2025 Range Trend Project Report

Utah Watershed Restoration Initiative Vegetation Monitoring

Utah's Big Game Range Trend Studies



Publication Number 26-13 | Federal Aid Project W-82-R-70

Prepared by the Utah Division of Wildlife Resources

Great Basin Research Center

UTAH DNR WILDLIFE RESOURCES

Utah Watershed Restoration Initiative Vegetation Monitoring 2025

Written and Edited by

Jason Lane
Jason Cox
Ciaran Payne

Tables prepared by

Jason Cox
Jason Lane
Ciaran Payne

Data Collection by

Jason Cox
Ciaran Payne
Jason Lane
Benjamin Culler
Eleni Christley
Hank Basta
Jace Sweat
Rily Higginson
Mason Hurd
Rachael McBride
Samuel Rowley

Cover Photo Credit

Upright Prairie Coneflower (*Ratibida columnifera*) by Jason Cox (2025)

Performance Report for Federal Aid Project W-82-R-70

Publication No. 26-13

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

TABLE OF CONTENTS

TABLE OF CONTENTS i
PROGRAM NARRATIVE iv
REMARKS v
WRI STUDY SITES SURVEYED IN 2025 vi
RANGE TREND STUDY METHODS vii
TREND DETERMINATION x
REPORT FORMAT xiii
2025 BIG GAME RANGE TREND STUDIES - WRI PROJECTS xx
REFERENCES xxiv
NORTHERN REGION 1
Metz Hollow - Study No. 04-20 2
Broad Hollow - Study No. 05-16 7
South Fork Chalk Creek - Study No. 06R-6 12
NORTHEASTERN REGION 17
Diamond Mountain Bullhog - Study No. 09R-4 18
Little Donkey - Study No. 09R-5 27
North Little Donkey - Study No. 09R-6 34
Red Fleet Lop and Scatter - Study No. 09R-7 41
Pot Creek Chaining - Study No. 09R-14 48
Brush Creek Dixie - Study No. 09R-15 56
Davis Draw Sagebrush - Study No. 09R-25 64
Little Jim Canyon - Study No. 10-6 70
McCook Ridge Plateau Exclosure North - Study No. 10R-43 80
McCook Ridge Plateau Exclosure South - Study No. 10R-44 86
McCook Ridge Plateau Exclosure Outside - Study No. 10R-45 92
Seep Ridge Bullhog - Study No. 10R-52 98
Moon Ridge - Study No. 10R-53 106
Winter Ridge - Study No. 10R-68 114
Jump Off Point - Study No. 10R-69 119
Horse Ridge 3 - Study No. 10R-70 124
Santaquin Greasewood - Study No. 17R-11 129
Rabbit Gulch Chaining - Study No. 17R-13 137
Golden Stairs Chaining - Study No. 17R-15 144
Grey Wolf Chaining - Study No. 17R-16 153
Wildcat - Study No. 17R-34 162
Big Dry Hollow - Study No. 17R-45 169
SOUTHEASTERN REGION 174
Long Canyon Bench Chaining - Study No. 10R-49 175
Bitter Creek - Study No. 10R-50 182
Bitter Creek Herbicide - Study No. 10R-54 188
South Book Cliffs - Study No. 10R-55 194
Sagers Bench - Study No. 10R-59 200

Hat Rock - Study No. 10R-60 207
Bar X Wash - Bitter Creek - Study No. 10R-63 213
West Thompson Bench 2 - Study No. 10R-66 218
Burnt Cabin Spring - Study No. 11R-12 224
Cold Springs WMA - Study No. 11R-16 232
Cottonwood Ridge - Study No. 11R-18 240
Black Ridge Fuel Reduction - Study No. 13R-3 247
Doe Canyon - Study No. 13R-7 255
South Plain 2 - Study No. 14R-29 260
Dark Canyon - Study No. 14R-31 266
Sego Spring 1 - Study No. 14R-33 273
Sego Spring 2 - Study No. 14R-34 279
Lower Wild Cow Point - Study No. 14R-37 285
Sweet Alice Spring - Study No. 14R-38 293
Duck Lake - Study No. 14R-39 299
Gooseberry North - Study No. 14R-40 305
Stump Flat 2 - Study No. 16R-49 311
Grimes Wash 3 - Study No. 16R-55 318
CENTRAL REGION 324
New Canyon Reservoir - Study No. 16R-57 325
Wildwest - Study No. 16R-59 330
Pole Canyon - Study No. 16R-60 335
Spring Hill - Study No. 16R-61 341
Round Valley - Study No. 17R-40 346
Murdock Hollow - Study No. 17R-44 352
SOUTHERN REGION 356
Cedar Mountain Brush Saw - Study No. 16R-17 357
Cedar Mountain Dixie - Study No. 16R-18 365
Kanosh Lop and Scatter - Study No. 21R-11 372
Wide Mouth Canyon - Study No. 21R-14 379
Duggins Creek - Study No. 21R-15 386
Black Mountain - Study No. 22R-5 392
Greenville Bullhog - Study No. 22R-6 399
Spry Sagebrush Restoration - Study No. 22R-16 407
Greenwich Disking - Study No. 23R-1 414
South Narrows - Study No. 23R-7 422
Browns Canyon Drill - Study No. 23R-8 428
Panguitch East Bench Harrow - Study No. 24R-6 434
Sand Ledges - Study No. 25R-9 440
Parker Front - Study No. 25R-10 447
Brown Spring - Study No. 25R-11 454
Paradise Valley - Study No. 25R-12 461
South Canyon 2 - Study No. 28R-9 466

REFERENCES 474
APPENDIX A - VEGETATION TYPE 475

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-70

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.

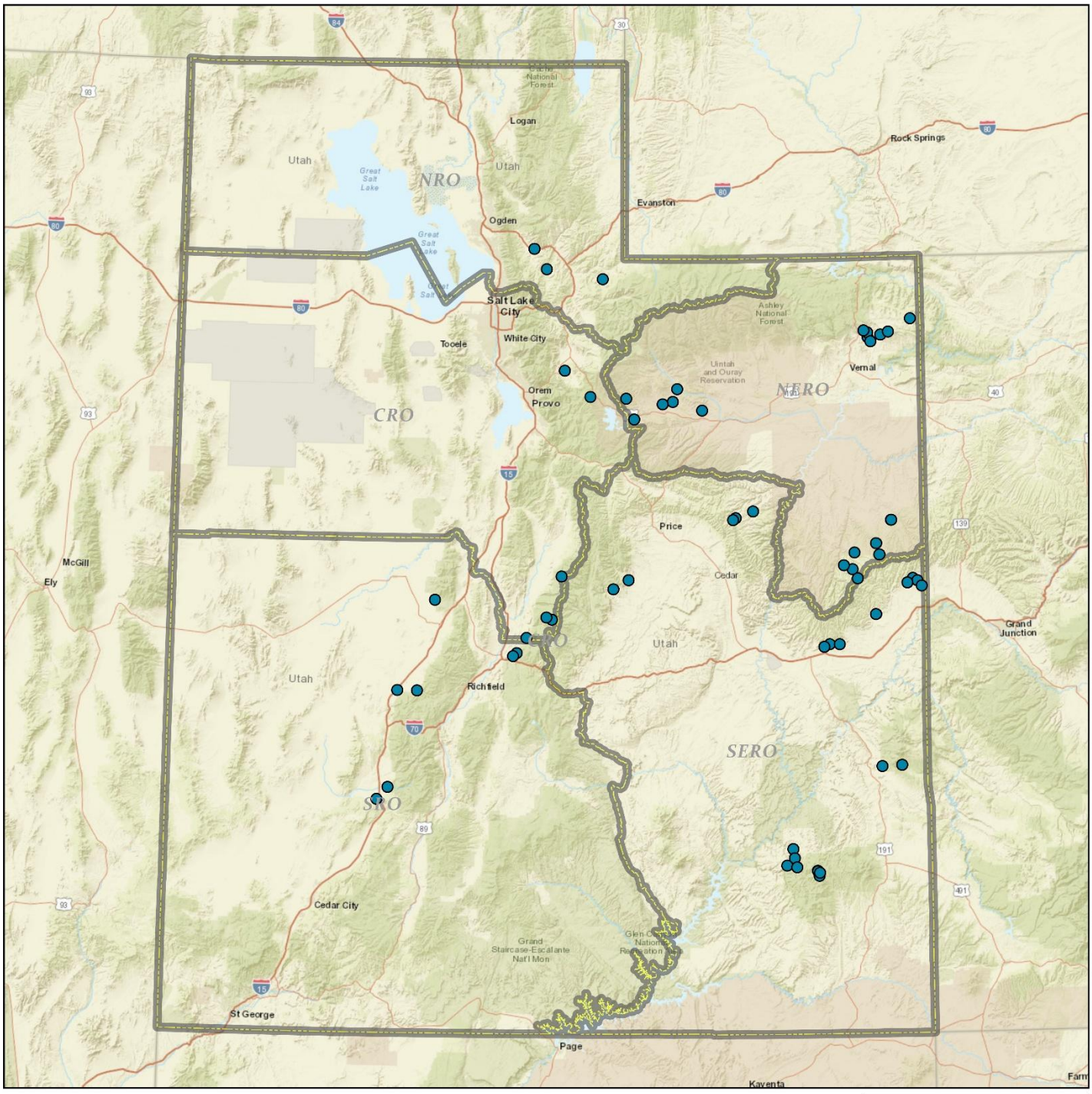
Expected Results or Benefits: Range trend studies in each region will be re-monitored every five years, and vegetation condition and trend assessments will be made for key areas. DWR biologists, land management personnel from the USFS and BLM, and private landowners will use the range trend database 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 2025 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 2025



Miles

0 15 30 60 90 120 150 180 210 240

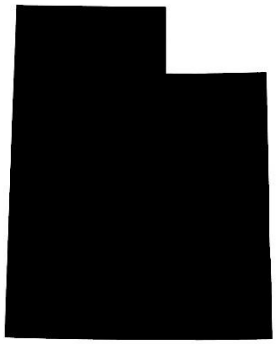
Study Locations

2025 WRI Study Sites

Administrative Boundaries

Region Boundaries

Area of Interest



Credits: Esri, HERE, Garmin, NGA, USGS

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 the 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 mark 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 set up 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 a 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 of 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.

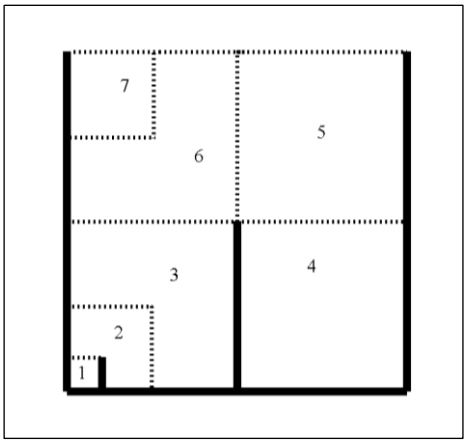


Figure 1 Cover classes of the 1/4 m^2 sampling quadrat

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.

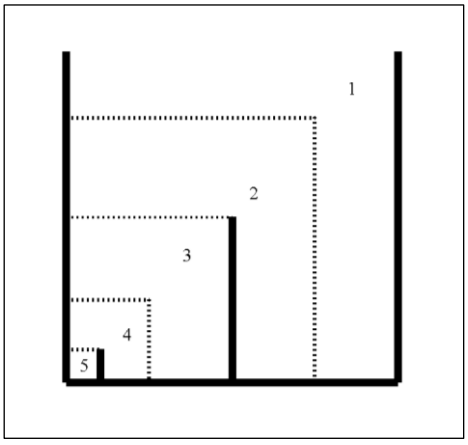


Figure 2 Nested frequency sub-quadrats of the 1/4 m^2 sampling quadrat

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

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

and composition through time. Nested frequency has been found to be a more sensitive measurement for changes taking place within plant communities than quadrat frequency (Smith et al., 1987; Smith et al., 1986; Mosley et al., 1986). Plant cover and density values are not reliable indicators of trend for herbaceous species and can fluctuate greatly with precipitation and time of season sampled. Therefore, plant cover and density values can be misleading if used independently and do not necessarily indicate changes in composition and/or distribution of key plant species.

