-	-	0.0	20.5	-	0.0	0.9	2.6
2018	0.7	1.7	0.0	-	-	0.3	0.0	0.1	27.5	0.0	0.0	0.9	8.2
2023	-	2.9	-	0.0	0.0	0.2	-	0.1	28.8	0.1	0.0	0.1	10.1

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

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

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Allium (onion)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Delphinium nuttallianum (two-lobed larkspur)	Draba ^a (draba)	Epilobium brachycarpum ^a (tall annual willowherb)	Erigeron divergens ^a (spreading fleabane)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lactuca serriola ^{ai} (prickly lettuce)	Lomatium (desertparsley)	Madia glomerata ^a (mountain tarweed)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Silene antirrhina ^a (sleepy silene)
year	Nested Frequency																
2006	21	20	8	-	-	3	-	16	1	-	-	-	-	24	-	-	2
2013	14	13	-	-	1	-	7	18	7	-	-	-	-	16	-	-	-
2018	31	20	16	2	50	3	13	28	84	3	1	11	2	30	4	4	-
2023	38	48	5	-	10	-	-	-	9	-	-	-	-	21	-	8	-
year	Average Cover (%)																
2006	0.3	0.1	0.0	-	-	0.0	-	0.1	0.0	-	-	-	-	0.7	-	-	0.0
2013	0.1	0.1	-	-	0.0	-	0.0	0.1	0.0	-	-	-	-	0.1	-	-	-
2018	1.0	0.3	0.1	0.0	0.2	0.0	0.1	0.2	1.5	0.0	0.0	0.0	0.0	0.3	0.0	0.0	-
2023	0.8	0.3	0.1	-	0.1	-	-	-	0.2	-	-	-	-	0.1	-	0.0	-

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

FORB SPECIES				
	Symphotrichum (aster)	Symphotrichum ascendens (western aster)	Tragopogon dubius ^{ai} (yellow salsify)	Wyethia amplexicaulis (mule-ears)
year	Nested Frequency			
2006	-	20	-	146
2013	9	17	-	152
2018	3	33	9	154
2023	12	19	3	147
year	Average Cover (%)			
2006	-	0.2	-	10.3
2013	0.0	0.1	-	12.6
2018	0.0	0.7	0.1	20.9
2023	1.6	0.2	0.0	18.3

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

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

SHRUB SPECIES				
	Amelanchier utahensis ^p (Utah serviceberry)	Artemisia arbuscula ^p (little sagebrush)	Chrysothamnus viscidiflorus sp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Mahonia repens (creeping barberry)
year	Line Intercept Cover (%)			
2006	0.5	21.9	-	-
2013	0.6	20.4	-	-
2018	0.7	19.7	-	-
2023	0.5	24.7	-	0.2
year	Quadrat Cover (%)			
2006	0.0	20.7	-	-
2013	0.0	15.7	-	-
2018	0.0	19.4	-	-
2023	0.0	20.6	0.0	0.0

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

Table 02R-20.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

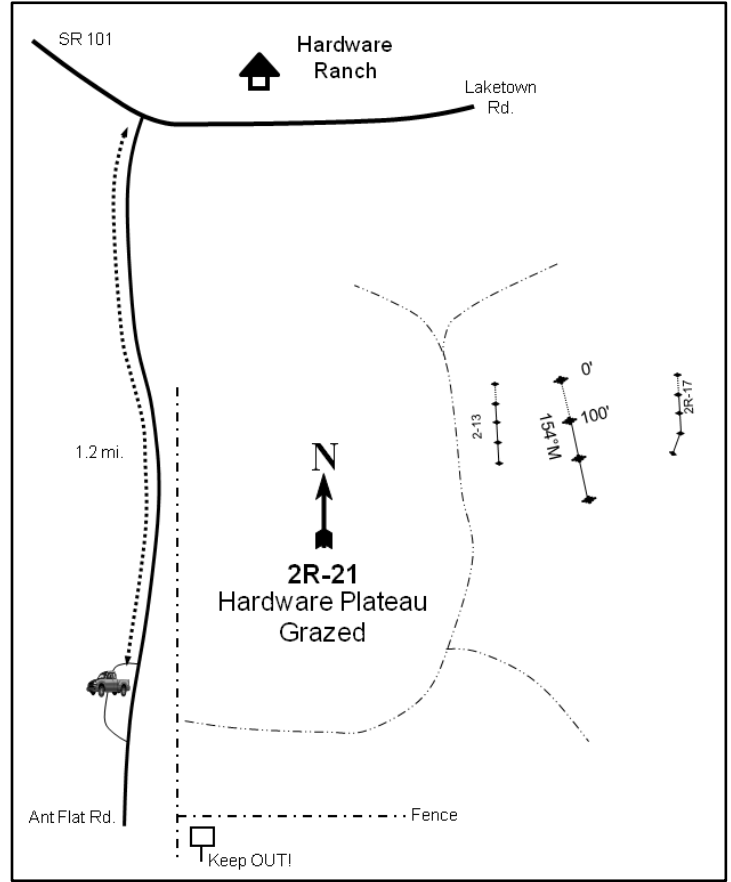
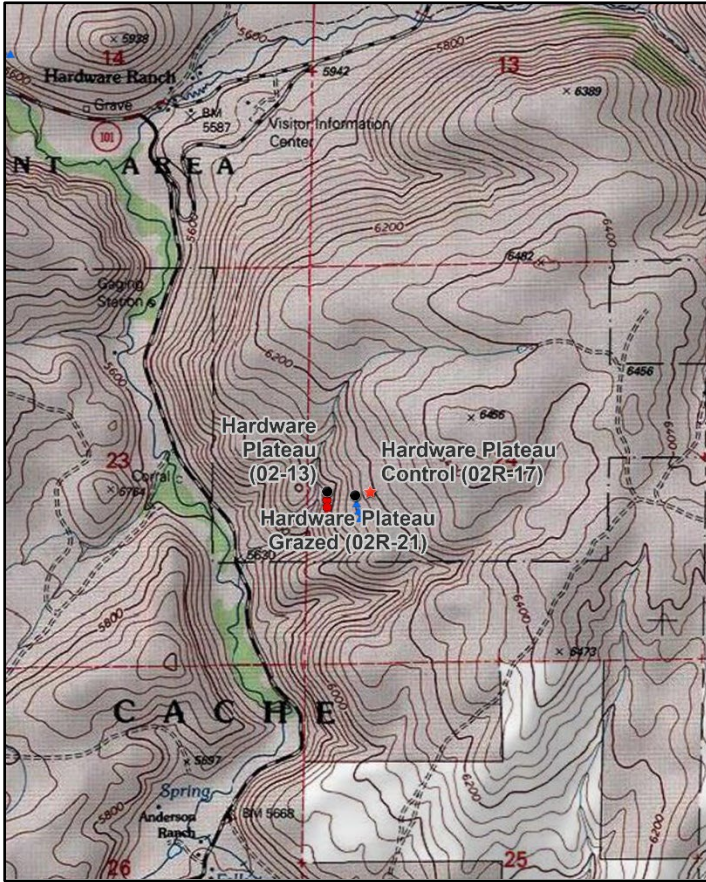
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2006	60	-	0	100	0	100	0	0	62/94
2013	20	-	0	100	0	0	100	0	69/121
2018	60	-	33	67	0	0	0	0	60/75
2023	20	-	0	100	0	100	0	0	- / -
Artemisia arbuscula^p -- (little sagebrush)									
2006	10980	620	3	77	20	5	0	16	25/48
2013	10020	120	2	93	5	39	8	52	24/53
2018	10040	120	5	74	21	14	0	9	30/48
2023	10100	60	5	87	8	4	0	21	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	-	-	-	-	-	-	-	-	23/35
2013	-	-	-	-	-	-	-	-	-/-
2018	100	-	0	100	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	-/-
Juniperus scopulorumⁱ -- (Rocky Mountain juniper)									
2006	20	-	100	0	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	100	0	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
2006	-	-	-	-	-	-	-	-	9/19
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	8/6
2023	20	-	0	100	0	0	0	0	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2006	-	-	-	-	-	-	-	-	45/118
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	55/179
2023	-	-	-	-	-	-	-	-	-/-
Symphoricarpos oreophilus^p -- (mountain snowberry)									
2006	-	-	-	-	-	-	-	-	41/79
2013	20	-	0	100	0	100	0	100	59/131
2018	-	-	-	-	-	-	-	-	47/92

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

Table 02R-20.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2018	10	-	100	-	-	-	17.0
2023	2	-	100	-	-	-	3.0

HARDWARE PLATEAU GRAZED - STUDY NO. 02R-21



Location Information

USGS 7.5 min Map Info	Hardware Ranch NE; Township 10N, Range 3E, Section 24
GPS (0' Stake)	NAD 83 UTM ZONE 12, 453541 East 4604155 North

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,100ft (1,859m)
Aspect	Southwest-West
Slope	30%
Sample Dates	07/09/2007, 07/24/2013, 07/25/2018, 07/25/2023

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

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

Wildlife Habitat and Vegetation History

Table 02R-21.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 02R-21.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Perennial Grass	Phase I
2013	Perennial Grass	Phase I
2018	Perennial Grass/Annual Grass	Phase I
2023	Perennial Grass	Phase I

Site Notes

This study was established 200 feet from the Hardware Plateau Control study (02R-17). Both Hardware Plateau studies were established as part of an intensive grazing project conducted on Hardware Ranch to improve browse composition. This study was noted as heavily grazed, while the control study was excluded from cattle grazing by an electric fence. The closest water source is a spring approximately one-quarter of a mile from the transect.

Site Potential

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

Since study establishment in 2007, this site has remained in a perennial grass dominated state. Flushes of annual grasses and forbs have occurred during alternate sample years (Table 02R-21.7). Grass species have not been diverse, but moderate cover has been provided by native species. The dominant grass species since site establishment has been bluebunch wheatgrass (*Pseudoroegneria spicata*), although the introduced and undesirable species bulbous bluegrass (*Poa bulbosa*) became codominant in 2018 (Table 02R-21.10). The introduced annual grass species cheatgrass (*Bromus tectorum*) provided little cover in 2007 and 2013, but increased in both cover and abundance in 2018. However, both measurements had decreased considerably when the site was sampled in 2023 (Table 02R-21.10). Perennial forbs have remained moderate in both diversity and abundance with common yarrow (*Achillea millefolium*) providing the most cover (Table 02R-21.11). However, annual forbs, particularly the introduced weedy species redstem stork's bill (*Erodium cicutarium*), have contributed significant amounts of cover in most sample years (Table 02R-21.11). Shrubs have provided little cover throughout the duration of the study period, with broom snakeweed (*Gutierrezia sarothrae*) contributing a majority of that cover. Preferred browse species have included Utah serviceberry (*Amelanchier utahensis*) and little sagebrush (*Artemisia arbuscula*), though they have provided very little cover and density (Table 02R-21.12, Table 02R-21.13).

Deer winter range condition has generally remained very poor since study establishment; winter range condition was considered to be very poor to poor in 2023. Increasing cover and reproduction of preferred browse would greatly improve deer wintering range. Reducing or removing annual grasses would also be beneficial (Table 02R-21.15). In addition, increasing sagebrush cover and density could increase available browse for wintering deer and elk (Table 02R-21.3; Wambolt, 1996). According to pellet transect data, deer presence on this site was moderate in 2023 and elk presence was high (Table 02R-21.9).

Trend Summary Tables

Table 02R-21.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	0.0	0.1	-	0.1	0.6	-
2013	-	0.2	-	-	0.8	-
2018	0.0	2.4	-	0.1	3.0	-
2023	0.0	2.6	-	0.1	2.9	-

Table 02R-21.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	268	394	464	156	2.5	18.1	19.6	2.0
2013	183	384	424	167	1.4	27.5	6.1	3.1
2018	446	377	433	163	21.3	28.1	15.7	4.2
2023	21	427	344	170	0.2	35.5	8.7	4.3

Table 02R-21.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	11.1	25.3	21.6	3.6	5.3	44.3
2013	6.8	22.9	22.8	1.4	5.8	46.2
2018	1.2	9.0	52.3	1.5	5.0	69.8
2023	8.7	13.1	23.1	2.9	4.1	52.1

Table 02R-21.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	10	35	33	12
2013	2	31	38	12
2018	1	13	9	-
2023	1	41	28	-
Days Use Per Acre (ha)				
2007	13.1 (32.3)	42.9 (105.9)	46.2 (114.2)	-
2013	0.7 (1.8)	3.4 (8.3)	8.7 (21.5)	-
2018	-	16.1 (39.7)	4.0 (9.9)	-
2023	6.5 (16.1)	33.5 (82.8)	45.6 (112.6)	-

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

GRASS SPECIES	Nested Frequency					
Bromus arvensis ^{ai} (field brome)	1	268	-	14	263	282
Bromus tectorum ^{ai} (cheatgrass)	16	181	19	153	224	278
Melica bulbosa (oniongrass)	125	437	21	191	199	274
Poa bulbosa ⁱ (bulbous bluegrass)	2023	11	10	2	348	19
Poa secunda (Sandberg bluegrass)	year	Average Cover (%)				
Pseudoroegneria spicata (bluebunch wheatgrass)	2007	0.0	2.5	-	0.4	5.5
	2013	0.1	1.3	0.3	6.3	4.6
	2018	2.7	18.6	0.2	12.1	3.3
	2023	0.0	0.2	0.0	15.9	1.0
						18.6

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

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

FORB SPECIES	Nested Frequency																	
Achillea millefolium (Common yarrow)	69	43	3	141	1	-	2	66	2	123	139	-	12	319	20	1	398	
Agoseris glauca (pale agoseris)	2013	53	33	3	102	-	3	-	41	-	289	224	-	-	189	138	-	117
Allium (onion)	2018	50	32	-	238	-	10	-	-	-	59	217	2	3	4	59	24	357
Alyssum desertorum ^{ai} (desert madwort)	2023	42	20	8	72	10	13	-	1	12	48	190	-	-	-	28	4	230
Antennaria (pussytoes)	year	Average Cover (%)																
Artemisia ludoviciana (white sagebrush)	2007	0.9	0.2	0.0	0.5	0.0	-	0.0	0.2	0.1	0.5	0.3	-	0.1	1.8	0.1	0.0	11.7
Astragalus (milkvetch)	2013	1.3	0.1	0.0	0.3	-	0.1	-	0.1	-	1.2	0.8	-	-	0.7	0.8	-	1.1
Ceratocephala testiculata ^{ai} (curseweed butterwort)	2018	1.6	0.2	-	1.7	-	0.5	-	-	-	0.2	1.1	0.0	0.0	0.0	0.4	0.1	10.7
Cirsium (thistle)	2023	1.1	0.1	0.0	0.3	0.0	0.8	-	0.0	0.4	0.2	1.6	-	-	-	0.1	0.1	5.9
Collinsia parviflora ^a (maiden blue eyed Mary)																		
Collomia linearis ^a (tiny trumpet)																		
Cryptantha ^a (annual cryptantha)																		
Descurainia pinnata ^a (western tansymustard)																		
Draba ^a (draba)																		
Epilobium brachycarpum ^a (tall annual willowherb)																		
Erigeron pumilus (shaggy fleabane)																		
Erodium cicutarium ^{ai} (redstem stork's bill)																		

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

FORB SPECIES											
Gayophytum ramosissimum ^a (pinyon groundsmoke)											
Gilia inconspicua ^a (shy gilia)											
Lactuca serriola ^{ai} (prickly lettuce)											
Lappula occidentalis ^a (flatspine stickseed)											
Lomatium (desertparsley)											
Microsteris gracilis ^a (slender phlox)											
Polygonum douglasii ^a (Douglas' knotweed)											
Silene antirrhina ^a (sleepy silene)											
Symphotrichum (aster)											
Tragopogon dubius ^{ai} (yellow salsify)											
Wyethia amplexicaulis (mule-ears)											
year	Nested Frequency										
2007	29	-	12	89	47	34	7	377	24	7	4
2013	2	57	11	-	72	32	2	185	24	12	9
2018	26	2	136	4	41	-	-	38	40	66	5
2023	1	-	13	-	58	42	7	-	40	3	-
year	Average Cover (%)										
2007	0.1	-	0.1	0.4	0.4	0.1	0.0	3.7	0.4	0.1	0.0
2013	0.0	0.2	0.1	-	1.2	0.1	0.0	0.6	0.2	0.2	0.1
2018	0.1	0.0	0.8	0.0	0.8	-	-	0.1	0.9	0.6	0.1
2023	0.0	-	0.1	-	0.9	0.3	0.2	-	0.8	0.0	-

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

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

SHRUB SPECIES				
Amelanchier utahensis ^p (Utah serviceberry)				
Artemisia arbuscula ^p (little sagebrush)				
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)				
Gutierrezia sarothrae (broom snakeweed)				
year	Line Intercept Cover (%)			
2007	-	0.1	-	0.6
2013	-	-	-	0.8
2018	-	0.1	-	3
2023	0.1	-	-	2.9
year	Quadrat Cover (%)			
2007	-	0.0	0.0	0.1
2013	-	-	-	0.2
2018	-	0.0	-	2.4
2023	0.0	-	-	2.6

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

Table 02R-21.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

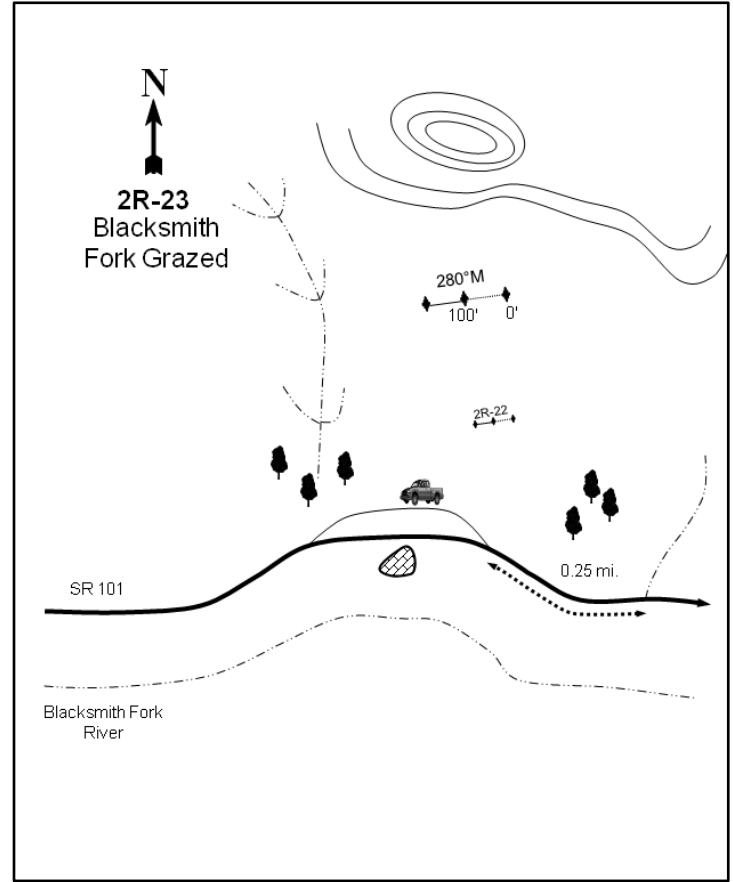
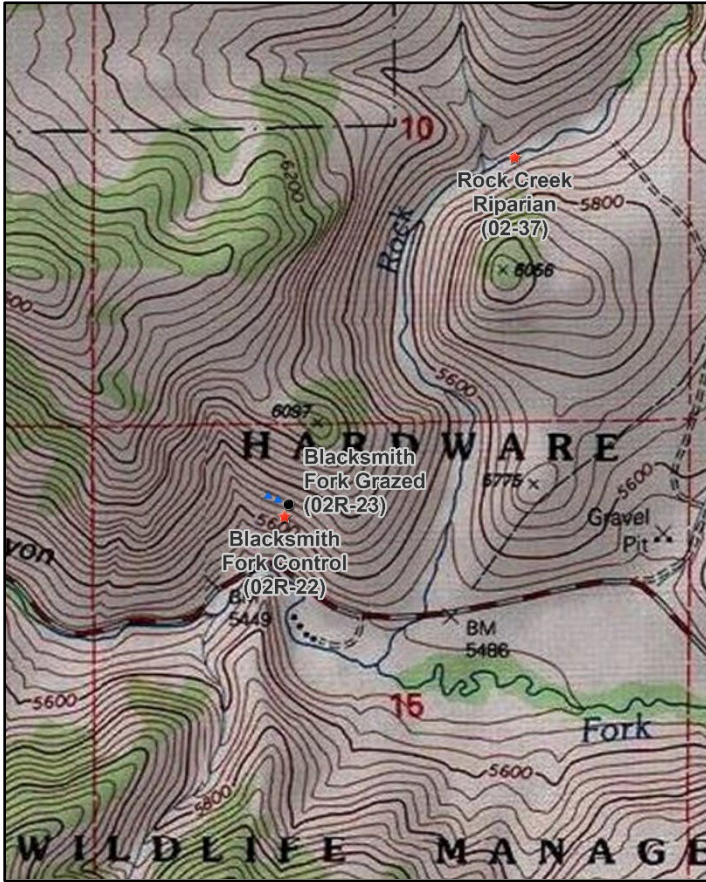
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2007	20	-	0	100	0	0	100	0	43/53
2013	20	-	0	100	0	0	100	0	38/52
2018	20	-	0	100	0	100	0	0	53/72
2023	60	-	0	100	0	0	0	0	- / -
Artemisia arbuscula^p -- (little sagebrush)									
2007	60	-	0	100	0	100	0	0	25/53
2013	-	-	-	-	-	-	-	-	27/59
2018	40	-	0	50	50	0	0	50	27/43
2023	20	-	0	0	100	0	0	100	- / -
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2007	40	-	0	0	100	0	50	50	67/124
2013	-	-	-	-	-	-	-	-	66/73
2018	-	-	-	-	-	-	-	-	61/88
2023	-	-	-	-	-	-	-	-	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2007	20	-	0	100	0	100	0	0	27/45
2013	20	-	0	100	0	0	0	0	19/21
2018	20	-	0	100	0	0	0	0	29/44
2023	20	-	100	0	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2007	320	-	6	94	0	31	19	0	20/33
2013	1320	20	35	65	0	0	0	0	18/25
2018	2360	-	3	98	0	0	0	0	21/31
2023	2360	20	20	81	0	0	0	0	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2007	-	-	-	-	-	-	-	-	50/104
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	109/170
2023	-	-	-	-	-	-	-	-	- / -
Sambucus racemosa^p -- (red elderberry)									
2007	-	-	-	-	-	-	-	-	52/111

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

Table 02R-21.15 - 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	0.1	0.0	0.0	30.0	-1.9	4.0	0.0	32.2	Very Poor
2013	0.0	0.0	0.0	30.0	-1.1	6.2	0.0	35.1	Very Poor
2018	0.1	0.0	0.0	30.0	-16.0	8.4	0.0	22.5	Very Poor
2023	0.2	0.0	0.0	30.0	-0.2	8.6	0.0	38.5	Very Poor-Poor

BLACKSMITH FORK GRAZED - STUDY NO. 02R-23

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

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

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,660ft (1,725m)
Aspect	South
Slope	41%
Sample Dates	07/09/2007, 07/23/2013, 07/25/2018, 07/25/2023

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

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

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

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

Wildlife Habitat and Vegetation History**Table 02R-23.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	crucial	winter
Greater Sage-Grouse		
Shiras Moose	crucial	winter

Table 02R-23.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Annual Grass-Forb	Phase I
2013	Annual Grass-Forb/Perennial Grass	Phase I
2018	Annual Grass-Forb/Perennial Grass	Phase I
2023	Perennial Grass/Mountain Big Sagebrush	Phase I

Site Notes

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

Site Potential

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

This site was dominated by an annual grass-forb plant community from study establishment in 2007 through 2018, although the area was treated to reduce undesirable plants and increase beneficial forbs and browse in 2007 (Table 02R-23.1). The grass community remained depauperate during that time period with most of the cover provided by the introduced annual species cheatgrass (*Bromus tectorum*). However, the native perennial grass species bluebunch wheatgrass (*Pseudoroegneria spicata*) increased in 2023 while cheatgrass decreased, and perennial grasses replaced annual grasses as a codominant site component (Table 02R-23.7, Table 02R-23.10). Forbs have been moderately diverse, although two noxious weeds have been sampled each year: Dyer's woad (*Isatis tinctoria*) and gypsyflower (*Cynoglossum officinale*). Annual forb cover was generally high through the 2018 year and moderate in 2023 with the dominant species being redstem stork's bill (*Erodium cicutarium*). Perennial forb cover has been low to moderate with white sagebrush (*Artemisia ludoviciana*) contributing the most cover in most sample years (Table 02R-23.11). Overall shrub cover was moderate in 2023 (Table 02R-23.6). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been the dominant shrub species since 2013 and has increased in cover and density since site establishment; sagebrush became codominant with perennial grasses in 2023. Rocky Mountain juniper (*Juniperus scopulorum*) has been observed on site. Although tree cover decreased following a lop and scatter treatment, infilling is likely to occur in the future as juniper was still present in the surrounding area as of 2023 (Photos, Table

02R-23.12, Table 02R-23.13).

Deer winter range condition on this site has ranged between very poor and fair since 2007. In 2023, deer winter range was considered to be in fair condition. Improvements to deer winter range could be achieved through efforts that increase preferred browse cover and reproduction. Decreasing annual grasses and removing noxious weed species would also benefit deer winter range (Table 02R-23.15). In addition, the sagebrush component of this site could provide valuable browse for elk during the winter months (Table 02R-23.3; Wambolt, 1996). However, pellet transect data shows that both deer and elk presence on this site have remained low since study establishment (Table 02R-23.9).

Trend Summary Tables

Table 02R-23.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	1.0	0.7	-	1.3	1.3	5.6
2013	2.1	0.7	0.0	1.8	0.8	4.5
2018	4.3	2.9	-	6.6	3.7	-
2023	5.5	1.3	-	7.7	3.1	-

Table 02R-23.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	307	88	367	129	3.6	0.7	15.6	2.5
2013	413	129	257	130	24.0	7.6	6.0	4.8
2018	423	108	279	78	32.3	6.7	10.6	2.7
2023	207	229	185	63	6.1	18.1	4.3	4.2

Table 02R-23.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	22.7	0.1	15.9	3.8	40.5	26.2
2013	4.3	-	19.9	0.5	37.7	48.7
2018	4.0	0.0	43.3	2.3	37.3	56.1
2023	10.4	0.0	20.1	2.6	37.0	39.4

Table 02R-23.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	18	7	4	-
2013	-	2	2	-
2018	-	4	-	1
2023	-	9	2	-
Year	Days Use Per Acre (ha)			
2007	21.1 (52.0)	6.7 (16.6)	0.7 (1.7)	-
2013	-	6.0 (14.9)	4.7 (11.6)	-
2018	-	18.7 (46.3)	-	-
2023	-	16.8 (41.4)	5.3 (13.2)	-

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

GRASS SPECIES	Nested Frequency					
<i>Bromus arvensis</i> ^{ai} (field brome)	26	302	-	-	-	88
<i>Bromus tectorum</i> ^{ai} (cheatgrass)	84	396	-	2	2	125
<i>Leymus cinereus</i> (basin wildrye)	46	414	1	-	-	107
<i>Poa bulbosa</i> ⁱ (bulbous bluegrass)	163	44	-	21	10	209
<i>Poa secunda</i> (Sandberg bluegrass)	Average Cover (%)					
<i>Pseudoroegneria spicata</i> (bluebunch wheatgrass)	0.1	3.5	-	-	-	0.7
year	1.9	22.0	-	0.0	0.0	7.5
2007	1.2	31.0	0.1	-	-	6.5
2013	5.3	0.9	-	0.7	0.4	17.0
2018						
2023						

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

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

FORB SPECIES	Nested Frequency																	
<i>Achillea millefolium</i> (Common yarrow)	42	53	54	-	5	2	5	4	3	0	1	5	353	2	-	119	40	
<i>Alyssum desertorum</i> ^{ai} (desert madwort)	71	22	44	-	-	-	12	2	10	-	3	5	183	3	-	5	17	
<i>Artemisia ludoviciana</i> (white sagebrush)	18	4	51	-	-	-	1	-	8	-	-	5	242	-	0	19	48	
<i>Buglossoides arvensis</i> ^{ai} (corn gromwell)	11	16	45	1	-	-	3	4	5	1	-	22	93	-	3	19	57	
<i>Camelina microcarpa</i> ^{ai} (litt lepod false flax)	Average Cover (%)																	
<i>Ceratocephala testiculata</i> ^{ai} (curvseed butterwort)	0.9	0.1	1.2	-	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	14.4	0.0	-	0.5	0.1	
<i>Cirsium</i> (thistle)	2.3	0.0	1.4	-	-	-	0.4	0.0	0.1	-	0.0	0.0	3.6	0.0	-	0.0	0.1	
<i>Collomia linearis</i> ^a (tiny trumpet)	0.3	0.0	1.6	-	-	-	0.0	-	0.0	-	-	0.0	7.1	-	0.0	0.6	0.6	
<i>Cynoglossum officinale</i> ^{ami} (gypsyflower)	0.2	0.2	3.4	0.0	-	-	0.0	0.0	0.4	0.0	-	0.2	1.5	-	0.4	0.2	1.2	
<i>Descurainia pinnata</i> ^a (western tansymustard)																		
<i>Draba</i> ^a (draba)																		
<i>Epilobium brachycarpum</i> ^a (tall annual willowherb)																		
<i>Erodium cicutarium</i> ^{ai} (redstem stork's bill)																		
<i>Galium aparine</i> ^a (stickywilly)																		
<i>Grindelia squarrosa</i> (curlycup gumweed)																		
<i>Isatis tinctoria</i> ^{ami} (Dyer's woad)																		
<i>Lactuca serriola</i> ^{ai} (prickly lettuce)																		

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

FORB SPECIES														
Lappula occidentalis ^a (flatspine stickseed)														
Lithospermum ruderale (western stoneseed)														
Lomatium (desertparsley)														
Lupinus argenteus (silvery lupine)														
Microsteris gracilis ^a (slender phlox)														
Polemoniaceae (plox family)														
Polygonum douglasii ^a (Douglas' knotweed)														
Rumex crispus ⁱ (curly dock)														
Silene antirrhina ^a (sleepy silene)														
Solidago (goldenrod)														
Tragopogon dubius ^{at} (yellow salsify)														
Verbascum thapsus ^{at} (common mullein)														
Vicia americana (American vetch)														
year	Nested Frequency													
2007	30	-	5	1	2	8	2	-	10	-	5	-	31	
2013	11	-	-	7	-	-	-	5	143	-	11	12	14	
2018	0	3	-	2	-	-	-	4	-	3	14	32	15	
2023	21	-	-	-	11	-	-	-	-	4	23	4	-	
year	Average Cover (%)													
2007	0.2	-	0.0	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-	0.3	
2013	0.0	-	-	0.5	-	-	-	0.0	1.8	-	0.1	0.1	0.2	
2018	0.0	0.0	-	0.4	-	-	-	0.0	-	0.1	0.3	1.9	0.2	
2023	0.1	-	-	-	0.1	-	-	-	-	0.1	0.4	0.0	-	

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

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

SHRUB SPECIES							
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)							
Gutierrezia sarothrae (broom snakeweed)							
Juniperus scopulorum ⁱ (Rocky Mountain juniper)							
Mahonia repens (creeping barberry)							
Ribes aureum ^p (golden currant)							
Rosa woodsii ^p (Woods' rose)							
year	Line Intercept Cover (%)						
2007	0.8	-	5.6	1.3	-	0.5	
2013	1.6	-	4.5	0.8	-	0.2	
2018	6.5	-	-	3.7	-	0.1	
2023	7.4	0.1	-	3	-	0.3	
year	Quadrat Cover (%)						
2007	0.5	-	0.0	0.7	-	0.5	
2013	1.9	-	0.0	0.7	0.0	0.3	
2018	4.1	0.6	-	2.3	0.0	0.2	
2023	5.1	0.0	-	1.3	0.1	0.2	

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

Table 02R-23.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

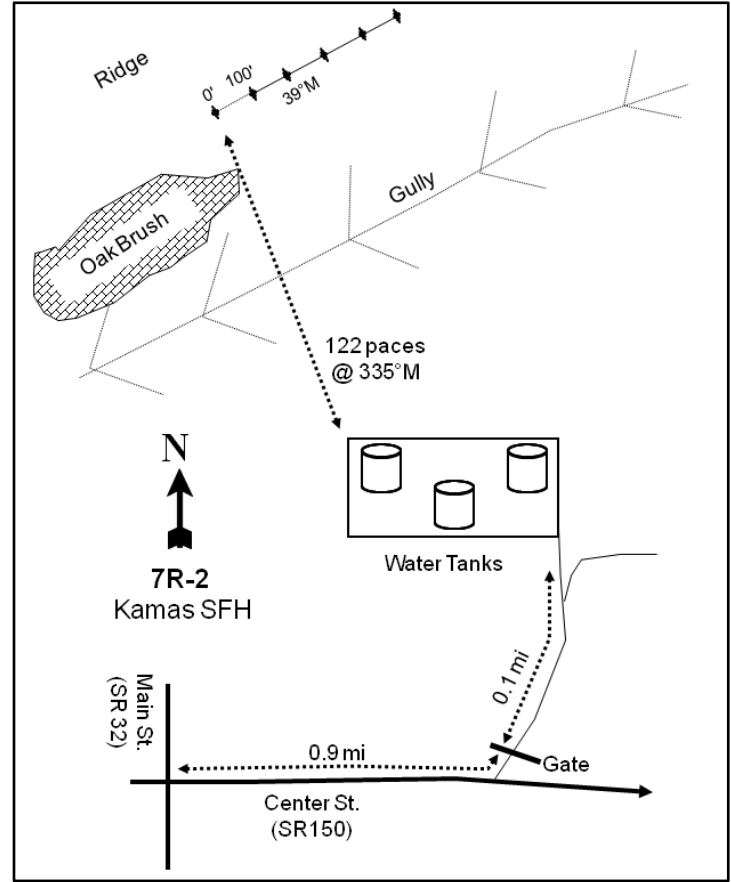
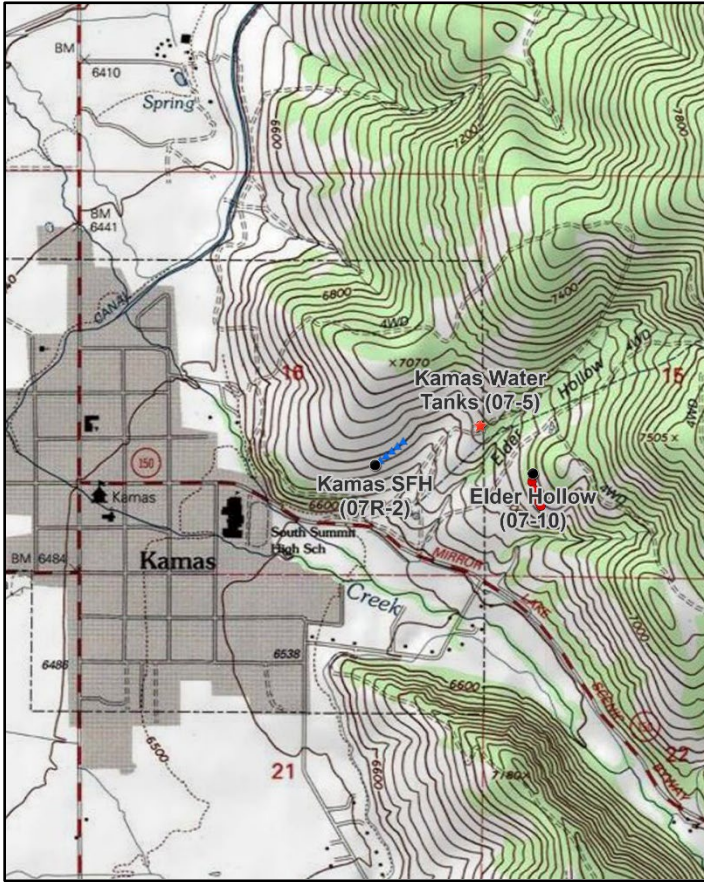
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2007	80	-	25	50	25	25	0	25	76/123
2013	620	-	7	94	0	3	0	39	38/55
2018	740	60	22	76	3	0	0	3	72/97
2023	800	60	13	75	13	10	0	15	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2007	20	-	0	100	0	0	0	0	9/14
2013	-	-	-	-	-	-	-	-	- / -
2018	40	-	50	50	0	0	0	0	24/22
2023	40	-	0	100	0	0	0	0	- / -
Juniperus scopulorum^t -- (Rocky Mountain juniper)									
2007	20	-	0	100	0	0	0	0	- / -
2013	20	-	0	100	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Mahonia repens -- (creeping barberry)									
2007	9900	-	2	98	0	0	6	22	6/9
2013	2220	-	2	98	0	0	0	28	9/23
2018	4560	-	0	100	0	0	0	0	10/14
2023	2880	260	87	13	0	0	0	0	- / -
Physocarpus malvaceus -- (mallow ninebark)									
2007	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	114/162
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Ribes aureum^p -- (golden currant)									
2007	-	-	-	-	-	-	-	-	81/62
2013	20	-	100	0	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	42/17
2023	20	-	0	100	0	0	0	0	- / -
Rosa woodsii^p -- (Woods' rose)									
2007	1860	-	73	27	0	33	5	0	57/39
2013	680	-	44	53	3	18	0	47	30/35
2018	620	-	19	74	7	48	0	3	31/24
2023	480	-	88	13	0	0	4	0	- / -

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

Table 02R-23.15 - 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	1.6	0.0	0.0	1.3	-2.7	5.0	-4.0	1.3	Very Poor
2013	2.3	0.0	0.0	15.1	-18.0	9.6	-4.0	5.0	Very Poor
2018	8.3	14.2	10.8	13.4	-20.0	5.4	-4.0	28.0	Very Poor
2023	9.6	11.4	7.7	30.0	-4.6	8.4	-4.0	58.5	Fair

KAMAS SFH - STUDY NO. 07R-2

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

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

Transect Information

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

177
39° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
No Rebar

Directions to Site

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

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,650ft (2,027m)
Aspect	Southeast
Slope	30%
Sample Dates	08/24/2006, 06/28/2011, 07/27/2017, 07/27/2023

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

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

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

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

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

Species	Habitat	Season
Mule Deer	substantial	winter
Rocky Mountain Elk	crucial	winter
Shiras Moose	crucial	winter

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

Year	Vegetation Type	Woodland Succession
2006	Bulbous Bluegrass/Annual Grass	NA
2011	Bulbous Bluegrass/Annual Grass	NA
2017	Bulbous Bluegrass	NA
2023	Bulbous Bluegrass/Perennial Forb	NA

Site Notes

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

Soils**Table 07R-02.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.8	43.0	32.7	24.3	3.8	46.5	560.0	0.7	08/23/2006

Site Potential

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC462UT
States and Transitions	2006-2023 - State Undefined: Community Phase Undefined

This study site has remained dominated by herbaceous species since establishment in 2006. The introduced perennial grass species bulbous bluegrass (*Poa bulbosa*) has contributed the most cover of any grass species and has dominated the site throughout the duration of the study; other perennial grasses have remained rare. In addition, the introduced annual grass cheatgrass (*Bromus tectorum*) was a codominant site component in 2006 and 2011, but cover decreased in 2017 (Table 07R-02.10). Forbs have been diverse and abundant, with native perennial forbs such as hairy false goldenaster (*Heterotheca villosa*), silvery lupine (*Lupinus argenteus*), and white sagebrush (*Artemisia ludoviciana*) contributing more cover than annual forbs. Cover of hairy false goldenaster increased significantly between the last two samplings, and it became a codominant vegetation component with bulbous bluegrass in 2023 (Table 07R-02.7, Table 07R-02.11). Broom snakeweed (*Gutierrezia sarothrae*) has been the most abundant shrub since 2017, while preferred browse such as Utah serviceberry (*Amelanchier utahensis*) and mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*) has remained rare (Table 07R-02.12, Table 07R-02.13).

Deer winter range on this site has remained in very poor condition since study establishment. Improvements to deer winter range could be accomplished by increasing preferred browse cover and recruitment of young; increasing cover of and diversifying native perennial grasses while reducing bulbous bluegrass and cheatgrass would also greatly improve deer winter range condition (Table 07R-02.15). Despite the very poor conditions, pellet transect data indicates that deer presence has remained high throughout the study period, but elk pellet groups were not observed in 2017 or 2023 (Table 07R-02.9). Augmenting sagebrush on this site could increase browse available for wintering elk (Table 07R-02.3; Wambolt, 1996).

Trend Summary Tables

Table 07R-02.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	0.6	2.7	-	0.7	2.7	-
2011	0.9	0.9	-	0.6	1.1	-
2017	1.0	4.2	-	1.3	6.7	-
2023	1.1	5.7	-	1.1	8.6	-

Table 07R-02.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	349	300	326	252	10.2	16.6	7.0	17.8
2011	398	361	389	278	10.0	19.8	9.8	12.8
2017	344	406	400	294	5.0	19.4	11.7	18.8
2023	209	407	115	317	2.0	20.1	1.6	29.7

Table 07R-02.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	8.7	0.4	16.4	3.2	28.8	55.0
2011	5.7	0.1	16.8	3.9	30.3	53.9
2017	9.1	0.2	15.2	11.5	26.6	52.6
2023	11.6	0.0	7.5	5.9	30.9	51.5

Table 07R-02.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	1	42	18	26
2011	5	22	3	8
2017	2	30	1	11
2023	1	31	4	2
Days Use Per Acre (ha)				
2006	8.7 (21.5)	101.9 (251.6)	31.5 (77.8)	-
2011	18.1 (44.8)	59.6 (147.3)	8.1 (19.9)	-
2017	10.9 (26.9)	107.9 (266.5)	-	-
2023	7.2 (17.9)	61.0 (150.6)	-	-

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

GRASS SPECIES	Nested Frequency				
Agropyron cristatum ⁱ (crested wheatgrass)					
Bromus tectorum ^{ai} (cheatgrass)					
Poa bulbosa ⁱ (bulbous bluegrass)					
Poa pratensis ⁱ (Kentucky bluegrass)					
Poa secunda (Sandberg bluegrass)					
year	Nested Frequency				
2006	44	349	287	5	-
2011	38	398	325	15	28
2017	34	344	401	17	9
2023	55	209	389	11	-
year	Average Cover (%)				
2006	1.3	10.2	14.9	0.3	-
2011	0.6	10.0	18.3	0.6	0.3
2017	0.3	5.0	18.8	0.1	0.1
2023	0.9	2.0	19.1	0.0	-

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

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

FORB SPECIES	Nested Frequency																	
Alyssum desertorum ^{ai} (desert madwort)																		
Arabis (rockcress)																		
Artemisia ludoviciana (white sagebrush)																		
Camelina microcarpa ^{ai} (litt lepod false flax)																		
Ceratocephala testiculata ^{ai} (curvseed butterwort)																		
Cirsium (thistle)																		
Cirsium undulatum ^a (wavyleaf thistle)																		
Collinsia parviflora ^a (maiden blue eyed Mary)																		
Draba ^a (draba)																		
Epilobium brachycarpum ^a (tall annual willowherb)																		
Eriogonum cernuum ^a (nodding buckwheat)																		
Eriogonum racemosum (redroot buckwheat)																		
Erodium cicutarium ^{ai} (redstem stork's bill)																		
Helianthella uniflora (oneflower helianthella)																		
Heliomeris multiflora var. multiflora (showy goldeneye)																		
Heterotheca villosa (hairy false goldenaster)																		
Lactuca serriola ^{ai} (prickly lettuce)																		
year	Nested Frequency																	
2006	220	3	72	3	5	-	3	57	37	71	5	9	187	6	6	181	1	
2011	124	-	93	7	25	2	23	39	60	110	-	8	339	1	20	179	28	
2017	214	-	88	-	5	7	3	-	-	-	25	12	353	-	-	232	-	
2023	69	8	62	-	9	1	-	-	-	5	9	3	59	-	78	221	-	
year	Average Cover (%)																	
2006	1.0	0.0	3.8	0.0	0.0	-	0.1	0.1	0.1	1.3	0.0	0.3	4.0	0.0	0.5	9.3	0.0	
2011	0.5	-	3.9	0.1	0.1	0.1	0.8	0.2	0.1	1.0	-	0.0	6.9	0.1	0.8	5.2	0.1	
2017	1.0	-	1.9	-	0.0	0.0	0.0	-	-	-	1.0	0.3	9.7	-	-	11.1	-	
2023	0.3	0.2	3.0	-	0.0	0.1	-	-	-	0.0	0.3	0.1	0.8	-	4.3	19.0	-	

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

FORB SPECIES														
Lepidium montanum ^a (mountain pepperweed)														
Lithospermum ruderales (western stoneseed)														
Lupinus argenteus (silvery lupine)														
Melilotus officinalis ⁱ (sweetclover)														
Phlox longifolia (longleaf phlox)														
Polygonum douglasii ^a (Douglas' knotweed)														
Salsola tragus ^{ai} (prickly Russian thistle)														
Silene antirrhina ^a (sleepy silene)														
Sisymbrium altissimum ^{ai} (tall tumbled mustard)														
Solidago (goldenrod)														
Tragopogon dubius ^{ai} (yellow salsify)														
Verbascum thapsus ^{ai} (common mullein)														
Veronica biloba ^{ai} (two-lobed speedwell)														
year	Nested Frequency													
2006	-	0	21	-	1	-	7	106	1	15	6	-	-	
2011	-	6	56	-	-	-	-	50	-	-	2	-	2	
2017	-	2	43	-	2	-	-	-	-	22	2	6	-	
2023	2	3	28	2	8	3	-	-	-	-	5	2	-	
year	Average Cover (%)													
2006	-	0.0	2.6	-	0.0	-	0.1	0.4	0.0	1.4	0.1	-	-	
2011	-	0.0	2.6	-	-	-	-	0.1	-	-	0.0	-	0.0	
2017	-	0.0	4.4	-	0.0	-	-	-	-	1.1	0.0	0.0	-	
2023	0.0	0.0	2.9	0.0	0.2	0.0	-	-	-	-	0.1	0.0	-	

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

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

SHRUB SPECIES									
Amelanchier utahensis ^p (Utah serviceberry)									
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)									
Chrysothamnus viscidiflorus sp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)									
Crataegus (hawthorn)									
Gutierrezia sarothrae (broom snakeweed)									
Mahonia repens (creeping barberry)									
Opuntia (pricklypear)									
Symphoricarpos oreophilus ^p (mountain snowberry)									
year	Line Intercept Cover (%)								
2006	-	0.7	-	0.1	1.7	0.3	0.6	0	
2011	-	0.6	-	0	0.3	0.4	0.4	-	
2017	-	0.9	-	0.4	5.1	0.5	0.7	0.4	
2023	-	1.1	-	0.4	6.7	1	0.5	-	
year	Quadrat Cover (%)								
2006	-	0.6	-	0.0	2.0	0.5	0.2	0.0	
2011	-	0.8	0.0	0.0	0.1	0.5	0.4	0.0	
2017	-	0.8	0.1	0.0	3.4	0.3	0.4	0.1	
2023	0.0	1.0	-	0.0	4.9	0.4	0.5	0.2	

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

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

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
2006	-	-	-	-	-	-	-	-	125/130
2011	-	-	-	-	-	-	-	-	140/147
2017	-	-	-	-	-	-	-	-	92/122
2023	40	-	50	50	0	0	0	50	- / -
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2006	20	-	0	100	0	100	0	0	57/95
2011	20	-	0	100	0	100	0	0	70/119
2017	20	-	0	100	0	0	100	0	74/138
2023	20	-	0	100	0	0	100	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	-	-	-	-	-	-	-	-	28/72
2011	20	-	100	0	0	0	0	0	20/32
2017	-	-	-	-	-	-	-	-	15/50
2023	-	-	-	-	-	-	-	-	- / -
Crataegus -- (hawthorn)									
2006	20	-	100	0	0	0	0	0	105/53
2011	20	-	0	100	0	0	0	0	177/123
2017	20	-	0	100	0	100	0	0	218/182
2023	20	-	0	100	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	76/114
2011	-	-	-	-	-	-	-	-	87/129
2017	60	-	100	0	0	0	0	0	51/59
2023	-	-	-	-	-	-	-	-	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2006	1980	20	22	76	2	0	0	1	20/29
2011	860	20	30	70	0	0	0	0	17/18
2017	8620	80	11	87	3	0	0	3	21/23
2023	5560	60	10	90	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
2006	2600	-	11	89	0	0	0	0	6/10
2011	3640	-	6	95	0	0	0	0	5/10
2017	3900	-	0	100	0	0	0	0	5/7
2023	2320	-	86	14	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2006	200	-	30	60	10	0	0	10	13/40
2011	360	-	0	100	0	0	0	6	14/45
2017	540	-	7	82	11	0	0	26	13/36
2023	840	60	17	83	0	0	0	0	- / -
Purshia tridentata^P -- (antelope bitterbrush)									
2006	-	-	-	-	-	-	-	-	- / -
2011	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	43/146
2023	-	-	-	-	-	-	-	-	- / -
Symphoricarpos oreophilus^P -- (mountain snowberry)									
2006	20	-	0	100	0	0	0	0	64/134
2011	40	-	0	100	0	0	50	0	68/129
2017	40	-	0	100	0	0	0	0	64/124
2023	20	-	0	100	0	0	0	0	- / -

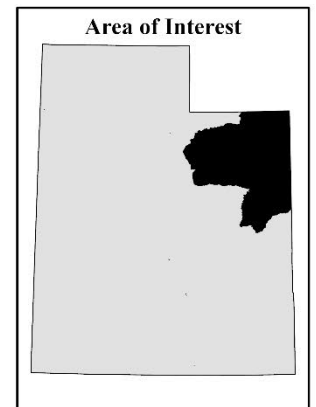
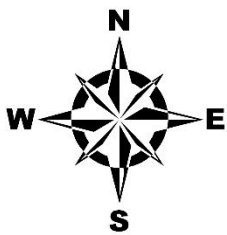
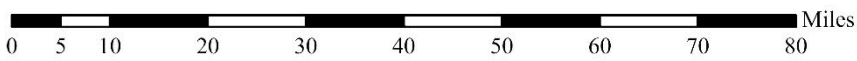
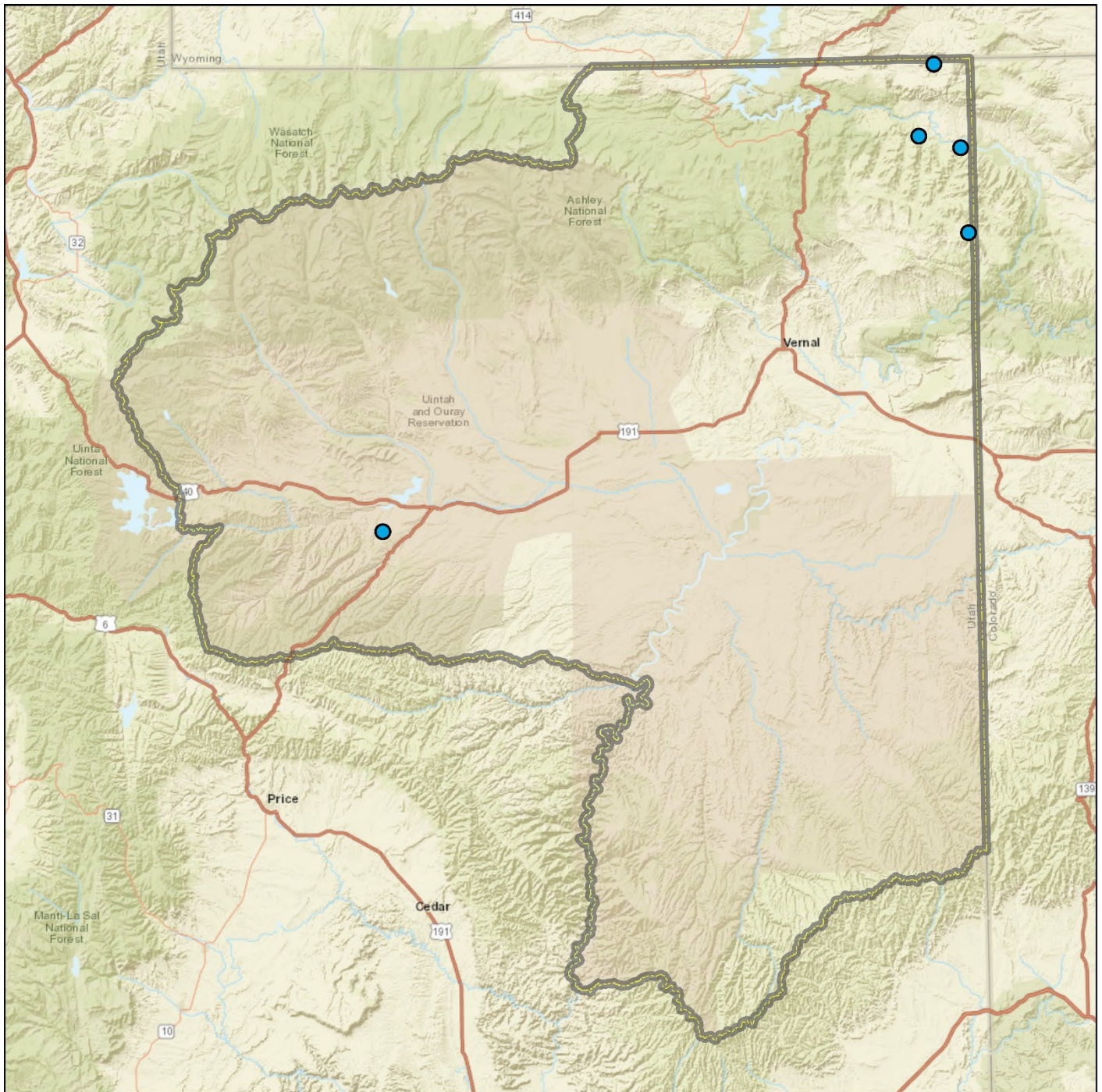
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Tetradymia canescens -- (spineless horsebrush)									
2006	-	-	-	-	-	-	-	-	37/111
2011	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	40/151

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

Table 07R-02.15 - Deer Desirable Components Index: Mountain Potential Scale.

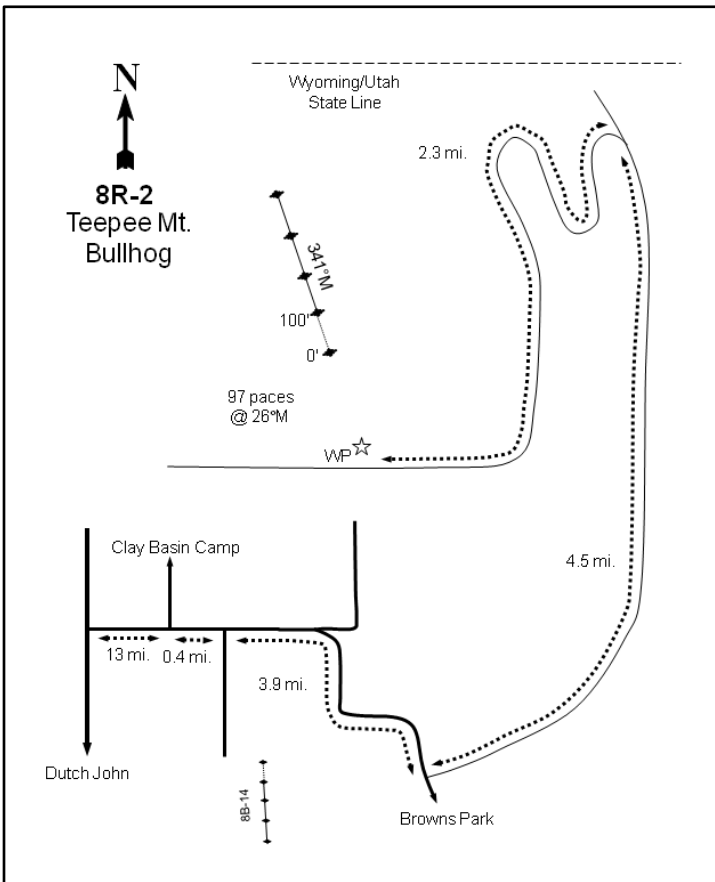
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2006	0.9	0.0	0.0	3.3	-7.7	10.0	0.0	6.5	Very Poor
2011	0.8	0.0	0.0	2.9	-7.5	10.0	0.0	6.1	Very Poor
2017	1.5	0.0	0.0	1.1	-3.8	10.0	0.0	8.9	Very Poor
2023	1.4	0.0	0.0	1.9	-1.5	10.0	0.0	11.8	Very Poor

NORTHEASTERN REGION



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

TEEPEE MOUNTAIN BULLHOG - STUDY NO. 08R-2



Location Information

USGS 7.5 min Map Info	Clay Basin NE; Township 3N, Range 25E, Section 18
GPS (0' Stake)	NAD 83 UTM ZONE 12, 656438 East 4539448 North

Transect Information

Browse Tag # (0' Stake)	194
Transect Bearing	341° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

Directions to Site

From Dutch John, proceed north toward Antelope Flat on US-191. Continue over the state line into Wyoming and turn right just after Minnies Gap onto the Clay Basin Road. Drive for approximately 13 miles towards Clay Basin to the turnoff to Clay Basin Camp. Turn right again and proceed 0.4 miles to the intersection to the Clay Basin Bench site (08B-14). Continue east for 3.9 miles to a road coming in from the left. Turn left here and go 4.5 miles to another road that comes in from the left. Turn left again and go 2.3 miles to the witness post on the right (north) side of the road. The 0-foot stake is 97 paces away at 26 degrees magnetic and is marked with browse tag #194.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	CLAY BASIN MEADOWS
Elevation	7,500ft (2,286m)
Aspect	Southwest
Slope	10-13%
Sample Dates	07/05/2007, 07/27/2010, 07/09/2013, 07/25/2018, 07/26/2023

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Teepee Mountain Bullhog Project	692	June-August 2007	535
Hand Crew - Spot Spray	Diamond Mountain Weed Inventory/Treatment	5656	May-June 2022	6576
Hand Crew - Lop and Scatter	Unknown Lop and Scatter	BLM	2019	-

Wildlife Habitat and Vegetation History

Table 08R-02.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	winter
Greater Sage-Grouse		undefined & undefined
Pronghorn	crucial	summer

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

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

Site Notes

Mormon crickets were observed in high amounts in 2023.

Soils

Table 08R-02.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.9	63.1	23.4	13.5	1.9	35.3	140.8	0.6	07/03/2007

Site Potential

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

Upon study establishment in 2007, the plant community on this site was a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Utah juniper (*Juniperus osteosperma*) that was considered to be within Phase I transitioning to Phase II of woodland succession. The 2007 bullhog treatment (Table 08R-02.1) removed a majority of the trees, and mountain big sagebrush has been the dominant vegetation component since 2010 (Table 08R-02.12, 08R-02.13). However, point-quarter data shows that density of juniper has increased each sample year following the bullhog project. The study site has been classified as being within Phase I of woodland succession since 2010, but continued tree presence indicates that there may be potential for infilling over time (Table 08R-02.4, Table 08R-02.14). Native perennial grasses and forbs have provided a majority of the herbaceous cover throughout the duration of the study. The introduced annual grass species cheatgrass (*Bromus tectorum*) has fluctuated in cover following treatment. Although cheatgrass cover was low in 2023, it could present a threat to the ecological resilience of the community if it increases in the future (Table 08R-02.7, Table 08R-02.10, Table 08R-02.11).

This site likely serves as adequate summer range for deer due to the diverse and abundant herbaceous and shrub communities. In addition, the sagebrush component could provide valuable browse for elk during the winter months (Table 08R-02.3; Wambolt, 1996). However, pellet group data indicates that both deer and elk presence have remained low since 2007, and elk pellet groups were not observed in 2023 (Table 08R-02.9).

Trend Summary Tables

Table 08R-02.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	8.3	3.0	5.5	14.0	0.9	10.9
2010	7.9	2.7	-	12.5	2.7	-
2013	9.9	1.3	0.0	11.1	2.4	0.1
2018	10.5	2.8	0.1	13.1	2.7	-
2023	12.2	2.8	0.0	17.2	2.2	0.1

Table 08R-02.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	36	366	153	238	0.4	18.9	0.5	13.6
2010	69	342	4	188	2.2	22.1	0.0	14.1
2013	78	360	31	206	1.4	15.2	0.1	11.0
2018	188	353	24	202	6.2	20.6	0.1	9.3
2023	43	341	26	187	0.2	14.1	0.1	15.6

Table 08R-02.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	26.6	5.7	29.6	3.4	3.5	44.9
2010	12.2	2.9	59.2	1.8	2.5	50.6
2013	15.7	2.5	54.2	0.7	3.9	42.5
2018	13.8	2.6	58.9	2.5	3.3	42.8
2023	16.1	1.2	43.3	3.6	7.8	41.5

Table 08R-02.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Horse	Rabbit
	Quadrat Frequency					
2007	15	7	4	-	-	34
2010	2	2	-	-	-	-
2013	7	1	2	-	-	1
2018	5	4	1	-	-	1
2023	1	4	-	1	-	1
Year	Days Use Per Acre (ha)					
2007	16.7 (41.2)	16.8 (41.4)	10.0 (24.8)	-	1.2 (2.9)	-
2010	3.6 (9.0)	10.7 (26.5)	2.7 (6.6)	-	-	-
2013	-	11.4 (28.1)	0.7 (1.7)	-	-	-
2018	22.5 (55.6)	10.7 (26.5)	0.7 (1.7)	-	-	-
2023	15.3 (37.7)	7.4 (18.2)	-	-	-	-

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

GRASS SPECIES	Achmatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency											
2007	16	-	36	0	2	74	61	-	53	252	213	3
2010	3	-	69	5	-	81	124	26	31	159	117	40
2013	14	-	78	2	3	92	24	105	11	222	159	1
2018	16	-	188	-	-	117	49	84	62	173	141	-
2023	5	4	43	-	2	116	33	82	14	197	118	-
year	Average Cover (%)											
2007	0.4	-	0.4	0.0	0.0	1.6	1.0	-	1.2	7.6	6.9	0.0
2010	0.0	-	2.2	0.0	-	3.2	4.7	1.1	0.9	4.1	6.3	1.7
2013	0.2	-	1.4	0.0	0.0	3.7	0.3	1.9	0.2	3.9	4.9	0.0
2018	0.8	-	6.2	-	-	4.8	1.4	3.0	1.3	3.4	5.9	-
2023	0.0	0.0	0.2	-	0.0	4.4	0.8	1.5	0.2	4.4	2.7	-

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

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

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria (pussytoes)	Arabis (rockerness)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Castilleja flava (yellow Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album ^a (lambsquarters)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Delphinium nuttallianum (twolobe larkspur)
year	Nested Frequency																
2007	12	-	3	14	-	62	93	18	3	-	4	37	23	5	17	16	1
2010	-	-	-	-	3	69	70	6	3	-	-	-	32	0	8	-	-
2013	3	-	-	1	2	44	81	13	9	3	-	4	34	1	28	1	-
2018	9	15	-	2	3	21	80	1	-	1	-	-	45	-	15	-	-
2023	3	16	-	4	1	26	76	-	2	-	-	-	49	-	10	1	-
year	Average Cover (%)																
2007	0.1	-	0.0	0.1	-	3.5	7.8	0.0	0.0	-	0.0	0.1	0.5	0.1	0.1	0.1	0.0
2010	-	-	-	-	0.0	2.5	9.5	0.0	0.0	-	-	-	0.8	0.0	0.1	-	-
2013	0.0	-	-	0.0	0.0	1.3	7.5	0.0	0.2	0.0	-	0.0	0.3	0.0	0.1	0.0	-
2018	0.0	0.0	-	0.0	0.0	0.7	5.7	0.0	-	0.0	-	-	0.7	-	0.2	-	-
2023	0.0	0.1	-	0.0	0.1	1.4	11.0	-	0.0	-	-	-	1.6	-	0.2	0.0	-

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

FORB SPECIES	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron (fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Lithospermum ruderale (western stoneseed)	Lomatium triternatum (nineleaf biscuitroot)	Machaeranthera grindelioides (rayless tansyaster)	Mertensia (bluebells)	Microsteris gracilis ^a (slender phlox)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)
year	Nested Frequency																
2007	8	7	5	-	-	3	12	-	3	1	-	6	0	-	120	-	6
2010	-	-	11	5	-	-	4	1	-	-	-	1	3	5	3	-	-
2013	5	-	2	1	-	-	-	-	10	4	-	4	-	2	12	3	-
2018	2	4	8	15	-	-	-	-	-	-	-	-	7	3	-	7	-
2023	-	-	-	20	1	-	-	-	3	-	2	15	2	3	1	-	-
year	Average Cover (%)																
2007	0.0	0.0	0.0	-	-	0.0	0.1	-	0.0	0.0	-	0.0	0.0	-	0.4	-	0.2
2010	-	-	0.3	0.1	-	-	0.0	0.0	-	-	-	0.0	0.1	0.2	0.0	-	-
2013	0.0	-	0.1	0.0	-	-	-	-	0.0	0.0	-	0.0	-	0.1	0.0	0.0	-
2018	0.0	0.0	0.2	0.1	-	-	-	-	-	-	-	-	0.1	0.0	-	0.1	-
2023	-	-	-	0.1	0.0	-	-	-	0.0	-	0.0	0.0	0.0	0.0	0.0	-	-

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

FORB SPECIES	Penstemon humilis (low beardtongue)	Petrorhiza pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Stenotus acaulis (stemless mock goldenweed)	Symphotrichum (aster)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency						
2007	5	4	46	22	17	-	2
2010	4	6	17	6	-	2	0
2013	4	-	33	29	23	-	2
2018	5	-	37	6	23	-	6
2023	10	-	23	14	17	-	10
year	Average Cover (%)						
2007	0.0	0.3	0.4	0.1	0.2	-	0.0
2010	0.0	0.0	0.2	0.1	-	0.0	0.0
2013	0.0	-	0.3	0.1	0.7	-	0.0
2018	0.0	-	0.9	0.0	0.6	-	0.0
2023	0.0	-	0.3	0.1	0.4	-	0.0

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

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

SHRUB SPECIES	Line Intercept Cover (%)													
	year													
Artemisia nova ^p (black sagebrush)	2.7	8.9	-	0.5	0.3	2.1	-	10.9	0.3	0.1	-	-	-	-
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	2.6	7.6	-	1.8	0.7	2.3	-	-	-	0.1	-	-	-	0.1
Cercocarpus montanus ^p (alderleaf mountain mahogany)	2.1	7.1	-	2.4	-	1.9	-	0.1	-	0	-	-	-	-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	1.8	10	-	1.4	1.1	1.3	-	0	-	-	-	-	-	0.2
Ericameria nauseosa (rubber rabbitbrush)	2023	3.6	12.2	-	1.3	0.9	1.4	-	0.1	-	0	-	-	-
Eriogonum microthecum ^p (slender buckwheat)	year	Quadrat Cover (%)												
Gutierrezia sarothrae (broom snakeweed)	2007	1.4	4.7	0.0	2.2	0.1	2.1	0.0	5.5	0.0	0.5	0.0	0.1	-
Juniperus osteosperma ⁱ (Utah juniper)	2010	1.3	4.9	0.1	2.1	0.4	1.5	-	-	0.0	0.2	0.0	0.0	0.0
Krascheninnikovia lanata ^p (winterfat)	2013	1.2	5.7	0.4	1.1	-	2.6	-	0.0	-	0.2	-	0.0	-
Linanthus pungens (granite prickly phlox)	2018	1.9	6.8	0.4	1.9	0.8	1.4	0.0	0.1	-	0.1	-	0.0	0.1
Opuntia (pricklypear)	2023	1.5	9.5	-	1.6	1.0	1.1	-	0.0	0.0	0.2	0.0	0.0	0.0
Pediocactus simpsonii (mountain ball cactus)														
Tetradymia canescens (spineless horsebrush)														

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

Table 08R-02.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2007	-	-	-	-	-	-	-	-	78/112
2010	-	-	-	-	-	-	-	-	38/76
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	46/95
2023	20	-	0	100	0	0	100	0	-/-
Artemisia nova^p -- (black sagebrush)									
2007	1620	160	5	73	22	10	3	3	27/45
2010	560	20	4	96	0	61	0	0	20/46
2013	1020	20	14	78	8	16	8	4	18/50
2018	1120	-	4	88	9	13	45	9	19/52
2023	1480	-	0	87	14	10	5	14	-/-
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2007	1640	60	5	49	46	24	33	38	61/97
2010	1160	160	12	69	19	52	9	22	61/91
2013	1360	60	13	74	13	38	28	29	54/79
2018	2200	-	19	74	7	10	1	8	54/81
2023	1800	-	1	83	16	21	6	16	-/-
Cercocarpus montanus^p -- (alderleaf mountain mahogany)									
2007	-	-	-	-	-	-	-	-	66/86
2010	20	-	0	100	0	100	0	0	82/90
2013	20	-	0	100	0	100	0	100	79/81
2018	20	-	0	100	0	100	0	0	58/63
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2007	1460	-	4	92	4	3	0	4	25/37
2010	1180	-	10	88	2	5	0	2	33/43
2013	1600	-	15	84	1	3	4	9	36/50
2018	1120	-	0	95	5	7	0	14	30/41
2023	1080	-	0	93	7	0	0	7	- / -
Eriogonum microthecum^p -- (slender buckwheat)									
2007	4680	60	6	92	2	14	1	2	17/25
2010	2040	-	5	90	5	29	5	0	20/25
2013	3180	-	7	93	1	4	2	3	19/25
2018	2220	-	0	99	1	11	1	15	15/19
2023	2220	-	0	100	0	21	2	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2007	60	-	0	100	0	0	0	0	58/70
2010	60	-	0	100	0	0	0	0	59/68
2013	-	-	-	-	-	-	-	-	57/83
2018	60	-	0	100	0	67	0	0	72/110
2023	40	-	0	50	50	0	0	50	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2007	20	-	0	100	0	0	0	0	20/21
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	120	-	0	100	0	0	0	0	17/17
2023	80	-	0	100	0	0	0	0	- / -
Juniperus osteosperma¹ -- (Utah juniper)									
2007	120	60	50	50	0	0	0	0	- / -
2010	20	20	100	0	0	0	0	0	- / -
2013	40	-	100	0	0	0	0	0	- / -
2018	60	20	67	33	0	0	0	0	- / -
2023	140	-	86	14	0	0	0	0	- / -
Krascheninnikovia lanata^p -- (winterfat)									
2007	40	-	0	100	0	0	50	0	13/25
2010	40	-	0	100	0	50	0	0	17/20
2013	80	-	0	100	0	0	0	0	19/32
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2007	200	-	0	80	20	0	0	20	16/32
2010	200	-	0	100	0	0	0	40	23/35
2013	160	-	0	100	0	0	0	0	22/32
2018	280	-	7	71	21	0	0	21	14/20
2023	260	-	0	92	8	0	0	31	- / -
Opuntia -- (pricklypear)									
2007	80	-	0	25	75	0	0	0	8/16
2010	20	-	0	100	0	0	0	0	9/37
2013	20	-	0	100	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	9/24
2023	20	-	0	100	0	0	0	0	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2007	160	-	0	100	0	0	0	0	4/8
2010	100	-	0	100	0	0	0	0	5/8
2013	80	-	0	100	0	0	0	0	5/8
2018	140	-	14	86	0	0	0	0	5/7
2023	20	-	0	100	0	0	0	0	- / -

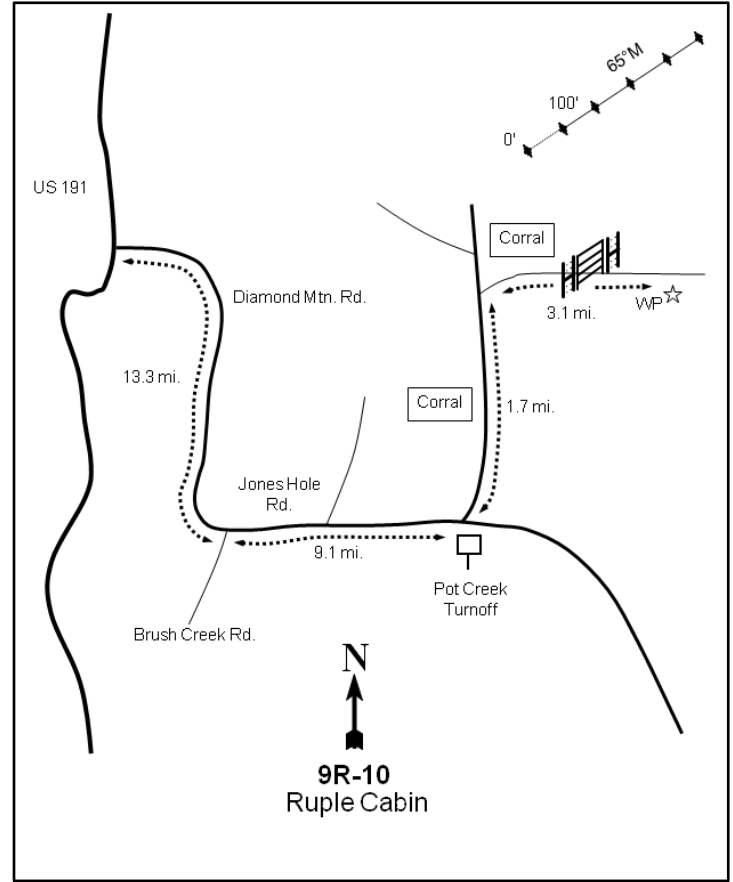
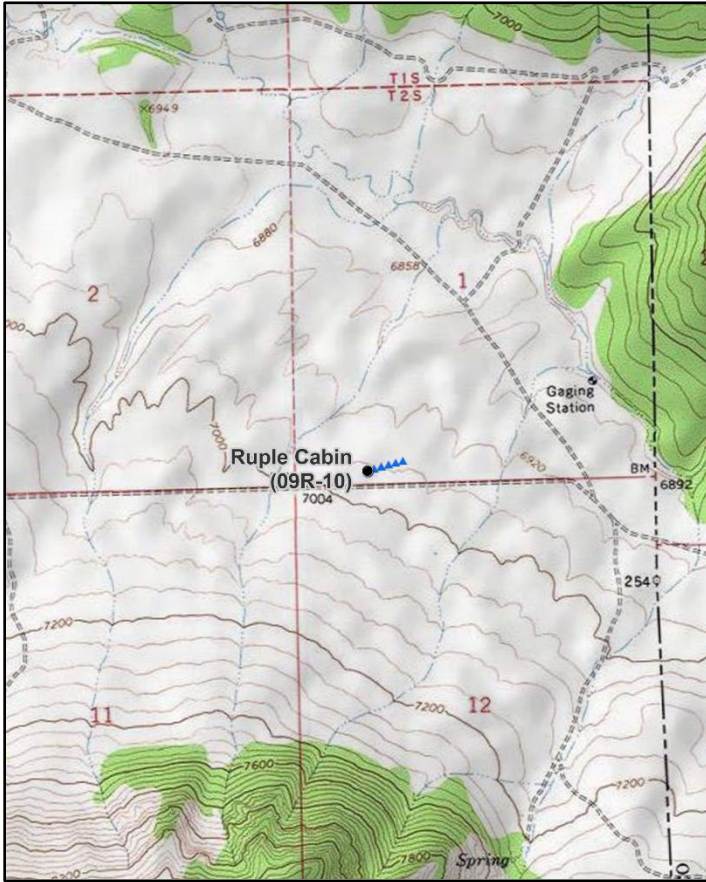
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Purshia tridentata^p -- (antelope bitterbrush)									
2007	-	-	-	-	-	-	-	-	15/29
2010	20	-	0	100	0	0	0	0	43/96
2013	-	-	-	-	-	-	-	-	43/150
2018	-	-	-	-	-	-	-	-	48/155
2023	-	-	-	-	-	-	-	-	-/-
Tetradymia canescens -- (spineless horsebrush)									
2007	40	-	50	50	0	100	0	0	24/37
2010	60	-	0	100	0	0	0	0	27/36
2013	20	-	0	100	0	0	0	0	29/46
2018	100	-	0	100	0	20	20	0	26/48
2023	80	-	0	100	0	0	25	0	- / -

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

Table 08R-02.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	133	15	30	35	15	5	11.8
2010	31	47	47	7	-	-	4.1
2013	42	-	100	-	-	-	3.5
2018	45	6	88	6	-	-	3.9
2023	55	100	-	-	-	-	1.0

RUPLE CABIN - STUDY NO. 09R-10



Location Information

USGS 7.5 min Map Info Hoy Mountain SW; Township 2S, Range 25E, Section 01
 GPS (0' Stake) NAD 83 UTM ZONE 12, 663742 East 4503958 North

Transect Information

Browse Tag # (0' Stake) 83
 Transect Bearing 65° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

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

Site Information

Land Ownership Private
 Land Administrator Private
 Allotment RUPLE CABIN
 Elevation 7,000ft (2,134m)
 Aspect North
 Slope 5-8%
 Sample Dates 07/27/2005, 07/08/2008, 07/10/2013, 07/27/2018, 07/27/2023

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

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

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

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

Wildlife Habitat and Vegetation History

Table 09R-10.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 09R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Perennial Grass/Mountain Big Sagebrush/Bitterbrush	Phase I
2018	Perennial Grass/Bitterbrush/Mountain Big Sagebrush	Phase I
2023	Perennial Grass/Bitterbrush/Mountain Big Sagebrush	Phase I

Site Notes

Sage-grouse sign was present on the site between 2008 and 2023. Mormon crickets were observed in high amounts in 2023.

Soils

Table 09R-10.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.7	51.1	27.1	21.8	2.5	13.1	137.6	0.7	08/02/2005

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC430UT
States and Transitions	No state and transition model is available for this ecological site.

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was the sole dominant browse species on this site from study establishment in 2005 through 2008. Sagebrush decreased following the treatments in 2008 and 2013 while antelope bitterbrush (*Purshia tridentata*) increased and became a codominant browse species in 2013 (Table 09R-10.1, Table 09R-10.12, Table 09R-10.13). The herbaceous understory has fluctuated, but has generally remained abundant and diverse throughout the duration of the study. Perennial grasses such as Sandberg bluegrass (*Poa secunda*) and thickspike wheatgrass (*Elymus lanceolatus*) have provided a majority of the herbaceous cover in all years, and have been a codominant vegetation component since 2013. The introduced annual grass species cheatgrass (*Bromus tectorum*) increased in cover each year through 2018, but had decreased as of the most recent sampling. Although present in very low amounts in 2023, cheatgrass could pose a threat to the community's ecological resilience if it increases in the future (Table 09R-10.7, Table 09R-10.10, Table 09R-10.11).

Due to the diversity and abundance of the herbaceous and shrub communities, this site may serve as adequate foraging range for mule deer during the summer months. For elk, the sagebrush component could provide browse during the winter (Table 09R-10.3). Elk and deer presence have fluctuated over the study period according to pellet transect data, but both were present in moderate amounts in 2023. Also notable is the increase in sage-grouse presence since 2008 (Table 09R-10.9).

Trend Summary Tables

Table 09R-10.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	30.7	0.2	-	36.0	0.5	-
2008	14.8	0.3	-	17.5	0.1	-
2013	3.7	0.6	-	9.5	1.4	-
2018	9.6	4.3	-	11.4	5.5	-
2023	21.2	3.7	-	28.7	4.9	-

Table 09R-10.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	13	371	85	232	0.0	11.6	0.4	5.8
2008	73	383	120	248	1.2	17.6	0.5	7.5
2013	114	368	68	225	3.1	11.9	0.5	7.1
2018	164	393	1	136	4.5	17.1	0.0	4.6
2023	12	399	9	152	0.1	19.0	0.0	3.5

Table 09R-10.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	30.8	2.0	36.1	1.6	2.7	45.0
2008	18.6	0.2	47.9	1.0	2.9	43.7
2013	31.6	0.6	46.4	0.3	1.8	30.1
2018	12.9	0.0	70.2	0.7	1.9	35.8
2023	21.2	0.2	48.6	2.5	2.1	43.1

Table 09R-10.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2005	5	6	8	-	30
2008	2	9	3	3	6
2013	6	5	1	1	1
2018	3	5	4	3	4
2023	10	16	12	1	-
Year	Days Use Per Acre (ha)				
2005	10.9 (26.9)	11.4 (28.1)	10.7 (26.5)	26.2 (64.6)*	-
2008	2.9 (7.2)	8.1 (19.9)	-	8.7 (21.5)*	-
2013	25.4 (62.8)	27.5 (67.9)	6.7 (16.6)	17.4 (43.0)*	-
2018	10.2 (25.1)	12.1 (29.8)	5.3 (13.2)	26.2 (64.6)*	-
2023	18.1 (44.8)	27.5 (67.9)	20.8 (51.3)	-	-

*Pellets per acre (ha)

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency												
2005	-	-	13	32	39	56	-	41	20	-	10	339	-
2008	0	-	73	7	85	102	-	88	35	102	57	244	-
2013	11	3	114	8	77	70	7	76	13	56	12	259	3
2018	12	7	164	15	121	224	4	136	10	28	21	215	-
2023	-	-	12	4	55	315	-	87	24	16	32	178	3
year	Average Cover (%)												
2005	-	-	0.0	0.1	0.3	0.4	-	0.7	0.2	-	0.3	9.7	-
2008	0.0	-	1.2	0.2	1.7	1.0	-	2.9	0.9	3.9	1.1	6.0	-
2013	0.1	0.0	3.1	0.1	0.8	0.7	0.0	1.1	0.3	1.0	0.1	7.6	0.0
2018	0.1	0.2	4.5	0.1	3.2	4.0	0.0	3.2	0.1	0.2	0.5	5.6	-
2023	-	-	0.1	0.0	1.3	11.3	-	2.6	0.6	0.2	0.2	2.7	0.1

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

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

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Alyssum desertorum ⁿⁱ (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus tenellus (looseflower milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Delphinium nuttallianum (two-lobed larkspur)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)
year	Nested Frequency																
2005	-	3	-	17	11	30	14	-	-	1	35	20	14	2	-	6	-
2008	-	8	-	19	10	32	15	-	1	27	52	39	15	3	3	18	19
2013	0	16	4	29	-	17	3	1	-	-	27	13	10	5	-	-	-
2018	-	-	-	18	-	11	2	-	-	-	1	-	10	-	-	-	-
2023	-	23	-	20	-	5	4	-	-	7	3	5	14	-	-	-	-
year	Average Cover (%)																
2005	-	0.0	-	0.3	0.1	1.0	0.3	-	-	0.0	0.1	0.0	0.2	0.1	-	0.0	-
2008	-	0.0	-	0.4	0.0	0.8	1.0	-	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1
2013	0.0	0.0	0.0	0.4	-	0.1	0.0	0.0	-	-	0.1	0.1	0.0	0.0	-	-	-
2018	-	-	-	0.9	-	0.3	0.0	-	-	-	0.0	-	0.1	-	-	-	-
2023	-	0.1	-	1.0	-	0.1	0.0	-	-	0.0	0.0	0.0	0.1	-	-	-	-

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

FORB SPECIES	Erigeron eatonii (Eaton's fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Grindelia squarrosa (curlycup gumweed)	Heterotheca villosa (hairy false goldenaster)	Lappula occidentalis ^a (flatspine stickseed)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stone seed)	Lomatium (desertparsley)	Lupinus (lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis ^a (slender phlox)	Orthocarpus ^a (owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Petroradia pumila (rock goldenrod)
year	Nested Frequency																
2005	12	0	20	8	-	36	-	13	-	5	3	2	37	-	27	12	46
2008	1	-	10	5	9	11	3	47	2	8	19	-	58	0	70	19	40
2013	3	2	13	-	19	7	5	26	-	4	26	8	27	-	9	9	54
2018	-	10	10	-	-	36	-	13	-	-	0	-	-	-	19	3	22
2023	-	3	1	-	-	9	-	7	-	-	-	-	-	-	14	3	20
year	Average Cover (%)																
2005	0.3	0.0	0.3	0.0	-	1.0	-	0.2	-	0.0	0.0	0.0	0.1	-	0.1	0.1	0.9
2008	0.0	-	0.5	0.0	0.0	0.9	0.0	0.6	0.0	0.0	0.4	-	0.2	0.0	0.9	0.1	0.9
2013	0.0	0.0	0.7	-	0.7	0.3	0.0	0.3	-	0.0	2.3	0.1	0.3	-	0.2	0.1	1.1
2018	-	0.2	0.1	-	-	1.1	-	0.4	-	-	0.0	-	-	-	0.1	0.0	1.0
2023	-	0.0	0.0	-	-	0.1	-	0.1	-	-	-	-	-	-	0.2	0.0	0.8

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

FORB SPECIES										
Phlox austromontana (mountain phlox)										
Phlox longifolia (longleaf phlox)										
Polygonum douglasii ^a (Douglas' knotweed)										
Schoenocrambe limifolia (flaxleaf plainsmustard)										
Sphaeralcea coccinea (scarlet globemallow)										
Streptanthus cordatus (heartleaf twistflower)										
Symphytotrichum (aster)										
Tragopogon dubius ^{at} (yellow salsify)										
Trifolium (clover)										
Zigadenus paniculatus (foothill deathcamas)										
year	Nested Frequency									
2005	11	55	17	2	25	-	2	1	28	7
2008	7	65	9	-	22	-	-	1	29	12
2013	15	65	-	-	17	2	4	4	29	1
2018	7	-	-	-	24	-	1	-	5	12
2023	4	6	1	-	38	-	-	-	1	-
year	Average Cover (%)									
2005	0.2	0.3	0.0	0.0	0.2	-	0.0	0.0	0.1	0.1
2008	0.0	0.4	0.0	-	0.2	-	-	0.0	0.1	0.1
2013	0.1	0.4	-	-	0.1	0.0	0.0	0.0	0.1	0.0
2018	0.1	-	-	-	0.2	-	0.0	-	0.0	0.0
2023	0.0	0.0	0.0	-	1.0	-	-	-	0.0	-

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

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

SHRUB SPECIES							
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)							
Ericameria nauseosa (rubber rabbitbrush)							
Eriogonum microthecum ^p (slender buckwheat)							
Gutierrezia sarothrae (broom snakeweed)							
Opuntia (pricklypear)							
Purshia tridentata ^p (antelope bitterbrush)							
Tetradymia canescens (spineless horsebrush)							
year	Line Intercept Cover (%)						
2005	34.5	-	-	0.1	-	1.5	0.4
2008	14.8	-	-	0.1	0	2.7	-
2013	4.2	0.8	0.3	0.3	0.1	5	0.2
2018	3	4.1	-	1.2	0.1	8.4	0.1
2023	14.3	2.5	-	2	0.1	14.4	0.3
year	Quadrat Cover (%)						
2005	29.4	0.0	-	0.1	0.0	1.3	0.0
2008	12.1	0.0	0.0	0.2	0.1	2.8	-
2013	1.7	0.4	0.0	0.2	0.1	2.0	0.0
2018	2.6	2.7	-	1.6	0.0	6.9	0.0
2023	9.3	2.9	0.0	0.8	0.0	11.9	0.0

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

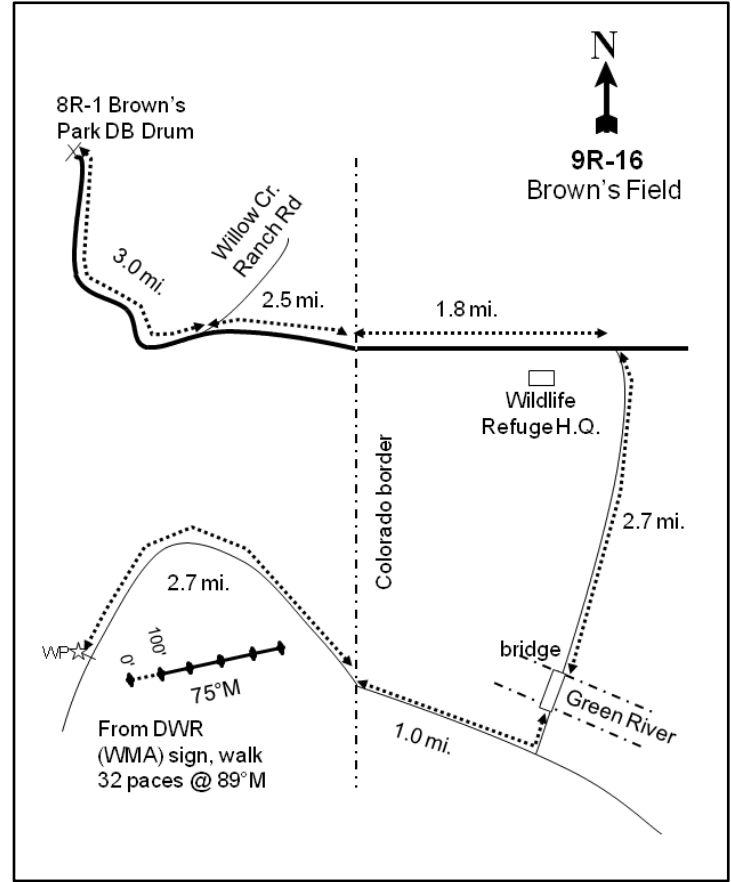
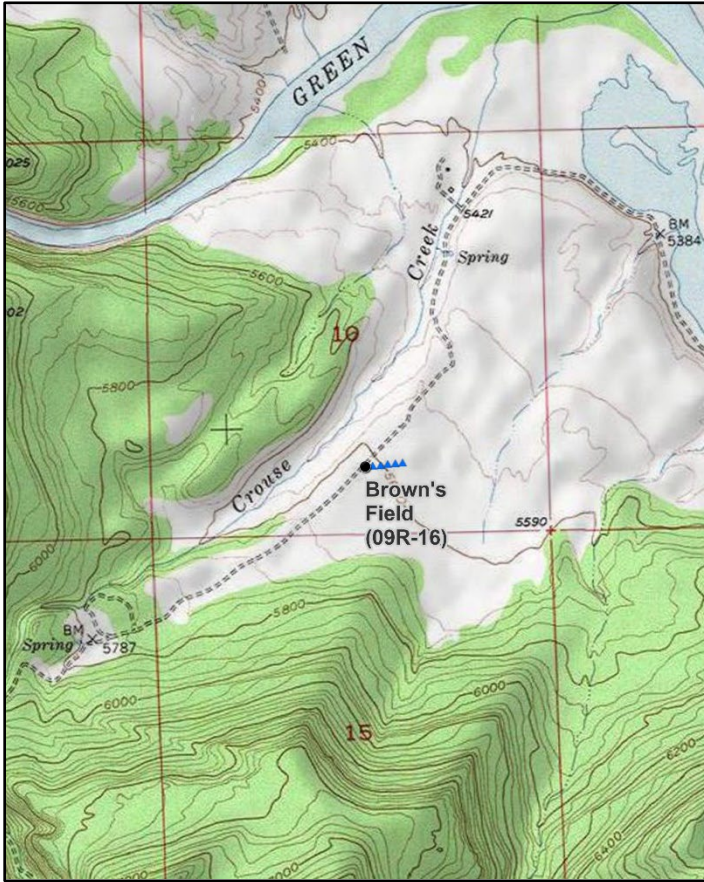
Table 09R-10.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2005	9360	-	5	73	22	28	29	3	60/76
2008	5380	20	1	41	58	2	2	60	48/64
2013	2680	780	59	19	22	10	8	27	40/49
2018	2620	-	18	77	5	24	4	5	43/51
2023	3420	1500	12	83	5	6	0	4	- / -
Eriogonum microthecum^P -- (slender buckwheat)									
2005	20	-	0	100	0	0	0	0	17/16
2008	20	-	0	100	0	0	0	0	18/28
2013	20	-	0	100	0	0	0	0	9/13
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	100	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	60	-	33	0	67	33	0	33	50/68
2008	100	-	0	100	0	0	0	0	42/56
2013	500	-	32	68	0	8	16	8	47/70
2018	1120	-	4	84	13	23	5	11	52/71
2023	1100	-	2	53	46	6	0	42	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2005	260	-	8	92	0	0	0	0	22/26
2008	340	-	41	59	0	0	0	0	24/31
2013	380	-	11	90	0	11	5	5	22/27
2018	3160	-	1	99	0	0	0	0	17/19
2023	1820	200	2	95	3	0	0	3	- / -
Juniperus osteosperma¹ -- (Utah juniper)									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Opuntia -- (pricklypear)									
2005	220	-	18	64	18	0	0	9	7/28
2008	80	-	0	25	75	0	0	0	11/29
2013	200	-	10	90	0	0	0	10	8/20
2018	160	-	0	100	0	0	0	0	11/20
2023	100	-	20	80	0	0	0	0	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2005	-	-	-	-	-	-	-	-	6/7
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	20	-	0	100	0	0	0	0	- / -
2023	20	-	0	100	0	0	0	0	- / -
Purshia tridentata^P -- (antelope bitterbrush)									
2005	780	-	15	77	8	28	44	5	26/55
2008	660	-	0	85	15	18	15	15	32/69
2013	980	-	8	88	4	27	61	29	31/77
2018	1400	-	4	91	4	33	59	1	37/89
2023	1580	-	1	99	0	35	63	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 (%)				
Tetradymia canescens -- (spineless horsebrush)									
2005	20	-	0	100	0	100	0	0	30/58
2008	20	-	0	0	100	0	0	0	- / -
2013	40	-	0	50	50	50	50	50	19/34
2018	20	-	0	100	0	0	0	0	30/37
2023	40	-	0	100	0	0	0	0	- / -

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

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

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

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

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	WATSON-DM
Elevation	5,617ft (1,712m)
Aspect	North-Northeast
Slope	5%
Sample Dates	07/08/2008, 08/09/2011, 08/19/2014, 07/26/2018, 07/26/2023

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

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

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

Mix Name			Application Type	Application Date	Acres
Brown's Park Fields			Drill	Jan 2009	161
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.62	0.51
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.62	0.59
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.62	0.55
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.93	0.79
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.31	0.27
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.62	0.57
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.24	1.08
G	Poa secunda	Canby Bluegrass	Canbar	0.31	0.27
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.93	0.88
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.62	0.51
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	1.24	1.13
F	Medicago sativa	Alfalfa	Ladak	0.93	0.85
F	Medicago sativa	Alfalfa	Ranger	1.24	1.14
S	Atriplex canescens	Fourwing Saltbush	Central UT	0.31	0.13

Mix Name			Application Type	Application Date	Acres
Brown's Park Fields - sage and kochia			Drill	Jan 2009	161
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.99	0.19
S	Bassia prostrata	Forage Kochia	Harney OR	0.35	0.25
S	Bassia prostrata	Forage Kochia	Harney OR	0.62	0.45

Mix Name			Application Type	Application Date	Acres
Crouse Bench			Drill	Dec 2006	225
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Dactylis glomerata	Orchardgrass	Paiute	0.24	0.23
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.00	0.92
G	Poa secunda	Canby Bluegrass	Canbar	0.24	0.18
F	Medicago sativa	Alfalfa	Nomad	2.00	1.86
F	Onobrychis viciifolia	Sainfoin	Eski	4.00	3.67
F	Sanguisorba minor	Small Burnet	Delar	3.00	2.79

Mix Name			Application Type	Application Date	Acres
Crouse Bench Shrubs			Drill	Dec 2006	225
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Utah UT	1.00	0.17
S	Bassia prostrata	Forage Kochia	Millard UT	1.00	0.76

Wildlife Habitat and Vegetation History

Table 09R-16.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		
Shiras Moose	crucial	summer
Rocky Mountain Bighorn	RMBS	year-long

Table 09R-16.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Annual-Perennial Grass	No Encroachment
2011	Annual Grass-Forb	No Encroachment
2014	Annual Grass	No Encroachment
2018	Annual Grass	No Encroachment
2023	Perennial Grass	No Encroachment

Site Notes

Mormon crickets were observed in high amounts in 2023.

Site Potential

1981 - 2010 Average Annual Precipitation 9 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.

Upon study establishment in 2008, this site was dominated by a mixture of annual and perennial grasses, namely cheatgrass (*Bromus tectorum*) and intermediate wheatgrass (*Thinopyrum intermedium*). Since then, the dominant vegetation component has varied. Annual grasses were a dominant vegetation component in each sample year through 2018. Cheatgrass cover decreased in 2023 while that of perennial grasses increased, however, and perennial grasses, mainly the native species western wheatgrass (*Pascopyrum smithii*) and introduced species intermediate wheatgrass, were the dominant site component during the most recent sampling. Forb cover varied from year to year with the most abundant species being burningbush (*Bassia scoparia*) in 2011 (Table 09R-16.7, Table 09R-16.10). Browse has remained rare throughout the duration of the study period (Table 09R-16.12, Table 09R-16.13).

Deer winter range condition on this site has remained very poor throughout the study period. Improvements to winter range could be accomplished through efforts that increase preferred browse cover and recruitment of young. Diversifying and increasing cover of perennial forbs while decreasing annual grasses would also be beneficial for deer winter range (Table 09R-16.15). Despite the very poor condition, deer and elk presence was high in 2023 according to pellet transect data (Table 09R-16.9).

Trend Summary Tables**Table 09R-16.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	0.0	0.1	-	0.1	-	-
2011	-	0.1	-	0.2	0.2	-
2014	-	0.4	-	0.1	0.5	-
2018	0.4	0.4	-	0.7	-	-
2023	1.0	0.3	-	1.5	0.2	-

Table 09R-16.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	371	246	373	36	9.9	7.6	8.5	0.4
2011	202	184	151	29	9.6	7.7	16.4	1.1
2014	433	191	90	29	37.7	4.1	2.2	0.3
2018	431	330	24	47	20.1	17.9	0.2	0.6
2023	231	398	109	51	4.2	29.7	3.2	1.5

Table 09R-16.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	43.2	-	32.9	0.6	0.3	35.5
2011	43.6	-	24.4	-	0.0	33.5
2014	34.2	-	47.7	0.3	0.2	46.6
2018	19.7	-	69.1	0.1	0.6	37.3
2023	46.2	0.6	29.3	1.3	0.8	37.5

Table 09R-16.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Pronghorn	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
2008	-	-	61	31	-	69
2011	-	-	15	12	-	1
2014	3	-	39	22	2	36
2018	1	-	10	19	-	23
2023	-	-	25	39	-	5
Year	Days Use Per Acre (ha)					
2008	-	-	99.8 (246.6)	28.1 (69.5)	-	-
2011	-	-	11.4 (28.1)	22.8 (56.3)	-	-
2014	-	-	67.0 (165.5)	11.4 (28.1)	8.7 (21.5)*	-
2018	-	2.9 (7.2)	32.2 (79.5)	13.4 (33.1)	8.7 (21.5)*	-
2023	-	0.7 (1.8)	57.7 (142.4)	54.3 (134.1)	-	-

*Pellets per acre (ha)

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex obtusata (obtusate sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca idahoensis (Idaho fescue)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency												
2008	2	57	-	371	-	-	-	-	-	-	6	36	199
2011	-	61	1	202	-	0	-	-	89	-	5	-	57
2014	1	42	-	433	-	-	4	2	114	4	32	-	8
2018	-	122	20	431	-	-	-	-	104	-	46	-	118
2023	0	49	14	231	9	-	-	-	282	2	41	4	87
year	Average Cover (%)												
2008	0.1	1.2	-	9.9	-	-	-	-	-	-	0.2	0.4	5.6
2011	-	1.5	0.1	9.6	-	0.0	-	-	3.3	-	0.2	-	2.5
2014	0.0	1.4	-	37.7	-	-	0.0	0.0	1.6	0.0	1.0	-	0.0
2018	-	5.5	1.1	20.1	-	-	-	-	3.5	-	1.9	-	5.8
2023	0.0	2.9	0.7	4.2	0.5	-	-	-	15.9	0.0	2.6	0.2	6.8

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

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

FORB SPECIES														
Bassia scoparia ^{ai} (burningbush)														
Chenopodium fremontii ^a (Fremont's goosefoot)														
Chenopodium leptophyllum ^a (narrowleaf goosefoot)														
Descurainia pinnata ^a (western tansymustard)														
Helianthus annuus ^{ai} (common sunflower)														
Iva axillaris (povertyweed)														
Lactuca serriola ^{ai} (prickly lettuce)														
Medicago sativa ^a (alfalfa)														
Penstemon (beardtongue)														
Salsola tragus ^{ai} (prickly Russian thistle)														
Sisymbrium altissimum ^{ai} (tall tumblemustard)														
Sphaeralcea coccinea (scarlet globemallow)														
Tragopogon dubius ^{ai} (yellow salsify)														
year	Nested Frequency													
2008	269	-	1	-	-	13	-	1	25	163	164	2	3	
2011	136	2	8	-	6	26	-	-	-	8	5	3	-	
2014	13	-	-	10	-	5	2	-	25	25	45	-	4	
2018	-	-	-	3	-	-	-	2	38	-	20	14	1	
2023	3	-	19	5	-	51	-	0	-	25	72	3	-	
year	Average Cover (%)													
2008	5.3	-	0.0	-	-	0.2	-	0.0	0.1	0.3	2.9	0.0	0.0	
2011	14.8	0.0	0.6	-	0.2	1.1	-	-	-	0.6	0.2	0.0	-	
2014	0.6	-	-	0.0	-	0.0	0.0	-	0.2	0.6	0.9	-	0.0	
2018	-	-	-	0.0	-	-	-	0.0	0.4	-	0.1	0.1	0.0	
2023	0.4	-	0.1	0.0	-	1.5	-	0.0	-	0.2	2.5	0.0	-	

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

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

SHRUB SPECIES				
Atriplex canescens ^p (fourwing saltbush)				
Bassia prostrata ^{ai} (forage Kochia)				
Gutierrezia sarothrae (broom snakeweed)				
Opuntia (pricklypear)				
year	Line Intercept Cover (%)			
2008	-	0.1	-	-
2011	-	0.2	-	0.2
2014	-	0.1	-	0.5
2018	-	0.7	-	-
2023	1.1	0.4	-	0.2
year	Quadrat Cover (%)			
2008	-	0.0	-	0.1
2011	-	0.0	-	0.1
2014	-	0.0	0.0	0.4
2018	-	0.4	-	0.4
2023	1.0	0.0	-	0.3

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

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

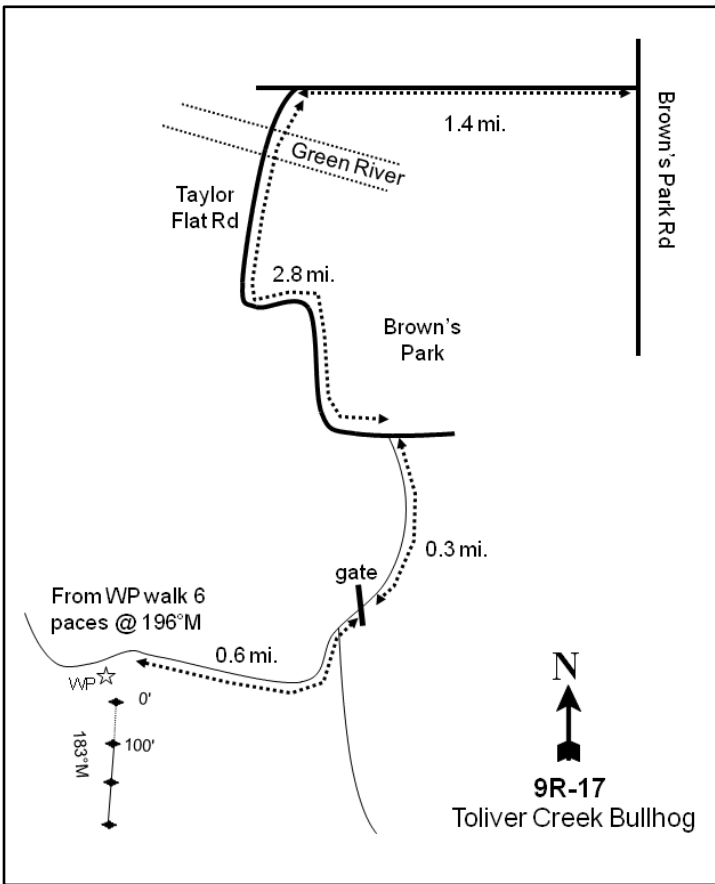
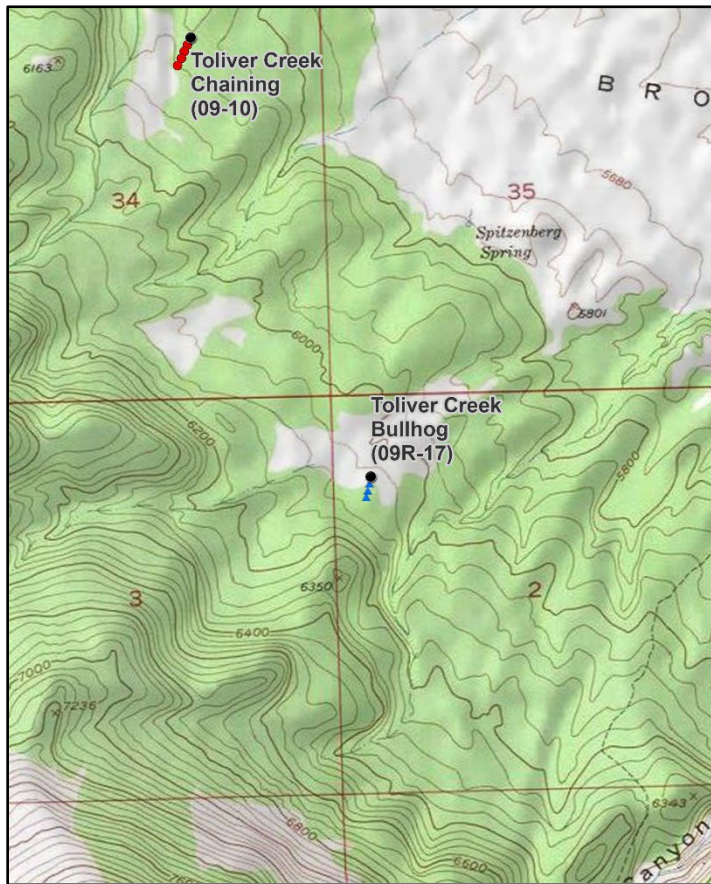
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	20	-	100	0	0	0	0	0	- / -
2014	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	14/16
2023	-	-	-	-	-	-	-	-	-/-
Atriplex canescens^p -- (fourwing saltbush)									
2008	-	-	-	-	-	-	-	-	50/69
2011	-	-	-	-	-	-	-	-	84/99
2014	-	-	-	-	-	-	-	-	82/134
2018	-	-	-	-	-	-	-	-	91/141
2023	40	-	0	100	0	0	0	0	- / -
Bassia prostrata^{pi} -- (forage kochia)									
2008	-	-	-	-	-	-	-	-	8/23
2011	20	-	0	100	0	0	0	0	- / -
2014	20	-	0	100	0	0	0	0	27/40
2018	40	-	0	100	0	50	0	0	61/93
2023	20	-	0	100	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	43/76
2011	-	-	-	-	-	-	-	-	65/92
2014	-	-	-	-	-	-	-	-	53/71
2018	-	-	-	-	-	-	-	-	86/158
2023	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2008	-	-	-	-	-	-	-	-	20/32
2011	-	-	-	-	-	-	-	-	-/-
2014	-	20	0	0	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	16/21
2023	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2008	100	-	0	100	0	0	0	0	8/20
2011	80	-	0	100	0	0	0	0	9/39
2014	100	-	0	100	0	0	0	0	9/65
2018	120	-	17	83	0	0	0	0	10/65
2023	860	-	0	100	0	0	0	0	- / -

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

Table 09R-16.15 - 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	0.2	0.0	0.0	15.2	-7.4	0.7	0.0	8.7	Very Poor
2011	0.3	0.0	0.0	15.4	-7.2	2.2	0.0	10.7	Very Poor
2014	0.2	0.0	0.0	8.1	-20.0	0.5	0.0	-11.2	Very Poor
2018	1.1	0.0	0.0	30.0	-15.1	1.1	0.0	17.1	Very Poor
2023	2.0	0.0	0.0	30.0	-3.2	3.1	0.0	31.9	Very Poor

TOLIVER CREEK BULLHOG - STUDY NO. 09R-17



Location Information

USGS 7.5 min Map Info Warren Draw NE; Township 1N, Range 24E, Section 02
 GPS (0' Stake) NAD 83 UTM ZONE 12, 653277 East 4524286 North

Transect Information

Browse Tag # (0' Stake) 261
 Transect Bearing 183° magnetic
 Length 300ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (54ft), Line 3 (34ft & 71ft)
 Belt Marker Placement No Rebar; Line 3: 85ft Long

Directions to Site

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

Site Information

Land Ownership State
 Land Administrator SITLA
 Allotment TAYLOR FLAT
 Elevation 6,050ft (1,844m)
 Aspect Northeast
 Slope 4%
 Sample Dates 07/29/2008, 08/09/2011, 08/20/2014, 07/26/2018, 07/26/2023

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Toliver's Creek Bullhog	1084	Fall 2008	195
Seeding - Aerial Before	Toliver's Creek Bullhog	1084	October 2008	195
Hand Crew - Lop and Scatter	Diamond Mountain Maintenance Project	5105	August-October 2020	2902

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

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

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

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

Table 09R-17.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Pinyon-Juniper	Phase II
2011	Mountain Big Sagebrush/Perennial Grass	Phase I
2014	Mountain Big Sagebrush/Perennial Grass	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I
2023	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

Mormon crickets were observed in high amounts in 2023.

Site Potential

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

The plant community on this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), Utah juniper (*Juniperus osteosperma*), and twoneedle pinyon (*Pinus edulis*) and was in Phase II of woodland succession upon study establishment in 2008 (Table 09R-17.4). Most of the trees were removed by a bullhog project later that year, and sagebrush has been a dominant vegetation component in all post-treatment sample years. Furthermore, most of the remaining tree component was removed by a maintenance lop and scatter project in 2020. However, pinyon and juniper were observed in low amounts in 2023: this continued tree presence indicates that infilling may be possible over time (Table 09R-14.1, Table 09R-14.12, Table 09R-14.13, Table 09R-17.14). Herbaceous cover was low prior to treatment and only perennial grasses were diverse. Cover of perennial grasses has increased following the bullhog and seeding treatment, and they have been a codominant cover type since 2011. Cheatgrass (*Bromus tectorum*) has been present with fluctuating cover since the first reading of the study. In 2018 and 2023, however, cheatgrass was abundant (Table 09R-17.7, Table 09R-17.10, Table 09R-17.11); high amounts of annual grasses can negatively impact the community's resilience and resistance to disturbance.

Deer winter range condition on this site has ranged between very poor and fair since study establishment. In 2023, condition was considered to be fair. Further improvements to deer winter range could be accomplished through efforts that encourage recruitment of young and additional cover increases in the preferred browse community. Diversifying and increasing cover of perennial forbs while

reducing cheatgrass would also prove beneficial for deer winter habitat (Table 09R-17.15). In addition, the sagebrush component of this site could provide valuable browse for elk during the winter months (Table 09R-17.3; Wambolt, 1996). According to pellet transect data, deer presence on this site was very high in 2023 while elk presence was moderate (Table 09R-17.9).