Line Intercept Cover: Total canopy cover of shrubs or trees is also estimated using the line-intercept method ([1]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 ([2]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 the nine form classes:

1. All available, lightly hedged
2. All available, moderately hedged
3. All available, heavily hedged
4. Largely available, lightly hedged
5. Largely available, moderately hedged
6. Largely available, heavily hedged
7. Mostly unavailable
8. Unavailable due to height
9. Unavailable due to hedging

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

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

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

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

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

Height and Crown

Each mature shrub species closest to every 10-foot mark along a sampling belt is measured to determine average height and crown. This allows a maximum sample of 50 plants per species to be measured at a given site depending on their respective densities. Height and Crown measurements were discontinued prior to the 2021 field season.

Point-Center Quadrat Method: Tree density is determined using the point-center quarter method (Mitchell, 2007; Dahdouh-Guebas and Koedam, 2006; Pollard, 1971; Cottam and Curtis, 1956) at 100-foot intervals along the baseline measuring to a maximum of 15 meters. The strip method that is used to estimate shrub density can, in most cases, effectively inventory seedling and young tree densities. However, the strip method is less effective at estimating density of mature trees that are often widely distributed.

Animal Occupancy: The pellet group transect utilizes (50) 100ft^2 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.

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 consider factors such as soil stability, hydrologic function, and other environmental factors, it should not be used to assess 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 on 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 can support specific plant species or communities based on the characteristics 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 name, 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 to 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 state-and-transition model provided in order to understand the driving factors within the community. The paragraph describes the community dynamics and changes that occur over the duration of the study

Trend Summary Tables

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

with the 1/4m^2 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 years close to the year 2000 but have not been sampled 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 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] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum shockleyi (Shockley's buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Medicago sativa[i] (alfalfa)	Microsteris gracilis[a] (slender phlox)	Onobrychis 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[t] (Utah juniper)	Linanthus 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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
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

2025 BIG GAME RANGE TREND STUDIES - WRI PROJECTS

The following table is a list of big game range trend studies that were read in 2024 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 2025 Wildlife Management Units 8, 9, 10, 11, 13B, 17B&C" 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 #
08A-2	Widdop Mtn. North Slope	Hand Crew: Lop and Scatter	Telephone Hollow Lop and Scatter	September 2014	303	2536
08A-5	Telephone Hollow	Hand Crew: Lop and Scatter	Telephone Hollow Lop and Scatter	September 2014	303	2536
08B-6	Death Valley	Hand Crew: Lop and Scatter	West Northwest D1 Wildlife Habitat Project- Sheep Creek Geological Loop (Phases 4, 5, and 6) (Proposed)	Fall 2026	2039	7582
08C-2	Goslin Mountain	Hand Crew: Lop and Scatter	Goslin Mountain Phase 2 Lop and Scatter	May 2008	1221	691
08C-7	Antelope Flat	Hand Crew: Lop and Scatter	Goslin Mountain P/J Encroachment Removal	August 2006	1677	297
09-1	Red Mountain Allotment	Chaining: One-Way Smooth	Taylor Mountain Fire Rehabilitation	Fall 2014	1100	3182
09-1	Red Mountain Allotment	Hand Crew: Lop and Scatter	Steinaker Draw PJ (CCI)	September 2005	266	28
09-1	Red Mountain Allotment	Herbicide: Aerial Fixed Wing	2021-GRD-Herbicide Treatment-Coalmine Basin, Cottonwood	August 2021	7697	5721
09-1	Red Mountain Allotment	Seeding: Aerial After	Taylor Mountain Fire--BLM ESR Supplement	December 2014	2019	3207
09-9	Little Hole	Herbicide: Aerial	Herbicide Treatments - Richard Mtn. and Little Davenport	September 2020	8513	5107
09-9	Little Hole	Hand Crew: Lop and Scatter	Little Davenport Slashing/Lop and Scatter	Fall 2017	946	3782
09-9	Little Hole	Hand Crew: Lop and Scatter	Little Hole Hazardous Fuel Reduction 2006	Summer-Fall 2007	330	LTDL 6755-18626
09-10	Toliver Creek Chaining	Hand Crew: Lop and Scatter	Taylor Flat P/J Removal	August 2005	1040	10
09-10	Toliver Creek Chaining	Hand Crew: Lop and Scatter	Diamond Mountain Maintenance Project	August-October 2020	2916	5105
09-10	Toliver Creek Chaining	Chaining: One-Way Unknown	Browns Park Reseeding 1962	August 1962-February 1963	300	LTDL 1528-4297
09-10	Toliver Creek Chaining	Seeding: Aerial After	Browns Park Reseeding 1962	August 1962-August 1963	300	LTDL 1528-4298
09-16	Mosby Mountain	Seeding: Aerial	South Slope Vegetation Restoration Phase 2	October 2019	667	4856
09-24	Brush Creek Substation	Seeding: Rangeland Drill	Brush Creek Bench Seeding	October 2010	408	1659
09-24	Brush Creek Substation	Herbicide: Imazapic	Brush Creek Bench Sage Restoration	September 2008	279	315
09-24	Brush Creek Substation	Seeding: Aerial After	Brush Creek Bench Sage Restoration	March 2009	279	315
09-24	Brush Creek Substation	Harrow: One-Way Dixie	Brush Creek Bench Sage Restoration	December 2008	279	315
09-24	Brush Creek Substation	Seeding: Broadcast Before	Brush Creek Bench Sage Restoration	December 2008	279	315
09-25	Buckhorn Canyon	Hand Crew: Lop and Scatter	Brush Creek Juniper Removal 2004	November 2004	1100	LTDL 1547-4355
09-25	Buckhorn Canyon	Hand Crew: Lop and Scatter	Red Fleet Maintenance	September-October 2012	317	2273
09-27	Little Mountain	Herbicide: Imazapic	2021-GRD- Herbicide Treatment - Coalmine Basin, Cottonwood	August 2021	7697	5721
09-27	Little Mountain	Chaining: Two-Way Unknown	Coalmine Basin Seeding	March 1965-January 1966	1700	LTDL 2547-7024
09-27	Little Mountain	Seeding: Aerial After	Coalmine Basin Seeding	March 1965-January 1966	1700	LTDL 2547-7023
09-27	Little Mountain	Seeding: Hand Planter	Coalmine Basin Seeding	March 1965-January 1966	1700	LTDL 2547-7023
09-27	Little Mountain	Hand Crew: Lop and Scatter	Dry Fork Hazardous Fuel Project Phase II	August-September 2013	1842	2789
10-1	Indian Ridge	Hand Crew: Lop and Scatter	Indian Ridge Lop and Scatter	June 2009	1001	1079
10-1	Indian Ridge	Herbicide: Plateau	Indian Ridge Sagebrush	October 2011	218	1952
10-1	Indian Ridge	Seeding: Rangeland Drill	Indian Ridge Sagebrush	September 2011	218	1952

Study #	Study Name	Type	Disturbance Name (If Available)	Date	Acres	WRI Project #
10-1	Indian Ridge	Hand Crew: Lop and Scatter	Seep Ridge Maintenance Lop & Scatter	September-October 2021	3814	5517
10-2	McCook Ridge Exclosure	Hand Crew: Lop and Scatter	Seep Ridge Maintenance Lop & Scatter	September-October 2021	3814	5517
10-2	McCook Ridge Exclosure	Fencing: Exclosure	Book Cliffs Three-Way Exclosure Reconstruction	August 2010-June 2011		1734
10-2	McCook Ridge Exclosure	Seeding: Drill	McCook Ridge Cheatgrass Control	September 2009	400	1109
10-3	McCook Ridge Chaining	Hand Crew: Lop and Scatter	Seep Ridge Maintenance Lop & Scatter	September-October 2021	3814	5517
10-3	McCook Ridge Chaining	Mechanical: Bullhog	McCook Ridge P/J Removal	April 2005	520	260
10-4	Wirefence Point	Hand Crew: Lop and Scatter	Willow Watershed Improvements FY2023	September 2022-June 2024	3791	5934
10-4	Wirefence Point	Hand Crew: Lop and Scatter	Three Pines L and S	September 2008-March 2009	1943	1078
10-5	Willow Flat	Hand Crew: Lop and Scatter	Cedar Camp Lop and Scatter	May-June 2010	2042	1337
10-7	Cherry Mesa	Herbicide: Tebuthiuron	Book Cliffs Bison Habitat Enhancement Cherry Mesa	September 2019	500	4444
10-7	Cherry Mesa	Mechanical: Bullhog	Cherry Mesa Bullhog	July 2009	576	1106
10-15	East Thompson Bench	Seeding: Aerial Before	South Book Cliffs Vegetation Improvement Phase 1	October 2013	500	2593
10-15	East Thompson Bench	Mechanical: Bullhog	South Book Cliffs Vegetation Improvement Phase 1	November-December 2013	500	2593
10-15	East Thompson Bench	Seeding: Aerial After	South Book Cliffs Vegetation Improvement Phase 1	January 2014	500	2593
10-16	West Horse Pasture	Seeding: Aerial	Moab Cheat grass control and seeding (Proposed)	Fall 2025	9029	7359
10-16	West Horse Pasture	Seeding: Rangeland Drill	Nash Wash WMA Wildfire Rehab	October-November 2012	81	2480/2258
10-16	West Horse Pasture	Herbicide: Plateau	Nash Wash WMA Wildfire Rehab	October-November 2012	115	2480/2258
10-17	East Calf Canyon	Seeding: Aerial	Moab Cheat grass control and seeding (Proposed)	Fall 2025	9029	7359
10-17	East Calf Canyon	Herbicide: Plateau	Moab Field Office Cheatgrass Control	November 2023	11016	5573
10-18	East Horse Pasture	Seeding: Aerial	Moab Cheat grass control and seeding (Proposed)	Fall 2025	9029	7359
10-18	East Horse Pasture	Herbicide: Imazapic	Moab Field Office Cheatgrass Control	November 2023	9714	5573
10-31	Tom Patterson Ridge	Herbicide: Imazapic	Tom Patterson Herbicide	August 2022	2297	5913
10-32	Mexico Point	Fire: Prescribed	Bookcliffs Mountain Browse Prescribed Fire 1999	October 1999	523	LTDL 1316-3716
10R-5	Lower Tom Patterson Point	Mechanical: Bullhog	Tom Patterson Mastication (Proposed)	Fall 2025	3652	7294
10R-7	Monument Ridge	Mechanical: Bullhog	Monument Ridge Bullhog II	October-November 2019	2081	4381
10R-7	Monument Ridge	Hand Crew: Lop and Scatter	Seep Ridge Maintenance Lop & Scatter	Fall 2020	4491	5517
10R-7	Monument Ridge	Hand Crew: Lop and Scatter	Monument Ridge PJ Removal	August 2005	1004	22
10R-7	Monument Ridge	Seeding: Harrow	Monument Ridge Fire Reseeding 1956	January 1956-December 1956	4646	LTDL 7694-21017
10R-9	Winter Ridge Exclosure Out	Lop and Scatter: Hand Crew	Wolf Point Lop and Scatter	April 2006	811	259
10R-9	Winter Ridge Exclosure Out	Lop and Scatter: Hand Crew	Willow Watershed Improvements FY2023	September 2022-June 2024	3791	5934
10R-10	Winter Ridge Livestock Exclosure	Lop and Scatter: Hand Crew	Wolf Point Lop and Scatter	April 2006	811	259
10R-10	Winter Ridge Livestock Exclosure	Lop and Scatter: Hand Crew	Willow Watershed Improvement FY2023	September 2022 - June 2024	3791	5934
10R-11	Winter Ridge Total Exclosure	Lop and Scatter: Hand Crew	Willow Watershed Improvement FY2023	September 2022 - June 2024	3791	5934
10R-11	Winter Ridge Total Exclosure	Lop and Scatter: Hand Crew	Wolf Point Lop and Scatter	April 2006	811	259
10R-13	McCook Ridge Livestock Exclosure	Fencing: Exclosure	Fencing - Book Cliffs Three-Way Exclosure Reconstruction	August 2010-June 2011		1734

Study #	Study Name	Type	Disturbance Name (If Available)	Date	Acres	WRI Project #
10R-14	McCook Ridge Total Exclosure	Fencing: Exclosure	Fencing - Book Cliffs Three-Way Exclosure Reconstruction	August 2010-June 2011		1734
10R-15	Saddle Horse	Fire: Prescribed	PR Prescribed Fire 2001	September 2001	12500	LTDL 9067-24718
10R-17	Railroad Canyon	Fire: Prescribed	Upper Bookcliffs Prescribed Fire 1998	September 1998	484	LTDL 12168-32921
10R-22	Rathole Ridge	Fire: Prescribed	Bookcliffs Mountain Browse Prescribed Fire 1999	October 1999	1311	LTDL 1316-3715
10R-28	Indian Ridge 2	Hand Crew: Lop and Scatter	Seep Ridge Maintenance Lop and Scatter	September-October 2021	3813	5517
10R-28	Indian Ridge 2	Hand Crew: Lop and Scatter	Indian Ridge Lop and Scatter	June 2009	1001	1079
10R-28	Indian Ridge 2	Herbicide: Imazapic	Indian Ridge Sagebrush	October 2011	224	1952
10R-28	Indian Ridge 2	Seeding: Rangeland Drill	Indian Ridge Sagebrush	September 2011	224	1952
10R-29	Massey Junction	Seeding: Hand Planter	Atchee Ridge Burn Reseeding 1955	October 1955-May 1956	100	LTDL 379-1009
11A-3	Chokecherry Canyon	Fire: Prescribed	Anthro-Mountain Prescribed Burn	Fall 2007	642	841
11B-1	Deadman	Hand Crew: Lop and Scatter	Miller Creek Watershed Restoration 2.0	May-June 2020	2816	4734
11B-1	Deadman	Chaining: Chain Unknown	Coal Creek Seeding 1 1964	July 1964-January 1965	1041	LTDL 2526-6975
11B-1	Deadman	Seeding: Aerial After	Coal Creek Seeding 1 1964	July 1964-January 1965	1041	LTDL 2526-6974
11B-1	Deadman	Mechanical: Bullhog	West Coal Creek	Fall 2007 and Spring 2008	1868	847
11B-1	Deadman	Seeding: Aerial Before	West Coal Creek	August 2007 and December 2007	1868	847
11B-4	Coal Creek	Hand Crew: Lop and Scatter	Carbon and Emery County Habitat Restoration and Maintenance (Proposed)	2025	5824	6706
11B-5	'B' Canyon	Seeding: Aerial Unknown	East Carbon Fire Rehabilitation 1996	1996	321	LTDL 3763-10552
11B-5	'B' Canyon	Chaining: Two-Way Unknown	Mud Springs Chaining and Seeding 8 1966	1966	3822	LTDL 7826-21376
11B-5	'B' Canyon	Seeding: Aerial Before	Mud Springs Chaining and Seeding 8 1966	1966	3822	LTDL 7826-21375
11B-5	'B' Canyon	Chaining: Chain Unknown	East Carbon Fire Rehabilitation 1996	1996	321	LTDL 3763-10553
11B-5	'B' Canyon	Seeding: Dribbler Unknown	East Carbon Fire Rehabilitation 1996	1996	321	LTDL 3763-10554
11B-7	Cottonwood	Hand Crew: Lop and Scatter	Cottonwood Ridge PJ Removal	July 2015-July 2016	1019	3267
11B-7	Cottonwood	Hand Crew: Lop-Pile-Burn	Cottonwood Ridge Maintenance	May-June 2020	372	5404
11B-7	Cottonwood	Seeding: Aerial	Cottonwood Ridge Maintenance	January 2021	487	5404
11B-8	Cedar Corral	Hand Crew: Lop and Scatter	Bishop Ridge Pinyon and Juniper Removal	November 2015-January 2016	224	3448
11B-8	Cedar Corral	Seeding: Aerial Before	Bishop Ridge Pinyon and Juniper Removal	December 2015	490	3448
11B-19	Dugout Creek PJ Chained	Hand Crew: Lop and Scatter	Dugout Creek Fuels Reduction and Habitat Restoration: Phase II	May-September 2011	162	1935
11B-19	Dugout Creek PJ Chained	Hand Crew: Lop and Scatter	Carbon and Emery County Habitat Restoration and Maintenance (Proposed)	2025	5824	6706
11B-19	Dugout Creek PJ Chained	Chaining: Two-Way Unknown	Anadarko Mitigation Project 1995	October 1995	160	LTDL 174-502/504
11B-19	Dugout Creek PJ Chained	Seeding: Aerial Before	Anadarko Mitigation Project 1995	October 1995	160	LTDL 174-505
11B-19	Dugout Creek PJ Chained	Seeding: Dribbler	Anadarko Mitigation Project 1995	October 1995	160	LTDL 174-503
13B-2	Upper Westwater-Dolores	Herbicide: Plateau	Moab Cheat grass control and seeding (Proposed)	Winter-Spring 2026	7292	7359
13B-3	Fish Park	Herbicide: Plateau	Moab Cheat grass control and seeding (Proposed)	Winter-Spring 2026	7292	7359
13B-3	Fish Park	Chaining: Two-Way Unknown	Fish Park Seeding 1967	August 1967-May 1968	490	LTDL 4259-11928
13B-3	Fish Park	Seeding: Aerial Before	Fish Park Seeding 1967	August 1967	490	LTDL 4259-11929
13B-6	Ryan Creek	Herbicide: Plateau	Moab field office Cheatgrass Control	November 2023	9714	5573
13B-6	Ryan Creek	Seeding: Aerial	Moab Cheat grass control and seeding (Proposed)	2025-2026	9029	7359

Study #	Study Name	Type	Disturbance Name (If Available)	Date	Acres	WRI Project #
13B-6	Ryan Creek	Chaining: Two-Way Unknown	Granite Park Reseeding 1967	August 1967-May 1968	1888	LTDL 4813-13374
13B-6	Ryan Creek	Seeding: Aerial Before	Granite Park Reseeding 1967	August 1967-May 1968	1888	LTDL 4813-13373
13B-7	Steamboat Mesa North	Seeding: Aerial Before	Steamboat Mesa Reseeding 1967	August-December 1967	1352	LTDL 11188-30313
13B-7	Steamboat Mesa North	Chaining: Two-Way Unknown	Steamboat Mesa Reseeding 1967	August-December 1967	1352	LTDL 11188-30312
13B-8	Steamboat Mesa South	Herbicide: Imazapic	Moab field office Cheatgrass Control	November 2024	11016	5573
13B-8	Steamboat Mesa South	Seeding: Aerial	Moab Cheat grass control and seeding (Proposed)	2025-2026	9029	7359
13B-9	Steamboat East Bench	Seeding: Aerial Before	Steamboat Mesa Reseeding 1967	August-December 1967	1352	LTDL 11188-30313
13B-9	Steamboat East Bench	Chaining: Two-Way Unknown	Steamboat Mesa Reseeding 1967	August-December 1967	1352	LTDL 11188-30312
17-51	Santaquins Cabin	Hand Crew: Lop and Scatter	Coyote Draw Pinyon and Juniper Thinning	July 2006-June 2007	1240	328
17-55	Lower Horse Ridge	Mechanical: Bullhog	Horse Ridge Bullhog	June 2016	759	3293
17-55	Lower Horse Ridge	Hand Crew: Lop and Scatter	Anthro/Avintaquin Lop and Scatter	September-October 2023	759	6694
17-67	Rabbit Gulch	Hand Crew: Lop and Scatter	Rabbit Gulch Lop and Scatter	June 2021	1507	5624
17-68	Road Hollow	Hand Crew: Lop and Scatter	Skitzy Lop and Scatter	Fall 2010	392	1729

REFERENCES

Allison L. E. & C. C. Moode. Carbonate. pp. 1387-1388. In C. A. Black (ed.), Methods of Soil Analysis Part 2. 1965. American Society of Agronomy, Inc. Madison, WI.

Bailey, A. W. & C. E. Poulton. 1968. Plant communities and environmental interrelationships in a portion of the Tillamook burn, Northwest Oregon. Ecology. 49(1):1-13.

Boyd, C. S., J. D. Bates, & R. F. Miller. 2007. The influence of gap size on sagebrush cover estimates using line intercept technique. Rangeland Ecology and Management 60:199–202.

Cottam, G. & Curtis, J. T. 1956. The use of distance methods in phytosociological sampling. Ecology 37:451-460.

Conover, W. J. 1980. Practical Nonparametric Statistics (second edition). John Wiley & Sons, New York. 493pp.

Cronquist, A., A. H. Holmgren, N. H. Holmgren, J. Reveal and P. Holmgren. 1977. Intermountain Flora (volume six). Columbia University Press, New York. 584pp.

Dahdouh-Guebas, F. & N. Koedam. 2006. Empirical estimate of the reliability of the use of the point- centred quarter method (PCQM): solutions to ambiguous field situations and description of the PCQM+ protocol. Forest Ecology and Management. 228:1-18

Daubenmire, R. 1959. A canopy coverage method of vegetational analysis. Northwest Science 33:43-66.

Day P. R. Particle fractionation and particle-size analysis. pp. 562-566. In: C. A. Black (ed.), Methods of Soil Analysis Part 1. 1965. American Society of Agronomy, Inc. Madison, WI.

Giunta, B. C. 1983. Utah interagency big game range trend plant species list. Utah Dept. Of Natural Resources, Division of Wildlife Resources. Salt Lake City, Utah. 281pp.

Jones, B.E., Burton, D. & Tate, K.W. 2005. Effectiveness monitoring of aspen regeneration on managed rangelands. R5–EM–TP–004, USDA, Forest Service, Pacific Southwest Region, Vallejo, CA.

Kenney, D. R. & D. W. Nelson. Nitrogen - Inorganic forms. Pp. 643-698. In: A. L. Page (ed.), Methods of Soil Analysis Part 2. 1982. American Society of Agronomy, Inc. Madison, WI.

Mitchell, K. 2007. Quantitive Analysis by the Point-Centered Quarter Method. Department of Mathematics and Computer Science Hobart and William Smith Colleges. Geneva, New York. 33pp. <http://people.hws.edu/mitchell/PCQM.pdf>

Mosley, J. C., S. C. Bunting, & M. Hironaka. 1986. Determining range condition from frequency data in mountain meadows of central Idaho. J. Range Manage. 39:561-565.

Neff, D. J. 1968. The Pellet-Group Count Technique for Big Game Trend, Census, and Distribution: A Review. Journal of Wildlife Management. 32(3):597-614

Normandin, V., J. Kotuby-Amacher, & R. O. Miller. 1998. Modification of the ammonium acetate extractant for the determination of exchangeable cation in calcareous soils. Commun. Soil Sci. Plant Anal. 29(11-14):1785-1791.

Olsen, S. R., C. V. Cole, F. S. Watanabe, & L. A. Dean. 1954. Estimation of Available phosphorous in soil by extraction with sodium bicarbonate. USDA Cir. No. 939.

Plummer, A. P., S. B. Monsen and R. Stevens. 1977. Intermountain Range Plant Names and Symbols. USDA Forest Service, General Technical Report INT-38. Ogden, Utah.

Pollard, J. H. 1971. On distance estimators of density in randomly distributed forests. Biometrics. 27(4):991-1002.

Schoenau, J. J. and R. E. Karamonos. Sodium Bicarbonate Extractable P, K, and N. pp. 51-58. In: M. R. Carter (ed.), Soil Sampling and Methods of Analysis. 1993. Canadian Society of Soil Science. Ottawa, Ontario, Canada.