Trend Summary Tables

Table 09R-17.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	10.8	1.2	11.2	12.4	1.0	10.3
2011	9.7	1.6	-	14.7	1.8	0.2
2014	9.9	1.0	0.0	9.4	1.4	0.3
2018	10.0	3.5	0.1	10.4	4.7	0.5
2023	11.0	2.5	0.0	15.5	4.5	-

Table 09R-17.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	204	253	22	41	1.9	6.2	0.1	0.3
2011	333	304	92	87	7.9	12.6	0.4	1.7
2014	351	310	13	49	5.2	10.6	0.0	0.2
2018	341	332	19	55	12.4	16.0	0.1	0.4
2023	251	338	62	81	10.2	19.1	0.4	1.6

Table 09R-17.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	42.0	2.0	42.0	6.0	0.1	28.9
2011	36.5	1.4	38.1	0.1	0.1	32.1
2014	29.8	0.9	49.2	4.4	0.4	28.6
2018	24.5	1.8	62.1	0.2	-	36.1
2023	31.5	0.1	40.0	2.2	0.2	41.2

Table 09R-17.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2008	7	20	10	-	73
2011	-	25	12	-	10
2014	4	59	11	-	24
2018	-	22	1	-	21
2023	1	33	10	-	13
Year	Days Use Per Acre (ha)				
2008	26.8 (66.3)	75.7 (187.0)	26.2 (64.6)	-	-
2011	-	46.2 (114.2)	12.1 (29.8)	26.2 (64.6)*	-
2014	-	4.7 (11.6)	3.4 (8.3)	-	-
2018	-	34.9 (86.1)	3.4 (8.3)	-	-
2023	3.6 (9.0)	133.4 (329.4)	29.5 (72.8)	-	-

*Pellets per acre (ha)

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus airoides (alkali sacaton)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency												
2008	14	18	172	39	2	-	94	108	2	90	-	7	104
2011	9	22	325	44	11	11	111	155	-	31	14	-	44
2014	9	43	327	26	13	16	127	91	-	85	18	21	165
2018	23	31	312	33	20	2	91	180	49	61	2	8	181
2023	4	53	243	49	5	-	88	227	9	79	1	10	55
year	Average Cover (%)												
2008	0.1	0.4	1.7	0.9	0.1	-	2.2	1.3	0.0	1.2	-	0.0	0.3
2011	1.1	1.1	7.8	0.9	0.4	0.0	5.1	2.9	-	0.6	0.3	-	0.2
2014	0.5	2.1	4.2	0.1	0.1	0.1	5.6	0.6	-	1.0	0.2	0.2	1.0
2018	1.7	1.9	9.0	0.2	0.3	0.0	5.1	3.6	2.0	0.9	0.1	0.2	3.4
2023	0.5	3.6	9.9	1.1	0.0	-	4.3	7.7	0.1	1.6	0.0	0.1	0.2

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

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

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cirsium (thistle)	Comandra umbellata (bastard toadflax)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Iva axillaris (povertyweed)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium ^a (pepperweed)	Mentzelia albicaulis ^a (whitestem blazingstar)
year	Nested Frequency																
2008	12	-	-	-	-	-	1	2	-	-	-	8	15	-	3	-	-
2011	45	9	7	8	1	-	-	4	-	-	21	20	37	2	-	-	2
2014	-	3	-	-	-	-	-	13	-	-	-	-	27	-	5	-	-
2018	1	7	3	-	4	1	-	-	7	4	-	-	32	6	-	3	-
2023	35	-	-	-	9	-	-	-	-	-	4	3	42	-	5	18	-
year	Average Cover (%)																
2008	0.0	-	-	-	-	-	0.0	0.0	-	-	-	0.1	0.0	-	0.0	-	-
2011	0.2	0.6	0.0	0.0	0.0	-	-	0.0	-	-	0.1	0.0	0.6	0.0	-	-	0.0
2014	-	0.0	-	-	-	-	-	0.0	-	-	-	-	0.1	-	0.0	-	-
2018	0.0	0.1	0.0	-	0.0	0.0	-	-	0.0	0.0	-	-	0.3	0.0	-	0.0	-
2023	0.2	-	-	-	0.2	-	-	-	-	-	0.0	0.0	0.6	-	0.0	0.1	-

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

FORB SPECIES	Orobanche fasciculata (clustered broomrape)	Packera multilobata (lobeleaf groundsel)	Phlox hoodii (spiny phlox)	Plantago patagonica ^a (woolly plantain)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency					
2008	5	-	-	-	20	-
2011	-	-	-	2	42	2
2014	-	2	3	-	17	-
2018	-	-	-	2	14	-
2023	-	-	-	6	47	1
year	Average Cover (%)					
2008	0.0	-	-	-	0.2	-
2011	-	-	-	0.0	0.4	0.0
2014	-	0.0	0.0	-	0.0	-
2018	-	-	-	0.0	0.0	-
2023	-	-	-	0.0	0.8	0.0

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

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

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)					
2008	-	12.4	0.4	5.9	0.6	4.4
2011	-	14.7	1.2	0.2	0.6	-
2014	-	9.4	0.3	0.3	1.1	-
2018	-	10.4	3.9	0.5	0.8	-
2023	-	15.5	3.2	-	1.3	-
year	Quadrat Cover (%)					
2008	-	10.8	0.5	7.6	0.8	3.6
2011	0.0	9.6	1.1	0.0	0.5	-
2014	-	9.9	0.3	0.0	0.7	-
2018	-	10.0	2.9	0.1	0.6	-
2023	-	11.0	1.6	0.0	0.8	-

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

Table 09R-17.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
2008	-	-	-	-	-	-	-	-	-/-
2011	20	-	100	0	0	0	0	0	72/83
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	40	-	0	50	50	0	0	50	-/-
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2008	4120	160	3	63	34	21	65	17	35/57
2011	4800	240	14	80	6	27	30	6	33/58
2014	4340	80	7	77	16	32	60	15	33/61
2018	3920	40	4	82	14	36	12	20	36/61
2023	3780	20	4	84	13	29	10	8	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	35/39
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	53/56
2023	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2008	420	-	0	91	10	0	5	5	18/22
2011	860	-	9	84	7	0	0	9	21/33
2014	380	-	32	68	0	0	0	0	14/23
2018	6100	-	2	98	0	0	0	3	14/24
2023	2580	20	0	98	2	0	0	2	-/-
Juniperus osteosperma¹ -- (Utah juniper)									
2008	120	-	17	67	17	0	0	33	-/-
2011	20	-	0	100	0	0	0	0	-/-
2014	20	-	100	0	0	0	0	0	-/-
2018	160	-	13	88	0	0	0	0	-/-
2023	20	-	0	100	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2008	660	40	6	88	6	0	0	3	10/37
2011	660	-	0	100	0	0	0	0	9/27
2014	880	20	2	96	2	0	0	5	10/36
2018	900	-	4	96	0	0	0	0	8/27
2023	980	-	0	86	14	0	0	14	-/-
Pinus edulis¹ -- (twoneedle pinyon)									
2008	120	-	17	83	0	0	0	0	-/-
2011	20	-	100	0	0	0	0	0	-/-
2014	20	-	100	0	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Rhus trilobata var. trilobata^P -- (skunkbush sumac)									
2008	-	-	-	-	-	-	-	-	-/-
2011	20	-	100	0	0	0	0	0	15/12
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	8/13
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Rosa woodsii^p -- (Woods' rose)									
2008	-	-	-	-	-	-	-	-	35/35
2011	-	-	-	-	-	-	-	-	28/24
2014	-	-	-	-	-	-	-	-	37/28
2018	-	-	-	-	-	-	-	-	38/29

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

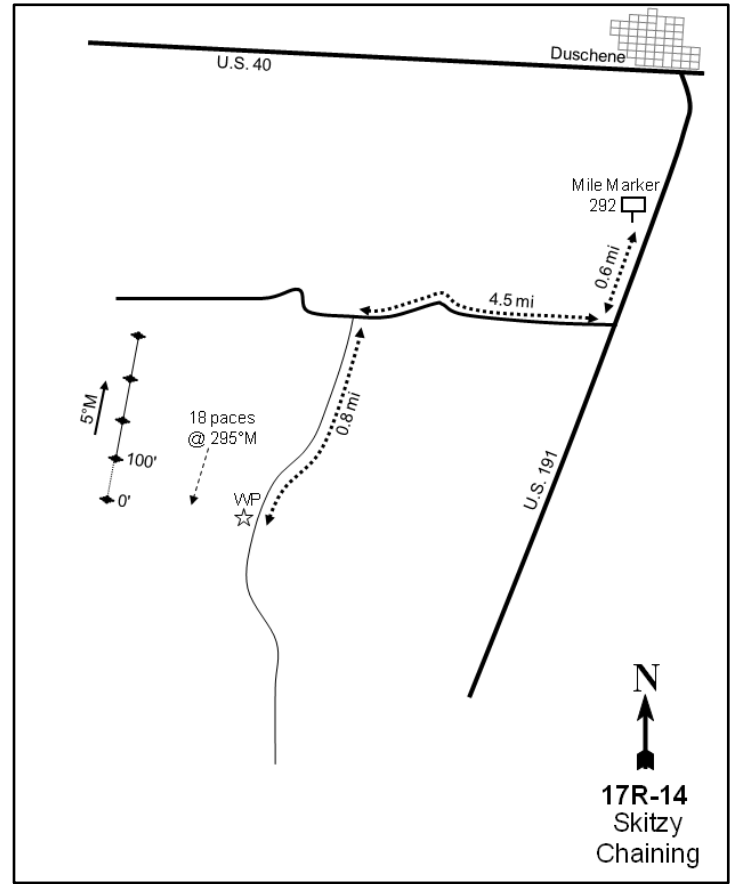
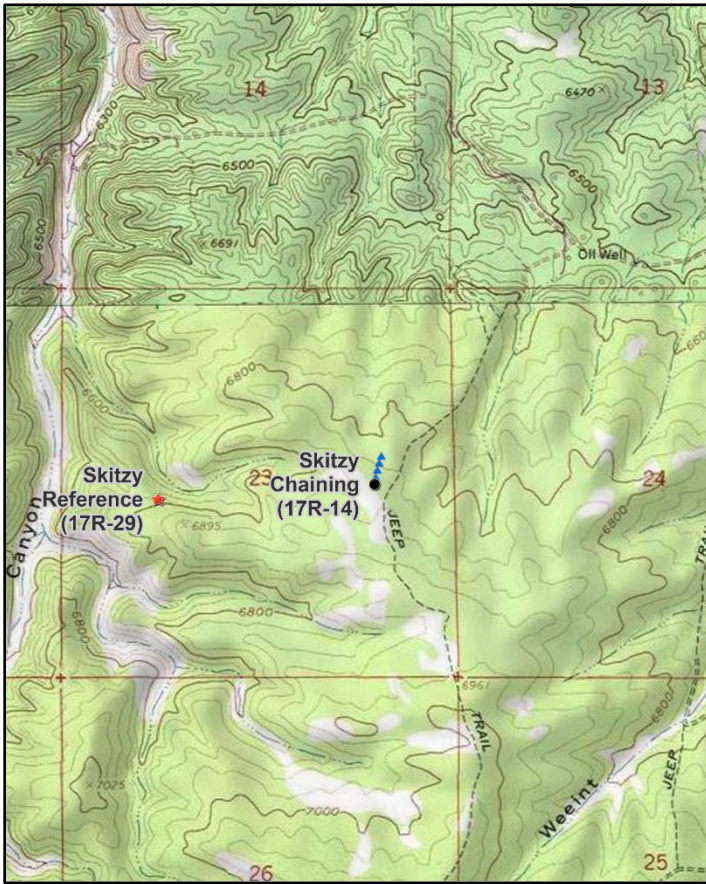
Table 09R-17.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	49	-	6	50	44	-	22.9
2011	15	9	82	9	-	-	9.9
2014	21	15	85	-	-	-	7.1
2018	25	21	50	29	-	-	4.7
2023	7	100	-	-	-	-	1.0
Pinus edulis (twoneedle pinyon)							
2008	36	-	-	38	23	38	13.3
2011	4	67	-	33	-	-	5.3
2014	4	-	67	33	-	-	6.0
2018	8	-	100	-	-	-	3.6
2023	1	100	-	-	-	-	1.0

Table 09R-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
2008	15.5	5.0	1.7	12.4	-1.4	0.5	0.0	33.6	Very Poor-Poor
2011	18.4	13.1	6.9	25.2	-6.0	3.5	0.0	61.1	Fair
2014	11.8	10.2	3.5	21.1	-3.9	0.4	0.0	43.0	Poor
2018	13.0	10.7	2.1	30.0	-9.3	0.9	0.0	47.4	Poor
2023	19.4	11.2	1.9	30.0	-7.6	3.2	0.0	58.0	Fair

SKITZY CHAINING - STUDY NO. 17R-14

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Buck Knoll NE; Township 4S, Range 6W, Section 23
NAD 83 UTM ZONE 12, 540499 East 4441000 North

Transect Information

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

254
5° magnetic
400ft
Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)
Belt 2: No Rebar

Directions to Site

Driving from the junction of US-40 and US-191 in Duschene, drive south on US-191 to mile marker 292. Drive 0.6 miles past the mile marker to a road on the right (west) side. Turn right and proceed for 4.5 miles to a two-track on the left (south) side of the road. Turn left and drive 0.8 miles to the witness post on the right (west) side of the road. From the witness post, walk 150 feet at 290 degrees magnetic to the 0-foot stake which is marked with browse tag #254.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,880ft (2,097m)
Aspect	North
Slope	11-13%
Sample Dates	07/29/2005, 08/04/2008, 07/08/2009, 06/26/2013, 06/18/2015, 08/01/2018, 07/25/2023

Table 17R-14.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Skitzzy Canyon Range Rehabilitation	69	November 2005	529
Seeding - Aerial After	Skitzzy Canyon Range Rehabilitation	69	November 2005	529
Chaining - Two-Way Ely	Skitzzy Canyon Range Rehabilitation	69	November 2005	529

Table 17R-14.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Skitzzy P/J Chaining			Aerial	Nov 2005	700
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	1.00	0.87
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.46
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.00	0.92
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.50	0.47
G	Poa secunda	Canby Bluegrass	Canbar	0.25	0.23
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.85
F	Linum perenne	Blue Flax		0.25	0.23
F	Medicago sativa	Alfalfa	Ladak	0.50	0.47
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.88
F	Sanguisorba minor	Small Burnet		2.00	1.92
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.71	0.32
S	Atriplex canescens	Fourwing Saltbush	Sevier UT	0.29	0.11

Mix Name			Application Type	Application Date	Acres
Skitzzy PJ Chaining - Browse			Aerial	Dec 2005	700
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.21
S	Bassia prostrata	Forage Kochia	Beaver UT	1.00	0.67
S	Ericameria nauseosa	Whitestem Rubber Rabbitbrush	Sanpete UT	0.50	0.17

Wildlife Habitat and Vegetation History

Table 17R-14.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 17R-14.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon-Juniper	Phase III
2008	Perennial Grass	Phase I
2009	Perennial Grass	Phase I
2013	Perennial Grass	Phase I
2015	Perennial Grass	Phase I
2023	Perennial Grass	Phase I

Site Notes

The study was established on the Skitzzy Canyon WMA to monitor a chaining and seeding project. This project was proposed after biologists attributed the loss of one half to one third of the historical herd size of deer to the loss of winter range to pinyon-juniper woodlands (WRI Database, 2023).

Soils

Table 17R-14.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.4	44.0	37.4	18.6	6.4	19.2	131.2	1.3	07/29/2005

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Stony Loam (Black Sagebrush)
NRCS Ecological Site #	R047XA332UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2005, this site was in Phase III of woodland succession and dominated by encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Other browse species were present, but provided limited cover. The chaining and seeding treatment in 2005 removed most of the trees, and the post-treatment shrub component has been dominated by forage kochia (*Bassia prostrata*) and black sagebrush (*Artemisia nova*) (Table 17R-14.1, Table 17R-14.4, Table 17R-14.12, Table 17R-14.13, Table 17R-14.14). The herbaceous understory was comprised of a diverse number of forbs and grasses that contributed little cover prior to treatment. Perennial grasses increased following treatment and have been the dominant vegetation component since 2008 (Table 17R-14.7, Table 17R-14.10, Table 17R-14.11). Although density has remained low, pinyon and juniper have maintained a presence on site in all post-treatment sample years (Photos, Table 17R-14.14), indicating that infilling could occur over time.

Deer winter range condition has ranged between very poor and excellent since study establishment in 2005. In 2023, winter range condition was considered to be good. Further improvements to deer winter range could be accomplished by increasing preferred browse cover and recruitment of young; increasing cover of native perennial forbs would also prove beneficial for deer wintering habitat (Table 17R-14.15). Deer presence has remained low throughout the study period, while elk presence has been high in most sample years including 2023 (Table 17R-14.9). The sagebrush component of this site could provide browse for elk during the winter months (Table 17R-14.3; Wambolt, 1996), but most black sagebrush and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) plants sampled in density measurements during the most recent sample year showed signs of little to no utilization (Table 17R-14.13).

Trend Summary Tables**Table 17R-14.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	1.1	0.5	9.4	0.8	0.5	28.4
2008	2.9	1.8	-	6.5	1.0	-
2009	4.0	0.9	-	5.0	0.4	-
2013	7.5	0.9	0.0	8.9	0.8	-
2015	9.5	1.0	-	10.5	0.7	-
2018	6.7	0.9	-	7.4	0.6	-
2023	13.1	0.8	-	18.4	0.5	-

Table 17R-14.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	1	200	73	120	0.0	4.0	1.0	2.4
2008	34	281	30	141	1.0	16.5	0.4	3.2
2009	26	280	39	105	0.4	14.8	0.6	1.9
2013	29	312	21	92	0.2	18.8	0.2	3.1
2015	49	326	71	75	0.9	30.4	1.1	2.6
2018	36	336	10	28	0.5	22.5	0.1	0.3
2023	3	311	41	45	0.0	16.9	0.6	0.5

Table 17R-14.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	21.3	1.9	47.5	22.0	2.9	16.6
2008	6.6	-	59.5	12.9	3.4	27.3
2009	6.1	-	54.3	16.4	2.4	28.2
2013	8.0	0.0	54.3	7.0	5.1	34.0
2015	15.0	-	51.7	17.7	2.5	44.9
2018	9.9	-	57.8	20.0	4.9	32.2
2023	7.8	-	45.4	20.0	7.3	30.1

Table 17R-14.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	-	2	4	31
2008	-	10	28	33
2009	-	17	23	9
2013	1	2	47	-
2015	-	2	19	9
2018	-	11	19	5
2023	1	2	26	2
Year	Days Use Per Acre (ha)			
2005	-	14.1 (34.8)	16.1 (39.7)	-
2008	-	6.0 (14.9)	42.2 (104.3)	-
2009	-	-	-	-
2013	-	2.0 (5.0)	45.6 (112.6)	-
2015	-	2.0 (5.0)	32.2 (79.5)	-
2018	-	16.1 (39.7)	47.6 (117.5)	-
2023	4.4 (10.8)	5.3 (13.2)	80.4 (198.6)	-

Table 17R-14.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Leymus salinus (saline wildrye)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency															
2005	8	-	-	1	1	3	-	75	29	-	7	12	9	46	-	55
2008	10	-	75	-	34	5	-	156	60	-	7	21	18	63	10	22
2009	15	-	78	-	26	-	-	137	95	-	8	2	8	39	15	21
2013	26	1	122	3	29	5	-	127	78	-	13	-	-	49	28	98
2015	38	-	113	5	49	-	1	130	62	36	13	51	3	62	31	19
2018	54	4	137	-	36	-	-	27	45	-	17	103	19	39	32	76
2023	33	6	117	1	3	-	-	1	42	-	13	97	11	25	56	69
year	Average Cover (%)															
2005	0.0	-	-	0.0	0.0	0.2	-	0.8	0.5	-	0.6	0.5	0.2	0.4	-	0.9
2008	0.4	-	2.9	-	1.0	0.0	-	4.6	2.7	-	0.4	1.5	0.3	1.5	0.5	1.6
2009	0.7	-	2.5	-	0.4	-	-	3.6	5.0	-	0.6	0.1	0.2	0.6	0.3	1.4
2013	1.7	0.0	3.3	0.4	0.2	0.0	-	3.5	1.8	-	0.4	-	-	0.4	1.0	6.4
2015	2.5	-	4.0	0.0	0.9	-	0.1	4.4	4.2	4.0	1.1	5.3	0.1	1.3	1.6	1.8
2018	3.2	0.0	6.6	-	0.5	-	-	0.3	0.7	-	0.3	5.6	0.1	0.2	0.6	4.7
2023	1.6	0.2	4.1	0.0	0.0	-	-	0.1	1.7	-	0.4	3.1	0.1	0.2	2.4	3.2

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

Table 17R-14.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis ^a (pygmy/flower rockjasmine)	Antennaria (pussytoes)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus (milkvetch)	Astragalus chamaeleuce var. chamaeleuce (cicada milkvetch)	Astragalus convallarius (lesser rusby milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album ^a (lambsquarters)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Hedysarum boreale (Utah sweetvetch)
year	Nested Frequency																
2005	8	-	56	-	-	-	2	-	-	-	8	44	-	9	5	18	37
2008	2	3	-	6	1	-	27	2	3	2	2	-	8	12	7	0	28
2009	-	-	-	-	-	-	14	14	-	2	7	6	20	7	8	-	31
2013	-	3	2	2	-	-	14	-	-	5	2	-	8	-	1	-	47
2015	12	-	-	-	-	5	7	-	-	-	1	1	6	-	5	36	37
2018	-	-	-	-	5	8	3	-	-	-	-	3	-	-	8	7	1
2023	2	-	-	-	-	11	12	-	-	-	-	2	24	4	1	-	11
year	Average Cover (%)																
2005	0.0	-	0.3	-	-	-	0.0	-	-	-	0.0	0.8	-	0.0	0.0	0.1	1.8
2008	0.0	0.0	-	0.0	0.0	-	0.3	0.0	0.0	0.0	0.0	-	0.0	0.2	0.1	0.0	1.1
2009	-	-	-	-	-	-	0.1	0.2	-	0.0	0.2	0.3	0.2	0.0	0.3	-	0.4
2013	-	0.0	0.0	0.1	-	-	0.1	-	-	0.1	0.0	-	0.2	-	0.0	-	2.3
2015	0.1	-	-	-	-	0.0	0.1	-	-	-	0.0	0.0	0.0	-	0.3	0.7	1.8
2018	-	-	-	-	0.0	0.1	0.0	-	-	-	-	0.0	-	-	0.2	0.1	0.0
2023	0.0	-	-	-	-	0.1	0.1	-	-	-	-	0.0	0.1	0.0	0.0	-	0.3

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

FORB SPECIES	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Mentzelia albicaulis ^{ai} (whitestem blazingstar)	Onobrychis vicifolia ⁱ (sainfoin)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Taraxacum officinale (common dandelion)	Townsendia (Townsend daisy)
year	Nested Frequency													
2005	-	-	8	-	-	-	10	12	11	-	-	7	-	3
2008	0	-	10	5	1	12	6	4	15	1	24	35	-	3
2009	-	1	9	5	-	-	14	3	2	-	22	19	-	-
2013	-	-	10	3	-	-	5	9	27	3	4	3	-	-
2015	-	-	29	4	-	-	3	10	10	-	4	2	4	-
2018	-	-	-	-	-	-	5	3	-	-	-	-	-	-
2023	-	-	19	3	-	-	-	6	-	4	-	2	-	-
year	Average Cover (%)													
2005	-	-	0.0	-	-	-	0.1	0.1	0.1	-	-	0.0	-	0.0
2008	0.0	-	0.1	0.0	0.0	0.2	0.1	0.0	0.1	0.0	0.7	0.5	-	0.0
2009	-	0.0	0.0	0.0	-	-	0.1	0.1	0.0	-	0.4	0.1	-	-
2013	-	-	0.0	0.0	-	-	0.0	0.1	0.1	0.0	0.2	0.0	-	-
2015	-	-	0.3	0.0	-	-	0.0	0.1	0.0	-	0.1	0.0	0.0	-
2018	-	-	-	-	-	-	0.0	0.0	-	-	-	-	-	-
2023	-	-	0.1	0.0	-	-	-	0.0	-	0.4	-	0.0	-	-

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

Table 17R-14.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Bassia prostrata ^p (forage kochia)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Echinocactus (echinocactus)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis ⁱ (twoneedle pinyon)
year	Line Intercept Cover (%)												
2005	0.4	0.4	-	-	0	0.3	-	0.1	12.2	-	0.1	-	16.2
2008	-	2.4	-	4.1	-	0.5	-	0.5	-	-	-	-	-
2009	-	2.3	-	2.7	-	0.4	-	-	-	-	-	-	-
2013	-	1.3	0.6	6.9	0.1	0.8	-	-	-	-	-	-	-
2015	-	3.1	0.4	7	-	0.7	-	-	-	-	-	-	-
2018	-	3.3	0.2	3.9	-	0.6	-	-	-	-	-	-	-
2023	-	5.7	0.8	11.9	-	0.5	-	-	-	-	-	-	-
year	Quadrat Cover (%)												
2005	0.0	1.0	-	-	0.0	0.4	-	0.0	4.4	-	0.1	-	5.0
2008	-	1.1	-	1.6	0.2	1.0	-	0.8	-	-	-	0.0	-
2009	-	1.2	0.0	2.8	-	0.8	0.0	0.0	-	-	0.0	-	-
2013	-	2.8	0.0	4.5	0.2	0.8	-	0.0	0.0	-	0.0	-	-
2015	-	3.0	0.1	6.3	0.0	1.0	-	-	-	-	-	-	-
2018	-	2.0	0.8	3.8	0.2	0.8	-	-	-	0.0	-	-	-
2023	-	3.0	0.0	9.9	0.2	0.8	-	-	-	-	-	0.0	-

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

Table 17R-14.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2005	20	-	0	100	0	100	0	0	56/26
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Artemisia nova^p -- (black sagebrush)									
2005	460	-	4	61	35	35	56	17	29/61
2008	4320	6520	93	7	1	0	0	0	23/47
2009	-	-	-	-	-	-	-	-	20/33
2013	3960	40	9	91	0	25	69	7	20/37
2015	4060	240	70	31	0	30	7	0	24/46
2018	3760	-	14	83	3	0	0	3	19/35
2023	1920	-	0	90	10	2	1	7	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	23/30
2013	220	-	9	91	0	36	46	0	29/37
2015	100	-	20	80	0	0	0	0	36/50
2018	400	-	5	90	5	0	10	0	36/49
2023	200	-	0	70	30	10	0	40	- / -
Atriplex canescens^p -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	64/56
2009	-	-	-	-	-	-	-	-	58/80
2013	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	97/165
2018	-	-	-	-	-	-	-	-	128/242
2023	-	-	-	-	-	-	-	-	-/-
Bassia prostrata^{pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	3580	280	30	70	0	24	43	0	36/42
2009	-	-	-	-	-	-	-	-	31/29
2013	12480	4020	62	38	0	29	2	0	20/29
2015	11120	5460	55	45	0	15	1	0	26/36
2018	9720	300	24	73	3	16	0	3	22/23
2023	9600	4920	2	98	0	45	7	0	- / -
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
2005	160	-	0	100	0	0	0	0	18/18
2008	80	-	0	100	0	25	0	0	19/33
2009	-	-	-	-	-	-	-	-	12/25
2013	160	-	25	75	0	0	0	0	23/37
2015	140	-	29	71	0	0	0	0	22/35
2018	220	-	0	73	27	18	0	27	17/37
2023	280	-	0	100	0	7	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2005	20	-	0	100	0	0	0	0	33/57
2008	20	-	0	100	0	0	0	100	36/61
2009	-	-	-	-	-	-	-	-	34/54
2013	60	-	33	67	0	0	0	0	43/70
2015	20	-	0	100	0	0	0	0	50/89
2018	20	-	0	100	0	0	0	0	45/64
2023	100	-	0	100	0	0	0	0	- / -
Ephedra viridis^p -- (mormon tea)									
2005	-	-	-	-	-	-	-	-	142/194
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	19/40
2013	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	52/64
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	34/45
2009	-	-	-	-	-	-	-	-	36/42
2013	-	-	-	-	-	-	-	-	53/52
2015	-	-	-	-	-	-	-	-	66/74
2018	-	-	-	-	-	-	-	-	63/82
2023	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2005	300	-	0	100	0	0	0	0	18/13
2008	120	-	0	100	0	0	0	0	28/35
2009	-	-	-	-	-	-	-	-	22/29
2013	20	-	0	100	0	0	0	0	12/9
2015	40	20	0	100	0	0	0	0	24/28
2018	280	-	71	29	0	0	0	0	13/13
2023	60	-	0	100	0	0	0	0	-/-
Juniperus osteosperma¹ -- (Utah juniper)									
2005	200	-	10	70	20	0	0	10	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	80	20	100	0	0	0	0	0	-/-
2015	20	20	100	0	0	0	0	0	-/-
2018	60	-	100	0	0	0	0	0	-/-
2023	-	-	-	-	-	-	-	-	-/-
Linanthus pungens -- (granite prickly phlox)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	40	0	0	0	0	0	0	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	60	-	0	100	0	0	0	0	3/13
2023	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2005	140	-	0	100	0	0	0	0	11/30
2008	60	-	0	100	0	0	0	33	7/19
2009	-	-	-	-	-	-	-	-	8/22
2013	40	-	0	100	0	0	0	0	7/18
2015	-	-	-	-	-	-	-	-	13/30
2018	20	-	0	100	0	0	0	0	9/15
2023	-	-	-	-	-	-	-	-	-/-
Pinus edulis¹ -- (twoneedle pinyon)									
2005	160	100	25	75	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Purshia tridentata^p -- (antelope bitterbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	38/44

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

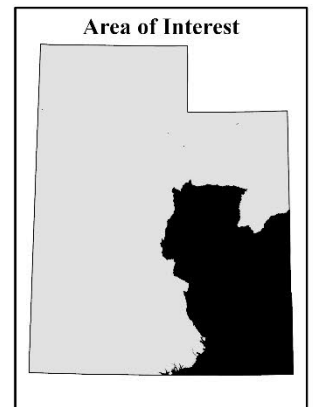
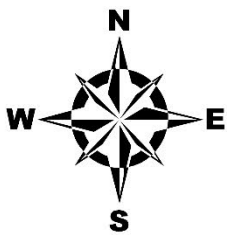
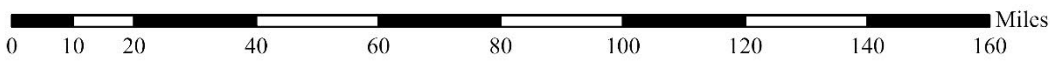
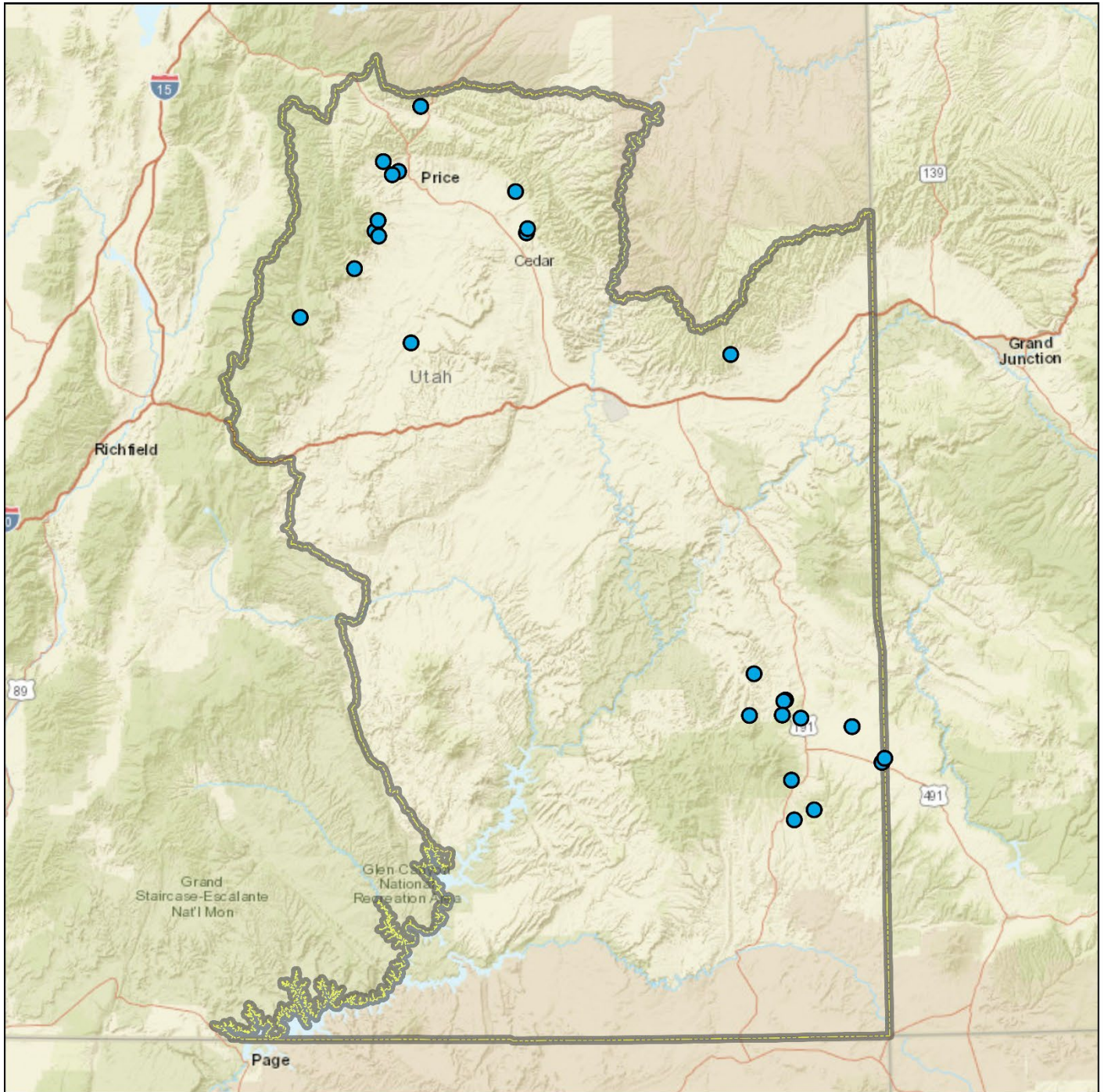
Table 17R-14.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2005	252	-	5	35	25	35	30.4
2008	14	25	75	-	-	-	4.9
2009	7	-	67	17	17	-	6.8
2013	8	-	100	-	-	-	6.0
2015	14	33	56	-	-	11	4.4
2018	30	55	45	-	-	-	5.1
2023	27	45	55	-	-	-	3.0
Pinus edulis (twoneedle pinyon)							
2005	185	15	35	5	20	25	10.8
2008	6	75	25	-	-	-	2.8
2009	5	-	100	-	-	-	3.0
2013	3	-	100	-	-	-	3.3
2015	5	25	75	-	-	-	2.3
2018	22	56	44	-	-	-	2.4
2023	16	25	75	-	-	-	3.0

Table 17R-14.15 - Deer Desirable Components Index: Upland Potential Scale.

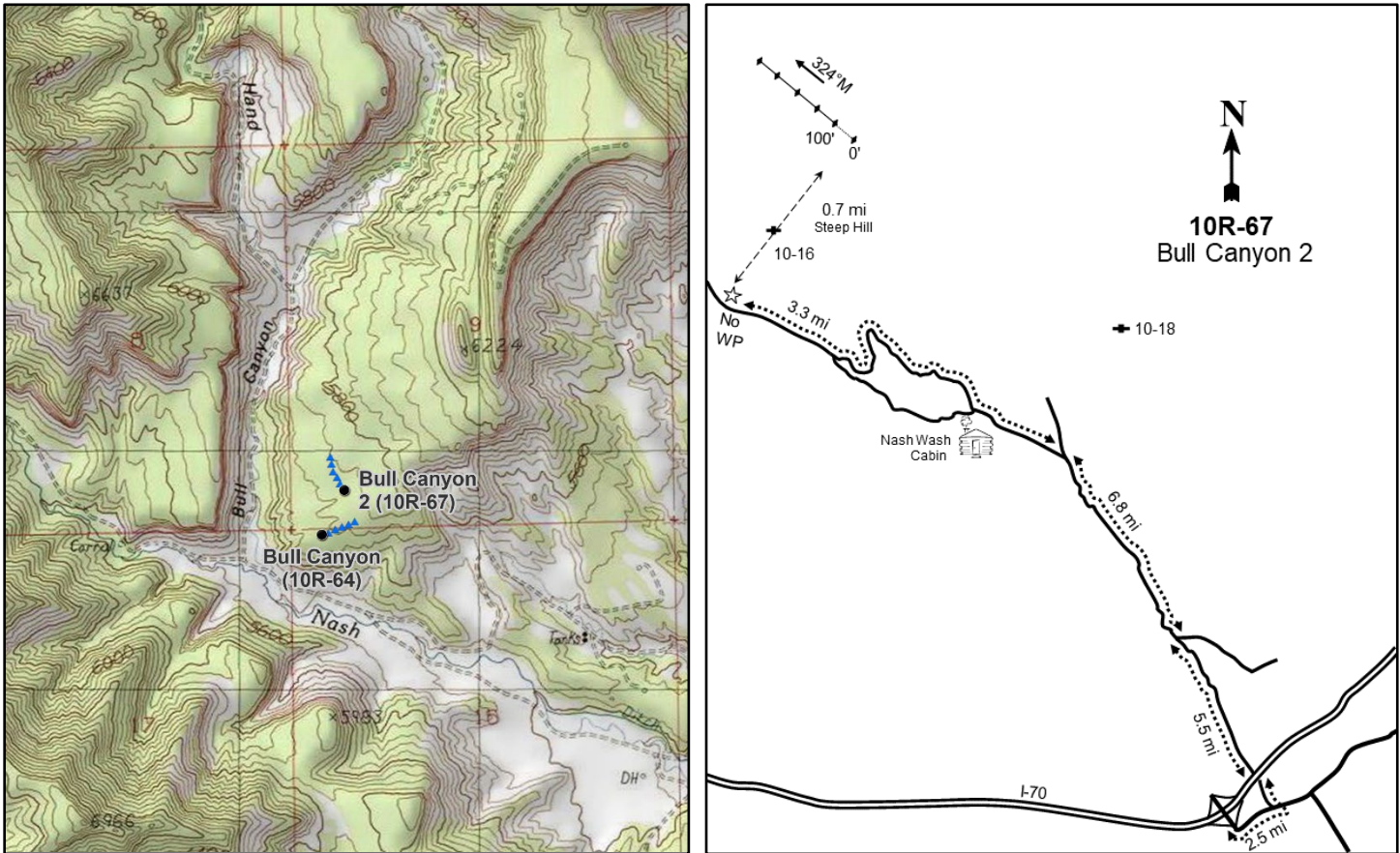
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2005	1.1	0.0	0.0	8.0	0.0	4.9	0.0	14.0	Very Poor
2008	9.2	14.9	15.0	30.0	-0.7	6.4	0.0	74.7	Good
2009	6.9	0.0	0.0	29.6	-0.3	3.7	0.0	39.9	Poor
2013	12.9	15.0	15.0	30.0	-0.1	6.2	0.0	79.0	Good-Excellent
2015	14.9	15.0	15.0	30.0	-0.7	5.3	0.0	79.4	Good-Excellent
2018	10.2	14.2	9.7	30.0	-0.4	0.7	0.0	64.4	Fair-Good
2023	26.0	13.6	0.6	30.0	0.0	1.0	0.0	71.1	Good

SOUTHEASTERN REGION



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

BULL CANYON 2 - STUDY NO. 10R-67

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Calf Canyon NW; Township 20S, Range 21E, Section 09
NAD 83 UTM ZONE 12, 620373 East 4326038 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	322° 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 east on I-70, take exit 204 for State Route 128 toward Cisco. Proceed on SR-128 for a short while, turn left onto the Nash Wash road (BLM #170), and continue under I-70 -- approximately 2.5 miles in total. Continue on the Nash Wash road for 5.5 miles to a road coming in from the right (east) and continue straight. From here, drive for 6.8 miles to a fork, then proceed to the left. Continue driving for 3.3 miles, passing the Nash Wash cabin, then park: there is no witness post. The study site is approximately 0.15 miles up a steep hill northeast of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	CISCO
Elevation	No data
Aspect	West
Slope	5-10%
Sample Dates	08/03/2023

Table 10R-67.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	South Bookcliffs Phase 7 (Nash)	4836	January-February 2020	174
Hand Crew - Lop and Scatter	-	-	2020-2023	-
Herbicide - Plateau	Moab Field Office Cheatgrass Control (Proposed)	5573	Winter-Spring 2024	-

Wildlife Habitat and Vegetation History

Table 10R-67.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 10R-67.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2023	Mountain Big Sagebrush/Annual Grass	Phase I

Site Notes

This site was established to replace the Bull Canyon study (10R-64), which was left mostly untreated with just a few random trees cut down. Bull Canyon 2 was placed in an area where there was evidence of trees that had been cut within the last year and where the treatment of trees was more widespread.

Site Potential

1981 - 2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Semidesert Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R034BY212UT
 States and Transitions 2023 - Current Potential State: Community Phase 2.4

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was the dominant shrub component when the study was established in 2023 following multiple lop and scatter treatments (Table 10R-67.1). Sagebrush cover was moderate, but demographic data indicates that more than half of the population was decadent and that there was very little recruitment of young plants. No other preferred browse species were sampled (Photos, Table 10R-67.12, Table 10R-67.13). Herbaceous diversity was moderate, but the introduced annual grass species cheatgrass (*Bromus tectorum*) provided a vast majority of the cover and was considered to be a codominant site component (Table 10R-67.7, Table 10R-67.10, Table 10R-67.11); increased amounts of annual grasses can negatively affect the resilience and resistance of a plant community following disturbance. However, a herbicide treatment scheduled for early 2024 (Table 10R-67.1) may help reduce annual grass loads on this site. Although the lop and scatter treatments that occurred prior to study establishment likely removed many of the twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees, they were still present with low density directly on the site in 2023; however, the area surrounding the site appears to be in phase III of woodland succession and provides a considerable seed source for future encroachment (Table 10R-67.14, Photos).

Deer winter range condition was very poor in 2023. Improvements to winter range could be accomplished through efforts that increase preferred browse cover and reproduction while decreasing decadence within the population. Diversifying and increasing cover of native perennial forbs and grasses while reducing cheatgrass would also greatly benefit deer winter range (Table 10R-67.15). The sagebrush component of this site could provide browse for wintering elk, while the herbaceous understory could provide forage during the summer; increasing diversity and cover of perennial grasses and forbs could improve this site's condition as elk summer habitat (Table 10R-67.3; Beck & Peek, 2005; Wambolt, 1996). However, pellet transect data shows that elk presence was low in 2023, while mule deer presence was moderate (Table 10R-67.9).

Trend Summary Tables

Table 10R-67.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2023	5.3	2.6	-	6.8	3.1	0.6

Table 10R-67.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2023	293	102	143	16	21.6	5.0	2.9	0.8

Table 10R-67.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2023	25.4	4.6	48.5	2.8	2.9	31.6

Table 10R-67.9 - Pellet 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		
2023	8	4	15
Year	Days Use Per Acre (ha)		
	2023	36.8 (91.0)	0.7 (1.7)

Table 10R-67.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Leymus salinus (saline wildrye)	Poa secunda (Sandberg bluegrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency						
2023	1	291	50	1	49	4	20
year	Average Cover (%)						
2023	0.0	20.9	2.1	0.0	2.9	0.0	0.7

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

Table 10R-67.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Arabis holboellii ^a (Holboell's rockcress)	Astragalus convallarius (lesser rusby milkvetch)	Calochortus nuttallii (sego lily)	Chaetopappa ericoides (rose heath)	Chenopodium atrovirens ^a (pinyon goosefoot)	Chenopodium berlandieri ^a (pitseed goosefoot)	Descurainia pinnata ^a (western tansymustard)	Draba cuneifolia ^a (wedgeleaf draba)	Gilia inconspicua ^a (shy gilia)	Hedysarum boreale (Utah sweetvetch)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Machaeranthera tanacetifolia ^a (tanseyleaf tansyaster)	Silene antirrhina ^a (sleepy silene)	Sisymbrium altissimum ^{ai} (tall tumbledmustard)
year	Nested Frequency															
2023	9	4	7	1	4	1	0	13	1	15	4	22	105	1	2	11
year	Average Cover (%)															
2023	0.0	0.1	0.3	0.0	0.2	0.0	0.0	0.3	0.0	0.2	0.4	0.2	1.7	0.1	0.0	0.2

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

Table 10R-67.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)			
2023	6.8	1.4	0.6	1.7
year	Quadrat Cover (%)			
2023	5.3	1.2	0.0	1.4

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

Table 10R-67.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2023	1000	-	2	46	52	4	30	54	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2023	2040	-	2	98	0	0	0	0	- / -
Juniperus osteosperma ⁱ -- (Utah juniper)									
2023	40	-	50	50	0	0	0	50	- / -
Opuntia polyacantha -- (plains pricklypear)									
2023	1160	-	0	69	31	0	0	26	- / -

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

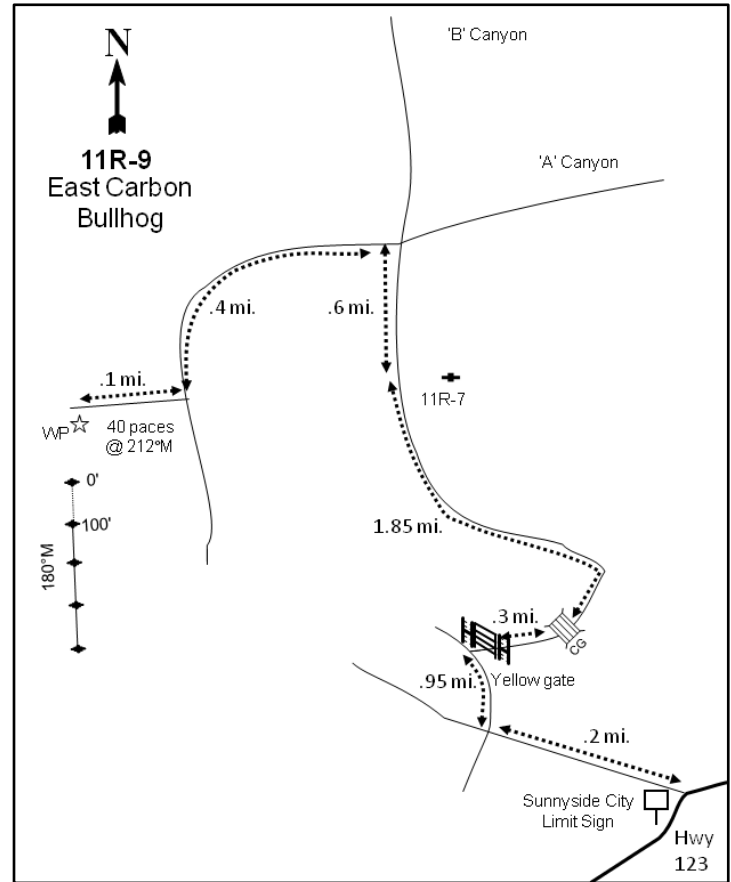
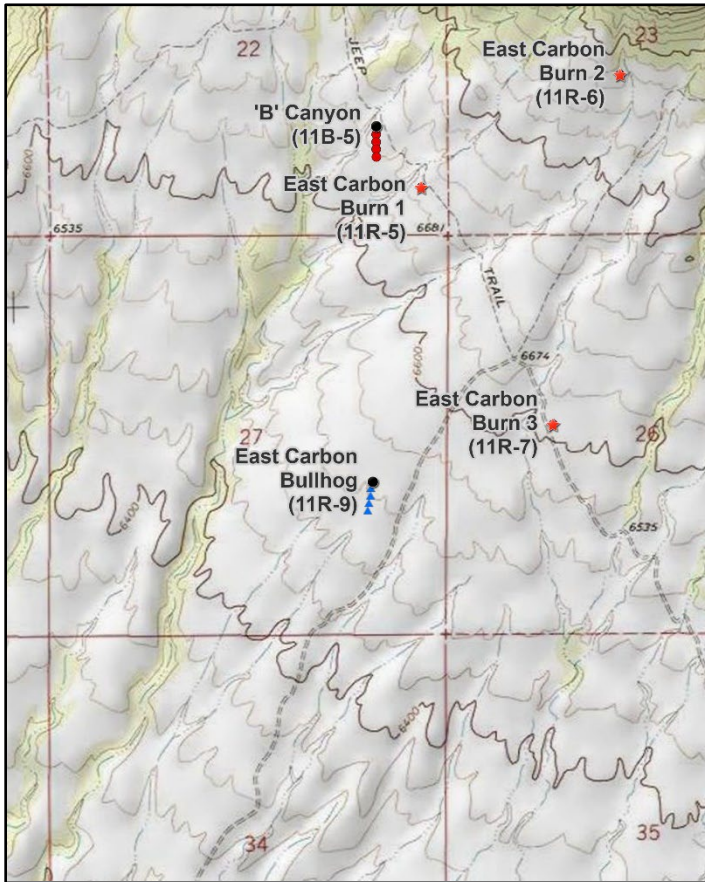
Table 10R-67.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2023	15	43	14	-	-	43	17.7
Pinus edulis (twoneedle pinyon)							
2023	1	100	-	-	-	-	2.0

Table 10R-67.15 - 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
2023	8.5	-0.6	1.0	10.1	-16.2	1.6	0.0	4.4	Very Poor

EAST CARBON BULLHOG - STUDY NO. 11R-9

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

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

Transect Information

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

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

Directions to Site

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

Site Information

Land Ownership: Federal
Land Administrator: BLM
Allotment: MUD SPRINGS
Elevation: 6,550ft (1,996m)
Aspect: South
Slope: 7%
Sample Dates: 08/23/2006, 05/20/2010, 08/04/2014, 08/15/2018, 08/15/2023

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

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

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

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

Table 11R-09.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Pinyon-Juniper	Phase II
2010	Perennial Grass	Phase I
2014	Perennial Grass	Phase I
2018	Perennial Grass	Phase I
2023	Perennial Grass	Phase I

Site Notes

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

Soils**Table 11R-09.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.8	48.2	27.0	24.8	3.5	17.1	83.2	0.6	08/23/2006

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Shallow Loam (Birchleaf Mountain Mahogany)
NRCS Ecological Site #	R034BY321UT
States and Transitions	No state and transition model is available for this ecological site.

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

Condition of deer winter range on this site has generally remained very poor since study establishment. Improvements to deer wintering range could be achieved by increasing cover and reproduction of the preferred browse component; diversifying and increasing cover of native perennial forbs would also improve winter range conditions (Table 11R-09.9). Despite the very poor condition, deer presence was high in 2023 according to pellet transect data, while elk presence has remained low throughout the study period (Table 11R-09.9). However, the abundant grass component could provide forage for elk during the summer months (Table 11R-09.3; Beck & Peek, 2005).

Trend Summary Tables

Table 11R-09.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	1.7	0.0	9.3	2.7	-	17.4
2010	1.7	0.0	2.6	2.0	0.1	4.7
2014	0.9	0.6	4.6	2.1	0.2	5.3
2018	2.7	0.4	4.3	2.5	0.3	8.6
2023	1.5	0.9	5.6	1.8	1.9	8.8

Table 11R-09.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	-	208	-	15	-	7.7	-	0.1
2010	-	219	-	67	-	18.7	-	0.6
2014	-	285	10	48	-	19.3	0.0	0.4
2018	-	291	-	74	-	17.7	-	1.0
2023	-	232	-	52	-	14.1	-	0.3

Table 11R-09.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	31.8	1.1	45.5	4.7	13.4	18.9
2010	18.5	0.3	44.4	5.0	12.8	23.8
2014	20.2	0.1	54.5	5.1	13.1	25.9
2018	29.2	0.7	47.2	9.8	16.4	25.6
2023	29.1	0.1	39.2	8.4	13.3	22.4

Table 11R-09.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2006	-	22	-	-	82
2010	2	8	3	-	11
2014	2	2	-	-	19
2018	3	10	1	-	13
2023	1	18	-	-	17
Days Use Per Acre (ha)					
2006	-	36.2 (89.4)	2.0 (5.0)	-	-
2010	7.2 (17.9)	28.1 (69.5)	12.8 (31.5)	-	-
2014	3.6 (9.0)	11.4 (28.1)	1.3 (3.3)	0.6 (1.4)	-
2018	2.9 (7.2)	18.1 (44.7)	2.0 (5.0)	-	-
2023	-	45.6 (112.6)	1.3 (3.3)	-	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Aristida purpurea (purple threeawn)	Elymus elymoides (squirreltail)	Psathyrostachys juncea ⁱ (Russian wildrye)
year	Nested Frequency				
2006	1	204	3	-	-
2010	3	212	7	2	2
2014	1	282	12	2	-
2018	4	284	22	0	-
2023	28	191	21	-	-
year	Average Cover (%)				
2006	0.2	7.4	0.2	-	-
2010	0.0	18.3	0.2	0.2	0.0
2014	0.1	18.8	0.4	0.0	-
2018	0.2	16.7	0.8	0.0	-
2023	1.3	11.6	1.2	-	-

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

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

FORB SPECIES	Astragalus convallarius (lesser rushy milkvetch)	Chamaesyce fendleri (Fendler's sandmat)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum umbellatum (sulphur-flower buckwheat)	Hymenoxys richardsonii (pingue rubberweed)	Lithospermum incisum (narrowleaf stonecress)	Lomatium (desertparsley)	Machaeranthera canescens (hoary tansyaster)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Townsendia incana (hoary Townsend daisy)
year	Nested Frequency														
2006	-	8	-	-	-	-	-	-	-	-	6	1	-	-	-
2010	-	16	-	-	-	-	12	3	7	-	31	-	8	-	3
2014	-	42	5	5	-	-	-	1	2	3	6	-	3	-	-
2018	4	60	-	-	1	2	1	-	1	-	3	-	-	2	4
2023	7	37	-	-	-	-	-	-	6	-	1	-	-	-	3
year	Average Cover (%)														
2006	-	0.1	-	-	-	-	-	-	-	-	0.0	0.0	-	-	-
2010	-	0.1	-	-	-	-	0.1	0.0	0.2	-	0.2	-	0.0	-	0.0
2014	-	0.4	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	0.0	-	-
2018	0.0	0.8	-	-	0.0	0.0	0.1	-	0.0	-	0.0	-	-	0.0	0.0
2023	0.0	0.2	-	-	-	-	-	-	0.0	-	0.0	-	-	-	0.0

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

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

SHRUB SPECIES	Line Intercept Cover (%)						
	year						
<i>Cercocarpus montanus</i> ^p (alderleaf mountain mahogany)	2006	1.8	-	0.9	-	2.5	14.9
<i>Echinocereus coccineus</i> (scarlet hedgehog cactus)	2010	1.5	-	0.5	0.1	1	3.7
<i>Ephedra viridis</i> ^p (mormon tea)	2014	1.4	-	0.7	0.2	1.5	3.8
<i>Gutierrezia sarothrae</i> (broom snakeweed)	2018	2	-	0.5	0.3	4.6	4
<i>Juniperus osteosperma</i> ⁱ (Utah juniper)	2023	0.9	1.9	0.9	0	3.3	5.5
<i>Pinus edulis</i> ⁱ (twoneedle pinyon)	year	Quadrat Cover (%)					
	2006	1.4	-	0.4	0.0	3.2	6.1
	2010	0.8	-	0.9	0.0	0.1	2.5
	2014	0.2	-	0.7	0.6	1.5	3.1
	2018	1.7	-	1.0	0.4	1.8	2.5
	2023	0.6	0.9	0.9	0.0	1.7	4.0

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

Table 11R-09.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<i>Cercocarpus montanus</i> ^p -- (alderleaf mountain mahogany)									
2006	120	-	0	33	67	67	17	67	145/148
2010	60	60	67	33	0	0	0	0	123/135
2014	140	-	43	43	14	43	29	14	114/133
2018	120	-	17	67	17	33	0	0	129/139
2023	80	-	25	75	0	75	25	0	- / -
<i>Echinocereus coccineus</i> -- (scarlet hedgehog cactus)									
2006	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	10/23
2014	-	-	-	-	-	-	-	-	10/23
2018	-	-	-	-	-	-	-	-	7/12
2023	20	-	0	0	100	0	0	100	- / -
<i>Ephedra viridis</i> ^p -- (mormon tea)									
2006	140	-	0	100	0	0	100	0	108/127
2010	320	60	88	13	0	0	0	0	96/112
2014	320	-	19	81	0	69	25	0	57/59
2018	360	-	67	33	0	0	0	0	62/63
2023	280	-	14	64	21	0	64	7	- / -
<i>Gutierrezia sarothrae</i> -- (broom snakeweed)									
2006	-	20	0	0	0	0	0	0	5/5
2010	220	-	36	64	0	0	0	0	12/20
2014	1720	560	4	97	0	0	0	0	11/12
2018	1080	-	32	69	0	0	0	0	13/23
2023	580	40	45	52	3	0	0	3	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus osteosperma¹ -- (Utah juniper)									
2006	240	20	25	75	0	0	0	0	- / -
2010	60	20	67	33	0	0	0	0	- / -
2014	60	-	67	33	0	0	0	0	- / -
2018	100	-	60	40	0	0	0	0	- / -
2023	100	-	20	80	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2006	-	-	-	-	-	-	-	-	10/23
2010	-	-	-	-	-	-	-	-	11/22
2014	-	-	-	-	-	-	-	-	11/33
2018	-	-	-	-	-	-	-	-	11/38
2023	20	-	0	100	0	0	0	0	- / -
Pinus edulis¹ -- (twoneedle pinyon)									
2006	220	20	18	82	0	0	0	0	- / -
2010	40	-	0	100	0	0	0	0	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	60	-	0	100	0	0	0	0	- / -
2023	80	-	50	50	0	0	0	0	- / -
Yucca -- (yucca)									
2006	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	29/56
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	38/156

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

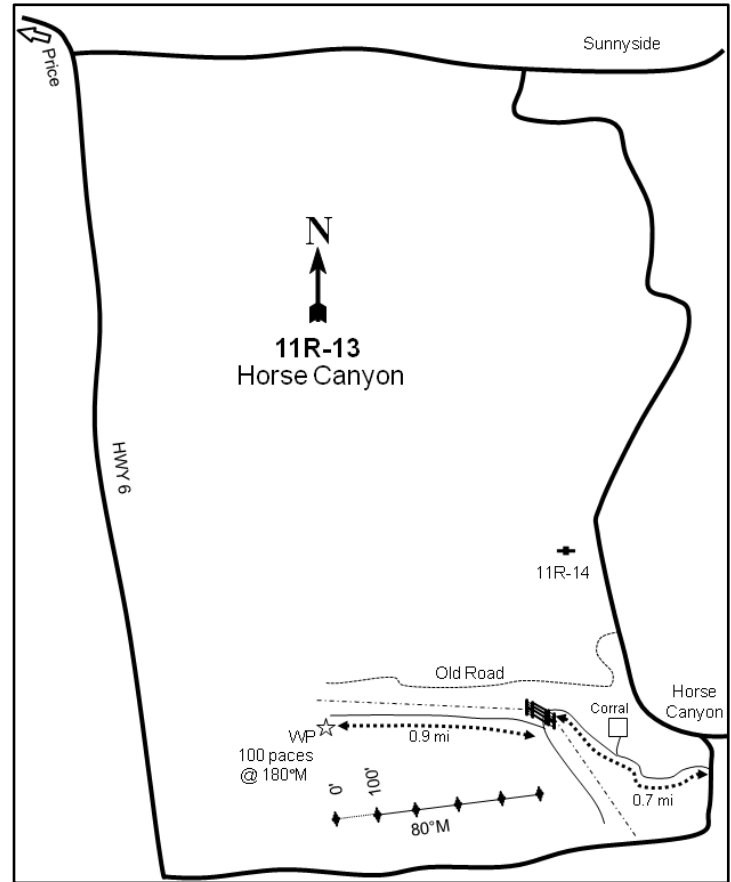
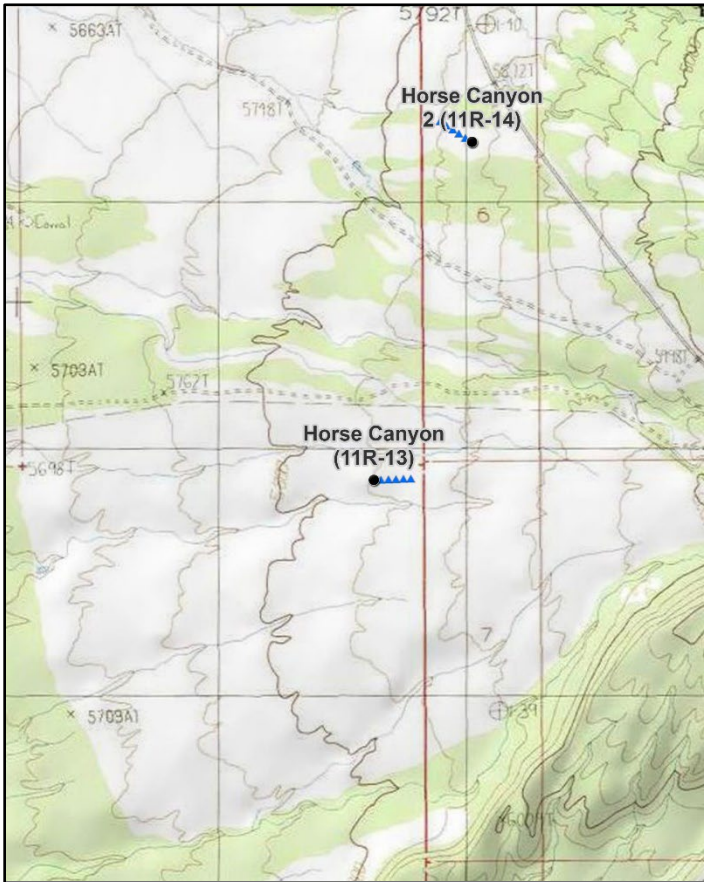
Table 11R-09.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2006	232	-	25	40	15	20	11.0
2010	74	-	68	21	5	5	6.5
2014	125	6	61	28	-	6	6.4
2018	114	17	17	56	6	6	6.7
2023	137	5	32	42	21	-	8.1
Pinus edulis (twoneedle pinyon)							
2006	116	-	15	10	50	25	12.6
2010	18	-	30	30	10	30	9.8
2014	24	-	38	50	13	-	11.6
2018	30	-	27	36	18	18	10.5
2023	28	-	31	38	31	-	9.9

Table 11R-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
2006	3.8	0.0	0.0	15.4	0.0	0.3	0.0	19.5	Very Poor
2010	2.9	0.0	0.0	30.0	0.0	1.2	0.0	34.1	Very Poor-Poor
2014	3.0	0.0	0.0	30.0	0.0	0.9	0.0	33.8	Very Poor-Poor
2018	3.6	0.0	0.0	30.0	0.0	2.1	0.0	35.7	Very Poor-Poor
2023	2.5	0.0	0.0	28.1	0.0	0.6	0.0	31.3	Very Poor

HORSE CANYON - STUDY NO. 11R-13

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

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

Transect Information

Browse Tag # (0' Stake)	157
Transect Bearing	80° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	ICELANDER
Elevation	5,852ft (1,784m)
Aspect	Southwest
Slope	5%
Sample Dates	08/20/2012, 07/20/2015, 08/14/2018, 08/15/2023

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

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

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

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

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

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

Table 11R-13.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon-Juniper/Broom Snakeweed	Phase I
2015	Broom Snakeweed	Phase I
2018	Broom Snakeweed	Phase I
2023	Broom Snakeweed	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Upland Shallow Loam (Birchleaf Mountain Mahogany)
NRCS Ecological Site #	R034BY321UT
States and Transitions	No state and transition model is available for this ecological site.

This site was dominated by Utah juniper (*Juniperus osteosperma*) and broom snakeweed (*Gutierrezia sarothrae*) when it was established in 2012. Juniper cover decreased following the 2012 bullhog treatment (Table 11R-13.1), while that of broom snakeweed increased overall; broom snakeweed has been the dominant vegetation component since 2015 (Table 11R-13.12, Table 11R-13.13). The herbaceous layer has remained rather depauperate (Table 11R-13.7) with either annual or perennial forbs contributing the most understory cover in all sample years (Table 11R-13.11). The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed since 2018, but with low cover and abundance (Table 11R-13.10). Although density was low in 2023, trees have maintained a presence on site following treatment (Table 11R-13.14): this indicates that there may be potential for infilling over time.

Deer winter range on this site has remained in very poor condition since 2012. Increasing cover and reproduction of preferred browse would improve winter range condition. The seeding treatment helped diversify the herbaceous understory. However, further diversifying and increasing cover of perennial forbs and grasses while removing cheatgrass would also be beneficial for deer winter range (Table 11R-13.15). Pellet transect data indicates that mule deer presence has remained low since study establishment, and no deer pellet groups were observed in 2023 (Table 11R-13.9).

Trend Summary Tables**Table 11R-13.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	1.5	3.9	1.0	1.8	2.6	2.5
2015	1.4	7.7	1.6	1.8	10.8	2.0
2018	0.9	7.0	0.8	2.0	5.6	1.7
2023	1.9	7.2	2.1	1.7	7.7	1.4

Table 11R-13.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	-	34	42	198	-	0.6	0.3	3.9
2015	-	48	308	150	-	0.7	5.1	2.7
2018	6	41	78	90	0.1	0.5	0.9	2.8
2023	82	68	170	33	1.1	3.3	5.4	0.9

Table 11R-13.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	48.2	1.5	26.8	11.7	5.4	10.7
2015	51.3	0.0	27.6	9.2	5.2	17.0
2018	46.9	-	37.1	16.7	4.5	12.3
2023	51.1	0.0	27.5	8.3	3.7	20.0

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

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2012	1	1	17
2015	2	4	22
2018	-	1	21
2023	1	1	5
Year	Days Use Per Acre (ha)		
2012	-	-	-
2015	-	2.7 (6.6)	-
2018	6.5 (16.1)	2.0 (5.0)	-
2023	5.1 (12.6)	-	-

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

GRASS SPECIES									
Achnatherum hymenoides (Indian ricegrass)									
Agropyron cristatum ⁱ (crested wheatgrass)									
Aristida purpurea (purple threeawn)									
Bromus tectorum ^{ai} (cheatgrass)									
Elymus elymoides (squirreltail)									
Hesperostipa comata (needle and thread)									
Pleuraphis jamesii (James' galleta)									
Psathyrostachys juncea ⁱ (Russian wildrye)									
Vulpia octoflora ^a (sixweeks fescue)									
year	Nested Frequency								
2012	6	3	20	-	-	-	-	5	-
2015	9	8	4	-	4	-	3	20	-
2018	7	11	8	6	1	7	-	8	-
2023	4	-	15	81	26	6	2	18	9
year	Average Cover (%)								
2012	0.2	0.0	0.2	-	-	-	-	0.2	-
2015	0.4	0.0	0.1	-	0.0	-	0.0	0.2	-
2018	0.0	0.1	0.1	0.1	0.0	0.1	-	0.1	-
2023	0.3	-	0.8	1.1	0.6	0.4	0.2	1.1	0.0

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

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

FORB SPECIES																	
Caulanthus crassicaulis ^a (thickstem wild cabbage)																	
Chamaesyce albomarginata (whitemargin sandmat)																	
Chamaesyce fendleri (Fendler's sandmat)																	
Cryptantha (cryptantha)																	
Cryptantha flavoculata (roughseed cryptantha)																	
Cryptantha gracilis ^a (narrowstem cryptantha)																	
Descurainia pinnata ^a (western tansymustard)																	
Eriogonum (buckwheat)																	
Eriogonum cernuum ^a (nodding buckwheat)																	
Eriogonum ovalifolium (cushion buckwheat)																	
Eriogonum shockleyi (Shockley's buckwheat)																	
Frasera albomarginata (desert fraseria)																	
Gilia inconspicua ^a (shy gilia)																	
Hymenopappus filifolius (fineleaf hymenopappus)																	
Lappula occidentalis ^a (flatspine stickseed)																	
Lepidium ^a (pepperweed)																	
Lesquerella (bladderpod)																	
year	Nested Frequency																
2012	1	12	-	70	-	-	25	40	14	16	-	112	-	-	-	-	8
2015	9	51	-	55	-	-	29	5	16	5	40	32	4	0	-	1	8
2018	-	-	15	37	-	-	21	-	-	14	31	12	-	-	-	-	1
2023	-	-	1	3	9	4	9	-	22	9	-	-	5	1	18	1	3
year	Average Cover (%)																
2012	0.0	0.1	-	1.6	-	-	0.2	0.5	0.1	0.2	-	1.2	-	-	-	-	0.0
2015	0.0	0.5	-	1.1	-	-	0.3	0.1	0.1	0.0	0.5	0.1	0.0	0.0	-	0.0	0.1
2018	-	-	0.1	1.2	-	-	0.3	-	-	0.2	1.1	0.1	-	-	-	-	0.0
2023	-	-	0.0	0.0	0.4	0.0	0.0	-	0.4	0.1	-	-	0.0	0.0	0.1	0.1	0.0

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

FORB SPECIES					
Machaeranthera grindeioides (rayless tansyaster)					
Packera multilobata (lobeleaf groundsel)					
Penstemon (beardtongue)					
Salsola tragus ^{ai} (prickly Russian thistle)					
Townsendia incana (hoary Townsend daisy)					
year	Nested Frequency				
2012	13	3	7	4	-
2015	14	5	6	297	1
2018	5	12	-	63	-
2023	1	-	10	150	1
year	Average Cover (%)				
2012	0.2	0.0	0.1	0.0	-
2015	0.1	0.2	0.2	4.7	0.0
2018	0.1	0.1	-	0.6	-
2023	0.1	-	0.2	4.6	0.0

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

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

SHRUB SPECIES								
Cercocarpus montanus ^p (alderleaf mountain mahogany)								
Chrysothamnus viscidiflorus sp. viscidiflorus var. stenophyllus (yellow rabbitbrush)								
Ephedra viridis ^p (mormon tea)								
Eriogonum microthecum ^p (slender buckwheat)								
Fraxinus anomala ⁱ (singleleaf ash)								
Gutierrezia sarothrae (broom snakeweed)								
Juniperus osteosperma ⁱ (Utah juniper)								
Linanthus pungens (granite prickly phlox)								
year	Line Intercept Cover (%)							
2012	-	-	1.8	-	-	2.6	2.5	-
2015	-	-	1.7	0.1	1.4	10.8	0.6	-
2018	-	-	1.9	0.1	1.2	5.6	0.5	-
2023	-	-	1.7	-	0.6	7.7	0.8	-
year	Quadrat Cover (%)							
2012	0.0	-	1.5	0.0	-	3.9	1.0	0.0
2015	0.1	0.0	1.2	0.0	0.8	7.6	0.8	-
2018	0.1	-	0.8	0.0	0.0	6.8	0.8	0.1
2023	0.0	-	1.7	0.2	1.1	7.2	1.0	-

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

Table 11R-13.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Atriplex canescens^P -- (fourwing saltbush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	22/12
2023	20	-	0	100	0	0	0	0	-/-
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2012	40	-	50	50	0	100	0	0	98/84
2015	20	-	100	0	0	0	0	0	68/93
2018	20	-	0	100	0	0	100	0	93/67
2023	40	-	0	100	0	50	0	0	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	60	-	67	33	0	0	67	67	8/15
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Ephedra viridis^P -- (mormon tea)									
2012	40	-	0	100	0	0	0	0	110/207
2015	60	-	0	100	0	0	0	0	91/192
2018	40	-	0	100	0	50	0	0	75/168
2023	100	-	0	100	0	0	0	0	-/-
Eriogonum microthecum^P -- (slender buckwheat)									
2012	120	-	17	83	0	17	0	0	8/13
2015	100	-	20	60	20	0	0	20	7/12
2018	280	-	0	100	0	36	14	0	7/11
2023	80	-	0	100	0	0	0	0	-/-
Fraxinus anomala¹ -- (singleleaf ash)									
2012	-	-	-	-	-	-	-	-	-/-
2015	40	-	0	100	0	0	0	0	156/144
2018	120	-	17	83	0	0	0	0	240/186
2023	20	-	0	0	100	100	0	100	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2012	4900	320	20	76	5	0	0	27	17/24
2015	10980	780	12	85	3	0	0	6	21/36
2018	11480	280	14	76	11	0	0	10	17/25
2023	5300	120	9	88	3	0	0	3	-/-
Juniperus osteosperma¹ -- (Utah juniper)									
2012	40	-	0	100	0	0	0	0	-/-
2015	40	-	50	50	0	0	0	0	-/-
2018	20	20	0	100	0	0	0	0	-/-
2023	60	-	33	67	0	0	0	0	-/-
Linanthus pungens -- (granite prickly phlox)									
2012	40	-	50	50	0	0	0	0	6/14
2015	20	-	0	100	0	0	100	0	4/17
2018	20	-	0	100	0	0	0	0	8/20
2023	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2012	20	-	0	100	0	0	0	0	9/25
2015	-	-	-	-	-	-	-	-	8/19
2018	-	-	-	-	-	-	-	-	9/33
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Purshia stansburiana^p -- (Stansbury cliffrose)									
2012	-	-	-	-	-	-	-	-	148/172
2015	-	-	-	-	-	-	-	-	238/259
2018	-	-	-	-	-	-	-	-	62/71

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

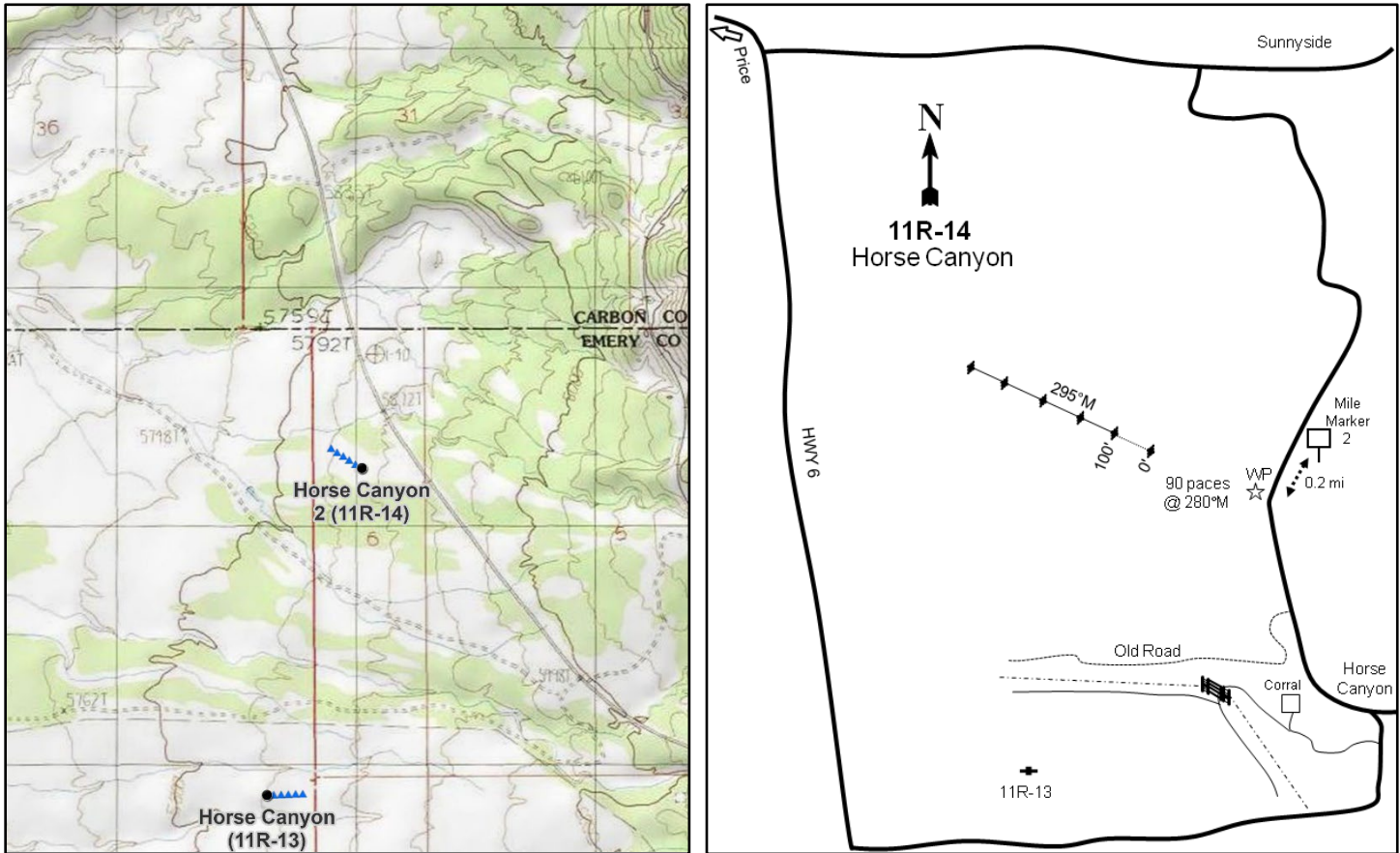
Table 11R-13.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Fraxinus anomala (singleleaf ash)							
2012	23	-	11	11	56	22	10.0
2015	27	6	19	6	50	19	13.1
2018	28	-	25	31	44	-	12.9
2023	29	7	43	21	21	7	9.9
Juniperus osteosperma (Utah juniper)							
2012	43	-	21	21	58	-	12.6
2015	17	36	57	7	-	-	4.6
2018	20	23	62	15	-	-	9.0
2023	40	42	37	21	-	-	6.7
Pinus edulis (twoneedle pinyon)							
2012	5	-	33	33	33	-	8.7
2015	2	100	-	-	-	-	3.0
2018	10	-	100	-	-	-	5.0
2023	2	-	100	-	-	-	5.0

Table 11R-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
2012	2.3	0.0	0.0	1.1	0.0	7.7	0.0	11.1	Very Poor
2015	2.3	0.0	0.0	1.4	0.0	5.5	0.0	9.1	Very Poor
2018	2.5	0.0	0.0	1.0	-0.1	5.6	0.0	9.0	Very Poor
2023	2.1	0.0	0.0	6.6	-0.8	1.9	0.0	9.8	Very Poor

HORSE CANYON 2 - STUDY NO. 11R-14

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

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

Transect Information

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

Not available
295° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
No Rebar

Directions to Site

From mile marker 2 on SR-124, travel 0.2 miles south and park. The study site is on the right (west) side of the road. The 0-foot stake is approximately 90 paces away from the road at 280 degrees magnetic; there is no browse tag.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	ICELANDER
Elevation	5,879ft (1,792m)
Aspect	West
Slope	5%
Sample Dates	08/20/2012, 07/20/2015, 08/15/2018, 08/15/2023

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

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

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

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

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

Year	Vegetation Type	Woodland Succession
2012	Juniper/Mountain Big Sagebrush	Phase I
2015	Juniper/Mountain Big Sagebrush	Phase I
2018	Juniper/Mountain Big Sagebrush	Phase I
2023	Juniper/Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

This site has been dominated by Utah juniper (*Juniperus osteosperma*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since study establishment in 2012. Cover of juniper has exhibited a slight decrease following treatment while that of sagebrush has slightly increased (Table 11R-14.12, Table 11R-14.13). Point quarter data shows that although juniper did decrease in the first sample year following treatment, density in 2023 was similar to that observed prior to treatment. The continued presence of trees on this site indicates that infilling may be possible over time (Table 11R-14.14). The herbaceous understory has never been abundant (Table 11R-14.7), with most of the diversity and limited cover provided by perennial grasses (Table 11R-14.10). Although somewhat diverse, forbs have remained rare (Table 11R-14.11).

Deer winter range condition has generally remained poor since study establishment. Improvements to deer winter range could be accomplished through treatments that encourage further increases in cover and reproduction of preferred browse while decreasing decadence. Diversifying and increasing cover of perennial grasses and forbs while decreasing cheatgrass would also prove beneficial for deer winter range (Table 11R-14.15). According to pellet transect data, deer presence was low in 2023 (Table 11R-14.9).

Trend Summary Tables**Table 11R-14.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	10.2	3.8	6.7	8.3	4.0	9.1
2015	12.1	2.3	4.4	15.5	4.7	8.0
2018	12.8	2.3	2.5	9.9	2.1	6.7
2023	12.1	3.8	3.2	11.9	5.1	6.9

Table 11R-14.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	4	153	6	19	0.0	3.8	0.0	0.2
2015	4	160	48	37	0.0	3.5	0.3	0.1
2018	8	121	18	21	0.0	4.2	0.5	0.1
2023	118	134	158	100	2.4	3.7	1.1	1.2

Table 11R-14.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	50.2	6.0	33.7	0.7	3.8	21.8
2015	48.5	12.9	31.1	1.2	4.2	21.5
2018	54.4	5.6	35.5	1.5	4.7	19.4
2023	53.3	5.0	26.6	1.2	3.1	24.9

Table 11R-14.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Horse	Rabbit
	Quadrat Frequency			
2012	-	15	1	29
2015	-	5	-	52
2018	-	2	-	30
2023	-	3	-	11
Year	Days Use Per Acre (ha)			
2012	-	27.5 (67.9)	-	-
2015	1.5 (3.6)	-	-	-
2018	-	-	-	-
2023	-	4.7 (11.6)	1.2 (2.9)	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Vulpia octiflora ^a (sixweeks fescue)
year	Nested Frequency								
2012	6	48	77	-	40	2	7	-	4
2015	3	17	65	-	55	-	25	28	4
2018	4	-	50	4	57	4	22	9	5
2023	4	3	55	91	30	-	19	42	57
year	Average Cover (%)								
2012	0.1	1.1	1.3	-	1.2	0.0	0.1	-	0.0
2015	0.0	0.4	1.5	-	0.8	-	0.4	0.4	0.0
2018	0.2	-	2.4	0.0	1.0	0.0	0.5	0.2	0.0
2023	0.1	0.1	1.0	1.9	0.4	-	0.8	1.3	0.5

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

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

FORB SPECIES	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Chenopodium album ^a (lambsquarters)	Cordylanthus ^a (bird's-beak)	Cryptantha (cryptantha)	Cryptantha ^a (annual cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum ovalifolium (cushion buckwheat)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium ^a (pepperweed)	Packera multilobata (lobeleaf groundsel)	Phlox longifolia (longleaf phlox)	Plantago patagonica ^a (woolly plantain)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	Townsendia (Townsend daisy)
year	Nested Frequency																
2012	3	-	-	-	2	-	6	-	-	-	-	-	12	-	1	1	-
2015	-	-	1	3	1	-	31	-	-	-	6	5	22	13	2	11	-
2018	4	-	-	-	-	-	13	-	-	2	-	-	14	3	2	2	-
2023	3	4	3	-	-	3	35	49	3	46	3	0	75	115	7	17	3
year	Average Cover (%)																
2012	0.1	-	-	-	0.0	-	0.0	-	-	-	-	-	0.0	-	0.0	0.0	-
2015	-	-	0.0	0.0	0.0	-	0.2	-	-	-	0.0	0.0	0.1	0.0	0.0	0.0	-
2018	0.0	-	-	-	-	-	0.5	-	-	0.0	-	-	0.1	0.0	0.0	0.0	-
2023	0.0	0.0	0.0	-	-	0.0	0.1	0.3	0.0	0.2	0.1	0.1	0.7	0.3	0.3	0.1	0.0

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

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

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ephedra nevadensis ^p (Nevada jointfir)	Ephedra viridis ^p (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ¹ (Utah juniper)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)							
2012	7.3	-	-	-	1	4	9.1	0
2015	14.5	-	0.1	-	1	4.5	8	0.1
2018	9.2	-	-	0.1	0.6	2.1	6.7	-
2023	10.9	-	-	0.1	0.9	5.1	6.9	0
year	Quadrat Cover (%)							
2012	9.8	-	-	-	0.5	3.8	6.7	0.0
2015	11.7	0.0	0.0	-	0.3	2.3	4.4	0.0
2018	12.3	0.1	0.0	0.1	0.1	2.2	2.5	-
2023	11.4	-	0.4	0.4	0.4	3.4	3.2	0.0

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

Table 11R-14.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2012	4020	40	52	33	14	20	19	38	55/79
2015	4100	180	39	45	17	11	74	16	49/75
2018	4620	20	31	48	21	7	2	18	53/80
2023	3060	20	25	54	22	18	3	20	- / -
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	0	100	0	100	100	15/39
2018	20	-	0	100	0	0	0	0	14/28
2023	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	15/35
2018	-	-	-	-	-	-	-	-	13/22
2023	20	-	0	100	0	0	0	0	- / -
Echinocereus -- (hedgehog cactus)									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	12/18
2018	20	-	0	100	0	0	0	0	9/18
2023	20	-	0	100	0	0	0	0	- / -
Ephedra nevadensis^P -- (Nevada jointfir)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	200	-	0	100	0	30	0	0	20/20
2023	160	-	0	100	0	0	0	0	- / -
Ephedra viridis^P -- (mormon tea)									
2012	120	-	83	17	0	0	0	0	31/39
2015	100	-	20	80	0	0	60	0	32/42
2018	20	-	0	100	0	0	0	0	87/153
2023	60	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2012	11480	220	17	82	1	1	0	25	15/22
2015	7900	2240	6	93	1	1	19	1	18/22
2018	7940	140	18	76	6	1	0	11	13/14
2023	3900	100	7	93	0	0	0	0	- / -
Juniperus osteosperma^t -- (Utah juniper)									
2012	160	-	88	13	0	0	0	25	- / -
2015	120	-	67	17	17	0	0	17	- / -
2018	140	-	86	14	0	0	0	14	- / -
2023	200	-	40	30	30	0	0	30	- / -
Opuntia polyacantha -- (plains pricklypear)									
2012	60	-	0	100	0	0	0	33	7/34
2015	120	-	0	100	0	0	0	0	8/21
2018	80	-	0	100	0	0	0	0	7/23
2023	80	-	0	100	0	0	0	0	- / -
Pinus edulis^t -- (twoneedle pinyon)									
2012	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Sclerocactus -- (fishhook cactus)									
2012	20	-	0	100	0	0	0	0	10/20

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

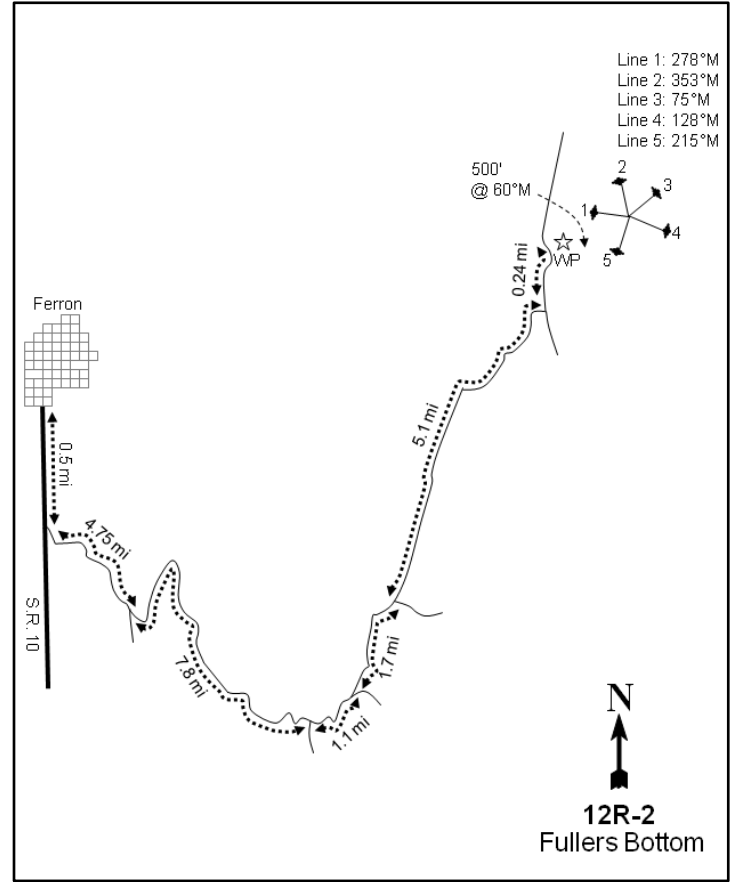
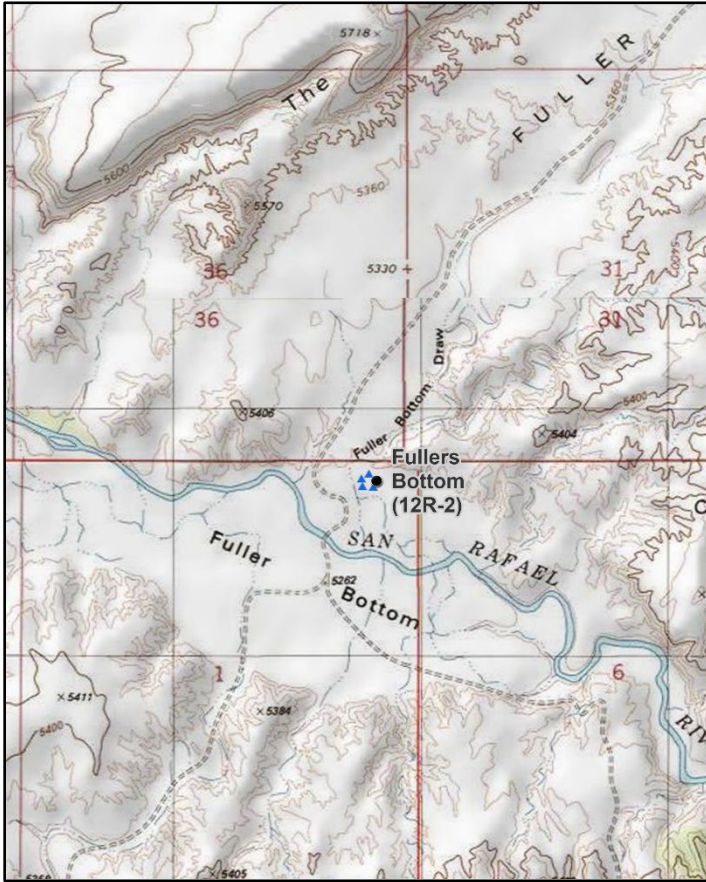
Table 11R-14.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	147	25	20	15	25	15	8.2
2015	128	-	75	5	-	20	10.0
2018	147	5	80	-	-	15	9.1
2023	135	15	65	-	10	10	13.3

Table 11R-14.15 - 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	10.4	11.2	15.0	7.6	0.0	0.4	0.0	44.6	Poor
2015	19.4	10.3	15.0	7.1	0.0	0.2	0.0	52.0	Poor-Fair
2018	12.4	9.1	14.3	8.5	0.0	0.3	0.0	44.5	Poor
2023	14.9	9.1	11.4	7.4	-1.8	2.5	0.0	43.4	Poor

FULLERS BOTTOM - STUDY NO. 12R-2



Location Information

USGS 7.5 min Map Info Sids Mountain NW; Township 20S, Range 9E, Section 01
 GPS (0' Stake) NAD 83 UTM ZONE 12, 512758 East 4329917 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing magnetic) 278° magnetic (Line 2: 353° magnetic, Line 3: 75° magnetic, Line 4: 128° magnetic, Line 5: 215° magnetic)
 Length 100ft
 Belt Placement Lines originate from the 0-foot stake. No belts, read data along lines.
 Belt Marker Placement No Belts

Directions to Site

Drive east from Castle Dale and travel 1.1 miles on SR-10 from the intersection of 500 East and SR-10. Turn right onto CR-401/Green River Cutoff Road. Travel 13 miles and turn right onto Fullers Bottom Road. Drive for another 5.5 miles; the study site is on the right (east) side of the road. The study is set up in a spoke design and rebar has been left on the site to mark the transect ends and center.

Site Information

Land Ownership State
 Land Administrator UDWR
 Allotment FULLER BOTTOM
 Elevation 5,280ft (1,609m)
 Aspect East
 Slope 1%
 Sample Dates 08/05/2015, 07/31/2018, 08/15/2023

Table 12R-02.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Fullers Bottom Riparian and Upland Improvement Phase 2	4050	November 2017-June 2020	24
Mechanical - Bullhog	Fuller Bottom Riparian and Upland Improvement	3371	October 2015-June 2016	24

Wildlife Habitat and Vegetation History**Table 12R-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 12R-02.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Tamarisk	NA
2018	Rubber Rabbitbrush	NA
2023	Tamarisk	NA

Site Notes

The study transect is set up in a spoke design. Tamarisk beetles (*Diorhabda sp.*) were observed on site in 2023.

Site Potential

1981 - 2010 Average Annual Precipitation 8 inches

NRCS Ecological Site Semidesert - River Floodplain (Fremont Cottonwood)

NRCS Ecological Site # R034BY011UT

2015 - State Undefined: Community Phase Undefined

States and Transitions 2018 - Xerified Shrub and Tree Dominated Drained State: Community Phase 2.2

2023 - State Undefined: Community Phase Undefined

When the study was established in 2015, the plant community on this site was dominated by five-stamen tamarisk (*Tamarix chinensis*); the site transitioned to a rubber rabbitbrush (*Ericameria nauseosa*) dominated state in 2018 following a tamarisk-removal treatment (Table 12R-02.1). Although density decreased between 2018 and 2023, cover of tamarisk increased in 2023 as the remaining plants matured, and tamarisk was considered to be the dominant vegetation component in that sample year. However, more than half of the plants were considered to have poor vigor: this may be due to tamarisk beetles (*Diorhabda sp.*) that were observed during the most recent sampling (Table 12R-02.12, Table 12R-02.13). The herbaceous understory has remained in very poor condition throughout the study period. The understory consisted of mainly annual forbs both prior to and after treatment: the introduced species burningbush (*Bassia scoparia*) provided over 12% cover in 2023. No grass species have been present in any sample year (Table 12R-02.7, Table 12R-02.10, Table 12R-02.11). Fremont cottonwood (*Populus fremontii*) trees have been observed near the site, but none have been sampled on the transect itself (Photos).

Trend Summary Tables**Table 12R-02.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2015	0.0	36.9	-	0.2	59.9	-
2018	-	2.4	-	-	3.4	-
2023	1.9	15.5	-	1.8	20.3	-

Table 12R-02.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2015	-	-	259	10	-	-	20.7	0.4
2018	-	-	29	-	-	-	1.2	-
2023	-	-	299	9	-	-	13.4	0.3

Table 12R-02.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2015	21.1	0.0	39.4	-	-	56.0
2018	43.0	-	64.1	0.0	-	5.8
2023	42.3	-	43.6	0.0	0.1	27.5

Table 12R-02.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Horse	Rabbit
	Quadrat Frequency			
2015	-	1	3	12
2018	1	-	-	13
2023	3	1	-	2
Year	Days Use Per Acre (ha)			
2015	0.7 (1.8)	-	2.3 (5.7)	-
2018	2.9 (7.2)	-	-	-
2023	14.5 (35.9)	-	3.5 (8.6)	-

Table 12R-02.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

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

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

Table 12R-02.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Artemisia dracunculus (tarragon)	Bassia scoparia ^{ai} (burningbush)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrow/leaf goosefoot)	Descurainia pinnata ^a (western tansymustard)	Halogeton glomeratus ^{ai} (saltlover)	Salsola tragus ^{ai} (prickly Russian thistle)
year	Nested Frequency						
2015	10	1	246	12	3	10	1
2018	-	29	-	-	-	-	3
2023	9	283	2	-	-	3	50
year	Average Cover (%)						
2015	0.4	0.0	19.6	0.3	0.2	0.7	0.0
2018	-	0.7	-	-	-	-	0.5
2023	0.3	12.2	0.0	-	-	0.1	1.0

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

Table 12R-02.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
	year	Line Intercept Cover (%)					
<i>Atriplex canescens</i> ^p (fourwing saltbush)	2015	0.2	1.9	2.7	0.2	-	55.1
<i>Chrysothamnus viscidiflorus</i> (yellow rabbitbrush)	2018	-	0.4	2.5	-	-	0.5
<i>Ericameria nauseosa</i> (rubber rabbitbrush)	2023	1.8	1.2	5.1	-	0.1	13.9
<i>Gutierrezia sarothrae</i> (broom snakeweed)	year	Quadrat Cover (%)					
<i>Sarcobatus vermiculatus</i> (greasewood)	2015	0.0	0.6	1.3	0.1	-	34.8
<i>Tamarix chinensis</i> ⁱ (five-stamen tamarisk)	2018	-	0.5	1.1	-	-	0.8
	2023	1.9	1.1	4.2	-	0.0	10.1

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

Table 12R-02.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

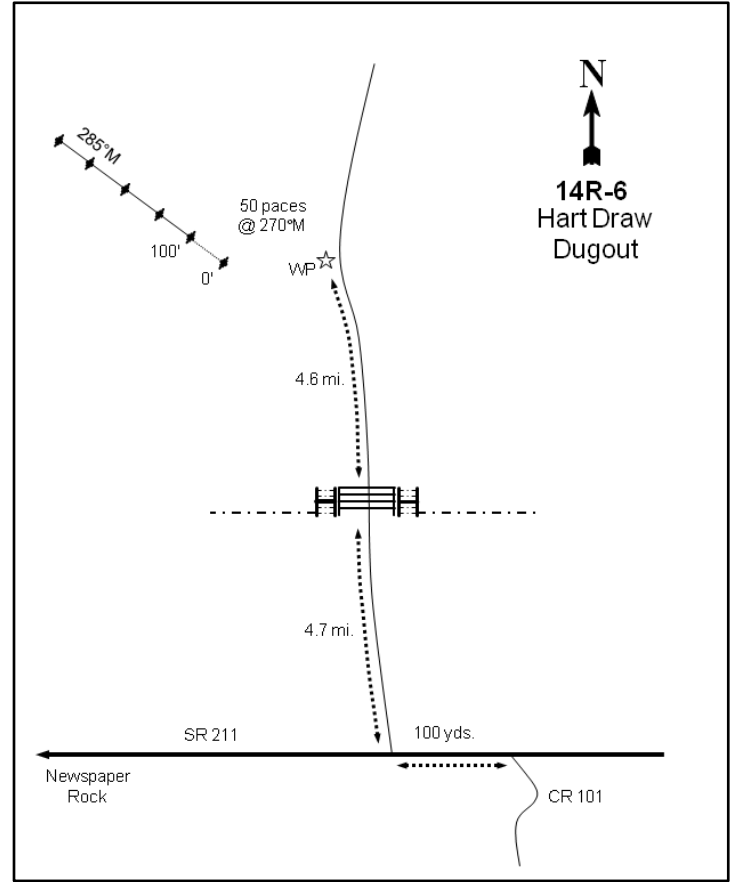
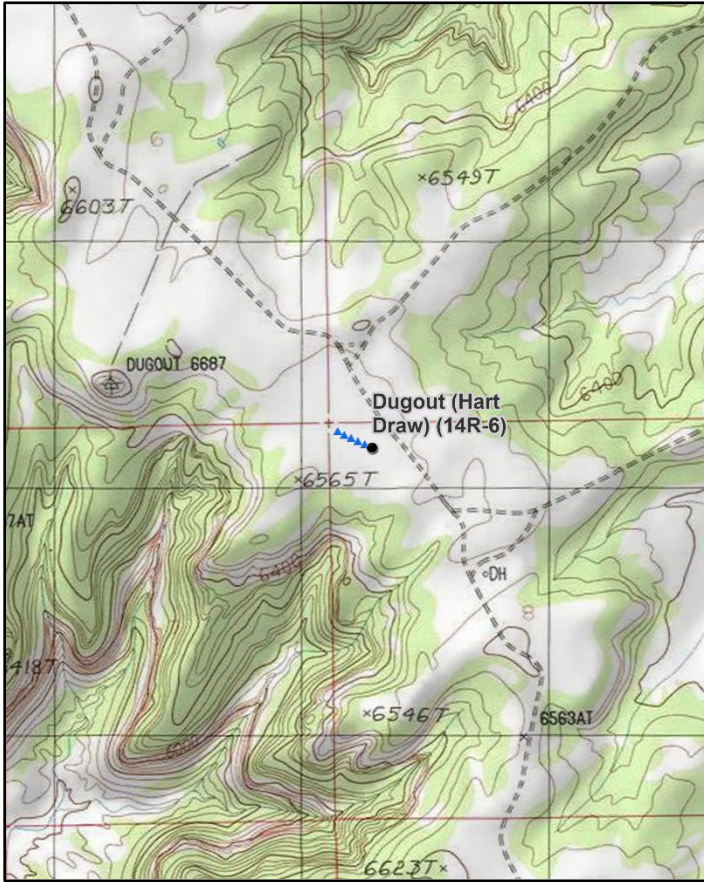
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<i>Atriplex canescens</i> ^p -- (fourwing saltbush)									
2015	40	-	0	100	0	0	0	0	120/110
2018	20	-	0	100	0	100	0	100	71/78
2023	60	-	0	67	33	0	0	33	- / -
<i>Chrysothamnus viscidiflorus</i> -- (yellow rabbitbrush)									
2015	580	-	48	52	0	0	0	0	81/71
2018	1140	-	2	86	12	21	0	12	40/44
2023	60	-	0	100	0	0	0	0	- / -
<i>Ericameria nauseosa</i> -- (rubber rabbitbrush)									
2015	120	-	0	100	0	0	0	50	112/140
2018	240	-	0	83	17	0	0	0	90/114
2023	500	-	40	60	0	0	0	0	- / -
<i>Gutierrezia sarothrae</i> -- (broom snakeweed)									
2015	120	-	0	100	0	0	0	0	23/32
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<i>Sarcobatus vermiculatus</i> -- (greasewood)									
2015	20	-	0	100	0	0	0	0	128/221
2018	-	-	-	-	-	-	-	-	104/255
2023	-	-	-	-	-	-	-	-	- / -
<i>Tamarix chinensis</i> ⁱ -- (five-stamen tamarisk)									
2015	7660	120	33	54	13	0	0	7	142/125
2018	1280	-	28	22	50	0	0	34	37/34
2023	1080	-	6	69	26	9	2	57	- / -

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

Table 12R-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
2015	0.3	0.0	0.0	0.0	0.0	0.8	-2.0	-0.9	Very Poor
2018	0.0	0.0	0.0	0.0	0.0	0.0	-2.0	-2.0	Very Poor
2023	2.3	0.0	0.0	0.0	0.0	0.6	-2.0	0.9	Very Poor

DUGOUT (HART DRAW) - STUDY NO. 14R-6



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Harts Point South NE; Township 31S, Range 22E, Section 08
NAD 83 UTM ZONE 12, 628236 East 4218365 North

Transect Information

Browse Tag # (0' Stake)	28
Transect Bearing	290° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From SR-211 about 2.4 miles east of Newspaper Rock, turn north onto a road that is about 100 yards west of a paved road (SJ County Road #101) that goes south toward Monticello Lake. Follow this road for 4.7 miles to a gate. Pass through the gate and continue for 4.6 miles to a witness post on the left (west) side of the road. The 0-foot stake is 50 paces from the witness post at 270 degrees magnetic and is marked with browse tag #28.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	HART POINT
Elevation	6,560ft (1,999m)
Aspect	Northwest
Slope	4-6%
Sample Dates	06/17/2004, 07/14/2008, 06/25/2013, 08/21/2018, 08/02/2023

Table 14R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Aerator - Single Drum/Seed	Hart Draw Sagebrush Restoration (year 1)	246	December 2005	628

Table 14R-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hart Draw			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.97	0.94
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.06	1.01
G	Dactylis glomerata	Orchardgrass	Paiute	0.48	0.45
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.29	0.22
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.19	0.18
G	Pascopyrum smithii	Western Wheatgrass		0.95	0.79
G	Sporobolus cryptandrus	Sand Dropseed		0.29	0.28
F	Linum perenne	Blue Flax		0.19	0.17
F	Medicago sativa	Alfalfa	Nomad	0.48	0.45
F	Medicago sativa	Alfalfa	Spreador 4	0.48	0.45
F	Onobrychis viciifolia	Sainfoin	Eski	2.03	1.87
F	Sanguisorba minor	Small Burnet	Delar	2.03	1.89
S	Atriplex canescens	Fourwing Saltbush	San Juan UT	0.20	0.07
S	Atriplex canescens	Fourwing Saltbush	Juab/Tooele UT	0.77	0.44
S	Atriplex canescens	Fourwing Saltbush	Wayne UT	0.06	0.02

Mix Name			Application Type	Application Date	Acres
Harts Draw Browse			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.97	0.29

Wildlife Habitat and Vegetation History**Table 14R-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 14R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Mountain Big Sagebrush	No Encroachment
2008	Mountain Big Sagebrush	No Encroachment
2013	Mountain Big Sagebrush/Perennial Grass	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I
2023	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes**Soils****Table 14R-06.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.9	61.3	25.4	13.3	0.6	9.0	80.0	0.7	06/17/2004

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	2004-2023 - Current Potential State: Community Phase 2.2

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been the dominant shrub species on this site since study establishment in 2004. Density of sagebrush had decreased to just over half of pre-treatment levels in 2008, but line intercept cover during the most recent sampling was equivalent to that observed in 2004. Other shrub species have remained sparse (Table 14R-06.12, Table 14R-06.13). The herbaceous understory has been abundant in all sample years. Perennial grasses, primarily blue grama (*Bouteloua gracilis*), have contributed the most herbaceous cover throughout the duration of the study period and have been a codominant vegetation component since 2013. Annual grasses were common in 2023, but species data shows that much of the abundance was provided by the native species sixweeks fescue (*Vulpia octoflora*). Forbs have generally remained rare, but annual forbs were moderately abundant in 2023 (Table 14R-06.7, Table 14R-06.10, Table 14R-06.11).

Deer winter range condition on this site has ranged between very poor and poor since study establishment. In 2023, winter range was considered to be in poor condition. Improvements to deer winter range could be accomplished through efforts that increase cover and reproduction of preferred browse while decreasing decadence. Diversifying and increasing cover of perennial grasses and forbs would also be beneficial for deer winter range (Table 14R-06.15). Despite the poor condition, pellet transect data indicate deer presence on this site has remained high since 2013 (Table 14R-06.9).

Trend Summary Tables**Table 14R-06.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	10.6	0.3	-	9.6	0.5	-
2008	6.1	0.2	-	6.4	0.3	-
2013	6.7	0.1	-	6.8	0.5	-
2018	5.5	0.5	-	5.1	0.5	-
2023	9.6	1.7	-	11.4	2.6	-

Table 14R-06.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	45	359	123	41	0.2	25.3	0.5	0.5
2008	363	373	363	50	5.2	16.2	6.5	0.5
2013	61	388	190	40	0.2	25.0	0.8	0.2
2018	50	407	12	10	0.1	26.6	0.0	0.0
2023	400	271	269	68	8.5	11.6	4.5	1.0

Table 14R-06.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	49.2	3.3	18.6	0.0	-	36.4
2008	36.5	1.3	38.7	0.4	-	34.4
2013	43.1	1.0	27.8	-	-	36.2
2018	46.4	2.6	37.7	0.0	-	31.8
2023	54.9	0.2	32.1	0.3	0.1	28.4

Table 14R-06.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2004	4	29	-	11
2008	8	38	-	65
2013	1	27	1	29
2018	6	52	1	32
2023	5	41	1	29
Year	Days Use Per Acre (ha)			
2004	25.4 (62.8)	38.2 (94.4)	-	-
2008	19.6 (48.4)	29.5 (72.8)	-	-
2013	5.8 (14.3)	58.3 (144.0)	-	-
2018	17.4 (43.0)	48.9 (120.8)	-	-
2023	18.1 (44.8)	63.7 (157.3)	-	-

Table 14R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency							
2004	7	-	329	40	11	52	-	7
2008	7	13	323	268	27	75	-	315
2013	20	-	361	47	6	49	3	21
2018	6	-	388	7	31	27	-	43
2023	9	3	263	11	3	4	12	400
year	Average Cover (%)							
2004	0.1	-	23.7	0.1	0.3	1.2	-	0.0
2008	0.1	0.1	14.8	2.6	0.6	0.7	-	2.6
2013	0.1	-	24.3	0.2	0.0	0.6	0.0	0.1
2018	0.1	-	25.8	0.0	0.3	0.4	-	0.1
2023	0.2	0.0	10.8	0.1	0.1	0.1	0.5	8.4

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

Table 14R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Calochortus nuttallii (sego lily)	Chenopodium ^a (goosefoot)	Cryptantha gracilis ^a (narrowstem cryptantha)	Delphinium nuttallianum (two-lobed larkspur)	Descurainia pinnata ^a (western tansymustard)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gaillardia pinnatifida (red dome blanketflower)	Gilia inconspicua ^a (shy gilia)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Machaeranthera canescens (hoary tansyaster)	Mentzelia albicaulis ^a (whitestem blazingstar)	Oenothera (evening primrose)	Packera multilobata (lobeleaf groundsel)	Phacelia ^a (phacelia)	Phlox longifolia (longleaf phlox)	Plantago patagonica ^a (woolly plantain)
year	Nested Frequency																
2004	2	1	-	6	-	1	-	75	1	-	-	-	-	3	-	-	66
2008	-	-	-	1	7	33	-	40	22	0	3	-	11	3	14	-	359
2013	-	-	-	-	5	7	-	3	15	-	-	-	-	6	-	3	183
2018	6	1	1	-	-	-	-	-	-	-	-	3	-	-	-	3	7
2023	3	-	53	-	9	16	6	121	6	-	31	-	-	12	-	-	202
year	Average Cover (%)																
2004	0.0	0.0	-	0.0	-	0.0	-	0.3	0.0	-	-	-	-	0.1	-	-	0.2
2008	-	-	-	0.0	0.0	0.8	-	0.1	0.1	0.0	0.0	-	0.0	0.0	0.1	-	5.5
2013	-	-	-	-	0.0	0.0	-	0.0	0.0	-	-	-	-	0.0	-	0.0	0.7
2018	0.0	0.0	0.0	-	-	-	-	-	-	-	-	0.0	-	-	-	0.0	0.0
2023	0.0	-	1.1	-	0.0	0.7	0.1	1.0	0.0	-	0.4	-	-	0.4	-	-	1.7

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

FORB SPECIES	Sphaeralcea coccinea (scarlet globemallow)
year	Nested
2004	30
2008	34
2013	31
2018	3
2023	17
year	Average Cover (%)
2004	0.3
2008	0.5
2013	0.1
2018	0.0
2023	0.1

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

Table 14R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
	year						
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^p (mountain big sagebrush)	2004	9.1	-	0.2	0.5	0.3	-
<i>Atriplex canescens</i> ^p (fourwing saltbush)	2008	5.9	-	0.2	0.5	0.1	-
<i>Gutierrezia sarothrae</i> (broom snakeweed)	2013	6.3	-	0.2	0.5	0.3	-
<i>Krascheninnikovia lanata</i> ^p (winterfat)	2018	4.6	-	0.1	0.5	0.4	-
<i>Opuntia polyacantha</i> (plains pricklypear)	2023	9.5	-	2.3	1.9	0.3	-
<i>Pediocactus simpsonii</i> (mountain ball cactus)	year	Quadrat Cover (%)					
	2004	10.4	0.1	0.2	0.0	0.1	-
	2008	6.1	-	0.0	0.1	0.1	-
	2013	6.7	-	0.0	0.0	0.0	-
	2018	5.5	-	0.1	0.0	0.5	-
	2023	9.0	-	1.0	0.6	0.7	0.0

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

Table 14R-06.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>^p -- (mountain big sagebrush)									
2004	2360	40	0	6	94	38	6	55	50/81
2008	1720	-	1	16	83	58	19	56	41/63
2013	1840	-	1	40	59	58	22	69	43/75
2018	1540	-	0	48	52	66	25	36	45/85
2023	1260	-	0	79	21	6	29	27	- / -
<i>Chrysothamnus viscidiflorus</i> -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	- / -
2008	20	-	0	0	100	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	20	-	0	0	100	0	100	100	- / -
2023	-	-	-	-	-	-	-	-	- / -
<i>Ericameria nauseosa</i> -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	0	0	0	50/54
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<i>Gutierrezia sarothrae</i> -- (broom snakeweed)									
2004	220	-	0	91	9	9	0	9	27/30
2008	520	40	46	54	0	0	0	0	21/21
2013	260	140	31	69	0	0	0	0	12/25
2018	500	-	0	80	20	0	0	20	13/17
2023	720	-	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 (%)				
Krascheninnikovia lanata^p -- (winterfat)									
2004	320	-	0	100	0	31	63	19	14/26
2008	400	-	0	60	40	0	85	20	28/27
2013	400	20	10	90	0	25	65	10	18/27
2018	400	-	5	65	30	45	50	15	15/31
2023	760	-	11	90	0	29	8	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2004	120	-	0	67	33	0	0	0	11/38
2008	180	-	0	44	56	0	0	22	10/29
2013	200	-	30	60	10	0	0	30	10/28
2018	240	-	0	100	0	0	0	8	8/39
2023	220	-	0	100	0	0	0	9	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2004	20	-	0	100	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	3/6
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	0	0	- / -

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

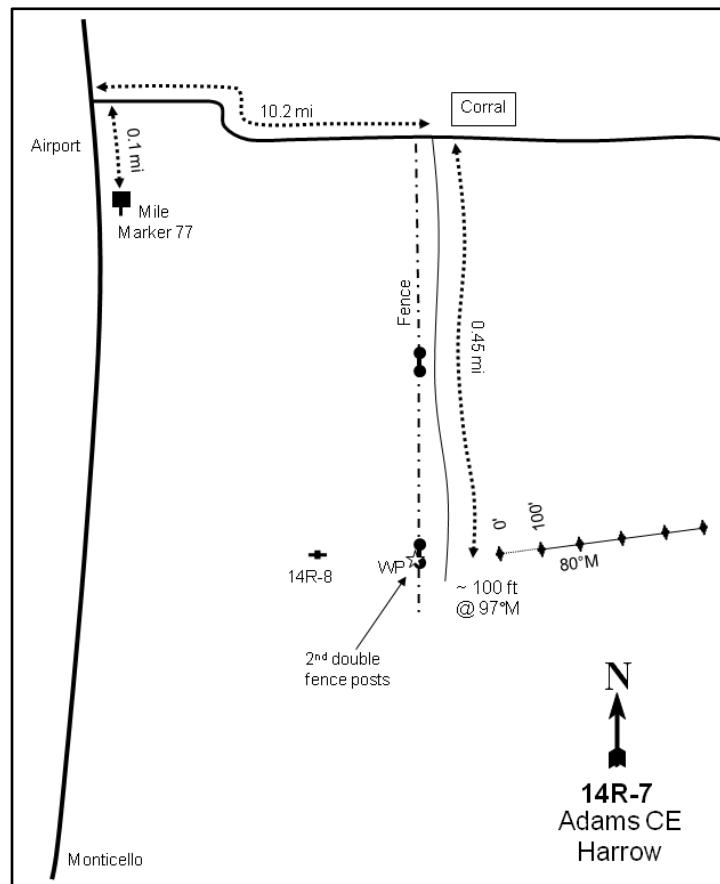
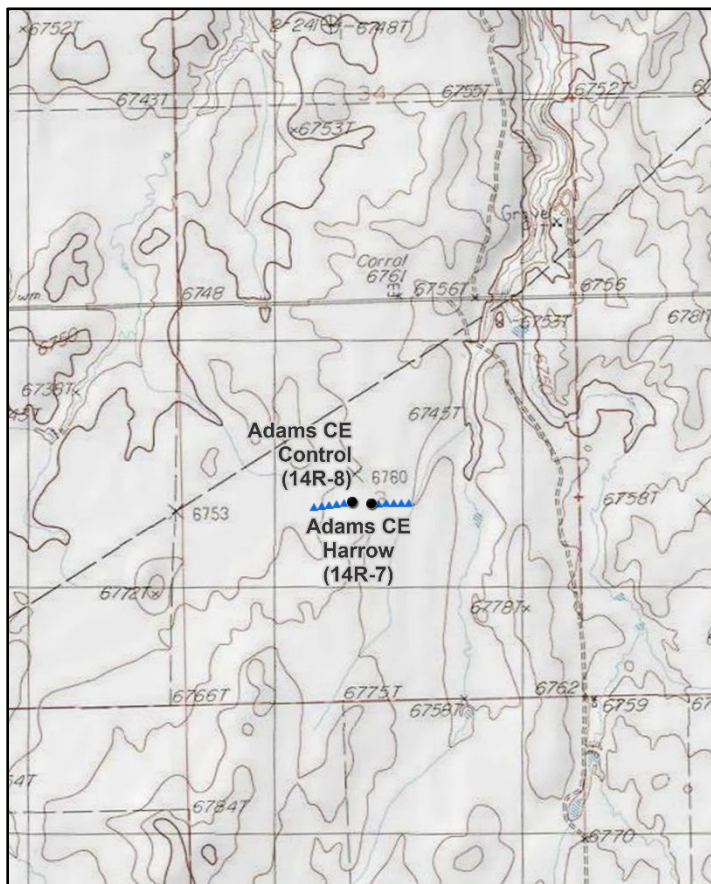
Table 14R-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2018	26	-	100	-	-	-	3.3
2023	9	-	33	67	-	-	5.3
Pinus edulis (twoneedle pinyon)							
2018	3	-	100	-	-	-	3.0

Table 14R-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
2004	12.0	-11.8	0.0	30.0	-0.1	1.0	0.0	31.1	Very Poor
2008	8.0	-8.8	0.6	30.0	-3.9	1.0	0.0	26.9	Very Poor
2013	8.5	-1.3	0.9	30.0	-0.2	0.3	0.0	38.2	Poor
2018	6.4	0.1	0.2	30.0	-0.1	0.1	0.0	36.6	Very Poor-Poor
2023	14.3	9.9	0.9	23.2	-6.4	2.0	0.0	43.8	Poor

ADAMS CE HARROW - STUDY NO. 14R-7

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Eastland NW NE; Township 33S, Range 25E, Section 03
NAD 83 UTM ZONE 12, 661334 East 4200536 North

Transect Information

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

Not Available
80° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
No Rebar

Directions to Site

On US-191 travel north of Monticello for about 5.5 miles to mile marker 77. Continue for 0.1 miles to a road that comes in from the right. Turn here and follow this road for 10.2 miles to another road that comes in from the right. Turn right here and travel south for 0.45 miles to the second pair of wooden fenceposts on the right side of the road. The 0-foot stake is about 100 feet from these fenceposts at an azimuth of 97 degrees magnetic.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,770ft (2,063m)
Aspect	North
Slope	2-5%
Sample Dates	09/10/2004, 06/12/2007, 06/20/2012, 07/26/2017, 08/01/2023

Table 14R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Broadcast Before	-	PDB	August-December 2001	320
Harrow - Two-Way Dixie	-	PDB	August-December 2001	320

Table 14R-07.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
			Broadcast	Sep 2001	320
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Agropyron cristatum</i>	Crested Wheatgrass		1.00	0.00
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass		2.00	0.00
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass		1.00	0.00
G	<i>Pascopyrum smithii</i>	Western Wheatgrass		1.00	0.00
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass		2.00	0.00
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		1.00	0.00
F	<i>Linum perenne</i>	Blue Flax		0.30	0.00
F	<i>Medicago sativa</i>	Alfalfa		2.00	0.00
F	<i>Sanguisorba minor</i>	Small Burnet		2.00	0.00

Wildlife Habitat and Vegetation History**Table 14R-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 14R-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Black Sagebrush	NA
2007	Black Sagebrush	NA
2012	Black Sagebrush	NA
2017	Black Sagebrush	NA
2023	Black Sagebrush	NA

Site Notes

Prairie dogs were observed on this site in 2023 and were having a negative impact on the herbaceous vegetation.