Sims, J. R. and G. D. Jackson. 1971. Rapid analysis of soil nitrate with chromotropic acid. Soil Sci. Soc. Amer. Proc. 35:603-606.

Smith, S. D., S. C. Bunting, and M. Hironaka. 1987. Evaluation of the improvement in sensitivity of nested frequency plots to vegetational change by summation. Great Basin Naturalist. 47(2): 299- 307.

Smith, S. D., S. C. Bunting, and M. Hironaka. 1986. Sensitivity of frequency plots for detecting vegetation change. Northwest Science. 60: 279-286.

Rhodes, J. D. Soluble Salts. pp. 167-179. In: A. L. Page (ed.), Methods of Soil Analysis Part 2. 1982. American Society of Agronomy, Inc. Madison, WI.

Tausch, R. J., Miller, R. F., Roundy, B. A., & Chambers, J. C. (2009). Piñon and Juniper Field Guide: Asking the Right Questions to Select Appropriate Management Actions. *Circular 1335*, 96. U.S. Geological Survey.

Tiedemann, A. R. and C. F. Lopez. 2004. Assessing Soil Factors in Wildland Improvement Programs. In: S. B. Monsen, R. Stevens, and N. Shaw (compilers) Restoring Western Ranges and Wildlands. Gen. Tech. Rep. RMRS-GTR-136-vol 1. Fort Collins, CO: U.S. Department of Agriculture, Forest

Service, Rocky Mountain Research Station. pp. 39-56. U. S. Dept. of Agriculture - Soil Conservation Service. 1972. Soil survey of Utah County, Utah - central part. U. S. Govt. Printing Office, Wash. D. C. 161 pp.

USDA, NRCS. 2016. The PLANTS Database (http://plants.usda.gov, 3 May 2016). National Plant Data Team, Greensboro, NC 27401-4901 USA.

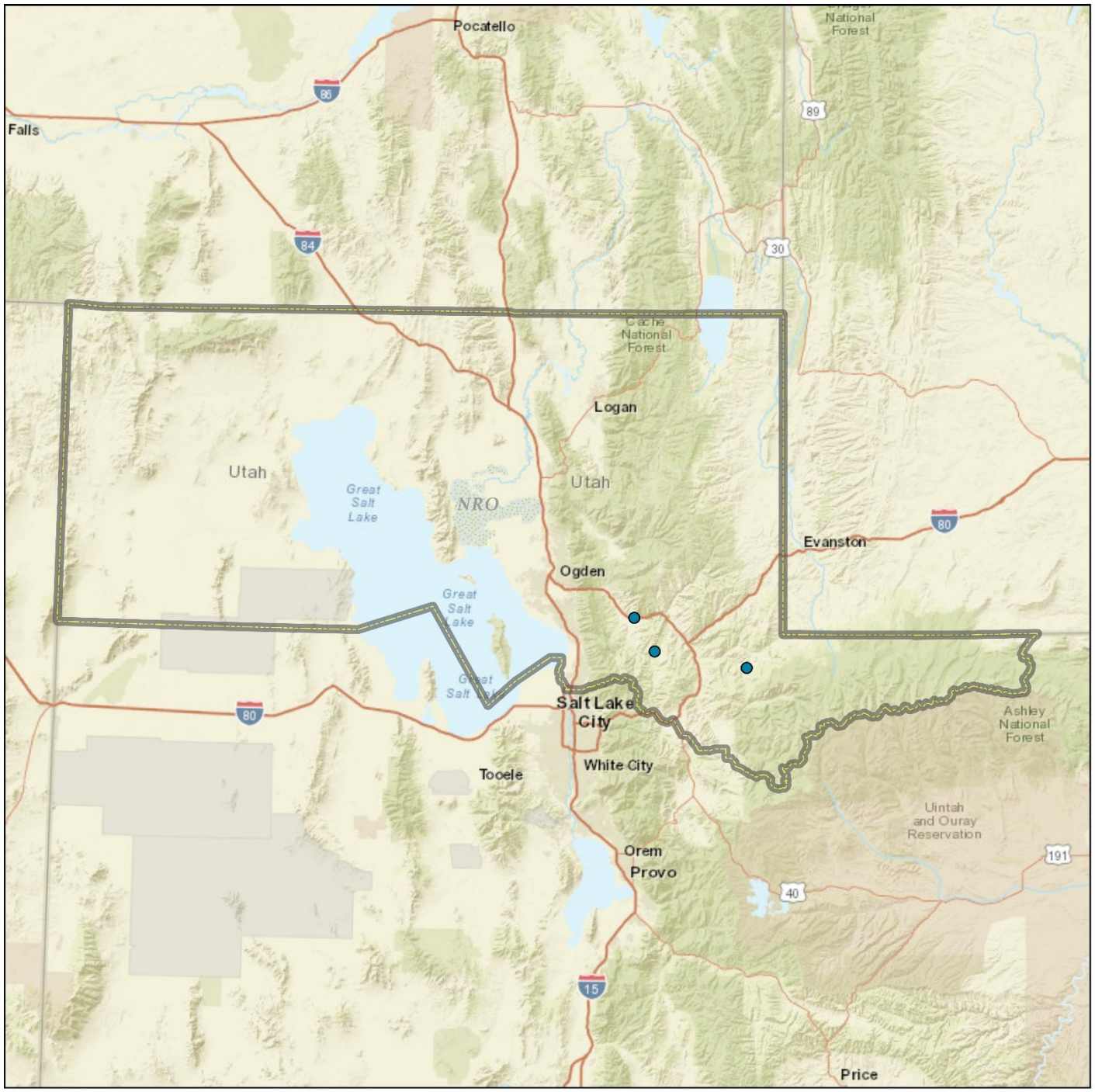
[1]U.S. Department of Interior Bureau of Land Management. 1999. Sampling vegetation attributes, Interagency Technical Reference, BLM/RS/ST-96/002+1730.

[2]U.S. Department of Interior Bureau of Land Management. 1999. Utilization Studies and Residual Measurements, Interagency Technical Reference, BLM/RS/ST-96/004+1730.

Walkley, A. and I. A. Black. 1934. An examination of Degtjareff method for determining soil organic matter and a proposed modification of the chromic acid titration method. Soil Science 37:29-38.

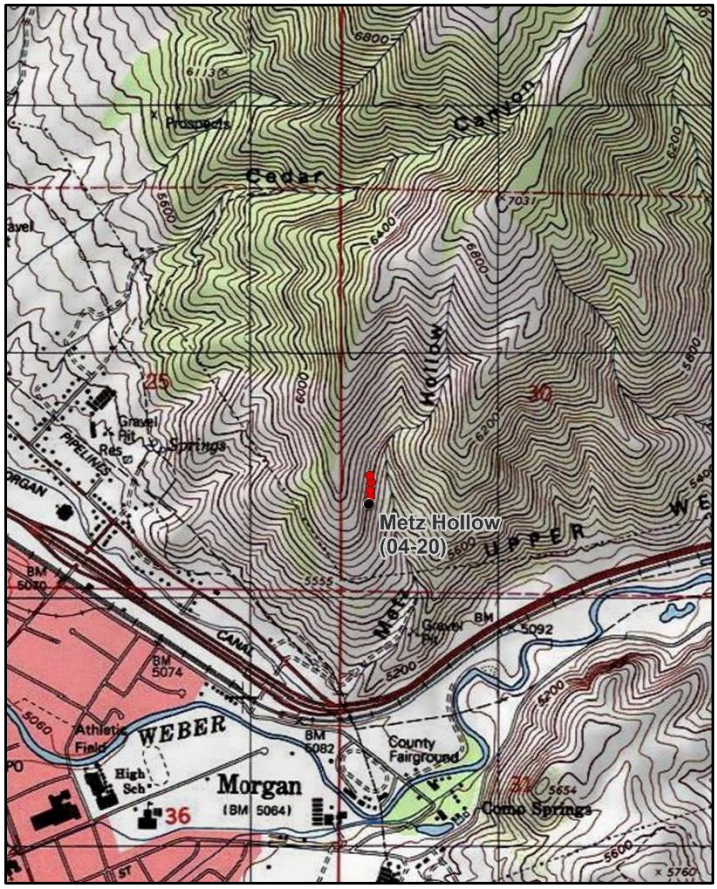
Welsh, S. L., N. D. Atwood, S. Goodrich and L. C. Higgins. 2003. A Utah Flora (Third Edition, revised). Brigham Young University. Provo, Utah. 912 pp.

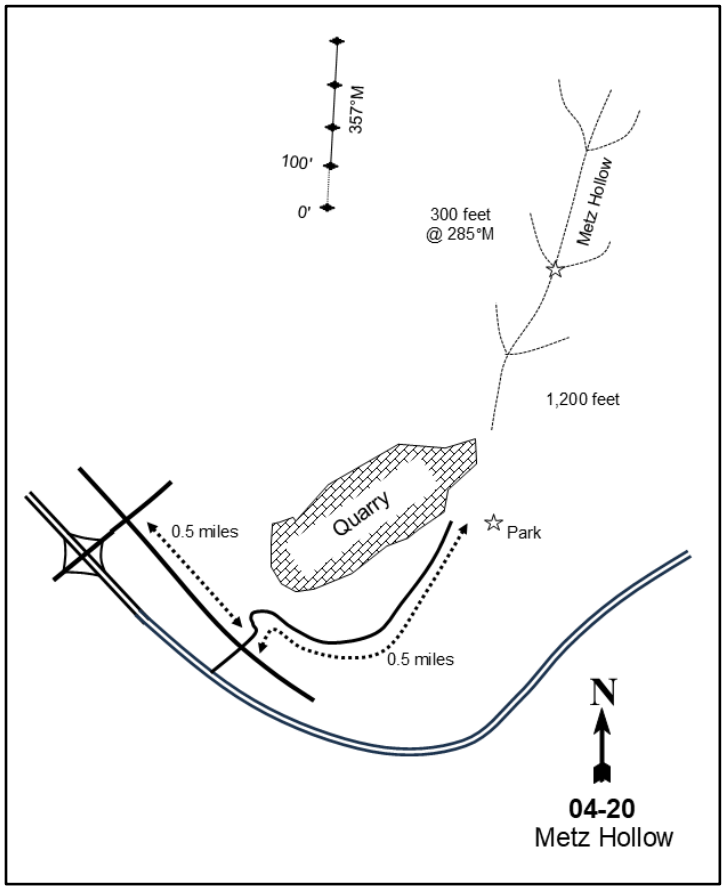
NORTHERN REGION



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

METZ HOLLOW - STUDY NO. 04-20





Location Information

USGS 7.5 min Map Info	Morgan SE; Township 4N, Range 3E, Section 30
GPS (0' Stake)	NAD 83 UTM ZONE 12, 444484 East 4544381 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	357° magnetic (Line 3: 352° magnetic, Line 4: 346° 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

After contacting the landowner for permission to access, hike north from the back of the gravel pit to the drainage at the bottom of the canyon (the drainage is very cobbly and rocky). Hike up the drainage for approximately 1200 feet, at which point the 0-foot baseline stake will be up through the pinyon and juniper trees on the steep, exposed slope to the west; there is no witness post. Use a GPS to navigate approximately 325-350 feet up the steep slope to the 0-foot baseline stake, which has no browse tag. The transect follows the contour line in a northerly direction.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,800ft (1,768m)
Aspect	Southeast
Slope	55-65%
Sample Dates	08/06/2025

Wildlife Habitat and Vegetation History

Table 04-20.3 - 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

Table 04-20.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2025	Bulbous Bluegrass/Mountain Big Sagebrush	Early Phase I

Site Notes

No Notes

Soils

Table 04-20.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.4	41.7	43.0	15.3	4.1	8.0	274.0	0.5	08/25/2025

Site Potential

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA461UT
States and Transitions	2025 - State Undefined: Community Phase Undefined

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated the shrub component of this site at the time of study establishment in 2025. Other shrubs were limited in both composition and cover, with rubber rabbitbrush (*Ericameria nauseosa* ssp. *nauseosa* var. *speciosa*) as the only other preferred browse species present in cover or density data (Table 04-20.12, Table 04-20.13). The introduced perennial grass species bulbous bluegrass (*Poa bulbosa*) contributed a majority of the herbaceous cover and was a co-dominant vegetation component with sagebrush. Various annual and introduced brome species (*Bromus arvensis*, *B. briziformis*, *B. tectorum*) were also observed, with cheatgrass (*B. tectorum*) providing moderate cover. Forbs were limited in diversity, with much of the cover being contributed the native perennial species hairy false goldenaster (*Heterotheca villosa*) and native annual species wavyleaf thistle (*Cirsium undulatum*). Numerous weedy annual species were also present. In addition, the introduced perennial forb and noxious weed field bindweed (*Convolvulus arvensis*) was observed, albeit with very low cover and abundance (Table 04-20.7, Table 04-20.10, Table 04-20.11). Utah juniper was present with low point-quarter density, placing this site in Early Phase I of woodland succession (Table 04-20.4, Table 04-20.14). Barring the occurrence of a shrub-removing disturbance or inputs to improve the degraded herbaceous understory, this site will likely remain in this or a similar state in future sample years.

At the time of study establishment in 2025, condition of this site as mule deer winter range was estimated to be poor. The reduced cover and recruitment of young plants within the preferred browse community; limited perennial grass cover; and the presence of annual grasses and noxious weeds negatively affect the wintering habitat conditions for deer (Table 04-20.10, Table 04-20.11, Table 04-20.12, Table 04-20.13, Table 04-20.15). Pellet transect data shows that deer presence was moderate in 2025. Meanwhile, 21% of sagebrush was considered to be moderately utilized while the remaining population was lightly hedged. On-site observations noted that the herbaceous understory had little to no utilization (Photos, Table 04-02.7, Table 04-20.9, Table 04-20.10, Table 04-20.11, Table 04-20.13).

Trend Summary Tables

Table 04-20.6 - 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
2025	7.0	1.1	1.8	9.2	1.4	2.4

Table 04-20.7 - 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
2025	238	406	199	100	5.0	26.7	4.6	6.2

Table 04-20.8 - 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
2025	8.4	0.0	22.5	1.4	35.9	47.5

Table 04-20.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk
	Quadrat Frequency	
2025	38	4
Year	Days Use Per Acre (ha)	
2025	28.8 (71.2)	-

Table 04-20.10 - 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)	Poa bulbosa[i] (bulbous bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency				
2025	33	16	216	398	90
year	Average Cover (%)				
2025	0.1	0.2	4.6	22.7	3.9

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

Table 04-20.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum alyssoides[ai] (pale madwort)	Alyssum desertorum[ai] (desert madwort)	Ambrosia psilostachya (Cuman ragweed)	Artemisia ludoviciana (white sagebrush)	Asclepias asperula (spider milkweed)	Ceratocephala testiculata[ai] (curveseed butterwort)	Cirsium undulatum[a] (wavyleaf thistle)	Convolvulus arvensis[ni] (field bindweed)	Erodium cicutarium[ai] (redstem stork's bill)	Galium aparine[a] (stickywilly)	Helianthus annuus[a] (common sunflower)	Heterotheca villosa (hairy false goldenaster)	Lactuca serriola[ai] (prickly lettuce)	Salsola tragus[ai] (prickly Russian thistle)	Verbascum blattaria[ai] (moth mullein)
year	Nested Frequency														
2025	59	127	56	8	4	9	61	1	3	5	9	50	3	3	0
year	Average Cover (%)														
2025	0.4	0.5	1.1	0.5	0.0	0.0	3.6	0.0	0.0	0.0	0.0	4.5	0.0	0.0	0.0

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

Table 04-20.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Acer negundo[t] (boxelder)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Ericameria nauseosa ssp. nauseosa var. speciosa[p] (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover (%)			
2025	2.4	6.8	2.4	1.4
year	Quadrat Cover (%)			
2025	1.8	5.3	1.7	1.1

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

Table 04-20.13 - 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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2025	780	40	18	74	8	21	0	8	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2025	20	-	0	100	0	0	0	0	- / -
Ericameria nauseosa ssp. nauseosa var. speciosa[p] -- (rubber rabbitbrush)									
2025	340	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2025	1500	-	1	96	3	0	0	3	- / -

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

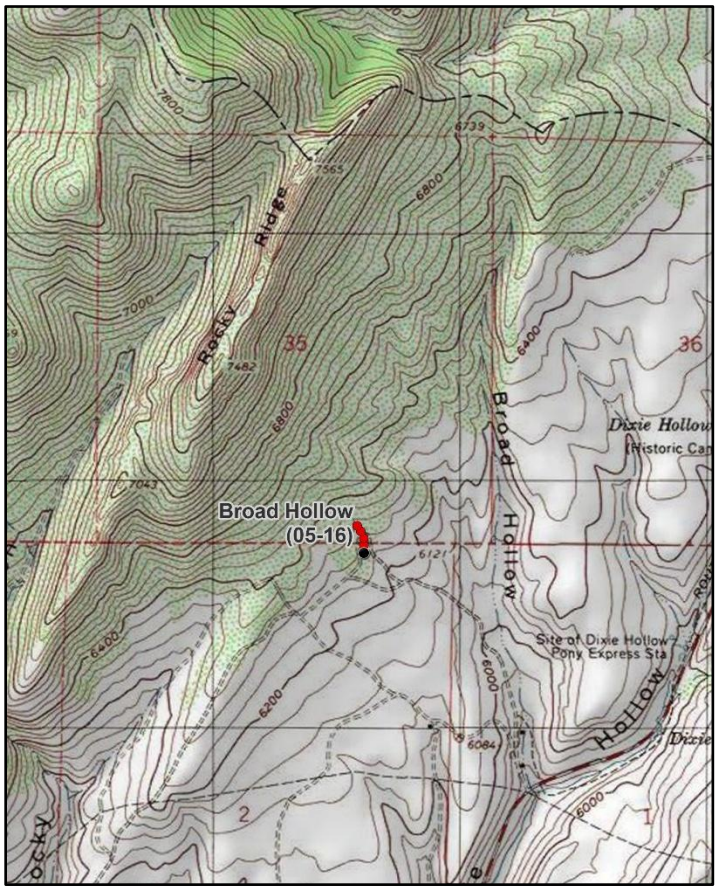
Table 04-20.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

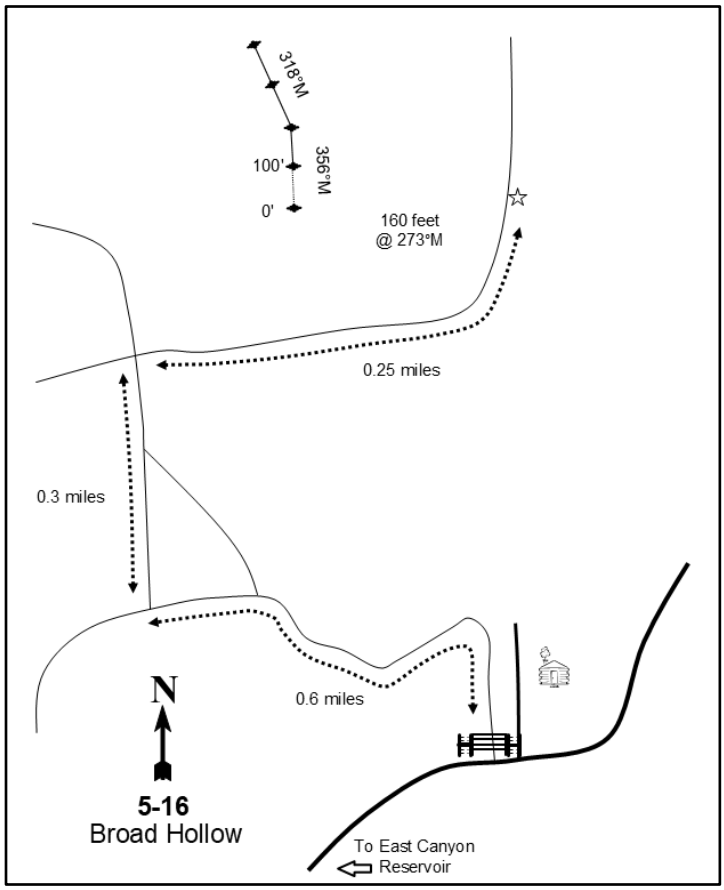
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Acer negundo (boxelder)							
2025	2	-	-	-	100	-	39.0
Juniperus osteosperma (Utah juniper)							
2025	2	-	-	50	-	50	23.0

Table 04-20.15 - 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
2025	11.5	13.3	6.6	7.9	-3.7	10.0	-2.0	**43.6**	Poor

BROAD HOLLOW - STUDY NO. 05-16





Location Information

USGS 7.5 min Map Info	East Canyon Reservoi; Township 2N, Range 3E, Section 02
GPS (0' Stake)	NAD 83 UTM ZONE 12, 451544 East 4532699 North

Transect Information

Browse Tag # (0' Stake)	539
Transect Bearing	356° magnetic (Lines 3-4: 318° magnetic)
Length	400ft
Belt Placement	Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)
Belt Marker Placement	Standard; Line 2: 98ft Long

Directions to Site

From the intersection of South Highway 66 and the East Emigration Canyon road just north of East Canyon State Park, continue north on the East Emigration Canyon road for approximately 0.7 miles to a road and a gate on the left (northwest; there is another left turn about 300 feet further north along the main road that is a private drive). Turn left, go through the gate, and continue for roughly 700 feet to a fork. Proceed left at the fork and continue west on this two-track for approximately 0.5 miles, passing a number of intersections with UTV and two-track roads. At this point, turn right (north) onto a two-track that leads north towards Rocky Ridge. Continue for 1500 feet on this road to a four-way intersection with other two-track roads. Turn right (northeast) and continue about 800 feet to a fork. Proceed left at the fork, drive for roughly 500 feet through the dense oak (there will be powerlines in the area), and stop; there is no witness post. The 0-foot baseline stake is approximately 100 feet to the west amid the sagebrush and oak, and is marked with browse tag #539.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,300ft (1,920m)
spect	Southeast
Slope	10-15%
Sample Dates	08/04/2025

Wildlife Habitat and Vegetation History

Table 05-16.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		undefined & undefined

Table 05-16.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2025	Gambel Oak/Mountain Big Sagebrush	NA

Site Notes

No Notes

Soils

Table 05-16.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.8	41.5	37.1	21.4	3.6	26.0	435.0	0.2	08/14/2025

Site Potential

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Gravelly Loam (Oak)
NRCS Ecological Site #	R047XA410UT
States and Transitions	2025 - Current Potential State: Community Phase 2.1

Upon study establishment in 2025, the plant community on this site was dominated by Gambel oak (*Quercus gambelii*) and, to a lesser extent, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Other preferred browse species such as mountain snowberry (*Symphoricarpos oreophilus*) and Utah serviceberry (*Amelanchier utahensis*) were also present, but they contributed less cover than sagebrush and oak (Table 05-16.12, Table 05-16.13). The herbaceous understory was moderate in both diversity and abundance. Perennial grasses dominated the herbaceous component and were mainly comprised of the introduced species bulbous bluegrass (*Poa bulbosa*) and native species bluebunch wheatgrass (*Pseudoroegneria spicata*). The introduced annual grass species field brome (*Bromus arvensis*) was also observed with low cover (Table 05-16.7, Table 05-16.10). Annual forbs were more abundant than their perennial counterparts, and the native annual stickywilly (*Galium aparine*) provided the most cover of any single species (Table 05-16.11). This site will likely remain in this or a similar state in the future without a major disturbance.