Soils**Table 14R-07.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay	7.1	31.3	28.2	40.5	1.8	2.6	182.4	0.5	09/09/2004

Site Potential

1981 - 2010 Average Annual Precipitation 14 inches
 NRCS Ecological Site Upland Shallow Loam (Black Sagebrush)
 NRCS Ecological Site # R035XY312UT
 States and Transitions No state and transition model is available for this ecological site.

This site has remained dominated by black sagebrush (*Artemisia nova*), the cover of which has exhibited a stable to slight increase, since study establishment in 2004. Other preferred browse species have also been present, but have contributed less cover than sagebrush (Table 14R-07.12, Table 14R-07.13). The herbaceous understory has remained abundant with a diverse number of perennial grasses being sampled: crested wheatgrass (*Agropyron cristatum*) was the most abundant grass species in 2023 (Table 14R-07.10). Forbs have been rare in comparison (Table 14R-07.7), with the most abundant species being the perennial species mountain phlox (*Phlox austromontana*) in most sample years (Table 14R-07.11). This study site is expected to remain in a similar state in the future unless a major disturbance occurs.

Condition of deer winter range on this site has ranged between poor and good since study establishment, and condition was considered to be good in 2023. Further improvement to deer winter range could be achieved through efforts that encourage increased preferred browse cover and reproduction. Diversifying and increasing cover of perennial forbs would also improve winter range condition (Table 14R-07.15). Pellet transect data shows that deer pellet groups have not been observed in any sample year (Table 14R-07.9).

Trend Summary Tables**Table 14R-07.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	10.7	0.2	-	13.0	0.3	-
2007	13.1	0.0	-	13.5	0.4	-
2012	10.9	0.0	-	9.7	0.1	-
2017	11.3	0.1	-	13.9	-	-
2023	14.1	0.2	-	15.5	0.3	-

Table 14R-07.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	-	220	77	180	-	7.1	0.3	2.3
2007	13	351	152	208	0.0	21.1	1.5	5.0
2012	-	334	2	161	-	19.1	0.0	2.1
2017	-	314	3	148	-	16.5	0.0	2.8
2023	-	236	20	121	-	13.9	0.1	1.2

Table 14R-07.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	67.5	0.0	19.6	2.0	0.4	20.1
2007	50.5	0.2	22.0	3.2	0.1	35.3
2012	48.6	-	23.8	4.2	0.2	35.1
2017	57.7	0.0	19.8	6.6	0.3	27.9
2023	58.5	0.0	16.4	4.4	0.6	24.9

Table 14R-07.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Gunnison Sage-Grouse	Rabbit	Gunnison's Prairie Dog
	Quadrat Frequency					
2004	-	-	-	-	2	-
2007	-	-	-	1	35	-
2012	2	-	-	-	-	-
2017	-	1	4	9	6	-
2023	3	-	1	-	1	51
Year	Days Use Per Acre (ha)					
2004	4.4 (10.8)	-	-	26.2 (64.6)*	-	-
2007	14.5 (35.9)	-	-	104.5 (258.2)*	-	-
2012	12.3 (30.5)	8.7 (21.5)*	-	-	-	-
2017	8.7 (21.5)	-	-	-	-	-
2023	7.2 (17.9)	-	-	-	-	-

*Pellets per acre (ha)

Table 14R-07.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nest Frequency													
year	Average Cover (%)													
Achnatherum hymenoides (Indian ricegrass)	15	76	1	-	-	50	-	102	10	-	4	-	4	
Agropyron cristatum ⁱ (crested wheatgrass)	24	195	1	10	13	112	4	111	14	-	14	-	30	
Bouteloua gracilis (blue grama)	31	246	20	10	-	41	4	64	12	9	7	5	11	
Bromus inermis ⁱ (smooth brome)	6	297	17	9	-	-	-	2	-	-	-	-	-	
Bromus tectorum ^{ai} (cheatgrass)	1	193	21	0	-	7	-	19	24	5	10	-	3	
Elymus elymoides (squirreltail)	0.3	4.0	0.0	-	-	1.0	-	1.5	0.2	-	0.1	-	0.0	
Koeleria macrantha (prairie Junegrass)	1.1	11.2	0.0	0.5	0.0	4.1	0.4	2.3	0.5	-	0.7	-	0.3	
Pascopyrum smithii (western wheatgrass)	0.4	15.4	0.3	0.0	-	0.8	0.0	1.2	0.3	0.3	0.1	0.2	0.2	
Pleuraphis jamesii (James' galleta)	0.4	15.3	0.6	0.3	-	-	-	0.0	-	-	-	-	-	
Poa secunda (Sandberg bluegrass)	0.0	10.4	1.1	0.0	-	0.1	-	0.1	1.3	0.0	0.9	-	0.0	
Psathyrostachys juncea ⁱ (Russian wildrye)														
Pseudoroegneria spicata (bluebunch wheatgrass)														
Thinopyrum intermedium ⁱ (intermediate wheatgrass)														

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

Table 14R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nest Frequency																	
year	Average Cover (%)																	
Antennaria (pussytoes)	-	-	60	6	6	4	-	2	5	8	-	12	132	-	11	8	71	
Ceratocephala testiculata ^{ai} (curveseed butterwort)	1	3	-	-	3	109	4	4	45	26	1	5	137	-	30	-	123	
Chenopodium leptophyllum ^a (narrowleaf goosefoot)	-	-	-	-	12	2	-	2	-	9	-	-	123	-	-	-	68	
Cordylanthus ramosus ^{ai} (bushy bird's beak)	-	-	-	3	-	-	-	-	-	-	-	1	121	-	-	-	48	
Cryptantha (cryptantha)	-	-	-	10	5	10	-	-	-	-	-	-	60	1	-	-	70	
Descurainia pinnata ^a (western tansymustard)																		
Draba ^a (draba)																		
Erigeron pumilus (shaggy fleabane)																		
Lappula occidentalis ^a (flatspine stickseed)																		
Lesquerella (bladderpod)																		
Linum perenne ⁱ (blue flax)																		
Medicago sativa ⁱ (alfalfa)																		
Phlox austromontana (mountain phlox)																		
Phlox longifolia (longleaf phlox)																		
Salsola tragus ^{ai} (prickly Russian thistle)																		
Sanguisorba minor ⁱ (small burnet)																		
Sphaeralcea coccinea (scarlet globemallow)																		

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

Table 14R-07.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
	Artemisia nova ^p (black sagebrush)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata ^p (winterfat)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)						
2004	6	3.8	-	0.1	0.1	3.1	0.2
2007	6.8	3.2	-	0	0.1	3.5	0.3
2012	6	1	-	0.2	0.1	2.5	-
2017	8.8	2.2	-	0	0	2.9	-
2023	8	1.5	0.3	0.1	-	5.9	-
year	Quadrat Cover (%)						
2004	6.9	1.3	-	0.0	0.2	2.5	0.0
2007	7.5	2.1	-	0.1	0.0	3.4	0.0
2012	6.1	1.4	-	0.1	0.0	3.4	-
2017	6.6	1.8	-	0.0	0.1	2.9	0.0
2023	7.0	2.2	0.2	0.1	-	4.7	0.0

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

Table 14R-07.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia frigida^p -- (prairie sagewort)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	10/21
2012	20	-	0	100	0	0	100	0	-/-
2017	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Artemisia nova^p -- (black sagebrush)									
2004	5000	140	0	41	59	15	18	39	22/35
2007	4980	500	8	51	41	35	0	11	22/42
2012	4240	-	5	85	10	10	33	13	22/41
2017	4200	-	5	91	4	1	0	4	19/39
2023	3140	-	9	69	22	12	1	21	-/-
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
2004	4260	120	1	87	13	13	0	7	15/25
2007	3820	200	9	79	12	14	1	5	14/26
2012	2580	40	5	91	5	12	1	4	11/33
2017	1840	-	1	99	0	5	0	0	12/25
2023	2280	220	14	83	4	0	1	4	-/-
Eriogonum microthecum^p -- (slender buckwheat)									
2004	480	20	0	100	0	4	0	0	8/12
2007	600	80	13	70	17	3	23	10	7/11
2012	660	20	0	97	3	0	0	3	9/12
2017	80	-	0	100	0	50	0	0	12/7
2023	880	-	2	98	0	5	0	0	-/-

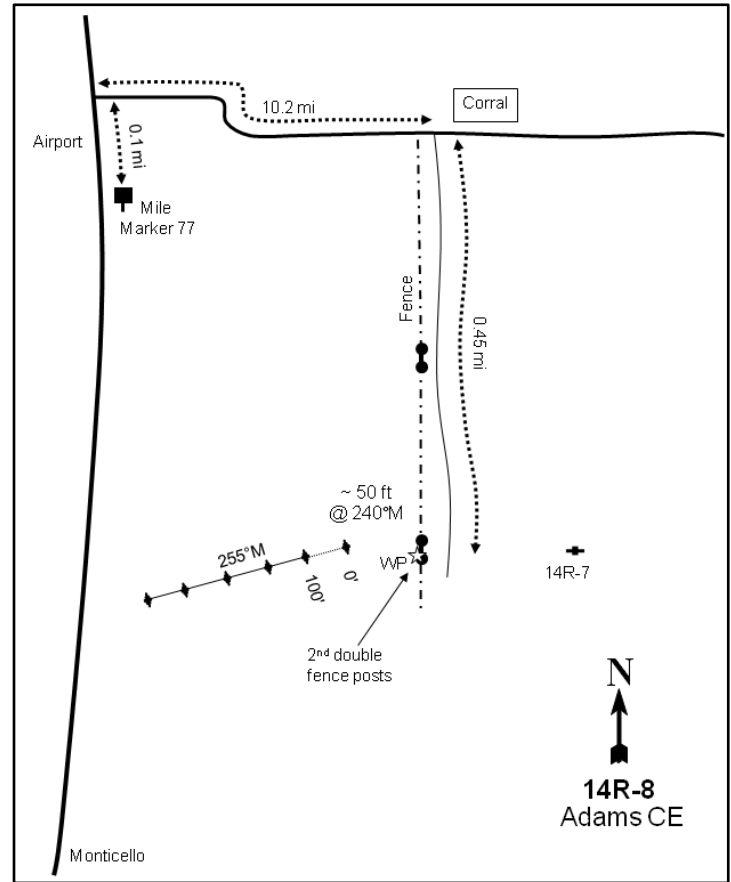
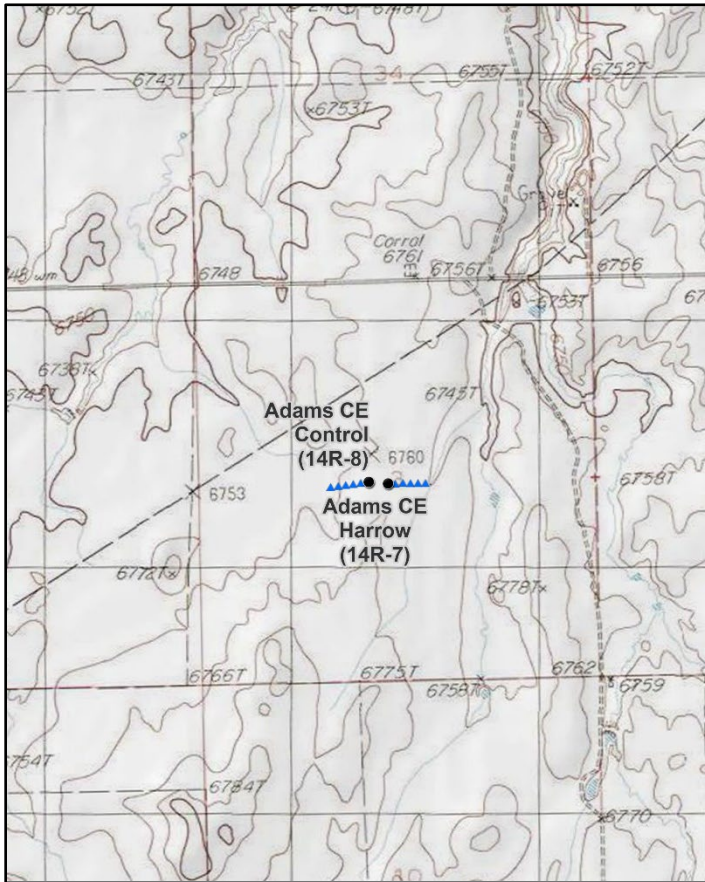
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	43/63
2017	-	-	-	-	-	-	-	-	-/-
2023	260	-	0	100	0	0	0	0	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2004	220	40	9	91	0	0	0	0	15/21
2007	160	-	25	75	0	0	0	0	12/17
2012	160	-	13	88	0	0	0	0	12/16
2017	120	-	0	100	0	0	0	0	16/24
2023	20	-	0	100	0	0	0	0	-/-
Krascheninnikovia lanata^p -- (winterfat)									
2004	3420	2900	4	96	0	13	2	0	20/28
2007	9980	2500	39	56	5	6	8	1	17/25
2012	6900	80	7	90	3	27	14	4	13/19
2017	7380	120	11	88	1	16	9	4	14/19
2023	8140	160	35	65	0	25	6	0	-/-
Tetradymia canescens -- (spineless horsebrush)									
2004	20	-	0	100	0	0	0	0	-/-
2007	60	-	0	100	0	100	0	0	23/37
2012	100	-	0	100	0	20	0	0	15/28
2017	20	-	0	100	0	0	0	0	13/29
2023	40	-	0	100	0	0	0	0	-/-

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

Table 14R-07.15 - 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	16.3	5.7	0.6	14.3	0.0	4.6	0.0	41.4	Poor
2007	16.9	7.6	8.0	30.0	0.0	9.9	0.0	72.4	Good
2012	12.1	12.8	2.8	30.0	0.0	4.3	0.0	62.0	Fair
2017	17.4	14.2	2.8	30.0	0.0	5.6	0.0	69.9	Good
2023	19.4	11.5	9.7	27.8	0.0	2.5	0.0	70.9	Good

ADAMS CE CONTROL - STUDY NO. 14R-8

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Eastland NW NE; Township 33S, Range 25E, Section 03
NAD 83 UTM ZONE 12, 661256 East 4200543 North

Transect Information

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

Not Available
255° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
No Rebar

Directions to Site

On US-191, travel north of Monticello for about 5.5 miles to mile marker 77. Continue for 0.1 miles to a road that comes in from the right. Turn right here and follow this road for 10.2 miles to another road that comes in from the right. Turn here and travel south for 0.45 miles to the second pair of wooden fenceposts on the right side of the road. The 0-foot stake is 50 feet from the fenceposts at an azimuth of 240 degrees magnetic.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,770ft (2,063m)
Aspect	Northwest
Slope	2-5%
Sample Dates	09/14/2004, 06/12/2007, 06/20/2012, 07/26/2017, 08/01/2023

Wildlife Habitat and Vegetation History**Table 14R-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 14R-08.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Black Sagebrush	NA
2007	Black Sagebrush	NA
2012	Black Sagebrush	NA
2017	Black Sagebrush	NA
2023	Black Sagebrush	NA

Site Notes

This study was established in 2004 as a control study for a Dixie pipe harrow project (14R-07 monitors the project).

Soils**Table 14R-08.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.2	33.3	31.4	35.3	1.5	12.4	160.0	0.6	09/14/2004

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R035XY312UT
States and Transitions	No state and transition model is available for this ecological site.

Black sagebrush (*Artemisia nova*) has been the dominant preferred browse species on this site since study establishment in 2004, and cover has remained stable overall (Table 14R-08.12, Table 14R-08.13). The herbaceous understory has remained composed of perennial grass species, particularly the introduced species crested wheatgrass (*Agropyron cristatum*), in all sample years (Table 14R-08.7, Table 14R-08.10). Forbs have been rare, and mountain phlox (*Phlox austromontana*) contributed most of the forb cover in 2023 (Table 14R-08.11). Barring a major disturbance, this study site is expected to remain in this or a similar state in future sample years.

Deer winter range condition has ranged between fair to good since study establishment, and was considered to be good in 2023. Further improvements to deer winter range could be achieved through efforts that increase reproduction of and decrease decadence in the preferred browse population. Diversifying and increasing cover of perennial forbs would also benefit deer winter range (Table 14R-08.15). However, deer pellet groups have not been observed in pellet transect data in any sample year (Table 14R-08.9).

Trend Summary Tables**Table 14R-08.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	17.2	0.0	-	23.5	0.2	-
2007	16.4	0.2	-	19.7	0.2	-
2012	15.5	0.1	-	21.8	0.4	-
2017	20.1	0.1	-	22.9	0.2	-
2023	17.9	-	-	23.5	0.1	-

Table 14R-08.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	-	262	22	112	-	7.5	0.1	0.9
2007	3	322	60	115	0.0	14.4	0.5	1.4
2012	-	303	-	106	-	13.5	-	1.9
2017	-	288	-	58	-	16.6	-	2.0
2023	-	266	1	73	-	15.1	0.0	0.8

Table 14R-08.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	66.3	0.6	17.0	0.9	0.1	24.3
2007	60.6	0.7	20.2	0.3	0.0	29.4
2012	54.8	0.3	24.7	0.6	0.0	32.1
2017	59.1	0.3	19.6	0.2	0.0	32.3
2023	51.5	0.1	20.6	1.8	0.8	29.7

Table 14R-08.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Gunnison Sage-Grouse	Rabbit	Gunnison's Prairie Dog
	Quadrat Frequency			
2004	5	1	1	-
2007	6	7	17	-
2012	3	-	-	-
2017	1	-	6	-
2023	10	-	-	4
Year	Days Use Per Acre (ha)			
2004	8.0 (19.7)	8.7 (21.5)*	-	-
2007	14.5 (35.9)	470.4 (1162.0)*	-	-
2012	0.7 (1.8)	34.9 (86.1)*	-	-
2017	8.0 (19.7)	-	-	-
2023	16.0 (39.5)	-	-	-

*Pellets per acre (ha)

Table 14R-08.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galletta)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2004	2	160	-	-	9	2	127	1	-	-
2007	9	235	4	3	16	26	118	-	-	7
2012	11	244	10	-	8	7	53	9	10	-
2017	-	285	6	-	-	-	14	-	-	-
2023	2	251	12	-	3	-	16	-	-	9
year	Average Cover (%)									
2004	0.1	5.0	-	-	0.3	0.0	2.2	0.0	-	-
2007	0.2	9.7	0.2	0.0	0.5	0.7	2.5	-	-	0.7
2012	0.5	11.1	0.2	-	0.0	0.0	1.4	0.1	0.1	-
2017	-	16.1	0.4	-	-	-	0.1	-	-	-
2023	0.2	13.9	0.7	-	0.0	-	0.3	-	-	0.0

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

Table 14R-08.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cordylanthus ramosus ^a (bushy bird's beak)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron (fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Lappula occidentalis ^a (flatspine stickseed)	Lupinus (lupine)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Silene antirrhina ^a (sleepy silene)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)	
year	Nested Frequency																	
2004	3	-	10	-	4	-	3	3	2	7	3	-	61	-	29	1	20	
2007	-	5	-	-	31	15	-	-	10	19	-	0	57	11	31	-	23	
2012	-	-	-	-	-	-	-	-	3	-	-	3	64	-	25	-	17	
2017	-	-	-	-	-	-	-	-	-	-	-	-	51	-	8	-	-	
2023	-	-	-	1	-	-	-	-	2	-	9	-	39	-	23	-	7	
year	Average Cover (%)																	
2004	0.0	-	0.0	-	0.0	-	0.0	0.0	0.0	0.0	0.0	-	0.6	-	0.2	0.0	0.1	
2007	-	0.0	-	-	0.2	0.0	-	-	0.2	0.2	-	0.0	1.0	0.1	0.1	-	0.1	
2012	-	-	-	-	-	-	-	-	0.0	-	-	0.0	1.5	-	0.2	-	0.1	
2017	-	-	-	-	-	-	-	-	-	-	-	-	2.0	-	0.0	-	-	
2023	-	-	-	0.0	-	-	-	-	0.0	-	0.1	-	0.5	-	0.2	-	0.0	

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

FORB SPECIES	unknown perennial forb (unknown forb)
year	Nested
2004	3
2007	-
2012	-
2017	-
2023	-
year	Average Cover (%)
2004	0.0
2007	-
2012	-
2017	-
2023	-

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

Table 14R-08.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
	Artemisia frigida ^p (prairie sagewort)	Artemisia nova ^p (black sagebrush)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata ^p (winterfat)
year	Line Intercept Cover (%)						
2004	-	22.9	0.2	-	0.1	0.2	0.3
2007	-	19.6	-	0.2	-	-	0.1
2012	-	21.4	-	0.4	-	-	0.4
2017	-	22.9	-	0.2	-	-	-
2023	-	23.5	-	0.1	-	-	-
year	Quadrat Cover (%)						
2004	-	17.0	0.0	-	0.1	0.0	0.1
2007	-	16.2	-	0.2	0.2	-	0.1
2012	-	15.3	0.0	0.1	0.0	-	0.1
2017	-	19.8	0.1	0.1	-	-	0.2
2023	0.1	17.6	0.1	0.0	-	-	-

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

Table 14R-08.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia frigida^p -- (prairie sagewort)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	60	-	0	100	0	100	0	0	12/29
2023	-	-	-	-	-	-	-	-	-/-
Artemisia nova^p -- (black sagebrush)									
2004	7700	80	3	72	26	4	0	10	31/53
2007	6980	80	4	56	40	13	0	17	33/55
2012	6020	180	4	83	13	11	16	13	30/59
2017	7840	-	2	84	14	3	0	8	25/56
2023	5860	240	8	69	24	17	3	22	-/-
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
2004	140	-	0	86	14	0	0	14	10/18
2007	80	-	0	75	25	0	0	25	13/34
2012	120	-	0	100	0	0	0	0	12/23
2017	60	-	0	100	0	0	0	0	14/32
2023	60	-	33	67	0	0	0	0	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2004	80	-	0	100	0	0	0	0	19/29
2007	160	20	0	88	13	0	0	25	17/31
2012	140	-	0	100	0	29	0	0	18/33
2017	260	-	0	100	0	0	0	0	16/12
2023	40	-	0	100	0	0	0	0	-/-

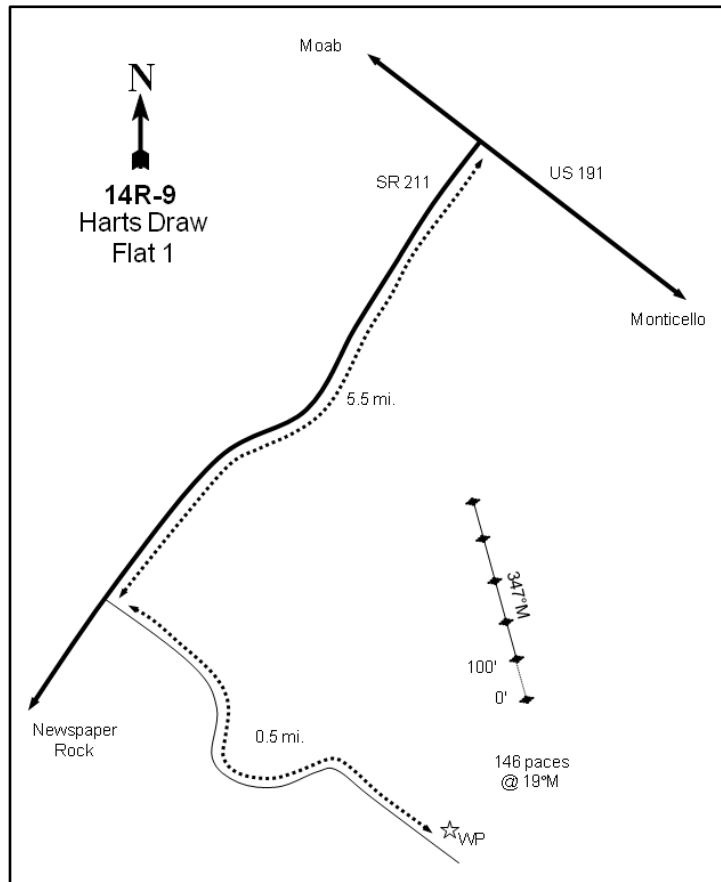
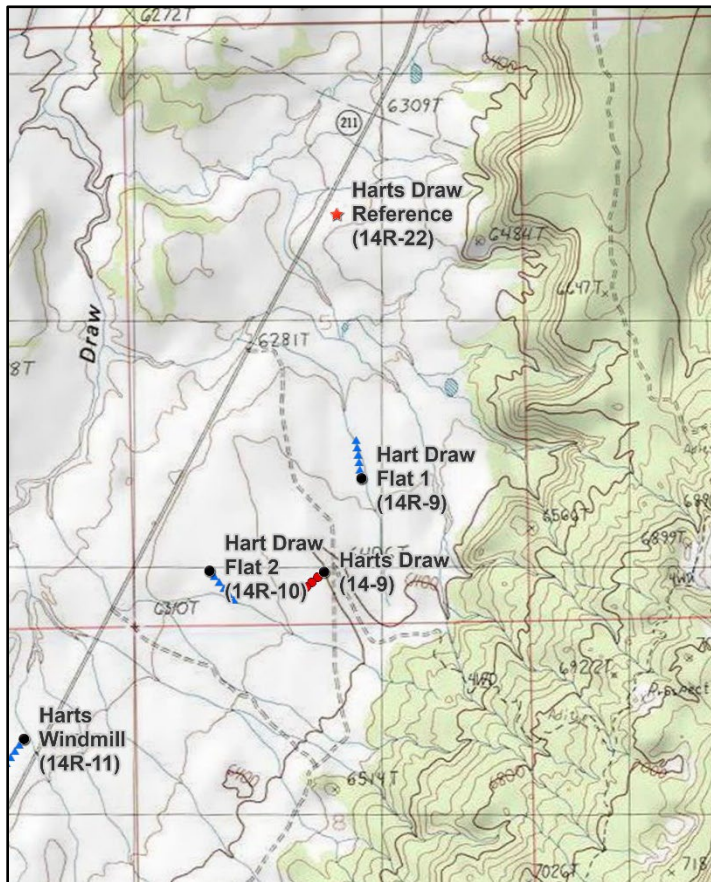
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Eriogonum microthecum^p -- (slender buckwheat)									
2004	220	-	0	100	0	36	0	0	11/13
2007	220	-	0	82	18	0	0	9	14/23
2012	120	-	0	83	17	0	0	17	12/10
2017	-	-	-	-	-	-	-	-	-/-
2023	20	-	0	100	0	0	0	0	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2004	220	-	0	100	0	0	0	0	13/26
2007	-	-	-	-	-	-	-	-	9/8
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	19/36
2023	60	-	0	100	0	0	0	0	-/-
Krascheninnikovia lanata^p -- (winterfat)									
2004	220	-	0	82	18	9	0	9	18/26
2007	160	800	0	100	0	0	0	0	18/22
2012	160	20	0	100	0	13	0	25	21/28
2017	140	-	0	86	14	43	14	0	24/23
2023	120	-	0	100	0	67	0	0	-/-
Tetradymia canescens -- (spineless horsebrush)									
2004	-	-	-	-	-	-	-	-	29/56

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

Table 14R-08.15 - 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	29.4	7.4	1.3	15.1	0.0	1.8	0.0	55.0	Fair
2007	24.6	3.0	2.0	28.8	0.0	2.8	0.0	61.2	Fair
2012	27.3	11.1	2.0	27.1	0.0	3.8	0.0	71.1	Good
2017	28.6	10.7	1.0	30.0	0.0	4.0	0.0	74.3	Good
2023	29.4	8.0	3.8	30.0	0.0	1.5	0.0	72.6	Good

HART DRAW FLAT 1 - STUDY NO. 14R-9



Location Information

USGS 7.5 min Map Info Photograph Gap SE; Township 32S, Range 23E, Section 05
 GPS (0' Stake) NAD 83 UTM ZONE 12, 638863 East 4209556 North

Transect Information

Browse Tag # (0' Stake) 65
 Transect Bearing 347° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

From the junction of US-191 and SR-211 north of Monticello, drive 5.5 miles on SR-211 to a dirt road on the left (south) side of the road. Turn onto this road and drive 0.5 miles to the witness post on the left (east) side of the road. From the witness post, walk 146 paces at 19 degrees magnetic to the 0-foot stake which is marked with browse tag #65.

Site Information

Land Ownership Federal
 Land Administrator BLM
 Allotment HART DRAW
 Elevation 6,350ft (1,935m)
 Aspect North
 Slope 1-3%
 Sample Dates 06/29/2005, 07/15/2008, 06/25/2013, 08/22/2018, 08/01/2023

Table 14R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Rangeland Drill	Hart Draw Phase 1 Cont.	1231	September-October 2008	263
Seeding - Aerial	Hart Draw Phase 1 Cont.	1231	October 2008	263
Aerator - Single Drum/Seed	Hart Draw Sagebrush Restoration (year 1)	246	December 2005	628

Table 14R-09.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hart Draw			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.97	0.94
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.06	1.01
G	Dactylis glomerata	Orchardgrass	Paiute	0.48	0.45
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.29	0.22
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.19	0.18
G	Pascopyrum smithii	Western Wheatgrass		0.95	0.79
G	Sporobolus cryptandrus	Sand Dropseed		0.29	0.28
F	Linum perenne	Blue Flax		0.19	0.17
F	Medicago sativa	Alfalfa	Nomad	0.48	0.45
F	Medicago sativa	Alfalfa	Spreador 4	0.48	0.45
F	Onobrychis viciifolia	Sainfoin	Eski	2.03	1.87
F	Sanguisorba minor	Small Burnet	Delar	2.03	1.89
S	Atriplex canescens	Fourwing Saltbush	San Juan UT	0.20	0.07
S	Atriplex canescens	Fourwing Saltbush	Juab/Tooele UT	0.77	0.44
S	Atriplex canescens	Fourwing Saltbush	Wayne UT	0.06	0.02

Mix Name			Application Type	Application Date	Acres
Harts Draw Browse			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.97	0.29

Mix Name			Application Type	Application Date	Acres
Harts Draw			Drill	Sep 2008	100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.00	0.92
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.50	1.37
G	Agropyron cristatum	Crested Wheatgrass	Nordan	1.50	1.39
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.00	1.87
G	Pleuraphis jamesii	Galleta	Viva	0.25	0.20
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.50	1.28
G	Sporobolus cryptandrus	Sand Dropseed		0.25	0.21
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	1.00	0.88
F	Medicago sativa	Alfalfa	Ladak	1.00	0.95
F	Medicago sativa	Alfalfa	Ranger	0.50	0.46
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.45
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.92

Mix Name			Application Type	Application Date	Acres
Harts Draw - Fluffy Box			Drill	Sep 2008	100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Garfield UT	0.75	0.20
S	Bassia prostrata	Forage Kochia	Immigrant	0.75	0.52

Mix Name			Application Type	Application Date	Acres
Harts Draw Aerial Sagebrush			Aerial	Oct 2008	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.67	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Garfield UT	0.70	0.18

Wildlife Habitat and Vegetation History**Table 14R-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 14R-09.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Annual-Perennial Grass/Black Greasewood	No Encroachment
2008	Annual-Perennial Grass/Black Greasewood	No Encroachment
2013	Perennial Grass/Black Greasewood	No Encroachment
2018	Perennial Grass/Black Greasewood	No Encroachment
2023	Perennial Grass/Black Greasewood	No Encroachment

Site Notes

No Notes

Soils**Table 14R-09.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.7	50.7	23.5	25.8	0.7	3.4	131.2	0.5	06/28/2005

Site Potential

1981 - 2010 Average Annual Precipitation 14 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R035XY308UT
 States and Transitions 2005-2008 - State Undefined: Community Phase Undefined
 2013-2023 - Warm Season Grass State: Community Phase 3.2

Since study establishment in 2005, black greasewood (*Sarcobatus vermiculatus*) has been the most abundant shrub species and a codominant vegetation component of the site; other browse species have remained rare (Table 14R-09.12, Table 14R-09.13). Perennial grasses, particularly James' galleta (*Pleuraphis jamesii*), have contributed a majority of the herbaceous cover in most sample years and have remained a codominant cover type since study establishment. The introduced annual grass species cheatgrass (*Bromus tectorum*) was also codominant in 2005 and 2008, but has since decreased in cover. Forbs have remained rare in most sample years, but the introduced annual species prickly Russian thistle (*Salsola tragus*) contributed over 22% cover in 2023 (Table 14R-09.7, Table 14R-09.10, Table 14R-09.11).

Deer winter range on this site has remained in very poor condition since study establishment in 2005. Improvements to deer winter range could be achieved through efforts that increase preferred browse cover and reproduction. Decreasing annual grasses and diversifying and increasing cover of native perennial forbs would also prove beneficial for this winter range (Table 14R-09.15). According to pellet transect data, deer presence has remained low throughout the study period (Table 14R-09.9).

Trend Summary Tables**Table 14R-09.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	1.1	4.7	-	1.1	4.8	-
2008	0.7	2.1	-	0.5	2.6	-
2013	0.7	3.2	-	0.8	4.8	-
2018	0.8	2.0	-	1.2	2.5	-
2023	0.6	6.8	-	1.4	7.4	-

Table 14R-09.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	356	290	338	13	10.2	9.0	7.9	0.1
2008	394	291	101	6	6.2	11.8	0.4	0.0
2013	7	307	17	3	0.0	17.1	0.1	0.0
2018	9	321	29	4	0.0	15.1	0.2	0.0
2023	157	246	223	8	4.2	13.5	24.6	0.1

Table 14R-09.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	50.7	0.1	34.5	0.3	0.0	27.8
2008	46.3	0.2	38.7	1.1	0.1	22.8
2013	64.1	0.4	16.8	0.1	0.2	21.8
2018	68.8	0.1	31.2	0.7	0.2	18.4
2023	55.2	0.1	13.9	0.5	0.0	43.7

Table 14R-09.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2005	12	16	-	-	33
2008	13	8	-	-	82
2013	4	6	1	-	30
2018	8	4	-	-	72
2023	7	3	-	-	18
Year	Days Use Per Acre (ha)				
2005	18.1 (44.8)	4.0 (9.9)	-	4.0 (10.0)	-
2008	39.9 (98.6)	0.7 (1.7)	0.7 (1.7)	-	-
2013	16.7 (41.2)	7.4 (18.2)	-	-	-
2018	19.6 (48.4)	4.0 (9.9)	-	-	-
2023	16.7 (41.2)	0.7 (1.7)	-	-	-

Table 14R-09.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency									
Achnatherum hymenoides (Indian ricegrass)										
Bouteloua gracilis (blue grama)										
Bromus tectorum ^{ai} (cheatgrass)										
Elymus elymoides (squirreltail)										
Erenopyrum triticeum ^{ai} (annual wheatgrass)										
Pascopyrum smithii (western wheatgrass)										
Pleuraphis jamesii (James' galleta)										
Poa pratensis ⁱ (Kentucky bluegrass)										
Sporobolus cryptandrus (sand dropseed)										
Vulpia octoflora ^a (sixweeks fescue)										
year	Average Cover (%)									
2005	-	-	355	10	25	60	238	5	6	20
2008	-	-	393	3	11	38	260	1	24	18
2013	6	12	7	-	-	22	283	-	12	-
2018	-	6	9	13	-	5	301	-	8	-
2023	0	-	8	1	142	22	177	-	63	11
year	Average Cover (%)									
2005	-	-	9.7	0.0	0.4	0.8	8.0	0.1	0.1	0.1
2008	-	-	6.0	0.0	0.2	0.6	10.6	0.0	0.5	0.0
2013	0.0	0.3	0.0	-	-	0.2	16.2	-	0.4	-
2018	-	0.0	0.0	0.1	-	0.1	14.9	-	0.0	-
2023	0.0	-	0.1	0.1	4.0	0.8	9.6	-	2.9	0.1

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

Table 14R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency													
Calochortus nuttallii (sego lily)														
Ceratocephala testiculata ^{ai} (curveseed butterwort)														
Chamaesyce (sandmat)														
Descurainia pinnata ^a (western fansynmustard)														
Eriogonum cernuum ^a (nodding buckwheat)														
Erodium cicutarium ^{ai} (redstem stork's bill)														
Gilia inconspicua ^a (shy gilia)														
Helianthus annuus ^{ai} (common sunflower)														
Ipomopsis congesta (ballhead ipomopsis)														
Lappula occidentalis ^a (flatspine stickseed)														
Oenothera albicaulis ^a (whitest evening primrose)														
Portulaca oleracea ^{ai} (little hogweed)														
Salsola tragus ^{ai} (prickly Russian thistle)														
Sphaeralcea coccinea (scarlet globemallow)														
year	Average Cover (%)													
2005	9	326	-	53	1	51	0	-	-	78	-	-	-	4
2008	1	79	1	-	-	9	3	-	-	15	-	-	-	4
2013	2	-	-	-	-	-	2	-	-	-	-	-	15	1
2018	-	4	4	-	-	-	-	-	-	-	-	25	1	-
2023	3	-	-	20	-	1	-	3	3	72	1	-	187	2
year	Average Cover (%)													
2005	0.0	5.7	-	0.5	0.0	1.1	0.0	-	-	0.6	-	-	-	0.0
2008	0.0	0.3	0.0	-	-	0.1	0.0	-	-	0.0	-	-	-	0.0
2013	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.1	0.0
2018	-	0.0	0.0	-	-	-	-	-	-	-	-	0.2	0.0	-
2023	0.0	-	-	1.1	-	0.0	-	0.0	0.0	1.3	0.0	-	22.2	0.0

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

Table 14R-09.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Atriplex confertifolia ^p (shadscale saltbush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Sarcobatus vermiculatus (greasewood)
year	Line Intercept Cover (%)				
2005	1.1	-	-	-	4.8
2008	0.4	0.1	-	-	2.6
2013	0.8	-	-	-	4.8
2018	1.2	-	-	-	2.5
2023	1.4	-	-	-	7.4
year	Quadrat Cover (%)				
2005	1.1	-	-	-	4.7
2008	0.5	0.2	-	-	2.1
2013	0.7	-	-	-	3.2
2018	0.8	-	-	-	2.0
2023	0.6	-	0.0	0.0	6.8

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

Table 14R-09.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2005	220	-	0	27	73	18	64	82	65/81
2008	100	-	0	40	60	0	0	60	61/68
2013	80	-	0	75	25	50	0	50	60/84
2018	120	-	0	67	33	0	0	33	54/89
2023	100	-	0	100	0	0	0	0	- / -
Atriplex confertifolia^p -- (shadscale saltbush)									
2005	-	-	-	-	-	-	-	-	15/27
2008	240	200	50	50	0	0	0	0	12/17
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Escobaria vivipara var. arizonica -- (Arizona spinystar)									
2005	20	-	0	100	0	0	0	0	12/10
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	2/4
2023	-	-	-	-	-	-	-	-	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2005	-	-	-	-	-	-	-	-	18/24
2008	20	-	0	100	0	0	0	0	17/21
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	60	-	0	100	0	0	0	0	- / -

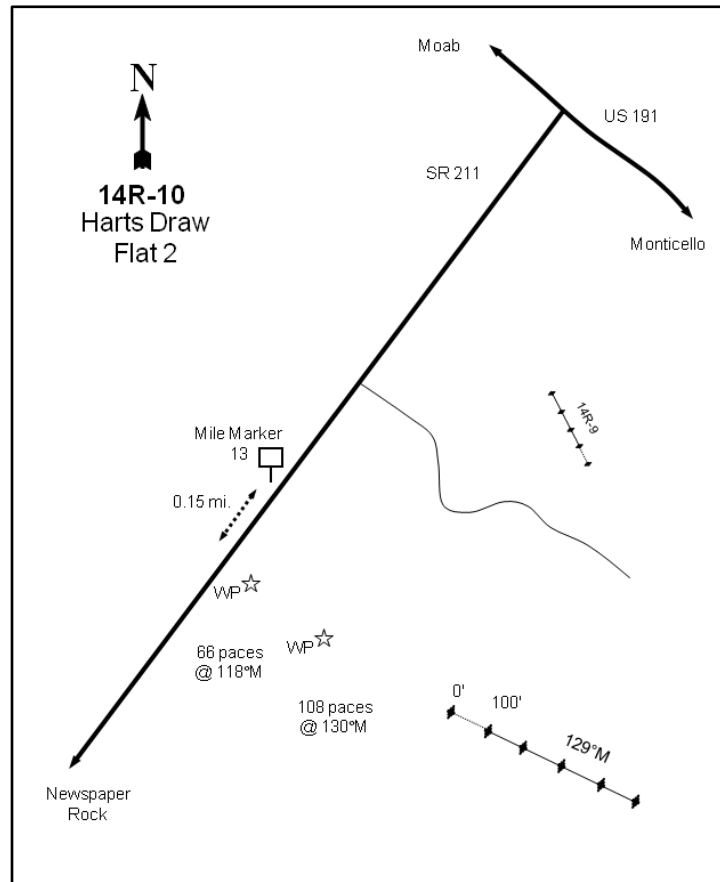
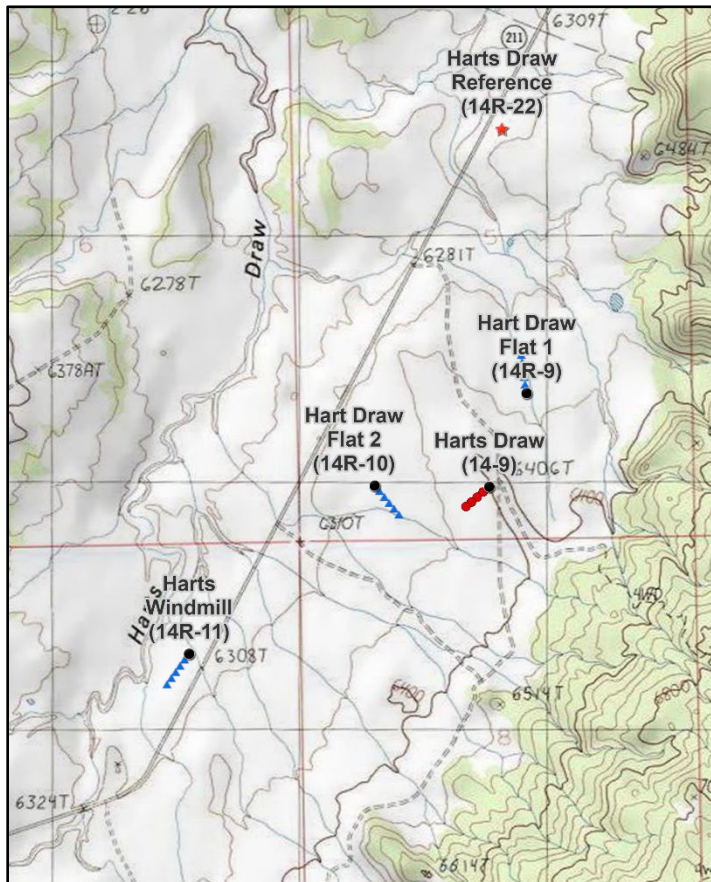
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Opuntia -- (pricklypear)									
2005	20	-	0	100	0	0	0	0	13/22
2008	60	20	0	100	0	0	0	0	10/24
2013	80	-	0	50	50	0	0	25	15/32
2018	40	-	0	0	100	0	0	100	- / -
2023	40	-	0	100	0	0	0	0	- / -
Sarcobatus vermiculatus -- (greasewood)									
2005	1360	60	25	53	22	44	28	6	53/73
2008	1360	60	18	74	9	0	0	15	47/61
2013	1300	-	11	85	5	14	2	23	51/68
2018	1080	-	6	33	61	6	0	44	44/57
2023	1080	-	7	93	0	0	0	0	- / -

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

Table 14R-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
2005	1.4	0.0	0.0	17.9	-7.7	0.1	0.0	11.8	Very Poor
2008	0.6	0.0	0.0	23.6	-4.7	0.1	0.0	19.6	Very Poor
2013	1.0	0.0	0.0	30.0	0.0	0.0	0.0	31.0	Very Poor
2018	1.5	0.0	0.0	30.0	0.0	0.1	0.0	31.6	Very Poor
2023	1.8	0.0	0.0	26.9	-3.1	0.1	0.0	25.7	Very Poor

HART DRAW FLAT 2 - STUDY NO. 14R-10



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Photograph Gap SE; Township 32S, Range 23E, Section 05
NAD 83 UTM ZONE 12, 638248 East 4209181 North

Transect Information

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

66
129° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
No Rebar

Directions to Site

From the junction of US-191 and SR-211 north of Monticello, drive past study site 14R-09 to mile marker 13. Continue for 0.15 miles to the witness post on the left (southeast) side of the road (about 20 feet from the road). From the witness post, walk 66 paces at 118 degrees magnetic to a second witness post. From the second witness post, walk 108 paces at 130 degrees magnetic to the 0-foot stake which is marked with browse tag #66.

Site Information

Land Ownership
Land Administrator
Allotment
Elevation
Aspect
Slope
Sample Dates

Federal
BLM
HART DRAW
6,350ft (1,935m)
South-Southwest
1-3%
06/30/2005, 07/16/2008, 06/25/2013, 08/22/2018, 08/01/2023

Table 14R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial	Hart Draw Phase 1 Cont.	1231	October 2008	263
Aerator - Single Drum/Seed	Hart Draw Sagebrush Restoration (year 1)	246	December 2005	628

Table 14R-10.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hart Draw			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.97	0.94
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.06	1.01
G	Dactylis glomerata	Orchardgrass	Paiute	0.48	0.45
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.29	0.22
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.19	0.18
G	Pascopyrum smithii	Western Wheatgrass		0.95	0.79
G	Sporobolus cryptandrus	Sand Dropseed		0.29	0.28
F	Linum perenne	Blue Flax		0.19	0.17
F	Medicago sativa	Alfalfa	Nomad	0.48	0.45
F	Medicago sativa	Alfalfa	Spreador 4	0.48	0.45
F	Onobrychis viciifolia	Sainfoin	Eski	2.03	1.87
F	Sanguisorba minor	Small Burnet	Delar	2.03	1.89
S	Atriplex canescens	Fourwing Saltbush	San Juan UT	0.20	0.07
S	Atriplex canescens	Fourwing Saltbush	Juab/Tooele UT	0.77	0.44
S	Atriplex canescens	Fourwing Saltbush	Wayne UT	0.06	0.02

Mix Name			Application Type	Application Date	Acres
Harts Draw Browse			Broadcast	Dec 2005	517
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.97	0.29

Mix Name			Application Type	Application Date	Acres
Harts Draw Aerial Sagebrush			Aerial	Oct 2008	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.67	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Garfield UT	0.70	0.18

Wildlife Habitat and Vegetation History

Table 14R-10.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 14R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Annual Weed/Perennial Grass	No Encroachment
2008	Annual Weed	No Encroachment
2013	Annual Weed	No Encroachment
2018	Perennial Grass/Annual Weed	No Encroachment
2023	Annual Forb	No Encroachment

Site Notes

Prairie dog mounds and prairie dog scat were observed on site in 2023, but not the prairie dogs themselves.

Soils

Table 14R-10.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.7	28.4	36.8	34.8	1.0	5.5	364.8	0.5	06/30/2005

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	2005-2023 - State Undefined: Community Phase Undefined

Weedy annual forbs were a dominant vegetation component on this site from study establishment in 2005 through 2018, and prickly Russian thistle (*Salsola tragus*) provided most of the annual forb cover during this time period. However, the native annual forb species golden crownbeard (*Verbesina encelioides*) contributed a vast majority of the herbaceous cover in 2023. The annual grass species cheatgrass (*Bromus tectorum*) was a codominant vegetation in 2005 and 2008, but contributed very little cover in 2013 and 2018 and was not observed in 2023. Perennial grass cover has remained low, but blue grama (*Bouteloua gracilis*) was codominant in 2018 (Table 14R-10.7, Table 14R-10.10, Table 14R-10.11). The shrub component has been limited throughout the duration of the study, with all of the cover contributed by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) through the 2018 year; broom snakeweed (*Gutierrezia sarothrae*) provided a small amount of cover for the first time in 2023 (Table 14R-10.12). Vegetation cover has exhibited an overall decrease, and bare ground has been the dominant ground cover type since 2013 (Table 14R-10.8).

Deer winter range on this site has remained in very poor condition since study establishment in 2005. Improvements to deer winter range condition could be accomplished by increasing preferred browse cover and reproduction. Diversifying and increasing cover of perennial forbs and grasses would also benefit deer winter range (Table 14R-10.15). Pellet transect data shows that deer presence has remained low since study establishment (Table 14R-10.9).

Trend Summary Tables**Table 14R-10.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	2.9	-	-	1.4	-	-
2008	0.2	-	-	0.5	-	-
2013	0.2	-	-	0.4	-	-
2018	0.5	-	-	0.5	-	-
2023	1.8	0.1	-	2.8	0.3	-

Table 14R-10.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	279	185	360	25	11.5	8.0	17.1	1.3
2008	383	191	330	25	11.5	5.1	11.7	0.6
2013	13	19	292	-	0.0	0.5	1.4	-
2018	20	52	73	21	0.0	1.9	1.1	0.3
2023	-	27	128	3	-	1.4	16.0	0.1

Table 14R-10.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	38.6	0.0	33.0	0.1	0.4	36.2
2008	36.8	0.0	39.4	0.1	0.0	32.7
2013	73.0	-	24.7	0.0	-	2.0
2018	80.2	-	27.6	0.1	-	4.0
2023	81.0	-	8.5	0.6	0.4	20.4

Table 14R-10.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit	Gunnison's Prairie Dog
	Quadrat Frequency				
2005	12	10	-	52	-
2008	31	19	1	91	-
2013	11	23	-	58	-
2018	8	25	4	71	-
2023	12	6	-	16	19
Year	Days Use Per Acre (ha)				
2005	40.6 (100.4)	5.3 (13.2)	-	-	-
2008	63.2 (156.0)	10.7 (26.5)	1.3 (3.3)	-	-
2013	18.9 (46.6)	10.0 (24.8)	-	-	-
2018	8.0 (19.7)	1.3 (3.3)	-	-	-
2023	12.3 (30.5)	3.4 (8.3)	-	-	-

Table 14R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Eremopyrum triticeum ^{ai} (annual wheatgrass)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency									
2005	16	155	-	279	26	-	-	7	5	2
2008	-	164	-	383	3	3	1	19	16	-
2013	-	19	-	13	-	-	-	-	-	-
2018	-	27	23	20	4	-	-	-	-	-
2023	-	-	-	-	-	-	-	17	11	-
year	Average Cover (%)									
2005	0.2	6.6	-	11.5	0.9	-	-	0.2	0.1	0.0
2008	-	4.2	-	11.5	0.0	0.0	0.0	0.3	0.6	-
2013	-	0.5	-	0.0	-	-	-	-	-	-
2018	-	0.7	1.2	0.0	0.1	-	-	-	-	-
2023	-	-	-	-	-	-	-	1.3	0.1	-

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

Table 14R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency														
year	Average Cover (%)														
Ceratocephala testiculata ^{ai} (curveseed butterwort)	33	-	8	38	39	-	46	-	352	2	-	25	-	-	
Chamaesyce (sandmat)	10	1	-	15	-	-	29	-	323	3	-	21	3	-	
Chenopodium album ^a (lambsquarters)	3	-	-	-	-	-	11	-	286	1	-	-	-	-	
Chenopodium fremontii ^a (Fremont's goosefoot)	-	3	-	-	-	18	-	16	60	-	-	-	-	-	
Descurainia pinnata ^a (western tansymustard)	-	-	-	-	5	-	13	-	2	-	3	3	-	111	
Helianthus (sunflower)	0.1	-	0.0	0.2	1.0	-	1.0	-	14.5	0.2	-	1.3	-	-	
Lappula occidentalis ^a (flatspine stickseed)	0.0	0.0	-	0.0	-	-	0.2	-	11.4	0.0	-	0.5	0.0	-	
Portulaca oleracea ^{ai} (littie hogweed)	0.0	-	-	-	-	-	0.0	-	1.4	0.0	-	-	-	-	
Salsola tragus ^{ai} (prickly Russian thistle)	-	0.0	-	-	-	0.3	-	0.3	0.8	-	-	-	-	-	
Sisymbrium altissimum ^{ai} (tall tumblemustard)	-	-	-	-	0.3	-	0.4	-	0.1	-	0.9	0.1	-	14.2	
Solanum triflorum ^a (cutleaf nightshade)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sphaeralcea coccinea (scarlet globemallow)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sphaeralcea grossularifolia (gooseberryleaf globemallow)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Verbesina encelioides ^a (golden crownbeard)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

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

Table 14R-10.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept	
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	1.4	-
Gutierrezia sarothrae (broom snakeweed)	0.5	-
	0.4	-
	0.5	-
	2.8	0.3
year	Quadrat Cover (%)	
2005	2.9	-
2008	0.2	-
2013	0.2	-
2018	0.5	-
2023	1.8	0.1

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

Table 14R-10.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

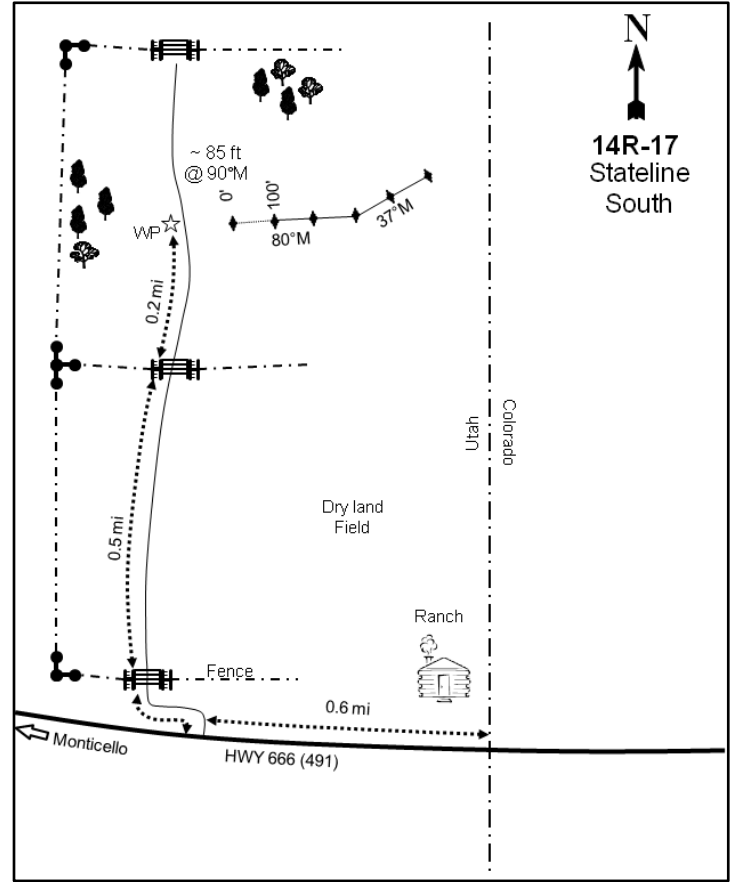
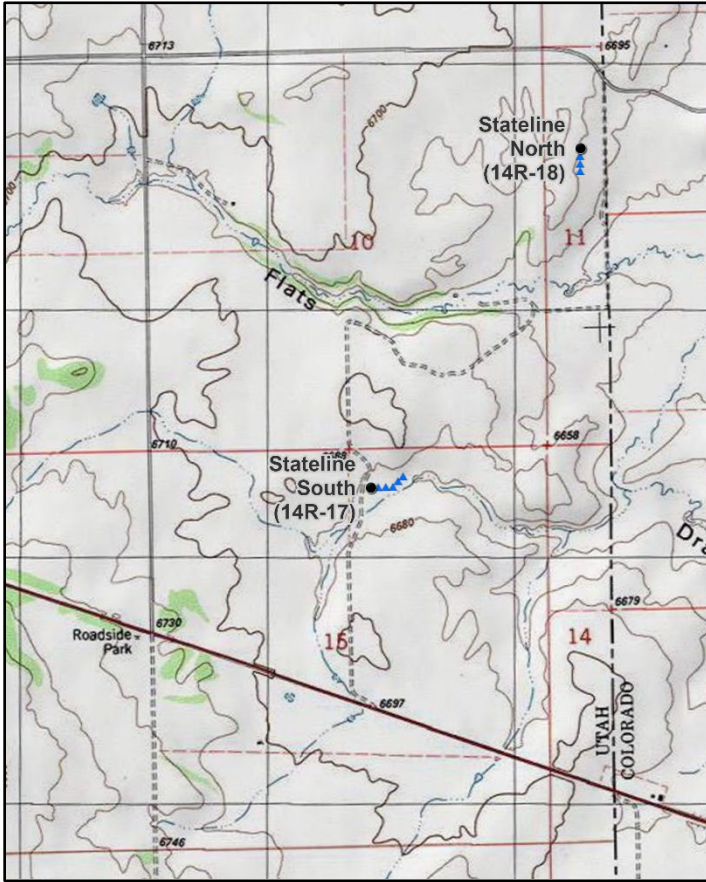
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2005	600	-	7	20	73	30	23	60	65/69
2008	140	-	0	43	57	29	43	43	56/70
2013	180	-	0	22	78	44	11	89	50/58
2018	200	-	0	80	20	10	10	0	49/69
2023	100	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2005	20	-	0	100	0	0	0	0	13/23
2008	20	-	0	100	0	0	0	0	15/14
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	140	-	0	100	0	0	0	0	- / -
Krascheninnikovia lanata^p -- (winterfat)									
2005	-	-	-	-	-	-	-	-	51/27

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

Table 14R-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	1.8	0.0	0.0	16.0	-8.6	2.5	0.0	11.6	Very Poor
2008	0.6	0.0	0.0	10.1	-8.6	1.2	0.0	3.3	Very Poor
2013	0.5	0.0	0.0	1.1	0.0	0.0	0.0	1.5	Very Poor
2018	0.6	0.0	0.0	3.9	0.0	0.7	0.0	5.1	Very Poor
2023	3.5	0.0	0.0	2.8	0.0	0.3	0.0	6.6	Very Poor

STATELINE SOUTH - STUDY NO. 14R-17



Location Information

USGS 7.5 min Map Info Northdale NE; Township 34S, Range 26E, Section 15
 GPS (0' Stake) NAD 83 UTM ZONE 12, 671357 East 4188476 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 80° magnetic (Lines 3-5: 37° magnetic)
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

On Highway 491 (666), drive 0.6 miles west from the Utah/Colorado border to a turnoff on the right (north). Travel north on this road for 0.7 miles to a witness post on the right (east) side of the road. Walk 85 feet at 90 degrees magnetic to the 0-foot stake. There is no browse tag.

Site Information

Land Ownership Federal
 Land Administrator BLM
 Allotment STATELINE
 Elevation 6,700ft (2,042m)
 Aspect East
 Slope 33%
 Sample Dates 08/22/2006, 06/18/2012, 07/25/2017, 08/01/2023

Table 14R-17.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Broadcast Before	Gunnison Sage-grouse Sagebrush Treatments phase I	334	November-December 2006	240
Harrow - One-Way Dixie	Gunnison Sage-grouse Sagebrush Treatments phase I	334	November-December 2006	240

Table 14R-17.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Gunnison Sage-Grouse Sagebrush Treatment 2			Broadcast	Nov 2006	150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	2.00	1.98
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	2.00	1.84
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.81
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	2.00	1.71
G	Sporobolus cryptandrus	Sand Dropseed		0.07	0.06
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.00	0.84
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.00	0.92
F	Medicago sativa	Alfalfa		1.00	0.94
F	Onobrychis viciifolia	Sainfoin		3.00	2.76
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.86
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.20

Wildlife Habitat and Vegetation History

Table 14R-17.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 14R-17.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Black Sagebrush	Phase I
2012	Black Sagebrush	Phase I
2017	Black Sagebrush	Phase I
2023	Black Sagebrush	Phase I

Site Notes

No Notes

Soils

Table 14R-17.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.3	39.2	33.0	27.8	2.1	15.0	156.8	0.5	08/22/2006

Site Potential

1981 - 2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Upland Shallow Loam (Black Sagebrush)
 NRCS Ecological Site # R035XY312UT
 States and Transitions No state and transition model is available for this ecological site.

This site has remained dominated by black sagebrush (*Artemisia nova*) since study establishment in 2006 with a number of other shrubs also present; line intercept cover of sagebrush has slightly decreased overall (Table 14R-17.12, Table 14R-17.13). The herbaceous understory has remained diverse, but was not particularly abundant in 2006 or 2012 (Table 14R-17.7). Perennial grasses, namely blue grama (*Bouteloua gracilis*) and the introduced species intermediate wheatgrass (*Thinopyrum intermedium*), contributed the most herbaceous cover between 2006 and 2017 (Table 14R-17.10). Perennial and annual forbs have remained relatively rare in most sample years, but both types provided as much cover as perennial grasses in 2023 (Table 14R-17.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been found on this site in low amounts (Table 14R-17.14), and the study has been considered to be within Phase I of woodland succession in all years (Table 14R-17.4).

Condition of deer winter range on this site has ranged between poor and good since 2006. In 2023, deer winter range condition was considered to be poor. Improvements to winter range could be achieved through efforts that increase preferred browse reproduction while decreasing decadence; increasing cover of perennial grasses and decreasing or removing cheatgrass would also be beneficial for

deer winter range (Table 14R-17.15). Pellet transect data shows that although it has increased each sample year, deer presence has remained low over the study period (Table 14R-17.9).

Trend Summary Tables

Table 14R-17.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	19.7	3.9	0.0	22.6	4.9	-
2012	11.8	5.1	-	14.9	4.9	-
2017	16.4	6.2	-	21.3	5.5	-
2023	13.4	6.2	-	18.8	8.5	-

Table 14R-17.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	182	137	-	83	1.4	3.0	-	0.6
2012	258	153	53	205	2.3	5.7	0.2	2.3
2017	85	218	49	118	1.5	11.6	0.2	3.3
2023	85	112	209	165	1.3	4.5	4.6	4.3

Table 14R-17.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	51.8	3.6	26.2	2.2	3.0	28.0
2012	44.4	0.3	31.8	1.8	2.7	28.0
2017	42.0	0.4	25.1	3.9	3.6	33.0
2023	51.9	0.6	29.7	0.1	2.9	30.6

Table 14R-17.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2006	-	5	70
2012	-	3	2
2017	-	14	38
2023	-	1	4
Year	Days Use Per Acre (ha)		
2006	5.8 (14.3)	2.0 (5.0)	-
2012	0.7 (1.8)	4.0 (9.9)	-
2017	-	6.0 (14.9)	-
2023	-	14.1 (34.8)	-

Table 14R-17.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa (bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency													
2006	1	-	39	182	-	12	-	7	65	34	3	-	-	-
2012	1	-	38	258	4	31	8	15	-	37	6	13	36	-
2017	10	-	61	85	-	13	22	37	-	13	-	3	100	-
2023	-	0	17	85	-	57	2	6	-	14	-	-	40	1
year	Average Cover (%)													
2006	0.0	-	1.5	1.4	-	0.1	-	0.1	0.7	0.6	0.0	-	-	-
2012	0.0	-	2.0	2.3	0.0	0.5	0.1	0.3	-	1.1	0.4	0.1	1.1	-
2017	0.4	-	4.0	1.5	-	0.5	1.4	0.9	-	0.3	-	0.2	4.0	-
2023	-	0.0	0.3	1.3	-	1.3	0.5	0.4	-	0.9	-	-	1.1	0.0

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

Table 14R-17.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Androsace septentrionalis ^a (pygmy flower rockjasmine)	Antennaria dimorpha (low pussytoes)	Astragalus tenellus (looseflower milkvetch)	Astragalus zionis (Zion milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa ^{ai} (litt lepod false flax)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cordylanthus ramosus ^a (bushy bird's beak)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)
year	Nested Frequency																
2006	-	-	-	1	7	-	-	-	-	-	1	-	-	-	2	-	-
2012	8	-	4	6	22	-	-	8	10	-	-	3	-	5	1	1	-
2017	45	-	-	11	-	1	-	-	2	-	-	-	-	1	-	-	-
2023	82	35	-	19	-	16	8	-	-	3	2	2	3	-	-	3	54
year	Average Cover (%)																
2006	-	-	-	0.0	0.0	-	-	-	-	-	0.0	-	-	-	0.0	-	-
2012	0.0	-	0.0	0.2	0.1	-	-	0.0	0.1	-	-	0.0	-	0.0	0.0	0.0	-
2017	0.2	-	-	0.4	-	0.0	-	-	0.0	-	-	-	-	0.0	-	-	-
2023	1.7	0.4	-	0.8	-	0.1	0.1	-	-	0.0	0.0	0.0	0.2	-	-	0.0	0.7

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

FORB SPECIES	Nested Frequency																
year	Average Cover (%)																
Draba ^a (draba)	-	12	-	3	9	-	-	-	-	2	-	10	3	22	3	-	-
Erigeron eatonii (Eaton's fleabane)	-	11	8	11	11	1	12	38	3	6	3	-	11	24	35	2	0
Erigeron pumilus (shaggy fleabane)	-	2	5	4	9	-	7	2	-	-	-	1	-	37	14	1	-
Eriogonum racemosum (redroot buckwheat)	35	-	2	1	-	5	14	100	-	-	4	7	-	17	33	2	-
Eriogonum umbellatum (sulphur-flower buckwheat)	-	0.0	-	0.0	0.2	-	-	-	-	0.0	-	0.0	0.0	0.1	0.0	-	-
Erodium cicutarium ^{ai} (redstem stork's bill)	-	0.1	0.2	0.0	0.1	0.0	0.2	0.1	0.0	0.0	0.0	-	0.1	0.2	0.3	0.0	0.0
Heterotheca villosa (hairy false goldenaster)	-	0.0	0.0	0.1	0.2	-	0.8	0.0	-	-	-	0.0	-	1.3	0.1	0.0	-
Lappula occidentalis ^a (flatspine stickseed)	0.3	-	0.1	0.2	-	0.0	0.5	1.3	-	-	0.1	0.1	-	0.7	0.4	0.0	-
Medicago sativa ^a (alfalfa)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oenothera (evening primrose)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Orobancha fasciculata (clustered broomrape)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Penstemon (beardtongue)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Penstemon caespitosus (mat penstemon)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phlox hoodii (spiny phlox)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phlox longifolia (longleaf phlox)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Polygonum douglasii ^a (Douglas' knotweed)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sanguisorba minor ^a (small burnet)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

FORB SPECIES	Nested Frequency		
year	Average Cover (%)		
Sphaeralcea coccinea (scarlet globemallow)	22	-	-
Tragopogon dubius ^{ai} (yellow salsify)	39	1	62
Trifolium gymnocarpon (hollyleaf clover)	36	3	6
2023	51	1	58
2006	0.1	-	-
2012	0.5	0.0	0.2
2017	0.4	0.0	0.0
2023	0.9	0.0	0.4

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

Table 14R-17.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)												
	year												
Artemisia frigida ^p (prairie sagewort)	2006	0.1	16.6	5.9	-	1.5	3.2	-	0.1	0.1	-	-	-
Artemisia nova ^p (black sagebrush)	2012	0.1	11.4	3.2	0.2	2.9	1.7	-	0.3	0	-	-	-
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	2017	0.5	15.7	4.2	0.9	2.4	1.8	-	1.3	-	-	-	-
Chrysothamnus depressus ^p (longflower rabbitbrush)	2023	0.5	13.9	3.5	0.9	3.1	3.4	-	1.9	-	-	-	0.1
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	year	Quadrat Cover (%)											
Ericameria nauseosa (rubber rabbitbrush)	2006	0.0	13.0	6.6	-	1.1	2.4	0.0	0.4	0.0	0.0	-	-
Escobaria (foxtail cactus)	2012	0.2	4.9	6.4	0.3	2.2	2.6	-	0.2	0.0	-	-	-
Gutierrezia sarothrae (broom snakeweed)	2017	1.0	12.7	1.8	0.8	2.3	2.8	-	1.1	-	-	0.0	-
Opuntia (pricklypear)	2023	0.3	10.0	2.5	0.7	2.0	2.8	-	1.4	0.0	-	-	0.0
Pinus edulis ^t (twoneedle pinyon)													
Quercus gambelii ^p (Gambel oak)													
Tetradymia canescens (spineless horsebrush)													

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

Table 14R-17.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia frigida^p -- (prairie sagewort)									
2006	320	-	0	100	0	31	6	0	15/24
2012	280	-	0	100	0	93	0	0	18/40
2017	800	-	45	55	0	3	0	3	14/33
2023	500	-	4	88	8	0	0	52	- / -
Artemisia nova^p -- (black sagebrush)									
2006	5540	140	2	69	30	2	0	17	29/57
2012	2760	860	11	82	7	45	25	2	26/58
2017	4600	-	3	93	4	15	26	2	28/59
2023	3940	-	1	69	31	15	4	45	- / -
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2006	1200	40	10	55	35	0	0	12	77/108
2012	820	40	12	88	0	5	2	2	44/88
2017	560	-	0	93	7	36	0	0	60/97
2023	600	-	0	40	60	13	3	60	- / -
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
2006	-	-	-	-	-	-	-	-	- / -
2012	220	-	0	100	0	18	0	0	14/27
2017	300	-	7	93	0	20	0	0	20/49
2023	240	-	0	83	17	0	0	17	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	1300	-	5	71	25	39	59	17	13/29
2012	1060	-	21	72	8	0	0	2	22/40
2017	800	-	15	70	15	5	0	0	36/65
2023	780	-	0	90	10	0	0	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 (%)				
Echinocereus coccineus var. coccineus -- (scarlet hedgehog cactus)									
2006	-	-	-	-	-	-	-	-	14/32
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	380	-	0	79	21	0	0	0	61/79
2012	340	-	35	59	6	0	0	24	58/94
2017	500	-	12	88	0	0	0	0	60/97
2023	440	-	0	46	55	5	0	55	-/-
Escobaria -- (foxtail cactus)									
2006	40	-	50	50	0	0	0	0	12/30
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2006	580	60	10	90	0	0	0	0	17/28
2012	520	-	27	73	0	4	0	0	19/27
2017	3720	-	8	88	4	0	0	2	16/20
2023	2700	540	11	88	1	0	0	1	-/-
Opuntia -- (pricklypear)									
2006	80	-	50	50	0	0	0	0	10/26
2012	20	-	0	100	0	0	0	0	10/21
2017	100	-	0	100	0	0	0	0	11/17
2023	60	20	0	100	0	0	0	33	-/-
Pediocactus simpsonii -- (mountain ball cactus)									
2006	40	-	0	100	0	0	0	0	4/7
2012	-	-	-	-	-	-	-	-	7/7
2017	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Pinus edulis^t -- (twoneedle pinyon)									
2006	-	20	0	0	0	0	0	0	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Quercus gambelii^p -- (Gambel oak)									
2006	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	60/45
2017	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Tetradymia canescens -- (spineless horsebrush)									
2006	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	27/47
2017	20	-	0	100	0	0	0	0	43/61
2023	20	-	0	100	0	0	0	0	-/-

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

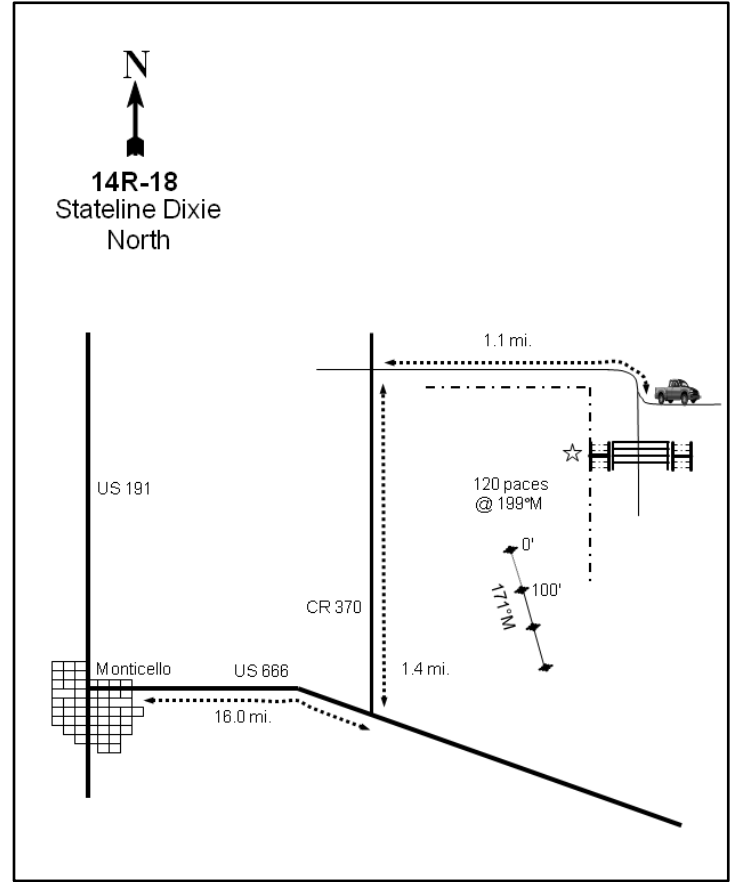
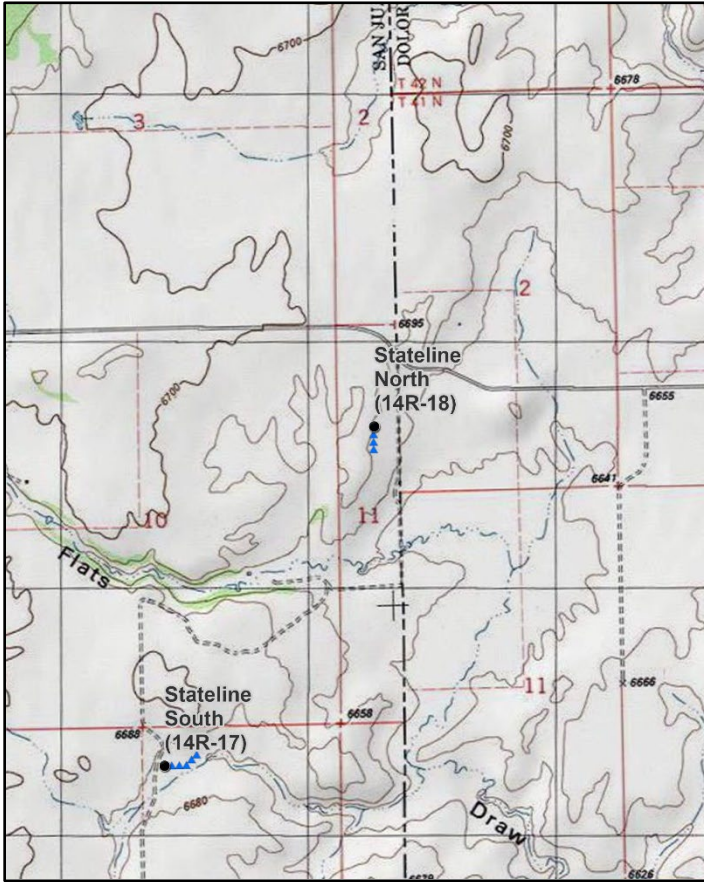
Table 14R-17.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2017	1	-	100	-	-	-	4.0
2023	1	-	-	100	-	-	15.0
Pinus edulis (twoneedle pinyon)							
2017	8	-	-	100	-	-	6.0
2023	8	-	-	100	-	-	8.0

Table 14R-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
2006	28.2	5.7	2.0	5.9	-1.1	1.1	0.0	41.9	Poor
2012	18.6	13.3	5.5	11.3	-1.7	4.5	0.0	51.6	Poor-Fair
2017	26.5	13.6	1.6	23.3	-1.1	6.6	0.0	70.5	Good
2023	23.4	4.5	0.2	8.9	-1.0	8.5	0.0	44.5	Poor

STATELINE NORTH - STUDY NO. 14R-18



Location Information

USGS 7.5 min Map Info Northdale NE; Township 34S, Range 26E, Section 11
 GPS (0' Stake) NAD 83 UTM ZONE 12, 672205 East 4189852 North

Transect Information

Browse Tag # (0' Stake) 100
 Transect Bearing 171° magnetic
 Length 300ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft & 71ft), Line 3 (59ft)
 Belt Marker Placement Standard

Directions to Site

From Highway 191, turn east onto Highway 491 (666). Proceed for 16.0 miles to County Road 370. Turn left (north) and drive for 1.4 miles to an intersection. Turn right at the intersection and drive for 1.1 miles to a road going south. Turn and park by the gate. Walk from the west post (cedar post) of the gate 120 paces at 199 degrees magnetic to the 0-foot stake marked with browse tag #100.

Site Information

Land Ownership Federal
 Land Administrator BLM
 Allotment STATELINE
 Elevation 6,679ft (2,036m)
 Aspect East
 Slope 4%
 Sample Dates 08/22/2006, 06/18/2009, 06/24/2013, 07/26/2017, 07/31/2023

Table 14R-18.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Dixie	Gunnison Sage-grouse Sagebrush Treatments phase 1	334	November-December 2006	240
Seeding - Broadcast Before	Gunnison Sage-grouse Sagebrush Treatments phase 1	334	November-December 2006	240

Table 14R-18.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Gunnison Sage-Grouse Sagebrush Treatment 2			Broadcast	Nov 2006	150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	2.00	1.98
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	2.00	1.84
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.81
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	2.00	1.71
G	Sporobolus cryptandrus	Sand Dropseed		0.07	0.06
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.00	0.84
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.00	0.92
F	Medicago sativa	Alfalfa		1.00	0.94
F	Onobrychis viciifolia	Sainfoin		3.00	2.76
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.86
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.20

Wildlife Habitat and Vegetation History

Table 14R-18.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 14R-18.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Wyoming Big Sagebrush	No Encroachment
2009	Wyoming Big Sagebrush	No Encroachment
2013	Wyoming Big Sagebrush	No Encroachment
2017	Wyoming Big Sagebrush	No Encroachment
2023	Wyoming Big Sagebrush	No Encroachment

Site Notes

The study monitors a Dixie harrow treatment that was implemented to rejuvenate sagebrush stands occupied by sage-grouse (WRI Database, 2023). There have been some rodent holes/mounds observed across the site.

Soils

Table 14R-18.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.3	38.2	38.0	23.8	0.9	13.8	70.4	0.4	08/22/2006

Site Potential

1981 - 2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Upland Loam (Big Sagebrush)
 NRCS Ecological Site # R036XY306UT
 States and Transitions 2006-2023 - Current Potential State: Community Phase 2.3

Since study establishment in 2006, this site has remained in a stable state as a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) dominated plant community. Post-treatment sagebrush cover and overall density have increased. However, no recruitment of young sagebrush plants was observed in 2023 (Table 14R-18.12, 14R-18.13). The herbaceous understory has remained a mixture of perennial and annual grasses and forbs. Perennial forbs, mainly scarlet globemallow (*Sphaeralcea coccinea*) and lupine (*Lupinus sp.*), and perennial grasses dominated the understory in 2023. The introduced annual grass cheatgrass (*Bromus tectorum*) was present under some of the sagebrush in the most recent sample year, and although it provided little cover, it may pose a potential risk to the resilience of this site should it increase in the future (Table 14R-18.7, Table 14R-18.10, Table 14R-18.11).

Condition of deer winter range on this site has varied between very poor and good since study establishment in 2006. In 2023, deer

winter range condition was considered to be fair. Sagebrush cover and herbaceous diversity have increased following the 2006 harrow and seeding treatment (Table 14R-18.1). However, further improvements to wintering range could be achieved through efforts that encourage recruitment of young and decreased decadence in the preferred browse community. In addition, increasing the cover of perennial grasses and decreasing or removing cheatgrass would also improve deer winter range condition (Table 14R-18.15). Pellet transect data indicates that deer presence has remained low throughout the study period (Table 14R-18.9).

Trend Summary Tables

Table 14R-18.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	20.5	1.2	-	23.0	0.8	-
2009	11.4	2.0	-	14.8	2.0	-
2013	8.5	1.9	-	12.0	2.3	-
2017	12.2	2.3	-	17.3	1.5	-
2023	22.2	2.0	-	31.6	3.7	-

Table 14R-18.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	14	226	-	43	0.0	6.8	-	0.1
2009	188	177	229	183	4.9	5.2	7.6	7.3
2013	152	214	55	230	1.7	4.3	0.9	2.8
2017	143	204	3	245	2.0	7.8	0.0	7.0
2023	76	187	149	225	1.3	6.1	4.3	6.3

Table 14R-18.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	54.0	2.8	30.2	0.1	0.7	27.7
2009	43.4	1.8	40.0	0.3	0.7	34.8
2013	42.2	0.6	40.2	0.0	-	26.7
2017	47.3	0.5	39.5	0.1	-	26.6
2023	45.0	0.1	31.7	0.0	0.5	38.3

Table 14R-18.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2006	2	-	94
2009	1	12	67
2013	3	1	45
2017	7	16	79
2023	3	1	11
Year	Days Use Per Acre (ha)		
2006	2.2 (5.4)	3.4 (8.3)	-
2009	0.7 (1.8)	12.1 (29.8)	-
2013	4.4 (10.8)	2.7 (6.6)	-
2017	6.5 (16.1)	2.0 (5.0)	-
2023	5.8 (14.3)	2.7 (6.6)	-

Table 14R-18.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency													
Achnatherum hymenoides (Indian ricegrass)	-	1	14	9	0	-	-	209	5	8	-	-	-	-
Agropyron cristatum ⁱ (crested wheatgrass)	3	1	188	34	-	-	-	135	2	1	13	17	-	-
Bromus tectorum ^{ai} (cheatgrass)	11	7	152	62	1	8	1	36	20	2	111	6	-	-
Elymus elymoides (squirreltail)	2	7	143	65	4	12	-	-	93	-	66	12	-	-
Koeleria macrantha (prairie Junegrass)	3	2	75	113	-	10	-	-	63	3	17	22	1	-
Pascopyrum smithii (western wheatgrass)	Average Cover (%)													
Pleurophis jamesii (James' galleta)	2006	-	0.0	0.0	0.1	0.0	-	-	6.6	0.0	0.0	-	-	-
Poa (bluegrass)	2009	0.0	0.0	4.9	0.7	-	-	-	3.8	0.0	0.0	0.2	0.5	-
Poa fendleriana (muttongrass)	2013	0.1	0.1	1.7	0.7	0.0	0.1	0.0	0.5	0.3	0.0	2.5	0.0	-
Poa secunda (Sandberg bluegrass)	2017	0.1	0.1	2.0	2.4	0.0	0.3	-	-	2.7	-	1.7	0.4	-
Pseudoroegneria spicata (bluebunch wheatgrass)	2023	0.0	0.1	1.3	3.2	-	0.1	-	-	1.4	0.0	0.6	0.5	0.0
Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Nested Frequency													
Vulpia octoflora ^a (sixweeks fescue)	2006	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Table 14R-18.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Alyssum alyssoides ^{ai} (pale madwort)	-	-	-	-	-	3	-	-	3	-	-	-	-	-	-	-	-	-
Astragalus (milkvetch)	-	0	-	26	7	-	1	-	2	5	4	202	110	0	10	2	40	-
Castilleja angustifolia (northwestern Indian paintbrush)	-	-	2	-	-	4	-	-	5	21	-	42	98	4	8	-	38	-
Ceratocephala testiculata ^{ai} (curvseed butterwort)	-	-	-	-	3	-	-	-	1	-	-	91	-	-	-	4	-	-
Cordylanthus ramosus ^{ai} (bushy bird's beak)	2	-	-	-	72	-	34	11	-	-	-	63	68	-	-	-	-	63
Cryptantha (cryptantha)	Average Cover (%)																	
Descurainia pinnata ^a (western tansymustard)	2006	-	-	-	-	0.0	-	-	0.0	-	-	-	-	-	-	-	-	-
Draba ^a (draba)	2009	-	0.0	-	0.4	0.0	-	0.0	-	0.0	0.0	0.0	7.2	6.2	0.0	0.0	0.0	0.1
Erigeron eatonii (Eaton's fleabane)	2013	-	-	0.0	-	0.0	-	-	0.0	0.2	-	0.8	1.0	0.0	0.0	-	0.1	-
Erodium cicutarium ^{ai} (redstem stork's bill)	2017	-	-	-	0.0	-	-	-	0.0	-	-	-	2.6	-	-	-	0.0	-
Lactuca serriola ^{ai} (prickly lettuce)	2023	0.0	-	-	-	3.9	-	0.1	0.0	-	-	0.3	2.8	-	-	-	-	0.8
Lappula occidentalis ^a (flatspine stickseed)	Nested Frequency																	
Lupinus (lupine)	2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Packera multilobata (lobeleaf groundsel)	2009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phlox austromontana (mountain phlox)	2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phlox hoodii (spiny phlox)	2017	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phlox longifolia (longleaf phlox)	2023	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

FORB SPECIES			
	Sphaeralcea coccinea (scarlet globemallow)	Trifolium (clover)	Zizgadenus paniculatus (foothill deathcamas)
year	Nested Frequency		
2006	37	-	-
2009	55	31	-
2013	142	34	-
2017	193	-	5
2023	150	24	-
year	Average Cover (%)		
2006	0.1	-	-
2009	0.8	0.1	-
2013	1.6	0.1	-
2017	4.4	-	0.0
2023	2.5	0.2	-

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

Table 14R-18.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES							
	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)
year	Line Intercept Cover (%)						
2006	23	0.7	-	-	-	-	0.1
2009	14.8	1.5	-	-	0.4	-	0.1
2013	12	1.1	-	-	1	0.1	0.1
2017	17.3	1	-	-	-	-	0.5
2023	31.6	0.8	-	-	1.9	-	1
year	Quadrat Cover (%)						
2006	20.5	0.4	-	-	-	-	0.8
2009	11.4	1.1	0.0	-	0.2	-	0.6
2013	8.5	0.3	-	0.0	1.5	0.0	0.0
2017	12.2	1.4	-	0.0	0.1	-	0.8
2023	22.2	0.3	-	0.0	0.8	-	0.8

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

Table 14R-18.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

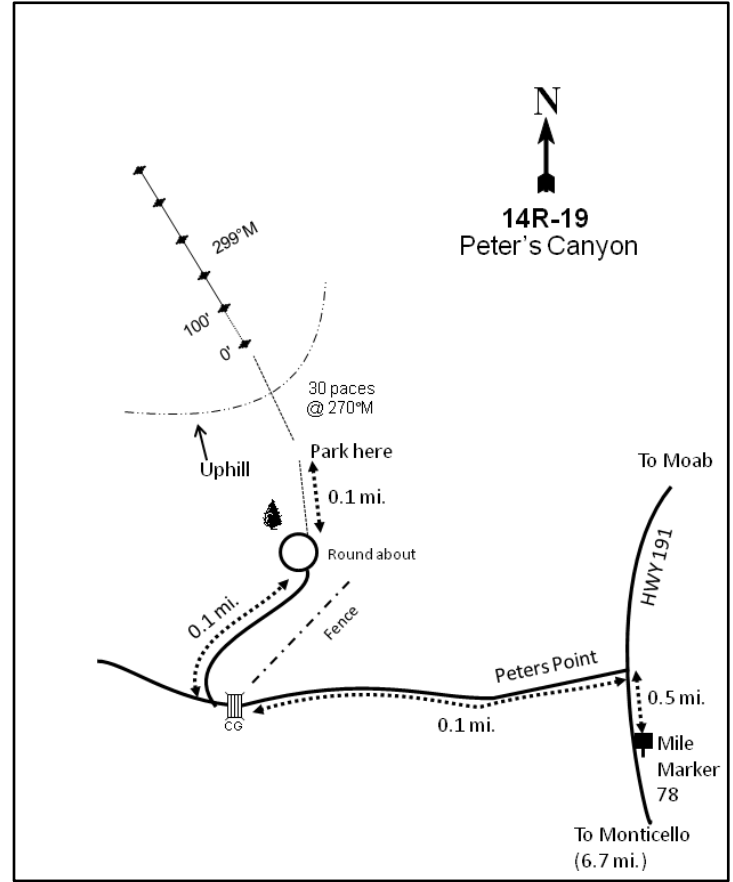
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2006	5160	120	2	63	35	9	0	16	73/91
2009	-	-	-	-	-	-	-	-	61/77
2013	6360	2260	54	42	4	9	1	14	50/68
2017	7560	20	11	82	7	3	1	3	44/61
2023	5580	-	0	86	14	0	0	23	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	1400	20	6	90	4	20	59	3	9/20
2009	-	-	-	-	-	-	-	-	20/31
2013	660	60	12	85	3	0	0	6	23/38
2017	1400	-	1	99	0	29	0	0	17/33
2023	620	-	0	100	0	0	0	0	- / -
Eriogonum microthecum^p -- (slender buckwheat)									
2006	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	40	-	50	50	0	0	50	0	- / -
2023	40	-	0	100	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	83/92
2009	-	-	-	-	-	-	-	-	48/34
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2006	40	20	0	100	0	0	0	0	12/24
2009	-	-	-	-	-	-	-	-	17/29
2013	880	-	18	73	9	0	2	7	22/36
2017	440	-	14	86	0	0	0	0	16/21
2023	820	-	7	93	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2006	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Opuntia -- (pricklypear)									
2006	320	-	0	94	6	19	0	0	14/45
2009	-	-	-	-	-	-	-	-	14/46
2013	460	20	13	87	0	0	0	0	11/30
2017	1060	20	2	98	0	0	0	0	12/30
2023	1540	-	0	96	4	0	0	8	- / -

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

Table 14R-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
2006	28.8	4.5	1.0	13.5	0.0	0.2	0.0	48.0	Poor
2009	18.5	0.0	0.0	10.5	-3.7	10.0	0.0	35.3	Very Poor-Poor
2013	15.0	13.8	15.0	8.6	-1.2	5.7	0.0	56.8	Fair
2017	21.6	12.9	5.7	15.5	-1.5	10.0	0.0	64.3	Fair-Good
2023	30.0	10.7	0.0	12.1	-1.0	10.0	0.0	61.8	Fair

PETER'S CANYON - STUDY NO. 14R-19



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Monticello North NW; Township 32S, Range 23E, Section 26
NAD 83 UTM ZONE 12, 643989 East 4203465 North

Transect Information

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

182
299° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
No Rebar

Directions to Site

On US-191 travel north from Monticello for about 6.7 miles to mile marker 78. Continue for 0.5 miles to a road that comes in from the left. Turn left here and follow this road for 0.1 miles to a cattle guard. Immediately after the cattle guard there will be a road to the right. Turn here and travel north for 0.1 miles to a small dirt roundabout. The 0-foot stake is 57 paces at 304 degrees magnetic from an old dead pinyon on the northwest part of the roundabout or 0.1 miles from the northwest part of the roundabout.

Site Information

Land Ownership
Land Administrator
Allotment
Elevation
Aspect
Slope
Sample Dates

Federal
BLM
SPRING CREEK
9,700ft (2,957m)
Southeast
2%
06/11/2007, 06/14/2010, 06/25/2014, 08/21/2018, 08/01/2023

Table 14R-19.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed Fire	Peter's Canyon	906	October 2007	151
Mechanical - Bullhog	Peter's Canyon	906	December 2006	151
Seeding - Broadcast/Harrow	Peter's Canyon	906	December 2007	151

Table 14R-19.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Peter's Canyon			Broadcast	Dec 2007	170
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.76	1.53
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	2.06	1.78
G	Bouteloua gracilis	Blue Grama		1.18	0.78
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.47	1.37
G	Poa secunda	Sandberg Bluegrass	Mountain Home ID	0.59	0.54
G	Poa secunda	Canby Bluegrass	Canbar	0.88	0.79
G	Sporobolus cryptandrus	Sand Dropseed		0.06	0.06
G	Sporobolus cryptandrus	Sand Dropseed		0.24	0.21
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.29	0.10
S	Purshia tridentata	Bitterbrush	Rocky Mountain	0.29	0.28

Wildlife Habitat and Vegetation History

Table 14R-19.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	spring/fall

Table 14R-19.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon-Juniper	Phase I transitioning to Phase II
2010	Pinyon-Juniper	Phase I transitioning to Phase II
2014	Pinyon-Juniper	Phase I transitioning to Phase II
2018	Pinyon-Juniper	Phase II
2023	Pinyon-Juniper	Phase II

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation 16 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R035XY308UT
 States and Transitions 2007-2014 - State Undefined: Community Phase Undefined
 2018-2023 - Pinyon-Juniper State: Community Phase 4.1

Since study establishment in 2007, the plant community on this site has remained dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), even after treatment (Table 14R-19.1). A small number of other shrub species are present, primarily mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), but they have contributed little cover in comparison with trees (Table 14R-19.12). The introduced annual grass species cheatgrass (*Bromus tectorum*) provided a majority of the herbaceous cover prior to treatment, but has since decreased. Perennial grasses, namely squirreltail (*Elymus elymoides*), muttongrass (*Poa fendleriana*), and/or sedge (*Carex* sp.), have contributed a majority of the herbaceous cover since 2010. Forbs have been diverse throughout the study period, but not abundant (Table 14R-19.7, Table 14R-19.10, Table 14R-19.11). Although the tree component decreased following treatment, cover has increased each year since 2014, indicating that future infilling is possible (Table 14R-19.6, Table 14R-19.12).

On this site, deer winter range has remained in very poor condition since study establishment in 2007. Deer winter range condition could be improved through efforts that increase preferred browse cover and reproduction. Diversifying and increasing cover of perennial grasses and forbs would also prove beneficial for winter range condition (Table 14R-19.15). Pellet transect data shows that although deer presence has increased overall, it has remained low throughout the study period (Table 14R-19.9).

Trend Summary Tables

Table 14R-19.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	0.2	1.0	2.2	0.2	2.0	19.4
2010	0.1	1.3	3.5	0.2	1.0	17.0
2014	1.1	1.6	3.5	1.1	1.1	15.9
2018	1.1	2.3	4.8	1.5	0.9	21.7
2023	2.4	4.2	5.4	4.3	3.2	25.3

Table 14R-19.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	263	180	150	114	8.2	7.2	4.0	1.8
2010	216	227	107	48	5.5	13.5	2.3	1.4
2014	15	228	116	63	0.2	10.2	2.3	0.4
2018	3	226	29	46	0.0	8.9	0.5	0.5
2023	20	199	121	99	0.1	5.9	2.6	1.8

Table 14R-19.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	16.8	0.9	61.2	0.4	2.0	24.4
2010	24.7	0.1	55.5	0.7	2.0	26.4
2014	40.4	-	53.4	0.7	2.5	18.3
2018	45.0	0.0	51.2	1.9	5.6	17.7
2023	40.8	0.0	45.9	0.7	4.5	20.3

Table 14R-19.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	1	5	1	71
2010	1	6	4	2
2014	2	1	-	-
2018	1	12	-	6
2023	6	8	1	10
Year	Days Use Per Acre (ha)			
2007	1.5 (3.6)	4.7 (11.6)	6.7 (16.6)	-
2010	6.5 (16.1)	2.7 (6.6)	6.7 (16.6)	-
2014	9.4 (23.3)	1.3 (3.3)	2.7 (6.6)	-
2018	13.8 (34.1)	6.0 (14.9)	1.3 (3.3)	-
2023	10.9 (26.9)	12.1 (29.8)	-	-

Table 14R-19.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency												
2007	13	-	11	262	13	115	-	2	7	83	7	-	5
2010	23	3	11	216	-	170	10	3	-	56	17	-	-
2014	18	12	17	14	19	126	1	-	-	91	-	9	1
2018	31	8	48	3	28	52	7	-	-	99	-	25	-
2023	24	0	47	20	49	8	-	3	1	66	11	25	-
year	Average Cover (%)												
2007	0.2	-	0.1	8.1	0.0	3.8	-	0.1	0.0	2.8	0.0	-	0.0
2010	1.1	0.2	0.7	5.5	-	8.3	0.1	0.2	-	2.7	0.3	-	-
2014	0.3	0.5	0.5	0.2	0.1	4.4	0.0	-	-	4.0	-	0.3	0.0
2018	0.7	0.2	1.7	0.0	0.7	1.3	0.2	-	-	2.7	-	1.5	-
2023	0.6	0.0	0.8	0.1	1.1	0.2	-	0.1	0.0	2.3	0.4	0.3	-

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

Table 14R-19.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockerness)	Astragalus humistratus (groundcover milkvetch)	Castilleja (Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Chamaesyce (sandmat)	Chenopodium album ^a (lambsquarters)	Chenopodium fremontii ^a (Fremont's goosefoot)	Cirsium (thistle)	Cordylanthus ramosus ^a (bushy bird's beak)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)
year	Nested Frequency																
2007	1	1	4	26	4	11	-	-	7	0	-	3	77	21	7	-	8
2010	-	3	-	3	-	-	-	-	27	5	-	8	13	4	9	-	-
2014	-	2	-	-	-	13	-	-	-	-	-	12	46	15	2	1	-
2018	3	-	-	-	-	-	16	-	2	-	-	1	-	-	4	1	-
2023	-	3	-	5	-	10	-	5	5	-	7	-	32	-	15	1	-
year	Average Cover (%)																
2007	0.0	0.1	0.0	0.1	0.0	0.3	-	-	0.0	0.0	-	0.0	3.1	0.1	0.1	-	0.0
2010	-	0.0	-	0.0	-	-	-	-	0.1	0.3	-	0.1	0.6	0.0	0.6	-	-
2014	-	0.0	-	-	-	0.2	-	-	-	-	-	0.1	1.1	0.1	0.0	0.0	-
2018	0.0	-	-	-	-	-	0.2	-	0.0	-	-	0.0	-	-	0.0	0.0	-
2023	-	0.0	-	0.0	-	0.3	-	0.2	0.0	-	0.3	-	0.2	-	0.2	0.0	-

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

FORB SPECIES	Erysimum (wallflower)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Halogeton glomeratus ^{ai} (saltflower)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Linum lewisii (Lewis flax)	Machaeranthera grindelioides (rayless tansyaster)	Microsteris gracilis ^a (slender phlox)	Packera multilobata (lobeleaf groundsel)	Pedicularis centranthera (dwarf lousewort)	Penstemon cyanocaulis (bluestem beardtongue)	Petradoria pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2007	5	1	18	1	10	-	64	1	3	-	41	1	17	4	9	1	44
2010	-	1	11	-	-	3	44	-	-	2	3	-	-	4	3	-	14
2014	-	-	-	-	1	-	46	-	-	3	3	1	3	-	-	-	16
2018	-	-	-	-	-	-	-	-	-	2	-	-	1	-	15	-	2
2023	-	12	14	-	5	-	44	-	-	1	-	-	-	1	15	-	38
year	Average Cover (%)																
2007	0.0	0.0	0.1	0.0	0.1	-	0.5	0.1	0.0	-	0.1	0.0	0.4	0.1	0.2	0.0	0.1
2010	-	0.0	0.4	-	-	0.0	0.9	-	-	0.0	0.0	-	-	0.2	0.0	-	0.1
2014	-	-	-	-	0.0	-	1.1	-	-	0.0	0.0	0.0	0.0	-	-	-	0.1
2018	-	-	-	-	-	-	-	-	-	0.0	-	-	0.0	-	0.2	-	0.0
2023	-	0.1	0.2	-	0.0	-	0.4	-	-	0.0	-	-	-	0.0	0.4	-	0.2

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

FORB SPECIES	Polygonum douglasii ^{ai} (Douglas' knotweed)	Portulaca oleracea ^{ai} (little hogweed)	Salsola tragus ^{ai} (prickly Russian thistle)	Sphaeralcea coccinea (scarlet globemallow)	Stenotus acaulis (stemless mock goldenweed)	Trifolium (clover)
year	Nested Frequency					
2007	6	-	-	-	5	11
2010	15	-	20	-	-	10
2014	-	-	30	-	-	11
2018	-	22	6	3	-	-
2023	3	-	43	14	-	7
year	Average Cover (%)					
2007	0.0	-	-	-	0.0	0.0
2010	0.1	-	0.2	-	-	0.1
2014	-	-	0.1	-	-	0.0
2018	-	0.3	0.2	0.0	-	-
2023	0.0	-	1.2	0.5	-	0.0

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

Table 14R-19.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Echinocereus coccineus var. coccineus (scarlet hedgehog cactus)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)
year	Line Intercept Cover (%)						
2007	0.2	-	-	2	10	0	9.4
2010	0.2	-	-	0.9	8.2	0.1	8.8
2014	1.1	-	-	1	9.3	0.1	6.6
2018	1.5	-	-	0.9	10.6	-	11.1
2023	4.3	-	0.2	3	11.4	0	13.9
year	Quadrat Cover (%)						
2007	0.2	0.0	-	0.7	0.0	0.3	2.2
2010	0.1	-	-	0.9	1.0	0.3	2.5
2014	1.1	-	-	1.3	0.1	0.3	3.3
2018	1.1	-	-	2.2	0.0	0.0	4.8
2023	2.4	-	0.0	4.0	0.7	0.2	4.7

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

Table 14R-19.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2007	140	200	29	43	29	29	0	29	51/76
2010	260	-	15	54	31	0	0	31	43/61
2014	360	-	39	56	6	28	6	0	44/59
2018	560	-	18	79	4	50	11	4	39/60
2023	1220	100	41	57	2	0	0	2	- / -
Echinocereus coccineus var. coccineus -- (scarlet hedgehog cactus)									
2007	-	-	-	-	-	-	-	-	6/39
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	20	-	0	100	0	0	0	0	5/2
2023	-	-	-	-	-	-	-	-	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2007	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	48/92
2023	100	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2007	3480	2200	32	66	2	0	0	1	22/28
2010	1300	20	15	83	2	0	0	2	18/23
2014	2360	3440	49	51	0	8	0	1	21/26
2018	6280	-	32	66	2	0	0	1	10/17
2023	6060	140	6	90	4	0	0	5	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus osteosperma¹ -- (Utah juniper)									
2007	100	40	0	100	0	0	0	0	- / -
2010	80	-	25	75	0	0	0	0	- / -
2014	80	-	25	75	0	0	0	0	- / -
2018	100	-	0	100	0	0	0	0	- / -
2023	100	-	20	80	0	0	0	0	- / -
Opuntia fragilis -- (brittle pricklypear)									
2007	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	40	-	0	100	0	0	0	0	6/13
2023	80	-	0	100	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2007	340	-	12	82	6	0	0	6	11/34
2010	140	-	14	86	0	0	0	0	11/23
2014	140	-	0	100	0	0	0	14	11/37
2018	60	-	0	100	0	0	0	0	10/35
2023	140	-	14	86	0	0	0	29	- / -
Pinus edulis¹ -- (twoneedle pinyon)									
2007	140	20	29	71	0	0	0	0	- / -
2010	60	20	33	67	0	0	0	0	- / -
2014	80	60	50	50	0	0	0	0	- / -
2018	140	-	29	71	0	0	0	0	- / -
2023	80	-	25	50	25	0	0	25	- / -
Purshia stansburiana^p -- (Stansbury cliffrose)									
2007	-	-	-	-	-	-	-	-	65/106
2010	-	-	-	-	-	-	-	-	43/103
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2007	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	40	-	100	0	0	0	0	0	49/114
2018	-	-	-	-	-	-	-	-	37/127
2023	-	-	-	-	-	-	-	-	- / -
Yucca baccata -- (banana yucca)									
2007	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	74/111
2023	-	-	-	-	-	-	-	-	- / -
Yucca -- (yucca)									
2007	-	-	-	-	-	-	-	-	82/176
2010	-	-	-	-	-	-	-	-	85/87
2014	-	-	-	-	-	-	-	-	25/89
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	0	0	- / -

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

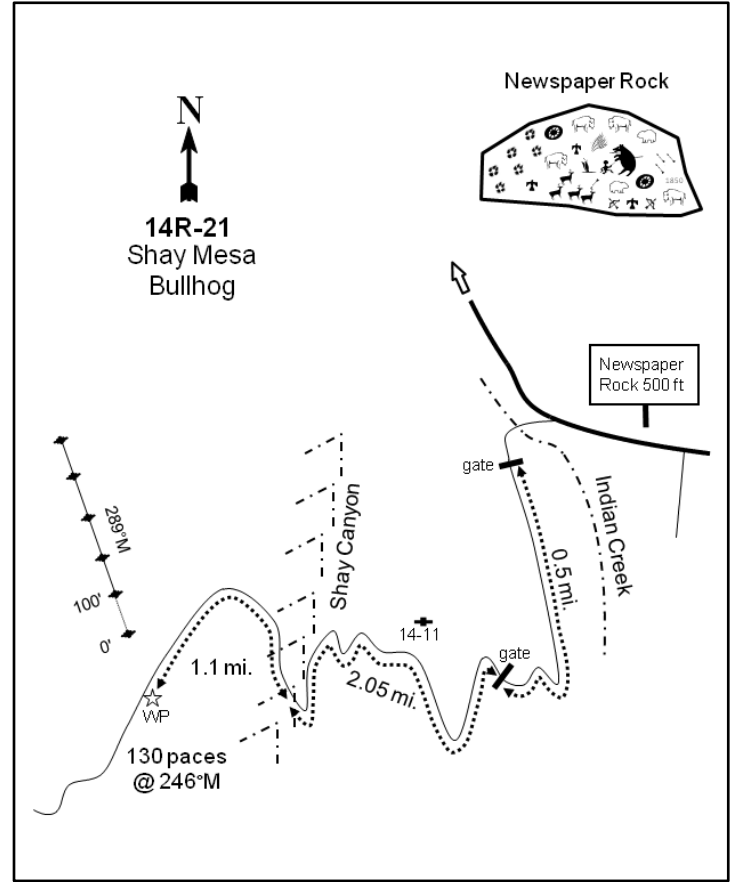
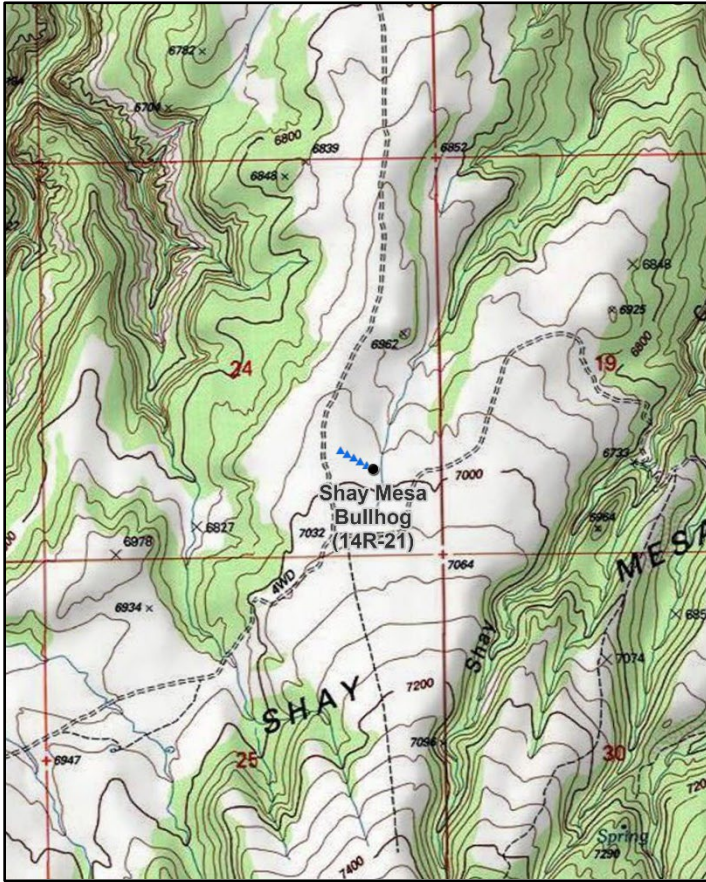
Table 14R-19.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	56	17	33	11	-	39	23.1
2010	46	12	47	-	6	35	24.5
2014	46	-	47	12	12	29	28.8
2018	47	-	31	31	6	31	20.4
2023	49	-	17	44	6	33	31.2
Pinus edulis (twoneedle pinyon)							
2007	39	21	7	14	7	50	15.4
2010	36	25	25	-	6	44	14.4
2014	41	31	31	-	6	31	11.4
2018	37	-	44	6	6	44	13.6
2023	38	-	29	35	6	29	13.9

Table 14R-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
2007	0.3	0.0	0.0	14.3	-6.1	3.6	0.0	12.0	Very Poor
2010	0.3	0.0	0.0	27.0	-4.1	2.8	0.0	25.9	Very Poor
2014	1.4	0.0	0.0	20.4	-0.1	0.9	0.0	22.5	Very Poor
2018	1.9	0.0	0.0	17.8	0.0	1.0	0.0	20.7	Very Poor
2023	5.4	0.0	0.0	11.7	-0.1	3.7	0.0	20.7	Very Poor

SHAY MESA BULLHOG - STUDY NO. 14R-21

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Shay Mountain NE; Township 32S, Range 21E, Section 24
NAD 83 UTM ZONE 12, 626684 East 4204320 North

Transect Information

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

Not Available
289° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
No Rebar

Directions to Site

Between Newspaper Rock and the 'Newspaper Rock 500 ft' sign, turn west onto a road that crosses Indian Creek and leads to a gate. From the gate, go 0.5 miles to a second gate. From this gate, drive 2.05 miles to the first sharp turn in Shay Canyon (you will probably have to reverse down the switchbacks if using a truck). From here, continue for 1.1 miles to the witness post on the right (north) side of the road. The 0-foot stake is 130 paces from the witness post at 264 degrees magnetic and does not have a browse tag.

Note: A UTV is *strongly* recommended to access this site.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	HART DRAW
Elevation	7,000ft (2,134m)
Aspect	North
Slope	4-6%
Sample Dates	07/16/2008, 07/20/2011, 06/24/2014, 08/20/2018, 07/31/2023

Table 14R-21.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1959	-
Seeding - Seed Unknown	-	-	1959	-
Mechanical - Bullhog	Shay Mesa Phase II	1091	April-September 2009	545
Seeding - Aerial Before	Shay Mesa Phase II	1091	December 2008-March 2009	212

Table 14R-21.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Shay Mesa phase II - Winterfat/Sage			Aerial	Oct 2008	483
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	White River	1.55	1.35
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	0.83	0.68
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Custer CO	0.21	0.16
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Iron UT	0.31	0.27
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	0.57	0.54
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.35	1.17
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	0.52	0.44
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.04	1.00
F	<i>Linum perenne</i>	Blue Flax	Appar	0.52	0.43
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		1.04	0.93
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.55	1.36
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sanpete UT	0.91	0.16
S	<i>Krascheninnikovia lanata</i>	Winterfat	Beaver UT	0.53	0.12
S	<i>Krascheninnikovia lanata</i>	Winterfat	White Pine NV	0.52	0.18
S	<i>Purshia tridentata</i>	Bitterbrush	Millard/Iron UT	0.20	0.14
S	<i>Purshia tridentata</i>	Bitterbrush	Lincoln NV	0.10	0.08
S	<i>Purshia tridentata</i>	Bitterbrush	Elko NV	0.31	0.27
S	<i>Purshia tridentata</i>	Bitterbrush	Eureka NV	0.31	0.25

Wildlife Habitat and Vegetation History**Table 14R-21.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 14R-21.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Pinyon	Phase II
2011	Mountain Big Sagebrush	Phase I
2014	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

Site Notes

Original study stakes were not found following treatment. New stakes were therefore placed as close to the previous location of the pre-treatment transect as possible.

Site Potential

1981 - 2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R035XY308UT
 States and Transitions 2008 - Pinyon-Juniper State: Community Phase 4.1
 2011-2023 - Current Potential State: Community Phase 2.1

Upon study establishment in 2008, this site was considered to be in Phase II of woodland succession (Table 14R-21.4) and dominated by twoneedle pinyon (*Pinus edulis*) with a minor component of Utah juniper (*Juniperus osteosperma*). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and broom snakeweed (*Gutierrezia sarothrae*) contributed a moderate amount of cover with few other browse species present (Table 14R-21.12, Table 14R-21.13). Tree cover and density decreased following the 2009 bullhog treatment (Table 14R-21.1) while that of sagebrush increased; sagebrush has been the dominant vegetation component since 2011.

However, point-quarter data shows that trees have remained on site throughout the duration of the study, indicating that infilling may be possible in future sample years (Table 14R-21.14). The herbaceous understory was sparse prior to treatment, with most of the cover provided by the introduced annual grass species cheatgrass (*Bromus tectorum*). Annual grass cover decreased following treatment, while that of perennial grasses increased (Table 14R-21.7, Table 14R-21.10, Table 14R-21.11).

Deer winter range condition on this site has ranged between very poor and good since 2008. Deer winter range condition was considered to be fair to good in 2023. The original treatment has helped to improve winter range. However, further improvements could be made by increasing recruitment of young and decreasing decadence in the preferred browse population. Further increasing cover of perennial grasses and forbs would also be beneficial for deer winter range (Table 14R-21.15). In addition, the sagebrush component of this site could provide browse for elk during the winter (Table 14R-21.3; Wambolt, 1996). According to pellet transect data, elk presence was high in 2023 while that of deer was low (Table 14R-21.9).