Mule deer winter range condition on this site was fair in 2025. Winter range condition was mainly limited by reduced perennial grass and forb cover and the presence of annual grass (Table 05-16.7, 05-16.15). Pellet transect data indicates that deer presence was moderate in 2025 (Table 05-16.9). However, browse on this site received varying degrees of utilization. There were few bitterbrush plants sampled in density strips, and as such, all individuals were considered to be heavily hedged due to their preference by deer. Serviceberry plants showed signs of mostly light utilization. Sagebrush was the most abundant preferred browse species of the three mentioned with 100% of plants showing signs of light utilization (Table 05-16.13). Furthermore, on-site observations for 2025 noted little to no utilization of the herbaceous understory.

Trend Summary Tables

Table 05-16.6 - 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
2025	43.1	4.5	-	82.2	5.0	-

Table 05-16.7 - 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
2025	104	177	238	109	1.1	5.1	3.8	1.5

Table 05-16.8 - 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
2025	4.0	-	69.8	0.8	0.6	51.7

Table 05-16.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2025	4	2	3
Year	Days Use Per Acre (ha)		
2025	25.5 (62.9)	-	-

Table 05-16.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus arvensis[ai] (field brome)	Carex (sedge)	Koeleria macrantha (prairie Junegrass)	Leymus cinereus (basin wildrye)	Melica bulbosa (oniongrass)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa[i] (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency										
2025	2	0	104	6	4	3	1	55	92	4	50
year	Average Cover (%)										
2025	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.8	2.4	0.0	1.8

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

Table 05-16.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum desertorum[ai] (desert madwort)	Antennaria parvifolia (small-leaf pussytoes)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Ceratocephala testiculata[ai] (curveseed butterwort)	Cirsium (thistle)	Collinsia parviflora[a] (maiden blue eyed Mary)	Collomia linearis[a] (tiny trumpet)	Comandra umbellata (bastard toadflax)	Cryptantha[a] (annual cryptantha)	Descurainia pinnata[a] (western tansymustard)	Galium aparine[a] (stickywilly)	Heliomeris multiflora (showy goldeneye)	Lappula occidentalis[a] (flatspine stickseed)	Lupinus argenteus (silvery lupine)	Microsteris gracilis[a] (slender phlox)
year	Nested Frequency																
2025	46	13	3	15	1	3	2	69	107	1	11	23	117	12	8	5	51
year	Average Cover (%)																
2025	0.5	0.1	0.0	0.6	0.0	0.0	0.0	0.3	0.6	0.0	0.0	0.2	1.9	0.1	0.0	0.0	0.4

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

FORB SPECIES	Polygonum douglasii[a] (Douglas' knotweed)	Senecio integerrimus[a] (lambstongue ragwort)	Silene antirrhina[a] (sleepy silene)	Silene menziesii (Menzies' campion)	Symphyotrichum ascendens (western aster)	Veronica biloba[ai] (twolobe speedwell)	Viola (violet)
year	Nested Frequency						
2025	52	8	2	9	44	8	1
year	Average Cover (%)						
2025	0.2	0.1	0.0	0.0	0.3	0.1	0.0

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

Table 05-16.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Mahonia repens (creeping barberry)	Prunus virginiana[p] (chokecherry)	Quercus gambelii[p] (Gambel oak)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)						
2025	3.7	14.4	1.5	3.5	-	52.5	11.6
year	Quadrat Cover (%)						
2025	0.9	10.2	1.5	3.1	0.1	25.1	6.8

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

Table 05-16.13 - 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.

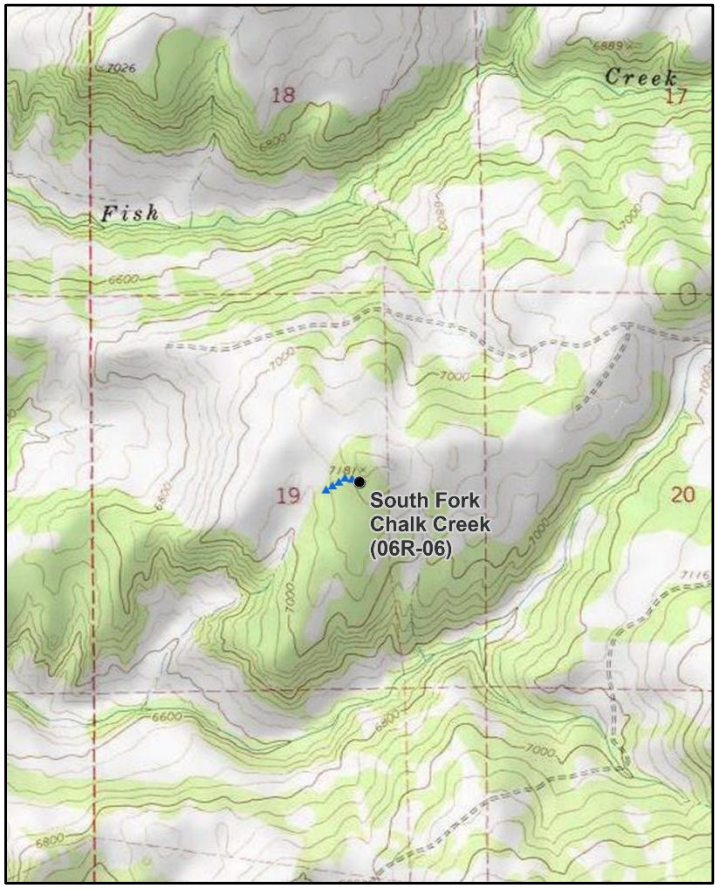
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2025	460	-	87	9	4	4	17	22	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2025	2040	60	0	71	29	0	0	36	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2025	800	-	5	88	8	3	3	13	- / -
Mahonia repens -- (creeping barberry)									
2025	7040	-	1	99	0	0	0	0	- / -
Prunus virginiana[p] -- (chokecherry)									
2025	140	-	86	14	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2025	40	-	100	0	0	100	0	0	- / -
Quercus gambelii[p] -- (Gambel oak)									
2025	10180	-	29	70	2	21	0	2	- / -
Rosa woodsii[p] -- (Woods' rose)									
2025	20	-	0	100	0	0	0	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2025	2540	-	6	95	0	13	6	33	- / -

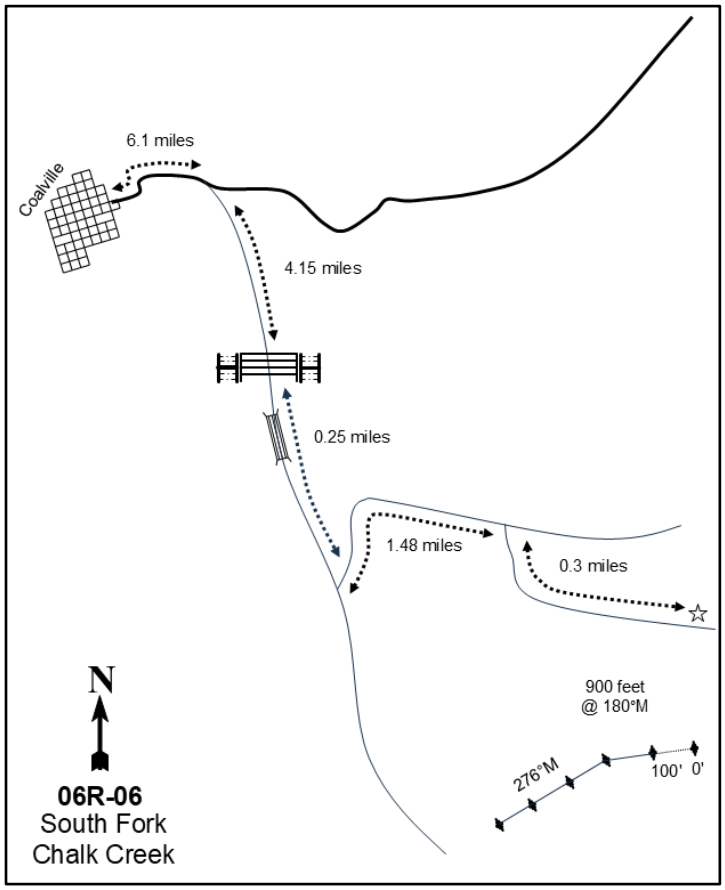
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 05-16.15 - 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
2025	30.0	13.1	11.6	5.4	-0.8	3.0	0.0	**62.3**	Fair

SOUTH FORK CHALK CREEK - STUDY NO. 06R-6





Location Information	
USGS 7.5 min Map Info	Upton SW; Township 2N, Range 7E, Section 19
GPS (0' Stake)	NAD 83 UTM ZONE 12, 483535 East 4526983 North

Transect Information	
Browse Tag # (0' Stake)	Not Available
Transect Bearing	273° magnetic (Lines 3-5: 226° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the intersection of N 200 E and East Chalk Creek Road in Coalville, travel east for approximately 6.1 miles to a turn on the right (south). Turn south onto Blonquist Lane (which turns into East South Fork Road), then continue for roughly 4.15 miles to a large pipe gate with several locks (you will need access permission and the lock combination). Approximately 300 feet from the gate is a fork: stay straight. Continue for 0.25 miles, crossing a bridge and a stream, to a sharp hairpin turn on the left (east) that leads up the side of the mountain. Turn left onto this road and proceed for roughly 1.14 miles to a fork. Continue to the left at this fork and travel for another 0.34 miles to another fork. Proceed to the right, continue for 0.3 miles to a hill, and park: there is no witness post. The 0-foot baseline stake is approximately 900 feet south of the road in the bullhogged area.

Site Information	
Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	7,180ft (2,188m)
Aspect	Southwest
Slope	10-20%
ample Dates	08/05/2025

Table 06R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Weber River Headwaters Resilience FY25 (Proposed)	6912	Between July 2024 and July 2025	61

Wildlife Habitat and Vegetation History

Table 06R-06.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 06R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2025	Mountain Big Sagebrush	Early Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	2025 - Mountain Big Sagebrush-Steppe/Non-Natives State: Community Phase 2.1

This study was established in 2025 and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated the plant community. Other preferred browse species were also present to a lesser extent, including (but not limited to) longflower rabbitbrush (*Chrysothamnus depressus*), mountain snowberry (*Symphoricarpos oreophilus*), and Utah serviceberry (*Amelanchier utahensis*) (Table 06R-06.12, Table 06R-06.13). The herbaceous understory was moderately diverse and dominated by mainly native perennial grasses and forbs such as bluebunch wheatgrass (*Pseudoroegneria spicata*) and Fendler's sandwort (*Arenaria fendleri*) (Table 06R-06.10, Table 06R-06.11). Utah juniper (*Juniperus osteosperma*) was observed despite a recent bullhog treatment (Table 06R-06.1), suggesting that there may be potential for infilling over time. However, tree density and cover were low and the site was considered to be within Early Phase I of woodland succession (Table 06R-06.12, Table 06R-06.14): this indicates that infilling is likely not an immediate concern.

Mule deer winter range condition on this site was fair in 2025. Winter range condition was mainly limited by reduced preferred browse cover and limited recruitment. Perennial grass cover was also limited (Table 06R-06.6, Table 06R-06.7, Table 06R-06.13, Table 06R-06.15). Pellet transect data indicates that deer and elk presence was low in 2025 (Table 06R-06.9). During the 2024/25 winter season the area had occurrences of collared mule deer, and occasional collared elk occurrences (Wildlife Migration Initiative). However, browse on this site received varying degrees of utilization. There were few bitterbrush plants sampled in density strips, and as such, the majority of individuals were considered to be moderately or heavily hedged. Serviceberry plants showed signs of mostly light utilization. Sagebrush was the most abundant preferred browse species, but 84% of plants showed signs of light utilization (Table 06R-06.13). Furthermore, on-site observations for 2025 noted little to no utilization of the herbaceous understory.

Trend Summary Tables

Table 06R-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
2025	9.6	4.7	0.0	11.8	2.7	-

Table 06R-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
2025	4	269	174	206	0.0	8.3	1.5	7.6

Table 06R-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
2025	13.8	0.1	67.5	0.2	1.7	26.6

Table 06R-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			
2025	1	13	4	1
Year	Days Use Per Acre (ha)			
2025	0.7 (1.8)	15.4 (38.1)	3.4 (8.3)	-

Table 06R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bromus arvensis[ai] (field brome)	Bromus inermis[i] (smooth brome)	Bromus tectorum[ai] (cheatgrass)	Carex rossii (Ross' sedge)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa[i] (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency											
2025	4	1	2	4	2	9	2	17	29	83	82	191
year	Average Cover (%)											
2025	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.4	1.3	0.7	5.4

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

Table 06R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium (onion)	Alyssum desertorum[ai] (desert madwort)	Antennaria dimorpha (low pussytoes)	Arenaria fendleri (Fendler's sandwort)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium undulatum[a] (wavyleaf thistle)	Collinsia parviflora[a] (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cordylanthus ramosus[a] (bushy bird's beak)	Cymopterus (springparsley)	Draba[a] (draba)	Erigeron pumilus (shaggy fleabane)
year	Nested Frequency																
2025	18	12	139	27	143	42	14	1	38	4	6	53	32	9	2	4	4
year	Average Cover (%)																
2025	0.3	0.1	0.5	0.4	4.4	0.8	0.1	0.0	0.1	0.0	0.0	0.5	0.5	0.1	0.0	0.0	0.0

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

FORB SPECIES	Eriogonum umbellatum (sulphur-flower buckwheat)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis[a] (slender phlox)	Penstemon humilis (low beardtongue)	Phlox austromontana (mountain phlox)	Polygonum douglasii[a] (Douglas' knotweed)
year	Nested Frequency					
2025	30	5	3	38	4	38
year	Average Cover (%)					
2025	0.7	0.0	0.0	0.2	0.0	0.2

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

Table 06R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus depressus[p] (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Purshia tridentata[p] (antelope bitterbrush)	Symphoricarpos oreophilus[p] (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)								
2025	0.6	6.8	2.8	2.4	0.2	-	0.5	1.1	0.1
year	Quadrat Cover (%)								
2025	0.4	5.3	2.3	3.5	0.8	0.0	0.6	1.1	0.3

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

Table 06R-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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2025	260	-	69	23	8	0	15	8	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2025	1980	80	20	65	15	14	2	13	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2025	3600	-	0	96	4	0	0	4	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2025	4040	20	23	61	16	0	0	21	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2025	800	-	3	95	3	0	0	3	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2025	-	20	0	0	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2025	20	-	100	0	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2025	120	-	33	67	0	33	33	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2025	620	-	7	94	0	0	13	0	- / -
Tetradymia canescens -- (spineless horsebrush)									
2025	100	-	0	100	0	0	20	20	- / -

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

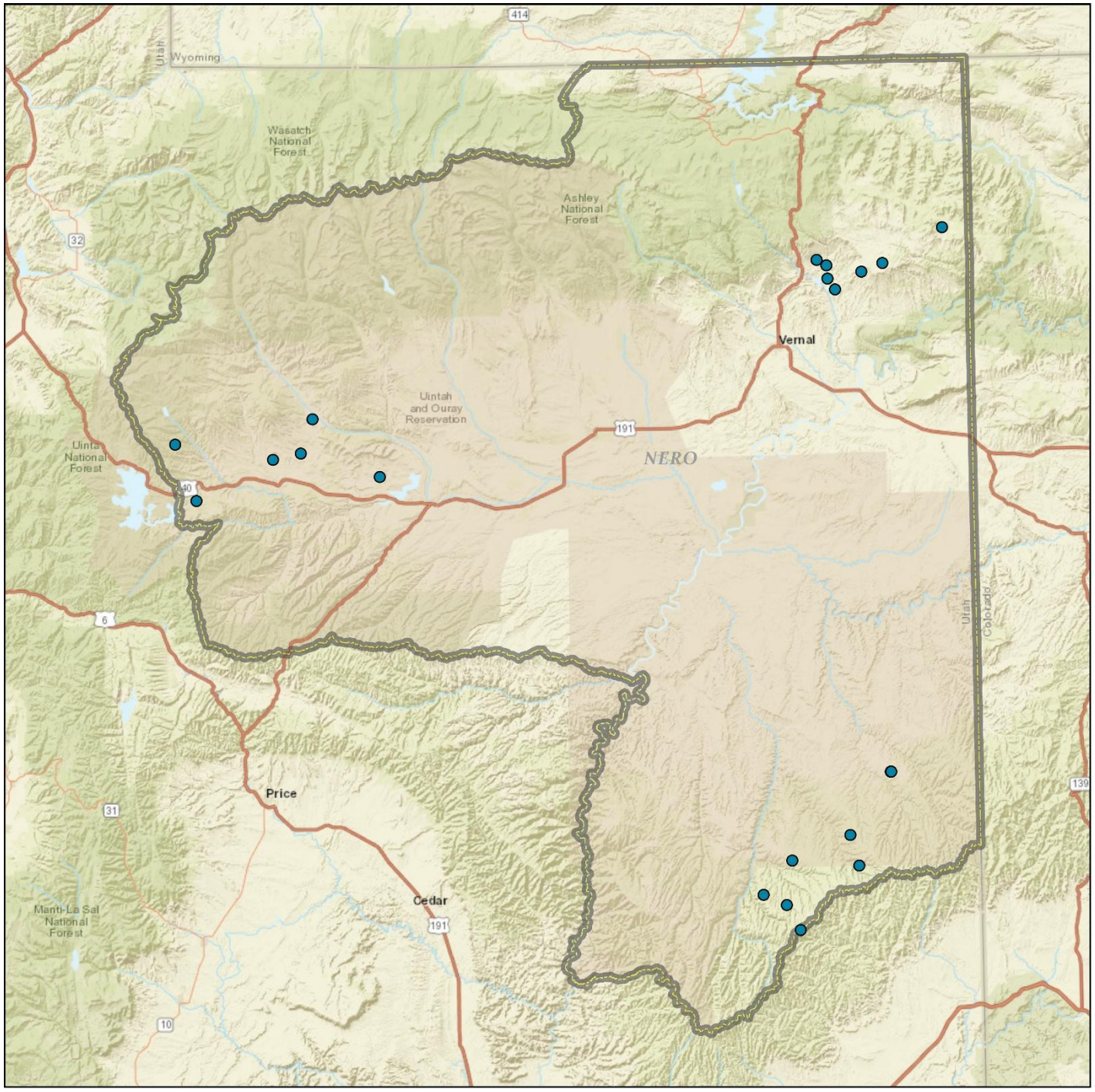
Table 06R-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2025	20	55	18	27	-	-	2.8

Table 06R-06.15 - 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
2025	14.8	11.9	8.6	15.8	0.0	10.0	0.0	**61.1**	Fair

NORTHEASTERN REGION



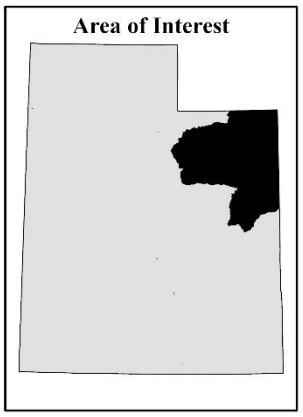
0 5 10 20 30 40 50 60 70 80 Miles

Study Locations

NERO WRI Study Sites

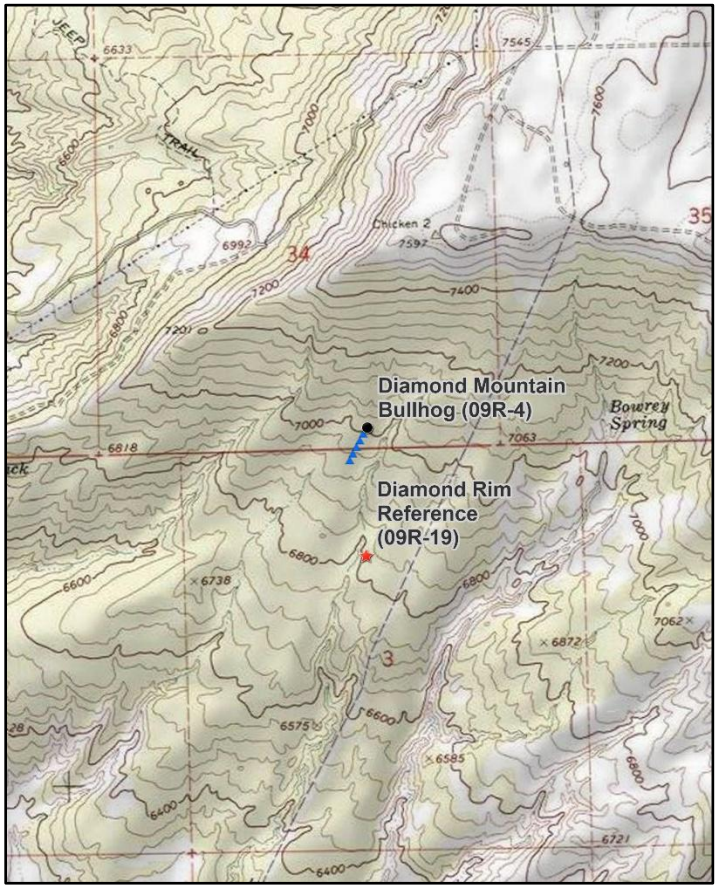
Administrative Boundaries

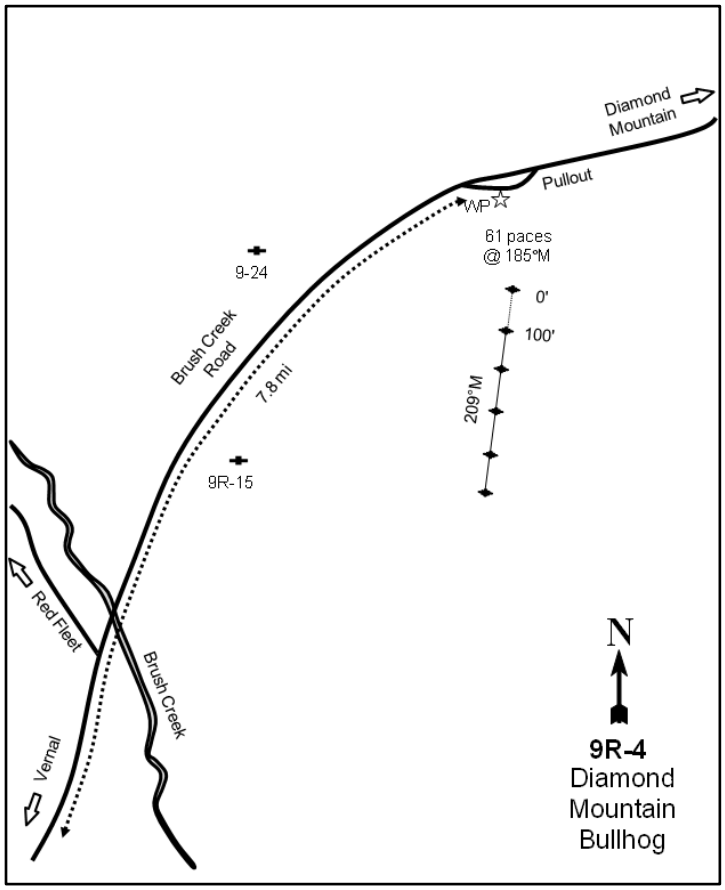
Northeastern Region



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

DIAMOND MOUNTAIN BULLHOG - STUDY NO. 09R-4





Location Information

USGS 7.5 min Map Info	Jensen Ridge NW; Township 2S, Range 23E, Section 34
GPS (0' Stake)	NAD 83 UTM ZONE 12, 642204 East 4495283 North