Trend Summary Tables

Table 14R-21.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	5.8	5.3	12.5	6.9	6.6	22.8
2011	11.9	1.5	1.2	17.8	1.4	3.3
2014	15.4	0.7	1.3	16.6	0.2	1.6
2018	15.8	0.9	1.5	18.6	0.3	1.6
2023	21.8	4.1	0.4	22.9	4.2	0.5

Table 14R-21.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	141	101	53	25	2.3	0.7	0.3	0.1
2011	62	184	-	68	0.3	6.2	-	1.3
2014	102	213	118	92	0.7	9.3	0.8	1.1
2018	8	253	-	65	0.0	10.8	-	1.1
2023	-	202	39	126	-	7.4	0.4	3.1

Table 14R-21.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	40.6	0.4	45.9	5.6	0.1	26.1
2011	46.5	0.7	32.2	0.3	0.0	22.2
2014	44.1	0.4	28.3	0.6	0.1	31.1
2018	48.1	0.4	43.5	1.9	0.2	26.9
2023	47.4	0.4	27.4	2.1	0.2	31.1

Table 14R-21.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2008	3	2	12	-	43
2011	-	1	12	-	-
2014	3	7	9	-	4
2018	3	9	15	-	11
2023	1	4	23	-	4
Year	Days Use Per Acre (ha)				
2008	5.1 (12.6)	4.7 (11.6)	25.5 (62.9)	0.6 (1.4)	-
2011	0.7 (1.8)	9.4 (23.2)	20.8 (51.3)	-	-
2014	1.5 (3.6)	4.0 (9.9)	4.0 (9.9)	-	-
2018	11.6 (28.7)	7.4 (18.2)	8.7 (21.5)	-	-
2023	6.5 (16.1)	13.4 (33.1)	55.6 (137.4)	-	-

Table 14R-21.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency												
Achnatherum hymenoides (Indian ricegrass)													
Agropyron cristatum ⁱ (crested wheatgrass)													
Bouteloua gracilis (blue grama)													
Bromus tectorum ^{ai} (cheatgrass)													
Elymus elymoides (squirreltail)													
Hesperostipa comata (needle and thread)													
Koeleria macrantha (prairie Junegrass)													
Pascopyrum smithii (western wheatgrass)													
Pleuraphis jamesii (James' galleta)													
Poa secunda (Sandberg bluegrass)													
Sporobolus cryptandrus (sand dropseed)													
Vulpia octoflora ^a (sixweeks fescue)													
year	Average Cover (%)												
2008	1	78	-	141	10	12	-	-	3	-	-	-	-
2011	10	58	39	60	35	47	-	-	-	32	-	2	-
2014	9	64	35	50	88	31	2	14	7	20	6	64	-
2018	14	106	56	8	75	16	-	25	2	29	2	-	-
2023	20	63	39	-	67	31	-	2	6	19	8	-	-
year	Average Cover (%)												
2008	0.0	0.5	-	2.3	0.1	0.1	-	-	0.0	-	-	-	-
2011	0.1	3.0	0.4	0.3	1.2	0.8	-	-	-	0.6	-	0.0	-
2014	0.6	2.9	1.9	0.5	2.3	1.1	0.0	0.1	0.3	0.2	0.0	0.2	-
2018	0.3	3.9	3.4	0.0	1.9	0.9	-	0.2	0.0	0.2	0.0	-	-
2023	0.7	2.5	0.8	-	1.6	1.2	-	0.0	0.5	0.1	0.0	-	-

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

Table 14R-21.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Agoseris glauca (pale agoseris)																		
Astragalus amphioxys (Crescent milkvetch)																		
Astragalus cibaricus (browse milkvetch)																		
Calochortus nuttallii (sego lily)																		
Ceratocephala testiculata ^{ai} (curvseed butterwort)																		
Chenopodium leptophyllum ^a (narrowleaf goosefoot)																		
Cryptantha (cryptantha)																		
Descurainia pinnata ^a (western tansymustard)																		
Draba ^a (draba)																		
Erigeron pumilus (shaggy fleabane)																		
Gilia inconspicua ^a (shy gilia)																		
Lappula occidentalis ^a (flatspine stickseed)																		
Linum perenne ⁱ (blue flax)																		
Machaeranthera canescens (hoary tansyaster)																		
Melilotus officinalis ⁱ (sweetclover)																		
Phlox austromontana (mountain phlox)																		
Phlox longifolia (longleaf phlox)																		
year	Average Cover (%)																	
2008	5	14	-	-	32	3	-	11	-	-	-	20	-	-	-	7	-	-
2011	-	9	8	-	-	-	5	-	-	6	-	-	11	2	0	3	15	-
2014	-	31	2	-	-	1	-	64	29	3	29	49	-	2	-	18	18	-
2018	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-	16	22	-
2023	-	32	2	5	4	-	1	-	-	20	8	-	-	5	-	23	32	-
year	Average Cover (%)																	
2008	0.0	0.1	-	-	0.1	0.0	-	0.1	-	-	-	0.1	-	-	-	0.0	-	-
2011	-	0.1	0.0	-	-	-	0.0	-	-	0.0	-	-	0.6	0.2	0.0	0.1	0.1	-
2014	-	0.2	0.0	-	-	0.0	-	0.3	0.1	0.0	0.2	0.4	-	0.0	-	0.5	0.1	-
2018	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	0.7	0.2	-
2023	-	0.3	0.0	0.0	0.0	-	0.0	-	-	0.4	0.0	-	-	0.2	-	0.5	0.5	-

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

FORB SPECIES			
	Salsola tragus ^{ai} (prickly Russian thistle)		
	Sphaeralcea coccinea (scarlet globemallow)		
	Trifolium (clover)		
year	Nested Frequency		
2008	-	-	-
2011	-	11	1
2014	-	28	2
2018	-	25	-
2023	31	44	3
year	Average Cover (%)		
2008	-	-	-
2011	-	0.1	0.0
2014	-	0.4	0.0
2018	-	0.2	-
2023	0.3	1.3	0.0

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

Table 14R-21.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES										
	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Ephedra viridis ^p (mormon tea)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)
year	Line Intercept Cover (%)									
2008	6.8	-	-	-	0.1	6.6	1.6	-	-	21.2
2011	17.6	-	0.1	-	0.1	1.2	-	0.2	-	3.3
2014	16.2	-	0.1	-	0.3	0.2	-	-	-	1.6
2018	17.5	1.1	-	-	0	0	-	-	0.3	1.6
2023	22.5	-	-	-	0.4	3.9	-	-	0.3	0.5
year	Quadrat Cover (%)									
2008	5.8	0.0	-	0.1	0.0	5.1	1.5	-	-	11.0
2011	11.2	-	0.4	-	0.2	1.4	-	0.1	-	1.2
2014	14.9	0.0	0.4	-	0.1	0.7	-	-	-	1.3
2018	15.4	0.0	0.0	-	0.3	0.9	-	-	0.0	1.5
2023	21.4	0.0	0.1	0.3	0.2	3.8	-	-	0.0	0.4

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

Table 14R-21.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2008	2400	3380	16	73	12	14	7	5	62/81
2011	3560	60	5	64	32	33	15	23	41/69
2014	4520	-	11	86	4	36	56	2	42/66
2018	4440	-	9	76	15	28	22	25	41/75
2023	3600	-	11	73	16	11	19	15	- / -
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
2008	60	-	0	33	67	0	100	67	7/10
2011	-	-	-	-	-	-	-	-	- / -
2014	80	-	75	25	0	0	0	0	10/26
2018	20	-	100	0	0	0	0	0	- / -
2023	40	-	0	100	0	0	0	0	- / -
Ephedra viridis^P -- (mormon tea)									
2008	-	-	-	-	-	-	-	-	38/28
2011	180	-	0	100	0	0	100	0	24/26
2014	140	-	86	14	0	0	86	0	52/78
2018	80	-	0	100	0	0	0	0	23/27
2023	60	-	0	100	0	0	67	0	- / -
Eriogonum microthecum^P -- (slender buckwheat)									
2008	240	20	42	58	0	17	0	0	19/13
2011	460	-	4	96	0	74	9	17	14/17
2014	640	-	38	63	0	9	0	0	16/19
2018	440	-	0	100	0	18	14	0	18/17
2023	420	20	14	86	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	20	-	0	100	0	0	0	0	44/41
2011	-	-	-	-	-	-	-	-	- / -
2014	80	-	100	0	0	0	0	0	- / -
2018	40	-	0	100	0	0	0	100	38/37
2023	100	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2008	9400	920	24	73	4	0	0	0	24/31
2011	2700	20	8	87	5	1	0	7	14/21
2014	1680	7100	38	62	0	0	0	0	15/17
2018	1160	-	0	71	29	0	0	43	9/13
2023	4160	40	3	94	3	0	0	3	- / -
Juniperus osteosperma¹ -- (Utah juniper)									
2008	20	-	0	100	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	20	-	100	0	0	0	0	0	- / -
2023	20	-	100	0	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2008	-	-	-	-	-	-	-	-	- / -
2011	560	-	0	100	0	0	0	0	5/13
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Opuntia -- (pricklypear)									
2008	-	-	-	-	-	-	-	-	- / -
2011	20	-	0	100	0	0	0	0	4/10
2014	-	-	-	-	-	-	-	-	19/53
2018	60	-	0	100	0	0	0	0	10/43
2023	80	-	25	75	0	0	0	0	- / -
Pinus edulis -- (twoneedle pinyon)									
2008	180	-	0	100	0	0	0	0	- / -
2011	80	-	75	25	0	0	0	0	- / -
2014	60	-	100	0	0	0	0	0	- / -
2018	40	-	0	100	0	0	0	0	- / -
2023	40	-	100	0	0	0	0	0	- / -

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

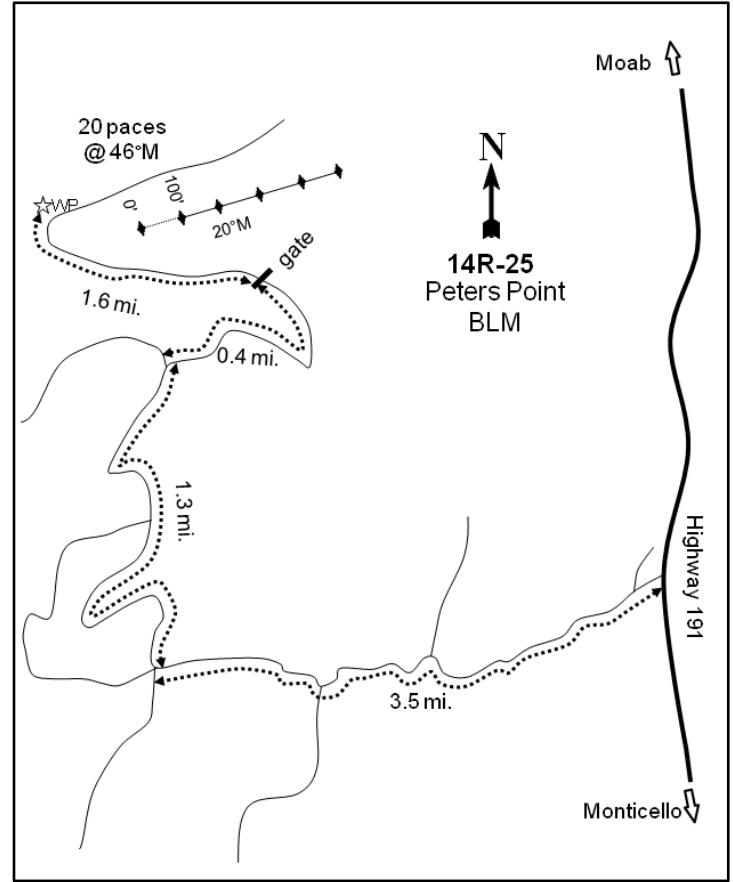
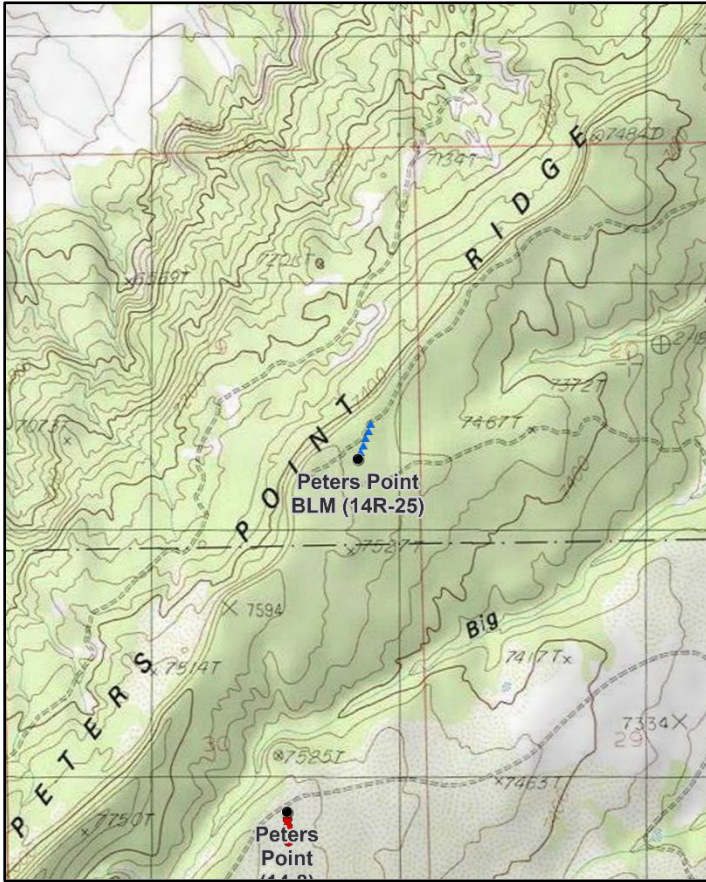
Table 14R-21.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	46	-	11	28	33	28	25.2
2011	5	33	33	-	33	-	10.3
2014	3	-	50	50	-	-	8.0
2018	11	20	60	20	-	-	3.8
2023	11	60	20	20	-	-	6.0
Pinus edulis (twoneedle pinyon)							
2008	65	-	5	37	47	11	16.8
2011	37	30	50	-	20	-	3.1
2014	24	-	78	22	-	-	6.8
2018	38	8	85	8	-	-	3.8
2023	20	-	86	14	-	-	7.6

Table 14R-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
2008	8.6	11.5	8.1	1.4	-1.7	0.3	0.0	28.2	Very Poor
2011	22.3	5.5	2.2	12.3	-0.3	2.7	0.0	44.7	Poor
2014	20.8	14.0	5.8	18.6	-0.5	2.2	0.0	60.8	Fair
2018	23.3	10.7	7.0	21.6	0.0	2.3	0.0	64.8	Fair-Good
2023	28.6	10.3	5.3	14.7	0.0	6.3	0.0	65.2	Fair-Good

PETERS POINT BLM - STUDY NO. 14R-25



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Monticello Lake NE; Township 32S, Range 23E, Section 19
NAD 83 UTM ZONE 12, 637776 East 4204486 North

Transect Information

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

Not Available
20° magnetic
500ft
No Rebar
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)

Directions to Site

From US-191, travel west on a gravel road for 3.5 miles; stay on the main road until you reach an intersection. Turn right at the intersection and travel north for another 1.3 miles, staying right. Turn right again to travel northeast and continue for 2.0 miles to a witness post on the left (west) side of the road. The study is 20 paces from the witness post at 43 degrees magnetic; there is no browse tag.

Site Information

Land Ownership: Federal
Land Administrator: BLM
Allotment: PETERS POINT
Elevation: 7,456ft (2,273m)
Aspect: East
Slope: 5%
Sample Dates: 07/19/2011, 06/24/2014, 08/21/2018, 08/02/2023

Table 14R-25.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Peter's Point Maintenance	4627	November 2019	2097
Mechanical - Bullhog	Peters Point - Phase I	1944	October 2011-May 2012	1253

Wildlife Habitat and Vegetation History**Table 14R-25.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	spring/fall
Rocky Mountain Elk	crucial	year-long

Table 14R-25.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Pinyon-Juniper	Phase III
2014	Pinyon-Juniper	Phase I transitioning to Phase II
2018	Pinyon-Juniper	Phase II
2023	Pinyon-Juniper	Phase I transitioning to Phase II

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	2011-2023 - Pinyon-Juniper State: Community Phase 4.2

When the study was established in 2011, this site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and considered to be within Phase III of woodland succession. Other browse species were present, but offered little cover. Tree cover decreased following the bullhog project, but pinyon and juniper have continued to be the dominant vegetation components following treatment. Tree density decreased between 2018 and 2023 due to a 2019 lop and scatter treatment, but total tree cover increased slightly over the same period; the site was classified as being within Phase I transitioning to Phase II of woodland succession in 2023 (Table 14R-25.1, Table 14R-25.4, Table 14R-25.12, Table 14R-25.13, Table 14R-25.14). The herbaceous understory was moderately abundant prior to treatment, but not diverse: a majority of the cover was provided by muttongrass (*Poa fendleriana*). Perennial herbaceous species have exhibited a post-treatment increase overall, but grasses have continued to lack diversity; muttongrass and squirreltail (*Elymus elymoides*) contributed most of the perennial grass cover in 2023. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in all post-treatment sample years, but in low amounts (Table 14R-25.7, Table 14R-25.10, Table 14R-25.11).

When used as deer winter range, condition of this site has generally been very poor since study establishment, and condition was considered to be very poor to poor in 2023. Further improvement to deer winter range could be achieved through efforts that encourage increased preferred browse cover and reproduction. Diversifying and increasing cover of perennial forbs would also improve winter range condition (Table 14R-25.15). Augmenting the limited sagebrush component on this site could result in increased potential browse for wintering elk. In addition, increasing perennial forb diversity and cover could improve forage for elk during the summer months (Table 14R-25.3; Beck & Peek, 2005; Wambolt, 2005). According to pellet group transect data, deer presence has remained low throughout the duration of the study period. Elk presence has been moderate in some years, but no elk pellet groups were observed in 2023 (Table 14R-25.9).

Trend Summary Tables

Table 14R-25.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	0.2	0.1	2.8	0.1	0.3	42.1
2014	-	0.3	5.1	-	0.1	22.0
2018	-	0.5	0.2	-	0.5	21.4
2023	0.1	0.1	2.0	0.5	0.3	22.2

Table 14R-25.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	-	237	13	62	-	9.5	0.1	0.9
2014	1	226	65	59	0.0	12.7	1.8	2.3
2018	2	305	7	42	0.0	16.7	0.0	1.6
2023	7	263	76	54	0.3	14.5	1.8	2.1

Table 14R-25.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	20.6	4.6	55.8	1.5	4.9	15.3
2014	12.9	0.3	74.2	2.5	3.0	21.9
2018	13.4	0.4	76.4	2.4	3.5	19.3
2023	13.4	-	66.1	0.1	3.2	22.9

Table 14R-25.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2011	-	5	13	10
2014	1	-	2	2
2018	2	14	27	5
2023	4	8	8	4
Year	Days Use Per Acre (ha)			
2011	5.8 (14.3)	11.4 (28.1)	22.1 (54.6)	-
2014	-	-	12.1 (29.8)	-
2018	3.6 (9.0)	2.7 (6.6)	21.5 (53.0)	-
2023	8.0 (19.7)	14.7 (36.4)	-	-

Table 14R-25.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency				
<i>Achnatherum hymenoides</i> (Indian ricegrass)	10	6	-	-	233
<i>Bouteloua gracilis</i> (blue grama)	3	8	1	41	185
<i>Bromus tectorum</i> ^{ai} (cheatgrass)	7	25	2	101	239
<i>Elymus elymoides</i> (squirreltail)	16	42	7	126	176
<i>Poa fendleriana</i> (muttongrass)	Average Cover (%)				
year	0.1	0.1	-	-	9.3
2011	0.6	0.3	0.0	1.5	10.3
2014	0.9	1.5	0.0	2.4	12.0
2018	1.5	1.1	0.3	6.1	5.8
2023					

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

Table 14R-25.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
<i>Aliciella</i> ^a (aliciella)	-	13	-	-	-	-	-	-	-	-	-	-	-	5	3	43	13	-
<i>Arabis holboellii</i> ^a (Holboell's rockcress)	-	19	-	6	18	16	6	2	-	2	1	-	1	3	32	23	1	
<i>Chenopodium album</i> ^a (lambsquarters)	-	4	-	-	-	-	-	4	-	-	-	-	-	3	34	-	3	
<i>Chenopodium fremontii</i> ^a (Fremont's goosefoot)	3	1	3	4	18	-	34	5	3	-	-	3	-	-	35	10	38	
<i>Descurainia pinnata</i> ^a (western tansymustard)	Average Cover (%)																	
<i>Draba</i> ^a (draba)	-	0.1	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0.9	0.0	-
<i>Gilia inconspicua</i> ^a (shy gilia)	-	0.7	-	0.0	0.9	0.1	0.1	0.2	-	0.0	0.0	-	0.0	0.0	1.3	0.7	0.0	
<i>Heterotheca villosa</i> (hairy false goldenaster)	-	0.0	-	-	-	-	-	0.3	-	-	-	-	-	0.0	1.3	-	0.0	
<i>Ipomopsis aggregata</i> (scarlet gilia)	0.0	0.0	0.0	0.2	1.0	-	0.3	0.2	0.0	-	-	0.0	-	-	1.9	0.1	0.3	
<i>Lactuca serriola</i> ^{ai} (prickly lettuce)																		
<i>Lappula occidentalis</i> ^a (flatspine stickseed)																		
<i>Mentzelia albicaulis</i> ^a (whitestem blazingstar)																		
<i>Pedicularis centranthera</i> (dwarf lousewort)																		
<i>Penstemon pachyphyllus</i> (thickleaf beardtongue)																		
<i>Petrorhiza pumila</i> (rock goldenrod)																		
<i>Physaria rectipes</i> (straight bladderpod)																		
<i>Polygonum douglasii</i> ^a (Douglas' knotweed)																		

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

FORB SPECIES			
	Streptanthus cordatus (heartleaf twistflower)	Tetraneris acaulis (stemless four-nerve daisy)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency		
2011	-	-	-
2014	-	3	1
2018	2	-	-
2023	-	1	-
year	Average Cover (%)		
2011	-	-	-
2014	-	0.0	0.0
2018	0.0	-	-
2023	-	0.0	-

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

Table 14R-25.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)				
2011	0.1	0.1	21.5	0.2	20.6
2014	-	-	10.6	0.1	11.4
2018	-	0.4	11.1	0.1	10.3
2023	0.5	0.1	10.8	0.2	11.4
year	Quadrat Cover (%)				
2011	0.2	0.0	0.4	0.1	2.4
2014	-	0.1	1.0	0.2	4.1
2018	-	0.5	0.0	0.0	0.2
2023	0.1	0.0	1.8	0.0	0.2

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

Table 14R-25.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2011	60	-	0	33	67	0	67	33	31/65
2014	20	-	0	100	0	0	0	0	34/57
2018	20	-	0	100	0	0	0	0	30/67
2023	40	-	0	50	50	0	0	50	- / -
Cercocarpus montanus^p -- (alderleaf mountain mahogany)									
2011	-	-	-	-	-	-	-	-	67/73
2014	-	-	-	-	-	-	-	-	50/56
2018	-	-	-	-	-	-	-	-	78/83
2023	-	-	-	-	-	-	-	-	-/-
Echinocereus mojavensis -- (Mojave kingcup cactus)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	5/20
2018	-	-	-	-	-	-	-	-	7/11
2023	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2011	40	-	0	100	0	0	0	0	13/16
2014	340	-	77	24	0	18	0	0	20/32
2018	1160	-	10	86	3	0	0	3	13/25
2023	160	-	0	100	0	0	0	0	- / -
Juniperus osteospermaⁱ -- (Utah juniper)									
2011	100	-	0	0	100	0	0	60	- / -
2014	20	-	0	0	100	0	0	100	- / -
2018	40	-	0	50	50	0	0	50	- / -
2023	40	-	0	0	100	0	0	100	- / -
Opuntia -- (pricklypear)									
2011	320	-	31	69	0	0	0	0	8/29
2014	220	-	36	55	9	0	0	9	10/28
2018	160	-	13	88	0	0	0	0	7/20
2023	220	-	0	100	0	0	0	27	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2011	-	-	-	-	-	-	-	-	8/32
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Pinus edulis^t -- (twoneedle pinyon)									
2011	180	20	22	22	56	11	0	22	- / -
2014	60	40	67	33	0	0	0	0	- / -
2018	140	20	57	43	0	0	0	0	- / -
2023	80	20	50	50	0	0	0	0	- / -
Yucca baccata -- (banana yucca)									
2011	-	-	-	-	-	-	-	-	18/29
2014	-	-	-	-	-	-	-	-	14/116
2018	-	-	-	-	-	-	-	-	31/48

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

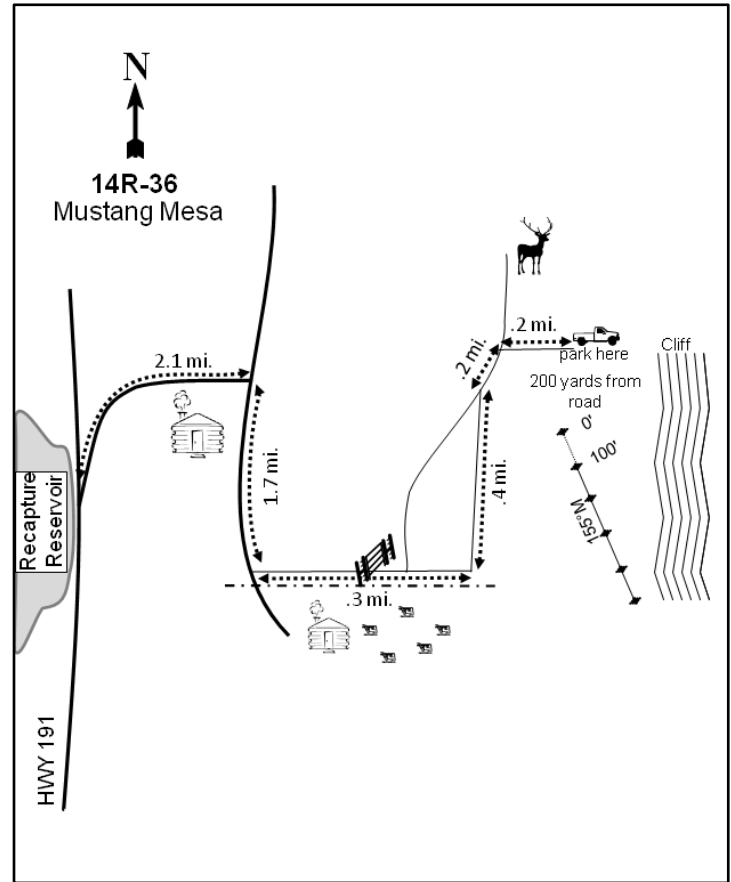
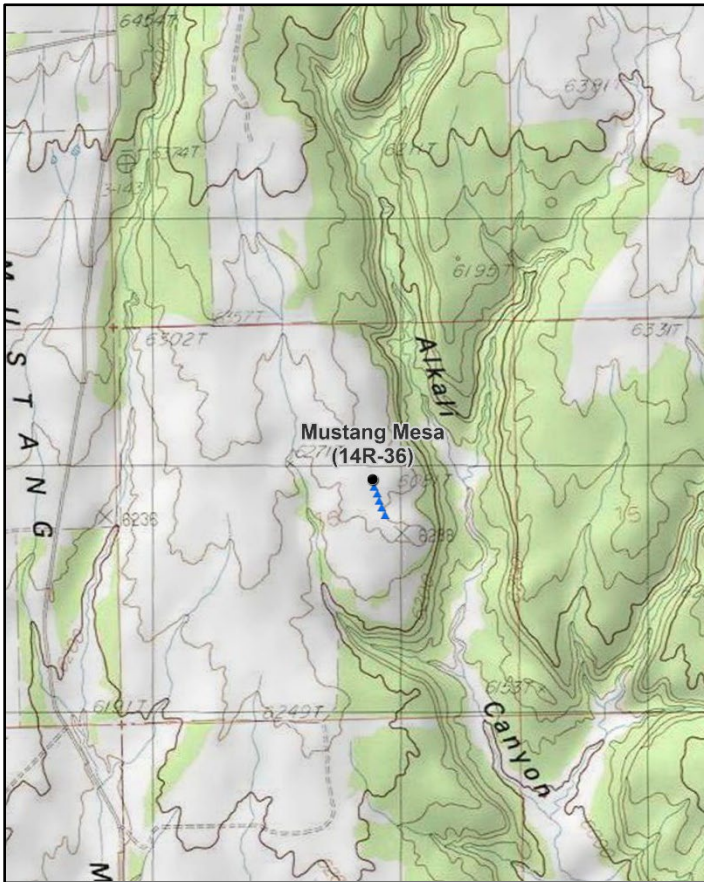
Table 14R-25.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2011	62	-	5	11	-	84	37.9
2014	26	-	-	-	8	92	60.4
2018	53	21	-	-	7	71	41.7
2023	41	-	8	8	-	85	57.1
Pinus edulis (twoneedle pinyon)							
2011	122	-	10	10	-	80	22.8
2014	34	-	20	-	-	80	31.5
2018	71	50	13	-	-	38	15.3
2023	32	17	17	-	-	67	29.7

Table 14R-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
2011	0.1	0.0	0.0	19.0	0.0	1.8	0.0	20.9	Very Poor
2014	0.0	0.0	0.0	25.4	0.0	4.5	0.0	29.9	Very Poor
2018	0.0	0.0	0.0	30.0	0.0	3.2	0.0	33.2	Very Poor-Poor
2023	0.6	0.0	0.0	29.1	-0.2	4.3	0.0	33.8	Very Poor-Poor

MUSTANG MESA - STUDY NO. 14R-36

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Blanding North SE; Township 36S, Range 23E, Section 16
NAD 83 UTM ZONE 12, 641832 East 4169137 North

Transect Information

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

662
155° magnetic (Line 2: 147° magnetic, Line 3: 151° magnetic, Lines 4-5: 155° magnetic)
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt 2: 8ft

Directions to Site

Driving on Highway 191, turn east across from Recapture Reservoir and follow the road around a curve until it "T"s into another road. Turn right (south) here and follow this road for 1.7 miles. Turn left (east) and drive along the fence line for 0.3 miles, passing through a gate. After 0.3 miles turn left again and proceed north for 0.4 miles. The road forks at this point: follow the right fork for 0.2 miles and then turn right at the following fork. Drive on this road for 0.2 miles and then park; the site is 200 yards from the road.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	ALKALI POINT
Elevation	6,299ft (1,920m)
Aspect	East
Slope	3-4%
Sample Dates	08/26/2014, 08/21/2017, 08/02/2023

Table 14R-36.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1960s	-
Hand Crew - Lop and Scatter	Mustang Mesa Lop and Scatter	3050	October-November 2014	418
Seeding - Aerial Before	Mustang Mesa Lop and Scatter	3050	October 2014	418

Table 14R-36.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mustang Mesa Lop and Scatter			Aerial	Oct 2014	450
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Nezpar	2.00	1.79
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	2.00	1.61
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	2.00	1.76
G	<i>Hesperostipa comata</i>	Needle and Threadgrass	Iron UT	0.20	0.15
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	2.00	1.89
G	<i>Pleuraphis jamesii</i>	Galleta		0.27	0.08
G	<i>Poa secunda</i>	Sandberg Bluegrass	UP Colorado Plateau	0.20	0.16
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed	Washington CO	0.10	0.09
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass		2.00	1.26
F	<i>Helianthus annuus</i>	Annual Sunflower	Box Elder UT	0.22	0.18
F	<i>Linum perenne</i>	Blue Flax	Appar	0.50	0.42
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Lincoln NV	0.11	0.05

Mix Name			Application Type	Application Date	Acres
Mustang Mesa Lop and Scatter - Bitterbrush			Aerial	Oct 2014	450
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Purshia tridentata</i>	Bitterbrush	Rocky Mountain	0.07	0.05

Wildlife Habitat and Vegetation History**Table 14R-36.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	spring/fall

Table 14R-36.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Pinyon-Juniper	Phase II
2017	Wyoming Big Sagebrush/Antelope Bitterbrush	Phase I
2023	Wyoming Big Sagebrush/Antelope Bitterbrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation 14 inches
 NRCS Ecological Site Upland Loam (Big Sagebrush)
 NRCS Ecological Site # R036XY306UT
 States and Transitions 2014 - Pinyon-Utah Juniper State: Community Phase 3.2
 2017-2023 - Seeded State: Community Phase 4.3

This site was established in 2014 and was a pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) dominated plant community in Phase II of woodland succession; a number of browse species were also present to a lesser extent. Tree cover and density decreased following a lop and scatter and seeding treatment in 2015 (Table 14R-36.1), placing the study site in Phase I of succession. Following treatment, the plant community transitioned into one dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and antelope bitterbrush (*Purshia tridentata*) (Table 14R-36.4, Table 14R-36.12, Table 14R-36.13, Table 14R-36.14). The herbaceous understory was rare in both the pre- and first post-treatment samplings. However, both perennial grasses and forbs diversified and perennial grasses contributed moderate cover in 2023 (Table 14R-36.7, Table 14R-36.10, Table 14R-36.11). Although cover and density were low in 2023 (Table 14R-36.12, Table 14R-36.14), the extant tree component indicates that there may be potential for infilling in future sample years.

When considered as deer winter range, condition of this site has varied between very poor and good since 2014, and was considered to

be fair in 2023. Winter range condition has improved following treatment. However, further improvements could be accomplished through efforts that increase preferred browse reproduction and decrease decadence within the population. In addition, further increasing cover and diversity of perennial grasses and forbs would also improve deer winter range (Table 14R-36.15). Pellet group data shows that deer presence has been low in all sample years, but a marginal increase in days use per acre did occur between 2017 and 2023 (Table 14R-36.9).

Trend Summary Tables

Table 14R-36.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2014	7.5	1.6	11.7	12.5	1.5	21.6
2017	12.9	7.3	0.6	22.6	7.1	0.7
2023	14.3	4.6	1.6	20.6	5.4	1.6

Table 14R-36.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2014	-	8	40	9	-	0.1	0.1	0.2
2017	2	109	0	61	0.0	5.2	0.0	2.3
2023	27	147	128	44	0.2	7.9	4.5	2.3

Table 14R-36.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2014	46.6	0.1	45.7	0.7	1.0	21.9
2017	27.2	0.0	62.1	0.6	1.3	29.1
2023	30.2	0.0	45.5	1.2	1.1	33.2

Table 14R-36.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2014	-	9	-	13
2017	-	11	-	7
2023	3	12	1	6
Year	Days Use Per Acre (ha)			
2014	-	18.1 (44.7)	2.0 (5.0)	-
2017	0.7 (1.8)	13.4 (33.1)	-	-
2023	8.0 (19.7)	18.1 (44.7)	-	-

Table 14R-36.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Pascopyron smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2014	3	-	-	-	7	-	-	-	-	-
2017	7	72	13	2	14	3	3	-	6	11
2023	10	46	18	27	55	16	9	4	2	2
year	Average Cover (%)									
2014	0.0	-	-	-	0.0	-	-	-	-	-
2017	0.3	3.9	0.1	0.0	0.4	0.1	0.0	-	0.2	0.2
2023	0.7	2.2	1.5	0.2	2.6	0.4	0.4	0.1	0.0	0.0

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

Table 14R-36.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus tenellus (looseflower milkvetch)	Chamaesyce (sandmat)	Cordylanthus ^a (bird's-beak)	Descurainia pinnata ^a (western tansymustard)	Gilia inconspicua ^a (shy gilia)	Lappula occidentalis ^{ai} (flatspine stickseed)	Lepidium ^a (pepperweed)	Linum perenne ⁱ (blue flax)	Machaeranthera grindelioides (rayless tansyaster)	Penstemon (beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Platyschuhria integrifolia (basindaaisy)	Stephanomeria (wirelettuce)
year	Nested Frequency													
2014	-	3	-	1	-	-	39	-	-	5	-	-	1	-
2017	12	-	0	-	-	-	-	34	3	2	2	6	8	-
2023	17	-	102	4	5	24	-	2	-	5	-	17	5	0
year	Average Cover (%)													
2014	-	0.0	-	0.0	-	-	0.1	-	-	0.0	-	-	0.1	-
2017	0.5	-	0.0	-	-	-	-	1.2	0.0	0.0	0.0	0.1	0.4	-
2023	2.0	-	4.2	0.0	0.0	0.1	-	0.0	-	0.0	-	0.1	0.1	0.0

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

Table 14R-36.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Cercocarpus montanus ^p (alderleaf mountain mahogany)	Ephedra viridis ^p (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Pinus edulis ^t (twoneedle pinyon)	Purshia stansburiana ^p (Stansbury cliffrose)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)								
2014	-	7.7	1.2	1.3	1.5	15.3	6.3	0.7	1.6
2017	0.6	7.2	1.6	1.3	7.1	0.7	-	3.4	8.5
2023	1.8	6.2	0.4	1.6	5.4	1.6	-	1.5	9.1
year	Quadrat Cover (%)								
2014	-	5.5	0.4	0.3	1.6	8.9	2.8	0.0	1.3
2017	0.1	5.0	1.4	0.9	7.3	0.6	-	1.4	4.0
2023	1.8	6.2	0.0	0.5	4.6	1.6	-	0.1	5.6

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

Table 14R-36.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2014	-	-	-	-	-	-	-	-	193/181
2017	-	-	-	-	-	-	-	-	223/225
2023	20	-	0	100	0	100	0	0	- / -
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2014	840	20	26	57	17	10	2	19	84/98
2017	900	60	40	60	0	7	0	0	75/93
2023	760	-	3	87	11	5	0	47	- / -
Cercocarpus montanus^p -- (alderleaf mountain mahogany)									
2014	60	-	0	33	67	33	0	67	94/124
2017	40	-	0	100	0	0	0	0	153/177
2023	20	-	0	0	100	0	100	100	- / -
Ephedra viridis^p -- (mormon tea)									
2014	120	-	33	50	17	0	0	33	90/106
2017	160	-	63	38	0	0	0	0	117/193
2023	260	-	23	46	31	0	0	31	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2014	3320	220	14	78	8	0	0	7	18/20
2017	7960	-	0	98	2	0	0	2	21/30
2023	6720	-	6	79	15	0	1	15	- / -
Juniperus osteosperma^t -- (Utah juniper)									
2014	140	-	14	86	0	0	0	0	- / -
2017	160	-	63	25	13	0	0	13	- / -
2023	80	-	75	0	25	0	0	25	- / -
Pinus edulis^t -- (twoneedle pinyon)									
2014	60	-	33	67	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Purshia stansburiana^p -- (Stansbury cliffrose)									
2014	80	-	0	25	75	100	0	0	156/148
2017	220	-	9	91	0	18	0	9	182/182
2023	40	-	0	50	50	0	0	50	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2014	520	-	0	27	73	4	0	27	64/87
2017	460	-	9	78	13	35	0	13	73/126
2023	520	-	12	54	35	23	42	35	- / -
Sclerocactus -- (fishhook cactus)									
2014	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	15/12

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

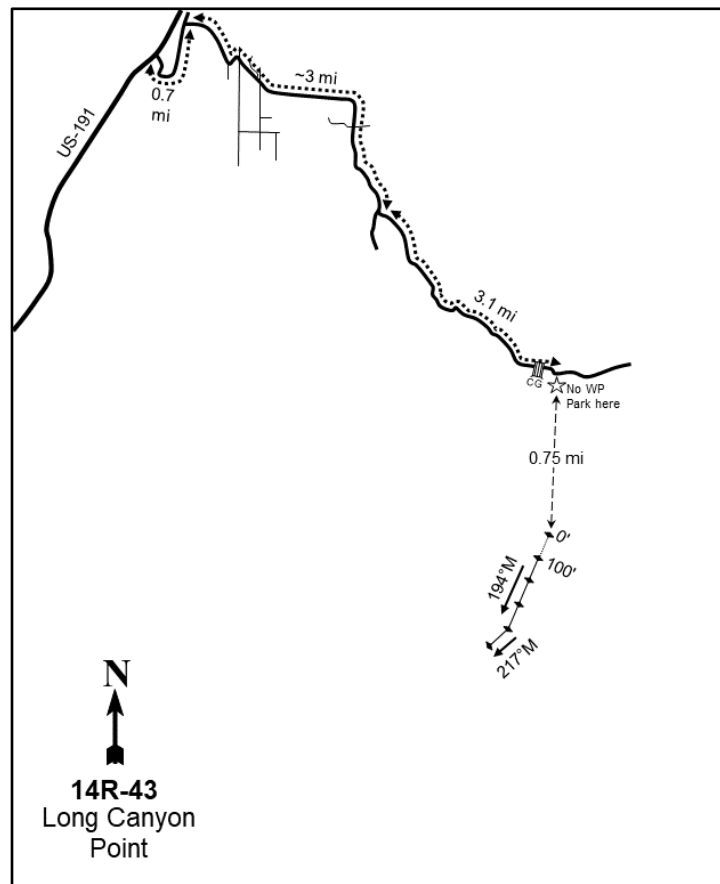
Table 14R-36.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2014	140	-	-	10	85	5	18.6
2017	38	-	75	25	-	-	13.7
2023	40	-	78	22	-	-	16.2
Pinus edulis (twoneedle pinyon)							
2014	27	-	-	38	38	23	15.7
2017	1	-	100	-	-	-	2.0
2023	2	-	100	-	-	-	2.5

Table 14R-36.15 - 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	16.5	5.4	9.8	0.2	0.0	0.3	0.0	32.2	Very Poor
2017	30.0	13.1	10.5	10.4	0.0	4.5	0.0	68.5	Good
2023	29.0	7.1	3.8	15.8	-0.2	4.7	0.0	60.1	Fair

LONG CANYON POINT - STUDY NO. 14R-43



14R-43
Long Canyon Point

Location Information

USGS 7.5 min Map Info Devil Mesa NW; Township 35S, Range 24E, Section 32
 GPS (0' Stake) NAD 83 UTM ZONE 12, 648483 East 4172543 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 194° magnetic (Line 5: 217° magnetic)
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

Traveling south on US-191, turn left (east) onto Long Canyon Highway. Proceed for 0.7 miles, looping back north, to a road on the right (east). Turn right onto East Long Canyon Point Road and drive for 6.1 miles, passing a cattle guard, and park; there is no witness post. The study site is approximately 0.75 miles south of the road. There is no browse tag.

Site Information

Land Ownership State
 Land Administrator SITLA
 Allotment MONTEZUMA CANYON
 Elevation 6,600ft (2,012m)
 Aspect South
 Slope 2%
 Sample Dates 08/21/2018, 08/01/2023

Table 14R-43.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Devil's Canyon	4476	November 2018-January 2019	258
Seeding - Aerial Before	Devil's Canyon	4476	October 2018	450
Seeding - Aerial After	Devil's Canyon	4476	March 2019	450
Chaining - Chain Unknown	-	-	1972	-
Seeding - Aerial Unknown	-	-	1972	-

Table 14R-43.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Devils Canyon			Aerial	Oct 2018	730
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Emery, UT	0.96	0.89
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	0.62	0.53
G	<i>Poa secunda</i>	Sandberg Bluegrass	UP Colorado Plateau	0.31	0.26
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.02	0.02
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant		0.19	0.18
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant		0.07	0.06
F	<i>Dalea purpurea</i>	Purple Prairie Clover		0.34	0.31
F	<i>Gaillardia aristata</i>	Blanket Flower		0.07	0.06
F	<i>Helianthus annuus</i>	Annual Sunflower		0.55	0.50
F	<i>Linum perenne</i>	Blue Flax		0.14	0.11
F	<i>Medicago sativa</i>	Alfalfa	Ladak DL	0.34	0.31
F	<i>Onobrychis viciifolia</i>	Sainfoin	Shoshone	0.62	0.54
F	<i>Penstemon comarrhenus</i>	Dusty Penstemon	Kane UT	0.10	0.10
F	<i>Ratibida columnifera</i>	Prairie Coneflower	Stillwater	0.34	0.29
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.62	0.54
F	<i>Sphaeralcea grossulariifolia</i>	Gooseberryleaf Globemallow	Uintah UT	0.07	0.02
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Kane UT	0.21	0.09
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Lincoln NV	0.10	0.05

Mix Name			Application Type	Application Date	Acres
Devils Canyon Shrub			Aerial	Mar 2019	450
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Medicago sativa</i>	Alfalfa	Ladak DL	0.44	0.38
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Kane, UT	0.50	0.12

Wildlife Habitat and Vegetation History**Table 14R-43.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	spring/fall

Table 14R-43.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Pinyon-Juniper/Mountain Big Sagebrush	Phase II
2023	Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	2018 - Pinyon-Juniper State: Community Phase 4.1 2023 - Current Potential State: Community Phase 2.1

Upon study establishment in 2018, this site was considered to be in Phase II of woodland succession (Table 14R-43.4) and dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). The shrub component was moderately abundant, with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) providing a majority of the cover. A bullhog and seeding treatment that occurred later that year (Table 14R-43.1) removed a majority of the trees, and the site was classified as being within Phase I of woodland succession in 2023. Sagebrush cover remained stable between the pre- and first post-treatment samplings, and it was considered to be the dominant vegetation component in 2023 (Photos, Table 14R-43.12, Table 14R-43.13, Table 14R-43.14). The herbaceous understory was sparse in both abundance and biodiversity prior to treatment. The seeding treatment augmented and diversified the herbaceous understory, however, and perennial and annual forb species were moderately abundant during the most recent sample year (Table 14R-43.7, Table 14R-43.10, Table 14R-43.11).

On this site, deer winter range condition was considered to be very poor in 2018 and poor in 2023. Further improvements could be accomplished by increasing preferred browse cover and reproduction; increasing perennial grass cover would also greatly benefit deer winter range. However, winter range condition has improved following treatment (Table 14R-43.15) and may continue to improve as the treatment matures. Pellet transect data shows that deer presence has been low in both 2018 and 2023 (Table 14R-43.9).

Trend Summary Tables**Table 14R-43.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	5.3	0.3	13.9	10.2	0.4	19.7
2023	4.6	9.1	0.1	8.8	11.8	-

Table 14R-43.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	-	9	-	15	-	0.2	-	0.2
2023	6	54	138	145	0.1	1.3	4.4	6.0

Table 14R-43.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	60.7	2.7	38.0	1.0	0.2	20.5
2023	32.7	-	45.1	0.0	0.0	26.8

Table 14R-43.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2018	1	3	27
2023	2	4	2
Year	Days Use Per Acre (ha)		
2018	2.9 (7.2)	4.7 (11.6)	-
2023	13.1 (32.3)	9.4 (23.2)	-

Table 14R-43.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency								
2018	-	-	-	2	7	-	-	-	-
2023	8	5	6	17	-	23	3	1	4
year	Average Cover (%)								
2018	-	-	-	0.0	0.2	-	-	-	-
2023	0.4	0.0	0.1	0.1	-	0.5	0.2	0.0	0.0

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

Table 14R-43.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Aliciella ^a (aliciella)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Chaetopappa ericoides (rose heath)	Cordylanthus ^{ai} (bird's-beak)	Dalea purpurea (purple prairie clover)	Descurainia incana ^a (mountain tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua ^a (shy gilia)	Helianthus annuus ^a (common sunflower)	Lactuca scariola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus (lupine)	Medicago sativa ^a (alfalfa)
year	Nested Frequency																
2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2023	2	72	6	5	66	3	14	4	7	63	10	0	11	9	3	5	4
year	Average Cover (%)																
2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2023	0.0	3.3	0.0	0.1	2.5	0.3	0.5	0.1	0.0	0.9	0.1	0.0	0.4	0.3	0.0	0.4	0.1

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

FORB SPECIES	Penstemon (beardtongue)	Penstemon comarrhenus (dusty beardtongue)	Petroradia pumila (rock goldenrod)	Phlox austromontana (mountain phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Ratibida columnifera (upright prairie coneflower)	Sanguisorba minor ⁱ (small burnet)
year	Nested Frequency						
2018	2	-	7	7	-	-	-
2023	16	40	-	4	4	10	10
year	Average Cover (%)						
2018	0.0	-	0.1	0.1	-	-	-
2023	0.2	0.9	-	0.0	0.0	0.3	0.2

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

Table 14R-43.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ephedra viridis ^p (mormon tea)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Pinus edulis ⁱ (twoncedle pinyon)	Purshia stansburiana ^p (Stansbury cliffrose)	Yucca (yuca)
year	Line Intercept Cover (%)										
2018	8.5	-	-	-	0.6	0.3	0.1	8.4	11.3	1.1	-
2023	8.4	0.2	-	1.7	0.2	0.6	9.1	-	-	-	0.4
year	Quadrat Cover (%)										
2018	4.7	-	0.0	-	0.5	0.0	0.3	6.0	8.0	0.0	-
2023	4.2	0.3	-	1.1	0.1	1.3	6.8	0.1	-	0.0	0.0

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

Table 14R-43.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	0	0	- / -
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2018	1940	-	13	76	10	2	0	45	63/100
2023	1980	40	5	85	10	0	0	23	- / -
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
2018	-	-	-	-	-	-	-	-	- / -
2023	80	-	0	100	0	0	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2018	20	-	0	0	100	0	100	100	26/44
2023	400	-	0	90	10	0	0	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 (%)				
Ephedra viridis^p -- (mormon tea)									
2018	320	-	50	38	13	0	0	13	60/64
2023	60	-	0	100	0	100	0	0	- / -
Eriogonum microthecum^p -- (slender buckwheat)									
2018	-	-	-	-	-	-	-	-	4/7
2023	-	-	-	-	-	-	-	-	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2018	40	-	0	0	100	0	0	100	82/103
2023	440	60	46	50	5	0	5	5	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2018	860	-	0	42	58	0	0	72	10/13
2023	5520	180	11	83	5	0	0	10	- / -
Juniperus osteospermaⁱ -- (Utah juniper)									
2018	100	-	20	80	0	0	0	40	- / -
2023	40	-	50	50	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2018	-	-	-	-	-	-	-	-	6/7
2023	20	-	0	100	0	0	0	0	- / -
Pinus edulisⁱ -- (twoneedle pinyon)									
2018	200	20	20	80	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
Purshia stansburiana^p -- (Stansbury cliffrose)									
2018	20	-	0	0	100	0	0	0	169/230
2023	-	20	0	0	0	0	0	0	- / -
Yucca -- (yucca)									
2018	-	-	-	-	-	-	-	-	41/49
2023	40	-	0	100	0	0	0	0	- / -

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

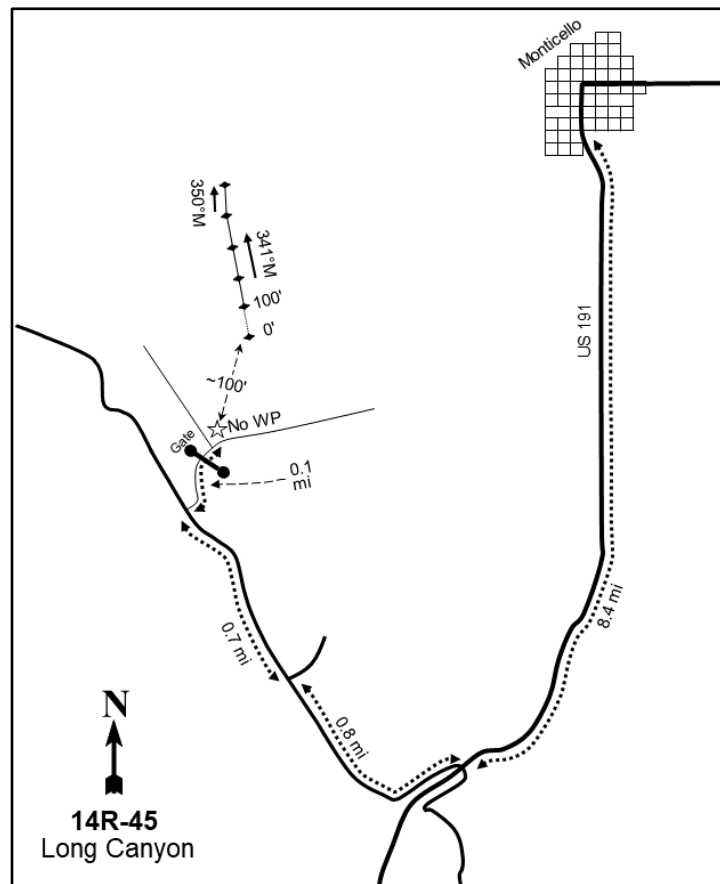
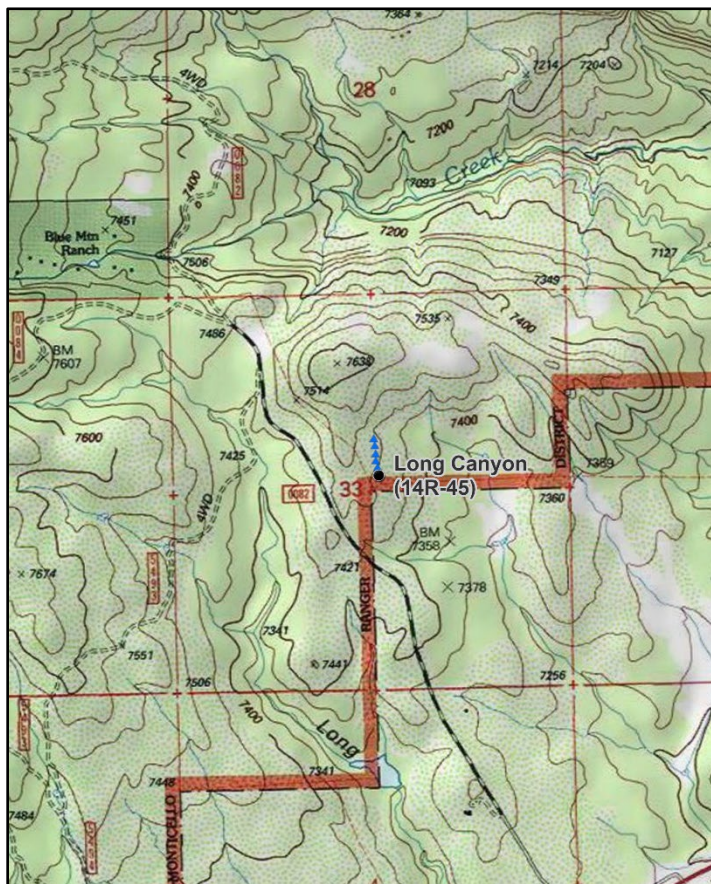
Table 14R-43.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2018	115	-	5	15	45	35	16.2
2023	8	-	100	-	-	-	4.7
Pinus edulis (twoneedle pinyon)							
2018	91	-	13	38	25	25	9.4
2023	2	-	100	-	-	-	3.0

Table 14R-43.15 - 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	13.0	9.0	7.1	0.4	0.0	0.5	0.0	29.9	Very Poor
2023	11.0	12.1	2.4	2.6	-0.1	10.0	0.0	38.1	Poor

LONG CANYON - STUDY NO. 14R-45

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Abajo Peak SE; Township 34S, Range 23E, Section 33
NAD 83 UTM ZONE 12, 640875 East 4182516 North

Transect Information

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

Not Available
341° magnetic (Line 5: 350° magnetic)
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Standard

Directions to Site

Drive south on US-191 from Monticello for 8.4 miles. Turn right onto Dude Ranch Road, then travel for 1.5 miles and turn right onto a two-track road. Proceed for 0.1 miles on this two-track, passing through a gate (which may be locked), to a three-way intersection. Park at this intersection: there is no witness post. The 0-foot baseline stake is roughly 100 feet northeast of the road.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	VERDURE
Elevation	7,420ft (2,262m)
Aspect	Southeast
Slope	4%
Sample Dates	08/21/2019, 08/02/2023

Table 14R-45.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Shingle Mill Phase I	4860	Fall 2019 and October-November 2020	312

Wildlife Habitat and Vegetation History**Table 14R-45.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 14R-45.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Mixed Shrub/Juniper	Phase II
2023	Mixed Shrub	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Mountain Loam (Oak)
NRCS Ecological Site #	R048AY415UT
States and Transitions	2019-2023 - State Undefined: Community Phase Undefined

This site has remained dominated by a mixture of browse species including mountain snowberry (*Symphoricarpos oreophilus*) and Gambel oak (*Quercus gambelii*) since study establishment in 2019; species such as wild crabapple (*Peraphyllum ramosissimum*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) have also been present, but have generally contributed less cover (Table 14R-45.12, Table 14R-45.13). The understory was moderately diverse and abundant during the most recent sample year. Perennial forbs, namely lupine (*Lupinus* sp.), provided most of the cover in 2019. In 2023, the understory was primarily composed of perennial grasses with the squirreltail (*Elymus elymoides*) as the most abundant species. The introduced annual grass species cheatgrass (*Bromus tectorum*) has also been present in both sample years, but with low cover and abundance (Table 14R-45.7, Table 14R-45.10, Table 14R-45.11). Utah juniper (*Juniperus osteosperma*) was observed in high amounts and was a co-dominant site component upon study establishment; this site was classified as being within Phase II of woodland succession in 2019. However, a bullhog treatment in 2019 and 2020 (Table 14R-45.1) removed most of the trees, and the site was considered to be within Phase I of succession in 2023. Although density and cover were low as of the most recent sample year (Table 14R-45.4, Table 14R-45.12, Table 14R-45.14), the extant tree component indicates that infilling may be possible over time.

Due to the abundance and diversity of the shrub and herbaceous communities, this site may serve as adequate foraging range for summering deer. Pellet transect data indicates that deer presence was low in 2019, but high in 2023. Elk presence has remained low since 2019, and no elk pellet groups were observed in 2023 (Table 14R-45.9). However, the sagebrush component of this site could provide browse for elk during the winter months (Table 14R-45.3; Wambolt, 1996).

Trend Summary Tables**Table 14R-45.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2019	32.1	0.7	14.4	39.6	0.4	35.6
2023	18.3	0.3	0.8	26.8	0.5	0.9

Table 14R-45.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2019	38	142	201	158	0.7	4.1	2.3	7.2
2023	75	254	94	101	2.1	11.6	1.0	4.4

Table 14R-45.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2019	28.1	0.2	54.9	1.7	3.0	46.4
2023	8.7	0.0	58.9	0.1	0.5	39.0

Table 14R-45.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2019	-	14	1	5
2023	14	20	-	1
Year	Days Use Per Acre (ha)			
2019	5.1 (12.6)	15.4 (38.1)	2.7 (6.6)	-
2023	25.4 (62.8)	48.9 (120.8)	-	-

Table 14R-45.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bromus porteri (Porter brome)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (nuttongrass)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency										
2019	4	-	-	38	-	54	31	36	51	-	-
2023	11	2	4	75	1	102	35	43	73	5	42
year	Average Cover (%)										
2019	0.2	-	-	0.7	-	1.3	0.6	0.5	1.6	-	-
2023	0.2	0.0	0.4	2.1	0.0	4.9	1.1	1.8	1.7	0.0	1.5

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

Table 14R-45.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Astragalus lentiginosus (freckled milkvetch)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Descurainia pinnata ^a (western tansymustard)	Dracocephalum (dragonhead)	Eriastrum ^a (woollystar)	Eriogon divergens ^{si} (spreading fleabane)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lactuca scariola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lomatium (desertparsley)	Lupinus (lupine)	Packera multiflobata (lobeleaf groundsel)	Penstemon caespitosus (mat penstemon)
year	Nested Frequency																
2019	45	36	43	22	73	9	4	77	2	14	-	3	3	1	47	6	30
2023	-	18	1	-	10	2	-	53	2	17	9	-	-	2	53	-	29
year	Average Cover (%)																
2019	0.2	1.0	0.2	0.1	0.8	0.1	0.0	0.7	0.0	0.8	-	0.0	0.0	0.0	4.4	0.0	0.5
2023	-	0.4	0.0	-	0.0	0.0	-	0.6	0.0	0.5	0.0	-	-	0.0	2.9	-	0.6

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Salsola tragus ^{ai} (prickly Russian thistle)	Tetraneris acaulis (stemless four-nerve daisy)
year	Nested Frequency			
2019	42	76	-	3
2023	11	51	1	-
year	Average Cover (%)			
2019	0.3	0.4	-	0.0
2023	0.1	0.3	0.0	-

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

Table 14R-45.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ¹ (Utah juniper)	Mahonia repens (creeping barberry)	Opuntia (pricklypear)	Opuntia fragilis (brittle pricklypear)	Peraphyllum ramosissimum ^p (wild crab apple)	Pinus edulis ⁱ (twoneedle pinyon)	Quercus gambelii ^p (Gambel oak)	Symphoricarpos oreophilus ^p (mountain snowberry)
year	Line Intercept Cover (%)									
2019	4.6	-	33.6	0.4	-	-	6.4	2	13.5	15.1
2023	4.6	0.1	0.6	0.4	-	-	2.4	0.3	4.6	15.2
year	Quadrat Cover (%)									
2019	4.5	0.1	12.5	0.5	0.0	0.0	5.0	1.9	10.7	12.0
2023	4.4	0.0	0.0	0.3	-	0.0	2.9	0.8	2.4	8.5

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

Table 14R-45.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2019	1660	-	8	82	10	12	4	68	44/63
2023	1540	980	22	70	8	52	10	56	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2019	60	-	0	100	0	0	0	0	26/23
2023	260	-	0	100	0	0	0	0	- / -
Juniperus osteosperma¹ -- (Utah juniper)									
2019	240	-	17	83	0	0	0	0	- / -
2023	-	20	0	0	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
2019	1500	-	7	93	0	0	0	0	10/14
2023	1760	-	5	96	0	0	0	0	- / -

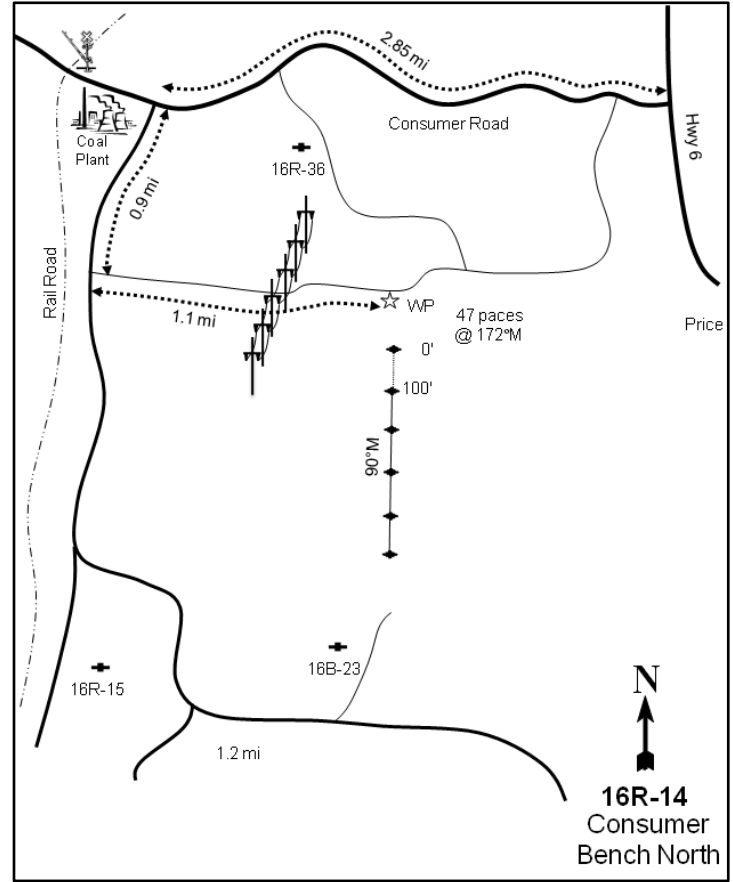
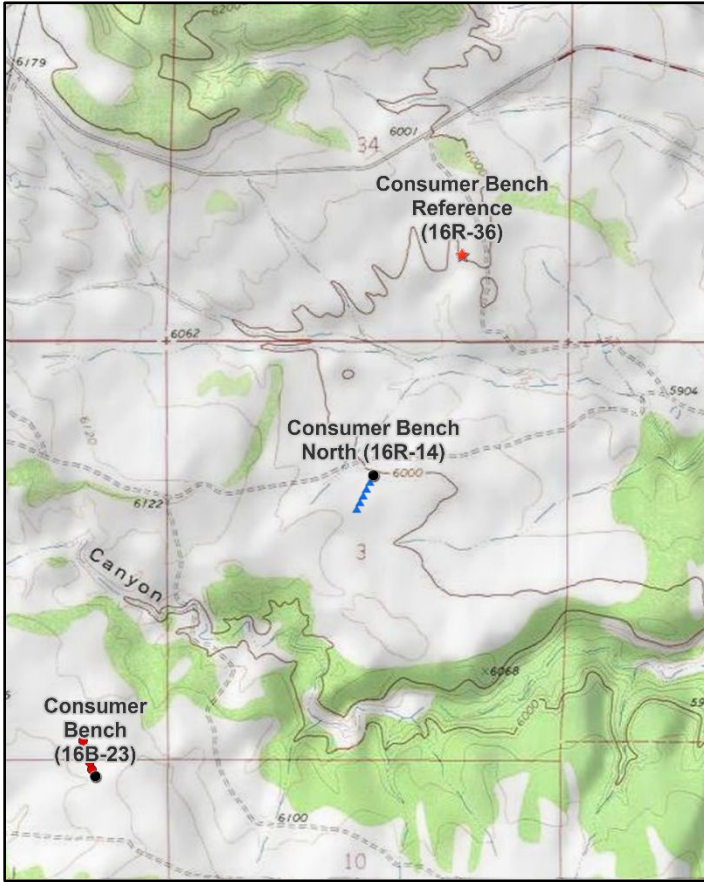
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Opuntia fragilis -- (brittle pricklypear)									
2019	20	20	0	100	0	0	0	0	6/9
2023	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2019	20	-	0	100	0	0	0	0	13/23
2023	-	-	-	-	-	-	-	-	-/-
Peraphyllum ramosissimum^p -- (wild crab apple)									
2019	780	-	28	64	8	33	23	10	100/135
2023	1260	-	24	76	0	22	54	2	-/-
Pinus edulisⁱ -- (twoneedle pinyon)									
2019	20	-	100	0	0	0	0	0	-/-
2023	20	-	100	0	0	0	0	0	-/-
Quercus gambelii^p -- (Gambel oak)									
2019	3780	-	53	40	7	26	34	7	70/79
2023	2940	40	31	69	1	39	33	10	-/-
Symphoricarpos oreophilus^p -- (mountain snowberry)									
2019	5680	-	12	88	0	6	5	0	44/54
2023	5920	-	18	81	1	42	27	3	-/-
Tetradymia canescens -- (spineless horsebrush)									
2019	-	-	-	-	-	-	-	-	46/51
2023	20	-	100	0	0	0	0	0	-/-

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

Table 14R-45.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2019	108	5	10	5	20	60	37.0
2023	15	11	78	-	-	11	5.3
Pinus edulis (twoneedle pinyon)							
2019	2	-	50	-	-	50	16.5
2023	1	-	-	100	-	-	7.0

CONSUMER BENCH NORTH - STUDY NO. 16R-14



Location Information

USGS 7.5 min Map Info Standardville SE; Township 14S, Range 9E, Section 03
 GPS (0' Stake) NAD 83 UTM ZONE 12, 508558 East 4387768 North

Transect Information

Browse Tag # (0' Stake) 63
 Transect Bearing 190° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

From the junction of US-6 and SR-139 in Price, drive west on SR-139 for 2.1 miles to a dirt road on the left (south) side of the road. Make an immediate left and drive for 0.3 miles to a fork. Take the right fork at the derrick pump and continue for 0.1 miles. Stay left and drive for 0.2 miles to a fork, then proceed for another 0.1 miles to another fork. Stay left at the fork and drive for 0.3 miles to another fork. Stay left again at the fork and continue for 0.1 miles to a better road. Turn right and drive 0.1 miles through a dry creek and gully. Proceed through the dry creek and continue for 0.4 miles to a fork. Go straight and drive for 0.3 miles to the witness post on the left (south) side of the road; the witness post is near a natural gas pipeline sign. From the witness post, walk 47 paces at 172 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag #63.

Alternate route (and probably better route) is to drive ~2.8 miles from the junction of US-6 and SR-139 to a road to the right (south) just before the railroad tracks. Turn onto this road and drive for 1.0 mile to Trestle Road. Turn left, drive 0.6 miles to a fork, and stay left. Continue east for 0.6 miles to the witness post on the right (south) side of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	CONSUMERS WASH
Elevation	6,000ft (1,829m)
Aspect	Northwest
Slope	5%
Sample Dates	06/27/2005, 08/07/2008, 08/01/2012, 08/16/2017, 08/14/2023

Table 16R-14.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Aerator - Double Drum/Seed	Price West Benches (Year2)(Consumers)(airport)	228	November 2004-March 2005	2658
Seeding - Aerial After	Price West Benches (Year2)(Consumers)(airport)	228	March 2005	2658

Table 16R-14.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Price West Benches Year 2- Consumers-Airport			Broadcast	Nov 2004	1851
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.46	0.43
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.54	0.52
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.62	0.50
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.54	0.47
G	Pascopyrum smithii	Western Wheatgrass		0.16	0.13
G	Pascopyrum smithii	Western Wheatgrass		0.84	0.69
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.60	1.48
G	Psathyrostachys juncea	Russian Wildrye		0.62	0.53
F	Medicago sativa	Alfalfa	Ladak+	0.41	0.38
F	Medicago sativa	Alfalfa	Nomad	0.41	0.38
F	Medicago sativa	Alfalfa	Ranger	0.41	0.36
F	Melilotus officinalis	Yellow Sweetclover		0.22	0.16
F	Onobrychis vicifolia	Sainfoin	Eski	1.35	1.27
F	Sanguisorba minor	Small Burnet	Delar	0.81	0.76
S	Atriplex canescens	Fourwing Saltbush	Juab UT	1.08	0.37

Mix Name			Application Type	Application Date	Acres
Price West Benches Year 2- Consumers-Airport-Browse			Aerial	Mar 2004	2750
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.48	0.10
S	Bassia prostrata	Forage Kochia	Millard UT	0.13	0.10

Wildlife Habitat and Vegetation History

Table 16R-14.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		

Table 16R-14.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Wyoming Big Sagebrush/Perennial Grass	No Encroachment
2008	Wyoming Big Sagebrush/Perennial Grass	No Encroachment
2012	Wyoming Big Sagebrush	No Encroachment
2017	Wyoming Big Sagebrush/Perennial Grass	Phase I
2023	Perennial Grass/Wyoming Big Sagebrush	Phase I

Site Notes

No Notes

Soils

Table 16R-14.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.4	28.0	45.2	26.8	1.3	6.5	118.4	0.4	06/27/2005

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2005-2008 - Current Potential State: Community Phase 2.1 2012-2017 - Current Potential State: Community Phase 2.2 2023 - Current Potential State: Community Phase 2.5

At the time of study establishment in 2005, the vegetation on this site existed as a decadent Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and perennial grass dominated plant community. The site was treated in 2004 and 2005 with a double drum aerator and seeding (Table 16R-14.1). The number of decadent sagebrush plants decreased and cover and density increased overall between 2008 and 2017. However, total sagebrush density and cover decreased in 2023 while decadence increased; 73% of plants were considered to have poor vigor during the most recent sampling (Table 16R-14.12, Table 16R-14.13). Graminoids in the herbaceous understory have remained diverse and plentiful following treatment, with mainly native perennial grass species such as Indian ricegrass (*Achnatherum hymenoides*), needle and thread (*Hesperostipa comata*), and squirreltail (*Elymus elymoides*) contributing most of the cover in 2023. The forb community has been largely depleted in most sample years, but annual forbs -- particularly the weedy introduced species prickly Russian thistle (*Salsola tragus*) -- provided over 10% cover in total during the most recent sample year (Table 16R-14.7, Table 16R-14.10, Table 16R-14.11). Utah juniper (*Juniperus osteosperma*) has been observed in point-quarter density measurements since 2017, possibly indicating potential for future encroachment (Table 16R-14.14).

Deer winter range condition on this site was considered to be fair in 2023, and has varied between fair and good over the study period. Improvements to deer winter range could be achieved through efforts that increase preferred browse cover and reproduction while decreasing decadence within the population. In addition, diversifying and increasing cover of native perennial forbs while decreasing cheatgrass would also prove beneficial for deer winter range (Table 16R-14.15). Pellet group data indicates that deer presence has remained high throughout the duration of the study, but a significant decrease in days use per acre occurred between 2017 and 2023 (Table 16R-14.9).

Trend Summary Tables

Table 16R-14.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	17.1	1.7	-	14.4	1.6	-
2008	10.8	2.4	-	13.6	1.7	-
2012	12.0	1.1	-	15.0	0.4	-
2017	13.2	8.4	-	17.4	9.0	-
2023	9.9	5.9	-	5.4	6.3	-

Table 16R-14.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	40	328	119	78	0.6	21.8	1.3	2.0
2008	6	301	18	115	0.0	15.9	0.1	1.4
2012	-	236	34	49	-	7.3	0.1	0.1
2017	69	219	200	60	0.6	9.6	4.6	0.4
2023	67	259	254	95	1.2	21.1	11.3	2.6

Table 16R-14.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	43.7	3.6	29.0	0.0	-	36.8
2008	43.8	1.4	41.2	0.1	-	32.4
2012	52.0	0.8	42.6	0.0	0.0	20.1
2017	43.1	1.2	35.3	0.0	0.0	35.6
2023	44.1	0.7	27.6	0.3	0.1	47.7

Table 16R-14.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Horse	Rabbit	Domestic Sheep
	Quadrat Frequency						
2005	-	-	38	11	-	15	-
2008	3	-	65	3	-	45	-
2012	-	-	29	1	-	18	-
2017	-	-	30	3	-	46	-
2023	-	-	38	7	-	4	-
Year	Days Use Per Acre (ha)						
2005	-	-	48.3 (119.2)	28.1 (69.5)	-	-	-
2008	2.2 (5.4)	17.4 (43.0)*	83.8 (206.9)	-	-	-	-
2012	-	8.7 (21.5)*	69.0 (170.5)	12.8 (31.5)	-	-	0.7 (1.7)
2017	1.5 (3.6)	-	87.1 (215.2)	0.7 (1.7)	2.9 (7.2)	-	6.0 (14.9)
2023	4.4 (10.8)	-	48.9 (120.8)	-	0.6 (1.4)	-	-

*Pellets per acre (ha)

Table 16R-14.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency									
2005	21	-	2	322	1	-	-	-	1	38
2008	45	2	3	286	14	3	-	2	2	4
2012	108	18	-	133	-	3	6	13	3	-
2017	85	2	14	137	19	2	-	19	5	58
2023	87	1	35	107	67	9	1	37	30	35
year	Average Cover (%)									
2005	1.0	-	0.0	20.8	0.1	-	-	-	0.0	0.6
2008	1.9	0.0	0.0	13.1	0.7	0.0	-	0.1	0.0	0.0
2012	3.1	0.3	-	3.3	-	0.0	0.0	0.5	0.0	-
2017	2.5	0.0	0.2	5.2	0.9	0.0	-	1.0	0.0	0.4
2023	9.3	0.0	0.6	3.4	4.9	0.5	0.0	1.8	1.2	0.6

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

Table 16R-14.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabid (rockcress)	Astragalus convallarius (tesser rushy milkvetch)	Bassia scoparia ^{ai} (burningbush)	Calochortus nuttallii (sego lily)	Castilleja (Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chenopodium atrovirens ^a (pinyon goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cryptantha (cryptantha)	Cryptantha gracilis ^a (narrowstem cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Lappula occidentalis ^a (flatspine stickseed)
year	Nested Frequency																
2005	2	3	-	-	2	1	-	88	-	-	29	-	5	4	2	0	11
2008	-	9	-	-	-	-	-	13	-	-	-	-	-	-	-	-	1
2012	-	1	-	-	-	-	-	6	-	-	3	-	-	-	-	-	-
2017	-	-	-	1	-	-	-	58	-	-	177	-	-	-	-	7	12
2023	-	10	1	1	-	3	2	136	2	4	32	2	-	-	4	22	53
year	Average Cover (%)																
2005	0.0	0.4	-	-	0.0	0.0	-	0.7	-	-	0.4	-	0.0	0.0	0.0	0.0	0.1
2008	-	0.1	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	0.0
2012	-	0.0	-	-	-	-	-	0.0	-	-	0.0	-	-	-	-	-	-
2017	-	-	-	0.0	-	-	-	0.6	-	-	3.8	-	-	-	-	0.0	0.1
2023	-	0.1	0.1	0.0	-	0.0	0.0	2.1	0.0	0.0	0.8	0.0	-	-	0.0	0.7	0.9

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

FORB SPECIES	Lepidium montanum ^a (mountain pepperweed)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioioides (rayless tansyaster)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Plantago patagonica ^a (woolly plantain)	Salsola tragus ^{ai} (prickly Russian thistle)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Senecio integerimus ^a (lambstongue ragwort)	Sphaeralcea coccinea (scarlet globemallow)	Townsendia (Townsend daisy)
year	Nested Frequency										
2005	8	-	3	0	2	1	-	5	5	59	2
2008	4	-	-	-	2	-	-	35	-	77	-
2012	7	2	-	-	-	-	19	-	-	43	3
2017	9	-	-	-	-	-	1	13	-	44	2
2023	-	-	-	-	5	-	157	8	-	70	-
year	Average Cover (%)										
2005	0.2	-	0.1	0.0	0.0	0.0	-	0.0	0.0	1.3	0.0
2008	0.0	-	-	-	0.0	-	-	0.3	-	1.0	-
2012	0.0	0.0	-	-	-	-	0.0	-	-	0.1	0.0
2017	0.1	-	-	-	-	-	0.0	0.1	-	0.3	0.0
2023	-	-	-	-	0.0	-	6.6	0.4	-	2.1	-

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

Table 16R-14.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Atriplex canescens ^p (fourwing saltbush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)				
2005	14.4	-	0.3	1	0.3
2008	13.6	-	0.2	1.3	0.2
2012	15	-	0.2	0.1	0.1
2017	17.4	-	0.3	8.3	0.4
2023	5.2	0.2	1	4.5	0.8
year	Quadrat Cover (%)				
2005	17.1	-	0.5	0.5	0.8
2008	10.8	-	0.3	1.7	0.4
2012	12.0	-	0.4	0.3	0.4
2017	13.2	-	1.5	5.9	1.1
2023	9.8	0.0	1.5	3.4	1.0

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

Table 16R-14.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2005	4580	40600	2	23	75	38	21	50	57/77
2008	4040	1100	27	10	63	17	30	55	49/80
2012	4380	620	24	45	31	31	47	13	42/72
2017	4300	11300	6	71	24	29	24	28	46/81
2023	2280	-	4	23	73	13	36	73	- / -
Atriplex canescens^p -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	- / -
2008	20	-	100	0	0	0	0	0	104/77
2012	20	-	100	0	0	0	100	0	63/58
2017	20	-	0	100	0	0	0	0	- / -
2023	180	20	89	11	0	0	0	0	- / -
Bassia prostrata^{pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	6/10
2023	-	-	-	-	-	-	-	-	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2005	320	-	0	100	0	0	38	0	28/35
2008	700	-	46	54	0	6	37	6	23/35
2012	840	80	7	93	0	17	60	2	11/18
2017	720	-	0	100	0	17	6	0	25/37
2023	720	20	14	86	0	0	3	3	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2005	1500	140	9	91	0	0	0	0	25/25
2008	2040	-	1	94	5	2	2	1	23/27
2012	2600	360	94	6	0	1	0	2	14/13
2017	8880	120	43	57	0	0	0	0	27/37
2023	4840	60	38	62	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2005	360	-	0	100	0	0	0	11	12/39
2008	260	-	23	54	23	0	0	23	11/37
2012	240	-	25	75	0	0	0	0	9/29
2017	240	-	0	100	0	0	0	8	8/35
2023	120	-	0	100	0	0	0	0	- / -

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

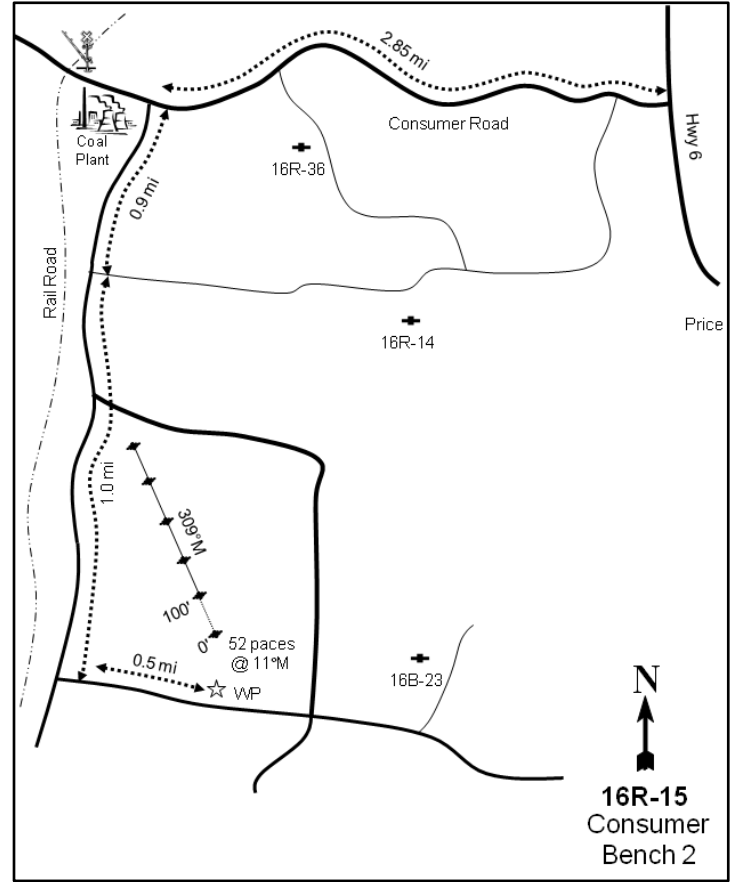
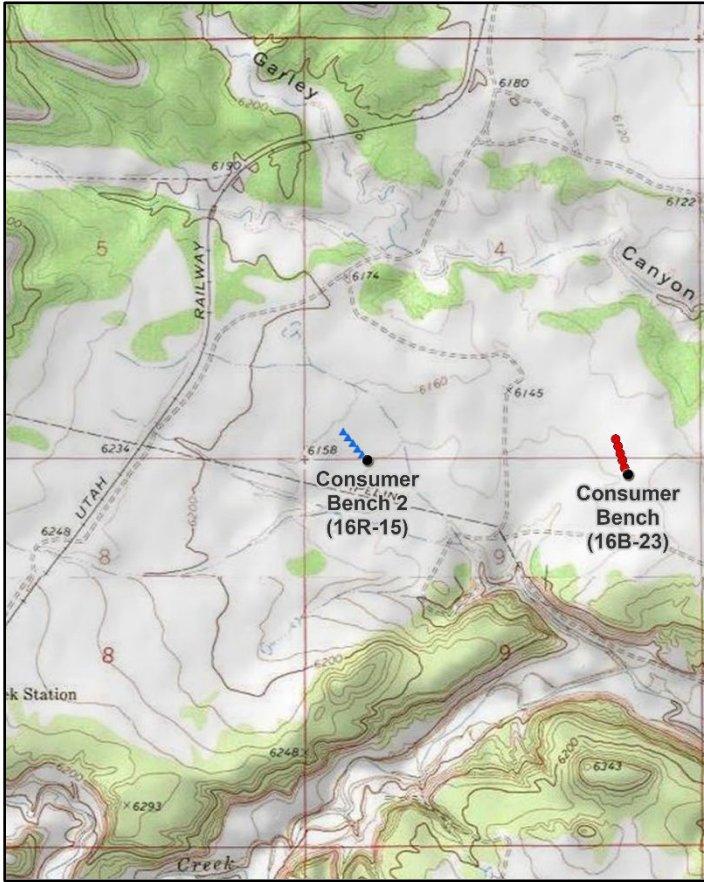
Table 16R-14.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2017	1	-	100	-	-	-	3.5
2023	1	-	-	100	-	-	4.0

Table 16R-14.15 - 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	18.0	-7.4	1.1	30.0	-0.4	4.1	0.0	45.3	Fair-Good
2008	17.0	-3.9	13.6	30.0	0.0	2.8	0.0	59.5	Good
2012	18.8	5.8	12.1	14.6	0.0	0.2	0.0	51.5	Good
2017	21.8	7.9	2.8	19.2	-0.4	0.7	0.0	51.9	Good
2023	6.8	-6.0	3.8	30.0	-0.9	5.3	0.0	38.9	Fair

CONSUMER BENCH 2 - STUDY NO. 16R-15



Location Information

USGS 7.5 min Map Info Standardville SE; Township 14S, Range 9E, Section 09
 GPS (0' Stake) NAD 83 UTM ZONE 12, 506377 East 4386606 North

Transect Information

Browse Tag # (0' Stake) 785
 Transect Bearing 309° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

From the junction of US-6 and SR-139 in Price, drive west on SR-139 for 2.8 miles to a dirt road on the left (south) side of the road. Drive for 0.8 miles on this road that parallels the railroad tracks to a two-track road on the left. Continue straight for another 0.1 miles to another side road on the right and left. Continue straight (south) for 1.0 miles, passing through a wash and a gas derrick road on the left, to a fork. Stay left at the fork and drive 0.5 miles to the witness post on the left (north) side of the road. From the witness post, walk 52 paces at 11 degrees magnetic to the 0-foot baseline stake, which is marked with browse tag #785 (road(s) to site are not shown or have changed from Topo USA).

Site Information

Land Ownership Federal
 Land Administrator BLM
 Allotment CONSUMERS WASH
 Elevation 6,125ft (1,867m)
 Aspect Northeast
 Slope 4-8%
 Sample Dates 06/28/2005, 07/17/2008, 08/01/2012, 08/16/2017, 08/14/2023

Table 16R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Aerator - Double Drum/Seed	Price West Benches (Year2)(Consumers)(airport)	228	November 2004-March 2005	2658
Seeding - Aerial After	Price West Benches (Year2)(Consumers)(airport)	228	March 2005	2658

Table 16R-15.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Price West Benches Year 2- Consumers-Airport			Broadcast	Nov 2004	1851
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.46	0.43
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.54	0.52
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.62	0.50
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.54	0.47
G	Pascopyrum smithii	Western Wheatgrass		0.16	0.13
G	Pascopyrum smithii	Western Wheatgrass		0.84	0.69
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.60	1.48
G	Psathyrostachys juncea	Russian Wildrye		0.62	0.53
F	Medicago sativa	Alfalfa	Ladak+	0.41	0.38
F	Medicago sativa	Alfalfa	Nomad	0.41	0.38
F	Medicago sativa	Alfalfa	Ranger	0.41	0.36
F	Melilotus officinalis	Yellow Sweetclover		0.22	0.16
F	Onobrychis viciifolia	Sainfoin	Eski	1.35	1.27
F	Sanguisorba minor	Small Burnet	Delar	0.81	0.76
S	Atriplex canescens	Fourwing Saltbush	Juab UT	1.08	0.37

Mix Name			Application Type	Application Date	Acres
Price West Benches Year 2- Consumers-Airport-Browse			Aerial	Mar 2004	2750
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.48	0.10
S	Bassia prostrata	Forage Kochia	Millard UT	0.13	0.10

Wildlife Habitat and Vegetation History**Table 16R-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		

Table 16R-15.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Wyoming Big Sagebrush	No Encroachment
2008	Wyoming Big Sagebrush	No Encroachment
2012	Wyoming Big Sagebrush	No Encroachment
2017	Wyoming Big Sagebrush	No Encroachment
2023	Wyoming Big Sagebrush/Broom Snakeweed	Phase I

Site Notes

No Notes

Soils**Table 16R-15.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.6	24.4	47.4	28.2	1.0	5.0	86.4	0.4	06/28/2005

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2005 - Current Potential State: Community Phase 2.2 2008-2017 - Current Potential State: Community Phase 2.1 2023 - Current Potential State: Community Phase 2.5

At the time of study establishment in 2005, this site was dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Table 16R-15.12). Grasses were sparse, but forbs were abundant and diverse; the perennial forb scarlet globemallow (*Sphaeralcea coccinea*) contributed the most cover of any single forb species during the initial sampling. Following treatment, however, perennial grass cover increased, while forbs have fluctuated. Forbs provided little cover in 2008 and 2012. However, annual forbs increased and cover was high in 2017 and 2023, mainly due to the native species Fremont's goosefoot (*Chenopodium fremontii*) and the introduced species prickly Russian thistle (*Salsola tragus*) (Table 16R-15.10, 16R-15.11). The treatment reduced cover of sagebrush, but decadence was also reduced through the 2017 year. Between 2017 and 2023, however, sagebrush density decreased significantly and the percentage of decadent individuals increased. Cover and density of broom snakeweed (*Gutierrezia sarothrae*) increased over the same time period, and broom snakeweed was codominant with sagebrush in the most recent sample year (Table 16R-15.12, Table 16R-15.13). Sagebrush has the potential to become a minor vegetation component should similar trends continue in the future.

Deer winter range condition has ranged between poor and good since study establishment in 2005. In 2023, condition of deer winter range was considered to be fair. Improvements to winter range could be achieved through efforts that increase preferred browse cover and reproduction; increasing diversity and cover of perennial grasses and forbs would also benefit deer winter range (Table 16R-15.15). According to pellet transect data, deer presence was considered to be moderate in 2023 (Table 16R-15.9).

Trend Summary Tables**Table 16R-15.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	9.9	1.8	-	10.4	1.3	-
2008	6.7	1.8	-	8.3	2.2	-
2012	7.3	1.3	-	6.9	1.2	-
2017	6.7	6.2	-	6.7	7.0	-
2023	7.7	12.5	-	4.6	14.6	-

Table 16R-15.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	0	151	405	202	0.0	2.5	16.8	9.2
2008	-	209	128	259	-	8.9	1.1	3.2
2012	2	179	78	39	0.0	6.9	1.5	0.1
2017	2	217	269	84	0.1	7.4	12.2	0.4
2023	29	153	355	109	0.4	9.7	19.6	1.6

Table 16R-15.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	50.9	6.0	26.8	0.1	-	29.6
2008	64.5	2.3	22.7	0.1	-	19.5
2012	62.3	1.9	30.1	0.0	-	16.8
2017	52.0	1.3	27.3	0.1	-	32.4
2023	49.4	0.5	18.5	0.7	-	45.5

Table 16R-15.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	-	62	4	36
2008	-	58	6	50
2012	-	41	-	17
2017	-	25	-	41
2023	2	20	3	6
Year	Days Use Per Acre (ha)			
2005	-	113.2 (279.7)	3.4 (8.3)	-
2008	-	51.6 (127.5)	-	-
2012	-	31.5 (77.8)	-	-
2017	6.5 (16.1)	91.8 (226.8)	-	-
2023	17.4 (43.0)	23.4 (57.9)	-	-

Table 16R-15.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Leymus salinus (saline wildrye)	Pascopyrum smithii (western wheatgrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency											
2005	52	-	3	0	107	-	2	-	-	-	-	-
2008	86	6	-	-	137	-	17	-	-	-	2	-
2012	117	5	-	2	60	-	11	2	-	4	-	-
2017	118	5	-	2	85	-	5	9	-	13	13	-
2023	92	5	-	29	51	2	1	2	5	10	17	1
year	Average Cover (%)											
2005	0.4	-	0.0	0.0	2.0	-	0.1	-	-	-	-	-
2008	3.0	0.0	-	-	5.4	-	0.4	-	-	-	0.0	-
2012	5.0	0.0	-	0.0	1.3	-	0.6	0.0	-	0.0	-	-
2017	3.9	0.1	-	0.1	2.3	-	0.2	0.4	-	0.2	0.3	-
2023	6.3	0.2	-	0.4	1.4	0.0	0.0	0.0	0.2	0.2	1.3	0.0

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

Table 16R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Cryptantha ^a (annual cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Halogeton glomeratus ^{ai} (saltlover)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium montanum ^a (mountain pepperweed)	Mentzelia albicaulis ^a (whitestem blazingstar)	Plantago patagonica ^a (woolly plantain)
year	Nested Frequency																
2005	-	360	71	4	3	14	-	193	104	-	-	-	1	147	68	-	-
2008	-	3	13	-	-	-	7	2	29	7	-	-	-	24	74	4	-
2012	-	6	-	-	-	-	-	-	11	-	-	-	-	-	1	2	-
2017	-	168	44	-	-	-	-	148	5	3	-	2	4	35	5	-	-
2023	1	193	92	-	-	3	16	12	8	1	8	-	-	93	-	1	5
year	Average Cover (%)																
2005	-	5.2	0.2	0.0	0.2	0.1	-	4.8	0.3	-	-	-	0.0	2.6	3.6	-	-
2008	-	0.0	0.0	-	-	-	0.0	0.0	0.1	0.0	-	-	-	0.1	0.9	0.0	-
2012	-	0.0	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	0.0	-
2017	-	3.8	0.4	-	-	-	-	3.0	0.1	0.0	-	0.2	0.0	0.3	0.0	-	-
2023	0.0	5.6	1.7	-	-	0.0	0.2	0.1	0.2	0.0	0.0	-	-	1.6	-	0.1	0.0

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

FORB SPECIES	Salsola tragus ^{ai} (prickly Russian thistle)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sisymbrium altissimum ^{ai} (tall tumbled mustard)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency				
2005	5	22	2	178	2
2008	2	10	-	252	-
2012	59	-	-	39	-
2017	63	-	1	84	-
2023	191	-	5	109	-
year	Average Cover (%)				
2005	0.0	0.3	0.0	8.6	0.0
2008	0.0	0.0	-	3.2	-
2012	1.4	-	-	0.1	-
2017	4.3	-	0.0	0.4	-
2023	9.9	-	0.1	1.6	-

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

Table 16R-15.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Bassia prostrata ^{pi} (forage kochia)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata ^p (winterfat)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)						
2005	10.4	-	-	0.6	0.7	-	0
2008	8.3	-	-	0.9	1.2	-	0.1
2012	6.8	0.1	-	1	0.2	-	0
2017	6.5	0.2	-	4.2	2.6	-	0.2
2023	3.6	1	-	6.7	7.9	-	0
year	Quadrat Cover (%)						
2005	9.9	-	-	1.4	0.4	-	0.0
2008	6.7	-	-	1.0	0.7	-	0.2
2012	7.3	0.0	0.0	0.9	0.1	-	0.3
2017	6.5	0.2	-	3.8	2.1	0.0	0.2
2023	6.1	1.5	0.1	5.7	6.1	-	0.7

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

Table 16R-15.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2005	3420	53000	1	28	71	39	19	49	61/68
2008	7880	12260	63	16	22	14	14	12	53/66
2012	9960	1560	66	22	13	18	61	17	42/57
2017	5080	20	21	53	26	37	33	21	38/50
2023	2480	140	8	33	59	5	82	56	- / -
Atriplex canescens^p -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	75/91
2023	-	-	-	-	-	-	-	-	- / -
Bassia prostrata^{pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	- / -
2008	60	20	100	0	0	0	0	0	- / -
2012	120	-	17	83	0	33	67	0	6/13
2017	120	-	0	100	0	0	0	0	20/29
2023	1420	5140	89	11	0	1	1	0	- / -
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2012	20	-	0	100	0	0	100	0	12/10
2017	-	-	-	-	-	-	-	-	23/22
2023	20	-	0	100	0	0	100	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 (%)				
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2005	740	3920	51	46	3	0	0	0	28/37
2008	2420	640	38	61	1	14	9	0	21/29
2012	3060	-	41	58	1	11	86	58	11/19
2017	3480	20	3	94	3	5	2	3	25/37
2023	2240	-	8	91	1	5	0	19	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	94/94
2017	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2005	420	860	10	86	5	0	0	5	31/40
2008	4060	80	16	83	1	5	6	0	20/22
2012	880	60	48	52	0	0	0	0	12/14
2017	3780	220	29	71	0	0	0	0	26/34
2023	5300	100	4	96	0	0	0	0	- / -
Krascheninnikovia lanata^p -- (winterfat)									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	49/33
2017	20	-	100	0	0	0	0	0	44/44
2023	-	-	-	-	-	-	-	-	- / -
Opuntia polyacantha -- (plains pricklypear)									
2005	180	-	11	78	11	0	0	11	11/43
2008	200	20	20	70	10	0	0	10	11/43
2012	200	40	10	90	0	20	0	30	9/45
2017	300	-	0	100	0	0	0	0	8/60
2023	280	-	0	86	14	0	0	21	- / -

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

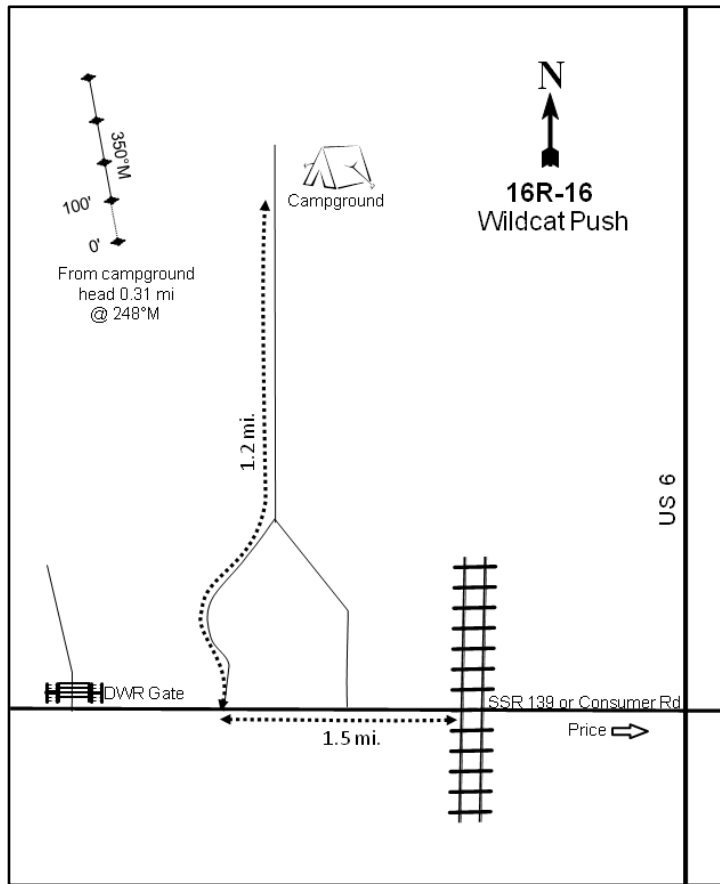
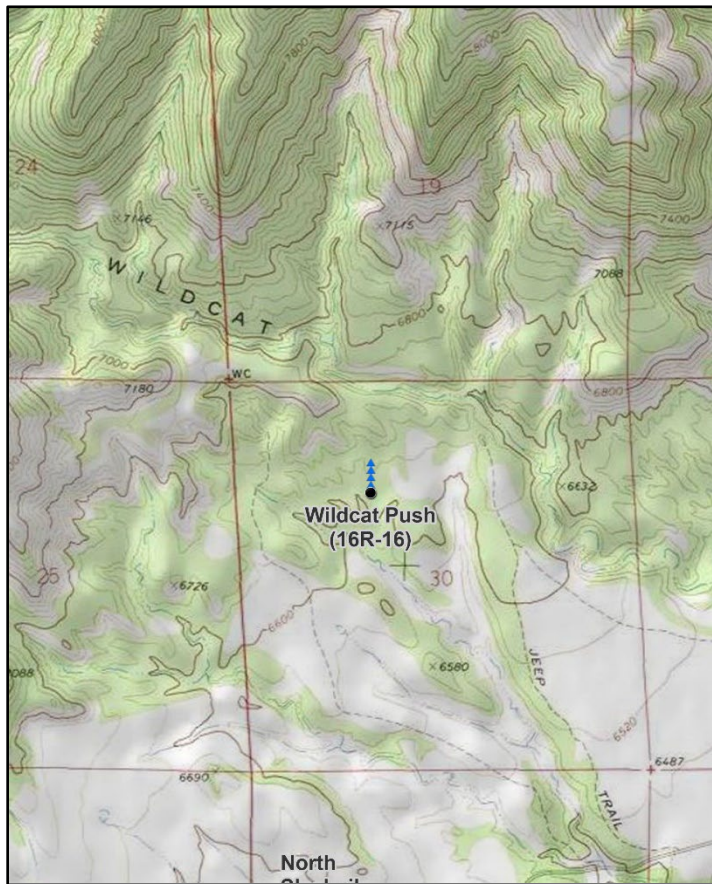
Table 16R-15.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2023	1	-	-	100	-	-	9.0

Table 16R-15.15 - 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	13.0	-6.4	0.3	5.0	0.0	10.0	0.0	21.9	Poor
2008	10.4	8.5	15.0	17.7	0.0	6.5	0.0	58.1	Good
2012	8.7	11.2	15.0	13.8	0.0	0.3	0.0	49.0	Good
2017	8.4	7.4	10.1	14.8	-0.1	0.9	0.0	41.5	Fair
2023	6.0	0.0	0.0	19.3	-0.3	3.2	0.0	28.3	Fair

WILDCAT PUSH - STUDY NO. 16R-16



Location Information

USGS 7.5 min Map Info Standardville SW; Township 13S, Range 9E, Section 30
 GPS (0' Stake) NAD 83 UTM ZONE 12, 503387 East 4391049 North

Transect Information

Browse Tag # (0' Stake) 80
 Transect Bearing 8° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement Standard

Directions to Site

Drive west on SR-139 for 3.2 miles to a railroad crossing from the junction of US-6 and SR-139 in Price. Drive over the railroad tracks and continue 1.5 miles to road on the right (north). Turn right onto this road and drive 1.2 miles to a campground on the right (east) side of the road; park at the campground. From the west side of the road, walk 0.31 miles at 248 degrees magnetic to the 0-foot stake which is marked with browse tag #80.

Site Information

Land Ownership State
 Land Administrator UDWR
 Allotment GORDON CRK WITHDRAWL
 Elevation 6,630ft (2,021m)
 Aspect South
 Slope 5-6%
 Sample Dates 07/21/2005, 08/16/2010, 07/22/2014, 08/13/2018, 08/14/2023

Table 16R-16.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Roller Chopper	Wildcat Canyon P-J Removal	32	October-November 2007	140
Seeding - Aerial Before	Wildcat Canyon P-J Removal	32	October 2007	140
Seeding - Dribbler	Wildcat Canyon P-J Removal	32	October-November 2007	140

Table 16R-16.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Wildcat Canyon PJ Removal			Aerial	Oct 2007	205
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.46	1.27
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	0.49	0.41
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Ephraim	0.49	0.44
G	<i>Bouteloua gracilis</i>	Blue Grama		0.98	0.64
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	1.22	1.14
G	<i>Poa secunda</i>	Sandberg Bluegrass	Mountain Home ID	0.49	0.45
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.49	0.43
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		0.49	0.41
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.22	1.04
G	<i>Purshia stansburiana</i>	Snake River Wheatgrass	Secar	0.98	0.79
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		0.98	0.82
G	<i>Thinopyrum ponticum</i>	Tall Wheatgrass	Alkar	0.73	0.67
F	<i>Cleome serrulata</i>	Rocky Mountain Beeplant	Sanpete UT	0.24	0.24
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.98	0.90
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.98	0.87
F	<i>Medicago sativa</i>	Alfalfa	Spreador 4	0.73	0.70
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	0.49	0.15
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Millard UT	0.12	0.05

Mix Name			Application Type	Application Date	Acres
Wildcat Canyon PJ Removal Dribbler			Dribbler	Oct 2007	205
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Millard UT	0.37	0.14
S	<i>Ephedra viridis</i>	Green Ephedra	Grand UT	0.12	0.11

Wildlife Habitat and Vegetation History**Table 16R-16.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 16R-16.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Juniper	Phase II transitioning to Phase III
2010	Perennial Grass	Phase I
2014	Perennial Grass	Phase I
2018	Perennial Grass	Phase I
2023	Perennial Grass	Phase I

Site Notes**Soils****Table 16R-16.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.2	42.4	28.4	29.2	1.9	5.5	83.2	0.5	07/21/2005

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

The plant community on this site was dominated by Utah juniper (*Juniperus osteosperma*) upon study establishment in 2005 and was considered to be within Phase II transitioning to Phase III of woodland succession (Table 16-16.4). Twoneedle pinyon (*Pinus edulis*) trees and shrubs such as black sagebrush (*Artemisia nova*) were also present, but in much lesser amounts; tree cover decreased significantly following a 2007 roller chopper and seeding treatment (Table 16R-16.1). Although cover of browse species has remained low, cover and/or density of many species have exhibited slightly increasing trends over the post-treatment years (Photos, Table 16R-16.12, Table 16R-16.13). Prior to treatment, the herbaceous understory was primarily comprised of annual forbs with a minor perennial grass component. Perennial grasses such as saline wildrye (*Leymus salinus*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) increased in cover and frequency and have been the dominant vegetation component since 2010. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in all sample years, but in low amounts (Table 16R-16.7, Table 16R-16.10, Table 16R-16.11). Point-quarter data shows that juniper and pinyon have increased in the years following treatment (Table 16R-16.14). Although the study was considered to be within Phase I of succession in 2023 (Table 16R-16.4), this increase indicates that trees will likely infill the area in the future.

Deer winter range condition on this site has varied between very poor and good since 2005; in 2023, winter range condition was considered to be fair to good. Further improvements to deer winter range could be accomplished by increasing preferred browse and perennial forb cover (Table 16R-16.15). Pellet group data indicates that deer presence has been low in most sample years, but was high in 2023. Elk presence has remained low throughout the study period (Table 16R-16.9). However, the sagebrush component of this site could provide browse for elk during the winter months (Table 16R-16.3; Wambolt, 1996).

Trend Summary Tables**Table 16R-16.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	0.2	0.1	3.5	0.1	0.6	16.4
2010	0.7	0.1	2.3	1.0	0.5	2.3
2014	1.5	0.0	0.6	1.5	-	1.3
2018	2.6	0.2	1.9	2.6	-	2.2
2023	6.8	0.5	2.6	6.2	0.4	3.6

Table 16R-16.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	3	130	258	36	0.0	3.1	7.2	1.0
2010	24	293	216	49	0.1	13.9	3.3	0.5
2014	14	314	111	23	0.1	18.6	0.7	0.1
2018	3	329	63	26	0.0	21.7	1.1	0.4
2023	88	332	80	33	2.5	24.0	2.7	1.0

Table 16R-16.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	46.7	0.8	41.2	2.8	0.8	15.6
2010	32.2	0.3	50.4	1.1	0.1	25.6
2014	36.4	0.0	46.6	1.0	0.6	23.2
2018	37.0	0.5	50.1	4.9	1.1	28.2
2023	38.8	0.1	38.7	4.8	0.8	38.3

Table 16R-16.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2005	1	-	8	3	59
2010	1	-	9	2	14
2014	3	-	12	14	45
2018	-	-	17	9	38
2023	1	-	21	22	10
Year	Days Use Per Acre (ha)				
2005	-	8.7 (21.5)*	2.7 (6.6)	12.1 (29.8)	-
2010	1.5 (3.6)	-	16.1 (39.7)	14.1 (34.8)	-
2014	2.2 (5.4)	-	6.7 (16.6)	18.1 (44.7)	-
2018	0.7 (1.8)	-	12.8 (31.5)	5.3 (13.2)	-
2023	7.2 (17.9)	-	67.7 (167.2)	5.3 (13.2)	-

*Pellets per acre (ha)

Table 16R-16.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus arvensis ^{ai} (field brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Leymus salinus (saline wildrye)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Thinopyrum ponticum ⁱ (tall wheatgrass)
year	Nested Frequency																
2005	15	-	21	-	3	44	-	-	3	50	-	3	-	-	-	12	-
2010	42	45	9	-	24	21	3	78	24	40	-	6	-	12	-	136	-
2014	46	45	17	-	14	34	10	53	17	57	-	3	-	83	-	71	-
2018	40	65	22	-	3	8	92	13	-	93	-	8	15	92	-	25	-
2023	23	91	35	4	86	23	18	12	6	109	9	14	16	133	2	33	1
year	Average Cover (%)																
2005	0.1	-	0.4	-	0.0	1.1	-	-	0.0	1.3	-	0.0	-	-	-	0.2	-
2010	2.0	1.0	0.4	-	0.1	0.9	0.0	1.9	0.8	1.6	-	0.0	-	0.4	-	4.9	-
2014	2.8	0.9	0.8	-	0.1	0.8	0.3	2.2	0.7	3.9	-	0.0	-	4.3	-	1.8	-
2018	2.4	1.6	0.9	-	0.0	0.3	2.2	0.6	-	7.0	-	0.1	0.5	5.5	-	0.5	-
2023	1.0	4.1	1.1	0.0	2.5	0.5	0.3	0.7	0.5	7.1	0.3	0.2	0.8	6.4	0.1	1.0	0.0

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

Table 16R-16.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabid (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Chenopodium album ^a (lambsquarters)	Chenopodium atrovirens ^a (pinyon goosefoot)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Chorisporea tenella ⁱⁱ (crossflower)	Cirsium (thistle)	Cordylanthus ramosus ^a (bushy bird's beak)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum ^a (nodding buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Lactuca serriola ⁱⁱ (prickly lettuce)
year	Nested Frequency																
2005	11	-	15	-	-	43	5	-	-	60	-	44	-	14	46	127	41
2010	3	1	18	10	-	49	63	2	-	14	-	3	-	113	-	20	43
2014	-	-	4	-	-	2	-	-	-	-	5	30	11	4	-	3	1
2018	-	-	-	-	-	-	-	-	1	1	-	34	13	-	-	1	-
2023	-	-	7	-	9	7	16	4	-	29	-	-	-	7	4	12	2
year	Average Cover (%)																
2005	0.1	-	0.6	-	-	0.2	0.0	-	-	2.3	-	0.2	-	0.1	0.1	1.5	0.8
2010	0.0	0.0	0.1	0.2	-	0.4	0.3	0.0	-	0.6	-	0.0	-	1.1	-	0.1	0.4
2014	-	-	0.0	-	-	0.0	-	-	-	-	0.0	0.1	0.0	0.0	-	0.0	0.0
2018	-	-	-	-	-	-	-	-	0.0	0.0	-	0.6	0.1	-	-	0.1	-
2023	-	-	0.4	-	0.1	0.2	0.4	0.0	-	1.4	-	-	-	0.6	0.0	0.1	0.0

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

FORB SPECIES	Lappula occidentalis ^a (flatspine stickseed)	Lepidium ^a (pepperweed)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ⁱ (alfalfa)	Mentzelia ^a (blazingstar)	Pedicularis centranthera (dwarf lousewort)	Penstemon (beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sisymbrium altissimum ⁱⁱ (tall tumblermustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency											
2005	50	6	-	-	4	8	3	-	-	-	0	-
2010	48	-	4	19	3	-	7	-	2	1	-	-
2014	90	-	-	2	-	-	2	-	-	-	1	3
2018	45	-	-	3	-	-	5	1	-	-	-	5
2023	9	-	3	3	-	1	-	6	16	1	-	0
year	Average Cover (%)											
2005	1.9	0.0	-	-	0.1	0.3	0.0	-	-	-	0.0	-
2010	0.2	-	0.0	0.3	0.0	-	0.0	-	0.0	0.0	-	-
2014	0.5	-	-	0.0	-	-	0.0	-	-	-	0.0	0.0
2018	0.4	-	-	0.1	-	-	0.0	0.0	-	-	-	0.0
2023	0.1	-	0.0	0.4	-	0.0	-	0.1	0.1	0.0	-	0.0

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

Table 16R-16.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)										
	year										
Artemisia nova ^p (black sagebrush)	0.1	-	-	-	-	15.3	0.6	0	1.1	-	-
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	-	0.8	-	0.2	-	2.3	0.4	-	-	0.1	-
Atriplex canescens ^p (fourwing saltbush)	0.2	0.8	0.5	-	-	1.3	0	-	-	-	-
Ephedra viridis ^p (mormon tea)	0.1	2.1	0.3	0.1	-	2.2	-	-	-	-	-
Gutierrezia sarothrae (broom snakeweed)	0.2	5.6	0.4	-	0.2	3.6	0.2	-	-	-	-
Juniperus osteosperma ⁱ (Utah juniper)											
Opuntia polyacantha (plains pricklypear)											
Pediocactus simpsonii (mountain ball cactus)											
Pinus edulis ⁱ (twoneedle pinyon)											
Sclerocactus (fishhook cactus)											
year	Quadrat Cover (%)										
2005	0.0	-	-	0.1	-	3.3	0.0	0.0	0.2	-	-
2010	0.0	0.6	0.0	0.0	-	2.1	0.0	0.0	0.1	0.0	0.0
2014	0.3	1.2	0.0	0.0	0.0	0.6	0.0	-	-	0.0	0.0
2018	0.2	2.2	0.0	0.1	0.0	1.3	0.0	-	0.6	0.1	0.1
2023	1.3	5.2	0.2	0.1	0.5	2.4	0.0	-	0.2	0.0	0.0

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

Table 16R-16.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^p -- (black sagebrush)									
2005	240	40	83	8	8	0	0	8	24/35
2010	60	-	0	100	0	0	0	0	19/41
2014	320	-	0	100	0	69	25	0	19/32
2018	80	-	0	100	0	100	0	0	22/46
2023	80	-	0	100	0	25	25	0	- / -
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2005	-	-	-	-	-	-	-	-	- / -
2010	1560	20	67	32	1	0	0	1	31/26
2014	1620	-	5	95	0	77	11	10	31/35
2018	1720	1060	9	91	0	55	13	0	34/44
2023	1980	-	22	74	4	38	22	5	- / -
Atriplex canescens^p -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	- / -
2010	40	20	0	100	0	0	0	0	46/50
2014	60	20	33	67	0	0	0	0	81/96
2018	80	20	50	50	0	0	0	0	83/119
2023	220	-	73	18	9	9	0	9	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	24/21
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ephedra viridis^p -- (mormon tea)									
2005	20	-	0	100	0	0	0	0	101/128
2010	20	-	0	100	0	0	0	0	74/99
2014	20	-	100	0	0	100	0	0	50/44
2018	40	-	50	50	0	0	0	0	55/79
2023	60	-	0	100	0	0	33	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	37/43
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Escobaria vivipara -- (spiny star)									
2005	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	5/13
2023	-	-	-	-	-	-	-	-	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2005	20	-	0	100	0	0	0	0	25/32
2010	-	-	-	-	-	-	-	-	26/38
2014	40	-	50	50	0	0	0	0	15/17
2018	180	-	33	67	0	0	0	0	20/27
2023	780	-	77	23	0	0	0	0	- / -
Juniperus osteosperma^t -- (Utah juniper)									
2005	220	-	27	64	9	0	0	0	- / -
2010	120	200	17	50	33	0	0	50	- / -
2014	100	-	40	60	0	0	0	20	- / -
2018	100	40	40	60	0	0	0	20	- / -
2023	160	20	25	75	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2005	220	-	0	91	9	0	0	9	10/32
2010	60	-	0	100	0	0	0	0	7/36
2014	60	-	0	67	33	0	0	100	7/34
2018	60	-	0	100	0	0	0	0	8/20
2023	80	-	0	100	0	0	0	0	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2005	-	20	0	0	0	0	0	0	3/5
2010	20	-	0	100	0	0	0	0	4/9
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Pinus edulis^t -- (twoneedle pinyon)									
2005	60	40	33	67	0	0	0	0	- / -
2010	40	40	50	50	0	0	0	0	- / -
2014	40	-	100	0	0	0	0	0	- / -
2018	20	20	100	0	0	0	0	0	- / -
2023	40	-	100	0	0	0	0	0	- / -
Sclerocactus -- (fishhook cactus)									
2005	40	-	50	50	0	0	0	0	16/15
2010	20	-	0	100	0	0	0	0	8/15
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	100	0	0	0	0	0	- / -

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

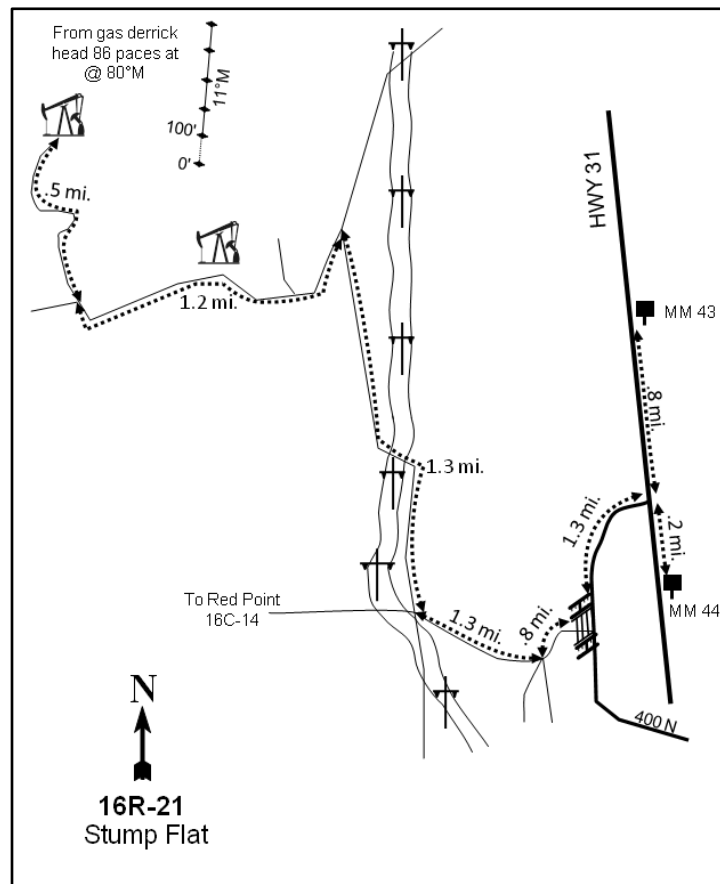
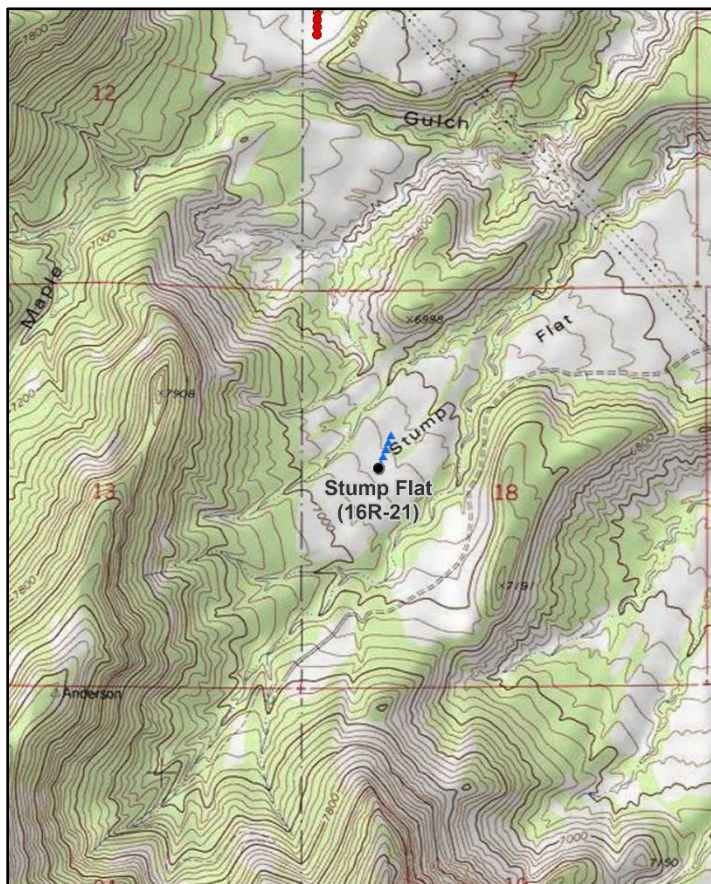
Table 16R-16.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2010	88	12	59	6	6	18	10.8
2014	75	6	72	17	-	6	7.6
2018	100	5	74	16	-	5	13.6
2023	101	6	22	72	-	-	8.8
Pinus edulis (twoneedle pinyon)							
2010	25	40	53	7	-	-	3.1
2014	26	13	87	-	-	-	2.8
2018	31	14	71	14	-	-	4.4
2023	60	50	-	50	-	-	4.8

Table 16R-16.15 - 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	0.1	0.0	0.0	6.1	0.0	2.1	0.0	8.3	Very Poor
2010	1.3	0.0	0.0	27.8	-0.1	1.1	0.0	30.0	Very Poor
2014	1.9	0.0	0.0	30.0	0.0	0.2	0.0	32.0	Very Poor
2018	3.3	0.0	0.0	30.0	0.0	0.8	0.0	34.1	Very Poor-Poor
2023	7.8	13.7	12.4	30.0	-1.9	1.9	0.0	63.9	Fair-Good

STUMP FLAT - STUDY NO. 16R-21

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Red Point NW; Township 17S, Range 8E, Section 18
NAD 83 UTM ZONE 12, 493633 East 4354996 North

Transect Information

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

153
10° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Standard

Directions to Site

Traveling south from mile marker 43 on Highway 31, drive 0.8 miles to a road on the right (if traveling north, drive 0.2 miles from mile marker 44). Turn right and drive 1.3 miles to a road on the right (west) and a gate. Go through the gate, drive 0.8 miles to a fork, and stay right. Drive 1.3 miles to a fork and some powerlines. Proceed to the right, following the powerlines, for 1.3 miles to another fork. Turn left here and drive 1.2 miles to a fork, passing a road and gas derrick on the right side of the road. At the fork, proceed to the right and drive 0.5 miles to another gas derrick. From the gas derrick, walk 86 paces at 80 degrees magnetic to the 0-foot stake that is marked with browse tag #153.

Site Information

Land Ownership
Land Administrator
Allotment
Elevation
Aspect
Slope
Sample Dates

State
SITLA
WEST HUNTINGTON
6,900ft (2,103m)
North-Northeast
5-10%
06/21/2006, 08/24/2010, 07/28/2014, 08/01/2018, 08/16/2023

Table 16R-21.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Burma Rd. Pinyon/Juniper Removal	2556	October-December 2013	1312
Chaining - Two-Way Unknown	West Huntington Chain and Seed	LTDL	September-December 1969	1158
Mechanical - Roller Chopper	Stump Flat Pinyon/Juniper Habitat Restoration	431	September-October 2006	67
Seeding - Aerial After	West Huntington Chain and Seed	LTDL	March 1973	1158
Seeding - Aerial After	West Huntington Chain and Seed	LTDL	December 1969	1158

Table 16R-21.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
West Huntington Chain and Seed			Aerial	Dec 1969	1158
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Desert Wheatgrass		9.00	0.00

Mix Name			Application Type	Application Date	Acres
West Huntington Chain and Seed			Aerial	Mar 1973	1158
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass		4.25	0.00
G	Psathyrostachys juncea	Russian Wildrye		0.17	0.00
G	Sporobolus airoides	Alkali Sacaton		0.78	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.18	0.00
F	Medicago sativa	Alfalfa	Nomad	0.61	0.00
F	Sanguisorba minor	Small Burnet		0.75	0.00
S	Artemisia tridentata	Big Sagebrush		0.43	0.00
S	Atriplex canescens	Fourwing Saltbush		0.61	0.00
S	Cercocarpus ledifolius	Curlleaf Mountain Mahogany		0.00	0.00
S	Cercocarpus montanus	Birchleaf Mahogany		0.00	0.00
S	Ericameria nauseosa	Rabbitbrush		0.44	0.00
S	Krascheninnikovia lanata	Winterfat		0.04	0.00
S	Purshia stansburiana	Cliffrose		0.01	0.00
S	Purshia tridentata	Bitterbrush		0.02	0.00

Wildlife Habitat and Vegetation History**Table 16R-21.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 16R-21.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Pinyon/Perennial Grass	Phase I
2010	Perennial Grass	Phase I
2014	Perennial Grass	Phase I
2018	Perennial Grass	Phase I
2023	Perennial Grass/Black Sagebrush	Phase I

Site Notes

No Notes

Soils**Table 16R-21.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.3	40.2	31.0	28.8	3.6	14.3	96.0	0.7	06/20/2006

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB309UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2006, this site was being encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase I of woodland succession (Table 16R-21.4); other browse species were rare. Tree cover and density decreased following a post-sampling roller chopper treatment in 2006 and a lop and scatter treatment in 2013 (Table 16R-21.1). Cover and density of black sagebrush (*Artemisia nova*) increased over the post-treatment sample years, and it has been the dominant shrub species since 2010 and was a codominant site component in 2023 (Table 16R-21.12, Table 16R-21.13). The herbaceous understory has remained abundant throughout the duration of the study, but not very diverse. A vast majority of the cover has been contributed by the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*), which has been a dominant vegetation component since 2006. Forbs have remained comparatively rare (Table 16R-21.7, Table 16R-21.10, Table 16R-21.11). Although cover and density have remained low (Table 16R-21.12, Table 16R-21.14), the extant tree component indicates that there may be potential for infilling in future sample years.

On this site, deer winter range condition has ranged between very poor and excellent since 2006. In 2023, winter range condition was considered to be good to excellent. Although condition has improved substantially over time, further improvements could be achieved mainly by increasing cover of preferred browse and perennial forbs (Table 16R-21.15). Both deer and elk presence were considered to be moderate in 2023 according to pellet transect data (Table 16R-21.9); the sagebrush component of this site could provide browse for elk during the winter months (Table 16R-21.3; Wambolt, 1996).

Trend Summary Tables**Table 16R-21.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	1.1	-	7.4	1.9	-	7.1
2010	0.7	0.0	0.1	1.1	-	0.4
2014	0.7	0.0	0.0	1.2	-	0.1
2018	1.9	0.3	0.0	3.1	0.2	0.1
2023	5.2	1.7	0.3	9.1	1.7	0.2

Table 16R-21.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	-	336	12	113	-	17.6	0.0	3.0
2010	-	285	108	121	-	16.2	2.5	4.1
2014	-	341	50	95	-	18.8	0.2	0.8
2018	-	354	17	68	-	26.7	0.1	0.9
2023	-	328	37	97	-	19.8	0.8	4.1

Table 16R-21.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	30.2	1.2	46.8	2.0	4.7	27.0
2010	25.1	0.0	49.1	5.9	6.3	21.8
2014	27.0	0.7	50.2	4.2	7.0	21.7
2018	21.3	0.1	58.4	3.1	6.9	31.4
2023	27.3	-	41.8	5.5	4.5	29.2

Table 16R-21.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	3	3	38	49
2010	5	22	3	20
2014	15	8	28	35
2018	10	27	6	49
2023	13	14	20	3
Year	Days Use Per Acre (ha)			
2006	7.2 (17.9)	9.4 (23.2)	93.8 (231.7)	-
2010	14.5 (35.9)	31.5 (77.8)	3.4 (8.3)	-
2014	26.2 (64.6)	8.7 (21.5)	29.5 (72.8)	-
2018	18.9 (46.6)	32.8 (81.1)	7.4 (18.2)	-
2023	26.2 (64.6)	39.6 (97.7)	35.5 (87.7)	-

Table 16R-21.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Elymus elymoides (squirreltail)	Leymus salinus (saline wildrye)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency					
2006	2	333	0	3	2	7
2010	3	280	-	-	-	6
2014	5	316	2	30	10	6
2018	8	343	-	11	0	20
2023	26	294	-	13	5	18
year	Average Cover (%)					
2006	0.0	17.1	0.0	0.1	0.1	0.2
2010	0.0	16.0	-	-	-	0.2
2014	0.2	17.1	0.0	1.2	0.2	0.1
2018	0.2	25.5	-	0.6	0.0	0.5
2023	1.0	17.6	-	0.5	0.2	0.6

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

Table 16R-21.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Chenopodium atrovirens ^a (pinyon goosefoot)	Chenopodium fremonti ^a (Fremont's goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum umbellatum (sulphur-flower buckwheat)	Hedysarum boreale (Utah sweetvetch)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lesquerella (bladderpod)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa ⁱ (alfalfa)	Packera multilobata (lobeleaf groundsel)
year	Nested Frequency																
2006	1	-	11	-	-	18	-	4	4	1	-	12	7	-	5	31	8
2010	46	-	25	-	13	19	-	-	3	1	3	58	-	-	3	24	-
2014	-	-	-	-	-	19	3	4	1	-	-	18	-	1	8	14	1
2018	3	1	3	-	2	17	3	-	1	-	-	-	-	6	1	5	2
2023	1	-	32	2	3	9	2	5	2	-	-	-	-	7	-	7	-
year	Average Cover (%)																
2006	0.0	-	0.3	-	-	0.3	-	0.0	0.1	0.0	-	0.0	0.0	-	0.2	0.6	0.1
2010	0.9	-	0.3	-	0.1	0.6	-	-	0.1	0.1	0.0	0.8	-	-	0.0	1.5	-
2014	-	-	-	-	-	0.2	0.0	0.1	0.0	-	-	0.0	-	0.0	0.0	0.1	0.0
2018	0.0	0.0	0.0	-	0.0	0.4	0.0	-	0.0	-	-	-	-	0.1	0.0	0.0	0.0
2023	0.0	-	1.5	0.0	0.0	0.3	0.0	0.1	0.2	-	-	-	-	0.2	-	0.2	-

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

FORB SPECIES	Penstemon (beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Salsola tragus ^{ai} (prickly Russian thistle)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Stanleya viridiflora (green princesplume)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)
year	Nested Frequency						
2006	14	-	-	6	40	-	-
2010	14	-	53	21	-	8	-
2014	-	-	36	16	39	-	3
2018	4	-	10	4	28	2	-
2023	5	8	30	10	32	3	-
year	Average Cover (%)						
2006	0.4	-	-	0.1	1.0	-	-
2010	0.3	-	1.5	0.3	-	0.0	-
2014	-	-	0.1	0.0	0.2	-	0.0
2018	0.0	-	0.1	0.0	0.3	0.0	-
2023	0.2	0.5	0.7	0.2	0.8	0.0	-

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

Table 16R-21.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Cercocarpus montanus ^p (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ephedra viridis ^p (mormon tea)	Ericameria nauseosa ssp. nauseosa var. hololeuca ^p (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)
year	Line Intercept Cover (%)										
2006	-	0.3	-	1.6	-	-	-	-	-	-	7.1
2010	-	0.3	-	0.5	-	0.3	-	-	0.4	-	-
2014	-	1.1	-	0.1	-	-	-	-	0.1	-	-
2018	0.5	2.1	0.5	0	0	-	-	0.2	0.1	-	-
2023	-	6.8	0.8	1.5	-	-	-	1.6	0.2	0.1	-
year	Quadrat Cover (%)										
2006	-	0.5	-	0.7	-	0.0	-	-	1.0	-	6.4
2010	-	0.3	-	0.0	-	0.4	-	0.0	0.1	-	-
2014	-	0.6	0.0	0.0	-	0.0	-	-	0.0	0.0	-
2018	0.1	0.7	0.8	0.1	0.0	0.1	-	0.2	0.0	0.0	-
2023	-	5.1	0.0	0.1	-	0.0	0.0	1.6	0.3	0.0	-

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

Table 16R-21.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2006	-	-	-	-	-	-	-	-	82/76
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	43/87
2018	40	-	0	100	0	0	100	0	157/104
2023	-	-	-	-	-	-	-	-	-/-
Artemisia nova^p -- (black sagebrush)									
2006	120	2080	67	33	0	17	0	0	41/82
2010	320	240	38	56	6	31	0	6	23/37
2014	1300	40	15	85	0	35	60	0	25/48
2018	1240	-	21	79	0	24	52	2	23/49
2023	1800	120	21	77	2	32	3	31	-/-
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	260	-	39	62	0	0	0	0	39/48
2014	240	60	58	42	0	58	0	0	26/39
2018	280	-	29	71	0	7	71	0	23/53
2023	40	-	100	0	0	0	0	0	-/-
Cercocarpus montanus^p -- (alderleaf mountain mahogany)									
2006	60	20	0	100	0	0	33	0	166/163
2010	80	-	0	100	0	0	100	0	99/128
2014	80	-	25	75	0	75	0	0	116/120
2018	40	-	50	50	0	0	50	0	109/130
2023	80	-	25	75	0	50	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 (%)				
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	-	-	-	-	-	-	-	-	25/32
2010	-	-	-	-	-	-	-	-	19/31
2014	-	-	-	-	-	-	-	-	26/32
2018	60	-	0	100	0	0	0	0	65/97
2023	-	-	-	-	-	-	-	-	-/-
Echinocereus -- (hedgehog cactus)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	6/11
2023	-	-	-	-	-	-	-	-	-/-
Ephedra nevadensis^P -- (Nevada jointfir)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	96/136
2018	-	-	-	-	-	-	-	-	118/170
2023	-	-	-	-	-	-	-	-	-/-
Ephedra viridis^P -- (mormon tea)									
2006	20	-	100	0	0	0	0	0	84/146
2010	20	-	0	100	0	0	100	0	66/115
2014	20	-	0	100	0	0	100	100	80/119
2018	100	-	40	60	0	0	0	0	63/96
2023	120	20	100	0	0	0	100	0	-/-
Eriogonum microthecum^P -- (slender buckwheat)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	11/13
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	7/13
2023	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	87/99
2010	-	-	-	-	-	-	-	-	47/65
2014	40	-	50	50	0	0	0	0	50/66
2018	60	-	100	0	0	67	33	0	79/103
2023	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa ssp. nauseosa var. hololeuca^P -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	60	20	100	0	0	0	0	0	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2006	-	-	-	-	-	-	-	-	23/29
2010	20	-	0	100	0	0	0	0	23/26
2014	-	-	-	-	-	-	-	-	17/21
2018	800	-	23	75	3	0	0	3	17/19
2023	2440	-	28	72	0	0	0	0	-/-
Juniperus osteosperma¹ -- (Utah juniper)									
2006	40	-	100	0	0	0	0	0	-/-
2010	20	-	100	0	0	0	0	0	-/-
2014	20	-	100	0	0	0	0	0	-/-
2018	20	-	100	0	0	0	0	100	-/-
2023	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 (%)				
Krascheninnikovia lanata^p -- (winterfat)									
2006	-	-	-	-	-	-	-	-	54/40
2010	-	-	-	-	-	-	-	-	36/37
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
2006	20	-	0	100	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	-/-
2014	40	-	50	50	0	0	0	0	10/28
2018	60	-	33	67	0	0	0	0	7/18
2023	80	-	0	100	0	0	0	0	- / -
Pinus edulis^t -- (twoneedle pinyon)									
2006	120	-	17	83	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana^p -- (Stansbury cliffrose)									
2006	-	-	-	-	-	-	-	-	99/104
2010	-	-	-	-	-	-	-	-	93/95
2014	20	-	0	100	0	0	100	0	89/97
2018	-	-	-	-	-	-	-	-	100/111
2023	20	-	0	100	0	0	0	100	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2006	-	-	-	-	-	-	-	-	64/122
2010	-	-	-	-	-	-	-	-	42/91
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	45/103

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

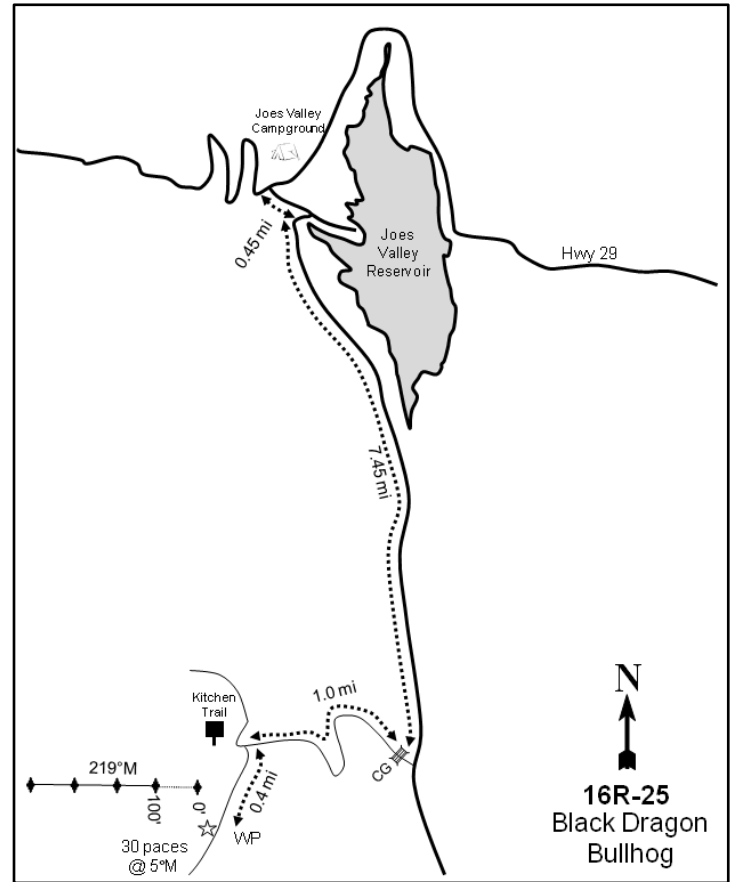
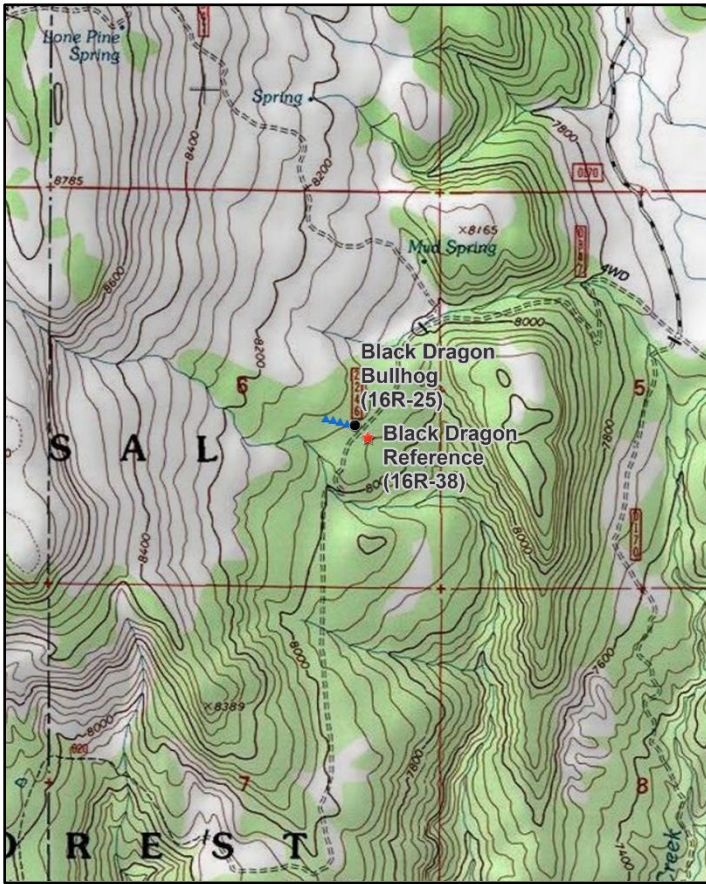
Table 16R-21.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2006	35	-	25	63	13	-	11.4
2010	12	-	89	11	-	-	3.9
2014	2	100	-	-	-	-	3.0
2018	7	80	20	-	-	-	5.0
2023	8	29	57	14	-	-	5.3
Pinus edulis (twoneedle pinyon)							
2006	63	-	11	53	26	11	12.7
2010	16	-	50	38	13	-	5.9
2014	3	-	100	-	-	-	5.0
2018	8	-	100	-	-	-	4.5
2023	3	-	50	50	-	-	8.5

Table 16R-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
2006	2.8	0.0	0.0	30.0	0.0	5.9	0.0	38.7	Poor
2010	1.5	0.0	0.0	30.0	0.0	8.3	0.0	39.8	Poor
2014	1.5	0.0	0.0	30.0	0.0	1.6	0.0	33.1	Very Poor-Poor
2018	4.0	0.0	0.0	30.0	0.0	1.7	0.0	35.7	Very Poor-Poor
2023	11.8	14.5	14.3	30.0	0.0	8.2	0.0	78.8	Good-Excellent

BLACK DRAGON BULLHOG - STUDY NO. 16R-25

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Ferron Canyon NE; Township 19S, Range 6E, Section 06
NAD 83 UTM ZONE 12, 475364 East 4338569 North

Transect Information

Browse Tag # (0' Stake)	194
Transect Bearing	270° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

Drive west on SR-29 to the west side of Joe's Valley Reservoir. Turn south onto the road that leads to the marina, drive 0.45 miles to a fork, and go right. Drive for 7.25 miles to a junction. Turn right and drive 1.0 mile, crossing a cattle guard and passing an ATV trail. Turn left onto the road with a sign reading "Kitchen Trail." Drive for 0.4 miles to a witness post on the right. Walk 30 paces at 5 degrees magnetic to the 0-foot stake marked with browse tag #194.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	HORN MT
Elevation	8,050ft (2,454m)
Aspect	Southeast
Slope	8-12%
Sample Dates	08/23/2006, 07/22/2009, 08/02/2012, 08/01/2018, 08/16/2023

Table 16R-25.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Black Dragon	514	August 2006-June 2008	4358

Wildlife Habitat and Vegetation History**Table 16R-25.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 16R-25.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Alderleaf Mountain Mahogany/Pinyon-Juniper	Phase II
2009	Alderleaf Mountain Mahogany/Perennial Grass	Phase I
2012	Alderleaf Mountain Mahogany/Perennial Grass	Phase I
2018	Alderleaf Mountain Mahogany/Perennial Grass	Phase I
2023	Alderleaf Mountain Mahogany/Perennial Grass	Phase I

Site Notes

No Notes

Soils**Table 16R-25.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.5	41.2	30.0	28.8	2.3	12.7	137.6	0.6	08/23/2006

Site Potential

1981 - 2010 Average Annual Precipitation 19 inches
 NRCS Ecological Site Mountain Loam (Browse)
 NRCS Ecological Site # R047XB420UT
 States and Transitions No state and transition model is available for this ecological site.

The plant community on this site has remained dominated by alderleaf mountain mahogany (*Cercocarpus montanus*) since study establishment in 2006; a variety of other shrub species have also been present, but have provided less cover (Table 16R-25.12). Twoneedle pinyon (*Pinus edulis*) and Rocky Mountain juniper (*Juniperus scopulorum*) were encroaching in the area, and the study was considered to be within Phase II of woodland succession in 2006. A bullhog treatment sometime between the initial sampling and the 2008 sampling removed most of these trees (Table 16R-25.1), and the site has been considered to be within Phase I since 2009. However, point-quarter measurements show that density of trees has increased each sample year following treatment, indicating that there may be potential for infilling over time (Table 16R-25.4, Table 16R-25.14). The herbaceous understory has remained abundant and diverse throughout the sample years. Perennial grasses such as saline wildrye (*Leymus salinus*) and Indian ricegrass (*Achnatherum hymenoides*) have provided the most herbaceous cover in all years and have been a codominant vegetation component since 2009 (Table 16R-25.7, Table 16R-25.10, Table 16R-25.11).

This site likely serves as adequate habitat for summering deer due to the diversity and abundance of the shrub and herbaceous communities. Pellet transect data indicates that both deer and elk presence have been low in all sample years (Table 16R-25.9). However, the limited sagebrush component of this site could provide browse for wintering elk (Table 16R-25.3; Wambolt, 1996).

Trend Summary Tables

Table 16R-25.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	15.2	2.0	3.1	20.4	1.3	6.1
2009	7.0	1.8	-	10.3	3.0	-
2012	8.1	1.3	0.0	12.4	1.5	-
2018	10.9	3.4	0.4	13.8	4.0	0.4
2023	15.5	3.0	1.1	18.9	2.6	0.7

Table 16R-25.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	-	220	10	171	-	10.7	0.0	6.8
2009	-	247	22	191	-	13.7	0.3	7.8
2012	2	295	-	236	0.0	16.4	-	8.3
2018	-	332	-	204	-	21.4	-	5.1
2023	-	301	11	194	-	18.3	0.1	6.9

Table 16R-25.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	29.0	0.4	33.4	20.6	7.1	34.4
2009	29.2	0.2	35.0	8.5	5.8	28.3
2012	21.9	0.2	49.0	12.3	4.8	31.4
2018	32.1	-	37.9	17.2	9.0	32.5
2023	31.8	-	30.0	13.8	5.6	38.7

Table 16R-25.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	1	1	4	26
2009	-	-	-	11
2012	1	-	1	6
2018	2	-	1	17
2023	3	1	-	1
Year	Days Use Per Acre (ha)			
2006	0.7 (1.8)	2.7 (6.6)	2.0 (5.0)	-
2009	1.5 (3.6)	2.0 (5.0)	9.4 (23.2)	-
2012	-	2.7 (6.6)	5.3 (13.2)	-
2018	0.7 (1.8)	-	-	-
2023	10.9 (26.9)	1.3 (3.3)	0.7 (1.7)	-

Table 16R-25.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bromus inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Leymus salinus (saline wildrye)	Pascopyrum smidii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency										
2006	73	6	12	-	8	-	3	103	-	-	54
2009	111	-	3	-	18	18	17	91	-	-	53
2012	153	5	3	2	38	11	8	126	-	3	56
2018	88	-	-	-	38	1	23	190	10	2	66
2023	96	-	1	-	19	4	22	135	-	-	98
year	Average Cover (%)										
2006	2.6	0.0	0.2	-	0.1	-	0.2	6.1	-	-	1.4
2009	3.3	-	0.0	-	0.3	0.6	0.6	7.1	-	-	1.7
2012	5.8	0.0	0.0	0.0	0.7	0.1	0.2	6.9	-	0.0	2.6
2018	3.0	-	-	-	1.2	0.0	0.7	13.8	0.6	0.0	2.1
2023	3.4	-	0.0	-	0.4	0.1	0.8	9.9	-	-	3.8

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

Table 16R-25.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis demissa (nodding rockcress)	Astragalus (milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Caulanthus crassicaulis ^a (thickstem wild cabbage)	Chaenactis douglasii (Douglas' dusty-aiden)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Erigeron (fleabane)	Eriogonum alatum (winged buckwheat)	Hymenopappus filifolius (finelaf hymenopappus)	Hymenoxys richardsonii (pingue rubberweed)	Ipomopsis aggregata (scarlet gilia)	Lithospermum incisum (narrowleaf stone seed)	Machaeranthera canescens (hoary tansyaster)
year	Nested Frequency																
2006	8	1	12	-	3	10	7	-	12	-	9	76	10	11	6	-	-
2009	-	1	8	3	11	16	9	-	30	-	4	61	15	6	2	-	8
2012	-	3	11	-	9	-	21	-	40	8	-	89	18	19	19	-	10
2018	-	2	-	-	1	-	1	-	22	24	3	46	6	5	4	-	21
2023	3	1	-	7	14	1	-	4	39	26	5	52	0	8	5	5	-
year	Average Cover (%)																
2006	0.0	0.0	0.1	-	0.2	0.0	0.0	-	0.1	-	0.1	2.1	0.5	0.4	0.0	-	-
2009	-	0.0	0.1	0.0	0.2	0.3	0.1	-	0.4	-	0.0	1.6	0.8	0.0	0.0	-	0.6
2012	-	0.0	0.1	-	0.1	-	0.1	-	0.4	0.0	-	1.0	0.6	0.2	0.1	-	0.1
2018	-	0.0	-	-	0.0	-	0.0	-	0.1	0.1	0.0	0.4	0.0	0.1	0.0	-	0.4
2023	0.0	0.0	-	0.1	0.7	0.0	-	0.0	1.1	0.6	0.0	1.0	0.0	0.3	0.0	0.1	-

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

FORB SPECIES	Nested Frequency													
year	Average Cover (%)													
Machaeranthera grindeioides (rayless tansyaster)	40	-	-	6	17	57	23	24	4	12	-	1	-	
Madia glomerata ^a (mountain tarweed)	27	5	-	-	8	74	48	23	22	8	-	-	1	
Oenothera (evening primrose)	38	-	3	6	-	107	56	34	5	7	-	-	-	
Packera multilobata (lobeleaf groundsel)	45	-	-	12	4	69	33	40	3	-	1	-	-	
Penstemon (beardtongue)	2023	43	6	1	1	-	52	17	29	4	-	10	-	
Penstemon caespitosus (mat penstemon)	2006	0.8	-	-	0.0	0.5	0.9	0.6	0.5	0.0	0.0	-	0.0	-
Penstemon pachyphyllus (thickleaf beardtongue)	2009	1.3	0.1	-	-	0.2	1.1	0.8	0.3	0.2	0.0	-	-	0.0
Phlox austromontana (mountain phlox)	2012	1.5	-	0.0	0.0	-	1.9	0.7	1.2	0.0	0.0	-	-	-
Physaria (twinpod)	2018	1.1	-	-	0.1	0.0	1.4	0.5	0.8	0.0	-	0.0	-	-
Schoenocrambe linifolia (flaxleaf plainsmustard)	2023	1.6	0.1	0.0	0.0	-	0.9	0.1	0.3	0.0	-	0.1	-	-
Symphotrichum ascendens (western aster)														
Taraxacum officinale (common dandelion)														
unknown annual forb ^a (unknown forb)														

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

Table 16R-25.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)														
year	Quadrat Cover (%)														
Ameiarchier utahensis ^p (Utah serviceberry)	2006	1.8	-	1.2	17.4	-	-	-	0.1	0.9	1.8	0.3	4.3	0	-
Artemisia nova ^p (black sagebrush)	2009	1.5	0.2	0.5	7.8	0.2	-	-	-	1.9	-	0.4	-	0.3	0.5
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	2012	1.8	-	1	9.2	0.7	-	-	0.1	0.1	-	0.1	-	0.4	0.5
Cercocarpus montanus ^p (alderleaf mountain mahogany)	2018	1.4	-	0.6	11.8	0.1	-	0.2	-	3.2	-	0.2	0.4	-	0.3
Chrysothamnus viscidiflorus sp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	2023	1.8	0.1	1.3	15.4	-	-	-	0.1	0.9	-	0.7	0.7	0.3	0.9
Ericameria nauseosa ssp. nauseosa var. speciosa ^p (rubber rabbitbrush)	2006	3.0	-	0.8	11.2	0.0	-	-	0.0	1.4	0.5	0.6	2.6	0.1	0.0
Ericameria parryi (Parry's rabbitbrush)	2009	1.4	0.0	0.8	4.5	0.0	0.2	-	-	1.1	-	0.6	-	0.1	0.0
Eriogonum corymbosum (crispleaf buckwheat)	2012	1.4	-	1.2	5.4	0.5	-	-	0.0	0.3	-	0.3	0.0	0.2	0.3
Gutierrezia sarothrae (broom snakeweed)	2018	0.6	-	1.4	8.8	0.1	-	0.0	-	2.6	-	0.4	0.4	0.2	0.3
Juniperus scopulorum ^t (Rocky Mountain juniper)	2023	1.7	0.4	0.6	12.4	-	-	0.4	0.1	1.1	-	1.3	1.1	0.4	0.0
Mahonia repens (creeping barberry)															
Pinus edulis ^t (twonneedle piñon)															
Symphoricarpos oreophilus ^p (mountain snowberry)															
Tetradymia canescens (spineless horsebrush)															

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

Table 16R-25.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
2006	680	20	38	24	38	9	3	29	125/119
2009	-	-	-	-	-	-	-	-	61/84
2012	680	-	29	59	12	59	18	12	70/81
2018	300	-	47	27	27	20	53	27	71/88
2023	520	-	35	62	4	12	54	19	- / -
Artemisia nova^P -- (black sagebrush)									
2006	-	-	-	-	-	-	-	-	27/60
2009	-	-	-	-	-	-	-	-	26/46
2012	-	-	-	-	-	-	-	-	28/48
2018	-	-	-	-	-	-	-	-	35/73
2023	80	-	0	50	50	50	50	50	- / -
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2006	600	20	10	70	20	3	0	13	37/51
2009	-	-	-	-	-	-	-	-	40/60
2012	440	-	46	50	5	27	55	9	37/56
2018	520	-	46	50	4	0	0	4	39/65
2023	340	-	18	71	12	41	41	18	- / -
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2006	1520	1500	40	53	8	12	0	5	129/133
2009	-	-	-	-	-	-	-	-	67/83
2012	2180	80	41	59	0	62	17	11	82/87
2018	2240	20	25	75	0	42	38	2	80/88
2023	2260	100	36	63	1	8	66	1	- / -
Ceanothus velutinus -- (snowbrush ceanothus)									
2006	-	-	-	-	-	-	-	-	35/117
2009	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2006	20	60	0	100	0	0	0	0	12/20
2009	-	-	-	-	-	-	-	-	28/43
2012	780	-	10	87	3	0	3	10	13/19
2018	120	-	0	100	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	-/-
Eriogonum corymbosum -- (crispleaf buckwheat)									
2006	40	-	0	100	0	0	0	0	18/26
2009	-	-	-	-	-	-	-	-	-/-
2012	40	-	0	100	0	0	0	0	15/17
2018	-	-	-	-	-	-	-	-	-/-
2023	40	-	0	100	0	0	0	0	- / -
Ericameria nauseosa ssp. nauseosa var. speciosa^P -- (rubber rabbitbrush)									
2006	20	-	100	0	0	0	0	0	91/90
2009	-	-	-	-	-	-	-	-	19/36
2012	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	66/75
2023	-	-	-	-	-	-	-	-	-/-

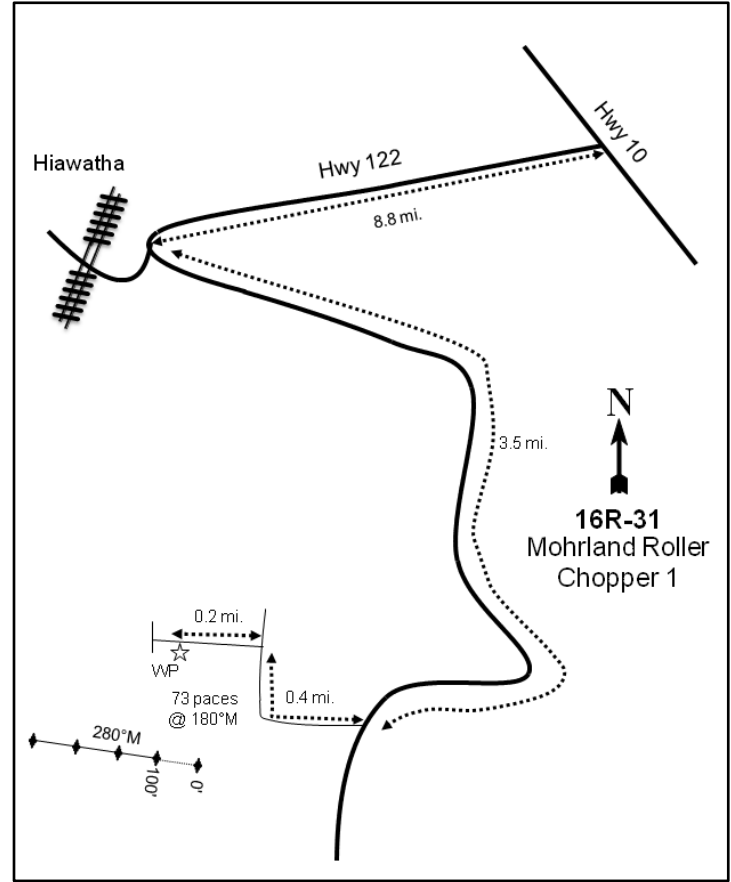
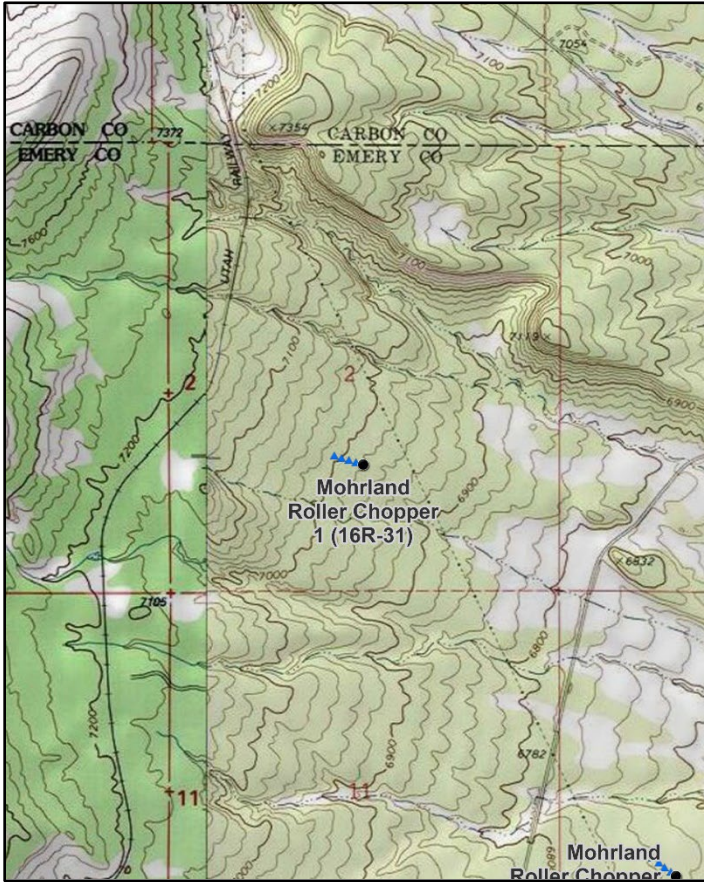
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria parryi -- (Parry's rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	26/44
2023	60	-	33	67	0	0	33	0	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2006	3560	40	12	84	3	0	0	1	15/19
2009	-	-	-	-	-	-	-	-	19/26
2012	480	-	21	79	0	0	0	0	12/16
2018	9600	-	2	98	0	0	0	0	11/15
2023	1460	-	10	90	0	0	0	0	-/-
Juniperus scopulorum^t -- (Rocky Mountain juniper)									
2006	40	20	0	100	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Mahonia repens -- (creeping barberry)									
2006	3980	40	12	88	0	0	0	0	7/10
2009	-	-	-	-	-	-	-	-	8/10
2012	2440	-	0	100	0	0	0	3	8/12
2018	2260	20	12	84	4	0	0	13	6/7
2023	5140	-	1	99	0	0	0	0	-/-
Pinus edulis^t -- (twoneedle pinyon)									
2006	220	60	73	27	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	-/-
2012	80	20	75	25	0	0	0	0	-/-
2018	80	-	100	0	0	0	0	0	-/-
2023	140	20	100	0	0	0	0	0	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2012	20	-	100	0	0	100	0	0	-/-
2018	20	-	0	100	0	100	0	0	13/35
2023	20	-	100	0	0	0	100	0	-/-
Symphoricarpos oreophilus^p -- (mountain snowberry)									
2006	120	20	17	83	0	0	0	0	20/32
2009	-	-	-	-	-	-	-	-	17/33
2012	80	-	0	100	0	0	0	0	26/48
2018	60	-	0	100	0	0	0	0	21/50
2023	120	20	0	100	0	0	17	0	-/-
Tetradymia canescens -- (spineless horsebrush)									
2006	160	-	38	13	50	13	0	38	23/41
2009	-	-	-	-	-	-	-	-	24/39
2012	260	20	54	46	0	23	15	0	22/38
2018	60	-	0	100	0	33	0	0	23/45
2023	380	-	37	58	5	26	0	0	-/-

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

Table 16R-25.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2006	24	33	44	-	11	11	6.4
2009	17	9	91	-	-	-	2.0
2012	23	14	79	7	-	-	3.5
2018	24	-	85	15	-	-	4.3
2023	34	19	56	25	-	-	5.2
Pinus edulis (twoneedle pinyon)							
2006	280	25	40	20	10	5	5.6
2009	58	67	33	-	-	-	2.0
2012	87	58	42	-	-	-	2.1
2018	88	5	74	21	-	-	3.6
2023	98	-	68	32	-	-	4.5

MOHRLAND ROLLER CHOPPER 1 - STUDY NO. 16R-31



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Poison Spring Bench ; Township 16S, Range 8E, Section 02
NAD 83 UTM ZONE 12, 500581 East 4367603 North

Transect Information

Browse Tag # (0' Stake)	262
Transect Bearing	280° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

From SR-10, turn onto SR-122 and drive 8.8 miles to a road on the left just before the railroad crossing near Hiawatha. Continue on this road for 3.5 miles to a fork and bear right. Drive 0.4 miles to a road on the left and go 0.2 miles to the half-high witness post on the left (south) side of the road. The 0-foot stake is 73 paces from the witness post at 180 degrees magnetic and is marked with browse tag #262.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,979ft (2,127m)
Aspect	Southeast
Slope	6%
Sample Dates	07/23/2008, 07/05/2011, 07/31/2014, 08/14/2018, 08/17/2023

Table 16R-31.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Unknown	Poison Spring Bench Seeding	LTDL	1970	-
Seeding - Aerial Before	Poison Spring Bench Seeding	LTDL	1970	4995
Mechanical - Roller Chopper	Mohrland PJ Removal	1083	October-December 2008	743
Seeding - Aerial Before	Mohrland PJ Removal	1083	October 2008	743
Seeding - Dribbler	Mohrland PJ Removal	1083	October-December 2008	743

Table 16R-31.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mohrland PJ Removal			Aerial	Oct 2008	847
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.30	0.27
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.77	0.62
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.47	0.44
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.24	0.21
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.30	0.25
G	Elymus elymoides	Bottlebrush Squirreltail	Emery UT	0.18	0.15
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.76
G	Hesperostipa comata	Needle and Threadgrass	Custer CO	0.24	0.18
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.48	1.38
G	Poa secunda	Canby Bluegrass	Canbar	0.47	0.41
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	1.06	0.93
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.89	1.66
F	Achillea millefolium	Western Yarrow		0.06	0.06
F	Linum perenne	Blue Flax	Appar	0.53	0.44
F	Sphaeralcea coccinea	Scarlet Globemallow	Duchesne/Uintah UT	0.02	0.02
S	Atriplex canescens	Fourwing Saltbush	Central UT	0.59	0.25

Mix Name			Application Type	Application Date	Acres
Mohrland PJ Removal Dribbler			Dribbler	Oct 2008	847
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Central UT	0.41	0.18
S	Cercocarpus montanus	True Mountain Mahogany	Sevier UT	0.03	0.02

Wildlife Habitat and Vegetation History

Table 16R-31.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 16R-31.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Pinyon-Juniper/Black Sagebrush	Phase I transitioning to Phase II
2011	Black Sagebrush	Phase I
2014	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I
2023	Black Sagebrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Gravelly Loam (Black Sagebrush)
 NRCS Ecological Site # R047XB306UT
 States and Transitions No state and transition model is available for this ecological site.

The dominant shrub species on this site has been black sagebrush (*Artemisia nova*) since study establishment in 2008. Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were present in moderate amounts in 2008, and the study was

considered to be within Phase I transitioning to Phase II of woodland succession. A roller chopper and seeding treatment later in 2008 removed most of the trees, and the site has been classified as being within Phase I since 2011 (Table 16R-31.1, Table 16R-31.4, Table 16R-31.12, Table 16R-31.13, Table 16R-31.14). The herbaceous component was initially sparse. Although the understory exhibited an increase during the first sampling following treatment (mainly due to perennial grasses), it decreased during each subsequent sample year through 2018. In 2023, herbaceous cover increased again, but this was primarily due to the weedy introduced annual forb species prickly Russian thistle (*Salsola tragus*) (Table 16R-31.7, Table 16R-31.10, Table 16R-31.11). Density of trees was low in 2023 (Table 16R-31.14), but their continued presence indicates that this site may be at risk of infilling in the future.

Deer winter range condition on this site has ranged between poor and fair since study establishment, and was considered to be poor in 2023. Improvements to deer winter range could be accomplished through efforts that increase preferred browse cover and reproduction while decreasing decadence. Diversifying and increasing cover of perennial grasses and forbs would also improve winter range (Table 16R-31.15). Pellet group data indicates that deer presence has been moderate in all sample years except 2023, when it was considered to be low. Elk presence has also ranged between low and moderate, and was low in 2023 (Table 16R-31.9). However, the sagebrush component of this site could provide browse for elk during the winter months (Table 16R-31.3; Wambolt, 1996).

Trend Summary Tables

Table 16R-31.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	12.8	1.7	8.9	14.4	2.1	13.3
2011	10.1	2.0	0.7	9.0	2.9	0.7
2014	8.0	1.9	0.5	8.3	1.6	0.8
2018	9.2	2.8	0.8	11.5	2.8	0.6
2023	14.8	4.4	1.6	16.7	3.7	0.8

Table 16R-31.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	-	71	17	49	-	0.3	0.1	1.5
2011	11	241	129	34	0.2	9.8	2.7	0.9
2014	3	261	54	15	0.0	8.2	0.2	0.1
2018	-	232	44	21	-	4.9	0.4	0.2
2023	6	194	253	59	0.0	4.5	7.3	0.7

Table 16R-31.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	40.3	0.1	37.2	7.9	7.3	26.0
2011	26.1	0.1	32.0	7.0	8.1	28.9
2014	39.3	-	38.2	9.8	10.1	18.6
2018	38.2	-	37.4	15.4	10.7	17.3
2023	35.0	-	25.6	14.3	9.6	30.6

Table 16R-31.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2008	3	41	1	-	54
2011	2	15	4	-	8
2014	1	16	6	-	37
2018	2	18	16	-	42
2023	3	30	7	-	6
Year	Days Use Per Acre (ha)				
2008	2.2 (5.4)	34.2 (84.4)	2.7 (6.6)	-	-
2011	-	34.2 (84.4)	21.5 (53.0)	-	-
2014	18.1 (44.8)	30.2 (74.5)	24.1 (59.6)	-	-
2018	8.0 (19.7)	26.2 (64.6)	29.5 (72.8)	-	-
2023	7.2 (17.9)	12.1 (29.8)	3.4 (8.3)	0.6 (1.4)	-

Table 16R-31.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency											
Achnatherum hymenoides (Indian ricegrass)												
Agropyron cristatum ⁱ (crested wheatgrass)												
Bromus arvensis ^{ai} (field brome)												
Bromus tectorum ^{ai} (cheatgrass)												
Elymus elymoides (squirreltail)												
Elymus wawawaiensis (Snake River wheatgrass)												
Hesperostipa comata (needle and thread)												
Pascopyrum smithii (western wheatgrass)												
Poa fendleriana (muttongrass)												
Poa secunda (Sandberg bluegrass)												
Thinopyrum intermedium ⁱ (intermediate wheatgrass)												
year	Average Cover (%)											
2008	-	71	-	-	-	-	-	-	-	-	-	-
2011	14	146	7	4	12	4	-	29	-	1	143	
2014	5	244	3	-	-	-	-	11	1	4	37	
2018	8	199	-	-	-	-	5	-	-	1	42	
2023	11	164	1	5	-	-	2	11	-	-	23	
year	Average Cover (%)											
2008	-	0.3	-	-	-	-	-	-	-	-	-	-
2011	0.2	4.6	0.2	0.0	0.2	0.0	-	1.1	-	0.0	3.6	
2014	0.0	7.4	0.0	-	-	-	-	0.1	0.1	0.0	0.5	
2018	0.1	4.3	-	-	-	-	0.0	-	-	0.0	0.6	
2023	0.4	3.8	0.0	0.0	-	-	0.0	0.2	-	-	0.1	

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

Table 16R-31.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Arabis (rockerness)																		
Astragalus convallarius (lesser rushy milkvetch)																		
Chamaesyce fendleri (Fendler's sandmat)																		
Chenopodium atrovirens ^a (pinyon goosefoot)																		
Descurainia pinnata ^a (western tansymustard)																		
Eriogonum cernuum ^a (nodding buckwheat)																		
Eriogonum jamesii (James' buckwheat)																		
Ipomopsis aggregata (scarlet gilia)																		
Lactuca serriola ^{ai} (prickly lettuce)																		
Lappula occidentalis ^a (flatspine stickseed)																		
Linum perenne ⁱ (blue flax)																		
Machaeranthera canescens (hoary tansyaster)																		
Packera multilobata (lobeleaf groundsel)																		
Penstemon (beardtongue)																		
Phlox austromontana (mountain phlox)																		
Physaria (twinpod)																		
Salsola tragus ^{ai} (prickly Russian thistle)																		
year	Average Cover (%)																	
2008	1	5	38	-	-	17	-	1	-	-	-	-	-	1	3	-	-	2
2011	-	7	23	-	12	17	-	-	5	-	2	2	-	-	-	-	-	109
2014	-	-	14	-	8	-	-	-	-	-	-	1	-	-	-	-	-	48
2018	-	1	12	-	12	3	-	-	-	2	-	-	-	-	-	3	-	27
2023	-	10	20	27	8	31	5	8	-	56	2	2	-	1	-	8	-	237
year	Average Cover (%)																	
2008	0.0	0.1	1.3	-	-	0.1	-	0.0	-	-	-	-	0.0	0.0	-	-	-	0.0
2011	-	0.2	0.7	-	0.4	0.2	-	-	0.0	-	0.0	0.0	-	-	-	-	-	2.0
2014	-	-	0.1	-	0.0	-	-	-	-	-	-	0.0	-	-	-	-	-	0.2
2018	-	0.0	0.2	-	0.3	0.0	-	-	-	0.0	-	-	-	-	-	0.0	-	0.1
2023	-	0.2	0.2	0.1	0.1	0.5	0.1	0.0	-	0.7	0.0	0.1	-	0.0	-	0.0	-	6.0

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

FORB SPECIES		
	Sisymbrium altissimum ^{ai} (tall tumblemustard)	
	Sphaeralcea coccinea (scarlet globemallow)	
year	Nested	
2008	-	-
2011	6	-
2014	-	-
2018	-	5
2023	-	3
year	Average Cover (%)	
2008	-	-
2011	0.0	-
2014	-	-
2018	-	0.0
2023	-	0.0

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

Table 16R-31.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES									
Artemisia nova ^p (black sagebrush)									
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)									
Cercocarpus montanus ^p (alderleaf mountain mahogany)									
Ericameria nauseosa (rubber rabbitbrush)									
Gutierrezia sarothrae (broom snakeweed)									
Juniperus osteosperma ^t (Utah juniper)									
Linanthus pungens (granite prickly phlox)									
Opuntia (pricklypear)									
Pinus edulis ^t (twoneedle pinyon)									
year	Line Intercept Cover (%)								
2008	13.8	-	0.6	1.9	-	7.1	-	0.2	6.2
2011	8.8	0	0.2	2.1	0.5	0.7	-	0.3	-
2014	8.3	-	-	1.3	0.2	0.8	-	0.1	-
2018	11.5	-	-	1.5	1.2	0.6	-	0.1	-
2023	16.7	-	-	2.5	1.2	0.8	-	-	-
year	Quadrat Cover (%)								
2008	12.7	-	0.1	1.6	0.0	5.9	0.0	0.0	3.0
2011	10.1	0.0	0.0	1.1	0.8	0.7	0.1	0.0	0.0
2014	8.0	-	-	1.1	0.8	0.5	0.0	0.0	-
2018	9.2	-	-	1.1	1.7	0.8	-	0.0	-
2023	14.8	-	-	1.9	2.4	1.6	0.1	-	-

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

Table 16R-31.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	67/93
2018	20	-	100	0	0	0	100	0	53/79
2023	40	-	0	100	0	0	100	0	-/-
Artemisia nova^P -- (black sagebrush)									
2008	8620	2940	23	42	35	32	12	6	23/59
2011	4440	1340	25	72	3	69	9	5	24/44
2014	7000	380	22	74	4	37	46	3	22/43
2018	6140	340	17	72	11	24	5	6	19/45
2023	6020	940	8	83	9	9	22	9	-/-
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	20	-	0	100	0	0	0	0	24/24
2014	-	-	-	-	-	-	-	-	13/34
2018	-	-	-	-	-	-	-	-	21/42
2023	-	-	-	-	-	-	-	-	-/-
Bassia prostrata^{Pi} -- (forage kochia)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	12/8
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2008	40	-	0	100	0	100	0	0	105/124
2011	20	-	100	0	0	100	0	0	66/94
2014	40	-	0	100	0	0	0	0	28/35
2018	-	-	-	-	-	-	-	-	38/60
2023	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	200	-	10	90	0	0	0	10	65/100
2011	240	-	33	58	8	25	0	8	34/52
2014	460	-	4	74	22	9	13	26	47/61
2018	540	-	15	85	0	7	11	0	56/69
2023	320	100	0	69	31	13	0	31	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2008	800	20	10	83	8	0	5	8	16/15
2011	280	-	43	50	7	0	0	7	22/26
2014	1340	40	5	96	0	0	0	0	14/16
2018	5520	-	26	73	1	0	0	1	13/16
2023	9740	1240	68	31	1	0	0	2	-/-
Juniperus osteosperma¹ -- (Utah juniper)									
2008	180	-	22	78	0	0	0	0	-/-
2011	20	20	0	100	0	0	0	0	-/-
2014	100	40	60	0	40	0	20	20	-/-
2018	100	20	60	40	0	0	0	0	-/-
2023	140	-	86	14	0	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 (%)				
Linanthus pungens -- (granite prickly phlox)									
2008	120	-	50	33	17	0	0	0	5/9
2011	40	20	0	100	0	0	0	0	8/21
2014	20	20	0	0	100	0	100	100	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	80	-	25	75	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2008	40	-	0	100	0	0	0	0	7/37
2011	20	-	0	100	0	0	0	0	8/21
2014	-	-	-	-	-	-	-	-	8/21
2018	60	-	0	100	0	0	0	0	8/25
2023	40	-	50	50	0	50	0	50	- / -
Pinus edulis -- (twoneedle pinyon)									
2008	20	-	0	100	0	0	0	0	- / -
2011	-	20	0	0	0	0	0	0	- / -

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

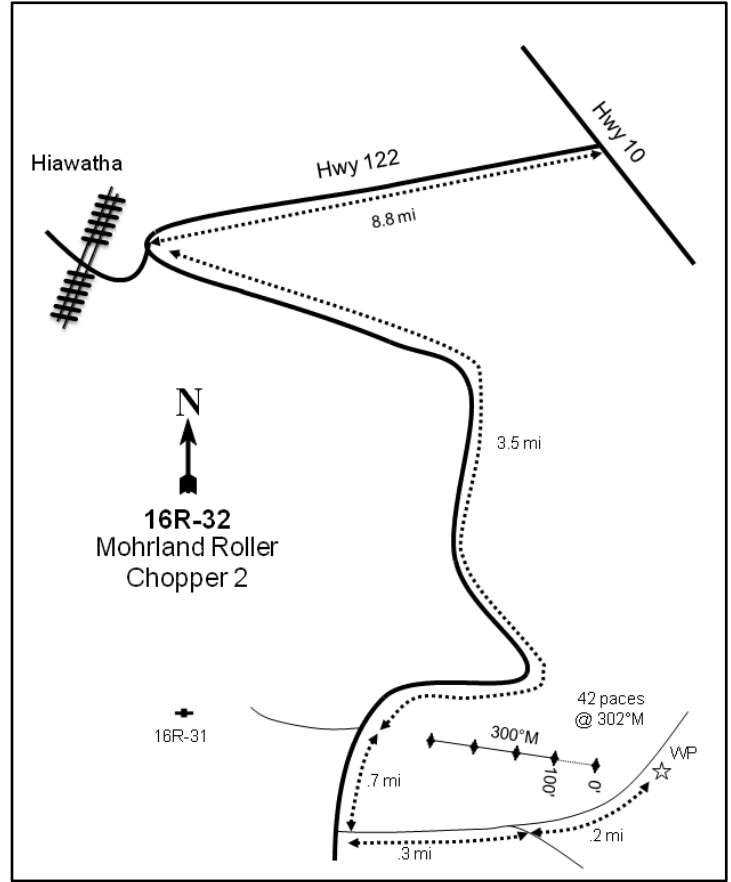
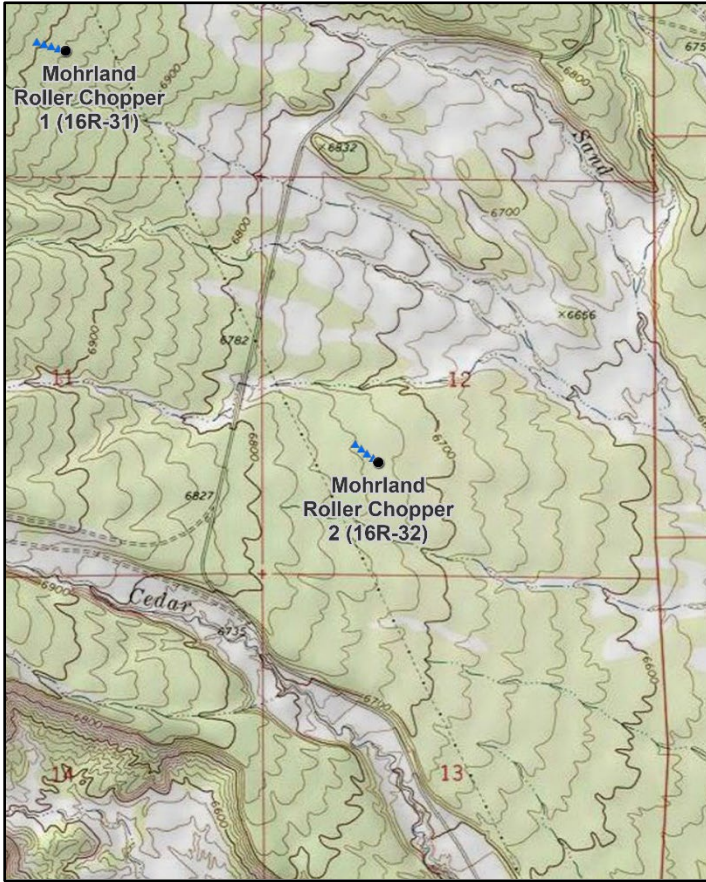
Table 16R-31.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	107	5	25	40	15	15	12.1
2011	41	-	80	20	-	-	5.1
2014	42	-	100	-	-	-	8.0
2018	48	6	67	28	-	-	6.9
2023	64	12	59	29	-	-	5.1
Pinus edulis (twoneedle pinyon)							
2008	46	-	12	41	41	6	16.6
2011	4	-	100	-	-	-	3.5
2014	6	-	100	-	-	-	5.0
2018	10	-	100	-	-	-	5.0
2023	4	-	67	33	-	-	4.3

Table 16R-31.15 - 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	18.2	4.9	11.1	0.5	0.0	2.9	0.0	37.7	Poor
2011	11.3	14.1	13.4	19.5	-0.1	1.8	0.0	60.0	Fair
2014	10.4	13.8	11.2	16.5	0.0	0.2	0.0	52.0	Poor-Fair
2018	14.4	11.7	8.7	9.9	0.0	0.4	0.0	44.9	Poor
2023	20.9	12.4	4.2	9.0	0.0	1.4	0.0	47.8	Poor

MOHRLAND ROLLER CHOPPER 2 - STUDY NO. 16R-32



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Poison Spring Bench ; Township 16S, Range 8E, Section 12
NAD 83 UTM ZONE 12, 501846 East 4365934 North

Transect Information

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

254
300° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Standard

Directions to Site

From SR-10, turn onto SR-122 and drive 8.8 miles to a road on the left just before the railroad crossing near Hiawatha. Continue on this road for 3.5 miles to the fork that leads to 16R-31. Continue straight for 0.7 miles to a left turn and follow this road for 0.3 miles to a fork. Bear left and drive 0.2 miles to the witness post on the right (southeast) side of the road. The 0-foot stake is 42 paces from the witness post at 302 degrees magnetic and is marked with browse tag #254.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,732ft (2,052m)
Aspect	East
Slope	5-9%
Sample Dates	07/23/2008, 07/05/2011, 07/31/2014, 08/13/2018, 08/17/2023

Table 16R-32.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Unknown	Poison Spring Bench Seeding	LTDL	1970	4995
Seeding - Aerial Before	Poison Spring Bench Seeding	LTDL	1970	4995
Mechanical - Roller Chopper	Mohrland PJ Removal	1083	October-December 2008	743
Seeding - Aerial Before	Mohrland PJ Removal	1083	October 2008	743
Seeding - Dribbler	Mohrland PJ Removal	1083	October-December 2008	743

Table 16R-32.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mohrland PJ Removal			Aerial	Oct 2008	847
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.30	0.27
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.77	0.62
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.47	0.44
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.24	0.21
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.30	0.25
G	Elymus elymoides	Bottlebrush Squirreltail	Emery UT	0.18	0.15
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.76
G	Hesperostipa comata	Needle and Threadgrass	Custer CO	0.24	0.18
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.48	1.38
G	Poa secunda	Canby Bluegrass	Canbar	0.47	0.41
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	1.06	0.93
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.89	1.66
F	Achillea millefolium	Western Yarrow		0.06	0.06
F	Linum perenne	Blue Flax	Appar	0.53	0.44
F	Sphaeralcea coccinea	Scarlet Globemallow	Duchesne/Uintah UT	0.02	0.02
S	Atriplex canescens	Fourwing Saltbush	Central UT	0.59	0.25

Mix Name			Application Type	Application Date	Acres
Mohrland PJ Removal Dribbler			Dribbler	Oct 2008	847
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Central UT	0.41	0.18
S	Cercocarpus montanus	True Mountain Mahogany	Sevier UT	0.03	0.02

Wildlife Habitat and Vegetation History

Table 16R-32.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 16R-32.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Black Sagebrush	Phase I transitioning to Phase II
2011	Black Sagebrush	Phase I
2014	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I
2023	Black Sagebrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Upland Loam (Black Sagebrush)
 NRCS Ecological Site # R047XB309UT
 States and Transitions No state and transition model is available for this ecological site.

Since study establishment in 2008, the plant community on this site has been dominated by black sagebrush (*Artemisia nova*). Cover and density of sagebrush decreased following a post-sampling roller chopper and seeding treatment in 2008 (Table 16R-32.1), but

both values have exhibited an overall increase since the initial post-treatment sampling. Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been observed on site since study establishment. Although treatment removed many of these trees, their continued presence indicates that there may be potential for infilling in future sample years (Photos, Table 16R-32.12, Table 16R-32.13, Table 16R-32.14). Perennial grasses have contributed a majority of the herbaceous cover throughout the duration of the study period. The cover of the herbaceous understory increased in 2011 initially following treatment, but has decreased overall since then. Forbs have generally remained rare, but annual forb cover increased by 4% between 2018 and 2023 primarily due to the weedy introduced species prickly Russian thistle (*Salsola tragus*) (Table 16R-32.7, Table 16R-32.10, Table 16R-32.11).

Deer winter range condition on this site has varied between very poor and fair since 2008. In 2023, winter range condition was considered to be fair; condition has improved over time. However, further improvements could be achieved by increasing preferred browse cover and reproduction while decreasing decadence within the population. Diversifying and increasing cover of perennial grasses and forbs would also be beneficial for deer winter range (Table 16R-32.15). Deer presence was considered to be low in 2023 according to pellet transect data, and elk pellet groups were not observed in 2018 or 2023 (Table 16R-32.9). However, the sagebrush component of this site could provide browse for elk during the winter (Table 16R-32.3; Wambolt, 1996).

Trend Summary Tables

Table 16R-32.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	17.0	-	5.3	20.1	-	9.5
2011	6.0	-	0.0	9.1	-	0.5
2014	6.3	-	0.1	9.9	-	0.9
2018	11.1	0.4	0.0	12.0	0.3	1.0
2023	12.4	0.4	0.6	18.9	0.4	1.9

Table 16R-32.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	-	84	16	20	-	0.8	0.1	0.1
2011	3	248	99	37	0.0	12.1	1.8	0.5
2014	-	263	45	13	-	7.2	0.3	0.1
2018	-	233	55	25	-	5.6	0.3	0.3
2023	2	203	196	20	0.0	6.3	4.3	0.5

Table 16R-32.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	39.5	0.2	26.6	25.3	3.0	23.7
2011	29.9	-	29.2	15.4	4.4	23.5
2014	41.5	0.0	33.1	14.1	7.9	13.0
2018	33.4	0.0	34.9	32.4	6.8	15.1
2023	32.8	-	26.6	26.6	5.5	22.8

Table 16R-32.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2008	-	45	1	-	47
2011	-	6	3	-	3
2014	4	9	8	-	44
2018	1	9	1	-	29
2023	4	27	-	-	5
Year	Days Use Per Acre (ha)				
2008	5.1 (12.6)	29.5 (72.8)	1.3 (3.3)	-	-
2011	2.9 (7.2)	16.8 (41.4)	8.1 (19.9)	-	-
2014	16.7 (41.2)	8.7 (21.5)	10.7 (26.5)	-	-
2018	0.7 (1.8)	26.2 (64.6)	-	0.6 (1.4)	-
2023	3.6 (9.0)	10.0 (24.8)	-	-	-

Table 16R-32.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency											
Achnatherum hymenoides (Indian ricegrass)	-	84	-	-	-	-	-	-	-	-	-	-
Agropyron cristatum ⁱ (crested wheatgrass)	33	167	0	3	18	7	1	11	-	2	114	-
Bromus arvensis ^{ai} (field brome)	16	239	-	-	5	-	-	3	-	-	32	-
Bromus tectorum ^{ai} (cheatgrass)	19	206	-	-	1	-	-	15	-	2	17	-
Elymus elymoides (squirreltail)	2023	4	181	-	-	1	-	-	5	3	13	2
Elymus wawawaiensis (Snake River wheatgrass)	Average Cover (%)											
Hesperostipa comata (needle and thread)	2008	-	0.8	-	-	-	-	-	-	-	-	-
Pascopyrum smidhii (western wheatgrass)	2011	0.8	7.3	0.0	0.0	0.3	0.1	0.0	0.1	-	0.1	3.4
Poa secunda (Sandberg bluegrass)	2014	0.3	6.1	-	-	0.0	-	-	0.0	-	-	0.9
Psathyrostachys juncea ⁱ (Russian wildrye)	2018	0.1	5.2	-	-	0.0	-	-	0.1	-	0.0	0.1
Thinopyrum intermedium ⁱ (intermediate wheatgrass)	2023	0.0	5.7	-	-	0.0	-	-	0.0	0.0	0.2	0.3
Vulpia octoflora ^a (sixweeks fescue)	Average Cover (%)											
	2008	-	0.8	-	-	-	-	-	-	-	-	-
	2011	0.8	7.3	0.0	0.0	0.3	0.1	0.0	0.1	-	0.1	3.4
	2014	0.3	6.1	-	-	0.0	-	-	0.0	-	-	0.9
	2018	0.1	5.2	-	-	0.0	-	-	0.1	-	0.0	0.1
	2023	0.0	5.7	-	-	0.0	-	-	0.0	0.0	0.2	0.3

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

Table 16R-32.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Caulanthus crassicaulis ^a (thickstem wild cabbage)	-	16	-	4	-	14	-	-	-	-	-	-	-	-	-	-	-
Chamaesyce fendleri (Fendler's sandmat)	-	26	2	-	26	6	-	2	1	-	7	4	-	2	-	-	1
Chenopodium fremontii ^a (Fremont's goosefoot)	-	9	-	-	-	3	-	-	-	-	-	-	-	-	-	-	3
Cryptantha (cryptantha)	-	12	-	10	15	5	-	1	-	-	3	-	-	-	-	-	1
Descurainia pinnata ^a (western tansymustard)	2023	1	8	3	3	-	3	7	-	2	2	-	-	1	-	1	2
Eriogonum cernuum ^a (nodding buckwheat)	Average Cover (%)																
Eriogonum jamesii (James' buckwheat)	2008	-	0.1	-	0.0	-	0.1	-	-	-	-	-	-	-	-	-	-
Erodium cicutarium ^{ai} (redstem stork's bill)	2011	-	0.3	0.0	-	0.8	0.0	-	0.0	0.0	-	0.0	0.0	-	0.1	-	0.0
Lactuca serriola ^{ai} (prickly lettuce)	2014	-	0.1	-	-	-	0.0	-	-	-	-	-	-	-	-	-	0.0
Lappula occidentalis ^a (flatspine stickseed)	2018	-	0.2	-	0.1	0.1	0.0	-	0.0	-	0.0	-	-	-	-	-	0.0
Linum perenne ⁱ (blue flax)	2023	0.0	0.1	0.0	0.0	-	0.0	0.3	-	0.0	0.0	-	-	0.0	-	0.0	-
Lithospermum incisum (narrowleaf stoneseed)	Average Cover (%)																
Orobanche fasciculata (clustered broomrape)	2008	-	0.1	-	0.0	-	0.1	-	-	-	-	-	-	-	-	-	-
Penstemon (beardtongue)	2011	-	0.3	0.0	-	0.8	0.0	-	0.0	0.0	-	0.0	0.0	-	0.1	-	0.0
Penstemon comarrhenus (dusty beardtongue)	2014	-	0.1	-	-	-	0.0	-	-	-	-	-	-	-	-	-	0.0
Penstemon pachyphyllus (thickleaf beardtongue)	2018	-	0.2	-	0.1	0.1	0.0	-	0.0	-	0.0	-	-	-	-	-	0.0
Penstemon palmeri (Palmer's penstemon)	2023	0.0	0.1	0.0	0.0	-	0.0	0.3	-	0.0	0.0	-	-	0.0	-	0.0	-

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

FORB SPECIES			
	Salsola tragus ^{ai} (prickly Russian thistle)		
	Sisymbrium altissimum ^{ai} (tall tumblemustard)		
	Streptanthus cordatus (heartleaf twistflower)		
year	Nested Frequency		
2008	4	-	-
2011	78	3	-
2014	42	-	1
2018	41	-	-
2023	185	5	-
year	Average Cover (%)		
2008	0.0	-	-
2011	0.7	0.1	-
2014	0.3	-	0.0
2018	0.1	-	-
2023	3.8	0.4	-

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

Table 16R-32.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES							
	Artemisia nova ^p (black sagebrush)		Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)						
2008	20.1	-	-	0.7	-	8.8	
2011	9.1	-	-	0.5	-	0	
2014	9.9	-	-	0.7	-	0.2	
2018	12	-	0.3	0.7	-	0.3	
2023	18.9	-	0.4	1.9	-	-	
year	Quadrat Cover (%)						
2008	17.0	-	-	1.1	-	4.2	
2011	6.0	-	-	0.0	-	0.0	
2014	6.3	-	-	0.0	-	0.0	
2018	11.1	-	0.4	0.0	0.0	0.0	
2023	12.4	0.0	0.4	0.6	-	-	

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

Table 16R-32.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^P -- (black sagebrush)									
2008	8860	3460	6	60	34	27	7	9	19/51
2011	4580	220	21	68	11	51	7	9	22/44
2014	6340	200	14	77	10	39	44	5	22/47
2018	6140	900	10	77	13	19	4	9	20/45
2023	6700	260	16	70	14	10	31	16	- / -
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	37/38
2014	-	-	-	-	-	-	-	-	34/49
2018	-	-	-	-	-	-	-	-	44/62
2023	-	-	-	-	-	-	-	-	-/-
Atriplex canescens^P -- (fourwing saltbush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	51/58
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	65/60
2023	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2008	160	-	0	100	0	0	0	0	15/16
2011	-	-	-	-	-	-	-	-	21/23
2014	-	-	-	-	-	-	-	-	17/22
2018	520	-	19	81	0	0	0	0	15/19
2023	560	-	29	71	0	0	0	0	- / -
Juniperus osteosperma¹ -- (Utah juniper)									
2008	240	-	100	0	0	0	0	0	- / -
2011	20	20	0	100	0	0	0	0	- / -
2014	120	-	100	0	0	17	0	17	- / -
2018	140	-	86	14	0	0	0	0	- / -
2023	140	-	43	57	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2008	-	-	-	-	-	-	-	-	8/42
2011	-	-	-	-	-	-	-	-	-/-
2014	20	-	0	100	0	0	0	0	7/21
2018	20	-	0	100	0	0	0	0	10/33
2023	20	-	0	0	100	0	0	100	- / -
Pinus edulis¹ -- (twoneedle pinyon)									
2008	200	-	20	80	0	0	0	0	- / -
2011	20	-	100	0	0	0	0	0	- / -
2014	20	-	0	100	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Rhus trilobata^p -- (skunkbush sumac)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	58/124

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

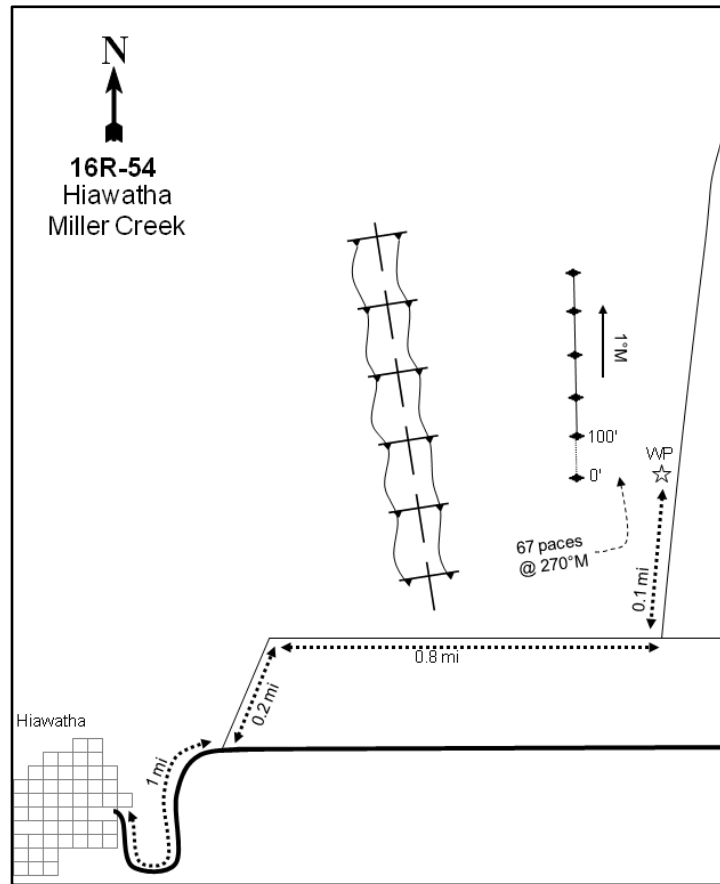
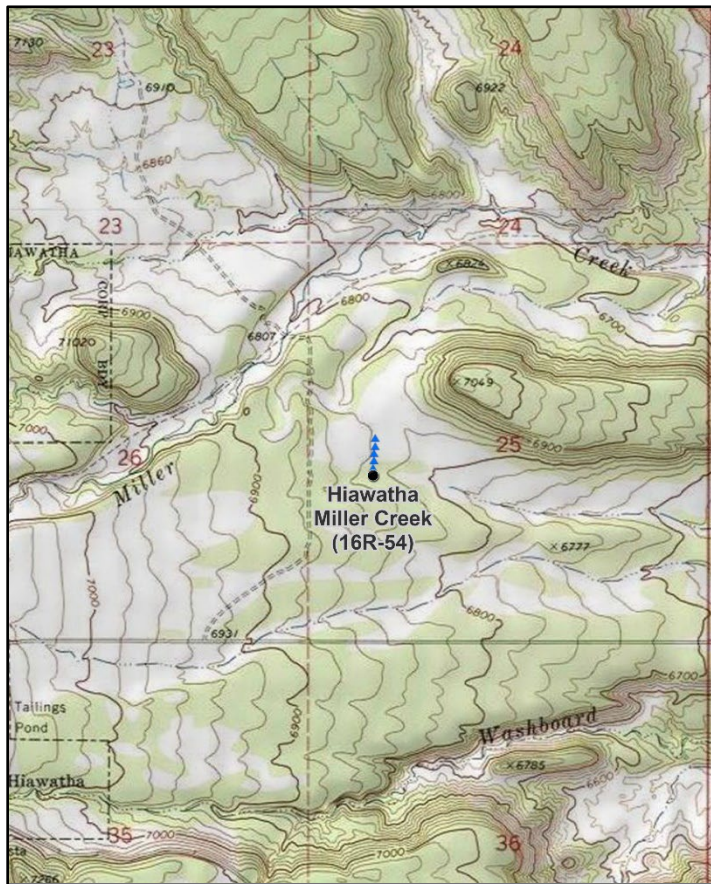
Table 16R-32.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	122	-	85	15	-	-	6.3
2011	64	-	100	-	-	-	4.2
2014	110	-	95	5	-	-	6.7
2018	105	5	85	10	-	-	5.0
2023	96	5	63	32	-	-	5.3
Pinus edulis (twoneedle pinyon)							
2008	156	-	25	60	15	-	11.2
2011	25	-	100	-	-	-	3.7
2014	28	7	87	7	-	-	6.5
2018	32	-	73	27	-	-	6.0
2023	25	-	43	57	-	-	5.6

Table 16R-32.15 - 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	25.1	4.8	3.1	1.6	0.0	0.3	0.0	34.8	Very Poor-Poor
2011	11.4	11.9	10.7	24.2	0.0	1.1	0.0	59.2	Fair
2014	12.4	12.1	6.8	14.5	0.0	0.2	0.0	45.8	Poor
2018	15.0	11.1	5.2	11.3	0.0	0.6	0.0	43.2	Poor
2023	23.6	10.8	7.9	12.5	0.0	1.0	0.0	55.9	Fair

HIAWATHA MILLER CREEK - STUDY NO. 16R-54



Location Information

USGS 7.5 min Map Info Poison Spring Bench ; Township 15S, Range 8E, Section 25
 GPS (0' Stake) NAD 83 UTM ZONE 12, 501579 East 4371173 North

Transect Information

Browse Tag # (0' Stake) 523
 Transect Bearing 355° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

From Hiawatha, continue east on SR-122. After 1.0 miles, turn left (north) and continue driving for 0.2 miles; the road will curve to the right (east). Follow the road right and drive for 0.8 miles after this curve. Just after passing under some powerlines, there will be a road to the left (north). Follow this road for 0.1 miles and park. The site will be 67 paces from the road at 270 degrees magnetic; there is no witness post.

Site Information

Land Ownership Private
 Land Administrator Private
 Allotment No data
 Elevation 6,824ft (2,080m)
 Aspect East
 Slope 1%
 Sample Dates 08/05/2015, 08/14/2018, 08/16/2023

Table 16R-54.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Hiawatha/Miller Creek Phase 2	3365	December 2015-March 2016	486
Seeding - Aerial Before	Hiawatha/Miller Creek Phase 2	3365	December 2015-March 2016	486

Table 16R-54.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hiawatha 2			Aerial	Aug 2015	486
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	White River	1.03	0.96
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.93	0.83
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.03	0.91
G	Poa secunda	Canby Bluegrass	Canbar	0.51	0.43
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.10	0.09
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.82	0.80
F	Cleome serrulata	Rocky Mountain Beeplant	Sevier UT	0.21	0.17
F	Cleome serrulata	Rocky Mountain Beeplant	Wayne UT	0.52	0.51
F	Linum perenne	Blue Flax	Appar	1.03	0.86
F	Medicago sativa	Alfalfa	Ladak +	1.44	1.34
F	Melilotus officinalis	Yellow Sweetclover		1.03	0.98
F	Onobrychis viciifolia	Sainfoin	Eski	1.54	1.50
F	Sanguisorba minor	Small Burnet		1.03	0.85
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Sanpete UT	0.21	0.18
S	Atriplex canescens	Fourwing Saltbush	Juab/Carbon UT	1.03	0.41

Mix Name			Application Type	Application Date	Acres
Hiawatha 2 Sagebrush			Aerial	Dec 2015	486
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.31	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.62	0.10
S	Bassia prostrata	Forage Kochia	Millard/Beaver UT	0.51	0.38
S	Bassia prostrata	Forage Kochia	Snowstorm	0.35	0.12

Wildlife Habitat and Vegetation History

Table 16R-54.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	crucial	winter
Greater Sage-Grouse		

Table 16R-54.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Pinyon-Juniper/Mountain Big Sagebrush	Phase II
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
 NRCS Ecological Site # R047XB308UT
 States and Transitions No state and transition model is available for this ecological site.

Upon study establishment in 2015, this site was a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) shrubland that had been encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase II of woodland succession. A bullhog and seeding treatment removed a majority of the trees, leaving sagebrush as the dominant vegetation component in both post-treatment sample years (Table 16R-54.1, Table 16R-54.4, Table 16R-54.12, Table 16R-54.13, Table 16R-54.14). The herbaceous understory was lacking in both diversity and abundance in 2015, but diversity was slightly

augmented by treatment. In 2023, a majority of the herbaceous cover was provided by native annual forbs such as flatspine stickseed (*Lappula occidentalis*) and Rocky Mountain beeplant (*Cleome serrulata*). The introduced annual grass species cheatgrass (*Bromus tectorum*) was observed during both post-treatment samplings, but in very low amounts (Table 16R-54.7, Table 16R-54.10, Table 16R-54.11). Although density of trees was low in 2023 (Table 16R-54.14), their continued presence indicates that this site may be at risk of being infilled in future sample years.

Deer winter range condition on this site has ranged between very poor and fair since 2015, and was considered to be fair in 2023. Winter range condition has improved following treatment. However, further improvements could be achieved through efforts that increase preferred browse cover while decreasing decadence in the population. Increasing perennial grass and forb cover while removing cheatgrass and the noxious weed species nodding plumeless thistle (*Carduus nutans*) would also be beneficial for deer wintering range (Table 16R-54.15). Pellet transect data shows that deer presence has decreased over time and that no elk pellet groups have been observed in any sample year (Table 16R-54.9). However, the sagebrush component of this site could provide browse for elk during the winter months (Table 16R-54.3; Wambolt, 1996).

Trend Summary Tables

Table 16R-54.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2015	4.9	0.9	3.9	5.0	1.0	13.9
2018	5.7	1.4	-	5.7	1.1	-
2023	11.3	5.2	-	14.0	6.7	-

Table 16R-54.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2015	-	204	5	36	-	6.6	0.0	0.2
2018	4	174	29	48	0.0	5.5	0.3	0.5
2023	13	160	174	60	0.1	4.1	5.4	0.8

Table 16R-54.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2015	62.0	6.3	24.2	0.2	1.3	17.0
2018	48.6	1.2	48.2	1.0	1.6	12.4
2023	42.1	0.4	40.6	0.5	0.6	24.2

Table 16R-54.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2015	-	45	28
2018	1	33	28
2023	9	42	2
Year	Days Use Per Acre (ha)		
2015	-	79.8 (197.0)	-
2018	3.6 (9.0)	46.2 (114.2)	-
2023	5.1 (12.6)	17.4 (43.0)	-

Table 16R-54.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES								
Achnatherum hymenoides (Indian ricegrass)								
Agropyron cristatum ⁱ (crested wheatgrass)								
Agropyron fragile ⁱ (Siberian wheatgrass)								
Bouteloua gracilis (blue grama)								
Bromus tectorum ^{ai} (cheatgrass)								
Elymus elymoides (squirreltail)								
Hesperostipa comata (needle and thread)								
Sporobolus cryptandrus (sand dropseed)								
year	Nested Frequency							
2015	20	-	-	125	-	42	50	3
2018	44	1	2	74	4	26	34	5
2023	21	7	-	100	13	12	17	19
year	Average Cover (%)							
2015	0.4	-	-	4.3	-	0.8	1.0	0.0
2018	0.4	0.0	0.0	4.2	0.0	0.6	0.4	0.0
2023	0.3	0.1	-	3.3	0.1	0.1	0.2	0.2

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

Table 16R-54.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Achillea millefolium (Common yarrow)																		
Astragalus (milkvetch)																		
Astragalus cicer ^a (chickpea milkvetch)																		
Astragalus convallarius (lesser rushy milkvetch)																		
Astragalus tenellus (looseflower milkvetch)																		
Carduus nutans ^{smi} (nodding plumeless thistle)																		
Chenopodium atrovirens ^a (pinyon goosefoot)																		
Chenopodium leptophyllum ^a (narrowleaf goosefoot)																		
Cleome serrulata ^a (Rocky Mountain beplant)																		
Comandra umbellata (bastard toadflax)																		
Descurainia pinnata ^a (western tansymustard)																		
Eriogonum cernuum ^a (nodding buckwheat)																		
Gayophytum ramosissimum ^a (pinyon groundsmoke)																		
Gilia inconspicua ^a (shy gilia)																		
Ipomopsis aggregata (scarlet gilia)																		
Ipomopsis congesta (ballhead ipomopsis)																		
Lactuca serriola ^{ai} (prickly lettuce)																		
year	Nested Frequency																	
2015	-	-	-	4	-	-	-	-	-	2	3	-	-	-	2	3	-	-
2018	2	1	5	6	-	-	-	-	-	-	18	-	-	-	2	-	0	-
2023	1	-	-	11	3	0	2	3	22	-	1	12	30	1	1	-	-	-
year	Average Cover (%)																	
2015	-	-	-	0.1	-	-	-	-	-	0.0	0.0	-	-	-	0.0	0.0	-	-
2018	0.0	0.0	0.2	0.0	-	-	-	-	-	-	0.1	-	-	-	0.0	-	0.0	-
2023	0.0	-	-	0.2	0.1	0.0	0.0	0.0	1.3	-	0.0	0.1	0.2	0.0	0.0	-	-	-

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

FORB SPECIES	Nest Frequency												
<i>Lappula occidentalis</i> ^a (flatspine stickseed)	4	-	-	-	-	8	-	1	-	-	-	19	
<i>Linum perenne</i> ⁱ (blue flax)	14	6	4	-	-	14	-	2	-	6	-	12	
<i>Machaeranthera canescens</i> (hoary tansyaster)	138	-	2	2	6	6	2	-	2	5	8	31	
<i>Marrubium vulgare</i> ⁱ (horehound)	Average Cover (%)												
<i>Orobanche fasciculata</i> (clustered broomrape)	2015	0.0	-	-	-	0.0	-	0.0	-	-	-	0.0	
<i>Penstemon pachyphylus</i> (thickleaf beardtongue)	2018	0.1	0.0	0.0	-	0.1	-	0.0	-	0.1	-	0.0	
<i>Phlox longifolia</i> (longleaf phlox)	2023	3.5	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.2	0.5	
<i>Physaria rectipes</i> (straight bladderpod)													
<i>Salsola tragus</i> ^{at} (prickly Russian thistle)													
<i>Sisymbrium altissimum</i> ^{at} (tall tumbled mustard)													
<i>Solanum triflorum</i> ^a (cutleaf nightshade)													
<i>Sphaeralcea coccinea</i> (scarlet globemallow)													

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

Table 16R-54.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)							
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^p (mountain big sagebrush)	5	-	0.9	4.8	-	0.1	9.1	
<i>Ericameria parryi</i> (Parry's rabbitbrush)	5.7	-	1	-	0.1	-	-	
<i>Gutierrezia sarothrae</i> (broom snakeweed)	14	-	6.7	-	0	-	-	
<i>Juniperus osteosperma</i> ^t (Utah juniper)	Quadrat Cover (%)							
<i>Linanthus pungens</i> (granite prickly phlox)	2015	4.9	-	0.7	1.3	-	0.2	2.7
<i>Opuntia fragilis</i> (brittle pricklypear)	2018	5.7	0.1	1.1	-	0.0	0.1	-
<i>Pinus edulis</i> ^t (twoneedle pinyon)	2023	11.3	0.7	4.2	-	0.0	0.1	-

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

Table 16R-54.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. <i>vaseyana</i> ^p -- (mountain big sagebrush)									
2015	2320	60	10	12	78	25	56	71	45/69
2018	2300	980	24	37	38	33	29	29	46/68
2023	4080	4580	45	45	10	15	26	12	- / -
Ericameria parryi -- (Parry's rabbitbrush)									
2015	-	-	-	-	-	-	-	-	- / -
2018	20	-	0	100	0	0	0	0	19/19
2023	620	720	42	58	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 (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2015	980	20	6	94	0	0	0	0	15/19
2018	3760	-	41	59	0	0	0	0	20/23
2023	9640	5540	39	61	1	0	1	1	- / -
Juniperus osteosperma¹ -- (Utah juniper)									
2015	80	-	25	50	25	0	0	50	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	40	-	50	50	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2015	-	-	-	-	-	-	-	-	- / -
2018	40	-	0	0	100	0	0	100	5/19
2023	80	-	0	100	0	0	0	0	- / -
Opuntia fragilis -- (brittle pricklypear)									
2015	180	-	22	67	11	0	0	11	8/21
2018	60	-	0	100	0	0	0	0	8/20
2023	60	-	0	100	0	0	0	33	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2015	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	100	-	100	0	0	0	0	0	- / -
Pinus edulis¹ -- (twoneedle pinyon)									
2015	20	20	100	0	0	0	0	0	- / -
2018	-	40	0	0	0	0	0	0	- / -
2023	40	-	100	0	0	0	0	0	- / -

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

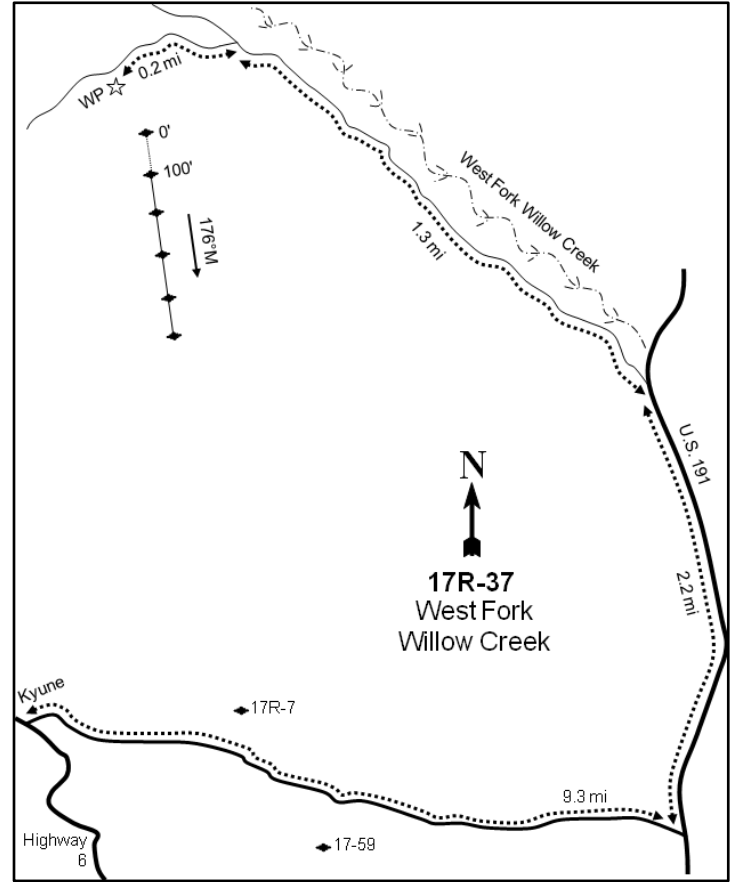
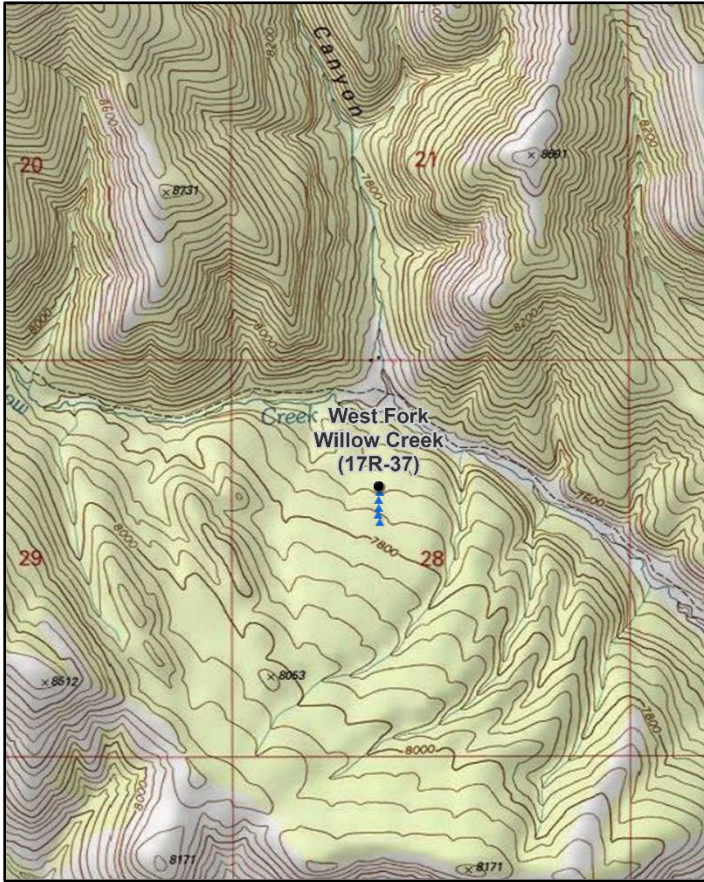
Table 16R-54.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2015	61	-	-	32	58	11	11.9
2018	10	25	50	25	-	-	4.9
2023	13	57	29	14	-	-	2.0
Pinus edulis (twoneedle pinyon)							
2015	68	20	10	20	35	15	11.8
2018	18	44	44	11	-	-	2.1
2023	23	36	55	9	-	-	2.1

Table 16R-54.15 - 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	6.3	0.0	0.0	13.2	0.0	0.4	0.0	19.8	Very Poor
2018	7.1	3.5	12.2	11.1	0.0	0.9	0.0	34.8	Very Poor-Poor
2023	17.5	11.9	15.0	8.2	-0.1	1.6	-2.0	52.1	Fair

WEST FORK WILLOW CREEK - STUDY NO. 17R-37

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Matts Summit NW; Township 11S, Range 10E, Section 28
NAD 83 UTM ZONE 12, 515998 East 4409669 North

Transect Information

Browse Tag # (0' Stake)	260
Transect Bearing	170° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Traveling south on US-6, turn left onto the road that leads to Kyune and continue for 9.3 miles. Turn left onto US-191 and drive for 2.2 miles to a road that runs parallel to West Fork Willow Creek. Turn left onto this road and continue for 1.3 miles to a fork. Bear left at the fork and drive for 0.2 miles. The site is on the left (south) side of the road; there is no witness post.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	WEST FORK
Elevation	7,717ft (2,352m)
Aspect	North
Slope	10%
Sample Dates	08/06/2015, 07/25/2018, 07/25/2023

Table 17R-37.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop-Pile-Burn	Upper Price River Watershed FY24 (Proposed)	6508	Fall-Winter 2023	25
Logging - Coppice Cutting	West Fork Willow Creek Aspen Restoration Phase 1	3222	May 2016	25

Wildlife Habitat and Vegetation History**Table 17R-37.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 17R-37.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Quaking Aspen/Perennial Grass-Forb	Phase I
2018	Quaking Aspen/Perennial Grass-Forb	Phase I
2023	Quaking Aspen/Perennial Grass-Forb	Phase I

Site Notes

The location of the study site was shifted slightly in 2018 to better capture the treatment and avoid fences.

Site Potential

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	F047XA508UT
States and Transitions	No state and transition model is available for this ecological site.

This site has remained dominated by quaking aspen (*Populus tremuloides*) since study establishment in 2015. However, age of the stand has changed: many older trees were present prior to treatment, whereas a majority of the plants sampled in 2023 were younger. Aspen density exhibited a significant decrease between 2018 and 2023, but 2023 density was still greater than that of 2015 (Photos, Table 17R-37.13a). The shrub understory has also been diverse and abundant with yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) and mountain snowberry (*Symphoricarpos oreophilus*) contributing most of the cover during the most recent sample year. Other shrub species such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) have also been present to a lesser extent (Table 17R-37.12, Table 17R-37.13). The herbaceous layer has remained very abundant, although cover has exhibited a slight decrease following treatment. Perennial grasses and forbs have made up a majority of the understory throughout the duration of the study (Table 17R-37.7). However, the noxious annual forb species gypsyflower (*Cynoglossum officinale*) has been observed in all sample years (Table 17R-37.11) and may pose a threat to the resilience of the community if it increases in the future. Although many of the conifer trees in the area were removed by treatment, some trees have remained on site, indicating that there could be potential for infilling over time (Table 17R-37.12, Table 17R-37.14).

Due to the diverse and abundant shrub and herbaceous components, this site likely serves as adequate habitat for summering mule deer. In addition, the sagebrush component of this site could provide browse for elk during the winter months (Table 17R-37.3; Wambolt, 1996). However, pellet transect data indicates that both deer and elk presence have remained low throughout the study period; no deer pellet groups were observed in 2023 (Table 17R-37.9).

Trend Summary Tables

Table 17R-37.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2015	6.7	5.3	4.6	11.1	10.4	18.0
2018	5.3	5.5	12.9	8.8	8.9	17.3
2023	9.0	9.5	8.6	16.0	11.3	24.6

Table 17R-37.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2015	-	463	89	379	-	29.2	2.3	23.6
2018	-	422	47	340	-	21.2	0.9	11.4
2023	-	382	64	398	-	14.7	0.9	32.1

Table 17R-37.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2015	6.2	0.0	37.6	0.0	0.1	70.9
2018	14.7	-	67.8	0.2	1.1	46.1
2023	13.1	-	43.5	0.5	0.9	59.1

Table 17R-37.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2015	1	-	1	-
2018	6	1	11	2
2023	-	-	3	1
Days Use Per Acre (ha)				
2015	-	12.8 (31.5)	2.7 (6.6)	-
2018	11.6 (28.7)	4.7 (11.6)	16.8 (41.4)	-
2023	18.9 (46.6)	-	1.3 (3.3)	-

Table 17R-37.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Carex (sedge)	Elymus lanceolatus (thickspike wheatgrass)	Koeleria macrantha (prairie Junegrass)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2015	-	11	3	11	-	453	4	5
2018	-	3	6	19	-	415	-	5
2023	2	2	13	37	0	367	-	1
year	Average Cover (%)							
2015	-	0.2	0.0	0.1	-	28.9	0.0	0.0
2018	-	0.0	0.0	0.4	-	20.7	-	0.0
2023	0.0	0.0	0.4	0.6	0.0	13.8	-	0.0

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

Table 17R-37.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Antennaria (pussytoes)	Astragalus (milkvetch)	Astragalus tenellus (looseflower milkvetch)	Cerastium beeringianum (Bering chickweed)	Chenopodium fremontii ^a (Fremont's goosefoot)	Cirsium (thistle)	Clematis columbiana (rock clematis)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cynoglossum officinale ^a ⁿⁱ (gypsyflower)	Dracocephalum parviflorum (American dragonhead)	Erigeron (fleabane)	Galium ^a (bedstraw)	Geranium richardsonii (Richardson's geranium)	Lathyrus brachycalyx (Bonneville pea)
year	Nested Frequency																
2015	193	1	6	-	15	3	3	2	7	4	3	59	4	-	25	8	131
2018	142	6	-	-	4	9	-	3	-	-	-	23	-	-	26	-	46
2023	165	-	5	2	8	15	-	-	-	-	-	10	3	2	23	-	107
year	Average Cover (%)																
2015	3.0	0.0	0.0	-	0.3	0.1	0.0	0.0	0.0	0.0	0.0	1.9	0.0	-	0.3	0.1	7.0
2018	1.4	0.0	-	-	0.0	0.1	-	0.1	-	-	-	0.6	-	-	0.1	-	0.9
2023	4.3	-	0.0	0.1	0.1	0.1	-	-	-	-	-	0.3	0.0	0.0	0.3	-	7.0

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

FORB SPECIES	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Potentilla hippiana (woolly cinquefoil)	Ranunculus inamoenus (graceful buttercup)	Symphyotrichum (aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^a (yellow salsify)	Veronica biloba ^a (two-lobed speedwell)	Vicia americana (American vetch)	Viola (violet)
year	Nested Frequency											
2015	-	1	1	8	4	8	201	198	1	7	50	34
2018	-	4	-	1	-	-	276	67	-	-	-	6
2023	6	44	17	5	-	-	341	94	2	10	49	-
year	Average Cover (%)											
2015	-	0.0	0.0	0.0	0.2	0.0	6.6	4.9	0.0	0.1	0.9	0.3
2018	-	0.0	-	0.0	-	-	8.6	0.3	-	-	-	0.0
2023	0.0	0.6	0.1	0.1	-	-	15.9	1.8	0.0	0.0	1.9	-

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

Table 17R-37.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES																
Amelanchier utahensis ^p (Utah serviceberry)	Artemisia cana ^p (silver sagebrush)	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus communis (common juniper)	Juniperus scopulorum ^t (Rocky Mountain juniper)	Mahonia repens (creeping barberry)	Populus tremuloides ^p (quaking aspen)	Pseudotsuga menziesii ^t (Douglas-fir)	Ribes ^p (currant)	Rosa woodsii ^p (Woods' rose)	Symphoricarpos oreophilus ^p (mountain snowberry)		
year	Line Intercept Cover (%)															
2015	0.4	0.6	-	0.2	-	9.5	-	-	5.9	0.9	10.4	1.7	-	0.9	9	
2018	0.2	-	-	2.2	-	7.4	0.1	1	2.9	0.4	14.4	-	0.4	0.4	5.6	
2023	0.1	-	-	5.2	-	9.7	0.2	0.6	3.8	0.8	20.8	-	1.1	0.3	9.3	
year	Quadrat Cover (%)															
2015	0.2	0.0	0.0	0.6	-	4.2	-	-	2.4	1.1	0.9	1.2	-	0.1	5.8	
2018	0.2	-	-	1.6	-	4.3	0.0	0.0	2.4	1.2	10.2	0.4	0.1	0.3	3.0	
2023	0.0	-	-	3.2	0.0	6.5	0.1	1.0	2.0	1.8	6.6	-	0.7	0.2	5.0	

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

Table 17R-37.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2015	140	20	57	29	14	14	29	71	33/35
2018	120	-	50	50	0	0	33	0	18/23
2023	80	-	50	50	0	0	0	50	- / -
Artemisia cana^p -- (silver sagebrush)									
2015	40	-	0	50	50	0	0	0	51/66
2018	-	-	-	-	-	-	-	-	38/71
2023	-	-	-	-	-	-	-	-	- / -
Artemisia nova^p -- (black sagebrush)									
2015	-	-	-	-	-	-	-	-	39/61
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2015	100	-	20	40	40	40	0	40	52/83
2018	960	-	10	88	2	8	0	0	47/53
2023	900	-	7	93	0	7	0	0	- / -
Cercocarpus montanus^p -- (alderleaf mountain mahogany)									
2015	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	30/46
2023	-	-	-	-	-	-	-	-	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2015	20	-	0	100	0	0	0	0	- / -
2018	200	-	10	80	10	0	0	10	- / -
2023	380	-	0	100	0	0	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2015	2740	-	1	98	2	0	0	5	38/56
2018	4300	-	0	99	1	17	1	6	30/39
2023	3780	-	0	98	2	0	0	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 (%)				
Ericameria nauseosa -- (rubber rabbitbrush)									
2015	-	-	-	-	-	-	-	-	-/-
2018	40	-	0	100	0	0	0	0	66/57
2023	40	-	0	100	0	50	0	0	-/-
Juniperus communis -- (common juniper)									
2015	-	-	-	-	-	-	-	-	80/278
2018	120	20	0	83	17	0	0	50	33/45
2023	80	-	0	100	0	0	0	0	-/-
Juniperus scopulorum^t -- (Rocky Mountain juniper)									
2015	60	100	67	33	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	-/-
2023	60	40	0	67	33	0	0	33	-/-
Mahonia repens -- (creeping barberry)									
2015	5900	-	42	58	0	0	0	0	10/13
2018	6720	40	5	87	8	0	0	13	5/6
2023	6340	-	0	100	0	0	0	0	-/-
Pseudotsuga menziesii^t -- (Douglas-fir)									
2015	20	20	0	100	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Ribes^p -- (currant)									
2015	-	-	-	-	-	-	-	-	35/45
2018	120	-	0	100	0	17	0	0	83/79
2023	40	-	0	100	0	50	0	0	-/-
Rosa woodsii^p -- (Woods' rose)									
2015	600	20	57	43	0	43	23	3	48/35
2018	680	-	15	82	3	15	9	3	17/16
2023	440	-	18	82	0	0	0	0	-/-
Symphoricarpos oreophilus^p -- (mountain snowberry)									
2015	2320	-	11	88	1	3	0	0	53/80
2018	1720	-	7	93	0	6	4	0	41/66
2023	2140	-	0	99	1	48	22	0	-/-

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

Table 17R-37.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

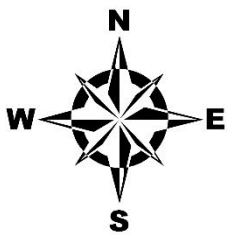
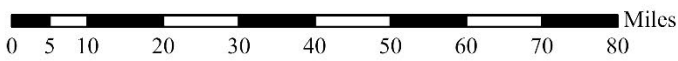
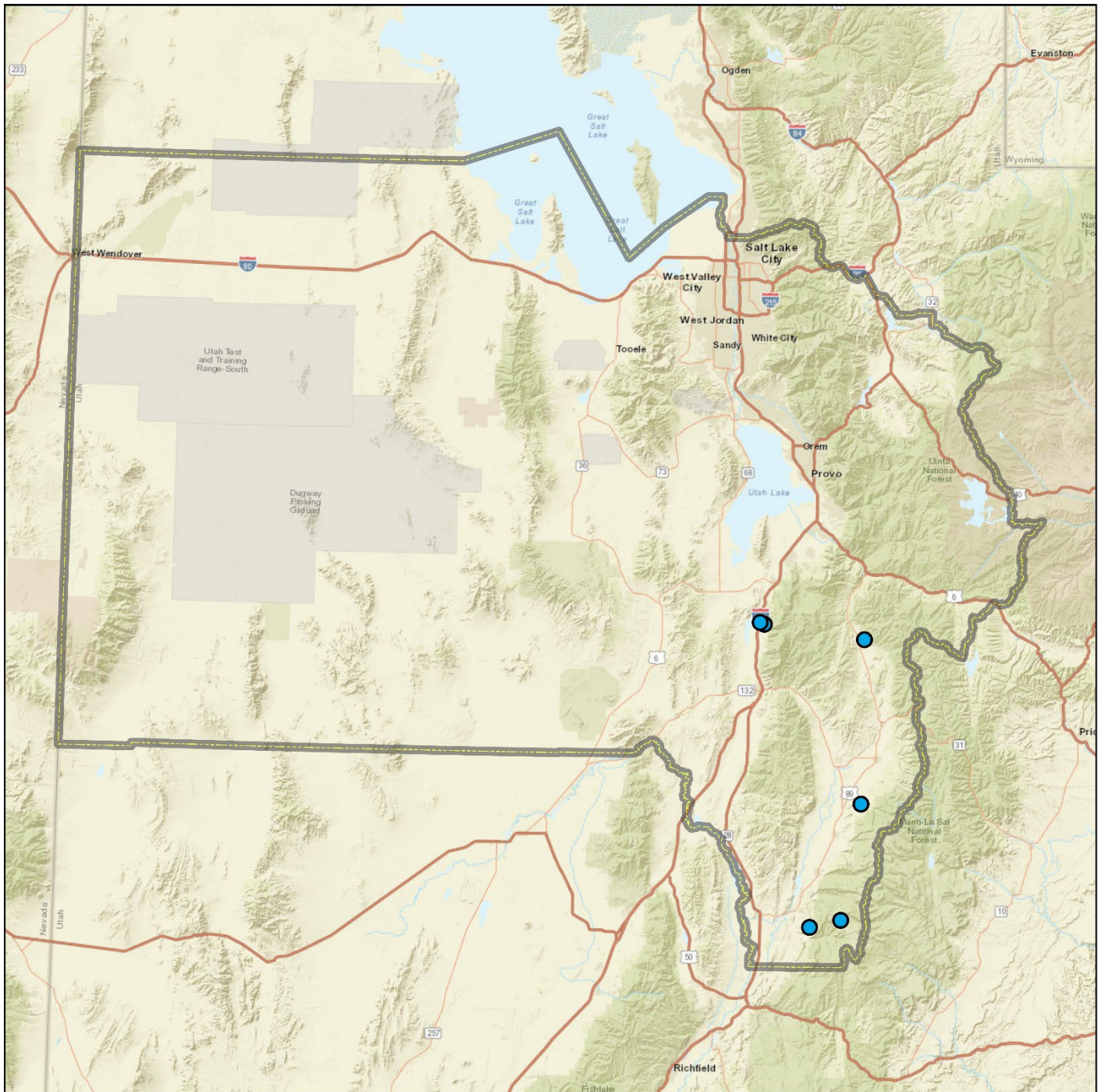
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2015	2400	79	11	-	10	4	0	28
2018	8060	21	79	-	-	2	0	1
2023	3760	4	72	24	-	24	1	1

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

Table 17R-37.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

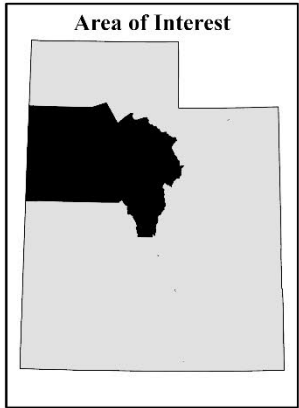
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2015	54	-	33	56	-	11	10.9
2018	19	9	18	55	-	18	11.4
2023	16	-	20	50	10	20	14.5
Pinus flexilis (limber pine)							
2015	6	-	67	33	-	-	13.7
Populus tremuloides (quaking aspen)							
2015	1663	80	20	-	-	-	1.6
2018	9727	15	85	-	-	-	1.1
2023	1104	5	85	10	-	-	2.3
Pseudotsuga menziesii (Douglas-fir)							
2015	22	-	36	27	-	36	10.1
2018	13	-	-	67	-	33	10.3
2023	4	-	-	50	-	50	8.0

CENTRAL REGION



Region Boundaries
Central Region

Study Location
2023 WRI Study Sites



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

MONA BENCH 2 - STUDY NO. 16R-41

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Mona NW; Township 11S, Range 1E, Section 10
NAD 83 UTM ZONE 12, 430451 East 4414045 North

Transect Information

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

195
181° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Standard

Directions to Site

From Mona drive north for 3 miles. Turn right onto the road to the east by the lavender farms, then proceed for 0.8 miles and drive under the freeway. Continue for another 0.1 miles to a panel gate. Proceed through the gate and go another 0.3 miles to a wire gate. Pass through the gate and continue for another 0.3 miles to a gate and corrals on the right. Turn right and travel south after passing through the gate. Continue for 0.1 miles, turn left, and travel east for 0.2 miles. There is no witness post, but there is a pile of larger rocks on the south side of the road: park here. The 0-foot stake is 18 paces south of the road and is marked with browse tag #195.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,432ft (1,656m)
Aspect	West
Slope	5-11%
Sample Dates	07/06/2011, 08/11/2014, 07/27/2018, 08/30/2023

Table 16R-41.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Mona Bench Project	1934	November 2011	128
Harrow - Two-Way Chain	Mona Bench Project	1934	October 2011	128
Seeding - Broadcast Before	Mona Bench Project	1934	October 2011	128
Seeding - Aerial After	Mona Bench Project	1934	January 2012	128

Table 16R-41.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mona Bench - Forb/Grass Mix			Broadcast	Oct 2011	129
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.16	1.10
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.55	1.40
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	1.55	1.24
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	1.16	1.07
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.94	1.66
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		1.55	1.21
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.16	1.14
F	<i>Linum perenne</i>	Blue Flax	Appar	0.27	0.25
F	<i>Medicago sativa</i>	Alfalfa	Nomad	0.78	0.70
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.55	1.49
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.16	1.07

Mix Name			Application Type	Application Date	Acres
Mona Bench - Browse Mix			Aerial	Jan 2012	235
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Medicago sativa</i>	Alfalfa	Nomad	0.28	0.25
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sevier UT	0.17	0.03
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	0.55	0.32

Wildlife Habitat and Vegetation History**Table 16R-41.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 16R-41.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Annual-Perennial Grass	No Encroachment
2014	Annual-Perennial Grass	No Encroachment
2023	Annual-Perennial Grass	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation 19 inches
 NRCS Ecological Site Upland Gravelly Loam (Bonneville Big Sagebrush)
 NRCS Ecological Site # R028AY306UT
 States and Transitions 2011-Present - Big Sagebrush/Snakeweed State: Community Phase 4.2

Since study establishment in 2011, this site has remained in an annual-perennial grass state with cheatgrass (*Bromus tectorum*) and purple threeawn (*Aristida purpurea*) as the dominant species; high amounts of cheatgrass may negatively impact the ecological resilience of this site. Forb cover and diversity have generally remained low (Table 16R-41.7, Table 16R-41.10, Table 16R-41.11). Shrubs have remained rare throughout the duration of the study period (Table 16R-41.12, Table 16R-41.13). Further treatment may be needed to reduce cheatgrass.

Deer winter range condition on this site has remained very poor in all sample years. Improvements to deer winter range could be achieved by increasing preferred browse cover and recruitment of young. Decreasing cheatgrass would also greatly improve winter range condition (Table 16R-41.15). Deer presence was low in 2023 according to pellet transect data, and no deer pellet groups were

observed in previous sample years (Table 16R-41.9).

Trend Summary Tables

Table 16R-41.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	-	3.7	-	-	3.4	-
2014	0.2	0.4	-	0.1	0.4	-
2018	0.0	-	-	-	-	-
2023	0.0	1.2	-	-	1.3	-

Table 16R-41.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	466	283	279	104	30.1	21.1	5.2	1.4
2014	470	324	155	120	35.4	20.3	3.2	2.4
2018	431	357	436	174	15.5	23.0	18.4	5.3
2023	450	433	242	164	15.2	25.3	2.1	3.9

Table 16R-41.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	1.1	0.5	24.1	27.1	11.2	53.4
2014	0.9	-	44.7	23.7	10.7	64.1
2018	2.4	0.0	34.1	23.0	15.6	59.6
2023	2.2	1.1	29.3	19.8	11.6	45.6

Table 16R-41.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Horse	Rabbit
	Quadrat Frequency			
2011	10	1	-	-
2014	-	-	-	3
2018	8	-	-	2
2023	5	9	1	6
Year	Days Use Per Acre (ha)			
2011	-	-	-	-
2014	0.7 (1.8)	-	-	-
2018	7.2 (17.9)	-	-	-
2023	10.2 (25.1)	2.7 (6.6)	3.5 (8.6)	-

Table 16R-41.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES									
Aegilops cylindrica ^{ani} (jointed goatgrass)									
Agropyron cristatum ⁱ (crested wheatgrass)									
Aristida purpurea (purple threeawn)									
Bromus arvensis ^{aii} (field brome)									
Bromus tectorum ^{ai} (cheatgrass)									
Poa bulbosa ⁱ (bulbous bluegrass)									
Poa secunda (Sandberg bluegrass)									
Sporobolus cryptandrus (sand dropseed)									
Vulpia myuros ^{ai} (annual fescue)									
year	Nested Frequency								
2011	76	-	273	1	456	10	29	39	75
2014	3	3	294	-	470	4	11	65	1
2018	-	-	347	107	391	4	21	33	80
2023	-	11	421	-	450	6	11	32	8
year	Average Cover (%)								
2011	7.0	-	19.9	0.0	22.4	0.1	0.1	1.1	0.7
2014	0.0	0.0	19.1	-	35.4	0.0	0.0	1.2	0.0
2018	-	-	22.2	3.0	11.9	0.1	0.1	0.5	0.6
2023	-	0.5	23.7	-	15.1	0.2	0.1	0.7	0.0

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

Table 16R-41.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Alyssum desertorum ^{ai} (desert madwort)																	
Arenaria (sandwort)																	
Artemisia ludoviciana (white sagebrush)																	
Astragalus (milkvetch)																	
Astragalus utahensis (Utah milkvetch)																	
Calochortus nuttallii (sego lily)																	
Ceratocephala testiculata ^{ai} (curveseed butterwort)																	
Chaetopappa ericoides (rose heath)																	
Chamaesyce albomarginata (whitemargin sandmat)																	
Cymopterus (springparsley)																	
Descurainia pinnata ^a (western tansymustard)																	
Draba ^a (draba)																	
Epilobium brachycarpum ^a (tall annual willowherb)																	
Eriogonum racemosum (redroot buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Erodium cicutarium ^{ai} (redstem stork's bill)																	
Helianthus annuus ^a (common sunflower)																	
year	Nested Frequency																
2011	118	-	13	-	1	7	-	21	1	-	3	26	1	38	-	230	23
2014	-	-	34	-	-	21	-	10	13	-	-	-	12	30	-	147	-
2018	147	92	38	1	-	23	5	22	-	5	-	18	-	20	-	428	-
2023	89	-	54	-	1	17	3	46	20	-	-	-	-	18	3	134	5
year	Average Cover (%)																
2011	0.5	-	0.4	-	0.0	0.1	-	0.1	0.0	-	0.0	0.1	0.0	0.3	-	3.5	0.1
2014	-	-	1.9	-	-	0.1	-	0.1	0.0	-	-	-	0.1	0.1	-	3.1	-
2018	0.6	4.3	0.5	0.0	-	0.1	0.0	0.2	-	0.0	-	0.1	-	0.1	-	17.6	-
2023	0.3	-	2.0	-	0.0	0.1	0.0	1.3	0.0	-	-	-	-	0.2	0.0	1.3	0.2

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

FORB SPECIES											
Holosteum umbellatum ^{ai} (jagged chickweed)											
Lactuca serriola ^{ai} (prickly lettuce)											
Lomatium (desertparsley)											
Medicago sativa ⁱ (alfalfa)											
Onobrychis vicifolia ⁱ (sainfoin)											
Phlox longifolia (longleaf phlox)											
Salsola tragus ^{ai} (prickly Russian thistle)											
Sanguisorba minor ⁱ (small burnet)											
Sphaeralcea coccinea (scarlet globemallow)											
Tragopogon dubius ^{ai} (yellow salsify)											
Zigadenus paniculatus (foothill deathcamas)											
year	Nested Frequency										
2011	133	26	1	-	-	-	-	-	28	4	16
2014	1	2	1	2	4	-	-	4	25	-	4
2018	47	-	-	-	-	-	-	-	-	-	8
2023	103	3	2	4	1	5	2	-	13	-	8
year	Average Cover (%)										
2011	0.9	0.1	0.0	-	-	-	-	-	0.5	0.0	0.1
2014	0.0	0.0	0.0	0.0	0.0	-	-	0.0	0.1	-	0.0
2018	0.1	-	-	-	-	-	-	-	-	-	0.1
2023	0.3	0.0	0.0	0.0	0.0	0.0	0.0	-	0.1	-	0.1

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

Table 16R-41.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)				
Bassia prostrata ^{pi} (forage kochia)				
Gutierrezia sarothrae (broom snakeweed)				
Pediocactus simpsonii (mountain ball cactus)				
year	Line Intercept Cover (%)			
2011	-	-	3.4	-
2014	-	0.1	0.3	0.1
2018	-	-	-	-
2023	0	-	1.3	-
year	Quadrat Cover (%)			
2011	-	-	3.7	0.0
2014	-	0.2	0.3	0.0
2018	-	0.0	-	-
2023	0.0	0.0	1.2	-

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

Table 16R-41.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

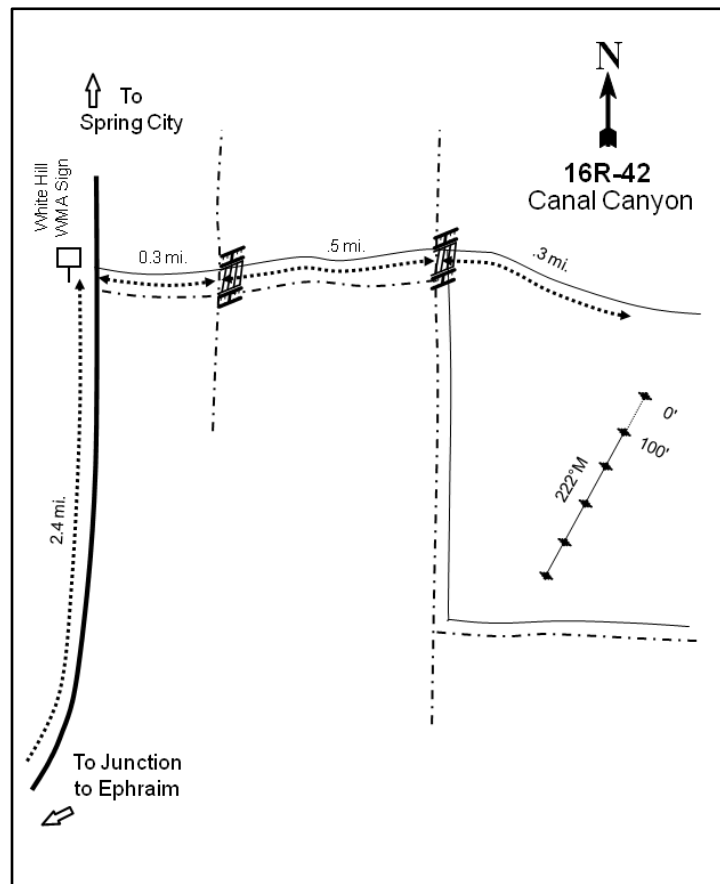
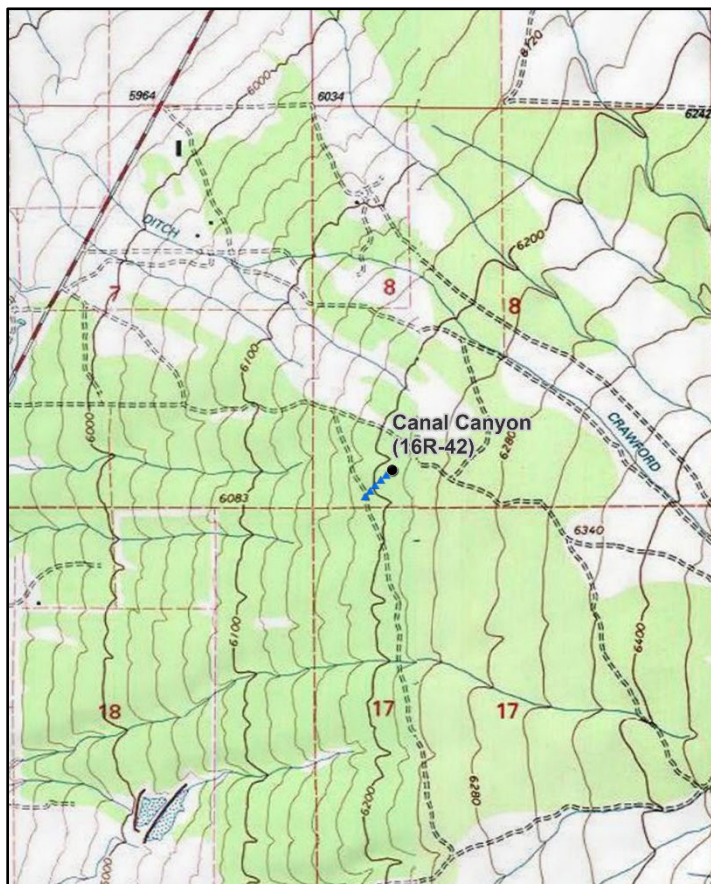
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2011	-	-	-	-	-	-	-	-	41/55
2014	-	-	-	-	-	-	-	-	34/51
2018	-	-	-	-	-	-	-	-	54/75
2023	-	80	0	0	0	0	0	0	- / -
Bassia prostrata^{pi} -- (forage kochia)									
2011	-	-	-	-	-	-	-	-	-/-
2014	700	20	26	74	0	26	0	0	12/16
2018	100	-	0	100	0	40	0	40	17/20
2023	180	80	56	44	0	0	67	0	- / -
Celtis laevigata var. reticulata -- (netleaf hackberry)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	110/214
2023	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2011	-	-	-	-	-	-	-	-	47/53
2014	-	-	-	-	-	-	-	-	58/151
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2011	3760	740	22	76	2	1	0	5	23/31
2014	320	140	6	88	6	0	0	6	21/27
2018	60	-	0	67	33	0	0	33	24/26
2023	860	-	16	79	5	0	0	5	- / -
Opuntia fragilis -- (brittle pricklypear)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	12/31
2023	-	-	-	-	-	-	-	-	-/-
Pediocactus simpsonii -- (mountain ball cactus)									
2011	20	-	0	100	0	0	0	0	8/9
2014	40	-	0	100	0	0	0	0	3/8
2018	-	-	-	-	-	-	-	-	4/8
2023	20	-	0	100	0	0	0	0	- / -

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

Table 16R-41.15 - 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
2011	0.0	0.0	0.0	30.0	-17.3	2.8	-2.0	13.5	Very Poor
2014	0.2	0.0	0.0	30.0	-20.0	4.7	-2.0	12.9	Very Poor
2018	0.0	0.0	0.0	30.0	-11.6	10.0	0.0	28.4	Very Poor
2023	0.0	0.0	0.0	30.0	-11.4	7.8	0.0	26.4	Very Poor

CANAL CANYON - STUDY NO. 16R-42

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Chester SE; Township 16S, Range 4E, Section 08
NAD 83 UTM ZONE 12, 456805 East 4365063 North

Transect Information

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

185
222° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt 3: 3ft

Directions to Site

From Pigeon Hollow Junction, travel east on US-89 towards Spring City. Travel 2.4 miles to the White Hill WMA sign on the left (west) side of the road. Turn right and proceed east for 0.3 miles to a gate. Proceed through the gate and continue for another 0.5 miles to another gate. Continue through the gate and travel 0.3 miles; there is no witness post. The study transect is approximately 75 paces south and the 0-foot stake is marked with browse tag #185.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,137ft (1,871m)
Aspect	West
Slope	5%
Sample Dates	07/27/2011, 05/28/2014, 07/30/2018, 08/30/2023

Table 16R-42.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Canal Canyon Project	1921	October 2011	314
Seeding - Dribbler	Canal Canyon Project	1921	October 2011	314
Seeding - Aerial Before	Canal Canyon Project	1921	October 2011	314
Seeding - Aerial After	Canal Canyon Project	1921	January 2012	314
Herbicide - Plateau	Canal Canyon Project	1921	Fall 2012	314

Table 16R-42.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
			Aerial	Oct 2011	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.94	0.00
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	2.30	0.00
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.94	0.00
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.43	0.00
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	0.64	0.00
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	0.96	0.00
F	<i>Achillea millefolium</i>	Western Yarrow		0.02	0.00
F	<i>Linum perenne</i>	Blue Flax	Appar	0.63	0.00
F	<i>Medicago sativa</i>	Alfalfa	Ladak	1.01	0.00
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.51	0.00
F	<i>Onobrychis viciifolia</i>	Sanfoin	Eski	1.94	0.00
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.18	0.00

Mix Name			Application Type	Application Date	Acres
			Dribbler	Oct 2011	370
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Atriplex canescens</i>	Fourwing Saltbush		0.13	0.00
S	<i>Purshia tridentata</i>	Bitterbrush		0.06	0.00

Mix Name			Application Type	Application Date	Acres
			Aerial	Jan 2012	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush		0.04	0.00
S	<i>Atriplex canescens</i>	Fourwing Saltbush		0.12	0.00
S	<i>Bassia prostrata</i>	Forage Kochia	Immigrant	0.92	0.00
S	<i>Purshia tridentata</i>	Bitterbrush		0.06	0.00

Wildlife Habitat and Vegetation History**Table 16R-42.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 16R-42.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Juniper	Phase III
2014	Annual-Perennial Grass	Phase I
2018	Perennial Grass	Phase I
2023	Perennial Grass	Phase I

Site Notes

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2011 - Utah Juniper/Invasive Annuals State: Community Phase 3.2 2014-2023 - Seeded Range State: Community Phase 5.1

Upon study establishment in 2011, this site was considered to be within Phase III of woodland succession with Utah juniper (*Juniperus osteosperma*) providing most of the cover; a chaining, herbicide, and seeding treatment removed much of the tree component. Many of the trees were young or partially treated in the years following treatment, but their continued presence indicates that this site may be at risk of infilling in the future (Table 16R-42.1, Table 16R-42.4, Table 16R-42.12, Table 16R-42.14). The herbaceous understory was not very diverse and contributed little cover prior to treatment. In 2014; the perennial forbs, grasses, and annual grasses increased in cover and perennial and annual grasses became the dominant vegetation components. Forbs and annual grasses were rare in 2018 and 2023, making perennial grasses, mainly crested wheatgrass (*Agropyron cristatum*) and bluebunch wheatgrass (*Pseudoroegneria spicata*), the sole dominant vegetation component in those years (Table 16R-42.7, Table 16R-42.10, Table 16R-42.11).

Deer winter range condition on this site has generally remained very poor. In 2023, winter range condition was considered to be very poor to poor, but it has improved following treatment. Further improvements to deer winter range could be achieved through efforts that increase preferred browse cover and reproduction. Diversifying and increasing cover of perennial forbs while decreasing or removing cheatgrass (*Bromus tectorum*) would also be beneficial for winter range condition. Despite the very poor conditions, deer presence measured through pellet groups was high in 2018 and 2023. In contrast, elk presence has been low in most years including 2023 (Table 16R-42.9).

Trend Summary Tables**Table 16R-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
2011	-	-	20.1	-	-	35.3
2014	0.7	-	1.2	0.2	-	1.9
2018	0.8	-	1.8	0.8	-	3.0
2023	0.8	-	2.5	0.7	-	4.3

Table 16R-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
2011	174	34	303	-	3.5	0.5	5.0	-
2014	339	232	148	117	14.1	12.7	0.9	5.0
2018	153	268	322	38	3.0	13.3	3.5	0.3
2023	61	305	227	33	1.1	23.5	2.2	1.6

Table 16R-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
2011	41.6	9.0	36.3	11.9	3.0	26.7
2014	32.4	0.0	46.1	4.6	2.2	34.1
2018	26.4	-	55.8	10.6	2.5	19.4
2023	21.5	1.1	44.5	13.6	2.7	28.9

Table 16R-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	Cattle/Bison	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency					
2011	-	-	5	12	-	19
2014	-	-	9	9	-	31
2018	-	-	34	3	-	18
2023	2	1	36	17	-	14
Year	Days Use Per Acre (ha)					
2011	-	-	8.1 (19.9)	15.4 (38.1)	-	-
2014	-	-	8.1 (19.9)	22.1 (54.6)	-	-
2018	-	-	68.3 (168.8)	11.4 (28.1)	6.4 (15.8)	-
2023	0.7 (1.8)	-	69.7 (172.1)	15.4 (38.1)	-	-

Table 16R-42.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Hordeum (barley)	Leymus cinereus (basin wildrye)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2011	-	12	174	-	16	-	-	10	-	2
2014	19	169	339	29	6	-	6	9	47	60
2018	7	204	153	13	18	-	-	7	56	71
2023	0	239	61	-	16	6	-	11	9	106
year	Average Cover (%)									
2011	-	0.3	3.5	-	0.1	-	-	0.1	-	0.0
2014	0.2	7.3	14.1	1.3	0.1	-	0.2	0.1	1.4	2.1
2018	0.1	8.5	3.0	0.4	0.2	-	-	0.0	2.6	1.3
2023	0.0	17.2	1.1	-	0.8	0.1	-	0.2	0.4	4.8

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

Table 16R-42.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Arabis holboellii ^a (Holboell's rockress)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chorisporea tenella ^{ai} (crossflower)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erodium cicutarium ^{ai} (redstem stork's bill)	Helianthus annuus ^a (common sunflower)	Lactuca serriola ^{ai} (prickly lettuce)	Linum perenne ⁱ (blue flax)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ⁱ (alfalfa)	Onobrychis vicifolia ⁱ (sainfoin)
year	Nested Frequency																
2011	-	-	295	2	-	121	-	-	-	4	-	-	5	-	-	-	-
2014	4	4	104	1	3	26	1	4	1	6	2	11	8	45	3	54	21
2018	1	-	322	-	-	-	-	-	-	-	3	-	-	8	-	21	-
2023	1	-	195	-	-	16	2	-	-	2	5	4	-	1	2	30	-
year	Average Cover (%)																
2011	-	-	4.6	0.1	-	0.3	-	-	-	0.0	-	-	0.0	-	-	-	-
2014	0.4	0.0	0.7	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.8	0.4
2018	0.0	-	3.5	-	-	-	-	-	-	-	0.0	-	-	0.1	-	0.1	-
2023	0.0	-	0.7	-	-	0.0	0.0	-	-	0.0	0.1	0.0	-	0.0	0.0	1.5	-

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

FORB SPECIES	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency		
2011	-	-	-
2014	22	17	2
2018	-	8	-
2023	31	-	2
year	Average Cover (%)		
2011	-	-	-
2014	0.1	0.2	0.0
2018	-	0.1	-
2023	1.2	-	0.0

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

Table 16R-42.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	year			
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^p (mountain big sagebrush)	2011	-	-	35.3
<i>Bassia prostrata</i> ^{pi} (forage kochia)	2014	-	0.2	1.9
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>speciosa</i> ^p (rubber rabbitbrush)	2018	-	0.8	3
<i>Juniperus osteosperma</i> ⁱ (Utah juniper)	2023	-	0.6	4.3
	2011	-	-	20.1
	2014	-	0.7	1.2
	2018	-	0.8	1.8
	2023	0.0	0.8	2.5

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

Table 16R-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 (%)				
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>^p -- (mountain big sagebrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	21/22
2023	20	-	0	100	0	100	0	0	-/-
<i>Bassia prostrata</i>^{pi} -- (forage kochia)									
2011	-	-	-	-	-	-	-	-	-/-
2014	940	-	13	87	0	40	9	0	10/16
2018	680	-	21	79	0	41	32	0	14/22
2023	320	-	38	63	0	25	19	0	-/-
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>speciosa</i>^p -- (rubber rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	20/34
2018	20	-	0	100	0	0	100	0	23/24
2023	20	-	0	100	0	0	0	0	-/-
<i>Juniperus osteosperma</i>ⁱ -- (Utah juniper)									
2011	180	-	0	100	0	0	0	0	-/-
2014	40	-	0	100	0	0	0	50	-/-
2018	40	-	0	50	50	0	0	50	-/-
2023	100	-	0	80	20	0	0	20	-/-
<i>Opuntia</i> -- (pricklypear)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	27/35
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Purshia tridentata ^p -- (antelope bitterbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	20	-	100	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	26/60

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

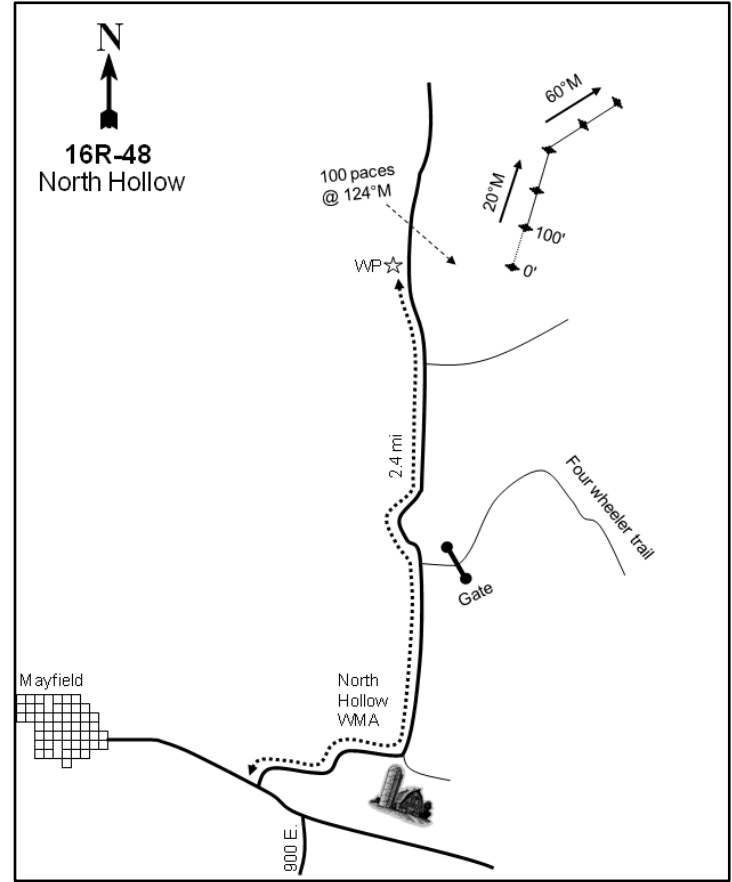
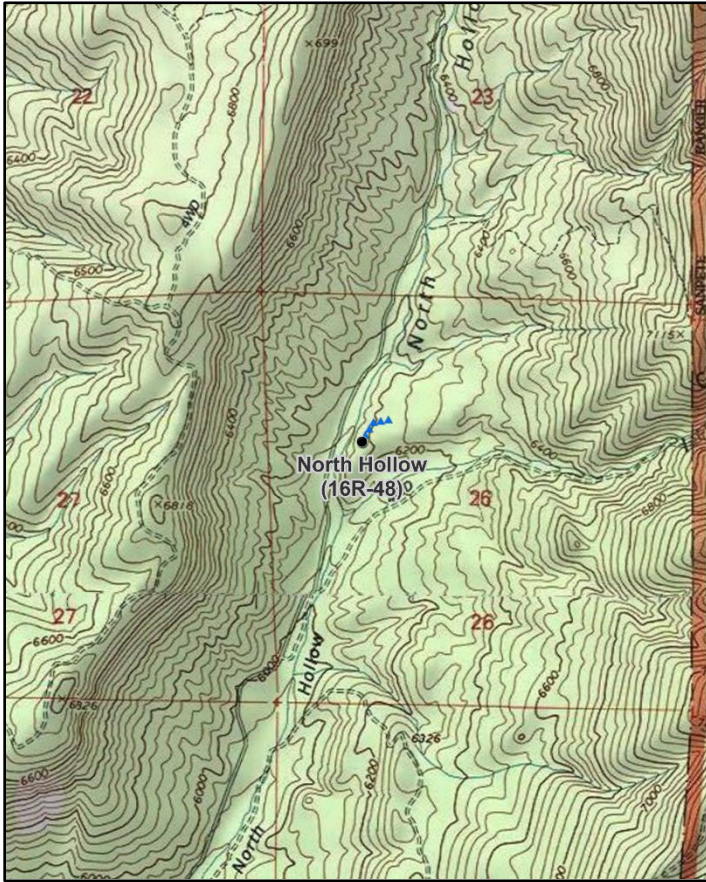
Table 16R-42.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2011	239	5	10	10	55	20	19.3
2014	38	-	56	44	-	-	10.4
2018	28	-	40	53	7	-	20.9
2023	28	-	47	53	-	-	11.0

Table 16R-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
2011	0.0	0.0	0.0	1.0	-2.6	0.0	0.0	-1.6	Very Poor
2014	0.3	0.0	0.0	25.4	-10.6	10.0	0.0	25.2	Very Poor
2018	1.2	0.0	0.0	26.6	-2.2	0.6	0.0	26.2	Very Poor
2023	1.0	0.0	0.0	30.0	-0.9	3.1	0.0	33.3	Very Poor-Poor

NORTH HOLLOW - STUDY NO. 16R-48

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Sterling SE; Township 19S, Range 2E, Section 26
NAD 83 UTM ZONE 12, 442736 East 4331475 North

Transect Information

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

9168
20° magnetic (Line 4-5: 60° magnetic)
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
No Rebar

Directions to Site

Driving from East Canyon Road, travel up the canyon and turn left before 900 East onto North Hollow Road. Drive 2.4 miles to a witness post on the right (west) side of the road. The 0-foot stake is 100 paces at 124 degrees magnetic from the witness post and is marked with browse tag #9168.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,165ft (1,879m)
Aspect	West
Slope	4-8%
Sample Dates	07/04/2012, 08/18/2015, 08/02/2018, 08/28/2023

Table 16R-48.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	North Hollow WMA and LS Conservation Easement Habitat Improvement	2276	December 2012-March 2013	447
Seeding - Aerial After	Mayfield Seeding	LTDL	October-November 1966	957
Chaining - Chain Unknown	Mayfield Seeding	LTDL	October-November 1966	957
Chaining - Two-Way Ely/Smooth	North Hollow WMA and LS Conservation Easement Habitat Improvement	2276	November 2012	321
Seeding - Aerial Before	North Hollow WMA and LS Conservation Easement Habitat Improvement	2276	November 2012	447
Seeding - Dribbler	North Hollow WMA and LS Conservation Easement Habitat Improvement	2276	November 2012	447
Seeding - Aerial After	North Hollow WMA and LS Conservation Easement Habitat Improvement	2276	January 2013	447

Table 16R-48.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mayfield Seeding			Aerial	Oct 1966	957
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass		4.00	0.00
G	Agropyron desertorum	Desert Wheatgrass		1.00	0.00
G	Bromus inermis	Smooth Brome		1.00	0.00
G	Pascopyrum smithii	Western Wheatgrass		1.00	0.00
G	Psathyrostachys juncea	Russian Wildrye		2.00	0.00
G	Thinopyrum intermedium	Intermediate Wheatgrass		2.00	0.00
F		Forbs		3.00	0.00
S		Shrubs		2.00	0.00

Mix Name			Application Type	Application Date	Acres
North Hollow WMA Habitat Improvement			Aerial	Nov 2012	420
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Private Land Owner Mix		7.38	0.00
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.31	1.23
G	Agropyron cristatum	Crested Wheatgrass	CDII	1.31	1.24
G	Dactylis glomerata	Orchardgrass	Paiute	0.36	0.32
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.31	1.20
G	Festuca ovina	Sheep Fescue	Covar	0.71	0.60
G	Leymus cinereus	Great Basin Wildrye	UDWR IntMtn Tetra	0.71	0.61
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.71	0.55
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.71	0.58
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.71	0.62
F	Medicago sativa	Alfalfa	Spredor 4	0.95	0.84
F	Melilotus officinalis	Yellow Sweetclover		0.71	0.67
F	Onobrychis viciifolia	Sainfoin	Eski	1.31	1.22
F	Sanguisorba minor	Small Burnet	Delar	1.31	1.22

Mix Name			Application Type	Application Date	Acres
North Hollow WMA Habitat Improvement - Dribbler			Dribbler	Nov 2012	420
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Private Land Owner Mix		0.27	0.00
F	Hedysarum boreale ssp. boreale var. boreale	Utah Sweetvech	Timp	0.12	0.11
F	Sanguisorba minor	Small Burnet	Delar	0.12	0.11
S	Cercocarpus ledifolius	Curlleaf Mountain Mahogany	Sevier UT	0.12	0.11

Mix Name			Application Type	Application Date	Acres
North Hollow Sagebrush Kochia			Aerial	Jan 2013	438
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak +	1.03	0.99
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Beaver UT	0.04	0.01
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Sevier UT	1.03	0.28
S	Bassia prostrata	Forage Kochia	Beaver UT	1.94	1.37

Wildlife Habitat and Vegetation History**Table 16R-48.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter/spring
Rocky Mountain Elk	crucial	winter
Shiras Moose	crucial	winter

Table 16R-48.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Gambel Oak/Pinyon-Juniper	Phase II
2015	Gambel Oak/Perennial Grass	Phase I
2018	Gambel Oak	Phase I
2023	Gambel Oak	Phase I

Site Notes

In 2015, lines 4 and 5 were moved to a bearing of 60 degrees magnetic in order to keep the entire study within the area that was treated by the 2012 chaining and seeding project.

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Stony Loam (Oak)
NRCS Ecological Site #	R047XA463UT
States and Transitions	No state and transition model is available for this ecological site.

When this site was established in 2012 it was considered to be within Phase II of woodland succession, being dominated by twoneedle pinyon (*Pinus edulis*), Utah Juniper (*Juniperus osteosperma*), and Gambel oak (*Quercus gambellii*). The chaining project later that year removed most of the conifers, and Gambel oak has been the dominant vegetation component since 2015 (Table 16R-48.1, Table 16R-48.4, Table 16R-48.12, Table 16R-48.13). Grasses have remained diverse throughout the duration of the study, but were not abundant in 2012. In 2015, the herbaceous understory was a codominant site component and was comprised mainly of the seeded perennial grass species intermediate wheatgrass (*Thinopyrum intermedium*) and crested wheatgrass (*Agropyron cristatum*). The introduced annual grass species cheatgrass (*Bromus tectorum*) has been sampled on the site in low abundance (Table 16R-48.7, Table 16R-48.10). The proximity of this site to pinyon and juniper trees and their continued presence on site (Photos, Table 16R-48.14) indicates that it could possibly be infilled over time.

Deer winter range condition was considered to be fair to good in 2012 and has remained good in all post-treatment sample years. Further improvements to deer winter range condition could be achieved mainly through efforts that increase perennial grass and forb cover (Table 16R-48.15). According to pellet transect data, mule deer presence on this site was moderate in 2023. In contrast, elk presence was low during the same sample year (Table 16R-48.9). However, the limited sagebrush component of this site could provide some browse for elk during the winter months (Table 16R-48.3; Wambolt, 1996).

Trend Summary Tables**Table 16R-48.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	26.1	-	15.1	38.9	-	21.3
2015	24.1	0.3	1.1	27.9	0.3	0.6
2018	30.2	0.1	0.6	34.3	0.2	0.5
2023	25.9	0.6	0.4	29.1	1.9	0.3

Table 16R-48.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	56	170	137	53	0.1	5.1	0.7	0.3
2015	72	227	141	16	0.8	13.7	1.2	0.3
2018	58	266	218	27	0.3	10.8	1.8	0.2
2023	29	249	217	17	0.1	12.2	1.5	0.2

Table 16R-48.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	15.9	0.6	67.7	7.6	2.1	45.5
2015	10.1	0.1	52.6	9.3	4.4	44.9
2018	19.6	-	67.2	9.1	2.9	46.6
2023	10.3	0.0	53.5	17.3	2.7	39.5

Table 16R-48.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2012	-	-	5	-	7
2015	-	-	5	-	14
2018	-	-	-	-	13
2023	4	-	14	2	10
Year	Days Use Per Acre (ha)				
2012	3.6 (9.0)	-	1.3 (3.3)	-	-
2015	2.9 (7.2)	-	12.1 (29.8)	2.7 (6.6)	-
2018	2.2 (5.4)	-	6.0 (14.9)	2.0 (5.0)	-
2023	7.2 (17.9)	8.7 (21.5)*	38.9 (96.0)	4.7 (11.6)	-

*Pellets per acre (ha)

Table 16R-48.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency											
2012	3	73	7	56	17	-	-	-	-	23	46	52
2015	15	81	42	72	21	5	-	2	-	5	18	104
2018	11	113	33	58	10	25	7	-	-	19	33	117
2023	10	145	20	29	8	13	9	0	1	10	10	99
year	Average Cover (%)											
2012	0.2	1.8	0.0	0.1	0.4	-	-	-	-	0.3	2.0	0.4
2015	0.9	4.3	1.5	0.8	1.3	0.1	-	0.1	-	0.0	0.8	4.6
2018	0.3	4.9	0.5	0.3	0.5	0.5	0.1	-	-	0.1	1.4	2.5
2023	0.6	6.8	0.4	0.1	0.4	0.4	0.9	0.0	0.0	0.3	0.6	1.7

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

Table 16R-48.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Alyssum desertorum ^{ai} (desert madwort)																	
Arabis holboellii ^a (Holboell's rockcross)																	
Astragalus (milkvetch)																	
Astragalus convallarius (lesser rushy milkvetch)																	
Ceratocephala testiculata ^{ai} (curvseed butterwort)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Collinsia parviflora ^a (maiden blue eyed Mary)																	
Descurainia pinnata ^a (western tansymustard)																	
Eriogonum brevicaulle (shortstem buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Lathyrus brachycalyx (Bonneville pea)																	
Medicago sativa ⁱ (alfalfa)																	
Packera multilobata (lobeleaf groundsel)																	
Petradoria pumila (rock goldenrod)																	
Phlox austromontana (mountain phlox)																	
Phlox longifolia (longleaf phlox)																	
Tragopogon dubius ^{ai} (yellow salsify)																	
year	Average Cover (%)																
2012	0.6	-	0.0	0.0	0.1	-	0.0	0.0	0.0	0.1	0.1	-	0.0	0.0	0.1	0.0	0.0
2015	1.2	-	-	-	-	-	-	0.0	-	0.0	0.0	0.2	0.0	0.0	-	-	-
2018	1.8	0.0	-	-	-	0.0	-	0.0	-	0.0	0.1	-	-	0.0	-	-	-
2023	1.5	0.0	-	-	0.0	-	-	-	-	0.1	0.1	-	0.0	-	-	0.0	-

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

Table 16R-48.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)									
Amelanchier utahensis ^p (Utah serviceberry)										
Artemisia nova ^p (black sagebrush)										
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)										
Cercocarpus montanus ^p (alderleaf mountain mahogany)										
Gutierrezia sarothrae (broom snakeweed)										
Juniperus osteosperma ⁱ (Utah juniper)										
Pinus edulis ⁱ (twoneedle pinyon)										
Purshia tridentata ^p (antelope bitterbrush)										
Quercus gambelii ^p (Gambel oak)										
Rhus trilobata ^p (skunkbush sumac)										
year	Quadrat Cover (%)									
2012	-	0.6	0.3	0.4	-	10	11.3	-	37.6	-
2015	-	0.8	-	-	0.3	0.4	0.2	-	27.1	-
2018	0.3	1.1	-	-	0.2	0.4	0.1	-	32.9	0
2023	-	1.4	-	0.3	1.9	0.3	-	0.1	27.3	-
2012	-	0.0	0.8	0.0	-	6.8	8.3	-	25.2	-
2015	-	0.7	-	-	0.3	1.1	0.0	-	23.4	-
2018	0.0	1.0	-	-	0.1	0.6	0.0	-	29.1	0.0
2023	-	0.7	-	0.6	0.6	0.4	0.1	0.9	23.7	-

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

Table 16R-48.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
2012	-	-	-	-	-	-	-	-	103/59
2015	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	100	0	42/67
2023	-	-	-	-	-	-	-	-	-/-
Artemisia nova^P -- (black sagebrush)									
2012	340	-	0	41	59	47	0	59	28/54
2015	280	-	0	100	0	14	0	0	27/45
2018	340	-	12	88	0	0	0	0	34/52
2023	520	-	12	77	12	23	0	12	-/-
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2012	340	-	0	65	35	6	0	53	34/55
2015	-	-	-	-	-	-	-	-	54/47
2018	-	-	-	-	-	-	-	-	44/63
2023	-	-	-	-	-	-	-	-	-/-
Cercocarpus ledifolius^P -- (curl-leaf mountain mahogany)									
2012	-	-	-	-	-	-	-	-	31/47
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2012	80	-	50	50	0	50	0	0	109/121
2015	-	-	-	-	-	-	-	-	64/106
2018	-	-	-	-	-	-	-	-	27/60
2023	20	-	0	100	0	0	100	0	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2012	20	-	0	100	0	0	100	100	12/21
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Eriogonum heracleoides -- (parsnipflower buckwheat)									
2012	-	-	-	-	-	-	-	-	13/28
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2012	20	-	0	100	0	0	0	0	19/23
2015	640	20	22	78	0	0	0	3	26/27
2018	420	-	0	100	0	0	0	0	24/24
2023	1420	20	9	92	0	0	7	0	-/-
Juniperus osteosperma¹ -- (Utah juniper)									
2012	260	-	23	69	8	0	0	0	-/-
2015	60	-	33	33	33	0	0	33	-/-
2018	120	-	67	33	0	0	0	0	-/-
2023	100	-	40	60	0	0	0	0	-/-
Pinus edulis¹ -- (twoneedle pinyon)									
2012	60	20	0	100	0	0	0	33	-/-
2015	20	-	100	0	0	0	0	0	-/-
2018	20	-	100	0	0	0	0	0	-/-
2023	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 (%)				
Purshia tridentata^p -- (antelope bitterbrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	73/175
2023	400	-	75	25	0	0	0	0	- / -
Quercus gambelii^p -- (Gambel oak)									
2012	10380	1420	67	26	7	0	0	8	110/87
2015	18080	300	36	64	0	5	0	0	82/69
2018	14340	500	19	81	0	1	0	0	87/60
2023	12740	40	32	67	1	12	9	1	- / -
Rhus trilobata^p -- (skunkbush sumac)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	92/101

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

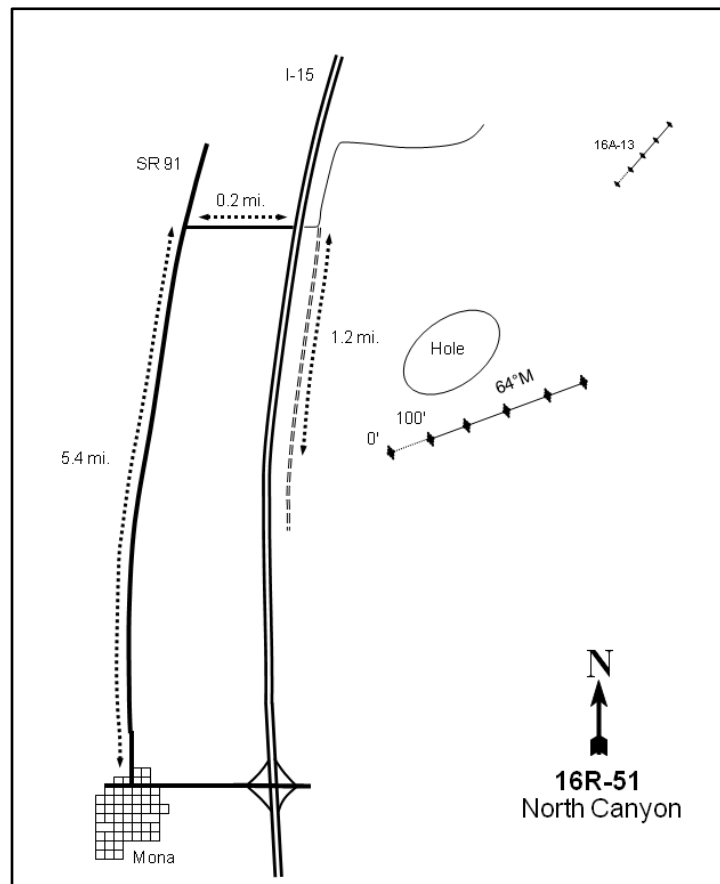
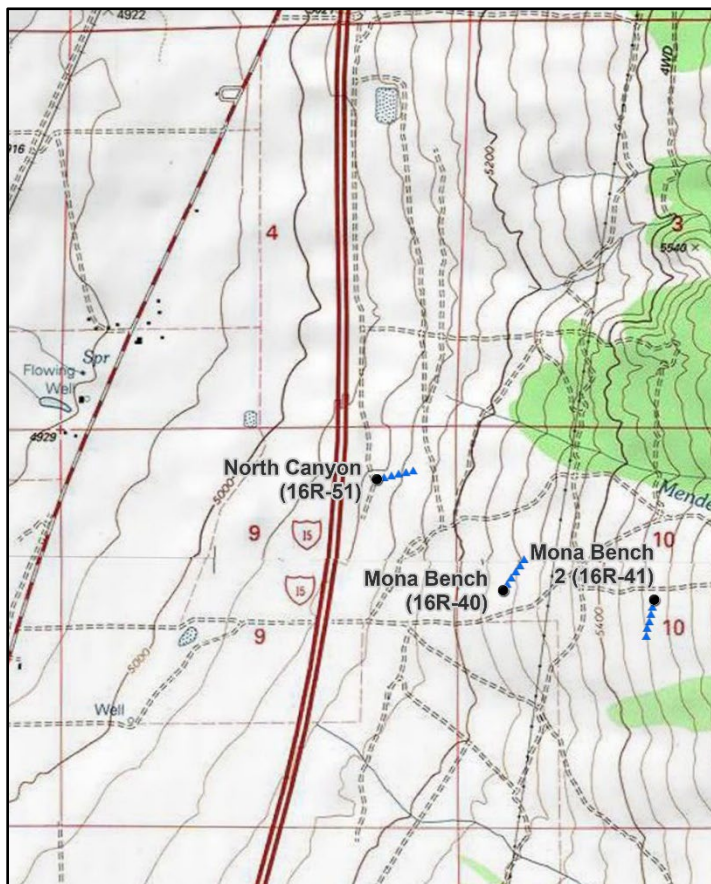
Table 16R-48.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	202	-	10	35	25	30	15.7
2015	80	6	72	11	11	-	7.2
2018	61	28	33	28	11	-	5.9
2023	54	6	31	56	6	-	5.6
Pinus edulis (twoneedle pinyon)							
2012	69	-	-	38	31	31	16.8
2015	3	-	-	100	-	-	3.0
2018	11	-	100	-	-	-	5.0

Table 16R-48.15 - 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
2012	30.0	12.7	15.0	10.3	-0.1	0.6	0.0	68.5	Fair-Good
2015	28.1	15.0	15.0	27.4	-0.6	0.6	0.0	85.4	Good
2018	30.0	14.9	9.2	21.5	-0.2	0.3	0.0	75.7	Good
2023	29.7	14.5	15.0	24.4	-0.1	0.5	0.0	83.9	Good

NORTH CANYON - STUDY NO. 16R-51

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Santaquin SW; Township 11S, Range 1E, Section 09
NAD 83 UTM ZONE 12, 429328 East 4414533 North

Transect Information

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

Not Available
45° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Standard

Directions to Site

Traveling north out of Mona on SR-91 drive for 5.4 miles and turn right (east). Drive for 0.2 miles, passing under I-15 and turn right (south). Drive for 1.2 miles and the transect will be off to the left (east) of the road just south of an old gravel pit.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	5,093ft (1,552m)
Aspect	West
Slope	3-6%
Sample Dates	07/03/2013, 07/26/2018, 08/30/2023

Table 16R-51.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	North Canyon Knapweed Project Phase I	2688	August 2014	447
Herbicide - Milestone	North Canyon Knapweed Project Phase I	2688	August 2016	662
Herbicide - Milestone	North Canyon Knapweed Project Phase I	2688	August 2015	662
Herbicide - Milestone	North Canyon Knapweed Project Phase I	2688	August 2013	662
Harrow - Two-Way Chain	North Canyon Knapweed Project Phase I	2688	October 2013	447
Seeding - Broadcast Before	North Canyon Knapweed Project Phase I	2688	October 2013	447

Table 16R-51.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
North Canyon Knapweed			Broadcast	Oct 2013	453
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Nezpar	1.43	1.33
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	CDII	1.99	1.81
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Magnar	0.15	0.13
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Magnar	0.88	0.60
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.43	1.28
G	<i>Poa secunda</i>	Sandberg Bluegrass	Mountain Home	0.99	0.81
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.77	0.64
G	<i>Psathyrostachys juncea</i>	Russian Wildrye		1.99	1.72
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.99	1.53
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass	Clarke	1.16	0.72
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass		0.22	0.20
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	0.99	0.84

Wildlife Habitat and Vegetation History**Table 16R-51.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
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Table 16R-51.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Mountain Big Sagebrush	No Encroachment
2018	Annual Grass	No Encroachment
2023	Perennial Grass	No Encroachment

Site Notes

The sagebrush seemed to be affected by drought and displayed some desiccation in 2013.

Site Potential

1981 - 2010 Average Annual Precipitation 18 inches
 NRCS Ecological Site Upland Gravelly Loam (Bonneville Big Sagebrush)
 NRCS Ecological Site # R028AY306UT
 States and Transitions 2011 - Utah Juniper/Invasive Annuals State: Community Phase 3.2
 2014-2023 - Seeded Range State: Community Phase 6.1

This site was established in 2013 and was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with limited cover contributed by other species. Sagebrush cover and density exhibited a significant decrease in the first sample year following a harrow and several herbicide treatments and remained low in 2023 (Table 16R-51.1, Table 16R-51.12, Table 16R-51.13). The herbaceous understory was dominated by the introduced annual grass cheatgrass (*Bromus tectorum*), which was the sole dominant vegetation component in 2018. Annual forbs were also common. Perennial grass cover increased in 2023 while that of cheatgrass decreased, and perennial grasses dominated the plant community in that sample year. Cover of perennial and annual forbs has decreased over time. However, the noxious weed squarrose knapweed (*Centaurea virgata*) provided the most cover of any single forb species in 2023 though cover did decrease since herbicide application; however, knapweed abundance increased slightly. The presence of squarrose knapweed and cheatgrass (Table 16R-51.7, Table 16R-51.10, Table 16R-51.11) may pose a threat to the ecological resilience of the plant community, and future treatments may be necessary to control undesirable plant species should they increase in the future.

Trend Summary Tables

Table 16R-51.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	6.6	1.8	-	8.8	2.9	-
2018	0.5	0.8	-	0.8	0.2	-
2023	0.2	0.2	-	0.6	0.2	-

Table 16R-51.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	434	173	391	156	14.0	2.4	15.1	6.4
2018	450	232	334	85	32.7	11.1	13.2	5.6
2023	281	372	177	135	7.9	20.4	2.0	3.8

Table 16R-51.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	5.2	1.9	41.8	3.0	2.6	54.5
2018	14.1	0.0	54.6	4.9	5.9	57.7
2023	17.7	1.1	40.5	10.3	7.2	32.1

Table 16R-51.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2013	7	15	9
2018	13	-	4
2023	1	8	1
Year	Days Use Per Acre (ha)		
2013	6.5 (16.1)	28.1 (69.5)	-
2018	8.0 (19.7)	-	-
2023	5.1 (12.6)	2.0 (5.0)	-

Table 16R-51.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus arvensis ^{si} (field brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hordeum pusillum ^a (little barley)	Leymus cinereus (basin wildrye)	Pascopyrum smidhii (western wheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency														
2013	-	3	2	29	430	12	6	-	-	32	127	-	5	2	37
2018	12	29	4	38	449	6	10	18	44	47	11	10	47	98	-
2023	-	52	1	-	281	-	-	-	65	222	-	3	72	156	-
year	Average Cover (%)														
2013	-	0.0	0.0	0.5	13.4	0.1	0.1	-	-	0.6	1.6	-	0.1	0.0	0.1
2018	0.1	0.9	0.0	0.6	31.9	0.2	0.2	0.5	1.7	0.7	0.3	0.4	2.4	3.8	-
2023	-	2.0	0.0	-	7.9	-	-	-	2.9	5.7	-	0.2	2.6	7.0	-

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

Table 16R-51.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Asclepias (milkweed)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Centaurea virgata ⁿⁱ (squarrose knapweed)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaetopappa ericoides (rose heath)	Chamaesyce (sandmat)	Collinsia parviflora ^a (maiden blue eyed Mary)	Draba ^a (draba)	Epilobium brachycarpum ^a (tall annual willowherb)	Eriogonum racemosum (redroot buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Helianthella uniflora (oneflower helianthella)	Iva axillaris (povertyweed)	Lactuca serriola ^{ai} (prickly lettuce)
year	Nested Frequency																
2013	-	95	7	11	4	57	120	17	-	14	5	5	-	343	-	35	4
2018	-	51	-	14	-	58	8	-	-	-	-	-	1	316	-	-	1
2023	2	78	0	4	-	87	26	-	3	-	1	-	-	97	6	-	0
year	Average Cover (%)																
2013	-	0.6	0.2	0.1	0.0	5.1	0.7	0.2	-	0.1	0.0	0.0	-	13.2	-	0.2	0.0
2018	-	0.2	-	0.1	-	5.4	0.0	-	-	-	-	-	0.0	13.0	-	-	0.0
2023	0.0	0.3	0.0	0.0	-	3.3	0.1	-	0.0	-	0.0	-	-	1.6	0.0	-	0.0

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

FORB SPECIES	Oenothera (evening primrose)	Phlox longifolia (longleaf phlox)	Silene antirrhina ^a (sleepy silene)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius ^{ai} (yellow salsify)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency					
2013	-	13	68	38	1	1
2018	-	-	-	18	-	0
2023	2	3	3	38	4	-
year	Average Cover (%)					
2013	-	0.1	0.5	0.5	0.0	0.0
2018	-	-	-	0.2	-	0.0
2023	0.0	0.0	0.0	0.4	0.0	-

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

Table 16R-51.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept	
	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	8.8
Gutierrezia sarothrae (broom snakeweed)	0.8	0.2
	0.6	0.2
year	Quadrat Cover (%)	
	2013	6.6
2018	0.5	0.8
2023	0.2	0.2

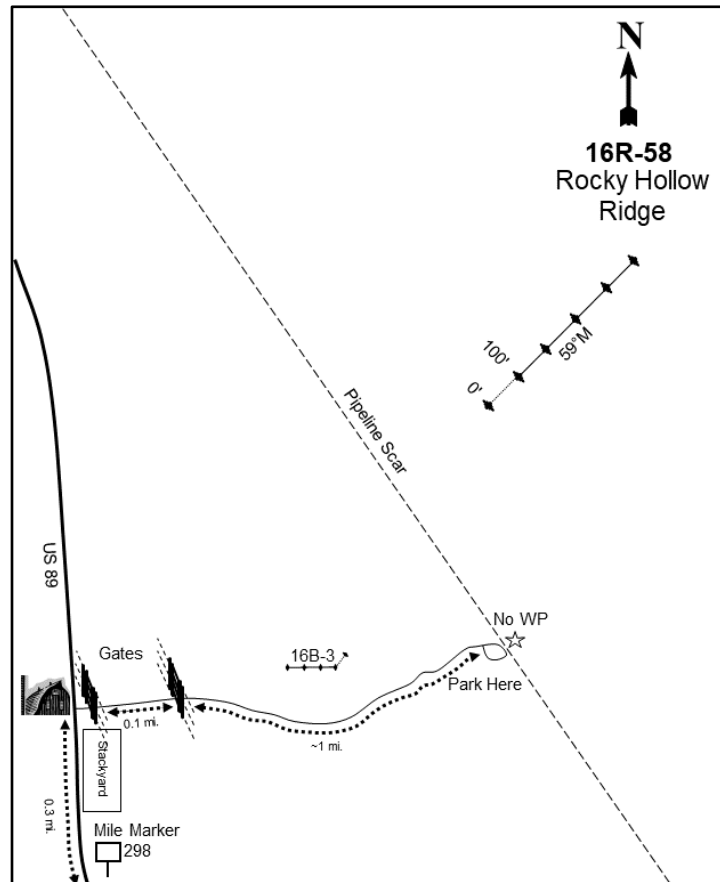
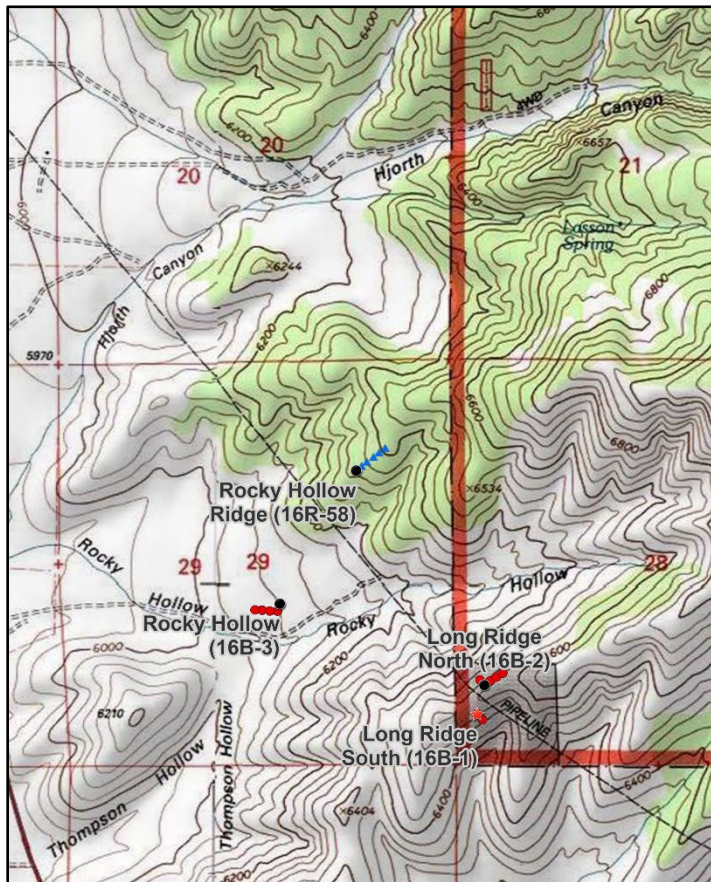
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 16R-51.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2013	1080	60	6	70	24	30	2	80	78/111
2018	140	-	0	29	71	0	0	57	51/71
2023	120	-	0	50	50	33	33	50	- / -
Bassia prostrata^{pi} -- (forage kochia)									
2013	-	-	-	-	-	-	-	-	29/76
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2013	1720	40	9	88	2	0	0	13	21/28
2018	260	-	0	100	0	0	0	31	30/36
2023	440	-	32	68	0	0	0	0	- / -

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

ROCKY HOLLOW RIDGE - STUDY NO. 16R-58



Location Information

USGS 7.5 min Map Info Indianola NW; Township 11S, Range 4E, Section 29
 GPS (0' Stake) NAD 83 UTM ZONE 12, 457722 East 4409835 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 42° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

On US-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.

Site Information

Land Ownership State
 Land Administrator UDWR
 Allotment No data
 Elevation 6,320ft (1,926m)
 Aspect Southwest
 Slope 15-20%
 Sample Dates 09/07/2021, 08/31/2022, 09/06/2023

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>	Curlleaf Mountain Mahogany		0.18	0.15

Wildlife Habitat and Vegetation History**Table 16R-58.3 - Wildlife Seasonal Habitat.** UDWR 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-Annual Grass	Phase I
2023	Perennial-Annual 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. Following the bullhog treatment (Table 16R-58.1), juniper tress were effectively removed and the site was considered to be in Phase I in both post-treatment sample years. 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 or 2023 (Table 16R-58.4, Table 16R-58.6, 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 all years. 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 and was codominant with bluebunch wheatgrass in both 2022 and 2023. Both perennial and annual forbs were rare, but increased in diversity following the bullhog due to both disturbance and introduction through seeding (Table 16R-58.2, Table 16R-58.7, Table 16R-58.10, Table 16R-58.11).

Deer winter range condition has been considered very poor since 2021. Improving deer winter range can be accomplished through

efforts that increase preferred browse cover and reproduction; reducing cheatgrass cover while increasing and diversifying native perennial forbs on the site would also improve deer winter range (Table 16R-58.15). Despite the very poor condition, pellet transect data indicates that deer presence was high in all sample years and was at its highest prior to treatment. In contrast, elk presence has been low each sample year (Table 16R-58.9).

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
2023	2.2	2.3	0.3	3.6	2.5	0.5

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
2023	253	211	127	92	11.8	13.1	2.1	1.4

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
2023	8.8	1.2	66.5	5.5	11.0	26.6

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	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2021	-	-	35	5	16
2022	-	-	28	4	15
2023	1	-	31	-	11
Year	Days Use Per Acre (ha)				
2021	-	-	158.1 (390.6)	17.4 (43.0)	-
2022	-	-	63.0 (155.6)	3.4 (8.3)	-
2023	2.2 (5.4)	8.7 (21.5)*	40.2 (99.3)	0.7 (1.7)	-

*Pellets per acre (ha)

Table 16R-58.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES											
Achnatherum hymenoides (Indian ricegrass)											
Bromus arvensis ^{ai} (field brome)											
Bromus tectorum ^{ai} (cheatgrass)											
Dactylis glomerata ⁱ (orchardgrass)											
Elymus elymoides (squirreltail)											
Hesperostipa comata (needle and thread)											
Leymus cinereus (basin wildrye)											
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	-	-	8	22	90	151
2023	6	74	218	1	29	0	2	6	16	40	163
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	-	-	0.1	0.5	1.0	5.0
2023	0.2	2.2	9.6	0.0	1.2	0.0	0.1	0.1	0.8	1.0	9.8

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 ^{ai} (pale madwort)																	
Alyssum desertorum ^{ai} (desert madwort)																	
Antennaria dimorpha (low pussytoes)																	
Arabis holboellii ^a (Holboell's rockcress)																	
Artemisia ludoviciana (white sagebrush)																	
Ceratocephala testiculata ^{ai} (curvseed butterwort)																	
Chenopodium atrovirens ^a (pinyon goosefoot)																	
Cirsium wheeleri (Wheeler's thistle)																	
Cleome serrulata ^a (Rocky Mountain beeplant)																	
Collinsia parviflora ^a (maiden blue eyed Mary)																	
Collomia linearis ^a (tiny trumpet)																	
Crepis intermedia (limestone hawkbeard)																	
Descurainia pinnata ^a (western tansymustard)																	
Epilobium brachycarpum ^a (tall annual willowherb)																	
year	Nested Frequency																
2021	-	-	-	-	4	-	1	-	-	-	-	-	-	-	-	4	-
2022	1	2	5	10	49	1	3	2	11	-	-	6	15	-	-	11	-
2023	-	1	57	30	21	1	1	-	-	3	0	3	11	24	3	-	2
year	Average Cover (%)																
2021	-	-	-	-	0.0	-	0.0	-	-	-	-	-	-	-	-	0.0	-
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	-
2023	-	0.0	0.8	0.5	0.1	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.2	0.0	-	0.0

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

FORB SPECIES	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Hackelia patens (spotted stickseed)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lithospermum ruderale (western stone seed)	Lomatium nevadense (Nevada biscuitroot)	Medicago sativa ^a (alfalfa)	Microsteris gracilis ^a (slender phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius ^{ai} (yellow salsify)	Vicia americana (American vetch)
year	Nested Frequency																
2021	10	2	1	-	32	-	-	1	-	-	-	18	3	-	-	-	6
2022	5	-	-	4	1	0	7	-	4	3	1	18	2	-	1	-	-
2023	4	0	-	3	3	41	11	-	-	4	4	28	22	4	-	0	-
year	Average Cover (%)																
2021	0.1	0.0	0.0	-	0.2	-	-	0.0	-	-	-	0.1	0.0	-	-	-	0.0
2022	0.2	-	-	0.0	0.0	0.0	0.1	-	0.0	0.0	0.0	0.0	0.0	-	0.0	-	-
2023	0.0	0.0	-	0.0	0.2	0.9	0.1	-	-	0.0	0.0	0.1	0.1	0.1	-	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	Amelanchier utahensis ^p (Utah serviceberry)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Atriplex canescens ^p (fourwing saltbush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Purshia tridentata ^p (antelope bitterbrush)	Quercus gambelii ^p (Gambel oak)	Symphoricarpos oreophilus ^p (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
2023	0.1	0.1	-	0.8	-	0.5	1.7	2.4	0.4	0.6
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
2023	0.0	0.3	-	0.8	0.0	0.3	1.5	1.0	0.7	0.2

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 (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2021	20	-	0	0	100	0	0	100	- / -
2022	20	-	100	0	0	0	0	0	- / -
2023	80	-	100	0	0	50	0	0	- / -
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2021	60	-	0	0	100	100	0	100	- / -
2022	80	40	25	0	75	0	50	75	- / -
2023	160	-	88	13	0	0	13	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 (%)				
Atriplex canescens^p -- (fourwing saltbush)									
2021	-	-	-	-	-	-	-	-	-/-
2022	20	-	100	0	0	0	0	0	-/-
2023	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2021	720	-	6	19	75	3	47	86	-/-
2022	540	-	19	82	0	4	0	0	-/-
2023	700	-	0	100	0	0	0	0	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2021	-	-	-	-	-	-	-	-	-/-
2022	20	-	0	100	0	0	0	0	-/-
2023	40	-	0	100	0	0	0	0	-/-
Juniperus osteospermaⁱ -- (Utah juniper)									
2021	240	-	17	67	17	8	0	17	-/-
2022	80	-	75	0	25	0	25	25	-/-
2023	100	-	80	20	0	0	0	40	-/-
Opuntia polyacantha -- (plains pricklypear)									
2021	2240	-	2	80	19	0	0	19	-/-
2022	1980	-	1	93	6	0	0	6	-/-
2023	1840	-	0	100	0	0	0	0	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
2021	380	-	11	16	74	11	53	79	-/-
2022	260	-	23	54	23	0	85	23	-/-
2023	220	-	0	91	9	9	64	9	-/-
Quercus gambelii^p -- (Gambel oak)									
2021	240	-	8	58	33	0	83	42	-/-
2022	200	-	100	0	0	20	40	40	-/-
2023	140	-	100	0	0	57	43	0	-/-
Symphoricarpos oreophilus^p -- (mountain snowberry)									
2021	300	-	100	0	0	0	0	0	-/-
2022	160	-	100	0	0	13	38	0	-/-
2023	200	-	90	10	0	30	40	0	-/-

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

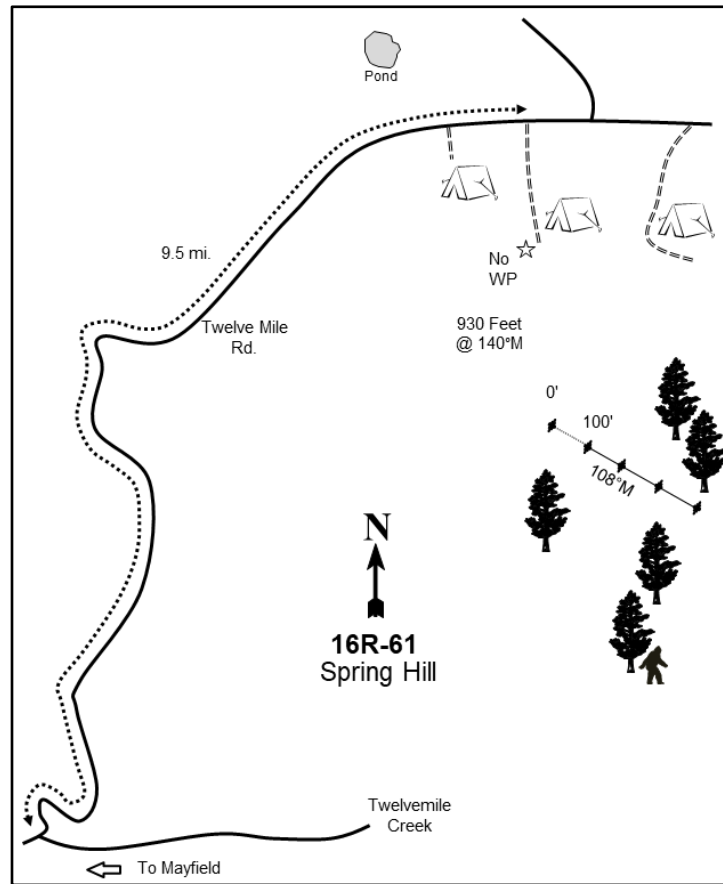
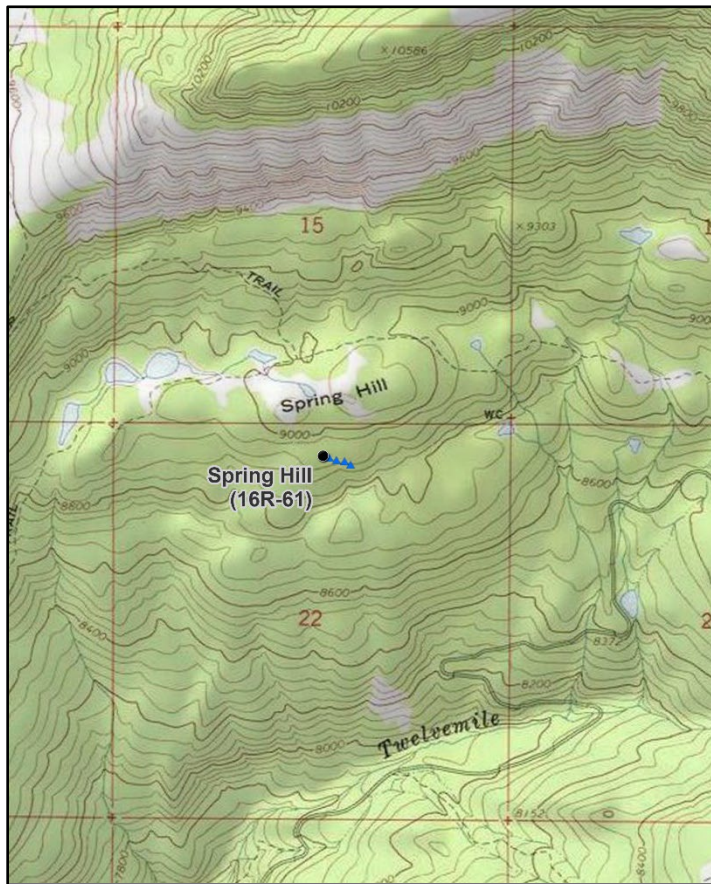
Table 16R-58.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2021	139	5	-	5	20	70	23.1
2022	22	67	33	-	-	-	3.2
2023	19	11	89	-	-	-	2.8

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
2023	4.9	0.0	0.0	26.2	-8.8	2.9	0.0	25.1	Very Poor

SPRING HILL - STUDY NO. 16R-61



Location Information

USGS 7.5 min Map Info Black Mountain SW; Township 19S, Range 3E, Section 22
 GPS (0' Stake) NAD 83 UTM ZONE 12, 451274 East 4333398 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 112° magnetic
 Length 400ft
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
 Belt Marker Placement No Rebar or Stakes

Directions to Site

From the point where Highway 137 bends to the east at a 90 degree angle in Mayfield, proceed east for 5.5 miles on East Canyon Road, continuing straight as it turns into West Twelve Mile Road. Proceed left at the major fork to stay on Twelve Mile Road, then continue for approximately 9.5 miles to a road on the left (south) side of the main road. Turn left here, proceed for about 700 feet (at which point the road ends), and park. The study site is approximately 800 feet southeast and downhill of this point; use a GPS to navigate to the transect as there are no stakes or rebar markers.

Site Information

Land Ownership Federal
 Land Administrator USFS
 Allotment TWELVE-MILE C & H
 Elevation 8,900ft (2,713m)
 Aspect South
 Slope No data
 Sample Dates 08/31/2023

Table 16R-61.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Slash and Pile	South Manti Mechanical Cut and Pile (Proposed)	-	Fall 2023	168

Wildlife Habitat and Vegetation History

Table 16R-61.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	spring/fall
Rocky Mountain Elk	crucial	summer
Shiras Moose	crucial	winter

Table 16R-61.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2023	White Fir/Limber Pine	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 and transition model is available for this ecological site.

This site was dominated by white fir (*Abies concolor*) and limber pine (*Pinus flexilis*) upon study establishment in 2023 with a young quaking aspen (*Populus tremuloides*) population scattered throughout the area (Photos, Table 16R-61.12, Table 16R-61.13a, Table 16R-61.14). The browse component was largely composed of mountain snowberry (*Symphoricarpos oreophilus*), although other species such as Utah serviceberry (*Amelanchier utahensis*) and chokecherry (*Prunus virginiana*) were also present to a lesser extent (Table 16R-61.12, Table 16R-61.13). The herbaceous understory was abundant with a vast majority of the cover being provided by a diverse perennial forb component. Annual forbs and perennial grasses were rare, and annual grasses were not observed (Table 16R-61.7, Table 16R-61.10, Table 16R-61.11). This site would likely continue to remain in this conifer-encroached state in future sample years without treatment. However, a conifer-removal treatment will likely take place in the area in the future (Table 16R-61.1) which may allow for the aspen stand to re-establish over time.

Deer winter range condition on this site was considered to be poor upon study establishment: this condition could be improved by increasing preferred browse cover, and cover and diversity of perennial grasses (Table 16R-61.15). Both deer and elk presence were low in 2023 according to pellet transect data (Table 16R-61.9). However, the diverse and abundant forb component could provide forage to elk during the summer months (Table 16R-61.3; Beck & Peek, 2005).

Trend Summary Tables

Table 16R-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
2023	10.0	1.4	13.0	11.9	0.3	79.2

Table 16R-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
2023	-	16	3	245	-	0.3	0.0	18.3

Table 16R-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
2023	2.4	0.2	77.2	0.5	0.6	35.1

Table 16R-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	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2023	-	3	3	3
Year	Days Use Per Acre (ha)			
	2023	2.9 (7.2)	6.7 (16.6)	2.7 (6.6)

Table 16R-61.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES			
Achnatherum nelsonii (Columbia needlegrass)			
Bromus porteri (Porter brome)			
Elymus trachycaulus (slender wheatgrass)			
year	Nested Frequency		
2023	8	1	8
year	Average Cover (%)		
2023	0.1	0.1	0.1

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

Table 16R-61.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Achillea millefolium (Common yarrow)																		
Alyssum alyssoides ^{ai} (pale madwort)																		
Anaphalis margaritacea (western pearly everlasting)																		
Cirsium wheeleri (Wheeler's thistle)																		
Draba aurea (golden draba)																		
Frasera speciosa (elkweed)																		
Geranium richardsonii (Richardson's geranium)																		
Helianthus multiflorus (showy goldeneye)																		
Lathyrus lanszwertii (Nevada pea)																		
Maianthemum racemosum (feathery false lily of the valley)																		
Osmorhiza depauperata (bluntseed sweetroot)																		
Polemonium foliosissimum (towering Jacob's-ladder)																		
Pseudostellaria jamesiana (tuber starwort)																		
Rudbeckia occidentalis (western coneflower)																		
Sidalcea candida (white checkerbloom)																		
Symphotrichum foliaceum (alpine leafybract aster)																		
Taraxacum officinale (common dandelion)																		
year	Nested Frequency																	
2023	1	3	3	2	19	14	29	8	122	7	30	7	66	6	1	17	0	
year	Average Cover (%)																	
2023	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	8.3	0.1	0.5	0.1	1.0	0.0	0.0	0.4	0.0	

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

FORB SPECIES	Nested Frequency		
<i>Thalictrum fendleri</i> (Fendler's meadow-rue)	60	82	44
<i>Viola adunca</i> (hookedspur violet)	2.3	2.9	1.4
<i>Viola purpurea</i> (goosefoot violet)			
year	Average Cover (%)		
2023	2.3	2.9	1.4

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

Table 16R-61.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)							
<i>Abies concolor</i> ^t (white fir)	48.9	0.2	0.3	22.6	7.7	0.3	-	11.4
<i>Amelanchier utahensis</i> ^p (Utah serviceberry)								
<i>Mahonia repens</i> (creeping barberry)								
<i>Pinus flexilis</i> ^t (limber pine)								
<i>Populus tremuloides</i> ^{ip} (quaking aspen)								
<i>Prunus virginiana</i> ^p (chokecherry)								
<i>Sambucus nigra</i> ssp. <i>cerulea</i> ^p (blue elderberry)								
<i>Symphoricarpos oreophilus</i> ^p (mountain snowberry)								
year	Quadrat Cover (%)							
2023	4.8	0.1	1.4	7.1	1.2	1.5	0.4	8.1

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

Table 16R-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 (%)				
<i>Abies concolor</i> ^t -- (white fir)									
2023	660	-	18	79	3	0	0	3	- / -
<i>Amelanchier utahensis</i> ^p -- (Utah serviceberry)									
2023	100	-	100	0	0	20	60	20	- / -
<i>Mahonia repens</i> -- (creeping barberry)									
2023	1360	-	0	100	0	0	0	0	- / -
<i>Pinus flexilis</i> ^t -- (limber pine)									
2023	220	40	0	100	0	0	0	0	- / -
<i>Prunus virginiana</i> ^p -- (chokecherry)									
2023	80	-	75	25	0	0	0	0	- / -
<i>Rosa woodsii</i> ^p -- (Woods' rose)									
2023	60	-	67	33	0	0	0	0	- / -
<i>Sambucus nigra</i> ssp. <i>cerulea</i> ^p -- (blue elderberry)									
2023	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 (%)				
Symphoricarpos oreophilus ^p -- (mountain snowberry)									
2023	5080	-	27	65	8	8	4	15	- / -

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

Table 16R-61.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

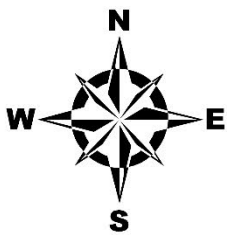
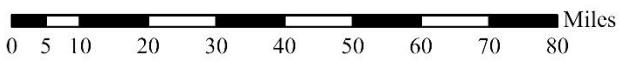
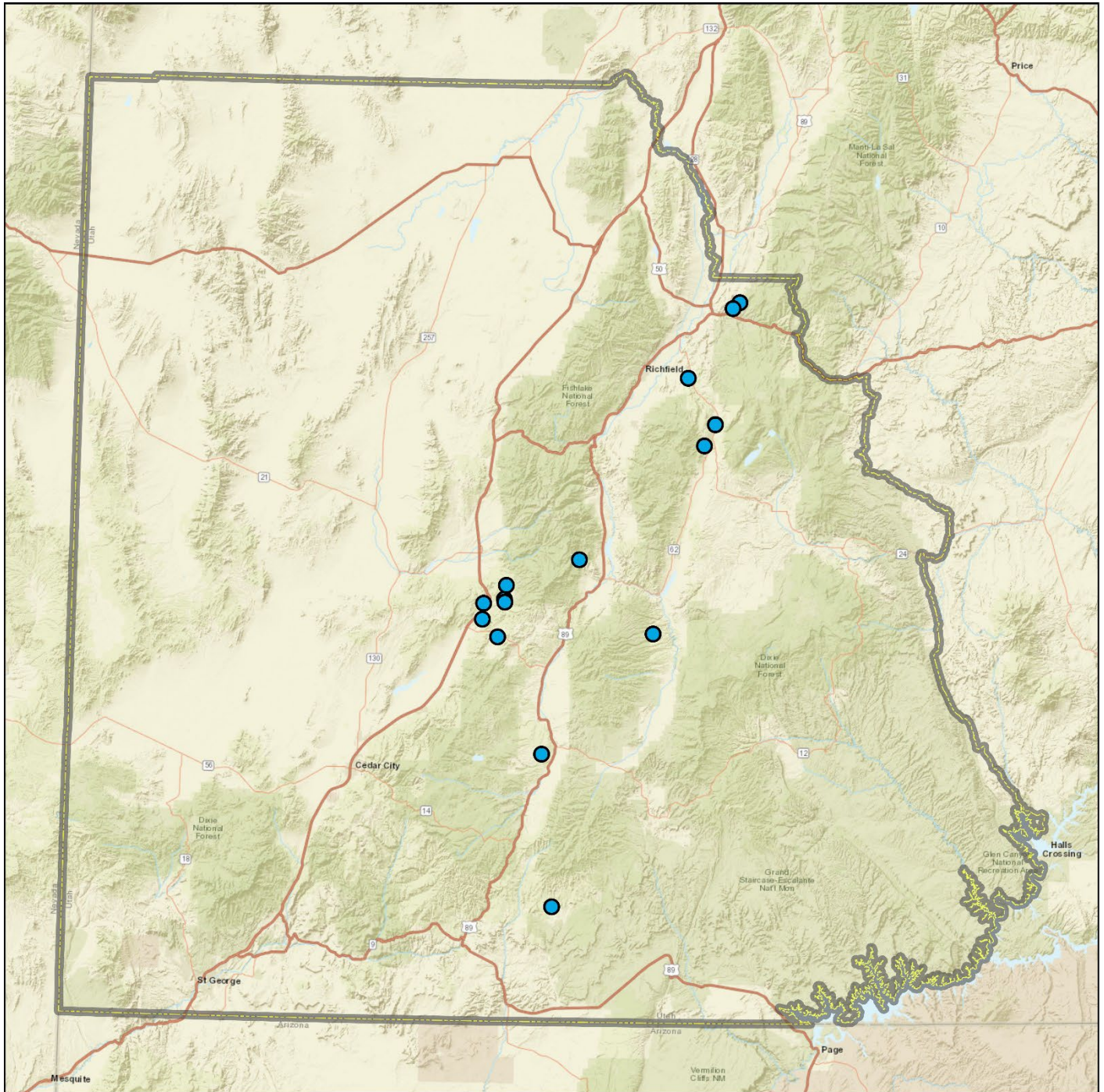
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2023	240	58	17	8	17	0	20	40

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)

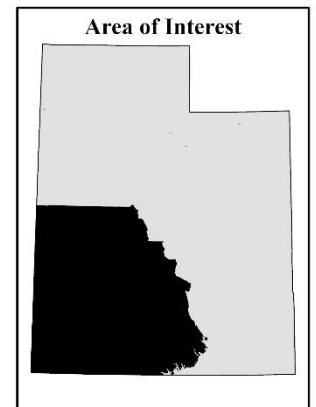
Table 16R-61.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Abies concolor (white fir)							
2023	223	5	5	5	5	80	37.6
Pinus flexilis (limber pine)							
2023	465	-	-	-	-	100	44.0
Populus tremuloides (quaking aspen)							
2023	73	-	50	-	-	50	11.2

SOUTHERN REGION

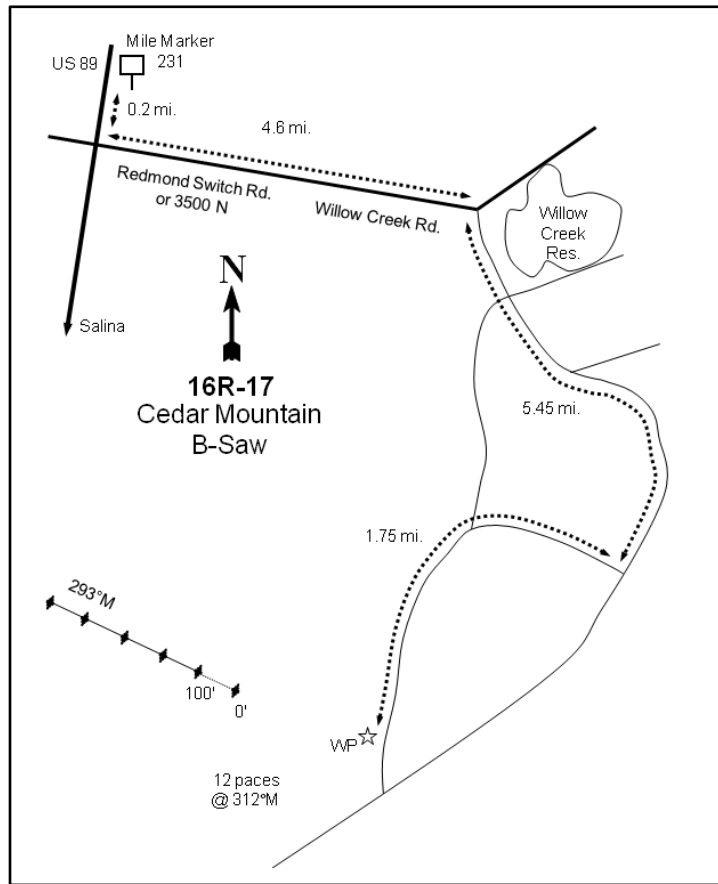
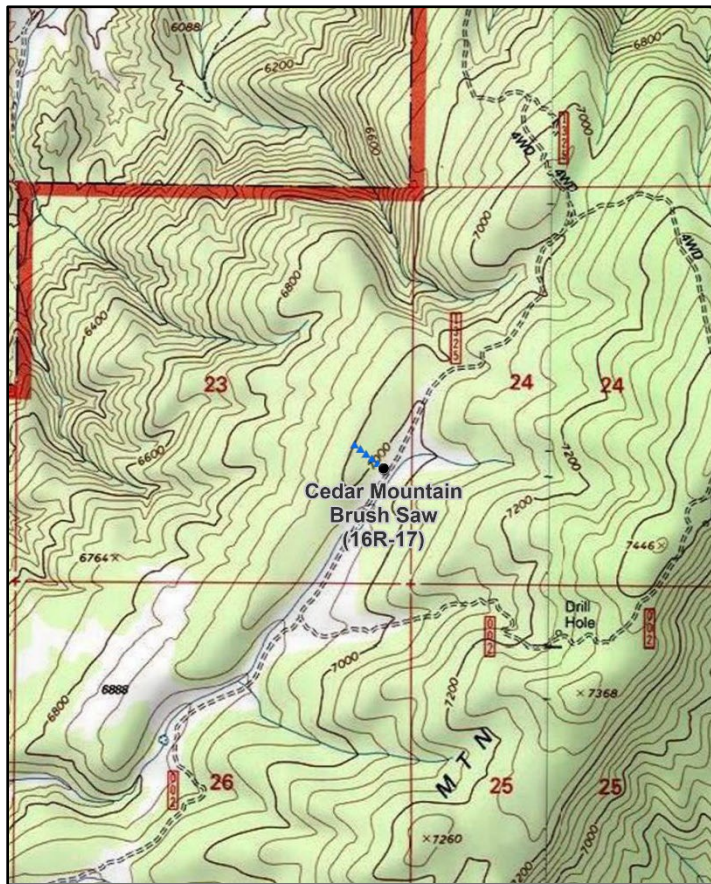


Region Boundaries	Study Location
Southern Region	2023 WRI Study Sites



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

CEDAR MOUNTAIN BRUSH SAW - STUDY NO. 16R-17



Location Information

USGS 7.5 min Map Info Salina NE; Township 21S, Range 1E, Section 23
 GPS (0' Stake) NAD 83 UTM ZONE 12, 434294 East 4313140 North

Transect Information

Browse Tag # (0' Stake) 88
 Transect Bearing 290° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

From Salina, drive north on US-89 to Redmond Switch Road (which is on the right (east) side of the road) 0.2 miles before mile marker 231. Turn right onto this road and drive 4.6 miles to a road on the right (south) just before Willow Creek Reservoir. Turn onto this road and continue 5.6 miles to a road to the right (north). Turn right and drive 1.7 miles to the witness post on the right-hand (west) side of the road. From the witness post, walk 12 paces at 312 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag #88.

Site Information

Land Ownership Federal
 Land Administrator USFS
 Allotment North Post Mountain Allo
 Elevation 6,950ft (2,118m)
 Aspect East
 Slope 10-12%
 Sample Dates 08/04/2005, 06/18/2008, 07/02/2013, 08/02/2018, 08/28/2023

Table 16R-17.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1970s	-
Mechanical - Brush Saw	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 2	465	June-December 2005	2469
Mechanical or Hand Crew - Bullhog or Lop and Scatter	-	-	Between 2008 and 2013	-

Wildlife Habitat and Vegetation History**Table 16R-17.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 16R-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
2008	Perennial Grass/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Perennial Grass/Gambel Oak/Black Sagebrush	Phase I
2018	Perennial Grass/Gambel Oak/Black Sagebrush	Phase I
2023	Perennial Grass/Gambel Oak/Black Sagebrush	Phase I

Site Notes

There is a guzzler 200 yards north of the study.

Soils**Table 16R-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
Silt Loam	7.6	30.0	56.4	13.6	5.0	8.4	236.8	0.7	08/04/2005

Site Potential

1981 - 2010 Average Annual Precipitation 17 inches
 NRCS Ecological Site Upland Stony Loam (Black Sagebrush)
 NRCS Ecological Site # R047XB332UT
 States and Transitions No state and transition model is available for this ecological site.

When established in 2005, this study was dominated by encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees and was considered to be within Phase II of woodland succession. Other browse species were also present, but they provided limited cover. A brush saw treatment in 2005 and bullhog or lop and scatter treatment between 2008 and 2013 (Table 16R-17.1) removed many of the trees, and the site has been considered to be within Phase I of succession since 2013 (Table 16R-17.4). Following treatment, the dominant browse species have been black sagebrush (*Artemisia nova*) and Gambel oak (*Quercus gambelii*). However, trees have maintained a presence in all post-treatment sample years. Although density and cover are low-moderate as of 2023, tree presence indicates that the site may be prone to infilling in the future (Photos, Table 16R-17.12, Table 16R-17.13, Table 16R-17.14). The herbaceous understory has been primarily composed of perennial grasses, particularly the introduced species intermediate wheatgrass (*Thinopyrum intermedium*) and crested wheatgrass (*Agropyron cristatum*), in all sample years. Perennial grasses exhibited an increase following treatment and have been a codominant vegetation component since 2008. Forbs have remained rare throughout the study period (Table 16R-17.7, Table 16R-17.10, 16R-17.11).

Deer winter range condition on this site has ranged between very poor and good since 2005, and was considered to be good in 2023. Further improvement to winter range could be achieved through efforts that increase preferred browse cover, diversify and increase cover of perennial forbs, and decrease or remove cheatgrass (Table 16R-17.15). Pellet transect data shows that mule deer presence has ranged from low to high over the sample period, but was considered to be high in 2023. In contrast, elk presence was low during the most recent sample year (Table 16R-17.9). However, the modest sagebrush component of this site could provide browse for elk during the winter (Table 16R-17.3; Wambolt, 1996).

Trend Summary Tables**Table 16R-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	-	9.6	3.7	-	16.1
2008	2.8	-	2.3	3.3	-	5.5
2013	5.7	0.2	2.0	10.1	0.5	3.9
2018	5.3	0.3	4.6	8.6	0.9	6.5
2023	8.9	0.3	6.5	12.1	0.2	8.4

Table 16R-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	26	293	224	19	0.3	10.9	2.3	0.1
2008	116	291	196	59	1.2	22.0	1.1	0.5
2013	11	352	259	28	0.0	24.0	1.8	0.2
2018	27	357	273	8	0.1	21.2	1.0	0.2
2023	43	315	227	19	0.4	17.9	0.9	0.2

Table 16R-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	19.7	0.4	37.4	22.0	9.2	21.2
2008	17.0	-	40.2	12.8	9.5	31.3
2013	13.7	-	57.3	3.2	10.2	40.2
2018	21.5	0.0	59.4	8.2	9.8	31.8
2023	20.2	0.4	41.9	10.4	11.1	33.5

Table 16R-17.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2005	11	10	70
2008	6	3	61
2013	7	7	14
2018	5	31	37
2023	18	17	9
Days Use Per Acre (ha)			
2005	15.4 (38.1)	4.7 (11.6)	-
2008	8.7 (21.5)	6.7 (16.6)	-
2013	30.2 (74.5)	2.0 (5.0)	-
2018	8.7 (21.5)	71.1 (175.5)	-
2023	46.9 (115.9)	10.0 (24.8)	-

Table 16R-17.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency							
2005	3	181	-	26	3	27	1	177
2008	16	145	3	116	-	28	0	202
2013	3	152	10	11	-	17	5	284
2018	3	155	-	27	-	12	11	267
2023	4	144	-	43	-	11	13	225
year	Average Cover (%)							
2005	0.1	7.4	-	0.3	0.0	0.3	0.0	3.1
2008	0.1	7.6	0.1	1.2	-	0.3	0.0	14.0
2013	0.5	6.2	0.0	0.0	-	0.3	0.3	16.7
2018	0.4	7.6	-	0.1	-	0.1	0.7	12.4
2023	0.8	8.3	-	0.4	-	0.0	0.9	7.9

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

Table 16R-17.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Arenaria (sandwort)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Carduus nutans ^{ai} (nodding plumeless thistle)	Caulanthus crassicaulis ^a (thickstem wild cabbage)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Descurainia pinnata ^a (western tansymustard)	Ipomopsis congesta (ballhead ipomopsis)	Lactuca serriola ^{ai} (prickly lettuce)	Lomatium (desertparsley)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ^a (alfalfa)
year	Nested Frequency																
2005	33	2	-	1	3	-	6	192	-	-	15	22	7	-	-	-	-
2008	116	1	1	8	16	-	7	117	2	12	24	6	3	7	17	-	-
2013	248	5	-	5	-	19	-	11	3	-	3	8	5	-	-	-	-
2018	273	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
2023	227	2	-	-	-	-	-	7	-	-	-	-	-	1	6	3	-
year	Average Cover (%)																
2005	0.1	0.0	-	0.0	0.0	-	0.1	1.9	-	-	0.0	0.1	0.0	-	-	-	-
2008	0.3	0.0	0.0	0.0	0.1	-	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-	-
2013	1.4	0.0	-	0.0	-	0.2	-	0.0	0.0	-	0.0	0.0	0.0	-	-	-	-
2018	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
2023	0.9	0.0	-	-	-	-	-	0.0	-	-	-	-	-	0.0	0.0	0.0	-

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

FORB SPECIES	Microsteris gracilis ^a (slender phlox)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)	Veronica biloba ^{ai} (two-lobed speedwell)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency							
2005	41	-	1	4	-	1	1	-
2008	51	-	12	3	-	1	5	2
2013	25	-	9	4	6	-	3	-
2018	-	-	7	-	-	-	-	-
2023	-	3	6	3	-	-	-	-
year	Average Cover (%)							
2005	0.2	-	0.0	0.1	-	0.0	0.0	-
2008	0.2	-	0.2	0.0	-	0.0	0.0	0.0
2013	0.1	-	0.1	0.0	0.0	-	0.0	-
2018	-	-	0.2	-	-	-	-	-
2023	-	0.0	0.1	0.0	-	-	-	-

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

Table 16R-17.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Ameiarcher utahensis ^p (Utah serviceberry)	Artemisia nova ^p (black sagebrush)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Pinus edulis ^t (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)	Quercus gambelii ^p (Gambel oak)	Symphoricarpos oreophilus ^p (mountain snowberry)
year	Line Intercept Cover (%)								
2005	-	0.4	-	-	7.1	9	-	2.4	0.9
2008	-	0.2	-	-	2	3.5	-	2.8	0.3
2013	-	4.3	-	0.5	1.4	2.5	0	5.2	0.6
2018	-	2.7	-	0.9	2.3	4.2	-	5.8	0.1
2023	-	3.1	-	0.2	2	6.4	0.2	8.1	0.7
year	Quadrat Cover (%)								
2005	0.0	0.6	-	-	5.2	4.4	0.1	1.2	0.4
2008	-	0.3	-	-	1.0	1.3	0.4	1.6	0.5
2013	-	1.4	-	0.2	0.6	1.4	0.4	3.1	0.8
2018	-	1.3	0.1	0.3	1.7	2.9	0.4	3.0	0.4
2023	-	1.8	0.1	0.3	1.4	5.2	0.6	6.1	0.2

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

Table 16R-17.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
2005	20	-	0	100	0	0	100	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Artemisia nova^P -- (black sagebrush)									
2005	280	-	14	43	43	21	36	36	34/52
2008	160	-	0	63	38	13	0	63	34/59
2013	160	-	13	88	0	0	0	0	39/72
2018	200	-	10	90	0	0	0	0	46/85
2023	420	260	43	52	5	0	24	5	- / -
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2005	-	-	-	-	-	-	-	-	49/70
2008	-	-	-	-	-	-	-	-	51/86
2013	-	-	-	-	-	-	-	-	56/107
2018	-	-	-	-	-	-	-	-	44/79
2023	-	-	-	-	-	-	-	-	- / -
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2005	-	-	-	-	-	-	-	-	34/47
2008	-	-	-	-	-	-	-	-	36/40
2013	-	-	-	-	-	-	-	-	47/51
2018	-	-	-	-	-	-	-	-	45/50
2023	-	-	-	-	-	-	-	-	- / -
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
2005	20	-	0	100	0	0	100	0	10/23
2008	20	-	0	100	0	100	0	0	13/25
2013	20	-	0	100	0	0	0	0	22/32
2018	20	-	0	100	0	0	100	0	11/24
2023	20	-	0	100	0	0	100	0	- / -
Ephedra viridis^P -- (mormon tea)									
2005	-	-	-	-	-	-	-	-	55/63
2008	20	-	0	100	0	100	0	0	69/68
2013	20	-	0	100	0	100	0	100	68/78
2018	20	-	0	0	100	100	0	0	60/67
2023	20	-	0	100	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	48/34
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	56/47
2023	-	-	-	-	-	-	-	-	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2005	-	-	-	-	-	-	-	-	25/29
2008	-	-	-	-	-	-	-	-	- / -
2013	160	-	25	50	25	0	0	25	28/37
2018	720	-	0	100	0	0	0	0	23/29
2023	1720	20	9	90	1	0	1	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 (%)				
Juniperus osteosperma^t -- (Utah juniper)									
2005	400	-	50	50	0	0	0	0	- / -
2008	120	20	67	17	17	0	0	67	- / -
2013	100	20	80	20	0	0	0	0	- / -
2018	60	-	67	33	0	0	0	0	- / -
2023	80	-	75	25	0	0	0	0	- / -
Pinus edulis^t -- (twoneedle pinyon)									
2005	140	40	29	71	0	0	0	0	- / -
2008	40	-	0	50	50	0	0	50	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	40	-	0	100	0	0	0	0	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2005	-	-	-	-	-	-	-	-	45/136
2008	-	-	-	-	-	-	-	-	65/162
2013	20	-	0	100	0	0	100	100	68/122
2018	20	-	0	100	0	0	100	0	70/137
2023	20	-	0	100	0	0	100	0	- / -
Quercus gambelii^p -- (Gambel oak)									
2005	500	-	16	76	8	0	64	0	105/76
2008	1380	-	20	75	4	0	0	1	118/78
2013	1060	20	40	60	0	0	0	0	73/51
2018	880	40	14	86	0	18	0	0	119/93
2023	1480	-	50	49	1	20	30	1	- / -
Symphoricarpos oreophilus^p -- (mountain snowberry)									
2005	80	-	0	100	0	0	0	0	31/49
2008	60	-	0	100	0	0	0	0	44/72
2013	100	-	20	80	0	80	0	0	36/58
2018	100	-	0	100	0	0	0	0	33/65
2023	60	-	67	33	0	67	0	0	- / -

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

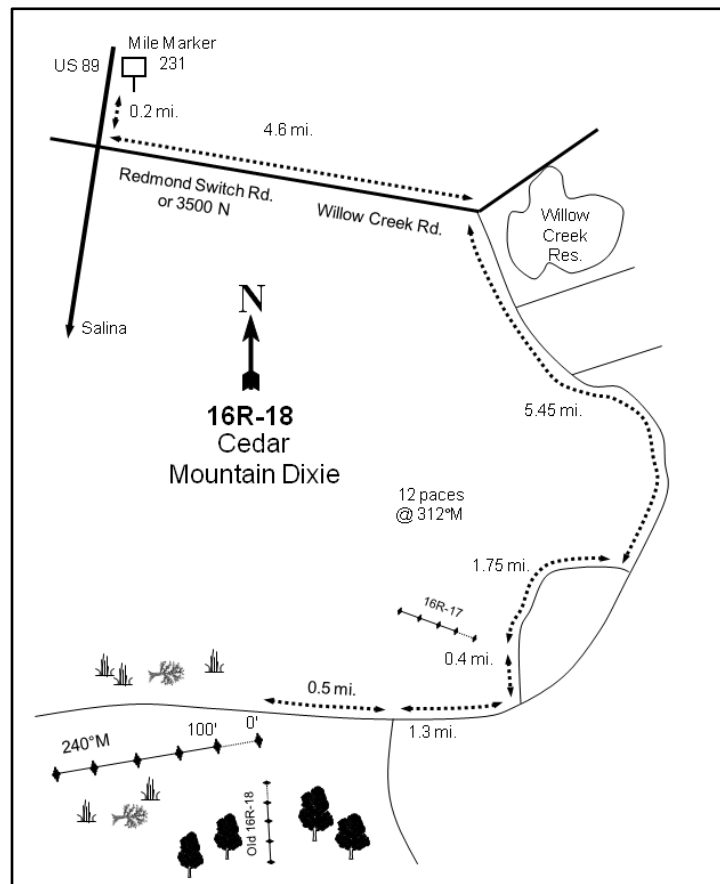
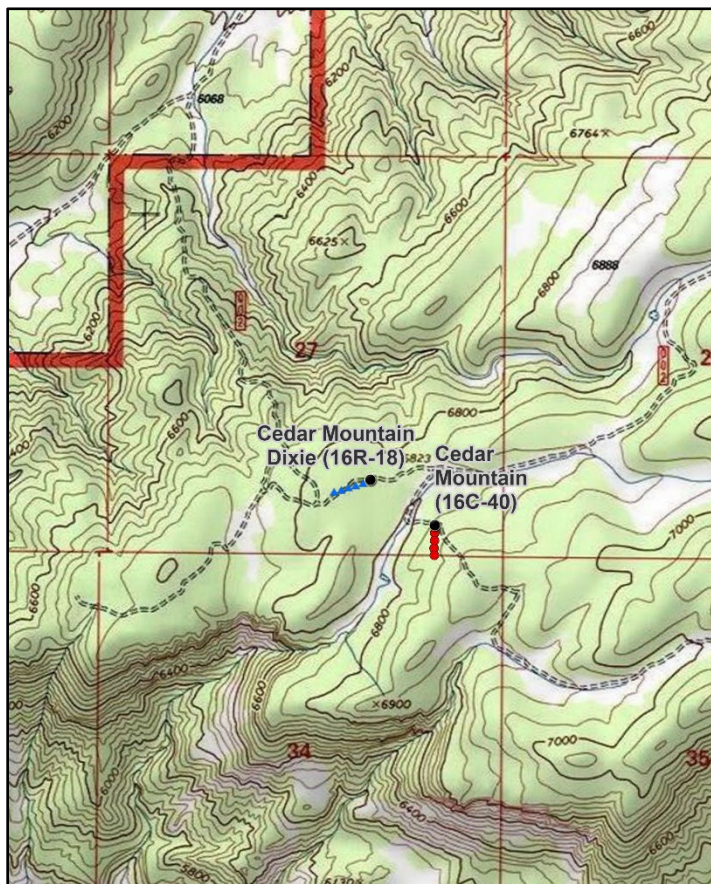
Table 16R-17.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	117	-	15	45	40	-	13.7
2013	49	13	60	27	-	-	3.9
2018	52	13	44	38	6	-	5.4
2023	68	18	12	71	-	-	6.7
Pinus edulis (twoneedle pinyon)							
2008	15	-	10	60	30	-	11.2
2018	7	-	50	-	50	-	8.0
2023	3	-	-	50	50	-	16.0

Table 16R-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	3.8	0.0	0.0	21.9	-0.2	0.2	0.0	25.7	Very Poor
2008	3.4	0.0	0.0	30.0	-0.9	1.0	0.0	33.5	Very Poor-Poor
2013	11.2	15.0	13.4	30.0	0.0	0.3	-2.0	67.9	Good
2018	9.3	15.0	6.2	30.0	-0.1	0.5	0.0	60.8	Fair
2023	13.0	14.3	15.0	30.0	-0.3	0.3	0.0	72.4	Good

CEDAR MOUNTAIN DIXIE - STUDY NO. 16R-18

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Salina NE; Township 21S, Range 1E, Section 27
NAD 83 UTM ZONE 12, 432256 East 4311372 North

Transect Information

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

89
240° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Standard

Directions to Site

From Salina, drive north on US-89 to Redmond Switch Road (which is on the right (east) side of the road) 0.2 miles before mile marker 231. Turn right onto this road and drive 4.6 miles to a road on the right (south) just before Willow Creek Reservoir. Turn onto this road and continue 5.5 miles to a road to the right (north). Turn right and drive 1.7 miles to the witness post of 16R-17 on the right-hand (west) side of the road. Continue driving another 0.4 miles to a fork. Bear right and proceed 1.3 miles to another fork. Stay right again at the fork and drive 0.15 miles to the witness post on the left (south) side of the road. From the witness post, walk 12 paces at 159 degrees magnetic to the 0-foot stake which is marked with browse tag #89.

Site Information

Land Ownership
Land Administrator
Allotment
Elevation
Aspect
Slope
Sample Dates

Federal
USFS
North Post Mountain Allo
6,830ft (2,082m)
SW
0-3%
08/04/2005, 06/18/2008, 07/02/2013, 08/01/2018, 08/28/2023

Table 16R-18.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Brush Saw	-	-	2011	-
Seeding - Broadcast	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	216	Fall 2005	1600
Chaining - Chain Unknown	-	-	1970s	-
Seeding - Seed Unknown	-	-	1970s	-
Harrow - One-Way Dixie	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	216	June-December 2005	4445

Table 16R-18.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Fishlake National Forest PJ Maintenance			Broadcast	Sep 2005	1600
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Bromus marginatus</i>	Mountain Brome	Bromar	0.13	0.00
G	<i>Bromus marginatus</i>	Mountain Brome	Bromar	1.88	0.00
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Critana	2.00	0.00
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass	Pryor	1.45	0.00
G	<i>Elymus trachycaulus</i>	Slender Wheatgrass		0.56	0.00
F	<i>Linum perenne</i>	Blue Flax		0.88	0.00
F	<i>Medicago sativa</i>	Alfalfa	Nomad	1.00	0.00
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.00	0.00

Wildlife Habitat and Vegetation History**Table 16R-18.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 16R-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/Perennial Grass	Phase I transitioning to Phase II
2008	Pinyon-Juniper/Perennial Grass	Phase I transitioning to Phase II
2013	Perennial Grass	Phase I
2018	Perennial Grass	Phase I
2023	Perennial Grass	Phase I

Site Notes

In 2013 the site was moved into the treatment area.

Soils**Table 16R-18.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.4	32.0	45.4	22.6	5.1	15.1	233.6	0.6	08/04/2005

Site Potential

1981 - 2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Upland Loam (Black Sagebrush)
 NRCS Ecological Site # R047XB309UT
 States and Transitions No state and transition model is available for this ecological site.

When the study was established in 2005, this site was dominated by encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees; other browse species were rare. Tree cover decreased following a harrow treatment in 2005 and a brush saw treatment in 2011 (Table 16R-18.1). Black sagebrush (*Artemisia nova*) remained stable or slightly decreased following treatment, although cover and density have remained low (Table 16R-18.12, Table 16R-18.13, Table 16R-18.14). The herbaceous understory has largely consisted of introduced perennial grasses, mainly intermediate wheatgrass (*Thinopyrum intermedium*) and to a lesser extent, crested wheatgrass (*Agropyron cristatum*), throughout the duration of the study. Perennial grasses have been a codominant site component in all sample years, with cover exhibiting an increase following the harrow and seeding (Table 16R-18.7, Table 16R-18.10). Although cover and density decreased significantly after treatment, trees have maintained a presence on this site (Photos, Table 16R-18.14), indicating that there may be potential for future infilling.

Deer winter range condition on this site has remained very poor since study establishment. This condition can mainly be attributed to a lack of preferred browse cover and reproduction and little cover provided by perennial forbs (Table 16R-18.15). Both deer and elk

presence were low in 2023 according to pellet transect data (Table 16R-18.9). However, increasing sagebrush on this site could increase browse available to elk during the winter months (Table 16R-18.3; Wambolt, 1996).

Trend Summary Tables

Table 16R-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	0.0	-	7.1	0.4	-	10.1
2008	0.2	-	5.4	0.4	-	5.9
2013	0.8	-	-	0.1	-	-
2018	0.8	-	0.1	-	-	0.4
2023	1.0	-	0.6	-	-	0.7

Table 16R-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	15	340	370	14	0.3	18.0	9.1	0.3
2008	15	361	300	39	0.0	30.9	2.0	0.5
2013	17	414	323	27	0.0	29.8	2.8	0.3
2018	18	433	285	3	0.1	30.8	1.9	0.1
2023	14	393	331	4	0.1	27.5	2.8	0.1

Table 16R-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	25.9	0.2	36.3	16.8	2.0	32.0
2008	15.6	0.1	40.7	16.7	2.3	37.0
2013	10.5	0.0	71.6	2.9	1.7	40.5
2018	21.0	-	64.1	6.2	2.1	32.7
2023	17.8	0.0	44.1	13.8	2.3	27.7

Table 16R-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/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	7	15	48	72
2008	3	18	23	64
2013	-	5	13	5
2018	-	3	28	35
2023	1	17	16	7
Year	Days Use Per Acre (ha)			
2005	-	36.8 (91.0)	12.1 (29.8)	-
2008	-	4.0 (9.9)	4.7 (11.6)	-
2013	-	6.0 (14.9)	20.8 (51.3)	-
2018	0.7 (1.8)	49.6 (122.5)	32.8 (81.1)	-
2023	-	6.0 (14.9)	2.7 (6.6)	-

Table 16R-18.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2005	-	158	77	15	-	0	29	2	7	253
2008	-	174	102	15	-	3	42	5	1	256
2013	2	95	131	17	-	-	26	0	3	376
2018	2	53	86	18	1	-	34	2	5	379
2023	-	94	93	14	7	4	22	-	-	352
year	Average Cover (%)									
2005	-	6.8	0.6	0.3	-	0.0	0.4	0.3	0.4	9.3
2008	-	10.1	5.0	0.0	-	0.2	0.4	0.7	0.0	14.6
2013	0.5	3.2	3.4	0.0	-	-	0.2	0.0	0.0	22.4
2018	0.1	2.5	3.0	0.1	0.0	-	0.4	0.1	0.4	24.2
2023	-	4.0	3.3	0.1	0.0	0.0	0.1	-	-	19.9

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

Table 16R-18.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Astragalus (milkvetch)	Astragalus utahensis (Utah milkvetch)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Collinsia parviflora ^a (maiden blue eyed Mary)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Ipomopsis congesta (ballhead ipomopsis)	Lappula occidentalis ^a (flatspine stickseed)	Lomatium (desertparsley)	Microsteris gracilis ^a (slender phlox)	Phlox austromontana (mountain phlox)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)
year	Nested Frequency															
2005	-	336	-	-	254	-	38	-	-	-	-	-	2	11	-	3
2008	8	286	3	1	83	3	-	-	2	-	1	6	1	14	-	10
2013	2	322	-	4	69	-	1	1	-	8	-	2	9	14	-	-
2018	-	285	-	-	-	-	-	-	-	-	-	-	-	3	-	-
2023	-	324	-	-	79	-	3	-	-	-	-	-	-	4	5	-
year	Average Cover (%)															
2005	-	4.7	-	-	3.9	-	0.5	-	-	-	-	-	0.0	0.3	-	0.0
2008	0.0	1.6	0.0	0.0	0.3	0.0	-	-	0.0	-	0.0	0.1	0.0	0.2	-	0.1
2013	0.0	2.5	-	0.1	0.2	-	0.0	0.0	-	0.1	-	0.0	0.0	0.2	-	-
2018	-	1.9	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-
2023	-	2.6	-	-	0.2	-	0.0	-	-	-	-	-	-	0.1	0.0	-

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

Table 16R-18.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Juniperus osteosperma ⁱ (Utah juniper)	Pinus edulis ⁱ (twoneedle pinyon)
year	Line Intercept Cover (%)			
2005	0.4	-	4.4	5.7
2008	0.4	-	1.3	4.6
2013	0.1	-	-	-
2018	-	-	0.4	-
2023	-	-	0.7	-
year	Quadrat Cover (%)			
2005	0.0	-	3.9	3.2
2008	0.2	0.0	1.0	4.4
2013	0.8	-	-	-
2018	0.8	-	0.1	-
2023	1.0	-	0.6	-

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

Table 16R-18.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^p -- (black sagebrush)									
2005	60	-	0	33	67	0	0	0	45/76
2008	40	-	0	50	50	50	50	0	40/61
2013	40	-	0	100	0	0	0	0	26/70
2018	40	-	0	100	0	0	0	0	30/65
2023	60	-	0	100	0	0	0	0	- / -
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2005	-	-	-	-	-	-	-	-	41/58
2008	20	-	0	100	0	100	0	0	51/65
2013	-	-	-	-	-	-	-	-	32/29
2018	20	-	0	0	100	100	0	100	21/24
2023	-	-	-	-	-	-	-	-	- / -
Ephedra viridis^p -- (mormon tea)									
2005	-	-	-	-	-	-	-	-	65/69
2008	-	-	-	-	-	-	-	-	59/85
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	83/85
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	94/130
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	34/41
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	22/37
2023	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma¹ -- (Utah juniper)									
2005	200	60	50	40	10	0	0	10	- / -
2008	120	-	67	17	17	0	0	17	- / -
2013	20	-	100	0	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	0	- / -
2023	20	-	0	100	0	0	0	0	- / -
Pinus edulis¹ -- (twoneedle pinyon)									
2005	80	-	0	100	0	0	0	0	- / -
2008	60	20	0	100	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
2005	-	-	-	-	-	-	-	-	64/142
2008	-	-	-	-	-	-	-	-	67/176
2013	-	-	-	-	-	-	-	-	68/133
2018	-	-	-	-	-	-	-	-	74/158

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

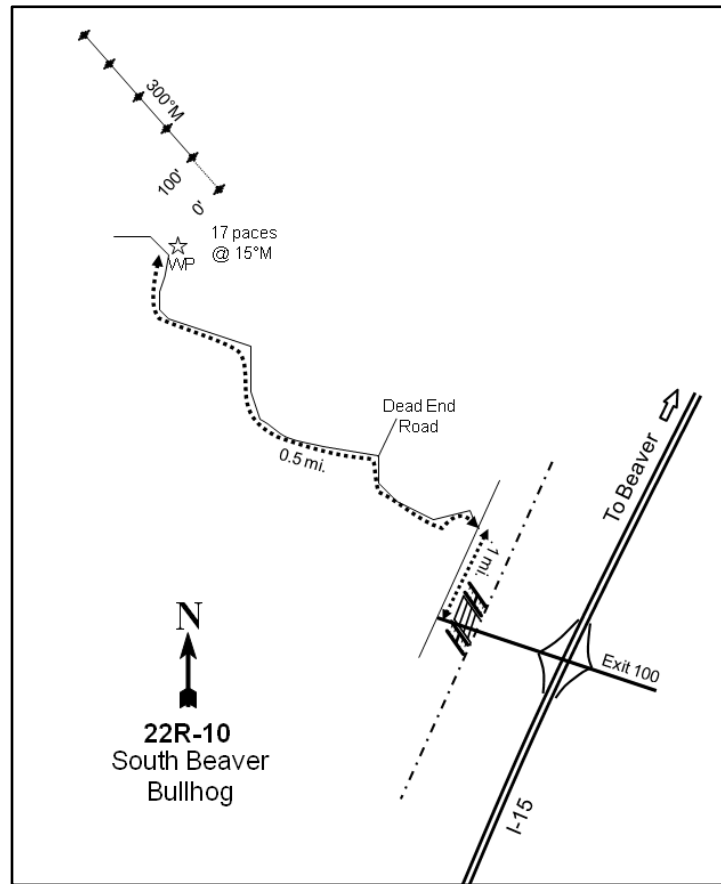
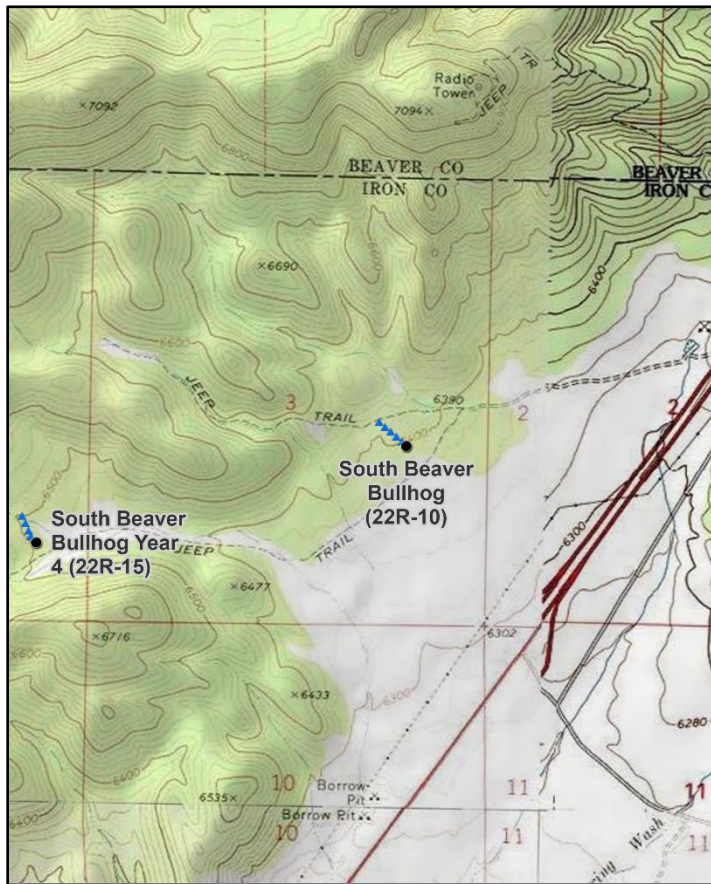
Table 16R-18.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	144	5	5	68	21	-	12.6
2013	36	13	87	-	-	-	4.7
2018	33	6	56	38	-	-	16.3
2023	39	-	35	59	6	-	16.6
Pinus edulis (twoneedle pinyon)							
2008	22	-	15	62	23	-	10.6

Table 16R-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	0.5	0.0	0.0	30.0	-0.2	0.6	0.0	30.8	Very Poor
2008	0.5	0.0	0.0	30.0	0.0	0.9	0.0	31.4	Very Poor
2013	0.1	0.0	0.0	30.0	0.0	0.7	0.0	30.7	Very Poor
2018	0.0	0.0	0.0	30.0	-0.1	0.1	0.0	30.0	Very Poor
2023	0.0	0.0	0.0	30.0	-0.1	0.1	0.0	30.1	Very Poor

SOUTH BEAVER BULLHOG - STUDY NO. 22R-10

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Greenville Bench SE; Township 31S, Range 7W, Section 03
NAD 83 UTM ZONE 12, 356966 East 4222402 North

Transect Information

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

238
300° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt 1: No Rebar

Directions to Site

Take exit 100 from I-15. From the off-ramp, turn right and proceed to a gate: go through the gate and turn right. Drive 0.1 miles to a fork. Turn left and drive 0.5 miles on a two-track road through a harrow project to a witness post on the right (north) side of the road. Walk 17 paces at 15 degrees magnetic from the witness post to the 0-foot stake marked with browse tag #238.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	FREMONT
Elevation	6,400ft (1,951m)
Aspect	East
Slope	4-6%
Sample Dates	07/28/2006, 07/14/2010, 08/12/2014, 08/13/2018, 08/21/2023

Table 22R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Beaver Vegetation Enhancement Yr 4	1224	Fall 2008-Summer 2009	1520
Seeding - Aerial Before	South Beaver Vegetation Enhancement Yr 4	1224	December 2008	1358
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver	3296	September-October 2015	4251

Table 22R-10.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
S Beaver Veg Enhancement			Aerial	Dec 2008	1224
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.23	1.13
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	0.94	0.77
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	0.12	0.11
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Nordan	0.82	0.77
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	1.84	1.55
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.84	1.69
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	0.33	0.28
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	1.17	0.96
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Goldar	0.04	0.03
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass	Oahe	0.61	0.56
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	2.45	2.21
F	<i>Linum perenne</i>	Blue Flax	Appar	0.61	0.55
F	<i>Medicago sativa</i>	Alfalfa	Ladak 65	0.61	0.54
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.61	0.56
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.61	0.55
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	0.61	0.59
F	<i>Penstemon palmeri</i>	Palmer Penstemon	White Pine NV	0.12	0.09
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.53	0.50
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.69	0.64

Wildlife Habitat and Vegetation History**Table 22R-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 22R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Pinyon-Juniper	Phase III
2010	Mountain Big Sagebrush	Phase I
2014	Mountain Big Sagebrush/Perennial Grass	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

Rebar is placed right where belts will be secured into the ground.

Soils**Table 22R-10.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.9	38.0	39.1	22.9	1.5	22.7	182.4	0.6	07/27/2006

Site Potential

1981 - 2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Loam (Bonneville Big Sagebrush)
 NRCS Ecological Site # R028AY310UT
 2006 - Utah Juniper/Invasive Annuals State: Community Phase 3.1
 States and Transitions 2010-2018 - Seeded Range State: Community Phase 5.1
 2023 - Seeded Range State: Community Phase 5.2

Upon study establishment in 2006, the plant community on this site was a mixed stand of twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees and the site was considered to be in Phase III of woodland succession. There were other browse

species present such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), but provided lesser amounts of cover (Table 22R-10.4, Table 22R-10.12, Table 22R-10.13, Table 22R-10.14). The herbaceous understory was abundant prior to treatment. However, almost all herbaceous cover was contributed by the introduced annual grass species cheatgrass (*Bromus tectorum*) (Table 22R-10.7, Table 22R-10.10); cheatgrass can pose a threat to the ecological resilience of a community when found in high amounts. Tree cover decreased substantially following a bullhog and seeding treatment in 2008 and 2009 (Table 22R-10.1, Table 22R-10.6). Shrub and herbaceous cover exhibited an initial decrease, but have increased over time; sagebrush has provided the most cover of any shrub in recent years (Table 22R-10.12). The herbaceous understory has been primarily composed of a mixture of native and introduced perennial grass species since 2014, with most of the cover provided by intermediate wheatgrass (*Thinopyrum intermedium*), squirreltail (*Elymus elymoides*), and crested wheatgrass (*Agropyron cristatum*) in 2023 (Table 22R-10.10). Forbs have remained rare (Table 22R-10.11). Some juniper and pinyon trees have remained following treatment (Table 22R-10.14), and although the site was in Phase I of woodland succession in 2023, there may be potential for infilling in future years.

Deer winter range condition on this site has ranged between very poor and good since study establishment in 2006, and was considered to be fair to good in 2023. Condition of deer winter range has improved in the years following treatment. However, further improvements could be accomplished through efforts that encourage increases in preferred browse cover and reproduction. In addition, diversifying and increasing cover of perennial forbs and reducing cheatgrass would also improve deer winter range (Table 22R-10.15). Pellet transect data indicates that deer presence has remained low throughout the study period (Table 22R-10.9).

Trend Summary Tables

Table 22R-10.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	7.0	1.1	11.6	8.0	1.5	31.1
2010	4.2	0.4	-	3.5	-	-
2014	6.9	1.0	0.0	6.5	1.4	-
2018	7.1	0.0	-	7.5	-	-
2023	12.9	0.8	-	13.5	0.8	-

Table 22R-10.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	346	71	9	12	12.9	1.2	0.0	0.1
2010	119	127	144	20	1.6	2.9	2.5	0.1
2014	121	282	5	14	1.8	19.2	0.0	0.1
2018	80	315	-	39	0.6	21.1	-	0.5
2023	96	302	53	19	1.2	18.9	0.1	0.2

Table 22R-10.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	18.7	0.0	45.5	14.5	8.0	32.9
2010	16.3	0.1	60.5	14.4	2.2	10.9
2014	8.1	0.0	54.4	11.7	4.0	32.8
2018	18.8	0.0	58.9	6.6	5.3	26.8
2023	11.4	0.3	52.2	9.5	3.9	31.6

Table 22R-10.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	-	-	-	51
2010	-	1	-	3
2014	3	2	1	32
2018	4	4	-	33
2023	6	1	-	25
Year	Days Use Per Acre (ha)			
2006	-	-	-	-
2010	-	0.7 (1.7)	-	-
2014	9.4 (23.3)	1.3 (3.3)	-	-
2018	5.1 (12.6)	-	-	-
2023	6.5 (16.1)	1.3 (3.3)	-	-

Table 22R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum ¹ (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{2a} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ¹ (intermediate wheatgrass)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency														
2006	12	9	-	-	12	340	37	-	-	-	5	-	-	-	64
2010	5	-	15	34	8	110	67	5	-	-	1	-	-	3	13
2014	15	4	67	39	15	121	161	14	0	13	3	8	-	55	-
2018	2	10	75	75	28	80	119	0	-	4	-	22	-	132	-
2023	-	2	62	52	26	93	88	1	-	-	-	12	15	143	3
year	Average Cover (%)														
2006	0.2	0.1	-	-	0.1	12.6	0.8	-	-	-	0.0	-	-	-	0.3
2010	0.0	-	0.1	0.4	0.5	1.5	1.7	0.2	-	-	0.0	-	-	0.0	0.1
2014	0.8	0.0	3.6	2.0	0.9	1.8	7.9	0.6	0.0	0.7	0.0	0.2	-	2.4	-
2018	0.2	0.3	3.0	5.1	1.1	0.6	5.1	0.0	-	0.0	-	1.1	-	5.0	-
2023	-	0.0	3.9	1.5	0.5	1.2	4.3	0.0	-	-	-	1.5	0.7	6.6	0.0

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

Table 22R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Astragalus (milkvetch)	Caulanthus crassicaulis ^a (thickstem wild cabbage)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Cirsium wheeleri (Wheeler's thistle)	Eriogonum cernuum ^a (nodding buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Hedysarum boreale (Utah sweetvetch)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Lygodesmia (skeletonplant)
year	Nested Frequency																
2006	-	5	-	4	-	5	5	-	-	-	-	-	1	-	-	-	-
2010	-	-	-	-	3	-	-	-	-	55	65	2	-	21	-	13	1
2014	-	-	2	-	-	3	-	-	-	-	-	2	-	-	-	1	-
2018	-	-	-	-	-	4	32	2	-	-	-	-	-	-	-	-	-
2023	3	-	-	-	-	3	3	3	2	34	19	-	-	-	1	-	-
year	Average Cover (%)																
2006	-	0.0	-	0.0	-	0.0	0.0	-	-	-	-	-	0.0	-	-	-	-
2010	-	-	-	-	0.0	-	-	-	-	0.6	1.5	0.0	-	0.3	-	0.0	0.0
2014	-	-	0.0	-	-	0.0	-	-	-	-	-	0.0	-	-	-	0.0	-
2018	-	-	-	-	-	0.0	0.4	0.0	-	-	-	-	-	-	-	-	-
2023	0.0	-	-	-	-	0.0	0.0	0.1	0.0	0.1	0.0	-	-	-	0.0	-	-

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

FORB SPECIES	Melilotus officinalis ⁱ (sweetclover)	Microsteris gracilis ^{ai} (slender phlox)	Orobanche fasciculata (clustered broomrape)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency					
2006	-	-	-	-	-	1
2010	1	34	-	2	2	1
2014	-	5	-	-	2	4
2018	-	-	1	-	-	3
2023	-	-	-	2	-	7
year	Average Cover (%)					
2006	-	-	-	-	-	0.0
2010	0.0	0.1	-	0.0	0.0	0.0
2014	-	0.0	-	-	0.0	0.0
2018	-	-	0.0	-	-	0.0
2023	-	-	-	0.0	-	0.0

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

Table 22R-10.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Linanthus pungens (granite prickly phlox)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)				
2006	8	1.4	0.4	0.1	30.7
2010	3.5	-	-	-	-
2014	6.5	1.1	-	0.3	-
2018	7.5	-	-	-	-
2023	13.5	0.6	-	0.2	-
year	Quadrat Cover (%)				
2006	7.0	0.8	1.6	0.3	10.0
2010	4.2	0.2	-	0.1	-
2014	6.9	0.8	0.0	0.2	-
2018	7.1	0.0	-	0.0	-
2023	12.9	0.7	-	0.1	-

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

Table 22R-10.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2006	2460	840	5	55	41	2	2	25	58/75
2010	1700	20	48	49	2	9	5	2	41/65
2014	1740	140	8	91	1	46	39	1	47/76
2018	1520	40	7	80	13	7	1	17	56/82
2023	1780	1720	14	79	8	20	2	9	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2006	1800	20	7	90	3	0	1	0	23/26
2010	180	40	0	100	0	0	0	0	23/29
2014	960	40	4	90	6	6	2	6	19/32
2018	180	-	11	78	11	0	0	44	15/15
2023	400	-	15	85	0	0	0	0	- / -
Juniperus osteospermaⁱ -- (Utah juniper)									
2006	20	40	0	100	0	0	0	0	- / -
2010	-	20	0	0	0	0	0	0	- / -
2014	-	20	0	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Linanthus pungens -- (granite prickly phlox)									
2006	100	20	0	100	0	20	0	0	15/27
2010	80	-	0	100	0	0	0	0	16/25
2014	180	60	0	100	0	0	0	0	19/31
2018	100	-	20	80	0	0	0	0	9/21
2023	140	-	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 (%)				
Opuntia -- (pricklypear)									
2006	-	-	-	-	-	-	-	-	10/25
2010	-	-	-	-	-	-	-	-	7/13
2014	-	-	-	-	-	-	-	-	10/17
2018	-	-	-	-	-	-	-	-	11/20
2023	-	-	-	-	-	-	-	-	-/-
Pediocactus simpsonii -- (mountain ball cactus)									
2006	-	-	-	-	-	-	-	-	5/8
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	3/5
2023	20	-	0	100	0	0	0	0	- / -
Pinus edulis^t -- (twoneedle pinyon)									
2006	220	220	55	46	0	0	0	0	- / -
2010	-	20	0	0	0	0	0	0	- / -
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	100	0	0	0	0	0	- / -

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

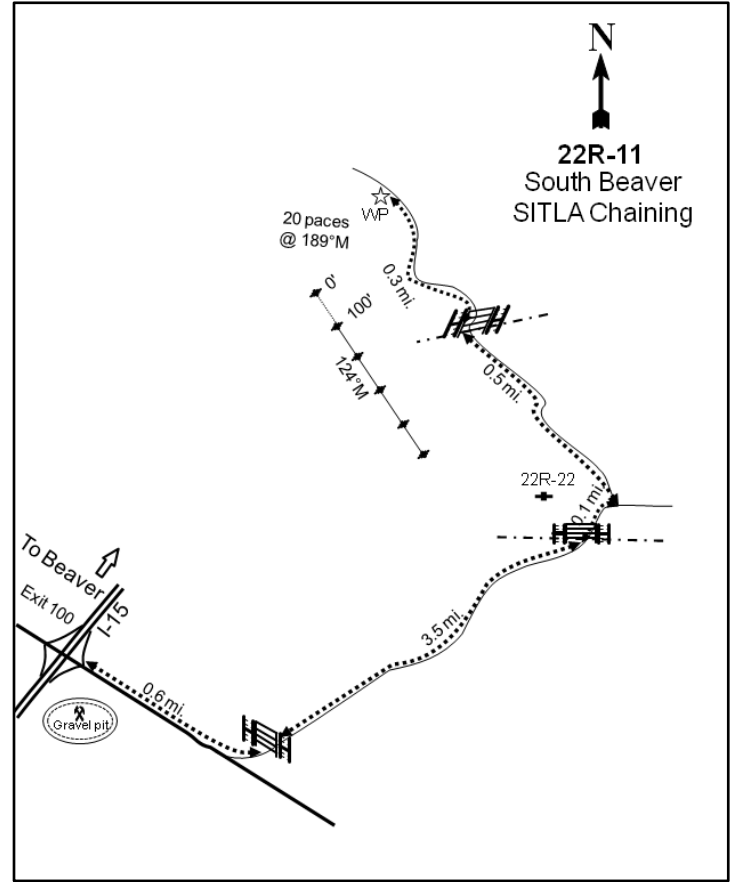
Table 22R-10.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2006	54	11	28	11	11	39	18.2
2014	3	33	67	-	-	-	4.3
2018	8	60	40	-	-	-	2.4
2023	3	33	67	-	-	-	2.0
Pinus edulis (twoneedle pinyon)							
2006	177	25	30	10	25	10	9.6
2014	12	100	-	-	-	-	1.5
2018	15	-	100	-	-	-	1.7
2023	2	-	100	-	-	-	2.0

Table 22R-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
2006	10.0	2.8	2.5	2.5	-9.6	0.1	0.0	8.2	Very Poor
2010	4.4	0.0	0.0	5.8	-1.2	0.2	0.0	9.2	Very Poor
2014	8.1	14.7	4.0	30.0	-1.3	0.2	0.0	55.6	Fair
2018	9.4	11.0	3.3	30.0	-0.5	1.0	0.0	54.2	Fair
2023	16.9	12.6	6.8	30.0	-0.9	0.5	0.0	65.8	Fair-Good

SOUTH BEAVER SITLA CHAINING - STUDY NO. 22R-11

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Kane Canyon SE; Township 30S, Range 6W, Section 32
NAD 83 UTM ZONE 12, 363187 East 4223621 North

Transect Information

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

187
124° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt 1: 1ft

Directions to Site

Take exit 100 from I-15; from the northbound on-ramp, drive east for 0.6 miles to a fork. Turn left and drive through a gate, then continue 3.5 miles to a fence. From the fence drive 0.1 miles to another fork and a witness post between the forks. From the post take the left fork and travel for 0.5 miles to a gate. Proceed through the gate and continue for 0.3 miles to a witness post on the left (west) side of the road. From the witness post the 0-foot stake is 20 paces away at 189 degrees magnetic and is marked with browse tag #187.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	SOUTH CREEK
Elevation	6,800ft (2,073m)
Aspect	Northwest
Slope	3-4%
Sample Dates	06/20/2007, 07/14/2010, 08/12/2014, 08/15/2018, 08/24/2023

Table 22R-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	South Beaver SITLA vegetation enhancement	918	November-December 2008	402
Seeding - Aerial Before	South Beaver SITLA vegetation enhancement	918	December 2008	402
Seeding - Dribbler	South Beaver SITLA vegetation enhancement	918	December 2008	402
Hand Crew - Lop (No Scatter)	Panguitch Creek/South Beaver Dedicated Hunter Habitat Projects maintenance	1801	April-June 2011	402
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver	3296	September-October 2015	4251

Table 22R-11.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Beaver SITLA vegetation enhancement			Aerial	Dec 2008	450
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Nordan	1.00	0.89
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.00	0.84
G	Dactylis glomerata	Orchardgrass	Paiute	0.44	0.36
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.92
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.33	0.28
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.82
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	2.00	1.80
F	Linum perenne	Blue Flax	Appar	0.22	0.20
F	Medicago sativa	Alfalfa	Ladak	0.33	0.30
F	Medicago sativa	Alfalfa	Ranger	0.33	0.31
F	Melilotus officinalis	Yellow Sweetclover		0.33	0.30
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.94
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.89
S	Bassia prostrata	Forage Kochia	Humbolt/Lander NV	0.44	0.30

Mix Name			Application Type	Application Date	Acres
South Beaver SITLA Dribbler			Dribbler	Dec 2008	450
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet	Delar	0.22	0.21
S	Purshia tridentata	Bitterbrush	Lincoln NV	0.22	0.18

Wildlife Habitat and Vegetation History**Table 22R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	substantial	winter
Greater Sage-Grouse		

Table 22R-11.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon-Juniper	Phase II transitioning to Phase III
2010	Perennial Forbs	Phase I
2014	Perennial Grass	Phase I
2018	Perennial Grass	Phase I
2023	Perennial Grass/Mountain Big Sagebrush	Phase I

Site Notes

The area is used heavily by deer and elk, and also once served as sage-grouse habitat.

Soils**Table 22R-11.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.3	43.4	35.0	21.6	2.1	8.7	156.8	0.5	06/20/2007

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Gravelly Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY306UT
States and Transitions	2007 - Utah Juniper/Invasive Annuals State: Community Phase 3.1 2010-2018 - Seeded Range State: Community Phase 6.1 2023 - Seeded Range State: Community Phase 6.2

When the study was established in 2007, this site was encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees and was considered to be within Phase II transitioning to Phase III of woodland succession. A small number of shrub species were also present, but offered limited cover (Table 22R-11.4, Table 22R-11.12, Table 22R-11.13, Table 22R-11.14). In addition, the herbaceous understory was depauperate in both quantity and diversity (Table 22R-11.7). The study was chained and seeded in 2008, removing much of the tree cover and augmenting the understory (Table 22R-11.1, Table 22R-11.6). Perennial forbs diversified and increased in cover, becoming the dominant vegetation type in 2010. In 2014, however, introduced and native perennial grasses such as crested wheatgrass (*Agropyron cristatum*), squirreltail (*Elymus elymoides*), intermediate wheatgrass (*Thinopyrum intermedium*), and bluebunch wheatgrass (*Pseudoroegneria spicata*) increased in cover and became the dominant vegetation component; the study site remained codominated by perennial grasses in the most recent sample year (Table 22R-11.10, Table 22R-11.11). Although mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) exhibited an initial decrease, cover and density have gradually increased over time, and sagebrush was codominant with perennial grasses in 2023 (Table 22R-11.12, Table 22R-11.13). The site has been classified as being within Phase I of woodland succession in all post-treatment sample years (Table 22R-11.4), but continued tree presence indicates that infilling may be possible as time since treatment(s) elapses.

Condition of deer winter range on this site has varied between very poor and good since study establishment in 2007, and condition was considered to be good in 2023. Deer winter range condition has improved in the years following treatment. However, further improvements could be achieved by increasing preferred browse cover and reproduction; increasing perennial forb cover; and decreasing or removing cheatgrass (Table 22R-11.15). According to pellet transect data, deer presence has remained low throughout the study period (Table 22R-11.9).

Trend Summary Tables**Table 22R-11.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	1.1	0.6	13.0	2.3	0.6	27.3
2010	1.8	0.1	0.5	1.6	0.2	1.2
2014	2.7	1.5	0.0	2.8	1.8	0.4
2018	4.7	1.1	0.0	4.3	1.3	0.3
2023	6.1	3.5	0.2	8.2	3.9	0.9

Table 22R-11.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	27	157	153	121	0.1	3.6	0.5	3.6
2010	1	135	190	145	0.0	2.8	7.8	5.0
2014	7	257	10	102	0.1	18.0	0.8	2.2
2018	4	256	2	82	0.0	22.7	0.0	3.2
2023	42	271	64	122	0.3	18.8	0.2	2.9

Table 22R-11.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	24.0	1.6	33.9	19.8	15.0	22.7
2010	23.0	0.1	53.8	5.8	6.0	18.6
2014	18.5	0.0	50.2	11.0	9.8	27.2
2018	24.0	2.0	44.5	6.0	12.1	30.9
2023	17.8	0.7	44.1	13.1	9.8	24.7

Table 22R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	-	-	-	52
2010	-	2	-	21
2014	1	2	5	16
2018	1	2	12	30
2023	6	5	1	10
Year	Days Use Per Acre (ha)			
2007	-	8.1 (19.9)	-	-
2010	-	2.7 (6.6)	2.0 (5.0)	-
2014	4.4 (10.8)	2.0 (5.0)	11.4 (28.1)	-
2018	4.4 (10.8)	3.4 (8.3)	0.7 (1.7)	-
2023	2.9 (7.2)	2.0 (5.0)	2.0 (5.0)	-

Table 22R-11.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum ^{ai} (cheatgrass)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency											
2007	36	-	-	27	-	1	-	6	-	127	-	-
2010	6	20	-	1	5	40	5	7	2	50	-	19
2014	38	58	5	7	0	102	3	2	1	84	-	60
2018	23	79	-	4	-	98	4	6	-	60	-	76
2023	47	63	-	42	-	46	1	9	6	93	1	120
year	Average Cover (%)											
2007	0.4	-	-	0.1	-	0.0	-	0.0	-	3.1	-	-
2010	0.3	0.4	-	0.0	0.2	0.4	0.1	0.1	0.0	1.3	-	0.1
2014	2.5	2.5	0.1	0.1	0.0	3.9	0.0	0.2	0.1	5.7	-	3.0
2018	2.2	6.9	-	0.0	-	5.6	0.0	0.5	-	4.9	-	2.5
2023	2.7	2.9	-	0.3	-	1.2	0.1	1.0	0.0	5.7	0.0	5.1

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

Table 22R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum ^{ai} (desert madwort)	Antennaria dimorpha (low pussytoes)	Arabis holboellii ^a (Holboell's rockcross)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Erigeron (fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)
year	Nested Frequency																
2007	-	-	3	11	9	-	-	82	6	1	-	-	-	-	-	5	-
2010	1	-	-	3	39	3	0	51	15	-	2	-	1	4	-	2	53
2014	-	-	-	-	22	-	-	-	4	-	2	-	-	2	-	4	-
2018	-	-	-	-	18	-	-	-	-	-	-	-	-	1	-	3	-
2023	-	35	3	2	14	-	-	20	1	5	-	4	-	3	1	5	7
year	Average Cover (%)																
2007	-	-	0.0	0.0	0.0	-	-	0.2	0.0	0.0	-	-	-	-	-	0.3	-
2010	0.0	-	-	0.0	2.6	0.0	0.0	0.7	0.2	-	0.1	-	0.0	0.0	-	0.0	2.1
2014	-	-	-	-	0.7	-	-	-	0.0	-	0.0	-	-	0.0	-	0.1	-
2018	-	-	-	-	1.0	-	-	-	-	-	-	-	-	0.1	-	0.0	-
2023	-	0.1	0.0	0.0	0.1	-	-	0.0	0.0	0.0	-	0.0	-	0.2	0.0	0.1	0.0

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

FORB SPECIES	Geranium ^a (geranium)	Gilia inconspicua ^a (shy gilia)	Hedysarum boreale (Utah sweetvetch)	Lactuca serriola ^{ai} (prickly lettuce)	Lesquerella (bladderpod)	Linum lewisii (Lewis flax)	Melilotus officinalis ⁱ (sweetclover)	Microsteris gracilis ^a (slender phlox)	Oenothera (evening primrose)	Onobrychis viciifolia ⁱ (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Physaria (twinpod)	Pleiacanthus spinosus (thorn skeletonweed)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)
year	Nested Frequency																
2007	-	65	-	-	6	-	-	54	-	-	-	-	96	-	3	-	-
2010	3	101	5	52	4	20	7	14	-	48	8	2	33	-	16	2	1
2014	-	4	4	2	4	11	0	-	-	-	9	8	29	31	4	-	1
2018	-	-	-	1	19	3	-	-	2	-	3	5	40	-	3	-	-
2023	-	5	-	-	-	-	-	3	-	-	11	5	40	59	5	-	-
year	Average Cover (%)																
2007	-	0.1	-	-	0.0	-	-	0.1	-	-	-	-	3.1	-	0.0	-	-
2010	0.0	3.8	0.0	1.1	0.1	0.4	0.3	0.1	-	0.4	0.0	0.1	0.3	-	0.1	0.0	0.1
2014	-	0.0	0.2	0.0	0.0	0.1	0.1	-	-	-	0.1	0.0	0.6	0.2	0.1	-	0.0
2018	-	-	-	0.0	0.3	0.0	-	-	0.0	-	0.0	0.0	1.6	-	0.1	-	-
2023	-	0.0	-	-	-	-	-	0.0	-	-	0.1	0.0	1.6	0.5	0.2	-	-

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

FORB SPECIES					
<i>Sisymbrium altissimum</i> ^{ai} (tall tumblemustard)					
<i>Sphaeralcea coccinea</i> (scarlet globemallow)					
<i>Sphaeralcea grossulariifolia</i> (gooseberry/leaf globemallow)					
<i>Tetranneuris acaulis</i> (stemless four-nerve daisy)					
<i>Tragopogon dubius</i> ^{ai} (yellow salsify)					
year	Nested Frequency				
2007	-	-	-	17	-
2010	-	-	-	-	-
2014	4	2	-	-	-
2018	-	1	-	-	1
2023	1	5	2	-	-
year	Average Cover (%)				
2007	-	-	-	0.1	-
2010	-	-	-	-	-
2014	0.8	0.0	-	-	-
2018	-	0.0	-	-	0.0
2023	0.0	0.0	0.1	-	-

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

Table 22R-11.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES										
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^p (mountain big sagebrush)										
<i>Chrysothamnus viscidiflorus</i> sp. <i>viscidiflorus</i> var. <i>stenophyllus</i> (yellow rabbitbrush)										
<i>Chrysothamnus viscidiflorus</i> sp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)										
<i>Gutierrezia sarothrae</i> (broom snakeweed)										
<i>Juniperus osteosperma</i> ⁱ (Utah juniper)										
<i>Linanthus pungens</i> (granite prickly phlox)										
<i>Opuntia</i> (pricklypear)										
<i>Pinus edulis</i> ⁱ (twoneedle pinyon)										
<i>Purshia tridentata</i> ^p (antelope bitterbrush)										
year	Line Intercept Cover (%)									
2007	2.3	0	-	0.2	10.5	0.4	-	16.8	-	-
2010	1.6	-	0.1	0.1	1	-	0	0.2	-	-
2014	2.8	-	-	1.8	0.2	-	-	0.2	-	-
2018	4.3	-	-	1.2	0.3	0.1	0	-	-	-
2023	8.2	0.1	-	3.7	0.9	0.1	-	-	-	-
year	Quadrat Cover (%)									
2007	1.1	0.0	-	0.2	4.2	0.4	-	8.9	-	-
2010	1.8	-	0.0	0.0	0.5	0.0	0.0	0.0	-	-
2014	2.6	-	-	1.5	0.0	0.0	-	0.0	0.0	0.0
2018	4.7	-	-	1.1	0.0	0.0	0.0	-	-	-
2023	6.1	0.0	-	3.5	0.2	0.0	-	-	-	0.0

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

Table 22R-11.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2007	1540	20	1	46	53	12	39	40	42/55
2010	500	20	0	88	12	0	0	4	44/60
2014	1180	220	34	64	2	50	28	3	49/73
2018	1960	320	39	55	6	14	1	5	49/70
2023	2540	540	42	56	2	13	2	2	- / -
Bassia prostrata^{PI} -- (forage kochia)									
2007	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	25/39
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	56/67
2023	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2007	240	-	0	83	17	25	58	8	14/16
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	25/31
2018	20	-	0	0	100	0	0	100	27/50
2023	80	-	0	100	0	0	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	40	-	0	100	0	0	0	0	29/31
2014	-	-	-	-	-	-	-	-	-/-
2018	20	-	100	0	0	0	0	0	22/27
2023	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	72/70
2018	-	-	-	-	-	-	-	-	55/60
2023	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2007	240	-	8	92	0	0	0	0	20/15
2010	100	-	0	100	0	0	0	0	27/29
2014	2060	240	22	77	1	18	0	1	25/35
2018	2060	20	6	79	16	0	0	14	16/23
2023	13280	80	6	94	0	0	0	0	- / -
Juniperus osteosperma^I -- (Utah juniper)									
2007	120	100	17	83	0	0	0	0	- / -
2010	80	80	75	25	0	0	0	0	- / -
2014	100	40	100	0	0	0	0	0	- / -
2018	200	-	100	0	0	0	0	0	- / -
2023	240	-	100	0	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2007	820	20	0	98	2	0	0	2	11/21
2010	60	-	0	100	0	0	0	0	16/35
2014	120	-	17	83	0	0	0	0	18/34
2018	220	-	9	91	0	0	0	0	12/29
2023	160	-	0	100	0	0	0	63	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Opuntia -- (pricklypear)									
2007	20	-	0	100	0	0	0	0	10/19
2010	20	-	0	100	0	0	0	0	11/19
2014	-	-	-	-	-	-	-	-	11/39
2018	40	-	0	100	0	0	0	0	10/24
2023	40	-	0	100	0	0	0	50	- / -
Pinus edulisⁱ -- (twoneedle pinyon)									
2007	300	100	47	53	0	0	0	0	- / -
2010	80	-	75	25	0	0	0	0	- / -
2014	40	60	100	0	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	0	- / -
2023	20	-	100	0	0	0	0	0	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2007	-	-	-	-	-	-	-	-	72/122
2010	-	-	-	-	-	-	-	-	46/90
2014	-	-	-	-	-	-	-	-	60/121
2018	-	-	-	-	-	-	-	-	64/126
2023	20	-	0	100	0	0	0	0	- / -

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

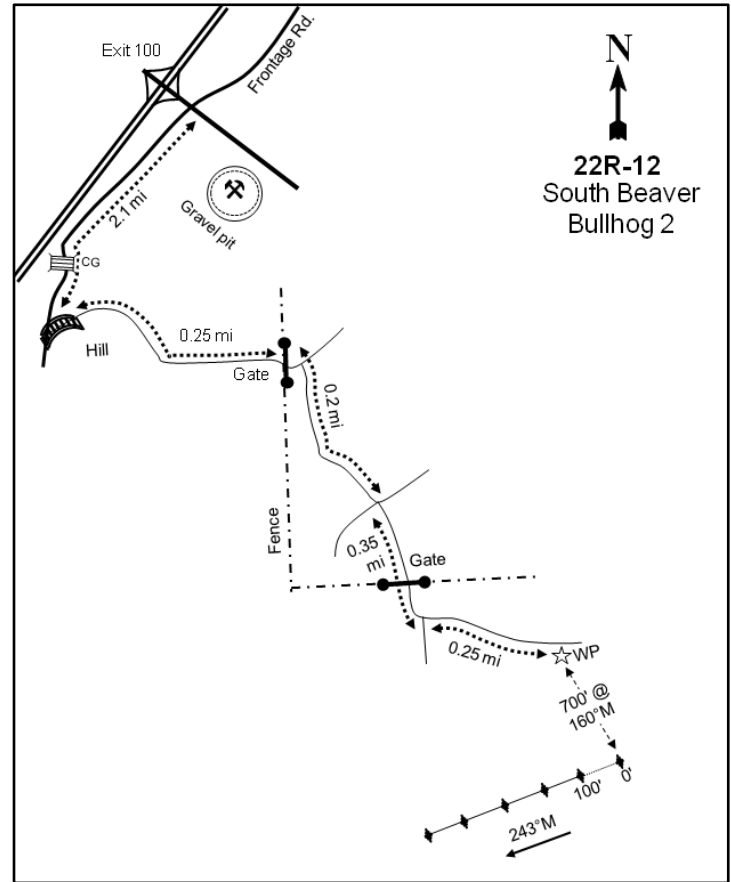
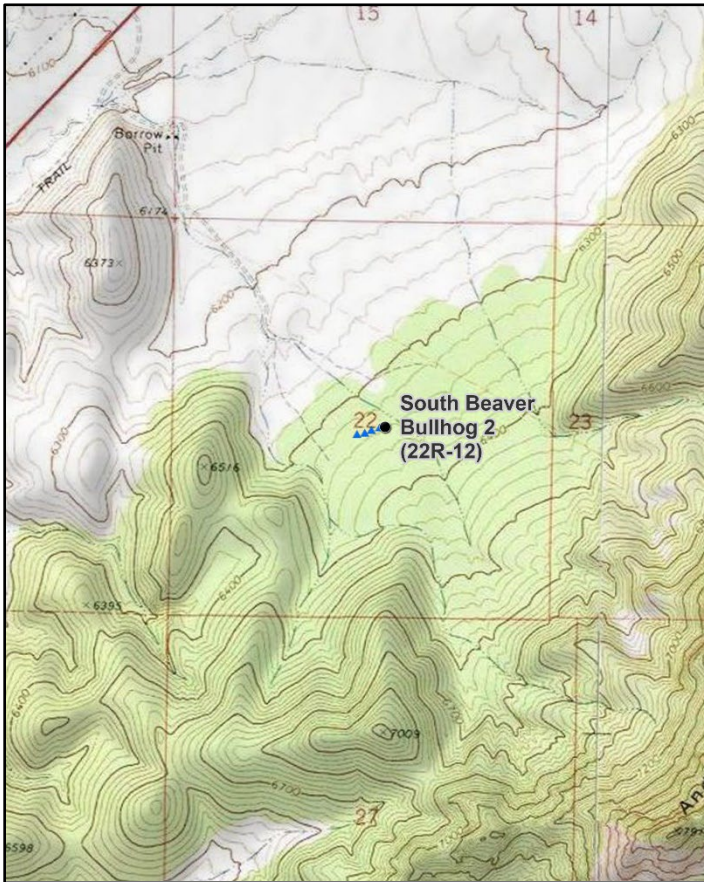
Table 22R-11.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	259	35	25	20	15	5	13.3
2010	74	11	78	11	-	-	4.3
2014	130	61	39	-	-	-	2.5
2018	77	44	56	-	-	-	2.2
2023	120	21	79	-	-	-	4.8
Pinus edulis (twoneedle pinyon)							
2007	169	10	30	30	20	10	13.6
2010	36	13	80	-	7	-	3.0
2014	15	86	14	-	-	-	1.6
2018	26	50	50	-	-	-	2.3
2023	6	-	100	-	-	-	2.8

Table 22R-11.15 - 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	2.9	0.0	0.0	7.1	0.0	7.2	0.0	17.1	Very Poor
2010	2.0	0.0	0.0	5.5	0.0	10.0	0.0	17.5	Very Poor
2014	3.5	0.0	0.0	30.0	-0.1	4.5	0.0	37.9	Poor
2018	5.4	0.0	0.0	30.0	0.0	6.5	0.0	41.8	Poor
2023	10.3	14.3	15.0	30.0	-0.2	5.7	0.0	75.1	Good

SOUTH BEAVER BULLHOG 2 - STUDY NO. 22R-12



Location Information

USGS 7.5 min Map Info Buckhorn Flat NE; Township 31S, Range 7W, Section 22
 GPS (0' Stake) NAD 83 UTM ZONE 12, 356565 East 4217544 North

Transect Information

Browse Tag # (0' Stake) 113
 Transect Bearing 243° 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 I-15, take exit 100 and go east to the frontage road running parallel and just east of the interstate. Travel south on the frontage road for 2.1 miles to a small bridge: here you will see a faint road on the left. Turn left (east) and drive 0.25 miles around a hill and pass through a gate to a fork. Take the right (south) fork and continue for 0.2 miles to another fork. Take the left fork and drive 0.35 miles, passing through another gate and to another fork. Go left and proceed 0.25 miles to a witness post on the right (south) side of the road. From the witness post the 0-foot stake is 700 feet away at 160 degrees magnetic and is marked with browse tag #113.

Site Information

Land Ownership Federal
 Land Administrator BLM
 Allotment BONE HOLLOW
 Elevation 6,350ft (1,935m)
 Aspect Northwest
 Slope 6-7%
 Sample Dates 08/22/2007, 07/12/2010, 07/29/2015, 08/16/2018, 08/23/2023

Table 22R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Rangeland Drill	South Beaver Vegetation Enhancement Project Year 3	895	August 2007-March 2008	385
Mechanical - Bullhog	South Beaver Vegetation Enhancement Project Year 3	895	August 2007-March 2008	385
Seeding - Aerial After	South Beaver Vegetation Enhancement Project Year 3	895	February-March 2008	385

Table 22R-12.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Beaver Veg Enhancement YR3			Aerial	Feb 2008	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	1.00	0.80
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.67	0.52
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.39
G	Elymus trachycaulus	Pubescent Wheatgrass		2.00	1.75
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.50	1.35
G	Poa secunda	Sandberg Bluegrass	Mountain Home ID	0.33	0.31
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.87
F	Linum perenne	Blue Flax	Appar	0.50	0.39
F	Medicago sativa	Alfalfa	Ladak	0.67	0.62
F	Medicago sativa	Alfalfa	Ranger	0.67	0.59
F	Melilotus officinalis	Yellow Sweetclover		0.17	0.15
F	Onobrychis viciifolia	Sainfoin	Eski	2.17	1.89
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.85
S	Purshia tridentata	Bitterbrush	Millard/Iron UT	0.17	0.13

Wildlife Habitat and Vegetation History**Table 22R-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 22R-12.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon-Juniper	Phase III
2010	Annual Forb/Pinyon-Juniper	Phase I
2015	Perennial Grass/Pinyon-Juniper	Phase I
2018	Perennial Grass/Pinyon-Juniper	Phase I
2023	Perennial Grass/Pinyon-Juniper	Phase I

Site Notes

No Notes

Soils**Table 22R-12.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.7	53.4	19.0	27.6	1.7	11.3	256.0	0.5	08/22/2007

Site Potential

1981 - 2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Loam (Bonneville Big Sagebrush)
 NRCS Ecological Site # R028AY310UT
 2007 - Utah Juniper/Invasive Annuals State: Community Phase 3.2
 States and Transitions 2010 - Utah Juniper/Invasive Annuals State: Community Phase Undefined
 2015-2023 - Seeded Range State: Community Phase 5.1

When this site was established in 2007, it was in Phase III of woodland succession and dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Tree cover decreased in the sample years following the bullhog and seeding treatment in 2008 (Table 22R-12.1), but the two species have retained codominance since 2010; the study site was considered to fall within Phase I of woodland succession in 2023 (Table 22R-12.4, Table 22R-12.12). The herbaceous understory was very limited in 2007, but the overall plant community was codominated by annual forbs in 2010 with prickly lettuce (*Lactuca serriola*) contributing the most cover

of any single species (Table 22R-12.11). However, perennial grasses, namely squirreltail (*Elymus elymoides*), increased in cover and replaced annual forbs as the dominant herbaceous component in 2015 (Table 22R-12.7). The introduced annual grass species cheatgrass (*Bromus tectorum*) has been recorded on the site in all post-treatment sample years in moderate abundance (Table 22R-12.10), and could potentially increase in the future. While juniper and pinyon remain scattered on the site and could infill over time, there was little or no recruitment of young plants in all post-treatment sample years (Table 22R-12.14).

Deer winter range condition on this site was considered to be very poor to poor in 2023 and very poor in all other sample years. Improvements to winter range could be accomplished through efforts that increase preferred browse cover and reproduction; increasing perennial forb cover while decreasing or removing cheatgrass would also benefit deer winter range (Table 22R-12.15). Both deer and elk presence have remained low throughout the study period (Table 22R-12.9). Increasing mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) cover and density could increase browse available to elk during the winter months (Table 22R-12.3; Wambolt, 1996).

Trend Summary Tables

Table 22R-12.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	-	-	5.3	0.2	-	40.2
2010	0.0	0.2	5.6	-	0.1	12.4
2015	0.0	-	2.0	0.1	-	9.6
2018	1.0	-	5.3	0.1	-	11.9
2023	-	2.2	3.5	0.1	1.6	10.4

Table 22R-12.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	116	24	174	48	0.9	0.1	0.5	0.2
2010	172	26	343	113	5.3	0.2	13.1	3.8
2015	168	228	51	69	4.0	8.8	0.6	3.1
2018	222	225	41	62	5.1	9.8	0.3	1.9
2023	177	233	119	88	2.2	16.5	2.3	3.2

Table 22R-12.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	4.0	7.5	51.9	25.6	16.8	6.7
2010	8.1	0.2	62.0	8.8	7.1	29.2
2015	1.6	0.0	69.0	8.8	10.1	21.5
2018	4.7	0.8	70.7	6.3	10.1	25.9
2023	4.3	0.0	63.1	8.9	6.9	27.0

Table 22R-12.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	-	3	-	82
2010	-	5	2	7
2015	4	1	3	76
2018	5	6	6	51
2023	9	6	12	23
Year	Days Use Per Acre (ha)			
2007	-	0.7 (1.7)	-	-
2010	-	2.7 (6.6)	0.7 (1.7)	-
2015	0.7 (1.8)	-	2.7 (6.6)	-
2018	1.5 (3.6)	8.1 (19.9)	9.4 (23.2)	-
2023	10.2 (25.1)	9.4 (23.2)	17.4 (43.0)	-

Table 22R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency										
2007	-	-	2	116	-	22	-	-	-	-	-
2010	-	-	-	172	-	16	-	2	-	-	8
2015	15	-	-	168	2	204	-	-	2	-	33
2018	49	5	4	222	-	190	-	5	4	-	20
2023	61	12	-	177	-	116	3	7	9	22	63
year	Average Cover (%)										
2007	-	-	0.0	0.9	-	0.1	-	-	-	-	-
2010	-	-	-	5.3	-	0.2	-	0.0	-	-	0.0
2015	0.4	-	-	4.0	0.0	7.6	-	-	0.1	-	0.7
2018	2.0	0.2	0.0	5.1	-	6.4	-	0.0	1.0	-	0.1
2023	4.2	0.4	-	2.2	-	6.2	0.3	0.3	1.4	0.2	3.5

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

Table 22R-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Ambrosia psilostachya (Cuman ragweed)	Arabis (rockerness)	Astragalus (milkvetch)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Chenopodium fremontii ^a (Fremont's goosefoot)	Cirsium wheeleri (Wheeler's thistle)	Cryptantha bakeri (Baker's cryptantha)	Cryptantha gracilis ^a (narrowstem cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)
year	Nested Frequency																
2007	-	6	1	10	-	3	-	-	5	-	41	-	6	7	-	1	31
2010	-	-	-	-	5	-	-	-	2	-	38	1	63	38	28	82	90
2015	-	-	-	-	-	-	-	2	2	-	-	-	6	21	-	-	1
2018	-	-	-	-	1	8	-	-	4	-	16	-	5	26	0	-	-
2023	1	-	-	-	-	3	1	1	5	7	14	-	45	10	3	5	6
year	Average Cover (%)																
2007	-	0.0	0.0	0.0	-	0.0	-	-	0.0	-	0.1	-	0.0	0.1	-	0.0	0.1
2010	-	-	-	-	0.0	-	-	-	0.0	-	0.5	0.0	0.9	0.3	0.4	1.2	1.1
2015	-	-	-	-	-	-	-	0.0	0.1	-	-	-	0.2	0.7	-	-	0.0
2018	-	-	-	-	0.0	0.0	-	-	0.0	-	0.1	-	0.0	0.5	0.0	-	-
2023	0.0	-	-	-	-	0.0	0.0	0.2	0.2	0.4	0.1	-	0.3	0.2	0.0	0.0	0.0

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

FORB SPECIES	Hymenopappus filifolius (fineleaf hymenopappus)	Hymenoxys richardsonii (pingue rubberweed)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^{ai} (flatspine stickseed)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)	Lygodesmia (skeletonplant)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa ⁱ (alfalfa)	Melilotus officinalis ⁱ (sweetclover)	Mentzelia albicaulis ^{ai} (whitestem blazingstar)	Microsteris gracilis ^{ai} (slender phlox)	Polygonum douglasii ^{ai} (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
2007	-	-	11	-	-	-	11	-	-	-	-	-	57	108	-	-	-
2010	-	12	7	280	7	6	19	14	17	3	9	12	84	59	-	-	-
2015	42	-	-	23	-	-	15	-	-	-	-	4	-	9	1	8	0
2018	31	-	1	2	-	-	8	-	-	-	-	3	-	8	2	8	-
2023	51	4	-	7	-	-	14	-	-	-	-	24	15	24	-	14	10
year	Average Cover (%)																
2007	-	-	0.0	-	-	-	0.0	-	-	-	-	-	0.1	0.2	-	-	-
2010	-	0.6	0.0	7.3	0.1	0.0	2.1	0.1	0.1	0.1	0.3	0.1	1.1	0.4	-	-	-
2015	1.4	-	-	0.1	-	-	0.8	-	-	-	-	0.0	-	0.0	0.0	0.2	0.0
2018	1.1	-	0.0	0.0	-	-	0.3	-	-	-	-	0.0	-	0.0	0.0	0.1	-
2023	1.6	0.1	-	0.2	-	-	0.7	-	-	-	-	0.2	0.0	0.1	-	0.2	0.2

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

FORB SPECIES	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius ^{ai} (yellow salsify)	Verbascum thapsus ^{ai} (common mullein)
year	Nested Frequency		
2007	9	-	-
2010	-	-	-
2015	-	2	1
2018	-	3	-
2023	-	-	4
year	Average Cover (%)		
2007	0.0	-	-
2010	-	-	-
2015	-	0.0	0.0
2018	-	0.0	-
2023	-	-	0.8

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

Table 22R-12.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)								
	year	Line Intercept Cover (%)							
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	2007	0.2	-	-	-	-	15.3	24.9	-
Bassia prostrata ^{pi} (forage kochia)	2010	-	-	-	0.1	-	6.5	5.9	-
Ericameria nauseosa (rubber rabbitbrush)	2015	0.1	-	-	-	-	6.5	3.1	-
Eriogonum corymbosum (crisp-leaf buckwheat)	2018	0.1	-	-	-	-	7.5	4.4	-
Eriogonum microthecum ^p (slender buckwheat)	2023	0.1	-	1.6	-	-	6.7	3.7	-
Juniperus osteosperma ⁱ (Utah juniper)	year	Quadrat Cover (%)							
Pinus edulis ⁱ (twoneedle pinyon)	2007	0.0	-	-	-	-	2.2	3.0	-
Sambucus ^p (elderberry)	2010	0.0	-	-	0.2	0.0	4.8	0.9	-
	2015	0.0	-	-	-	-	1.0	1.0	-
	2018	0.0	0.0	-	-	-	4.3	1.0	1.0
	2023	0.0	-	2.2	-	-	2.0	1.5	-

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

Table 22R-12.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2007	40	-	0	0	100	0	100	100	100/140
2010	60	20	0	100	0	33	0	0	45/43
2015	120	-	67	33	0	17	0	17	52/63
2018	80	-	0	50	50	25	25	50	47/61
2023	140	-	57	29	14	0	29	14	- / -
Bassia prostrata^{pi} -- (forage kochia)									
2007	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	40/40
2015	-	-	-	-	-	-	-	-	- / -
2018	-	20	0	0	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
Eriogonum corymbosum -- (crisp-leaf buckwheat)									
2007	-	-	-	-	-	-	-	-	- / -
2010	80	-	0	100	0	0	0	0	22/35
2015	-	-	-	-	-	-	-	-	43/54
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Eriogonum microthecum^p -- (slender buckwheat)									
2007	20	-	0	100	0	0	0	0	15/14
2010	20	-	100	0	0	0	0	0	- / -
2015	20	-	0	100	0	0	0	0	17/40
2018	20	-	0	100	0	0	0	0	20/16
2023	-	-	-	-	-	-	-	-	- / -

Year	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)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	36/41
2015	-	-	-	-	-	-	-	-	95/157
2018	-	-	-	-	-	-	-	-	85/122
2023	40	20	0	100	0	0	0	0	-/-
Juniperus osteosperma¹ -- (Utah juniper)									
2007	100	-	20	80	0	0	0	0	-/-
2010	20	-	0	100	0	0	0	0	-/-
2015	20	-	0	100	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	-/-
2023	20	-	0	100	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2007	-	-	-	-	-	-	-	-	15/38
2010	-	-	-	-	-	-	-	-	12/27
2015	20	-	0	100	0	0	0	0	12/24
2018	-	-	-	-	-	-	-	-	11/31
2023	-	-	-	-	-	-	-	-	-/-
Pinus edulis¹ -- (twoneedle pinyon)									
2007	420	100	29	67	5	0	0	0	-/-
2010	20	-	0	100	0	0	0	0	-/-
2015	20	-	0	100	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	-/-
2023	20	-	0	100	0	0	0	0	-/-
Sambucus^p -- (elderberry)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	162/191
2018	-	-	-	-	-	-	-	-	173/170

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

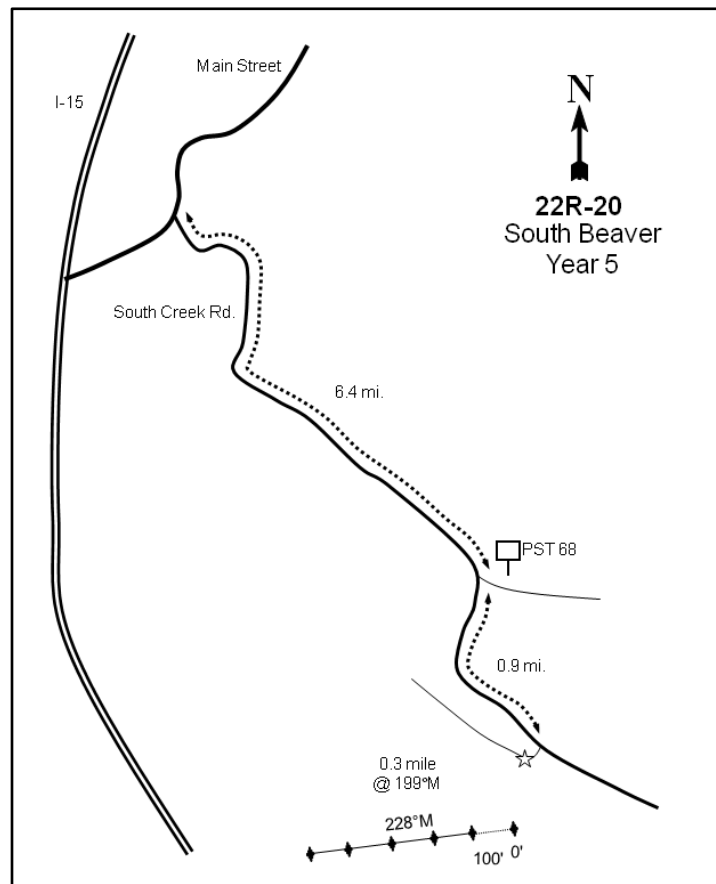
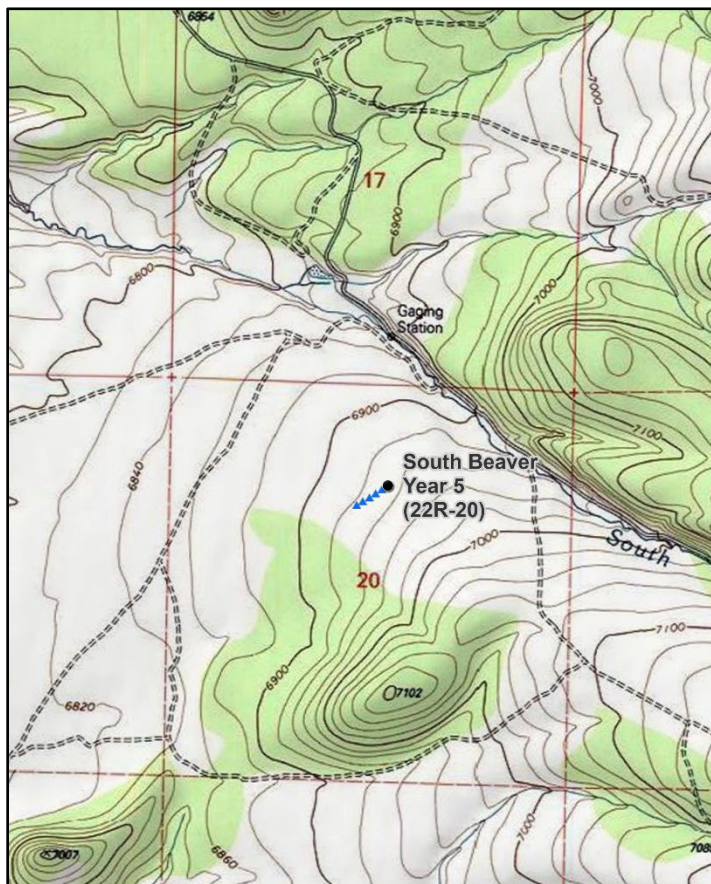
Table 22R-12.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	76	-	5	11	21	63	24.4
2010	2	-	33	-	-	67	52.3
2015	27	43	29	7	-	21	15.4
2018	8	-	-	-	-	100	45.8
2023	12	29	14	-	14	43	26.6
Pinus edulis (twoneedle pinyon)							
2007	171	20	5	10	20	45	15.9
2010	7	-	50	-	-	50	12.5
2015	8	-	-	-	-	100	30.3
2018	24	-	-	-	-	100	38.0
2023	11	20	-	-	-	80	25.8

Table 22R-12.15 - 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	0.3	0.0	0.0	0.2	-0.6	0.4	0.0	0.2	Very Poor
2010	0.0	0.0	0.0	0.5	-4.0	7.5	0.0	4.0	Very Poor
2015	0.1	0.0	0.0	17.6	-3.0	6.3	0.0	21.0	Very Poor
2018	0.1	0.0	0.0	19.6	-3.8	3.8	0.0	19.7	Very Poor
2023	0.1	0.0	0.0	30.0	-1.7	6.4	0.0	34.9	Very Poor-Poor

SOUTH BEAVER YEAR 5 - STUDY NO. 22R-20



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Kane Canyon SE; Township 30S, Range 6W, Section 20
NAD 83 UTM ZONE 12, 363811 East 4227750 North

Transect Information

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

198
228° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
No Rebar

Directions to Site

From Main Street in Beaver, travel south towards the I-15 interchange. Before Main Street bends to the west, turn east onto South Creek Road. Stay on the main road for 6.4 miles to a "PST 68" sign: from the sign, travel for 0.9 miles to a turn to the west. Cross the stream and park at a bend in the road that is about 100 feet past the stream. Walk 0.29 miles at 199 degrees magnetic to the 0-foot post. A new 200-foot stake needs to be placed during the next sample year.

Site Information

Land Ownership
Land Administrator
Allotment
Elevation
Aspect
Slope
Sample Dates

Federal
BLM
SOUTH CREEK
6,930ft (2,112m)
West-Northwest
1-5%
07/13/2010, 06/03/2013, 08/13/2018, 08/23/2023

Table 22R-20.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Beaver Vegetation Enhancement Year 5	1711	October 2010-January 2011	1761
Seeding - Aerial Before	South Beaver Vegetation Enhancement Year 5	1711	October 2010	1761
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver Phase II	4831	May-June 2019	6241

Table 22R-20.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Beaver Vegetation Enhancement Year 5			Aerial	Oct 2010	1771
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.02	0.87
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	1.50	1.33
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	1.50	1.16
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.50	1.34
G	<i>Poa secunda</i>	Sandberg Bluegrass	Mountain Home	0.25	0.23
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.95	0.85
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.54	0.49
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass	Oahe	0.48	0.43
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	2.00	1.84
F	<i>Linum perenne</i>	Blue Flax	Appar	0.51	0.40
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.99	0.92
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.23	0.20
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.28	0.25
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.02	0.96
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Iron UT	0.10	0.09
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.02	0.97

Wildlife Habitat and Vegetation History**Table 22R-20.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	substantial	winter
Greater Sage-Grouse		

Table 22R-20.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2010	Pinyon-Juniper	Phase III
2013	Perennial Grass/Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I
2023	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

There is no 200-foot stake. An untreated site, South Beaver Year 5 Reference (22R-21), was established as a reference study.

Site Potential

1981 - 2010 Average Annual Precipitation 16 inches
 NRCS Ecological Site Upland Gravelly Loam (Bonneville Big Sagebrush)
 NRCS Ecological Site # R028AY306UT
 States and Transitions 2010 - Utah Juniper/Invasive Annuals State: Community Phase 3.1
 2013-2023 - Seeded Range State: Community Phase 6.2

This site was dominated by encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be in Phase III of woodland succession upon study establishment in 2010 (Table 22R-20.4). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was the dominant shrub species, but provided substantially less cover than pinyon and juniper (Table 22R-20.12). The herbaceous understory was limited in cover and diversity. After a 2010 bullhog and seeding treatment (Table 22R-20.1) removed a majority of the trees, the site transitioned to one dominated by native and introduced perennial grasses and mountain big sagebrush. Annual grasses were present in low amounts in 2010 and 2013, but were not observed in 2018 or 2023 (Photos, Table 22R-20.7, Table 22R-20.10, Table 22R-20.12, Table 22R-20.13). Without further disturbance, sagebrush on this site will likely increase in cover, retaining codominance in the plant community. A maintenance lop and scatter treatment in 2019 (Table 22R-20.1) further removed some of the pinyon and juniper that infilled after the original treatment. However, the small trees that

remained in 2023 indicate that further infilling may again occur over time (Table 22R-20.14).

Condition of deer winter range on this site has ranged between very poor and good since study establishment. Winter range condition has improved following treatment, and the site was classified as being in good condition in 2023. Further improvements to deer winter range could be accomplished mainly through efforts that increase cover of preferred browse and perennial forbs (Table 22R-20.15). The sagebrush component of this site could provide browse for wintering elk (Table 22R-20.3; Wambolt, 1996). However, pellet transect data indicates that both deer and elk presence were low in 2023 (Table 22R-20.9).

Trend Summary Tables

Table 22R-20.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2010	3.5	0.2	28.3	3.5	1.2	47.5
2013	1.6	0.5	0.4	2.5	1.0	0.3
2018	4.7	1.2	0.5	8.4	0.8	1.1
2023	6.4	0.9	0.3	10.5	0.7	0.3

Table 22R-20.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2010	58	114	110	110	0.7	1.5	0.6	1.2
2013	27	299	21	167	0.1	13.2	0.1	4.7
2018	-	339	7	101	-	16.3	0.0	1.5
2023	-	355	74	140	-	18.1	0.3	2.5

Table 22R-20.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2010	19.7	0.2	53.4	13.4	7.6	34.9
2013	10.0	0.1	70.6	1.7	4.0	23.6
2018	25.0	-	58.3	2.1	8.1	24.6
2023	16.4	-	50.3	9.4	8.8	23.4

Table 22R-20.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2010	-	11	1	27
2013	-	1	1	-
2018	3	5	6	13
2023	5	3	5	6
Year	Days Use Per Acre (ha)			
2010	-	39.6 (97.7)	1.3 (3.3)	-
2013	23.2 (57.4)	-	5.3 (13.2)	-
2018	17.4 (43.0)	0.7 (1.7)	2.7 (6.6)	-
2023	6.5 (16.1)	3.4 (8.3)	-	-

Table 22R-20.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES									
Achnatherum hymenoides (Indian ricegrass)									
Agropyron cristatum ⁱ (crested wheatgrass)									
Bromus tectorum ^{ai} (cheatgrass)									
Elymus elymoides (squirreltail)									
Hesperostipa comata (needle and thread)									
Poa fendleriana (muttongrass)									
Poa secunda (Sandberg bluegrass)									
Pseudoroegneria spicata (bluebunch wheatgrass)									
Thinopyrum intermedium ⁱ (intermediate wheatgrass)									
year	Nested Frequency								
2010	-	-	58	101	-	3	20	-	-
2013	43	58	27	104	-	-	4	104	140
2018	21	27	-	72	7	9	1	59	268
2023	28	44	-	48	4	3	7	35	317
year	Average Cover (%)								
2010	-	-	0.7	1.4	-	0.0	0.1	-	-
2013	0.5	2.2	0.1	3.5	-	-	0.0	3.2	3.8
2018	0.4	1.1	-	1.5	0.2	0.1	0.0	1.2	11.8
2023	0.5	1.0	-	1.9	0.0	0.0	0.3	2.1	12.3

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

Table 22R-20.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Agoseris glauca (pale agoseris)																	
Allium (onion)																	
Antennaria (pussytoes)																	
Arabis (rockcress)																	
Astragalus (milkvetch)																	
Astragalus newberryi (Newberry's milkvetch)																	
Astragalus utahensis (Utah milkvetch)																	
Ceratocephala testiculata ^{ai} (curveseed butterwort)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Collinsia parviflora ^a (maiden blue eyed Mary)																	
Comandra umbellata (bastard toadflax)																	
Crepis acuminata (tapertip hawkbeard)																	
Cryptantha (cryptantha)																	
Cymopterus (springparsley)																	
Erigeron pumilus (shaggy fleabane)																	
Eriogonum (buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
year	Nested Frequency																
2010	-	-	-	-	8	-	3	8	10	1	20	-	4	-	14	3	3
2013	9	1	-	1	13	-	-	7	20	-	3	9	16	4	22	-	1
2018	-	-	-	-	-	-	-	-	22	-	4	-	10	-	15	-	-
2023	3	-	3	3	-	3	-	-	41	-	12	-	15	9	6	-	1
year	Average Cover (%)																
2010	-	-	-	-	0.0	-	0.0	0.0	0.0	0.0	0.1	-	0.0	-	0.1	0.0	0.0
2013	0.2	0.0	-	0.0	0.2	-	-	0.0	0.1	-	0.2	0.1	0.2	0.1	0.4	-	0.0
2018	-	-	-	-	-	-	-	-	0.1	-	0.0	-	0.1	-	0.1	-	-
2023	0.0	-	0.0	0.0	-	0.0	-	-	0.4	-	0.1	-	0.2	0.1	0.1	-	0.0

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

FORB SPECIES	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Hedysamum boreale (Utah sweetvetch)	Lactuca serriola ^{ai} (prickly lettuce)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ⁱ (alfalfa)	Melilotus officinalis ⁱ (sweetclover)	Microsteris gracilis ^a (slender phlox)	Oenothera (evening primrose)	Orobancha fasciculata (clustered broomrape)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox austromontana (mountain phlox)
year	Nested Frequency																
2010	42	4	2	-	-	-	-	-	-	-	50	-	-	7	1	-	54
2013	-	-	-	13	1	60	0	-	4	1	-	1	-	2	-	4	51
2018	-	-	-	-	4	2	5	-	1	3	-	1	-	3	-	7	32
2023	8	-	-	-	1	-	6	5	-	-	17	-	2	15	14	-	48
year	Average Cover (%)																
2010	0.3	0.0	0.0	-	-	-	-	-	-	-	0.2	-	-	0.0	0.0	-	0.6
2013	-	-	-	0.0	0.0	2.1	0.0	-	0.0	0.0	-	0.0	-	0.0	-	0.0	0.8
2018	-	-	-	-	0.0	0.0	0.0	-	0.0	0.0	-	0.0	-	0.0	-	0.0	1.0
2023	0.0	-	-	-	0.0	-	0.4	0.0	-	-	0.0	-	0.0	0.2	0.1	-	0.7

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency							
2010	3	45	-	3	-	27	-	-
2013	2	1	6	6	-	17	-	-
2018	1	2	1	-	-	16	5	5
2023	11	53	-	-	8	7	-	3
year	Average Cover (%)							
2010	0.0	0.1	-	0.0	-	0.1	-	-
2013	0.0	0.0	0.1	0.0	-	0.1	-	-
2018	0.0	0.0	0.0	-	-	0.0	0.0	0.0
2023	0.0	0.1	-	-	0.2	0.1	-	0.1

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

Table 22R-20.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Ericameria nauseosa ssp. nauseosa var. speciosa ^p (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)	Yucca (yucca)
year	Line Intercept Cover (%)								
2010	3.5	-	-	29.2	0.8	-	18.3	-	0.4
2013	2.5	-	-	-	0.8	0.1	0.3	-	0.1
2018	7.4	1	-	-	0.6	-	1.1	-	0.2
2023	10.2	0.3	-	0.1	0.4	-	0.2	-	0.3
year	Quadrat Cover (%)								
2010	3.5	-	-	17.3	0.2	0.0	11.0	-	0.0
2013	1.6	-	-	0.0	0.5	0.0	0.3	-	0.0
2018	4.3	0.4	0.2	0.0	0.9	0.0	0.5	-	0.1
2023	6.0	0.4	0.0	0.3	0.7	-	0.0	0.0	0.1

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

Table 22R-20.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2010	1600	20	10	60	30	13	1	38	45/62
2013	1340	-	28	69	3	3	0	3	39/53
2018	1300	40	12	85	3	9	3	2	48/72
2023	2220	420	39	60	1	1	0	1	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	53/92
2023	-	-	-	-	-	-	-	-	- / -
Ericameria nauseosa ssp. nauseosa var. speciosa^p -- (rubber rabbitbrush)									
2010	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	0	0	0	46/33
2018	20	-	0	100	0	0	0	0	63/52
2023	20	20	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2010	-	-	-	-	-	-	-	-	19/17
2013	-	-	-	-	-	-	-	-	33/43
2018	80	-	25	75	0	0	0	0	21/27
2023	300	-	87	13	0	0	0	0	- / -
Juniperus osteosperma^t -- (Utah juniper)									
2010	220	80	27	73	0	0	0	0	- / -
2013	20	60	100	0	0	0	0	0	- / -
2018	200	40	90	10	0	0	0	10	- / -
2023	220	-	82	18	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Linanthus pungens -- (granite prickly phlox)									
2010	340	-	12	88	0	0	0	0	18/25
2013	620	-	3	97	0	0	0	29	17/35
2018	1040	-	2	96	2	0	0	2	13/28
2023	660	-	0	100	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2010	40	-	50	50	0	0	0	0	9/20
2013	20	-	0	100	0	0	0	0	16/35
2018	40	-	0	50	50	0	0	100	7/16
2023	-	-	-	-	-	-	-	-	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2010	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	3/3
2023	-	-	-	-	-	-	-	-	- / -
Pinus edulis^t -- (twoneedle pinyon)									
2010	400	80	55	45	0	0	0	0	- / -
2013	100	140	80	20	0	0	0	20	- / -
2018	260	20	92	8	0	0	0	0	- / -
2023	120	-	83	17	0	0	0	0	- / -
Purshia stansburiana^p -- (Stansbury cliffrose)									
2010	-	-	-	-	-	-	-	-	94/177
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2010	-	-	-	-	-	-	-	-	54/126
2013	-	-	-	-	-	-	-	-	45/120
2018	-	-	-	-	-	-	-	-	59/143
2023	80	-	75	25	0	0	25	0	- / -
Yucca -- (yucca)									
2010	20	-	0	100	0	0	0	0	45/66
2013	40	-	100	0	0	0	0	0	40/78
2018	100	-	20	80	0	0	0	0	32/47
2023	100	-	40	60	0	0	0	0	- / -

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

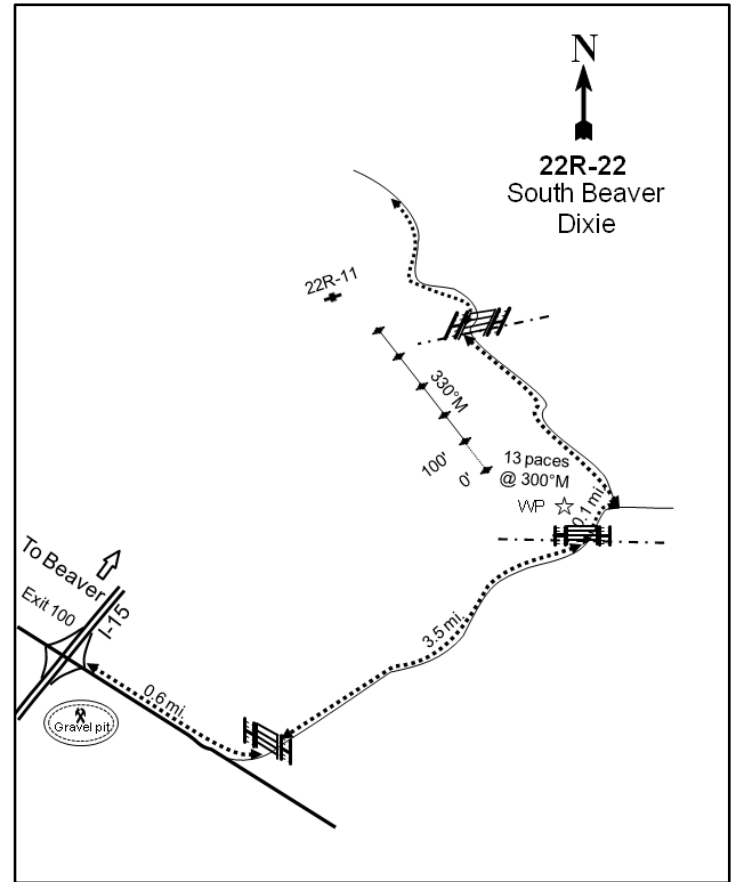
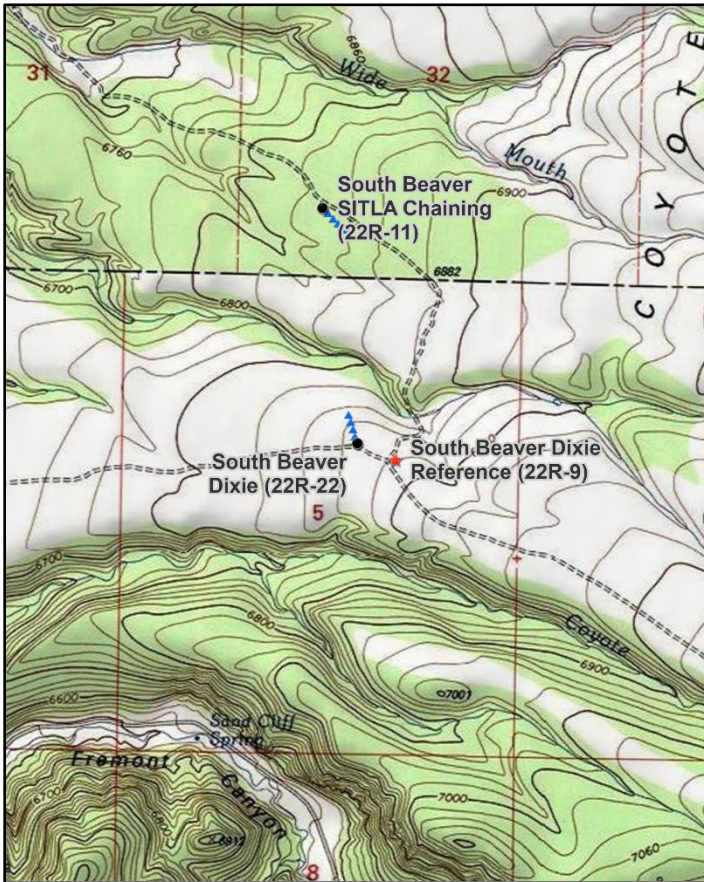
Table 22R-20.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2010	232	15	10	20	25	30	14.3
2013	7	17	83	-	-	-	2.2
2018	220	60	40	-	-	-	2.1
2023	99	50	50	-	-	-	2.2
Pinus edulis (twoneedle pinyon)							
2010	413	35	55	-	5	5	4.3
2013	7	-	100	-	-	-	2.7
2018	208	55	45	-	-	-	2.6
2023	131	60	40	-	-	-	1.7

Table 22R-20.15 - 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
2010	4.4	0.0	0.0	3.1	-0.5	2.4	0.0	9.3	Very Poor
2013	3.1	0.0	0.0	26.3	-0.1	9.4	0.0	38.8	Poor
2018	10.5	14.2	5.4	30.0	0.0	3.1	0.0	63.2	Fair-Good
2023	13.1	14.7	15.0	30.0	0.0	4.9	0.0	77.8	Good

SOUTH BEAVER DIXIE - STUDY NO. 22R-22

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Kane Canyon SE; Township 31S, Range 6W, Section 05
NAD 83 UTM ZONE 12, 363328 East 4222667 North

Transect Information

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

200
330° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Standard

Directions to Site

Take exit 100 from I-15; from the northbound on-ramp drive east for 0.6 miles to a fork. Turn left and drive through a gate, then continue 3.5 miles to a point just before a fence. You will see a witness post on the north side of the road: park here. From the witness post walk 14 paces at 300 degrees magnetic to the 0-foot stake which is marked with browse tag #200.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	FREMONT
Elevation	6,799ft (2,072m)
Aspect	North
Slope	3%
Sample Dates	07/14/2010, 08/12/2014, 08/15/2018, 08/24/2023

Table 22R-22.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver Phase II	4831	May-June 2019	6241
Chaining - Two-Way Unknown	Coyote Bench Seeding	LTDL	July 1964-November 1965	2905
Seeding - Aerial Unknown	Coyote Bench Seeding	LTDL	July 1964-November 1965	2905
Harrow - One-Way Dixie	South Beaver Vegetation Enhancement Project Year 1	104	December 2005-March 2006	1646
Seeding - Broadcast Before	South Beaver Vegetation Enhancement Project Year 1	104	December 2005-March 2006	1646

Table 22R-22.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Coyote Bench Aerial Seeding		Aerial	Jul 1964	2905	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Desert Wheatgrass		8.00	0.00

Mix Name		Application Type	Application Date	Acres	
South Beaver		Broadcast	Dec 2005	1900	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.50	0.48
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.58	0.47
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.21	0.20
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.79	0.72
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.46
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.92
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.26	0.24
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	1.00	0.92
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.00	1.69
F	Linum perenne	Blue Flax		0.16	0.14
F	Medicago sativa	Alfalfa	Spreader 4	1.00	0.93
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.35
F	Penstemon palmeri	Palmer Penstemon	Washington UT	0.11	0.08
F	Sanguisorba minor	Small Burnet	Delar	1.05	0.95
S	Purshia tridentata	Bitterbrush	Millard UT	0.11	0.10

Mix Name		Application Type	Application Date	Acres	
South Beaver		Broadcast	Dec 2005	1900	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.50	0.11
S	Bassia prostrata	Forage Kochia	Millard UT	0.50	0.38

Wildlife Habitat and Vegetation History**Table 22R-22.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	substantial	winter
Greater Sage-Grouse		

Table 22R-22.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2010	Mountain Big Sagebrush/Perennial Grass	Phase I
2014	Mountain Big Sagebrush/Perennial Grass	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I
2023	Mountain Big Sagebrush/Broom Snakeweed/Perennial Grass	Phase I

Site Notes

Study 22R-09 was established prior to treatment, but was not within the treatment polygon and is now a reference study for this site.

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Gravelly Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY306UT
States and Transitions	2010-2023 - Seeded Range State: Community Phase 6.2

Since study establishment in 2010, this site has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), which has gradually increased in cover and density and perennial grasses, mainly the introduced species crested wheatgrass (*Agropyron cristatum*). Broom snakeweed (*Gutierrezia sarothrae*) increased in both cover and density between the two most recent sample years, and was considered to be a codominant site component along with sagebrush and perennial grasses in 2023 (Photos, Table 22R-12.7, Table 22R-12, Table 22R-13). The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in all sample years, but in low amounts (Table 22R-22.10). A maintenance lop and scatter treatment in 2019 (Table 22R-22.1) removed many of the remaining or infilling twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees. However, both species were present with low density in 2023 (Table 22R-22.14), indicating that there may be potential for continued infilling over time.

Deer winter range condition on this site has ranged between fair and good since 2010, and condition was considered to be good in 2023. Further improvements to winter range could be achieved through efforts that increase preferred browse cover while decreasing decadence within the population. In addition, increasing cover of perennial grasses and forbs while decreasing or removing cheatgrass would also be beneficial for deer winter range (Table 22R-22.15). The sagebrush component of this site could provide browse for elk during the winter months (Table 22R-22.3; Wambolt, 1996). However, deer presence was low and elk pellet groups were not observed in 2023 according to pellet transect data (Table 22R-22.9).

Trend Summary Tables**Table 22R-22.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2010	8.6	0.3	0.2	8.1	0.5	0.5
2014	7.7	3.7	0.0	9.0	6.2	0.2
2018	9.3	1.1	0.0	10.5	0.9	0.3
2023	11.1	11.8	-	11.5	14.4	-

Table 22R-22.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2010	182	267	255	181	1.6	14.1	4.7	3.2
2014	31	333	134	133	0.2	16.4	0.7	2.6
2018	11	275	112	167	0.1	16.3	0.6	4.4
2023	32	355	296	89	0.3	13.1	1.2	2.2

Table 22R-22.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2010	24.7	0.4	40.7	5.8	11.4	32.6
2014	24.4	-	35.8	6.4	14.9	32.2
2018	37.8	0.2	37.5	4.8	17.3	32.5
2023	29.2	0.0	30.3	4.4	13.3	31.1

Table 22R-22.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2010	1	8	5	32
2014	2	3	11	7
2018	5	3	2	27
2023	11	1	5	14
Year	Days Use Per Acre (ha)			
2010	6.5 (16.1)	6.0 (14.9)	10.0 (24.8)	-
2014	1.5 (3.6)	3.4 (8.3)	6.7 (16.6)	-
2018	21.1 (52.0)	0.7 (1.7)	0.7 (1.7)	-
2023	25.4 (62.8)	0.7 (1.7)	-	-

Table 22R-22.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lancoolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Munroa squarrosa ^a (false buffalograss)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency										
2010	2	225	182	53	9	1	-	15	26	-	9
2014	9	271	31	67	11	12	-	2	20	-	8
2018	11	199	7	66	-	30	4	-	8	-	46
2023	5	322	32	34	-	19	-	-	-	8	16
year	Average Cover (%)										
2010	0.3	11.5	1.6	0.9	0.3	0.0	-	0.1	0.9	-	0.1
2014	0.2	12.7	0.2	2.2	0.1	0.2	-	0.0	0.8	-	0.2
2018	0.1	11.7	0.0	1.7	-	0.9	0.0	-	0.2	-	1.6
2023	0.0	11.9	0.3	0.3	-	0.7	-	-	-	0.0	0.1

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

Table 22R-22.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Amaranthus ^{ai} (pigweed)	Androsace septentrionalis ^{ai} (pygmyflower rockjasmine)	Astragalus (milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Castilleja flava (yellow Indian paintbrush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Cirsium (thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum ^a (nodding buckwheat)
year	Nested Frequency																
2010	106	-	1	2	-	9	1	162	123	-	1	3	3	2	-	26	4
2014	131	-	3	5	-	2	2	-	3	30	2	-	7	-	-	23	6
2018	53	11	0	4	-	-	-	3	13	64	-	-	6	-	-	14	2
2023	295	-	-	13	16	-	-	8	-	-	-	-	3	-	3	4	-
year	Average Cover (%)																
2010	2.2	-	0.1	0.0	-	0.0	0.0	1.9	0.8	-	0.0	0.1	0.0	0.0	-	0.4	0.0
2014	0.7	-	0.0	0.0	-	0.0	0.0	-	0.0	0.1	0.1	-	0.1	-	-	0.1	0.0
2018	0.1	0.1	0.0	0.0	-	-	-	0.0	0.1	1.3	-	-	0.0	-	-	0.1	0.0
2023	1.1	-	-	0.2	0.0	-	-	0.0	-	-	-	-	0.0	-	0.0	0.0	-

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

FORB SPECIES	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Geranium ^a (geranium)	Gilia inconspicua ^a (shy gilia)	Hedysarum boreale (Utah sweetvetch)	Linum perenne ⁱ (blue flax)	Lygodesmia (skeletonplant)	Machaeranthera grindeloides (rayless tansyaster)	Medicago sativa ⁱ (alfalfa)	Melilotus officinalis ⁱ (sweetclover)	Microsteris gracilis ^a (slender phlox)	Packera multilobata (lobeleaf groundsel)	Phlox austromontana (mountain phlox)	Sphaeralcea coccinea (scarlet globemallow)	unknown annual forb ^a (unknown forb)
year	Nested Frequency													
2010	13	5	7	5	12	1	-	2	-	52	-	58	-	-
2014	-	-	-	5	1	-	3	2	3	-	3	72	1	-
2018	-	-	3	-	12	-	-	-	-	-	-	87	-	66
2023	-	-	-	-	-	-	-	-	-	1	-	67	-	-
year	Average Cover (%)													
2010	0.1	0.0	0.0	0.0	0.3	0.0	-	0.0	-	0.2	-	1.5	-	-
2014	-	-	-	0.1	0.0	-	0.0	0.0	0.0	-	0.0	1.8	0.0	-
2018	-	-	0.0	-	0.1	-	-	-	-	-	-	2.8	-	0.3
2023	-	-	-	-	-	-	-	-	-	0.0	-	1.9	-	-

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

Table 22R-22.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis ^t (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)						
2010	8.1	-	0.5	-	-	0.5	-
2014	8.5	-	6.2	0.2	-	-	0.5
2018	9.8	-	0.9	0.2	-	0.1	0.7
2023	10.5	0	14.2	-	0.2	-	1
year	Quadrat Cover (%)						
2010	8.4	-	0.3	-	0.0	0.2	0.2
2014	7.3	-	3.7	0.0	-	-	0.4
2018	8.4	-	1.1	0.0	-	0.0	0.9
2023	10.1	0.1	11.6	-	0.0	-	1.0

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

Table 22R-22.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2010	2340	40	9	82	9	17	2	10	45/57
2014	2860	100	13	78	10	55	29	3	41/68
2018	3040	100	16	73	11	2	0	13	45/74
2023	3760	80	43	45	12	0	0	13	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2010	-	-	-	-	-	-	-	-	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	100	100	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2010	800	-	15	85	0	0	0	0	22/22
2014	6480	2760	20	80	1	22	0	1	24/34
2018	2140	40	2	89	9	2	0	13	15/16
2023	56820	300	44	56	0	0	0	0	- / -
Juniperus osteosperma^t -- (Utah juniper)									
2010	-	-	-	-	-	-	-	-	- / -
2014	20	-	0	100	0	0	0	100	- / -
2018	40	-	50	50	0	0	0	0	- / -
2023	20	-	0	100	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2010	20	-	0	100	0	0	0	0	11/23
2014	60	-	33	67	0	0	0	0	5/3
2018	120	-	0	100	0	0	0	0	8/13
2023	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 (%)				
Pinus edulis^t -- (twoneedle pinyon)									
2010	60	-	67	0	33	0	33	33	- / -
2014	40	-	100	0	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	- / -
2023	20	-	100	0	0	0	0	0	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2010	20	-	100	0	0	0	0	0	58/129
2014	20	-	0	100	0	100	0	0	107/142
2018	20	-	0	100	0	100	0	0	95/183
2023	20	-	0	100	0	0	0	0	- / -

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

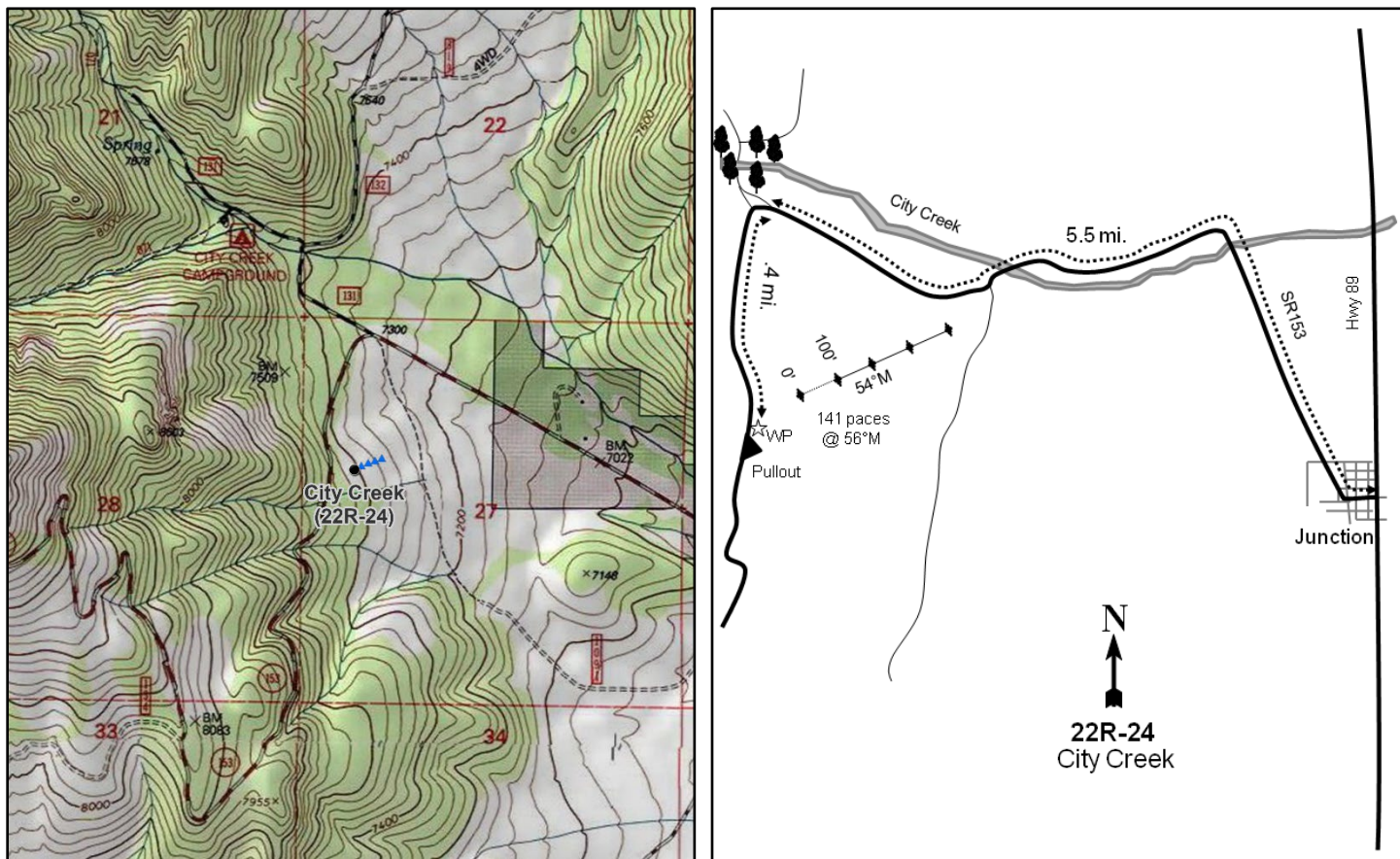
Table 22R-22.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2010	5	-	67	33	-	-	7.3
2014	8	-	100	-	-	-	4.5
2018	7	-	33	67	-	-	4.7
2023	1	-	100	-	-	-	4.0
Pinus edulis (twoneedle pinyon)							
2010	115	29	71	-	-	-	2.3
2014	43	15	85	-	-	-	2.2
2018	65	6	94	-	-	-	3.2
2023	7	20	80	-	-	-	2.0

Table 22R-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
2010	10.1	12.2	4.3	28.2	-1.2	6.4	0.0	59.9	Fair
2014	11.4	12.2	6.0	30.0	-0.1	5.2	0.0	64.6	Fair-Good
2018	13.3	11.9	7.4	30.0	0.0	8.8	0.0	71.3	Good
2023	14.6	11.7	15.0	26.2	-0.2	4.4	0.0	71.6	Good

CITY CREEK - STUDY NO. 22R-24

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Delano Peak SE; Township 29S, Range 4W, Section 27
NAD 83 UTM ZONE 12, 385836 East 4235496 North

Transect Information

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

192
54° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
No Rebar

Directions to Site

From the town of Junction turn onto State Road 153 (Center Street). Travel west for 5.5 miles. Stay left, travelling towards Puffer Lake, and go another 0.4 miles to a pullout on the east side of the road; the transect is located east of the pullout. The 0-foot stake is 141 paces at 56 degrees magnetic from the witness post and is marked with browse tag #192.

Site Information

Land Ownership
Land Administrator
Allotment
Elevation
Aspect
Slope
Sample Dates

Federal
USFS
Circleville Allotment
7,341ft (2,238m)
Northeast
10%
07/13/2011, 08/14/2014, 08/13/2018, 08/23/2023

Table 22R-24.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Historic	-
Seeding - Seed Unknown	-	-	Historic	-
Mechanical - Bullhog	City Creek Sagebrush-steppe Enhancement Year I	1995	September 2011-June 2012	1080

Wildlife Habitat and Vegetation History**Table 22R-24.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 22R-24.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Pinyon-Juniper/Mountain Big Sagebrush/Gambel Oak	Phase II transitioning to Phase III
2014	Mountain Big Sagebrush/Perennial Grass/Gambel Oak	Phase I
2018	Mountain Big Sagebrush/Gambel Oak	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB462UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2011, this site was in Phase II transitioning to Phase III of woodland succession and being encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) (Table 22R-24.4, Table 22R-24.14). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Gambel oak (*Quercus gambelii*) were major browse components (Table 22R-24.12) and the herbaceous understory was sparse (Table 22R-24.7). During the first post-treatment sample year, shrubs such as mountain big sagebrush and Gambel oak as well as perennial grasses, mainly muttongrass (*Poa fendleriana*) and squirreltail (*Elymus elymoides*), were codominant vegetation components, while cover of other herbaceous species remained low. Cover of sagebrush and oak continued to increase, and in 2018 they surpassed perennial grass to become the dominant vegetation components (Table 22R-24.7, Table 22R-24.10, Table 22R-24.11, Table 22R-24.12). Without disturbance, it is likely that these shrubs will continue to increase and retain dominance. Some trees have remained on site following treatment and could infill the area in the future (Table 22R-24.14).

Since study establishment in 2011, deer winter range condition on this site has varied between poor and good. Winter range condition has improved following treatment and was considered to be good in 2023. Further improvements could be accomplished through efforts that decrease decadence of preferred browse and encourage recruitment of young within the population. Increasing cover of perennial forbs and decreasing or removing cheatgrass would also prove beneficial for deer wintering habitat (Table 22R-24.15). Sagebrush on this site could provide browse for elk during the winter months (Table 22R-24.3; Wambolt, 1996). However, pellet transect data indicates that both deer and elk presence were low in 2023 (Table 22R-24.9).

Trend Summary Tables**Table 22R-24.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	22.0	0.0	13.7	25.8	0.3	29.4
2014	11.7	0.5	1.2	18.2	-	2.0
2018	21.5	1.2	1.1	29.3	0.6	2.4
2023	27.3	0.7	3.1	33.0	1.1	3.0

Table 22R-24.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	21	174	113	90	0.1	5.5	0.4	0.7
2014	42	276	25	76	1.4	12.8	0.2	0.6
2018	18	350	-	49	0.0	20.4	-	0.5
2023	26	312	56	83	0.2	19.2	0.2	1.5

Table 22R-24.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	12.9	0.7	45.1	3.7	26.5	37.9
2014	7.8	0.0	49.9	3.2	22.5	30.6
2018	5.3	0.1	58.5	2.7	21.9	43.4
2023	7.8	0.1	47.0	2.5	19.8	41.1

Table 22R-24.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2011	1	20	-	2
2014	-	11	2	5
2018	2	21	5	17
2023	1	24	3	13
Year	Days Use Per Acre (ha)			
2011	0.7 (1.8)	45.6 (112.6)	2.0 (5.0)	-
2014	2.9 (7.2)	28.8 (71.2)	3.4 (8.3)	-
2018	-	20.1 (49.7)	9.4 (23.2)	-
2023	4.4 (10.8)	14.1 (34.8)	4.7 (11.6)	-

Table 22R-24.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency										
2011	-	13	3	-	21	48	30	-	109	3	19
2014	-	26	12	2	42	26	82	-	186	16	26
2018	4	25	10	5	18	46	123	10	204	3	94
2023	3	23	2	5	26	30	91	21	167	6	102
year	Average Cover (%)										
2011	-	0.1	0.1	-	0.1	1.6	0.2	-	3.0	0.0	0.4
2014	-	0.7	0.1	0.0	1.4	1.6	2.8	-	6.4	0.8	0.3
2018	0.0	0.9	0.1	0.0	0.0	1.3	4.4	0.3	9.6	0.2	3.6
2023	0.1	0.8	0.0	0.0	0.2	1.0	3.5	1.4	7.7	0.3	4.4

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

Table 22R-24.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum ⁿⁱ (desert madwort)	Arabis holboellii ^a (Holboell's rockcross)	Artemisia ludoviciana (white sagebrush)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Castilleja linarifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium atrovirens ^a (pinyon goosefoot)	Chenopodium fremonti ^a (Fremont's goosefoot)	Cirsium wheeleri (Wheeler's thistle)	Collinsia parviflora ^a (maiden blue eyed Mary)	Collomia linearis ^a (tiny trumpet)	Comandra umbellata (bastard toadflax)	Coryza canadensis ^a (Canadian horseweed)
year	Nested Frequency																
2011	3	-	15	-	3	0	6	3	-	4	-	3	-	14	-	-	-
2014	-	3	-	-	-	-	11	-	5	-	-	3	-	-	-	3	12
2018	-	-	-	2	-	-	-	-	-	5	-	-	-	-	-	-	-
2023	6	1	-	1	-	4	4	5	-	6	7	3	2	9	1	-	-
year	Average Cover (%)																
2011	0.1	-	0.1	-	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-	0.0	-	-	-
2014	-	0.0	-	-	-	-	0.1	-	0.0	-	-	0.0	-	-	-	0.0	0.2
2018	-	-	-	0.1	-	-	-	-	-	0.0	-	-	-	-	-	-	-
2023	0.1	0.0	-	0.0	-	0.1	0.0	0.1	-	0.0	0.0	0.0	0.0	0.0	0.0	-	-

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

FORB SPECIES	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Hymenopappus filifolius (fineleaf hymenopappus)	Lactuca serriola ^{ai} (prickly lettuce)	Linum lewisii (Lewis flax)	Lomatium (desertparsley)	Lotus utahensis (Utah bird's-foot trefoil)	Machaeranthera canescens (hoary tansyaster)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon comarrhenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas knotweed)	Trifolium gymnocarpon (hollyleaf clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency															
2011	1	6	90	2	1	-	20	30	-	4	-	1	6	6	4	18
2014	15	9	-	-	4	3	4	15	7	-	9	-	-	3	1	7
2018	3	7	-	0	-	1	-	4	-	-	-	-	-	-	-	31
2023	4	1	31	-	-	-	3	7	-	-	5	1	1	7	-	38
year	Average Cover (%)															
2011	0.0	0.1	0.2	0.0	0.0	-	0.0	0.2	-	0.0	-	0.0	0.0	0.0	0.0	0.1
2014	0.2	0.1	-	-	0.0	0.0	0.0	0.1	0.0	-	0.1	-	-	0.0	0.0	0.1
2018	0.0	0.0	-	0.0	-	0.0	-	0.0	-	-	-	-	-	-	-	0.2
2023	0.1	0.0	0.1	-	-	-	0.1	0.2	-	-	0.1	0.1	0.0	0.0	-	0.7

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

Table 22R-24.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Cercocarpus ledifolius ^p (curl-leaf mountain mahogany)	Cercocarpus montanus ^p (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis ^t (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)	Quercus gambelii ^p (Gambel oak)
year	Line Intercept Cover (%)										
2011	11.2	0.1	0.5	0.2	-	11.5	0.1	-	17.9	4.5	9.5
2014	9.1	-	-	-	-	2	-	-	-	2.2	6.9
2018	12.2	0.1	1.1	0.5	0.1	1	-	-	1.4	4.4	11.5
2023	13.7	0.1	0.2	1	0.1	1.5	-	-	1.5	5.7	13.3
year	Quadrat Cover (%)										
2011	11.6	0.0	0.8	0.0	-	7.9	0.0	-	5.8	3.5	6.2
2014	3.8	-	0.6	0.1	0.2	1.0	0.1	0.1	0.2	2.6	4.8
2018	10.6	0.9	1.0	0.0	1.1	1.1	0.0	-	0.0	2.2	6.7
2023	12.7	0.4	0.9	0.7	0.0	1.8	-	-	1.3	4.0	9.3

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

Table 22R-24.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2011	3880	40	6	39	55	37	5	31	57/77
2014	2980	60	13	69	17	63	10	15	45/59
2018	3660	120	11	84	6	8	2	16	45/60
2023	3700	1580	20	67	13	9	4	13	- / -
Cercocarpus ledifolius^p -- (curl-leaf mountain mahogany)									
2011	40	-	0	100	0	0	50	0	54/60
2014	-	-	-	-	-	-	-	-	42/61
2018	40	-	0	100	0	50	50	0	48/72
2023	20	-	0	100	0	0	100	0	- / -
Cercocarpus montanus^p -- (alderleaf mountain mahogany)									
2011	80	-	0	100	0	25	50	25	83/87
2014	60	-	0	100	0	33	0	0	58/74
2018	40	-	0	100	0	100	0	0	86/89
2023	80	-	25	75	0	25	25	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2011	120	-	0	100	0	0	0	0	18/28
2014	60	-	67	33	0	33	0	0	22/37
2018	140	-	0	100	0	86	0	43	18/41
2023	200	-	10	90	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2011	-	-	-	-	-	-	-	-	- / -
2014	100	-	0	100	0	0	0	0	18/42
2018	100	-	0	100	0	0	0	0	21/36
2023	20	-	0	100	0	100	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 (%)				
Juniperus osteosperma^t -- (Utah juniper)									
2011	180	-	0	100	0	0	0	0	- / -
2014	80	-	75	25	0	25	0	50	- / -
2018	40	-	50	50	0	0	0	0	- / -
2023	40	-	50	50	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2011	200	-	0	80	20	0	0	20	15/34
2014	80	-	0	100	0	0	0	0	15/24
2018	20	-	0	100	0	0	0	0	13/34
2023	40	-	0	100	0	0	0	0	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2011	20	-	0	100	0	0	0	0	8/8
2014	20	-	0	0	100	0	0	100	50/56
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
Pinus edulis^t -- (twoneedle pinyon)									
2011	240	60	50	33	17	0	0	0	- / -
2014	80	40	100	0	0	0	0	25	- / -
2018	120	-	50	50	0	0	0	17	- / -
2023	180	20	78	22	0	0	0	11	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2011	420	-	0	76	24	43	48	29	60/106
2014	560	-	4	93	4	25	54	18	50/96
2018	580	-	0	100	0	38	21	0	61/110
2023	800	-	15	85	0	18	60	0	- / -
Quercus gambelii^p -- (Gambel oak)									
2011	1340	-	24	70	6	24	2	6	84/87
2014	1180	120	25	75	0	39	3	0	67/69
2018	2080	20	18	82	0	0	0	0	90/86
2023	2100	-	15	71	13	11	2	13	- / -

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

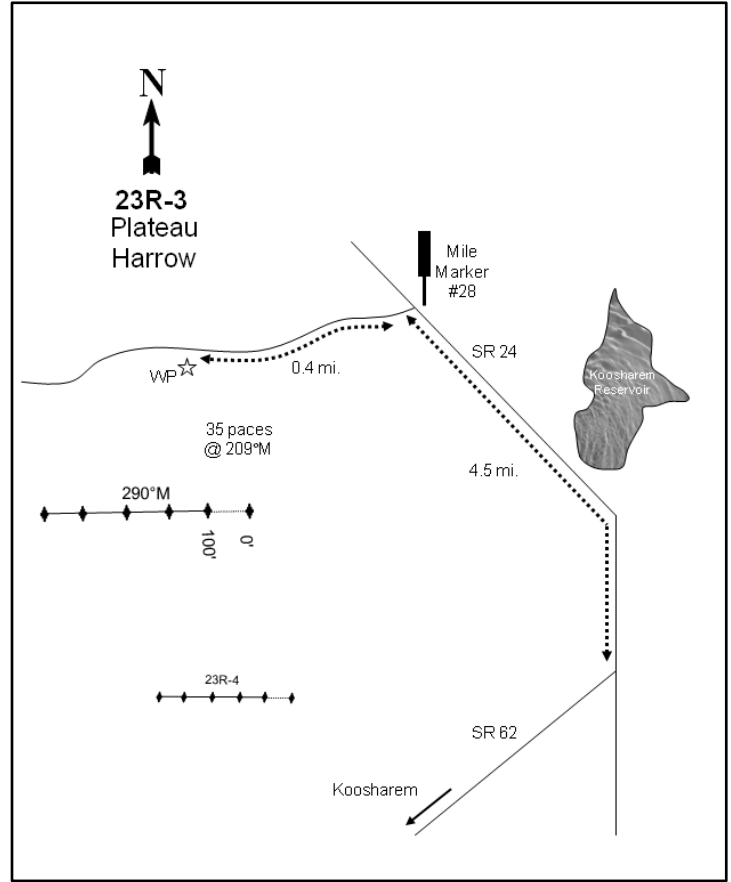
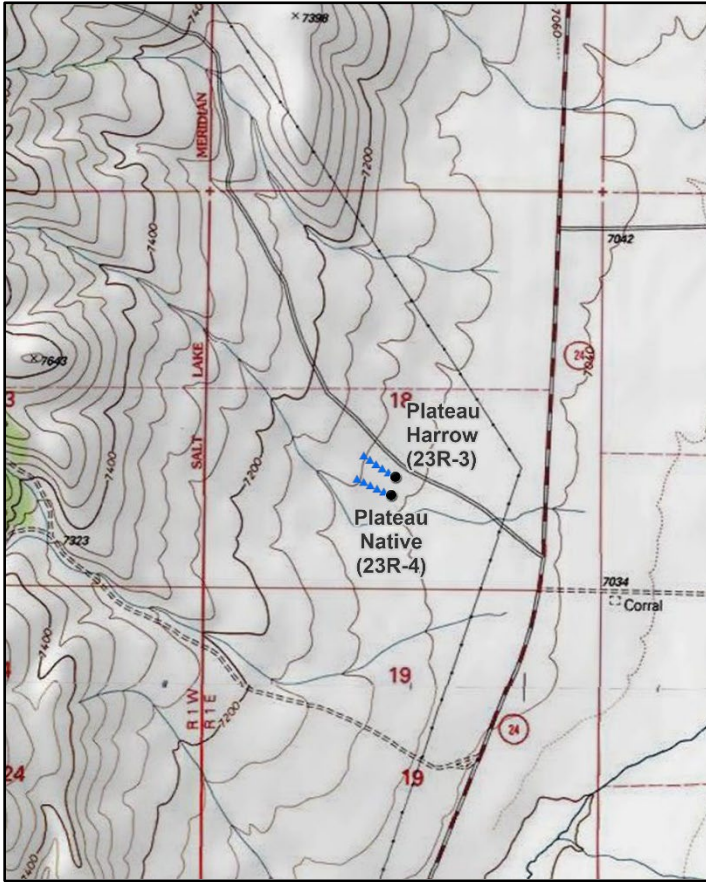
Table 22R-24.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2011	131	-	5	30	30	35	17.0
2014	52	-	87	13	-	-	4.0
2018	46	-	59	41	-	-	4.9
2023	55	6	35	59	-	-	14.1
Juniperus scopulorum (Rocky Mountain juniper)							
2011	1	-	-	-	100	-	12.0
Pinus edulis (twoneedle pinyon)							
2011	228	10	20	20	10	40	9.9
2014	76	19	75	6	-	-	2.3
2018	95	30	60	5	5	-	3.3
2023	94	16	63	16	5	-	3.7

Table 22R-24.15 - 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
2011	30.0	5.9	5.6	11.0	0.0	1.4	0.0	53.9	Poor-Fair
2014	21.6	12.3	8.4	25.6	-1.0	1.3	0.0	68.1	Fair-Good
2018	30.0	14.3	5.9	30.0	0.0	0.9	0.0	81.1	Good
2023	30.0	11.8	8.6	30.0	-0.2	3.1	0.0	83.3	Good

PLATEAU HARROW - STUDY NO. 23R-3



Location Information

USGS 7.5 min Map Info Boobe Hole Reservoir; Township 25S, Range 1E, Section 18
 GPS (0' Stake) NAD 83 UTM ZONE 12, 426873 East 4276341 North

Transect Information

Browse Tag # (0' Stake) 447
 Transect Bearing 293° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement Standard

Directions to Site

Start at the intersection of SR-62 and SR-24 in Koosharem. Drive north on SR-24 for 4.5 miles to mile marker 28. Near mile marker 28, turn left onto a road going west. Travel 0.4 mile to a witness post on the left (south) side of the road. From the witness post, walk 35 paces at 209 degrees magnetic to the 0-foot stake which is marked with browse tag #447.

Site Information

Land Ownership Federal
 Land Administrator BLM
 Allotment PLATEAU
 Elevation 7,100ft (2,164m)
 Aspect East
 Slope 2-5%
 Sample Dates 08/03/1999, 08/21/2003, 08/20/2008, 08/08/2012, 07/30/2018, 08/29/2023

Table 23R-03.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	-	-	1999	-
Seeding - Seeding Unknown	-	-	1999	-
Chaining - Two-Way Unknown	Plateau Brush Control #2	LTDL	July-October 1966	1200
Herbicide - Spike	Cedar Mtn (Mormon Peak Phase I) Habitat Protection	4881	Spring 2021	1131

Wildlife Habitat and Vegetation History**Table 23R-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		

Table 23R-03.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1999	Perennial Grass/Annual Grass	No Encroachment
2003	Perennial Grass	No Encroachment
2008	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2012	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2018	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2023	Perennial Grass/Mountain Big Sagebrush	No Encroachment

Site Notes

It was noted in 2012 that a salt lick was located near the end of the transect.

Soils**Table 23R-03.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.1	63.6	19.8	16.6	1.6	10.8	198.4	0.5	08/03/1999

Site Potential

1981 - 2010 Average Annual Precipitation 13 inches
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
 NRCS Ecological Site # R047XB308UT
 States and Transitions No state and transition model is available for this ecological site.

This site has transitioned through time from a perennial/annual grass dominated state to a mountain big sagebrush and perennial grass dominated state. This site was established after a harrow treatment was conducted to improve the sagebrush stand (Table 23R-03.1). The understory has been dominated by perennial grasses, primarily needle and thread (*Hesperostipa comata*), since 2003 (Table 23R-03.7, Table 23R-03.10). In 1999, cheatgrass (*Bromus tectorum*) provided moderate cover, but has not contributed significant cover in any subsequent samplings (Table 23R-03.10). Perennial forb cover was high in the initial sample years but has decreased steadily over time; western stoneweed (*Lithospermum ruderale*), cryptantha (*Cryptantha sp.*), and Utah bird's-foot trefoil (*Lotus utahensis*) contributed most of the perennial forb cover in 2023 (Table 23R-03.7, Table 23R-03.11). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has generally increased in cover and became a codominant component of the site in 2008, while other browse species have been present in very small amounts (Table 23R-03.6, Table 23R-03.12, Table 23R-03.13). Pellet data has exhibited an increase and cattle presence was high in 2012 and 2018 (Table 23R-03.9).

Deer winter range condition on this site has ranged between very poor to good since 1999. Deer winter range condition was considered to be fair to good in 2023. Improvements to deer winter range could be achieved by decreasing decadence in the preferred browse community while increasing cover; decreasing or removing cheatgrass; and diversifying and increasing native perennial forb components (Table 23R-03.15). Pellet group data shows that deer presence has been low since 2003 (Table 27-15.9).

Trend Summary Tables

Table 23R-03.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1999	3.7	-	-	-	-	-
2003	4.6	0.0	-	5.0	0.1	-
2008	7.1	0.0	-	9.1	0.5	-
2012	9.9	0.0	-	10.9	0.4	-
2018	8.6	0.1	-	10.8	0.5	-
2023	8.3	0.1	-	9.9	0.5	-

Table 23R-03.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1999	389	193	237	138	8.6	8.2	1.5	9.7
2003	126	305	-	74	1.4	21.8	-	8.1
2008	282	304	129	97	1.5	16.3	0.3	5.1
2012	68	325	212	125	1.0	21.2	0.4	1.6
2018	186	346	155	65	2.9	24.1	0.6	0.9
2023	290	340	283	71	6.6	33.2	5.1	2.9

Table 23R-03.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1999	22.3	0.0	28.9	15.6	0.6	35.4
2003	10.4	-	40.9	20.5	1.2	35.0
2008	19.7	0.0	51.2	9.6	0.2	34.2
2012	11.9	0.5	46.0	23.3	1.2	34.4
2018	24.1	0.0	38.9	24.1	1.2	32.9
2023	11.7	0.0	29.9	19.9	0.7	48.6

Table 23R-03.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1999	-	-	1	12
2003	-	-	1	84
2008	14	1	-	60
2012	14	1	-	20
2018	21	-	1	54
2023	10	9	2	13
Year	Days Use Per Acre (ha)			
1999	-	-	-	-
2003	-	4.0 (9.9)	2.7 (6.6)	-
2008	21.1 (52.0)	4.0 (9.9)	-	-
2012	47.9 (118.4)	10.7 (26.5)	0.7 (1.7)	-
2018	57.4 (141.7)	-	-	-
2023	10.2 (25.1)	6.0 (14.9)	6.7 (16.6)	-

Table 23R-03.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
1999	6	-	-	389	-	8	165	35
2003	13	22	-	126	-	26	276	11
2008	12	25	4	282	3	13	286	4
2012	19	4	7	68	18	-	309	1
2018	3	5	-	186	-	8	343	1
2023	19	11	-	290	-	15	332	1
year	Average Cover (%)							
1999	0.3	-	-	8.6	-	0.0	7.0	0.9
2003	1.1	0.4	-	1.4	-	0.5	19.2	0.5
2008	0.6	0.3	0.1	1.5	0.0	0.1	14.9	0.2
2012	0.3	0.1	0.2	1.0	0.2	-	20.3	0.0
2018	0.1	0.2	-	2.9	-	0.2	23.6	0.0
2023	1.1	0.1	-	6.6	-	0.7	31.2	0.0

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

Table 23R-03.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Amaranthus albus ^{ai} (prostrate pigweed)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Astragalus purshii (woollypod milkvetch)	Ceratocephala testiculata ^{ai} (curveseed butterwort)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western fansymustard)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis ^a (flatspine stickseed)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stoneseed)	Lotus utahensis (Utah bird's-foot trefoil)
year	Nested Frequency																
1999	237	-	-	6	-	-	-	5	-	14	3	-	1	-	3	43	61
2003	-	-	-	3	-	-	-	0	-	12	-	-	-	-	-	41	5
2008	129	-	1	9	-	1	-	9	-	16	-	-	1	-	0	46	5
2012	209	-	-	-	-	3	-	17	6	13	1	-	-	-	1	12	43
2018	142	-	2	2	3	2	15	0	2	12	-	1	-	-	1	13	18
2023	266	6	-	-	-	-	8	2	-	8	6	42	-	1	-	18	21
year	Average Cover (%)																
1999	1.5	-	-	0.0	-	-	-	0.2	-	0.2	0.0	-	0.0	-	0.0	3.4	1.3
2003	-	-	-	0.1	-	-	-	0.0	-	0.1	-	-	-	-	-	4.5	0.2
2008	0.3	-	0.0	0.2	-	0.0	-	0.1	-	0.1	-	-	0.0	-	0.0	3.1	0.0
2012	0.4	-	-	-	-	0.0	-	0.1	0.0	0.1	0.0	-	-	-	0.0	0.1	0.3
2018	0.5	-	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	-	0.0	-	-	0.0	0.3	0.3
2023	4.2	0.0	-	-	-	-	0.0	0.7	-	0.4	0.1	0.9	-	0.0	-	0.7	0.8

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

FORB SPECIES	Lupinus argenteus (silvery lupine)	Medicago sativa ⁱ (alfalfa)	Melilotus officinalis ⁱ (sweetclover)	Oenothera pallida ssp. pallida (pale evening primrose)	Onobrychis vicifolia ⁱ (sainfoin)	Penstemon comarrhenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea grossulariifolia (gooseberry/leaf globemallow)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium (clover)
year	Nested Frequency												
1999	23	7	1	-	11	-	-	-	9	1	-	3	-
2003	15	-	-	-	-	-	3	-	-	-	2	-	-
2008	10	-	1	-	-	-	3	-	-	0	3	-	-
2012	6	3	-	25	-	-	13	2	-	1	-	-	1
2018	6	-	-	-	-	5	-	-	-	2	-	-	-
2023	2	-	-	-	-	-	4	1	-	12	-	-	-
year	Average Cover (%)												
1999	4.4	0.0	0.0	-	0.0	-	-	-	0.1	0.0	-	0.0	-
2003	3.1	-	-	-	-	-	0.0	-	-	-	0.0	-	-
2008	1.5	-	0.0	-	-	-	0.0	-	-	0.0	0.0	-	-
2012	0.6	0.0	-	0.4	-	-	0.0	0.0	-	0.0	-	-	0.0
2018	0.0	-	-	-	-	0.0	-	-	-	0.0	-	-	-
2023	0.2	-	-	-	-	-	0.0	0.0	-	0.1	-	-	-

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

Table 23R-03.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Linanthus pungens (granite prickly phlox)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover		
1999	-	-	-
2003	5	-	0.1
2008	9.1	0.1	0.4
2012	10.9	0	0.4
2018	10.8	-	0.5
2023	9.9	-	0.5
year	Quadrat Cover (%)		
1999	3.7	-	-
2003	4.6	-	0.0
2008	7.1	0.0	0.0
2012	9.9	0.0	0.0
2018	8.6	-	0.1
2023	8.3	-	0.1

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

Table 23R-03.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

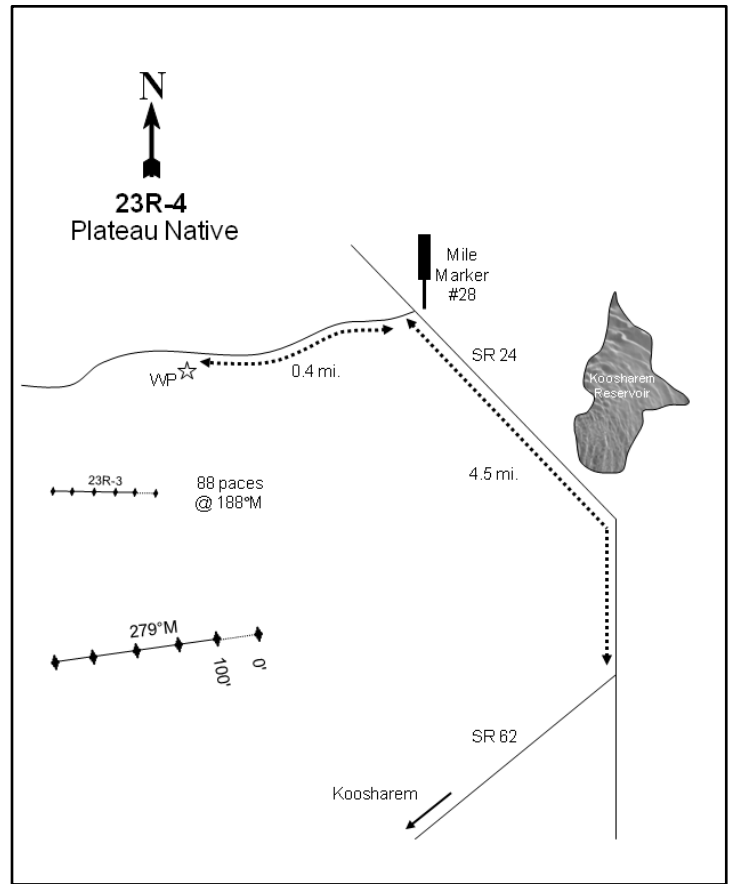
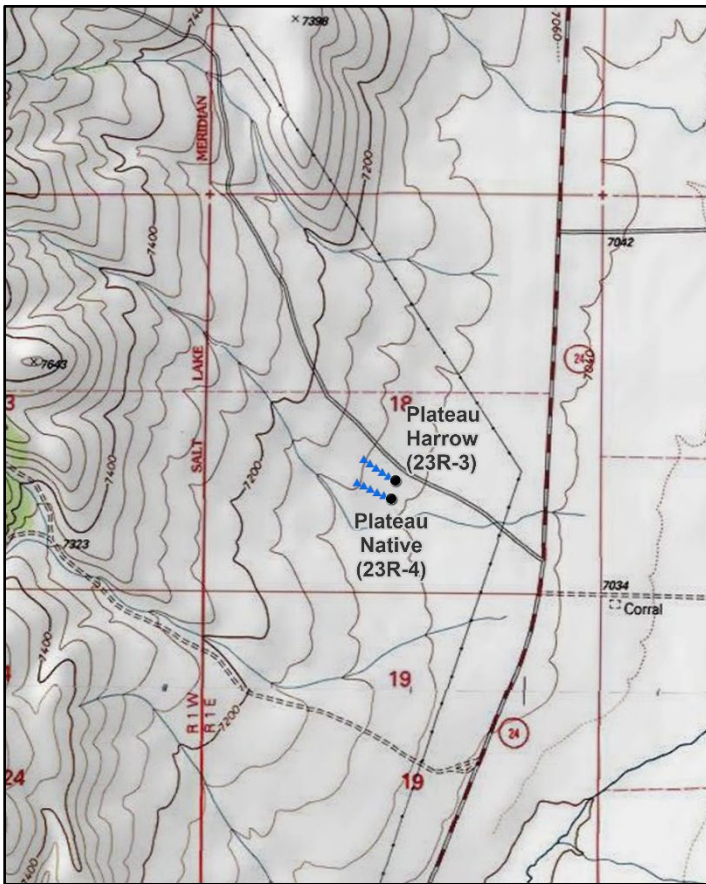
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
1999	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	24/31
2008	-	-	-	-	-	-	-	-	43/55
2012	-	-	-	-	-	-	-	-	47/43
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
1999	840	-	5	88	7	7	0	5	53/83
2003	700	20	9	74	17	6	0	9	61/84
2008	840	-	5	64	31	41	0	24	61/104
2012	1380	440	42	55	3	19	14	3	62/111
2018	960	20	13	67	21	2	0	13	65/96
2023	1660	180	30	43	27	2	4	27	- / -
Linanthus pungens -- (granite prickly phlox)									
1999	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	14/23
2008	40	-	0	50	50	0	0	0	20/34
2012	100	-	0	100	0	0	60	20	9/22
2018	20	-	0	100	0	0	0	0	7/13
2023	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
1999	80	-	50	25	25	0	0	25	10/33
2003	100	-	0	100	0	0	0	0	12/31
2008	220	-	0	91	9	0	0	9	10/35
2012	160	60	0	88	13	0	0	25	12/34
2018	180	-	11	89	0	0	0	11	12/44
2023	200	-	0	90	10	0	0	10	- / -
Symphoricarpos oreophilus^p -- (mountain snowberry)									
1999	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	44/62
2008	-	-	-	-	-	-	-	-	54/129
2012	-	-	-	-	-	-	-	-	44/93
2018	-	-	-	-	-	-	-	-	35/59

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

Table 23R-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
1999	4.6	0.0	0.0	16.4	-6.5	10.0	0.0	24.5	Very Poor
2003	6.3	0.0	0.0	30.0	-1.0	10.0	0.0	45.2	Poor
2008	11.4	5.7	2.4	30.0	-1.1	10.0	0.0	58.4	Fair
2012	13.6	14.1	15.0	30.0	-0.8	3.2	0.0	75.1	Good
2018	13.5	8.8	6.3	30.0	-2.2	1.9	0.0	58.2	Fair
2023	12.4	7.1	15.0	30.0	-4.9	5.8	0.0	65.3	Fair-Good

PLATEAU NATIVE - STUDY NO. 23R-4



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Boobe Hole Reservoir; Township 25S, Range 1E, Section 18
NAD 83 UTM ZONE 12, 426856 East 4276267 North

Transect Information

Browse Tag # (0' Stake)	448
Transect Bearing	279° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Start at the intersection of SR-62 and SR-24 in Koosharem. Drive north on SR-24 for 4.5 miles to mile marker 28. Near mile marker 28, turn left onto a road going west. Travel 0.4 mile to the witness post on the left (south) side of the road. From the witness post, walk 88 paces at 188 degrees magnetic to the 0-foot stake which is marked by browse tag #448.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	PLATEAU
Elevation	7,090ft (2,161m)
Aspect	East
Slope	2-5%
Sample Dates	08/03/1999, 08/21/2003, 08/08/2012, 07/30/2018, 08/28/2023

Table 23R-04.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Unknown	Plateau Brush Control #2	LTDL	July-October 1966	1200

Wildlife Habitat and Vegetation History**Table 23R-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		

Table 23R-04.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1999	Mountain Big Sagebrush	No Encroachment
2003	Mountain Big Sagebrush	No Encroachment
2012	Mountain Big Sagebrush	No Encroachment
2018	Mountain Big Sagebrush	No Encroachment
2023	Mountain Big Sagebrush/Perennial Grass	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has dominated this site since study establishment in 1999. Other browse species such as slender buckwheat (*Eriogonum microthecum*) and mountain snowberry (*Symphoricarpos oreophilus*) have also been present, but as minimal components of the shrub layer (Table 23R-04.6, Table 23R-04.12, Table 23R-04.13). Perennial grass cover has exhibited a slight increase over time, with most of the cover provided by needle and thread (*Hesperostipa comata*). Other native perennial grass species have been present, but have contributed little cover in comparison (Table 23R-04.7, Table 23R-04.10). Perennial forbs have remained moderately diverse, and cover data displayed a decreasing trend through 2018. However, perennial forb cover increased between the two most recent samplings; the dominant perennial forb species were redroot buckwheat (*Eriogonum racemosum*) and western stoneseed (*Lithospermum ruderale*) in 2023 (Table 23R-04.11). This site will likely remain in the current ecological state provided that a disturbance does not take place.

Condition of this site as deer winter range has ranged between fair and excellent since 1999. As of 2023, deer winter range condition was considered to be good to excellent. Improvements to deer winter habitat could be accomplished through efforts that increase cover of and recruitment of young in the preferred browse population; diversifying and increasing cover of native perennial forbs would also improve deer winter range (Table 23R-04.15). Deer presence has remained low throughout the study period according to pellet transect data, and no deer pellet groups were observed in 2023 (Table 23R-04.9).

Trend Summary Tables

Table 23R-04.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1999	16.8	0.2	-	-	-	-
2003	22.0	0.1	-	23.5	-	-
2012	20.9	0.2	-	28.8	0.2	-
2018	19.0	0.2	-	28.9	-	-
2023	19.8	0.3	-	28.7	0.2	-

Table 23R-04.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1999	248	221	368	169	2.7	7.8	1.9	5.2
2003	81	211	5	149	0.6	8.9	0.0	5.8
2012	169	211	237	185	3.0	8.4	0.7	3.5
2018	240	230	154	101	7.8	10.5	0.3	1.4
2023	259	247	244	153	4.9	14.3	2.1	5.8

Table 23R-04.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1999	20.2	4.0	22.7	29.9	0.6	30.8
2003	10.0	0.9	30.3	39.6	0.9	33.3
2012	16.2	2.1	40.2	29.4	0.1	35.3
2018	31.7	2.2	43.7	20.5	0.7	31.6
2023	16.5	3.8	29.5	28.1	0.9	39.5

Table 23R-04.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1999	-	2	5	35
2003	-	-	-	86
2012	5	2	-	15
2018	1	-	-	63
2023	-	2	-	35
Year	Days Use Per Acre (ha)			
1999	-	-	-	-
2003	-	-	-	-
2012	2.2 (5.4)	2.0 (5.0)	0.7 (1.7)	-
2018	9.4 (23.3)	1.3 (3.3)	-	-
2023	6.5 (16.1)	-	-	-

Table 23R-04.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency								
1999	32	-	248	-	-	2	165	2	63
2003	17	27	81	-	-	54	153	8	22
2012	11	-	169	3	2	2	185	-	24
2018	10	12	240	-	2	31	200	-	11
2023	15	11	259	-	-	68	188	3	13
year	Average Cover (%)								
1999	0.9	-	2.7	-	-	0.0	5.6	0.0	1.3
2003	0.5	0.4	0.6	-	-	1.2	6.2	0.2	0.5
2012	0.5	-	3.0	0.0	0.0	0.0	6.8	-	1.0
2018	0.3	0.3	7.8	-	0.0	0.8	8.4	-	0.6
2023	0.7	0.2	4.9	-	-	2.3	10.3	0.0	0.8

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

Table 23R-04.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockerness)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Astragalus utahensis (Utah milkvetch)	Castilleja angustifolia (northwestern Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium wheeleri (Wheeler's thistle)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stoneseed)	Lotus utahensis (Utah bird's-foot trefoil)
year	Nested Frequency																
1999	2	-	368	9	7	-	-	-	-	-	-	-	44	-	4	69	54
2003	-	-	5	-	31	-	-	-	-	-	13	-	35	-	-	56	16
2012	3	-	234	-	7	-	3	-	-	3	30	8	47	-	17	20	66
2018	-	0	154	1	4	-	-	-	1	3	1	-	26	-	-	34	11
2023	-	-	228	4	19	1	-	0	7	6	13	-	35	71	1	13	27
year	Average Cover (%)																
1999	0.0	-	1.9	0.0	0.0	-	-	-	-	-	-	-	0.4	-	0.0	2.8	0.7
2003	-	-	0.0	-	0.4	-	-	-	-	-	0.1	-	0.3	-	-	3.5	0.1
2012	0.0	-	0.6	-	0.1	-	0.0	-	-	0.0	0.6	0.0	0.8	-	0.1	0.5	0.8
2018	-	0.0	0.3	0.0	0.0	-	-	-	0.0	0.1	0.0	-	0.1	-	-	0.8	0.1
2023	-	-	1.4	0.0	0.3	0.1	-	0.0	0.0	0.5	0.7	-	1.5	0.7	0.0	1.2	0.2

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

FORB SPECIES													
Lupinus argenteus (silvery lupine)													
Medicago sativa ⁱ (alfalfa)													
Melilotus officinalis ⁱ (sweetclover)													
Oenothera pallida ssp. pallida (pale evening primrose)													
Penstemon comarrhenus (dusty beardtongue)													
Phlox longifolia (longleaf phlox)													
Polygonum douglasii ^a (Douglas' knotweed)													
Sphaeralcea grossularifolia (gooseberry/leaf globemallow)													
Streptanthus cordatus (heartleaf twistflower)													
Tragopogon dubius ^{ai} (yellow salsify)													
Trifolium gymnocarpon (hollyleaf clover)													
Zigadenus paniculatus (foothill deathcamas)													
year	Nested Frequency												
1999	22	-	-	-	5	-	-	-	2	0	-	-	-
2003	19	-	-	-	-	8	-	-	-	-	3	-	-
2012	16	3	3	3	-	24	1	3	6	3	-	-	-
2018	11	-	-	-	10	-	1	3	8	-	-	-	-
2023	16	-	-	3	-	24	6	0	19	-	7	1	-
year	Average Cover (%)												
1999	1.2	-	-	-	0.0	-	-	-	0.0	0.0	-	-	-
2003	1.3	-	-	-	-	0.0	-	-	-	-	0.0	-	-
2012	0.4	0.1	0.0	0.0	-	0.1	0.0	0.0	0.0	0.0	-	-	-
2018	0.1	-	-	-	0.1	-	0.0	0.0	0.1	-	-	-	-
2023	0.8	-	-	0.0	-	0.1	0.0	0.0	0.2	-	0.0	0.0	-

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

Table 23R-04.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)				
Linanthus pungens (granite prickly phlox)				
Opuntia polyacantha (plains pricklypear)				
Symphoricarpos oreophilus ^p (mountain snowberry)				
year	Line Intercept Cover (%)			
1999	-	-	-	-
2003	23.5	-	-	-
2012	28.8	0.2	-	-
2018	28.9	-	-	-
2023	28.7	0.2	-	-
year	Quadrat Cover (%)			
1999	16.8	0.2	-	-
2003	22.0	0.1	-	-
2012	20.8	0.2	0.0	0.1
2018	19.0	0.2	0.0	-
2023	19.8	0.2	0.1	-

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

Table 23R-04.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

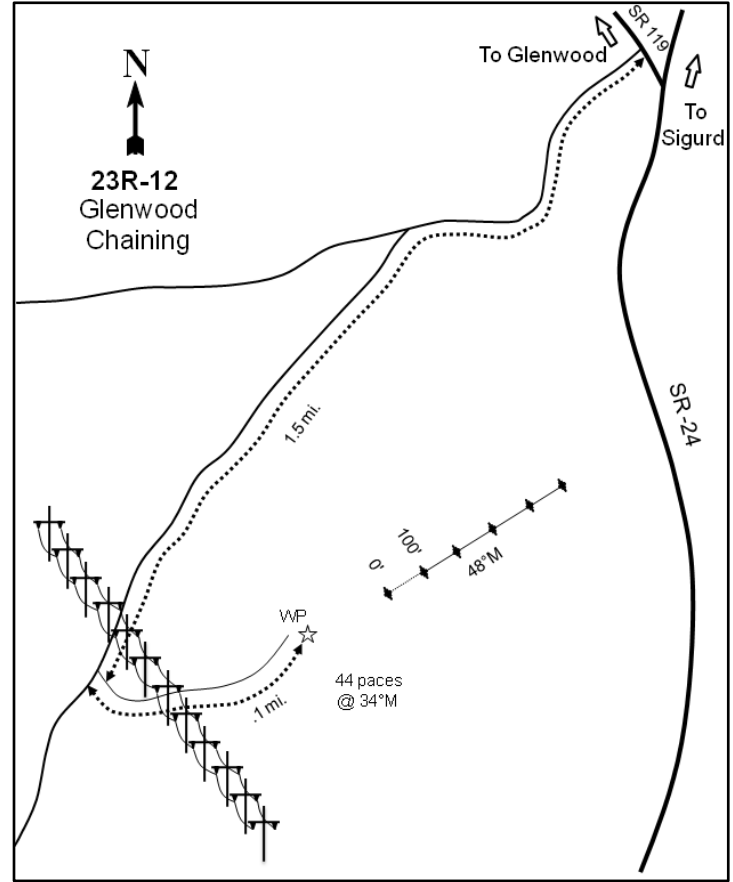
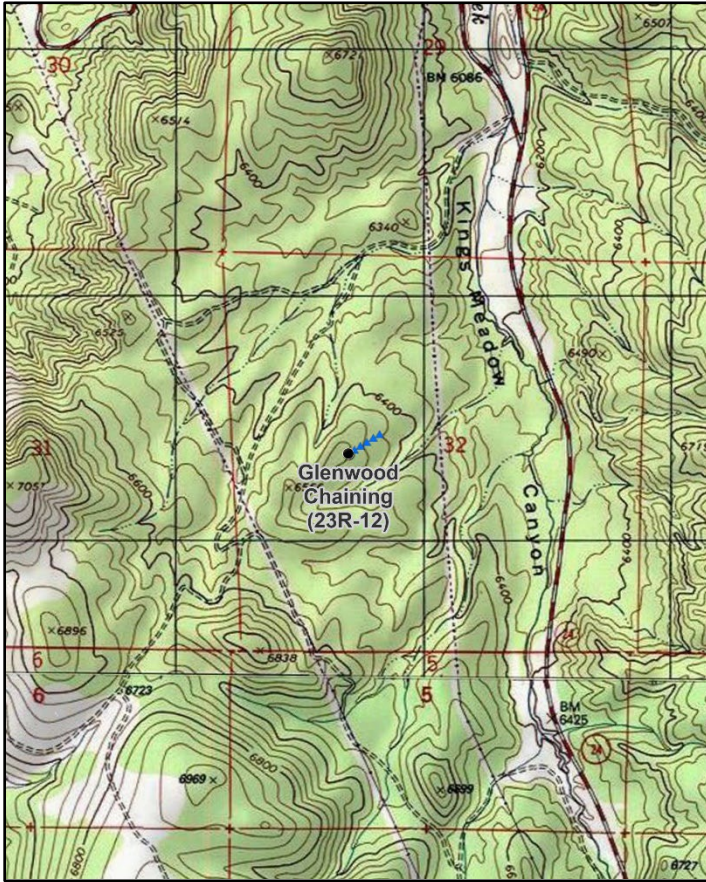
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
1999	1920	-	5	74	21	40	29	15	88/131
2003	2000	-	0	73	27	30	1	9	95/126
2012	2360	220	19	64	17	28	46	37	90/139
2018	2200	-	0	76	25	16	0	10	88/120
2023	2360	1440	9	75	16	4	3	16	- / -
Eriogonum microthecum^p -- (slender buckwheat)									
1999	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	15/26
2018	-	-	-	-	-	-	-	-	14/17
2023	-	-	-	-	-	-	-	-	-/-
Linanthus pungens -- (granite prickly phlox)									
1999	140	-	0	100	0	0	0	0	15/28
2003	140	-	0	100	0	0	43	0	11/15
2012	220	-	0	91	9	9	18	18	11/29
2018	220	-	0	91	9	18	27	55	10/18
2023	260	-	0	92	8	0	0	8	- / -
Opuntia fragilis -- (brittle pricklypear)									
1999	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	0	100	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
1999	20	-	0	100	0	0	0	0	7/40
2003	120	-	0	100	0	0	0	0	12/28
2012	100	-	0	100	0	0	0	0	12/45
2018	60	-	0	100	0	0	0	0	11/25
2023	60	-	0	100	0	0	0	0	- / -
Symphoricarpos oreophilus^p -- (mountain snowberry)									
1999	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	100	0	0	11/13

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

Table 23R-04.15 - 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
1999	20.9	8.7	2.6	15.5	-2.0	10.0	0.0	55.8	Fair
2003	29.4	6.9	0.0	17.8	-0.5	10.0	0.0	63.5	Fair-Good
2012	30.0	9.9	9.3	16.8	-2.2	7.0	0.0	70.8	Good
2018	30.0	7.7	0.0	20.9	-5.9	2.8	0.0	55.5	Fair
2023	30.0	10.2	4.7	28.6	-3.6	10.0	0.0	79.8	Good-Excellent

GLENWOOD CHAINING - STUDY NO. 23R-12



Location Information

USGS 7.5 min Map Info	Sigurd SE; Township 23S, Range 1W, Section 32
GPS (0' Stake)	NAD 83 UTM ZONE 12, 418699 East 4290353 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	50° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the junction of SR-24 and SR-119, turn onto the dirt road heading southwest and travel 1.5 miles. Turn left just past the powerpoles, traveling east up to the top of a hill. Continue for 0.1 miles and park on the top of the hill near a witness post on the left (east) side of the road. The 0-foot stake is 44 paces at 35 degrees magnetic from the witness post; there is no browse tag.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	NORTH COVE MOUNTAIN
Elevation	6,449ft (1,966m)
Aspect	Northeast
Slope	10-15%
Sample Dates	07/14/2011, 08/20/2014, 07/30/2018, 08/29/2023

Table 23R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Central Utah Chaining Maintenance Project Phase I	4582	2019	4776
Chaining - Two-Way Ely	Glenwood Habitat Enhancement	1941	November 2011	303
Seeding - Aerial Before	Glenwood Habitat Enhancement	1941	November 2011	303
Seeding - Dribbler	Glenwood Habitat Enhancement	1941	November 2011	303
Seeding - Aerial After	Glenwood Habitat Enhancement	1941	February 2012	303

Table 23R-12.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Glenwood Habitat Enhancement - Chaining			Aerial	Nov 2011	317
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.26	1.20
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	1.74	1.67
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.47	0.37
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.47	0.42
G	Psathyrostachys juncea	Russian Wildrye		0.95	0.74
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	1.26	1.09
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.95	0.77
F	Helianthus annuus	Annual Sunflower		0.03	0.03
F	Helianthus annuus	Annual Sunflower		0.95	0.90
F	Linum perenne	Blue Flax	Appar	0.95	0.84
F	Medicago sativa	Alfalfa	Nomad	0.95	0.85
F	Melilotus officinalis	Yellow Sweetclover		0.95	0.89
F	Penstemon palmeri	Palmer Penstemon	Lincoln NV	0.24	0.21
F	Sanguisorba minor	Small Burnet	Delar	2.21	2.04

Mix Name			Application Type	Application Date	Acres
Glenwood Habitat Enhancement Chaining- Dribbler Mix			Dribbler	Nov 2011	210
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet	Delar	0.48	0.44
S	Purshia tridentata	Bitterbrush	Elko NV	0.36	0.30

Mix Name			Application Type	Application Date	Acres
Glenwood Habitat Enhancement - Browse 3			Aerial	Feb 2012	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.92
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sevier UT	0.50	0.08
S	Bassia prostrata	Forage Kochia	Beaver UT	0.50	0.29

Wildlife Habitat and Vegetation History**Table 23R-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 23R-12.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Pinyon-Juniper	Phase II transitioning to Phase III
2014	Annual Grass	Phase I
2018	Perennial Grass	Phase I
2023	Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation 11 inches
 NRCS Ecological Site Upland Gravelly Loam (Bonneville Big Sagebrush)
 NRCS Ecological Site # R028AY306UT
 2011 - Utah Juniper/Invasive Annuals State: Community Phase 3.2
 States and Transitions 2014 - Yellow Rabbitbrush/Invasive Annuals State: Community Phase 5.2
 2018-2023 - Seeded Range State: Community Phase 6.1

When established in 2011, this study site was considered to be within Phase II transitioning to Phase III of woodland succession and encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*); almost no other browse species were present in the understory. Tree cover decreased following treatment (Table 23R-12.1), but browse species have remained rare (Photos, Table 23R-12.12, Table 23R-12.13). The herbaceous understory was very sparse prior to the chaining project. While grasses and forbs increased in cover during the first post-treatment sampling, the annual grass cheatgrass (*Bromus tectorum*) increased substantially and was the dominant cover type in 2014. However, annual grass cover decreased while perennial grasses increased and became the dominant vegetation component in 2018 (Table 23R-12.7, Table 23R-12.10). Pinyon and juniper trees have maintained a presence in all post-treatment sample years, indicating that there may be potential for future infilling (Table 23R-12.14).

Deer winter range condition has generally been very poor since 2011; condition was considered to be very poor to poor as of 2023. Improving deer winter range can be accomplished through efforts that increase preferred browse cover and reproduction, while increasing native perennial forbs and decreasing cheatgrass cover (Table 23R-12.15). Pellet transect data indicates that deer and elk presence have been low in each sample year, and no deer pellet groups were observed in 2023 (Table 23R-12.9).

Trend Summary Tables

Table 23R-12.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	0.4	0.1	10.5	-	-	26.8
2014	0.2	0.4	-	0.1	-	-
2018	0.8	0.2	0.2	0.1	0.1	-
2023	1.4	0.2	0.3	1.6	-	-

Table 23R-12.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	150	41	137	12	1.2	0.2	0.8	0.1
2014	319	181	24	74	11.1	5.5	0.1	1.9
2018	96	279	5	39	1.3	20.1	0.1	1.0
2023	63	267	87	23	1.4	19.8	1.7	1.0

Table 23R-12.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	12.8	0.4	24.4	41.6	19.1	12.6
2014	10.7	0.1	48.4	14.9	15.6	18.8
2018	20.3	0.2	47.4	15.7	16.9	23.9
2023	10.8	0.4	31.4	25.4	17.1	23.1

Table 23R-12.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2011	1	-	3	1	11
2014	-	-	18	1	38
2018	-	-	5	1	54
2023	-	-	7	23	5
Year	Days Use Per Acre (ha)				
2011	-	-	2.7 (6.6)	2.0 (5.0)	-
2014	-	-	17.4 (43.0)	3.4 (8.3)	-
2018	-	8.7 (21.5)*	6.7 (16.6)	2.0 (5.0)	-
2023	-	-	-	14.7 (36.4)	-

*Pellets per acre (ha)

Table 23R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2011	1	-	150	34	-	5	1	-	-	-
2014	19	58	319	71	-	-	-	-	49	31
2018	7	126	96	84	-	-	3	2	70	101
2023	6	141	63	22	0	-	3	4	81	88
year	Average Cover (%)									
2011	0.0	-	1.2	0.2	-	0.0	0.0	-	-	-
2014	0.2	1.7	11.1	2.0	-	-	-	-	1.0	0.6
2018	0.6	6.9	1.3	3.4	-	-	0.4	0.1	4.2	4.4
2023	0.7	8.0	1.4	0.6	0.0	-	0.0	0.4	6.0	4.1

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

Table 23R-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Arabis holboellii ⁿ (Holboell's rockcress)	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Astragalus purshii (woollypod milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dusty maiden)	Cryptantha (cryptantha)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Helianthus annuus ^a (common sunflower)	Lactuca serriola ^{ai} (prickly lettuce)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)
year	Nested Frequency																
2011	-	5	3	-	-	2	14	1	4	5	-	1	117	-	5	-	-
2014	-	-	6	3	2	-	-	3	-	6	-	0	-	9	9	19	11
2018	3	-	-	-	-	-	-	1	2	0	-	-	-	-	2	-	5
2023	44	-	1	-	-	3	-	5	-	-	0	-	-	54	3	-	3
year	Average Cover (%)																
2011	-	0.0	0.0	-	-	0.0	0.1	0.0	0.0	0.0	-	0.0	0.7	-	0.0	-	-
2014	-	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-	0.0	-	0.1	0.0	0.2	0.0
2018	0.0	-	-	-	-	-	-	0.0	0.0	0.0	-	-	-	-	0.0	-	0.0
2023	0.3	-	0.0	-	-	0.0	-	0.0	-	-	0.0	-	-	1.1	0.1	-	0.4

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

FORB SPECIES	Packera multilobata (lobeleaf groundsel)	Penstemon palmeri (Palmer's penstemon)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency				
2011	-	-	-	-	3
2014	1	10	30	-	-
2018	6	10	10	-	8
2023	-	7	5	0	-
year	Average Cover (%)				
2011	-	-	-	-	0.0
2014	0.0	0.5	1.1	-	-
2018	0.0	0.5	0.3	-	0.1
2023	-	0.4	0.2	0.1	-

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

Table 23R-12.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
	year	Line Intercept Cover (%)					
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	2011	0	-	14.2	-	12.6	-
Bassia prostrata ^{pi} (forage kochia)	2014	0.1	-	-	-	-	-
Juniperus osteosperma ⁱ (Utah juniper)	2018	-	-	-	0.1	-	0.1
Opuntia polyacantha (plains pricklypear)	2023	-	-	-	0	-	1.6
Pinus edulis ^t (twoneedle pinyon)	year	Quadrat Cover (%)					
Purshia tridentata ^p (antelope bitterbrush)	2011	0.0	-	7.1	0.1	3.3	0.4
	2014	0.0	0.0	-	0.4	-	0.1
	2018	-	0.0	0.2	0.2	-	0.8
	2023	-	0.0	0.3	0.2	0.0	1.4

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

Table 23R-12.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2011	40	-	0	0	100	0	0	100	55/35
2014	20	-	100	0	0	100	0	0	31/33
2018	-	-	-	-	-	-	-	-	41/46
2023	80	-	50	50	0	0	0	0	- / -
Bassia prostrata^{pi} -- (forage kochia)									
2011	-	-	-	-	-	-	-	-	- / -
2014	60	-	67	33	0	33	0	0	7/9
2018	20	-	0	100	0	0	100	0	4/18
2023	20	-	0	100	0	0	100	0	- / -
Juniperus osteospermaⁱ -- (Utah juniper)									
2011	140	80	29	43	29	0	0	0	- / -
2014	-	20	0	0	0	0	0	0	- / -
2018	20	20	100	0	0	0	0	100	- / -
2023	80	20	100	0	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2011	40	-	0	100	0	0	0	0	14/39
2014	80	-	25	75	0	0	0	0	10/30
2018	140	-	14	86	0	0	0	14	15/46
2023	80	-	0	100	0	0	0	0	- / -
Pinus edulis^t -- (twoneedle pinyon)									
2011	40	40	0	100	0	0	0	0	- / -
2014	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	20	0	0	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Purshia tridentata^p -- (antelope bitterbrush)									
2011	20	-	0	0	100	0	100	0	101/142
2014	40	-	0	100	0	50	50	0	25/36
2018	60	-	0	100	0	0	33	0	54/120
2023	40	-	0	100	0	0	100	0	- / -

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

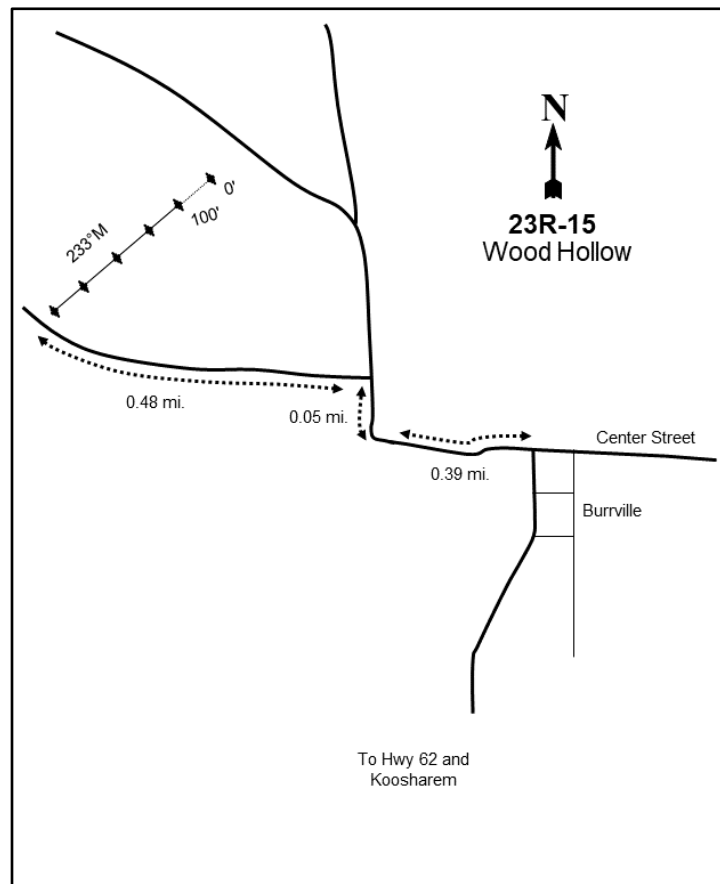
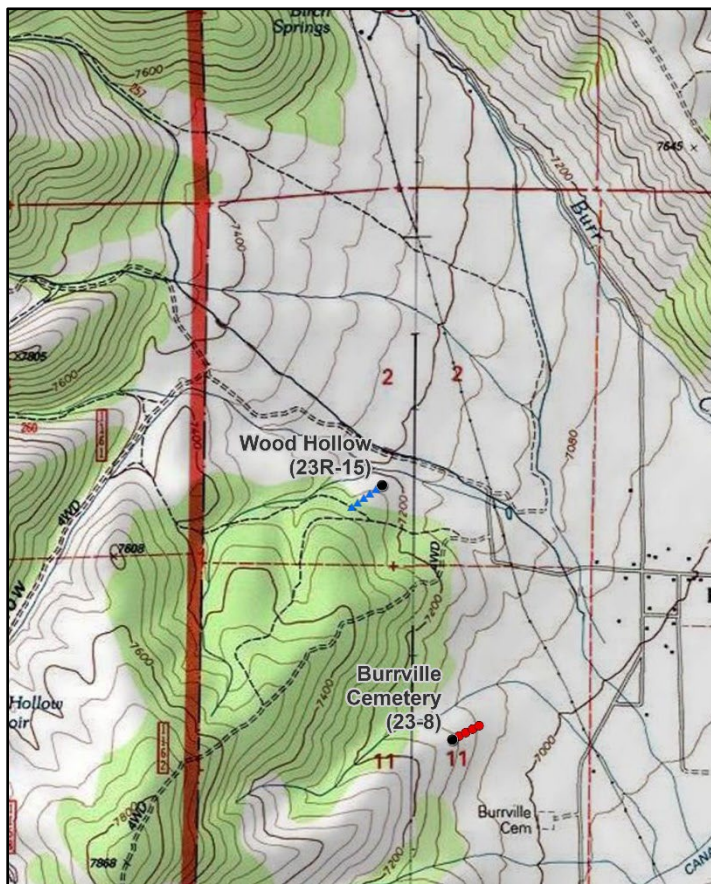
Table 23R-12.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2011	212	35	10	15	15	25	16.9
2014	113	11	50	39	-	-	5.6
2018	75	-	59	41	-	-	8.1
2023	90	29	65	6	-	-	2.8
Pinus edulis (twoneedle pinyon)							
2011	52	11	17	22	22	28	17.8
2014	14	13	63	25	-	-	3.0
2018	15	-	75	25	-	-	4.3
2023	17	33	33	33	-	-	5.7

Table 23R-12.15 - 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
2011	0.0	0.0	0.0	0.4	-0.9	0.2	0.0	-0.2	Very Poor
2014	0.1	0.0	0.0	10.9	-8.3	3.8	0.0	6.5	Very Poor
2018	0.2	0.0	0.0	30.0	-1.0	2.0	0.0	31.2	Very Poor
2023	2.4	0.0	0.0	30.0	-1.0	2.0	0.0	33.4	Very Poor-Poor

WOOD HOLLOW - STUDY NO. 23R-15

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Koosharem NE; Township 26S, Range 1W, Section 02
NAD 83 UTM ZONE 12, 423584 East 4269895 North

Transect Information

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

Not Available
225° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt 5: No Rebar

Directions to Site

From the intersection of Main Street and Center Street in Burrville, turn west on Center Street and travel 0.39 miles to a right turn in the road. Follow the road right (north) and travel 0.05 miles to a two-track on the left-hand (west) side. Stay to the left with the road that leads to the northwest and travel 0.48 miles to the study site; there is no witness post.

Site Information

Land Ownership
Land Administrator
Allotment
Elevation
Aspect
Slope
Sample Dates

State
SITLA
BURRVILLE
7,200ft (2,195m)
Northeast
25%
08/13/2020, 08/31/2023

Table 23R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Burrville Collaboration Ecosystem Restoration Project	5232	Fall-Winter 2020	312
Seeding - Aerial Before	Burrville Collaboration Ecosystem Restoration Project	5232	Fall 2020	312

Table 23R-15.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Burrville SITLA/Private			Aerial	Oct 2020	795
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.31	0.30
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Ephraim	1.01	0.89
G	<i>Bouteloua gracilis</i>	Blue Grama	Birdseye	0.15	0.14
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.09	0.08
G	<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Toe Jam	0.16	0.14
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	0.43	0.37
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock II	0.31	0.29
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	0.63	0.58
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	0.38	0.36
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	0.75	0.64
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.75	0.65
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.50	0.44
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed		0.05	0.05
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle	0.03	0.02
F	<i>Helianthus annuus</i>	Annual Sunflower		0.19	0.14
F	<i>Linum perenne</i>	Blue Flax	Appar	0.15	0.12
F	<i>Medicago sativa</i>	Alfalfa	Ladak 65	1.51	1.42
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.15	0.15
F	<i>Onobrychis viciifolia</i>	Sainfoin	Shoshone	2.01	1.91
F	<i>Ratibida columnifera</i>	Prairie Coneflower	Stillwater	0.05	0.04
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	2.01	1.97
S	<i>Bassia prostrata</i>	Forage Kochia	Millard, UT	0.50	0.34

Wildlife Habitat and Vegetation History**Table 23R-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		

Table 23R-15.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2020	Wyoming Big Sagebrush	Phase I transitioning to Phase II
2023	Wyoming Big Sagebrush/Annual Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Upland Loam (Wyoming Big Sagebrush)
 NRCS Ecological Site # R034BY306UT
 States and Transitions 2020 - Juniper Invasion State: Community Phase 3.1
 2023 - Sagebrush with Cheatgrass Understory State: Community Phase 6.1

When the study was established in 2020, the vegetation was a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community type with active Utah juniper (*Juniperus osteosperma*) encroachment. As is characteristic of Phase I transitioning to Phase II woodlands, the sagebrush population was decadent with few young and mature plants contributing to the population. A bullhog and seeding treatment later in 2020 (Table 23R-15.1) removed much of the tree component, and the site was considered to be within Phase I of succession in 2023. Sagebrush cover prior to treatment and during the first post-treatment sampling was similar. Density of sagebrush decreased between 2020 and 2023, but demographic data showed increased recruitment of young and a 60% decrease in decadence (Photos, Table 23R-15.4, Table 23R-15.12, Table 23R-15.13, Table 23R-15.14). Herbaceous diversity was depauperate in

2020 with the introduced annual grass species cheatgrass (*Bromus tectorum*) as the dominant understory species. Diversity, cover, and abundance of herbaceous species increased following the bullhog and seeding. Cheatgrass also exhibited a notable increase, however, and was considered to be codominant with sagebrush in 2023 (Table 23R-15.7, Table 23R-15.10, 23R-15.11). Although tree cover and density significantly decreased between the two sample years, the extant tree component sampled in 2023 (Table 23R-15.12, Table 23R-15.14) indicates that there may be potential for infilling in future sample years.

Deer winter range condition has been very poor since 2020; condition was considered to be very poor to poor as of 2023. Improving deer winter range can be accomplished through efforts that increase preferred browse cover and reproduction, while increasing native perennial forbs and grasses while decreasing cheatgrass cover (Table 23R-12.15). Pellet transect data shows that deer presence was considered to be moderate in 2020; however, deer presence decreased the following sample period and was considered to be low (Table 23R-12.9).

Trend Summary Tables

Table 23R-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
2020	11.9	0.2	3.0	13.1	0.1	6.9
2023	10.1	0.2	0.3	12.4	0.1	0.6

Table 23R-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
2020	275	75	18	29	6.4	0.8	0.1	0.1
2023	337	155	130	153	20.3	7.2	0.8	3.8

Table 23R-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
2020	6.5	0.7	40.6	31.5	9.0	22.1
2023	3.9	0.4	49.3	19.9	4.7	38.5

Table 23R-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			
2020	-	20	-	45
2023	-	7	-	22
Year	Days Use Per Acre (ha)			
2020	-	28.8 (71.2)	2.0 (5.0)	-
2023	0.7 (1.8)	2.0 (5.0)	-	-

Table 23R-15.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum pinetorum (pine needlegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Carex duriuscula (needleleaf sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Leymus cinereus (basin wildrye)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency											
2020	2	13	-	-	275	-	53	-	-	11	-	-
2023	1	17	4	29	337	25	87	3	3	3	7	9
year	Average Cover (%)											
2020	0.0	0.1	-	-	6.4	-	0.6	-	-	0.0	-	-
2023	0.3	1.4	0.1	0.5	20.3	0.3	4.0	0.0	0.4	0.0	0.0	0.1

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

Table 23R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Astragalus convallarius (lesser rushy milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce fendleri (Fendler's sandmat)	Cryptantha (cryptantha)	Erigeron aphanactis ^a (rayless shaggy fleabane)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Helianthus annuus ^a (common sunflower)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)	Onobrychis viciifolia ⁱ (sainfoin)	Packera multilobata (lobeleaf groundsel)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Ratibida columnifera (upright prairie coneflower)
year	Nested Frequency																
2020	4	-	-	-	10	-	19	14	-	-	-	-	-	-	-	-	-
2023	66	0	1	30	-	4	-	5	4	49	40	20	16	2	5	17	2
year	Average Cover (%)																
2020	0.0	-	-	-	0.1	-	0.1	0.1	-	-	-	-	-	-	-	-	-
2023	0.3	0.1	0.0	0.1	-	0.0	-	0.0	0.0	0.5	0.5	0.2	0.1	0.0	0.0	0.1	0.0

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

FORB SPECIES	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea munroana (Munro's globemallow)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius ^{ai} (yellow salsify)	Trifolium gymnocarpon (hollyleaf clover)
year	Nested Frequency				
2020	-	-	-	-	-
2023	68	4	1	4	1
year	Average Cover (%)				
2020	-	-	-	-	-
2023	2.6	0.0	0.0	0.0	0.0

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

Table 23R-15.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Bassia prostrata ⁿⁱ (forage kochia)	Juniperus osteosperma ⁱ (Utah juniper)	Juniperus scopulorum ⁱ (Rocky Mountain juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)						
2020	13	-	6.1	-	0.1	0.8	0.1
2023	12.1	0.3	0.5	0.1	0.1	-	-
year	Quadrat Cover (%)						
2020	11.9	-	2.6	-	0.2	0.4	0.0
2023	9.8	0.4	0.3	0.0	0.2	-	-

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

Table 23R-15.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2020	3920	40	3	5	92	37	2	99	67/78
2023	1680	320	13	56	31	0	2	27	- / -
Bassia prostrataⁿⁱ -- (forage kochia)									
2020	-	-	-	-	-	-	-	-	- / -
2023	480	-	42	58	0	0	0	0	- / -
Juniperus osteospermaⁱ -- (Utah juniper)									
2020	120	-	83	17	0	0	0	33	- / -
2023	120	-	83	0	17	0	0	17	- / -
Juniperus scopulorumⁱ -- (Rocky Mountain juniper)									
2020	-	-	-	-	-	-	-	-	- / -
2023	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 (%)				
Opuntia polyacantha -- (plains pricklypear)									
2020	340	-	18	59	24	0	0	35	11/26
2023	320	-	25	75	0	0	0	0	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2020	20	-	0	0	100	0	100	100	21/51

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

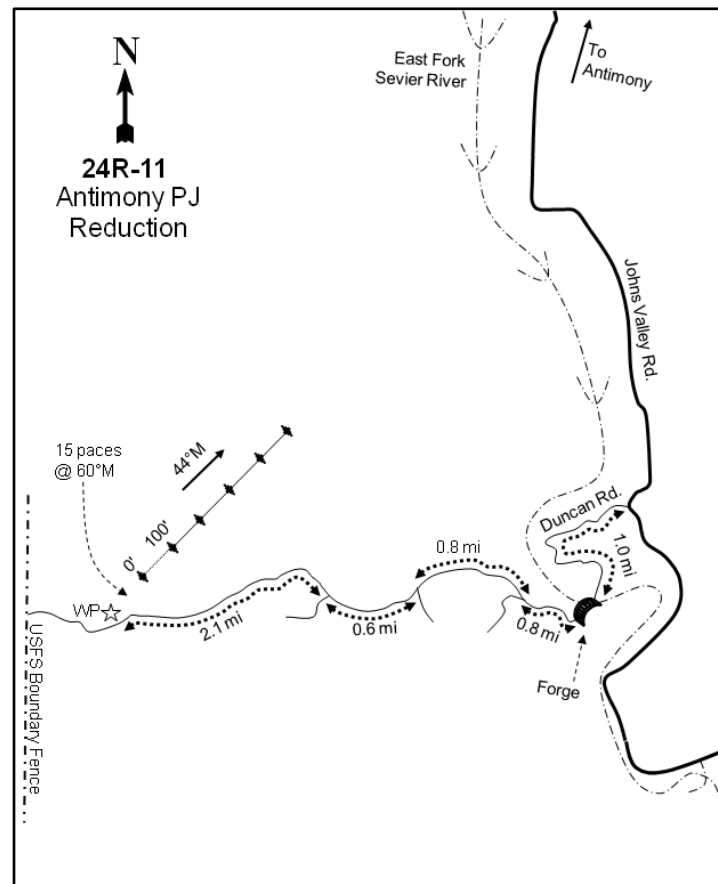
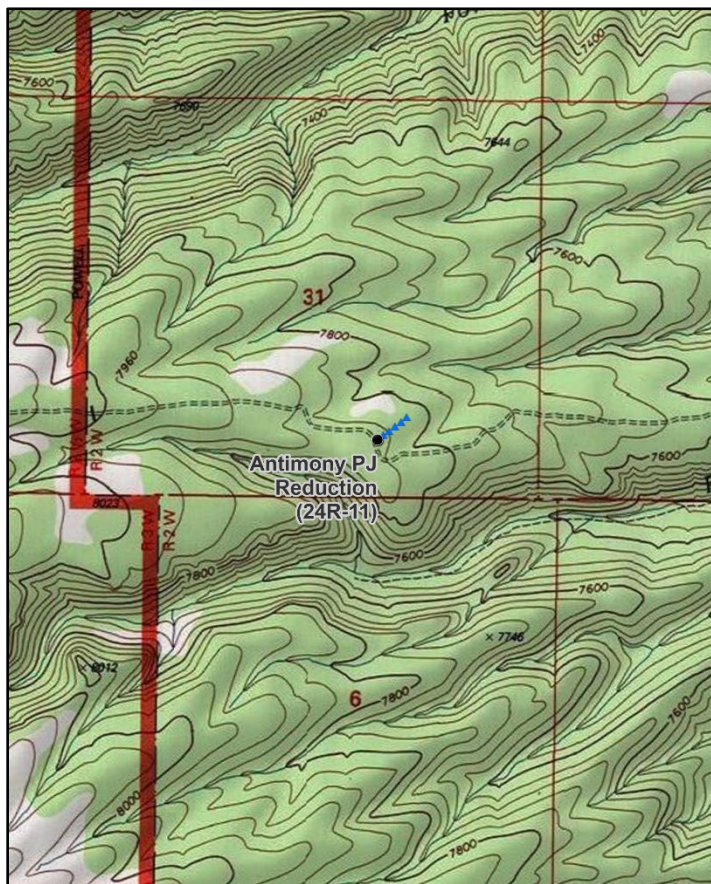
Table 23R-15.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2020	128	5	16	26	26	26	15.9
2023	11	29	71	-	-	-	2.7
Pinus edulis (twoneedle pinyon)							
2020	4	-	-	67	-	33	14.7
2023	2	-	100	-	-	-	2.0

Table 23R-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
2020	16.4	-12.7	1.5	1.5	-4.8	0.3	0.0	2.3	Very Poor
2023	15.6	5.9	6.9	14.3	-15.2	7.6	0.0	35.1	Very Poor-Poor

ANTIMONY PJ REDUCTION - STUDY NO. 24R-11

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Deep Creek SE; Township 31S, Range 2W, Section 31
NAD 83 UTM ZONE 12, 408097 East 4213076 North

Transect Information

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

9156
42° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Standard

Directions to Site

From Johns Valley Road south of Antimony, travel to Duncan Road. From there, drive 1.0 miles to the forge crossing the Sevier River. Continue for 0.8 miles and stay left, then proceed for 0.6 miles and stay left again. Travel 2.1 miles to the witness post on the right (north) side of the road. From the witness post, walk 15 paces at 60 degrees magnetic to the 0-foot stake, which is marked with browse tag #9156.

Site Information

Land Ownership
Land Administrator
Allotment
Elevation
Aspect
Slope
Sample Dates

Federal
BLM
PINE CREEK ANTIMONY
7,841ft (2,390m)
Northeast
4-5%
08/08/2012, 08/18/2015, 06/21/2018, 08/22/2023

Table 24R-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Antimony PJ Reduction and Riparian Improvement (Phase V)	2239	Fall 2012	1005
Seeding - Aerial Before	Antimony PJ Reduction and Riparian Improvement (Phase V)	2239	Fall 2012	1005

Table 24R-11.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Antimony PJ Reduction			Aerial	Sep 2012	1207
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Festuca ovina	Sheep Fescue	Covar	0.25	0.21
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.21	0.19
F	Helianthus annuus	Annual Sunflower		0.75	0.71
F	Linum perenne	Blue Flax	Appar	0.50	0.44
F	Medicago sativa	Alfalfa	Ladak DL	0.50	0.46
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.47
F	Onobrychis viciifolia	Sainfoin	Eski	2.03	1.59
F	Sanguisorba minor	Small Burnet	Delar	2.03	1.81

Wildlife Habitat and Vegetation History**Table 24R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 24R-11.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon-Juniper	Phase III
2015	Mixed Shrub/Perennial Grass/Annual Forb	Phase I
2018	Mixed Shrub/Perennial Grass	Phase I
2023	Mixed Shrub/Perennial Grass	Phase I

Site Notes

Elk shed antlers were found on site in 2012 and 2018. An elk bed was seen on site in 2023.

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB336UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2012, this site was in Phase III of woodland succession and dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) (Photos, Table 24R-11.4, Table 24R-11.14) with minimal herbaceous cover (Table 24R 11.7). Following a bullhog and seeding treatment later in 2012 (Table 24R-11.1), the plant community transitioned to a mixed shrub community type, with black sagebrush (*Artemisia nova*), mountain big sagebrush (*A. tridentata* ssp. *vaseyana*), and antelope bitterbrush (*Purshia tridentata*) as the dominant shrubs in 2023 (Table 24R-11.12). The herbaceous understory improved following the treatment, with a substantial increase in perennial grasses such as blue grama (*Bouteloua gracilis*) and squirreltail (*Elymus elymoides*) (Table 24R-11.7, Table 24R-11.10, Table 24R-11.11). It is likely that this site will remain in a similar state in future sample years. However, point-quarter density shows that a number of trees were still present in 2023 (Table 24R-11.14), indicating that infilling may occur over time.

Condition of deer winter range on this site has ranged between very poor and good since study establishment. Winter range condition has improved following treatment and was considered to be good in 2023. Further improvements could be accomplished through efforts that increase preferred browse cover and reproduction while decreasing decadence within the population. In addition, increasing perennial forb cover would also prove beneficial for deer winter range (Table 24R-11.15). The sagebrush component of this site could provide browse for elk during the winter months (Table 24R-11.3; Wambolt, 1996). However, pellet transect data shows that both deer and elk presence have remained low over the study period (Table 24R-11.9).

Trend Summary Tables

Table 24R-11.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	6.1	0.0	18.9	8.2	-	36.6
2015	5.8	1.7	0.0	6.9	2.8	1.9
2018	7.2	0.7	0.2	7.2	1.8	0.1
2023	12.3	1.1	0.8	15.5	1.4	1.2

Table 24R-11.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	-	109	4	24	-	1.9	0.0	0.1
2015	-	254	80	95	-	14.2	4.8	2.3
2018	-	329	-	34	-	18.6	-	0.5
2023	-	376	77	45	-	24.3	1.1	0.5

Table 24R-11.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	3.3	1.2	55.1	25.6	12.9	27.8
2015	3.7	0.1	72.4	8.8	5.6	26.0
2018	10.1	-	69.7	9.4	3.5	24.4
2023	4.7	0.0	50.9	11.7	3.2	34.8

Table 24R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2012	-	-	-	2
2015	3	3	1	9
2018	5	10	4	33
2023	4	4	11	3
Year	Days Use Per Acre (ha)			
2012	-	4.0 (9.9)	2.0 (5.0)	-
2015	0.7 (1.8)	4.0 (9.9)	-	-
2018	9.4 (23.3)	5.3 (13.2)	9.4 (23.2)	-
2023	16.0 (39.5)	5.3 (13.2)	11.4 (28.1)	-

Table 24R-11.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
Achnatherum hymenoides (Indian ricegrass)										
Agropyron cristatum ⁱ (crested wheatgrass)										
Bouteloua gracilis (blue grama)										
Elymus elymoides (squirreltail)										
Festuca ovina ⁱ (sheep fescue)										
Hesperostipa comata (needle and thread)										
Pascopyrum smithii (western wheatgrass)										
Poa fendleriana (muttongrass)										
Poa secunda (Sandberg bluegrass)										
Pseudoroegneria spicata (bluebunch wheatgrass)										
year	Nested Frequency									
2012	4	3	66	3	-	3	1	30	3	-
2015	1	9	72	144	13	5	1	45	-	29
2018	1	9	80	218	38	8	5	41	28	55
2023	5	-	125	238	21	3	-	93	1	77
year	Average Cover (%)									
2012	0.0	0.1	1.2	0.0	-	0.0	0.0	0.5	0.0	-
2015	0.1	0.1	5.3	5.0	0.4	0.2	0.0	2.3	-	0.9
2018	0.0	0.3	3.9	7.5	1.3	0.2	0.2	1.8	1.1	2.2
2023	0.7	-	4.2	10.7	1.0	0.1	-	2.8	0.0	4.8

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

Table 24R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Arabis demissa (nodding rockcress)																	
Astragalus (milkvetch)																	
Astragalus calycosus (Torrey's milkvetch)																	
Astragalus lentiginosus (freckled milkvetch)																	
Astragalus newberryi (Newberry's milkvetch)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Chamaesyce (sandmat)																	
Chenopodium atrovirens ^a (pinyon goosefoot)																	
Chenopodium fremontii ^a (Fremont's goosefoot)																	
Chenopodium leptophyllum ^a (narrowleaf goosefoot)																	
Cryptantha (cryptantha)																	
Descurainia pinnata ^a (western tansymustard)																	
Erigeron pumilus (shaggy fleabane)																	
Eriogonum alatum (winged buckwheat)																	
Gayophytum ramosissimum ^a (pinyon groundsmoke)																	
Helianthus annuus ^a (common sunflower)																	
Hymenopappus filifolius (fineleaf hymenopappus)																	
year	Nested Frequency																
2012	14	1	-	-	-	-	1	-	-	-	-	4	-	3	-	-	-
2015	-	-	-	0	-	6	-	-	2	1	4	8	-	-	2	70	-
2018	1	3	1	1	3	4	-	-	-	-	4	-	-	-	-	-	-
2023	10	-	-	-	-	-	-	7	16	1	-	-	4	-	-	64	3
year	Average Cover (%)																
2012	0.0	0.0	-	-	-	-	0.0	-	-	-	-	0.0	-	0.0	-	-	-
2015	-	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	0.1	-	-	0.0	4.6	-
2018	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	0.1	-	-	-	-	-	-
2023	0.0	-	-	-	-	-	-	0.0	0.4	0.0	-	-	0.0	-	-	0.4	0.2

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

FORB SPECIES	Nested Frequency														
<i>Ipomopsis aggregata</i> (scarlet gilia)	3	-	-	-	-	-	1	1	-	-	-	-	1	-	
<i>Lappula occidentalis</i> ^a (flatspine stickseed)	-	4	56	2	4	3	12	-	4	23	4	0	3	-	
<i>Linum perenne</i> ⁱ (blue flax)	-	-	7	-	1	-	-	-	-	10	-	1	5	-	
<i>Machaeranthera canescens</i> (hoary tansyaster)	3	-	4	-	-	-	6	-	5	-	-	8	3	9	
<i>Medicago sativa</i> ⁱ (alfalfa)	Average Cover (%)														
<i>Melilotus officinalis</i> ⁱ (sweetclover)	0.0	-	-	-	-	-	0.0	0.0	-	-	-	-	0.0	-	
<i>Packera multilobata</i> (lobeleaf groundsel)	-	0.0	1.5	0.0	0.0	0.0	0.2	-	0.0	0.4	0.0	0.1	0.0	-	
<i>Penstemon</i> (beardtongue)	-	-	0.1	-	0.0	-	-	-	-	0.1	-	0.0	0.0	-	
<i>Phlox longifolia</i> (longleaf phlox)	0.0	-	0.1	-	-	-	0.1	-	0.1	-	-	0.0	0.0	0.3	
<i>Sanguisorba minor</i> ^a (small burnet)	Line Intercept Cover (%)														
<i>Solanum triflorum</i> ^a (cutleaf nightshade)	1.5	1.1	-	-	-	2.7	33.9	5.6	-						
<i>Sphaeralcea grossularifolia</i> (gooseberry/leaf globemallow)	3.4	1.9	0.6	-	2.8	1.9	-	1	-						
<i>Trifolium</i> (clover)	3.1	3	0.5	-	1.8	-	0.1	0.6	-						
<i>Verbascum thapsus</i> ^{ai} (common mullein)	4.3	6.1	0.7	-	1.4	1	0.2	4.4	-						
	Quadrat Cover (%)														
	1.2	1.6	-	-	0.0	1.9	17.1	3.3	-						
	1.3	3.3	0.0	-	1.7	0.0	0.0	1.2	-						
	1.9	3.4	0.0	-	0.7	0.1	0.0	1.8	-						
	1.5	5.7	0.3	0.0	1.1	0.6	0.2	4.8	0.0						

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

Table 24R-11.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)									
<i>Artemisia nova</i> ^p (black sagebrush)	1.5	1.1	-	-	-	2.7	33.9	5.6	-	
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^p (mountain big sagebrush)	3.4	1.9	0.6	-	2.8	1.9	-	1	-	
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>hololeuca</i> ^p (rubber rabbitbrush)	3.1	3	0.5	-	1.8	-	0.1	0.6	-	
<i>Escobaria vivipara</i> (spiny star)	4.3	6.1	0.7	-	1.4	1	0.2	4.4	-	
<i>Gutierrezia sarothrae</i> (broom snakeweed)	Quadrat Cover (%)									
<i>Juniperus osteosperma</i> ⁱ (Utah juniper)	1.2	1.6	-	-	0.0	1.9	17.1	3.3	-	
<i>Pinus edulis</i> ⁱ (two-needle pinyon)	1.3	3.3	0.0	-	1.7	0.0	0.0	1.2	-	
<i>Purshia tridentata</i> ^p (antelope bitterbrush)	1.9	3.4	0.0	-	0.7	0.1	0.0	1.8	-	
<i>Tetradymia canescens</i> (spineless horsebrush)	1.5	5.7	0.3	0.0	1.1	0.6	0.2	4.8	0.0	

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

Table 24R-11.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^P -- (black sagebrush)									
2012	820	-	2	88	10	12	7	20	23/43
2015	920	-	2	98	0	28	4	7	28/51
2018	840	-	7	91	2	0	0	0	32/59
2023	1120	60	25	66	9	9	0	9	- / -
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2012	680	-	18	68	15	15	9	47	32/52
2015	580	-	0	100	0	35	0	0	41/61
2018	600	-	0	97	3	0	0	3	43/75
2023	800	100	8	88	5	0	0	5	- / -
Ericameria nauseosa ssp. nauseosa var. hololeuca^P -- (rubber rabbitbrush)									
2012	-	-	-	-	-	-	-	-	- / -
2015	20	-	0	100	0	0	0	0	62/102
2018	80	-	0	100	0	0	0	0	53/67
2023	20	-	0	100	0	0	0	0	- / -
Escobaria vivipara -- (spiny star)									
2012	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2012	40	-	100	0	0	0	0	0	20/13
2015	840	-	0	100	0	0	0	0	33/46
2018	900	-	4	91	4	0	0	2	20/31
2023	2300	3360	35	65	0	0	0	0	- / -
Juniperus osteosperma^t -- (Utah juniper)									
2012	160	220	50	50	0	0	0	0	- / -
2015	-	40	0	0	0	0	0	0	- / -
2018	40	-	100	0	0	0	0	0	- / -
2023	100	40	100	0	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2012	-	-	-	-	-	-	-	-	10/23
2015	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	9/17
2023	-	-	-	-	-	-	-	-	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2012	-	-	-	-	-	-	-	-	7/5
2015	-	-	-	-	-	-	-	-	- / -
2018	20	-	0	100	0	0	100	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
Pinus edulis^t -- (two needle pinyon)									
2012	440	80	50	50	0	0	0	0	- / -
2015	-	320	0	0	0	0	0	0	- / -
2018	120	120	100	0	0	0	0	17	- / -
2023	260	20	92	8	0	0	0	0	- / -
Purshia tridentata^P -- (antelope bitterbrush)									
2012	360	-	6	50	44	22	6	28	71/108
2015	300	-	27	73	0	13	47	7	34/75
2018	500	-	20	80	0	28	60	16	32/60
2023	620	-	26	74	0	0	77	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 (%)				
Tetradymia canescens -- (spineless horsebrush)									
2012	20	-	0	100	0	0	0	0	20/17
2015	40	-	0	100	0	0	0	0	37/39
2018	20	-	0	0	100	0	0	100	70/94
2023	20	-	0	100	0	0	0	0	- / -

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

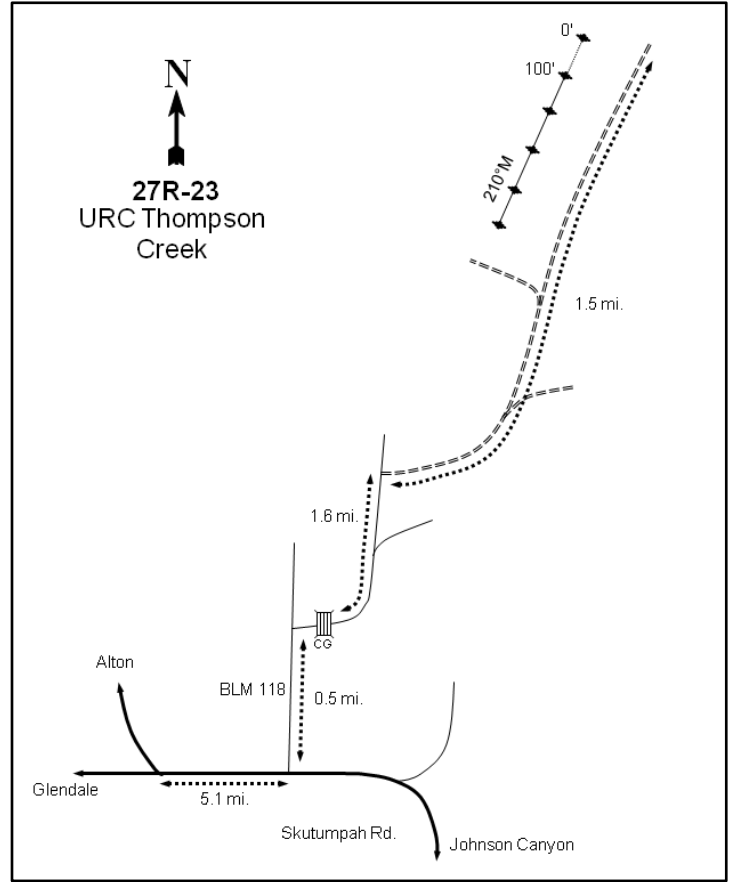
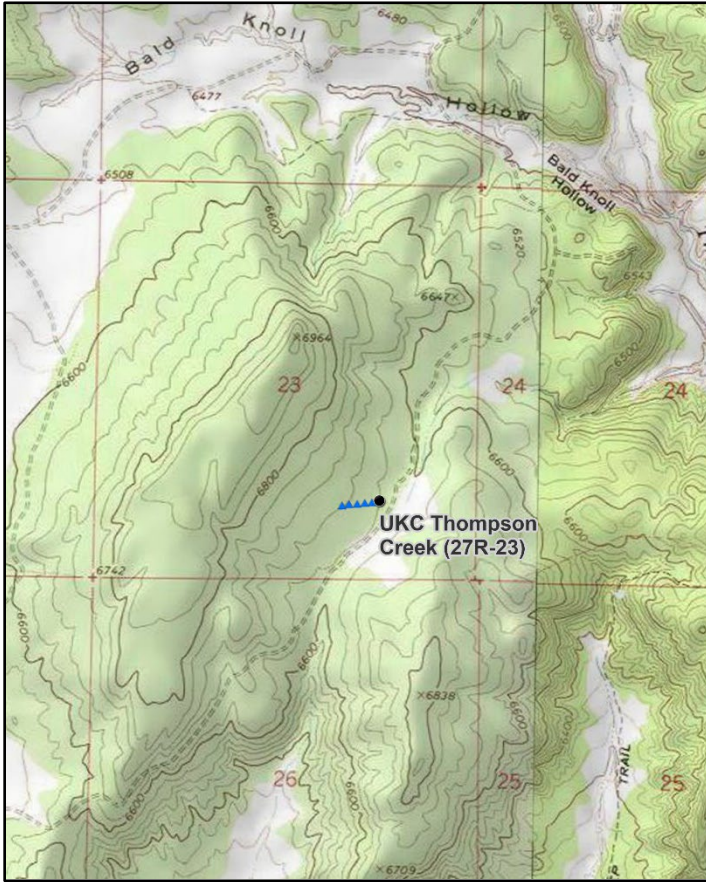
Table 24R-11.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	116	12	35	18	-	35	14.1
2015	27	62	31	-	-	8	5.0
2018	32	19	75	-	-	6	5.9
2023	36	6	88	-	-	6	7.9
Pinus edulis (twoneedle pinyon)							
2012	229	10	15	15	20	40	17.1
2015	60	100	-	-	-	-	1.2
2018	68	82	18	-	-	-	1.2
2023	86	53	47	-	-	-	1.5

Table 24R-11.15 - 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	11.7	4.8	3.3	3.8	0.0	0.2	0.0	23.7	Very Poor
2015	8.9	15.0	2.5	28.4	0.0	4.6	0.0	59.3	Fair
2018	9.2	14.3	2.4	30.0	0.0	0.9	0.0	56.7	Fair
2023	20.5	13.7	8.6	30.0	0.0	0.9	0.0	73.7	Good

UKC THOMPSON CREEK - STUDY NO. 27R-23



Location Information

USGS 7.5 min Map Info Bald Knoll NE; Township 40S, Range 5W, Section 23
 GPS (0' Stake) NAD 83 UTM ZONE 12, 377461 East 4130640 North

Transect Information

Browse Tag # (0' Stake) Not Available
 Transect Bearing 261° magnetic
 Length 500ft
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
 Belt Marker Placement No Rebar

Directions to Site

Drive east from the Glendale/Alton junction for 5.1 miles on Skutumpah Road. Turn left (north) onto BLM road #118 and drive for 0.5 miles. Turn left, crossing a cattleguard, and proceed for 1.6 miles. Turn right and continue for another 1.5 miles. The study will be on the left (west) side of the road.

Site Information

Land Ownership Federal
 Land Administrator BLM
 Allotment BALD KNOLL
 Elevation 6,672ft (2,034m)
 Aspect East
 Slope 6-8%
 Sample Dates 08/08/2013, 08/23/2016, 07/13/2023

Table 27R-23.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	UKC Thompson Creek	2701	January 2015	959
Chaining - Two-Way Ely	UKC Thompson Creek	2701	September-November 2014	959
Seeding - Aerial Before	UKC Thompson Creek	2701	September 2014	959

Table 27R-23.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Thompson Creek			Aerial	Sep 2014	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Paloma	0.30	0.26
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.70	1.63
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest II	1.50	1.29
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	1.50	1.23
G	<i>Poa secunda</i>	Sandberg Bluegrass	UP Colorado Plateau	0.50	0.41
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky	0.50	0.42
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		1.50	0.87
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.00	0.97
F	<i>Linum perenne</i>	Blue Flax	Appar	0.17	0.16
F	<i>Linum perenne</i>	Blue Flax	Appar	0.82	0.76
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.00	0.92
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon UT	0.22	0.17
F	<i>Penstemon palmeri</i>	Palmer Penstemon	White Pine NV	0.03	0.02
F	<i>Sanguisorba minor</i>	Small Burnet		1.50	1.36
F	<i>Trifolium hybridum</i>	Alsike Clover		0.04	0.04
F	<i>Trifolium hybridum</i>	Alsike Clover		0.05	0.04
F	<i>Trifolium hybridum</i>	Alsike Clover		0.25	0.23
F	<i>Trifolium hybridum</i>	Alsike Clover		0.66	0.64

Mix Name			Application Type	Application Date	Acres
Thompson Creek Kochia			Aerial	Jan 2015	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Medicago sativa</i>	Alfalfa	Ladak+	2.00	1.86
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	0.50	0.37

Wildlife Habitat and Vegetation History**Table 27R-23.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 27R-23.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Pinyon-Juniper	Phase III
2016	Gambel Oak/Perennial Grass-Forb	Phase I
2023	Perennial Grass-Forb/Gambel Oak	Phase I

Site Notes

The transect bearing was rotated in 2016 so that the site falls within and samples the treatment area.

Site Potential

1981 - 2010 Average Annual Precipitation 15 inches
 NRCS Ecological Site Mountain Loam (Oak)
 NRCS Ecological Site # R047XB432UT
 States and Transitions No state and transition model is available for this ecological site.

When this study was established in 2013, the site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with Gambel oak (*Quercus gambelii*) present to a lesser extent. Most of the tree cover was removed by a chaining and seeding treatment, and in 2016 and 2023 Gambel oak was dominant with forage kochia (*Bassia prostrata*) as a subordinate species (Table 27R-23.12). The herbaceous understory was initially sparse, but cover had increased as of 2016; seeded perennial grasses and

forbs have been codominant site components in both post-treatment sample years (Table 27R-23.7, Table 27R-23.10, Table 27R-23.11). Although most trees were removed during treatment, juniper and pinyon have remained on site in low amounts, indicating that infilling could occur in the future (Table 27R-23.12, Table 27R-23.14).

Due to the diversity and abundance of the shrub and herbaceous components, this site likely serves as adequate habitat for summering mule deer. Pellet transect data shows that deer presence was low and that elk pellet groups were not observed in 2023 (Table 27R-23.9). However, the diverse and abundant herbaceous understory on this site could serve as foraging range for elk during the summer months (Table 27R-23.3; Beck & Peek, 2005).

Trend Summary Tables

Table 27R-23.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	1.9	-	4.8	3.0	-	27.6
2016	7.5	-	0.6	12.7	-	2.7
2023	15.3	0.1	0.5	16.7	0.2	0.4

Table 27R-23.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	1	-	45	-	0.0	-	0.2
2016	-	192	50	186	-	10.1	1.1	12.1
2023	-	252	6	109	-	22.2	0.3	16.2

Table 27R-23.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	46.7	0.3	46.7	1.4	1.5	7.1
2016	26.6	0.1	42.7	6.5	5.2	29.5
2023	12.0	-	51.4	2.2	3.6	49.6

Table 27R-23.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2013	-	1	1	-	11
2016	-	10	8	-	6
2023	-	6	-	-	5
Year	Days Use Per Acre (ha)				
2013	-	-	2.0 (5.0)	-	-
2016	-	20.8 (51.3)	10.7 (26.5)	-	-
2023	3.6 (9.0)	6.0 (14.9)	-	0.6 (1.4)	-

Table 27R-23.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)	unknown perennial grass (unknown grass)
year	Nested Frequency								
2013	-	-	-	-	1	-	-	-	-
2016	66	71	4	0	2	8	4	104	2
2023	6	88	-	-	8	10	25	192	-
year	Average Cover (%)								
2013	-	-	-	-	0.0	-	-	-	-
2016	2.2	2.7	0.0	0.0	0.0	0.5	0.3	4.3	0.1
2023	0.2	5.6	-	-	0.5	1.2	2.7	12.1	-

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

Table 27R-23.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcross)	Astragalus cibarius (browse milkvetch)	Astragalus cicer ⁱ (chickpea milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Comandra umbellata (bastard toadflax)	Cordylanthus kingii ^a (King's bird's-beak)	Dalea searlsiae (Searl's prairie clover)	Descurainia pinnata ^a (western tansymustard)	Eriogonum alatum (winged buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Hymenopappus filifolius (finleaf hymenopappus)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)
year	Nested Frequency																
2013	12	-	-	-	-	-	-	-	1	-	10	7	-	5	-	-	6
2016	4	22	21	3	1	5	2	16	8	7	10	-	2	8	28	30	-
2023	-	-	7	3	-	4	-	2	3	3	3	-	-	-	1	2	-
year	Average Cover (%)																
2013	0.0	-	-	-	-	-	-	-	0.0	-	0.1	0.0	-	0.0	-	-	0.0
2016	0.0	1.5	0.7	0.1	0.0	0.1	0.0	0.6	0.4	0.0	0.7	-	0.0	0.1	0.5	1.3	-
2023	-	-	0.7	0.4	-	0.0	-	0.2	0.3	0.2	0.1	-	-	-	0.0	0.0	-

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

FORB SPECIES	Medicago sativa ^a (alfalfa)	Packera multilobata (lobeleaf groundsel)	Penstemon caespitosus (mat penstemon)	Penstemon leonardii (Leonard's beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{at} (tall tumblemustard)	Sphaeralcea parvifolia (smallflower globemallow)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency									
2013	-	-	4	2	-	-	-	-	-	-
2016	112	2	-	11	3	3	17	-	2	-
2023	93	-	-	-	-	-	-	0	-	4
year	Average Cover (%)									
2013	-	-	0.0	0.0	-	-	-	-	-	-
2016	5.8	0.0	-	0.7	0.0	0.0	0.6	-	0.0	-
2023	14.6	-	-	-	-	-	-	0.0	-	0.0

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

Table 27R-23.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Bassia prostrata ^{pi} (forage kochia)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma ^t (Utah juniper)	Pinus edulis ^t (twoneedle pinyon)	Quercus gambelii ^p (Gambel oak)
year	Line Intercept Cover (%)					
2013	-	-	-	12.3	15.3	3
2016	-	2.1	-	2.6	0.1	10.6
2023	-	7.8	0.2	0.3	0.1	8.9
year	Quadrat Cover (%)					
2013	0.0	-	-	1.2	3.6	1.9
2016	-	1.2	-	0.6	0.0	6.3
2023	-	7.1	0.1	0.5	0.0	8.2

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

Table 27R-23.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2013	40	-	100	0	0	0	0	0	37/46
2016	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Bassia prostrata^{pi} -- (forage kochia)									
2013	-	-	-	-	-	-	-	-	-/-
2016	4160	620	46	54	0	21	3	0	16/29
2023	4360	2400	0	99	1	0	0	1	-/-

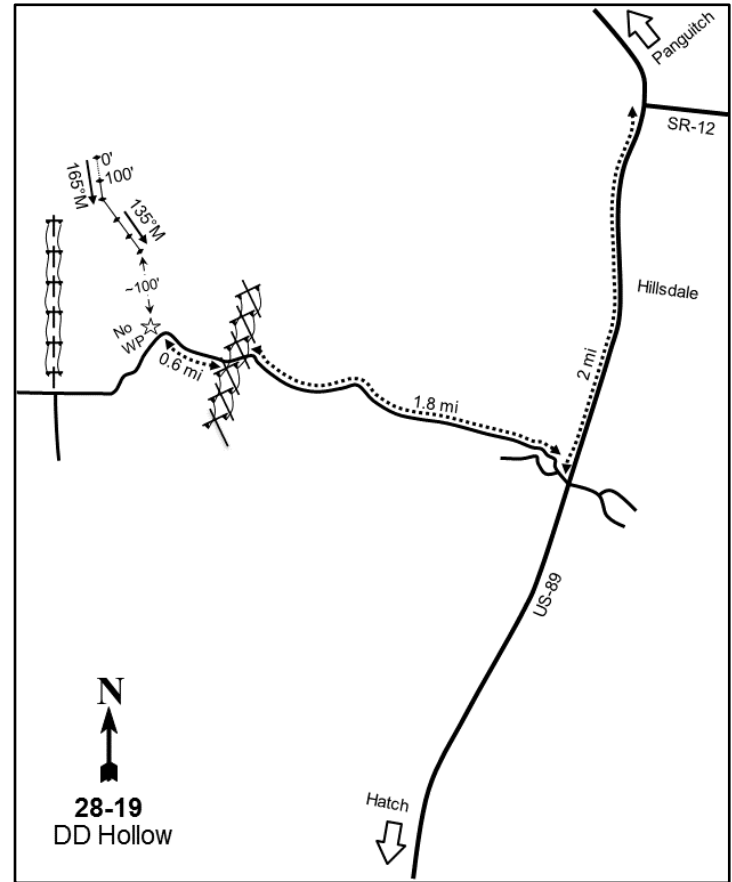
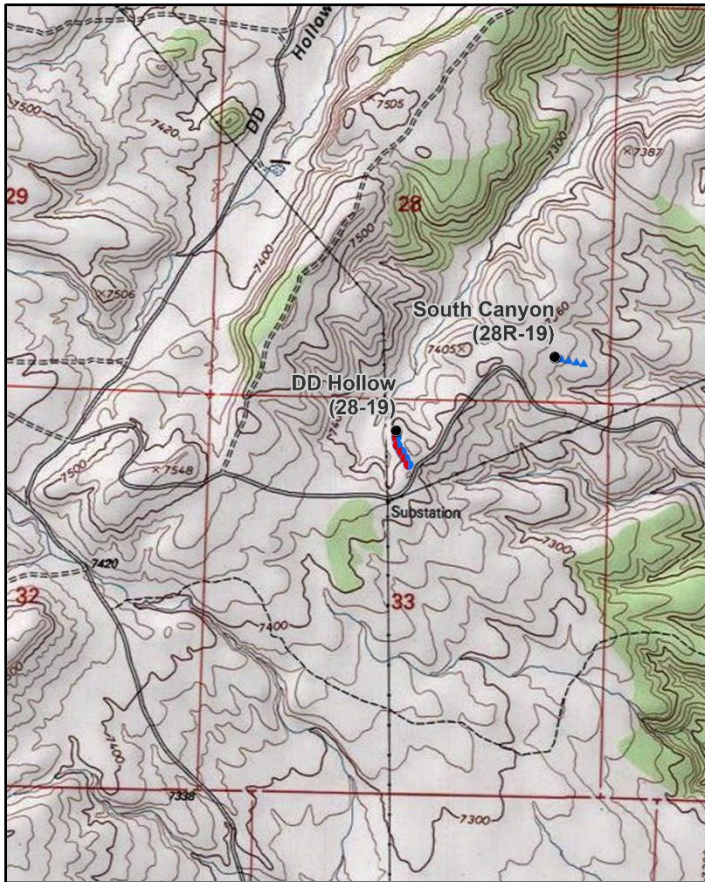
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	66/65
2023	20	-	0	100	0	0	0	0	-/-
Juniperus osteospermaⁱ -- (Utah juniper)									
2013	240	-	8	92	0	0	0	33	-/-
2016	-	160	0	0	0	0	0	0	-/-
2023	80	40	75	25	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2013	20	20	0	100	0	0	0	0	9/40
2016	-	-	-	-	-	-	-	-	9/39
2023	-	-	-	-	-	-	-	-	-/-
Pinus edulis^t -- (twoneedle pinyon)									
2013	240	220	50	50	0	0	0	8	-/-
2016	40	20	100	0	0	0	0	50	-/-
2023	20	-	0	100	0	0	0	0	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
2013	-	-	-	-	-	-	-	-	76/161
2016	20	-	0	100	0	0	0	0	47/91
2023	-	-	-	-	-	-	-	-	-/-
Quercus gambelii^p -- (Gambel oak)									
2013	1080	20	70	26	4	0	0	0	111/37
2016	2720	-	41	59	0	19	2	2	71/71
2023	3160	20	17	80	3	0	0	3	-/-

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

Table 27R-23.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	504	5	20	25	15	35	20.8
2016	68	13	69	19	-	-	14.8
2023	18	38	25	38	-	-	5.3
Pinus edulis (twoneedle pinyon)							
2013	688	65	-	10	-	25	8.9
2016	22	13	75	-	13	-	3.4
2023	2	-	100	-	-	-	3.0

DD HOLLOW - STUDY NO. 28-19

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Hatch NE; Township 35S, Range 5W, Section 33
NAD 83 UTM ZONE 12, 374402 East 4176769 North

Transect Information

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

163
165° magnetic (Lines 3-5: 135° magnetic)
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Standard

Directions to Site

From the turnoff to Red Canyon, drive 2 miles south towards Hatch. Turn right, going west on road #730, then drive 1.8 miles to a road and powerlines. Continue on the same road for another 0.6 miles. The 0-foot stake is on the northwest side of the road and is marked with browse tag #163.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SOUTH CANYON
Elevation	7,400ft (2,256m)
Aspect	Southwest
Slope	7-10%
Sample Dates	07/23/2003, 07/12/2011, 08/13/2014, 08/14/2018, 08/22/2023

Table 28-19.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	2022 Cedar City and Kanab Field Offices BLM Maintenance (Proposed)	5888	Fall 2023	805
Mechanical - Bullhog	BLM Project	BLM	Fall 2003	765
Seeding - Seed Unknown	BLM Project	BLM	Fall 2003	765
Mechanical - Bullhog	BLM	-	2012	-

Wildlife Habitat and Vegetation History**Table 28-19.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 28-19.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2003	Pinyon	Phase II
2011	Black Sagebrush	Phase I
2014	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I
2023	Black Sagebrush	Phase I

Site Notes

The study was established to monitor the effects of a prescribed fire project. In the fall of 2003, a total of 765 acres were bullhogged to protect the substation and other buildings around the project location and to help facilitate the South Canyon burn. The bullhog project consisted of two separate treatment polygon units: the northern unit (601 acres) was seeded while the southern unit (164 acres) was not. The study was located within the southern unit, although the transect appears to have been seeded based on the plant species sampled on site. The seed used on this project was surplus seed that the BLM contributed, and it is unknown what seed mixture was used. The area is important winter range for deer, and to a lesser extent elk, and pronghorn antelope use the surrounding open areas year-round.

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Gravelly Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB306UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2003, this site was in Phase II of woodland succession and being encroached by twoneedle pinyon (*Pinus edulis*); Utah juniper (*Juniperus osteosperma*) and Rocky Mountain juniper (*J. scopulorum*) were also present, but with much lower densities (Table 28-19.4, Table 28-19.14). The dominant browse species during this sample year was black sagebrush (*Artemisia nova*) with antelope bitterbrush (*Purshia tridentata*) contributing less cover. The herbaceous understory was very sparse, and what little cover there was was mainly provided by perennial grasses (Table 28-19.7). Tree cover and density decreased substantially following a bullhog treatment in 2003; a few large trees remained scattered across the site, but were removed in 2012 (Table 28-19.1). Smaller trees have been observed in point-quarter density since 2014, however, indicating that infilling may occur over time (Table 28-19.12, Table 28-19.14). Black sagebrush has become the dominant browse species following these tree-removing treatments. Although cover of black sagebrush was similar between 2018 and 2023, density had decreased considerably as of the most recent sample year (Table 28-19.12, Table 28-19.13). Perennial grasses increased in cover and diversity, but the cover of perennial forbs has shown a marginally decreasing trend (Table 28-19.10, Table 28-19.11).

Deer winter range has remained in good to excellent condition since the time of tree removal. This excellent condition can be attributed to diversified age classes within the black sagebrush and antelope bitterbrush populations, and the continued abundance of the herbaceous community (Table 28-19.15). Despite the excellent condition, pellet transect data indicates that deer presence has remained low since 2011 (Table 28-19.9).

Trend Summary Tables

Table 28-19.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2003	8.4	-	23.3	7.3	-	38.5
2011	15.3	1.8	1.4	20.3	0.6	5.6
2014	15.2	1.2	-	20.7	1.9	-
2018	20.3	1.3	-	28.0	0.7	-
2023	19.0	2.2	0.0	26.1	1.0	0.5

Table 28-19.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2003	-	49	20	-	-	0.6	0.1	-
2011	4	191	242	59	0.0	6.0	2.0	1.0
2014	-	266	24	72	-	13.1	0.5	0.8
2018	-	267	-	46	-	13.4	-	0.5
2023	5	315	38	45	0.4	17.8	0.4	0.6

Table 28-19.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2003	14.9	0.8	55.3	15.5	8.4	31.7
2011	11.0	0.0	55.2	9.5	7.2	24.8
2014	7.0	-	47.9	16.2	9.4	32.7
2018	10.9	0.0	50.1	14.3	9.6	33.1
2023	11.4	0.0	37.6	16.9	8.7	35.9

Table 28-19.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2003	2	9	1	20
2011	3	7	-	10
2014	1	1	1	15
2018	2	3	-	32
2023	2	4	1	3
Year	Days Use Per Acre (ha)			
2003	-	21.5 (53.0)	-	-
2011	4.4 (10.8)	8.7 (21.5)	-	-
2014	3.6 (9.0)	6.7 (16.6)	0.7 (1.7)	-
2018	2.2 (5.4)	9.4 (23.2)	-	-
2023	9.4 (23.3)	3.4 (8.3)	-	-

Table 28-19.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achmatherum hymenoides (Indian ricegrass)	Achmatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Carex duriuscula (needleleaf sedge)	Carex obtusata (obtuse sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency																
2003	-	7	-	29	-	-	-	-	10	-	-	-	-	-	-	3	-
2011	11	-	11	62	4	-	29	1	103	-	12	-	-	1	-	3	-
2014	21	-	38	87	-	-	19	2	130	0	12	-	6	3	5	13	-
2018	28	12	18	128	-	42	-	-	69	10	-	-	12	19	19	1	-
2023	24	8	26	111	5	56	-	-	131	5	11	10	-	10	10	-	28
year	Average Cover (%)																
2003	-	0.0	-	0.5	-	-	-	-	0.1	-	-	-	-	-	-	0.0	-
2011	0.6	-	0.4	2.0	0.0	-	0.3	0.0	2.2	-	0.4	-	-	0.0	-	0.0	-
2014	1.4	-	0.6	2.3	-	-	1.1	0.2	5.7	0.0	0.8	-	0.4	0.0	0.2	0.2	-
2018	1.7	0.2	0.6	4.8	-	2.1	-	-	1.6	0.0	-	-	1.5	0.8	0.1	0.0	-
2023	1.8	0.2	0.8	3.6	0.4	3.5	-	-	4.1	0.2	0.4	0.5	-	0.5	0.5	-	1.8

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

Table 28-19.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis holboellii ^a (Holboell's rockcress)	Astragalus argophyllus (silverleaf milkvetch)	Carduus nutans ^{ai} (nodding plumeless thistle)	Chamaesyce (sandmat)	Chenopodium atrovirens ^a (pinyon goosefoot)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cirsium vulgare ^{ai} (bull thistle)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Hymenopappus filifolius (finleaf hymenopappus)	Lactuca serriola ^{ai} (prickly lettuce)
year	Nested Frequency																
2003	-	4	-	-	-	-	-	-	-	-	15	-	-	3	-	-	-
2011	3	4	5	1	-	-	62	8	4	12	37	117	3	160	-	3	3
2014	-	-	2	-	-	-	-	3	-	2	4	4	-	-	0	0	-
2018	-	-	1	-	4	-	-	-	-	4	-	-	-	-	-	7	-
2023	-	-	-	-	-	3	-	-	-	3	8	-	-	11	-	-	-
year	Average Cover (%)																
2003	-	0.0	-	-	-	-	-	-	-	-	0.1	-	-	0.0	-	-	-
2011	0.0	0.0	0.0	0.0	-	-	0.3	0.0	0.0	0.0	0.2	0.3	0.0	0.7	-	0.0	0.0
2014	-	-	0.1	-	-	-	-	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0	-
2018	-	-	0.0	-	0.0	-	-	-	-	0.0	-	-	-	-	-	0.1	-
2023	-	-	-	-	-	0.0	-	-	-	0.0	0.1	-	-	0.0	-	-	-

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

FORB SPECIES	Lappula occidentalis ^a (flatspine stickseed)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah birds-foot trefoil)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ¹ (alfalfa)	Packera multilobata (lobeleaf groundsel)	Phlox longifolia (longleaf phlox)	Pleiactanthus spinosus (thorn skeletonweed)	Polygonum douglasii ^a (Douglas' knotweed)	Salsola tragus ^{at} (prickly Russian thistle)	Sanguisorba minor ¹ (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Verbascum thapsus ^{at} (common mullein)
year	Nested Frequency												
2003	1	-	-	-	-	-	-	-	-	-	-	-	-
2011	27	4	5	1	10	-	15	5	4	3	2	5	1
2014	5	35	-	-	3	1	7	2	-	-	16	16	8
2018	-	-	-	-	-	1	-	4	-	-	5	25	-
2023	17	-	-	-	-	1	-	-	-	-	-	41	6
year	Average Cover (%)												
2003	0.0	-	-	-	-	-	-	-	-	-	-	-	-
2011	0.2	0.0	0.2	0.0	0.4	-	0.1	0.2	0.0	0.0	0.0	0.1	0.1
2014	0.2	0.2	-	-	0.0	0.0	0.1	0.1	-	-	0.2	0.1	0.3
2018	-	-	-	-	-	0.0	-	0.3	-	-	0.0	0.1	-
2023	0.2	-	-	-	-	0.0	-	-	-	-	-	0.6	0.1

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

Table 28-19.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ¹ (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)								
2003	4.5	-	-	-	-	-	-	38.5	2.8
2011	12.9	2.2	-	0.5	-	-	0.1	5.6	5.2
2014	12	2.1	-	1.6	0.3	-	-	-	6.6
2018	19.1	1.6	-	0.5	0.2	-	-	-	7.3
2023	18.4	1.3	-	-	1	-	-	0.5	6.4
year	Quadrat Cover (%)								
2003	5.6	-	-	-	-	0.0	-	23.3	2.8
2011	10.3	1.3	-	1.8	0.0	-	0.0	1.4	3.7
2014	9.0	1.1	-	1.0	0.2	-	0.0	-	5.1
2018	13.9	1.4	0.0	1.1	0.1	-	0.0	-	5.0
2023	13.7	0.9	-	0.4	1.8	-	0.0	0.0	4.4

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

Table 28-19.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^P -- (black sagebrush)									
2003	3380	-	9	46	45	22	1	17	36/56
2011	12460	16240	77	22	1	2	0	3	34/62
2014	10780	2120	46	53	1	60	23	2	33/67
2018	16500	880	36	64	1	5	4	3	24/47
2023	9800	-	26	64	10	1	4	10	- / -
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2003	-	-	-	-	-	-	-	-	-/-
2011	100	60	0	80	20	0	0	20	66/101
2014	1100	-	38	60	2	78	20	2	42/80
2018	1100	-	20	80	0	16	0	14	51/82
2023	180	-	22	78	0	0	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2003	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	48/96
2014	-	-	-	-	-	-	-	-	58/117
2018	-	-	-	-	-	-	-	-	26/27
2023	20	-	0	0	100	0	0	100	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2003	-	-	-	-	-	-	-	-	-/-
2011	1320	1000	68	32	0	0	0	2	56/71
2014	1140	-	30	63	7	11	4	14	61/74
2018	800	-	3	57	40	23	18	63	54/60
2023	300	-	0	60	40	0	0	40	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2003	-	-	-	-	-	-	-	-	-/-
2011	80	400	0	100	0	0	0	0	26/29
2014	400	60	0	100	0	0	0	0	32/28
2018	580	20	0	97	3	0	0	3	13/9
2023	4320	-	60	40	0	0	0	0	- / -
Juniperus osteosperma¹ -- (Utah juniper)									
2003	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	20	-	100	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	- / -
Juniperus scopulorum¹ -- (Rocky Mountain juniper)									
2003	-	-	-	-	-	-	-	-	-/-
2011	-	20	0	0	0	0	0	0	- / -
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	- / -
Opuntia -- (pricklypear)									
2003	60	-	0	100	0	0	0	0	13/29
2011	40	-	0	100	0	0	0	0	11/23
2014	60	-	0	100	0	0	0	0	9/30
2018	20	-	0	100	0	0	0	0	12/20
2023	80	-	75	25	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pinus edulis^t -- (twoneedle pinyon)									
2003	680	-	24	77	0	3	0	0	- / -
2011	60	80	67	0	33	0	0	0	- / -
2014	-	20	0	0	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	- / -
2023	20	-	100	0	0	0	0	0	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2003	360	-	6	61	33	61	22	6	79/130
2011	420	-	14	81	5	33	24	0	50/115
2014	500	20	28	72	0	48	24	0	63/123
2018	980	-	25	76	0	31	14	0	62/121
2023	720	140	22	53	25	3	61	44	- / -
Ribes^p -- (currant)									
2003	-	-	-	-	-	-	-	-	90/145
2011	-	-	-	-	-	-	-	-	85/193

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

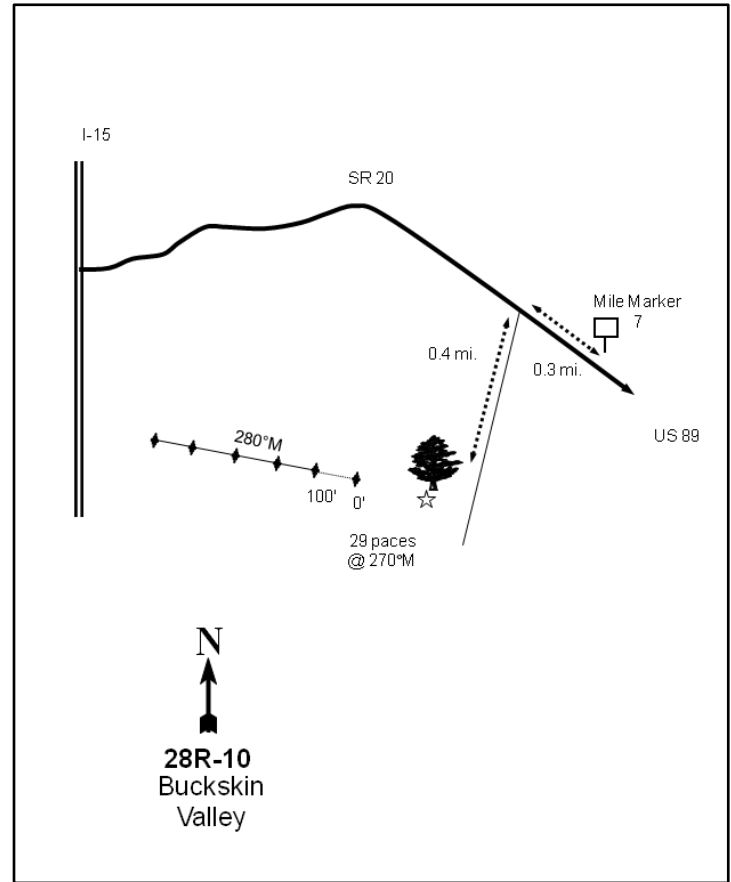
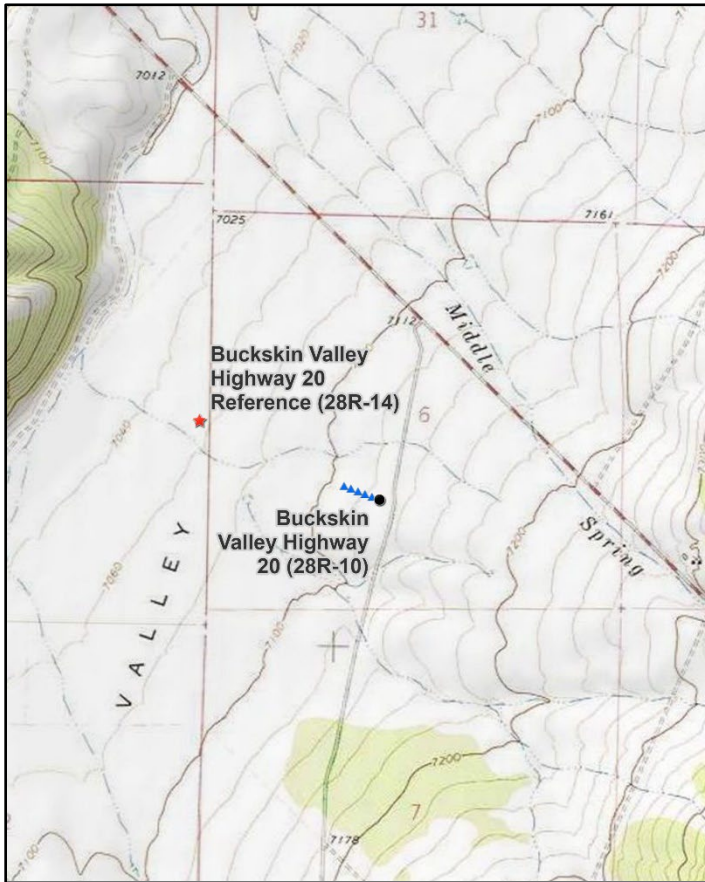
Table 28-19.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2003	8	-	-	100	-	-	13.0
2014	7	-	100	-	-	-	4.0
Juniperus scopulorum (Rocky Mountain juniper)							
2011	14	33	33	-	-	33	6.0
2014	3	-	100	-	-	-	3.0
2018	10	-	80	20	-	-	4.0
2023	16	17	17	67	-	-	7.3
Pinus edulis (twoneedle pinyon)							
2003	298	-	26	26	32	16	13.8
2011	22	20	40	7	-	33	16.0
2014	7	17	50	33	-	-	4.7
2018	16	-	82	18	-	-	4.6
2023	14	-	22	78	-	-	8.0

Table 28-19.15 - 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
2003	9.8	2.8	3.8	1.1	0.0	0.0	0.0	17.6	Very Poor
2011	26.7	13.8	15.0	11.9	0.0	2.0	-2.0	67.4	Good
2014	27.5	14.8	15.0	26.2	0.0	1.6	0.0	85.1	Excellent
2018	30.0	14.9	15.0	26.9	0.0	1.0	0.0	87.8	Excellent
2023	30.0	11.0	12.3	30.0	-0.3	1.2	0.0	84.2	Excellent

BUCKSKIN VALLEY HIGHWAY 20 - STUDY NO. 28R-10

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Burnt Peak SW; Township 32S, Range 6W, Section 06
NAD 83 UTM ZONE 12, 361181 East 4212201 North

Transect Information

Browse Tag # (0' Stake)	74
Transect Bearing	280° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

Drive north on US-89 from Panguitch to the junction of SR-20. Turn left (west) on SR-20 and drive to mile marker 7. Continue west for 0.3 miles to a dirt road on the left (south). Turn left and drive for 0.4 miles to the only big juniper on the right (west) side of the road. From the big juniper, walk 29 paces at 270 degrees magnetic to the 0-foot stake which is marked with browse tag #74.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	FREMONT
Elevation	7,125ft (2,172m)
Aspect	West
Slope	4%
Sample Dates	07/13/2005, 06/10/2008, 06/24/2009, 06/04/2013, 08/01/2017, 06/28/2023

Table 28R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Seeding Unknown	Middle Buckskin Seeding	-	Historic	-
Harrow - Two-Way Dixie	Buckskin Valley Hwy 20	242	September 2005	270
Seeding - Broadcast Before	Buckskin Valley Hwy 20	242	September 2005	270

Table 28R-10.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Buckskin Highway 20			Broadcast	Sep 2005	270
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.48	1.33
G	Bouteloua gracilis	Blue Grama	Alma	0.74	0.31
G	Elymus elymoides	Bottlebrush Squirreltail		0.19	0.12
G	Elymus elymoides	Bottlebrush Squirreltail		0.37	0.31
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.74	0.56
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.19	0.16
G	Pascopyrum smithii	Western Wheatgrass	Rosana	0.56	0.48
G	Pleuraphis jamesii	Galleta		0.52	0.30
G	Poa secunda	Sandberg Bluegrass		0.37	0.28
G	Poa secunda	Canby Bluegrass	Canbar	0.37	0.30
G	Sporobolus cryptandrus	Sand Dropseed		0.19	0.18
F	Achillea millefolium	Western Yarrow		0.11	0.10
F	Linum perenne	Blue Flax	Appar	0.93	0.81
F	Medicago sativa	Alfalfa	Ladak	0.74	0.68
F	Onobrychis viciifolia	Sainfoin	Eski	1.85	1.47
F	Penstemon palmeri	Palmer Penstemon	Washington UT	0.19	0.15
F	Penstemon strictus	Rocky Mtn. Penstemon		0.19	0.00
F	Sanguisorba minor	Small Burnet		0.56	0.00
F	Sanguisorba minor	Small Burnet	Delar	0.37	0.35
S	Atriplex canescens	Winterfat	Duchesne UT	0.46	0.18

Wildlife Habitat and Vegetation History**Table 28R-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	substantial	winter
Greater Sage-Grouse		undefined & undefined

Table 28R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Mountain Big Sagebrush/Perennial Grass	Phase I
2008	Mountain Big Sagebrush/Perennial Grass	Phase I
2009	Mountain Big Sagebrush/Perennial Grass	Phase I
2013	Mountain Big Sagebrush/Perennial Grass	Phase I
2017	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2023	Mountain Big Sagebrush	No Encroachment

Site Notes

Several sage-grouse pellet groups were observed on site in 2017 and 2023, but were only recorded in pellet group data in 2023.

Soils**Table 28R-10.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.9	47.1	31.1	21.8	2.2	11.3	131.2	0.6	07/13/2005

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2005, this site has existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated plant community; perennial grass has been a codominant vegetation component since 2008 (Table 28R-10.7). Sagebrush cover initially decreased after treatment (Table 28R-10.1), but has steadily increased over the sample years, and post-treatment age class distribution has diversified (Table 28R-10.12, Table 28R-10.13). The herbaceous understory has been primarily composed of the perennial grass species crested wheatgrass (*Agropyron cristatum*) with a diverse forb assemblage that has remained low in cover (Table 28R-10.10, Table 28R-10.11).

Deer winter range condition on this site has ranged between poor and excellent since study establishment, and was considered to be good to excellent in 2023. Further improvements could be accomplished mainly through efforts that encourage increased cover of preferred browse (Table 28R-10.15). Pellet groups for deer and elk were not observed in 2023 (Table 28R-10.9). However, the sagebrush component of this site could provide browse for elk during the winter months (Table 28R-10.3; Wambolt, 1996).

Trend Summary Tables**Table 28R-10.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	18.2	0.1	-	20.5	0.1	-
2008	5.2	0.0	-	3.3	-	-
2009	5.8	0.0	-	3.9	-	-
2013	8.2	0.3	-	6.1	-	-
2017	3.3	0.3	-	5.9	0.6	-
2023	8.4	0.8	-	11.2	0.3	-

Table 28R-10.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	-	352	29	188	-	14.9	0.1	1.5
2008	-	353	23	253	-	22.1	0.1	2.6
2009	-	362	39	174	-	17.3	0.2	2.5
2013	2	393	-	233	0.0	32.6	-	3.3
2017	1	373	71	239	0.0	25.2	0.3	4.5
2023	0	354	56	200	0.0	27.5	0.2	4.2

Table 28R-10.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	39.8	0.6	18.9	22.0	1.1	31.0
2008	33.0	-	32.0	13.9	4.1	26.5
2009	40.6	0.0	24.3	9.5	2.8	24.7
2013	25.7	-	30.6	11.7	2.7	46.5
2017	28.6	-	27.7	18.5	4.1	35.5
2023	19.1	-	17.4	28.4	5.2	37.2

Table 28R-10.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2005	6	2	-	-	46
2008	5	7	1	-	89
2009	9	10	-	-	65
2013	1	1	-	4	9
2017	5	2	2	1	52
2023	7	1	-	-	6
Year	Days Use Per Acre (ha)				
2005	36.3 (89.7)	0.7 (1.7)	-	-	-
2008	29.0 (71.7)	-	-	-	-
2009	14.5 (35.9)	36.8 (91.0)	-	-	-
2013	11.6 (28.7)	0.7 (1.7)	-	-	-
2017	10.9 (26.9)	8.7 (21.5)	2.0 (5.0)	-	-
2023	-	-	-	26.2 (64.6)*	-

*Pellets per acre (ha)

Table 28R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Sporobolus eryptandrus (sand dropseed)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2005	-	350	6	-	-	-	-	-	-	-
2008	2	353	3	-	2	-	6	3	-	-
2009	-	361	2	-	-	-	-	2	2	-
2013	-	391	3	2	-	-	-	8	1	-
2017	-	373	4	1	-	-	-	-	-	-
2023	6	354	2	0	-	1	-	-	-	3
year	Average Cover (%)									
2005	-	14.9	0.1	-	-	-	-	-	-	-
2008	0.0	22.1	0.0	-	0.0	-	0.0	0.0	-	-
2009	-	17.2	0.1	-	-	-	-	0.0	0.0	-
2013	-	32.3	0.1	0.0	-	-	-	0.2	0.0	-
2017	-	25.2	0.1	0.0	-	-	-	-	-	-
2023	0.0	27.4	0.0	0.0	-	0.0	-	-	-	0.0

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

Table 28R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum desertorum ^{ai} (desert madwort)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Collinsia parviflora ^a (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Lomatium (desertparsley)
year	Nested Frequency																
2005	-	-	4	-	-	3	-	6	9	8	4	16	20	-	1	-	-
2008	5	-	0	2	4	1	-	-	3	35	-	24	7	-	5	83	-
2009	5	-	-	-	-	14	3	1	19	-	-	13	5	-	8	57	-
2013	1	-	5	3	-	-	-	-	13	49	1	9	-	14	-	2	-
2017	12	18	1	-	-	-	-	-	-	-	1	13	34	-	-	8	-
2023	2	34	2	-	6	-	-	-	13	16	-	19	7	-	8	2	19
year	Average Cover (%)																
2005	-	-	0.1	-	-	0.0	-	0.0	0.0	0.0	0.0	0.1	0.1	-	0.0	-	-
2008	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.2	-	0.1	0.0	-	0.0	0.6	-
2009	0.0	-	-	-	-	0.1	0.0	0.0	0.7	-	-	0.2	0.0	-	0.0	0.5	-
2013	0.0	-	0.1	0.0	-	-	-	-	0.1	0.4	0.0	0.1	-	0.1	-	0.0	-
2017	0.1	0.0	0.0	-	-	-	-	-	-	-	0.0	0.2	0.1	-	-	0.0	-
2023	0.0	0.1	0.0	-	0.0	-	-	-	0.1	0.1	-	0.3	0.0	-	0.0	0.0	0.3

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

FORB SPECIES	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^{ai} (slender phlox)	Onobrychis viciifolia ⁱ (sainfoin)	Penstemon palmeri (Palmer's penstemon)	Penstemon strictus (Rocky Mountain penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Taraxacum officinale (common dandelion)	Tragopogon dubius ^{ai} (yellow safsify)	Trifolium (clover)	unknown annual forb ^a (unknown forb)
year	Nested Frequency																
2005	11	8	-	-	-	-	-	80	8	-	-	96	-	-	-	8	-
2008	14	11	6	-	8	0	16	97	15	-	5	118	-	-	-	10	-
2009	-	14	2	-	-	-	2	-	-	3	-	104	3	-	1	5	8
2013	41	19	1	-	-	-	16	81	-	-	3	75	28	-	-	4	-
2017	43	14	2	-	-	8	3	-	27	-	27	160	5	6	-	-	-
2023	-	4	-	11	-	-	-	39	2	-	6	147	-	-	-	6	-
year	Average Cover (%)																
2005	0.0	0.2	-	-	-	-	-	0.3	0.0	-	-	0.7	-	-	-	0.0	-
2008	0.1	0.1	0.0	-	0.0	0.0	0.1	0.3	0.0	-	0.0	0.9	-	-	-	0.1	-
2009	-	0.2	0.0	-	-	-	0.0	-	-	0.0	-	0.9	0.0	-	0.0	0.0	0.0
2013	0.2	0.9	0.0	-	-	-	0.1	0.2	-	-	0.0	0.8	0.2	-	-	0.0	-
2017	1.2	0.8	0.0	-	-	0.1	0.0	-	0.2	-	0.5	1.5	0.1	0.0	-	-	-
2023	-	0.0	-	0.0	-	-	-	0.3	0.0	-	0.2	2.7	-	-	-	0.1	-

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

FORB SPECIES	
	Zigadenus paniculatus (foothill deathcamas)
year	Nested
2005	2
2008	1
2009	2
2013	1
2017	-
2023	-
year	Average Cover (%)
2005	0.0
2008	0.0
2009	0.0
2013	0.0
2017	-
2023	-

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

Table 28R-10.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)				
Gutierrezia sarothrae (broom snakeweed)				
Linarthus pungens (granite prickly phlox)				
Opuntia (pricklypear)				
year	Line Intercept Cover (%)			
2005	20.5	0.1	-	-
2008	3.3	-	-	-
2009	3.9	-	0	-
2013	6.1	-	-	-
2017	5.9	0.6	-	-
2023	11.2	0.3	-	-
year	Quadrat Cover (%)			
2005	18.2	0.1	0.0	-
2008	5.2	0.0	-	-
2009	5.8	0.0	0.0	-
2013	8.2	0.3	0.0	-
2017	3.3	0.3	-	0.0
2023	8.4	0.7	0.0	-

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

Table 28R-10.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2005	6640	20	6	74	20	22	39	8	53/71
2008	2180	140	13	40	47	3	0	76	33/40
2009	-	-	-	-	-	-	-	-	39/47
2013	3680	2040	35	61	3	20	0	8	46/62
2017	3140	80	54	42	5	20	10	3	40/60
2023	6380	-	43	54	3	3	4	1	- / -
Atriplex canescens^p -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	20	0	0	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2005	300	-	7	93	0	0	0	0	22/15
2008	60	-	0	67	33	0	33	0	9/12
2009	-	-	-	-	-	-	-	-	6/3
2013	220	-	18	82	0	9	0	18	17/18
2017	1000	-	4	96	0	0	0	0	20/28
2023	560	1320	46	54	0	0	0	0	- / -
Juniperus osteosperma^t -- (Utah juniper)									
2005	-	20	0	0	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
Linanthus pungens -- (granite prickly phlox)									
2005	20	-	0	100	0	0	0	0	11/8
2008	60	-	33	0	67	0	0	0	13/14
2009	-	-	-	-	-	-	-	-	4/10
2013	40	-	0	100	0	0	0	0	16/23
2017	20	-	0	100	0	0	0	0	16/34
2023	120	-	0	100	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2005	-	-	-	-	-	-	-	-	19/33
2008	-	-	-	-	-	-	-	-	8/21
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	20	0	0	0	0	0	0	9/28
2023	80	-	0	100	0	0	0	0	- / -

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

Table 28R-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	25.6	9.0	2.9	29.9	0.0	3.0	0.0	70.4	Good
2008	4.1	0.0	0.0	30.0	0.0	5.3	0.0	39.4	Poor
2009	4.9	0.0	0.0	30.0	0.0	5.0	0.0	39.8	Poor
2013	7.6	14.0	15.0	30.0	0.0	6.7	0.0	73.3	Good
2017	7.4	13.7	15.0	30.0	0.0	9.1	0.0	75.1	Good
2023	14.0	14.1	15.0	30.0	0.0	8.4	0.0	81.5	Good-Excellent

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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 ¹). No pinyon present.
PINYON	Pinyon	Major component of the site (Phase III ¹). No juniper present.
PJ	Pinyon-Juniper	Major components of the site (Phase III ¹). Pinyon and Juniper present.
POTR	Quaking Aspen	POTR provides the dominant overstory (typically >5% cover).
POTR-CE	Quaking Aspen-Conifer Encroached	Mixture of QUGA and Conifers (conifers typically provide >5% cover).
PIPO	Ponderosa Pine	PIPO provides the dominant overstory (typically >5% cover).
PSMEM	Douglas Fir	Major component of the site (typically >5% cover).
ABCO	White Fir	Major component of the site (typically >5% cover).
PIFL	Limber Pine	Major component of the site (typically >5% cover).
PICO	Lodgepole Pine	Major component of the site (typically >5% cover).
PILO	Bristlecone Pine	Major component of the site (typically >5% cover).
PIEN	Engelmann Spruce	Major component of the site (typically >5% cover).
ABLA	Subalpine Fir	Major component of the site (typically >5% cover).
SUBALP	Subalpine Forest	Mixture of PIEN and ABLA provide the dominant vegetation cover
MIX CON	Mixed Conifer Forest	Mixture of conifer tree species provide the dominant vegetation cover
AG-PAST	Agricultural-Pasture	Active or abandoned agricultural pasture
AG-CL	Agricultural-Cropland	Active or abandoned agricultural cropland

*Vegetation types can be co-dominant on the study site and when more than one vegetation community types are co-dominant and are major components of the site a (/) is used to separate vegetation community types.

¹Phase of woodland succession