Transect Information

Browse Tag # (0' Stake)	133
Transect Bearing	193° 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 Vernal, travel northeast on Brush Creek Road heading toward Diamond Mountain for 7.8 miles to a pull off on the right (south) side of the road. Park in the pull off; the witness post is on the south side of the pull off. The 0-foot stake is 185 feet from the witness post at a bearing of 185 degrees magnetic and is marked with browse tag #133.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	S.J. HATCH
Elevation	7,000ft (2,134m)
Aspect	South
Slope	10-13%
Sample Dates	06/29/2004, 08/01/2007, 07/28/2009, 07/27/2010, 06/12/2012, 08/08/2016, 08/03/2020, 07/21/2025

Table 09R-04.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Diamond Rim	PDB	September 2004	320
Seeding - Aerial Before	Diamond Rim	PDB	September 2004	320
Seeding - Aerial After	Diamond Rim	PDB	November 2004	320
Hand Crew - Lop and Scatter	Diamond Mountain Maintenance Project	5105	August-October 2020	2903

Table 09R-04.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Diamond Rim			Aerial	Sep 2004	320
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Dactylis glomerata	Orchardgrass	Paiute	2.03	1.74
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.03	1.85
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.47	0.38
F	Linum perenne	Blue Flax	Appar	0.94	0.79
F	Medicago sativa	Alfalfa	Ladak+	2.03	1.93
F	Melilotus officinalis	Yellow Sweetclover		0.94	0.87
F	Onobrychis viciifolia	Sainfoin		1.09	1.05
F	Sanguisorba minor	Small Burnet	Delar	2.03	1.93
S	Atriplex canescens	Fourwing Saltbush		0.47	0.21

Mix Name			Application Type	Application Date	Acres
Diamond Rim Shrubs			Aerial	Nov 2004	320
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		1.00	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.28

Wildlife Habitat and Vegetation History

Table 09R-04.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 09R-04.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Utah Juniper	Phase III
2007	Annual-Perennial Grass	Early Phase I
2009	Black Sagebrush/Wyoming Big Sagebrush	Early Phase I
2010	Black Sagebrush/Wyoming Big Sagebrush	Early Phase I
2012	Wyoming Big Sagebrush/Black Sagebrush	Early Phase I
2016	Wyoming Big Sagebrush/Black Sagebrush	Early Phase I
2020	Wyoming Big Sagebrush/Black Sagebrush	Early Phase I
2025	Wyoming Big Sagebrush/Black Sagebrush	Early Phase I

Site Notes

The study is located approximately five and one half miles east of Red Fleet Reservoir within a treated two-needle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland. The Upland Stony Loam (Wyoming Big Sagebrush) ecological type, R034BY334UT, is also a major component of this site.

Soils

Table 09R-04.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.6	61.4	19.1	19.5	2.0	7.0	153.6	0.6	06/29/2004

Site Potential

1981 - 2010 Average Annual Precipitation 13 inches

NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R034BY320UT
States and Transitions	2004 - State Undefined: Community Phase Undefined 2007 - Introduced Annuals/Biennials State: Community Phase 3.1 2009-2025 - Black Sagebrush/Introduced Non-Natives State: Community Phase Undefined

This site was dominated by Utah juniper (*Juniperus osteosperma*) when it was established in 2004. Juniper cover was greatly reduced following a bullhog treatment later that year (Table 09R-04.1, Table 09R-04.12) and annual and perennial grasses, particularly cheatgrass (*Bromus tectorum*) and squirreltail (*Elymus elymoides*), were the dominant vegetation components in 2007 (Table 09R-04.7, Table 09R-04.10). Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and black sagebrush (*A. nova*) increased in abundance and cover and have been the main components of the community since 2009 (Table 09R-04.12, Table 09R-04.13). Utah juniper seedlings and young have been observed during all post-treatment samplings despite the original treatment and a 2020 lop and scatter project (Table 09R-04.1, Table 09R-04.14). However, the site has been considered to be within Early Phase I of woodland succession in all post-treatment sample years (Table 09R-04.4), suggesting that infilling is likely not an immediate concern.

Condition of this site as mule deer winter range has varied between very poor and good-excellent since 2004; winter range condition is considered to be good as of 2025. Factors that negatively influence this site's condition include reduced cover and recruitment of preferred browse, reduced perennial grass cover, and the presence of annual grass (Table 09R-04.6, Table 09R-04.7, Table 09R-04.13, Table 09R-04.15). Pellet transect data indicates that deer presence has been low in most sample years, but it was moderate in 2016; elk presence has been similar. During the 2024/25 winter season the area had occasional nearby occurrences of collared mule deer (Wildlife Migration Initiative). Over 80% of Wyoming big sagebrush plants were moderately to heavily browsed in 2012, but most plants showed signs of light utilization in most other years. Black sagebrush has shown similar utilization trends as Wyoming big sagebrush, but utilization impact was higher in 2025 for black sagebrush. Cattle presence has been low to moderate in many sample years (Table 09R-04.9, Table 09R-04.13). On-site observations for 2025 noted moderate utilization (20-40%) of western wheatgrass (*Pascopyrum smithii*).

Trend Summary Tables

Table 09R-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
2004	3.0	0.0	16.7	2.3	-	39.0
2007	3.3	-	-	4.6	-	-
2009	6.3	0.0	-	11.9	-	-
2010	8.3	-	-	11.0	-	-
2012	8.7	0.6	-	14.2	0.2	-
2016	15.1	0.0	-	17.0	0.2	-
2020	20.4	0.7	-	21.0	0.4	-
2025	21.0	2.3	0.0	18.5	3.4	-

Table 09R-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
2004	132	107	3	95	0.8	0.6	0.0	1.2
2007	344	175	30	125	14.0	8.6	0.2	5.8
2009	302	195	51	109	5.4	7.3	1.4	4.0
2010	164	241	103	151	1.5	7.5	1.7	6.1
2012	145	246	29	174	0.7	7.8	0.1	4.6
2016	154	250	47	154	2.9	11.0	0.3	8.3
2020	133	207	19	157	1.6	8.7	0.1	9.1
2025	102	197	18	150	1.3	8.1	0.1	7.9

Table 09R-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
2004	15.1	2.4	46.3	9.5	22.9	21.0
2007	3.8	0.0	62.2	2.2	8.6	32.1
2009	2.5	0.0	65.1	2.6	11.3	26.2
2010	3.3	0.0	65.6	2.8	10.1	27.1
2012	2.7	0.0	72.1	1.1	8.2	25.6
2016	1.8	0.0	58.5	2.7	7.9	38.1
2020	1.3	0.0	72.0	1.8	8.5	38.1
2025	3.8	0.2	63.2	0.7	11.2	35.5

Table 09R-04.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2004	-	-	1	7	65
2007	-	-	1	19	23
2009	6	-	12	10	3
2010	2	-	9	3	-
2012	3	-	2	6	1
2016	1	-	18	6	15
2020	3	-	19	10	5
2025	4	-	16	9	15
Year	Days Use Per Acre (ha)				
2004	-	-	5.3 (13.2)	8.7 (21.5)	-
2007	2.2 (5.4)	8.7 (21.5)*	7.4 (18.2)	25.5 (62.9)	-
2009	10.9 (26.9)	-	6.0 (14.9)	20.1 (49.7)	-
2010	5.8 (14.3)	-	6.0 (14.9)	12.8 (31.5)	-
2012	2.9 (7.2)	-	0.7 (1.7)	8.1 (19.9)	-
2016	13.8 (34.1)	-	30.8 (76.1)	31.5 (77.8)	-
2020	9.4 (23.3)	-	20.1 (49.7)	15.4 (38.1)	-
2025	1.5 (3.6)	-	15.4 (38.1)	13.4 (33.1)	-

*Pellets per acre (ha)

Table 09R-04.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus inermis[i] (smooth brome)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency												
2004	50	14	-	-	132	-	-	22	-	-	-	27	-
2007	9	2	3	-	344	4	17	133	-	10	-	35	-
2009	17	0	23	-	302	-	23	144	-	37	-	27	3
2010	10	7	17	-	164	2	19	184	-	26	-	44	2
2012	3	4	35	-	145	6	21	165	-	42	1	21	2
2016	21	4	31	-	154	-	3	130	-	80	-	23	-
2020	12	1	48	5	133	5	1	75	-	68	8	46	3
2025	26	-	43	10	102	-	-	19	1	78	1	61	-
year	Average Cover (%)												
2004	0.2	0.1	-	-	0.8	-	-	0.2	-	-	-	0.1	-
2007	0.5	0.0	0.2	-	14.0	0.1	0.5	6.7	-	0.2	-	0.4	-
2009	0.6	0.0	0.4	-	5.4	-	0.7	4.2	-	0.9	-	0.3	0.0
2010	0.1	0.2	0.4	-	1.5	0.0	0.6	5.3	-	0.6	-	0.3	0.0
2012	0.2	0.0	0.7	-	0.7	0.1	0.3	5.1	-	1.0	0.0	0.3	0.0
2016	0.5	0.1	1.2	-	2.9	-	0.2	2.5	-	6.2	-	0.3	-
2020	0.4	0.0	1.2	0.1	1.6	0.2	0.0	1.5	-	5.0	0.0	0.4	0.0
2025	0.6	-	1.6	0.4	1.3	-	-	0.3	0.0	4.5	0.0	0.7	-

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

Table 09R-04.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum[ai] (desert madwort)	Arabis (rockcress)	Arenaria fendleri (Fendler's sandwort)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cirsium (thistle)	Cryptantha (cryptantha)	Cymopterus longipes (longstalk springparsley)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Erigeron (fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua[a] (shy gilia)	Grindelia squarrosa (curlycup gumweed)
year	Nested Frequency																
2004	-	-	27	-	5	-	-	-	-	9	1	-	-	-	-	-	-
2007	-	-	2	6	45	-	-	-	-	2	35	3	-	-	-	16	-
2009	-	1	-	7	18	-	-	-	-	-	2	-	-	-	-	-	-
2010	-	-	-	13	85	-	1	4	1	-	21	-	1	-	-	3	-
2012	4	-	-	11	75	2	-	-	-	-	22	3	-	-	-	-	2
2016	-	1	3	19	95	-	-	3	-	1	10	6	-	1	4	9	-
2020	2	-	2	0	98	-	-	-	-	3	18	3	-	-	-	-	3
2025	10	6	-	3	81	-	-	-	-	2	11	11	-	-	3	-	6
year	Average Cover (%)																
2004	-	-	0.1	-	0.0	-	-	-	-	0.0	0.0	-	-	-	-	-	-
2007	-	-	0.0	0.0	2.1	-	-	-	-	0.0	0.2	0.1	-	-	-	0.0	-
2009	-	0.0	-	0.0	0.7	-	-	-	-	-	0.0	-	-	-	-	-	-
2010	-	-	-	0.1	2.7	-	0.0	0.0	0.1	-	0.1	-	0.0	-	-	0.0	-
2012	0.0	-	-	0.0	1.6	0.0	-	-	-	-	0.1	0.0	-	-	-	-	0.1
2016	-	0.0	0.0	0.0	4.0	-	-	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-
2020	0.0	-	0.0	0.0	4.4	-	-	-	-	0.0	0.1	0.0	-	-	-	-	0.0
2025	0.1	0.0	-	0.0	3.4	-	-	-	-	0.0	0.1	0.0	-	-	0.0	-	0.3

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

FORB SPECIES	Heterotheca villosa (hairy false goldenaster)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Lithospermum incisum (narrowleaf stoneseed)	Lupinus argenteus (silvery lupine)	Medicago sativa[i] (alfalfa)	Melilotus officinalis[i] (sweetclover)	Microsteris gracilis[a] (slender phlox)	Oenothera (evening primrose)	Onobrychis viciifolia[i] (sainfoin)	Penstemon humilis (low beardtongue)	Petradoria pumila (rock goldenrod)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)
year	Nested Frequency																
2004	-	-	-	-	-	-	-	-	-	-	-	-	3	56	1	2	-
2007	-	1	-	-	20	-	-	14	-	-	-	1	4	33	6	-	-
2009	-	-	38	-	23	-	-	16	-	-	-	0	-	42	10	10	-
2010	-	1	83	2	12	-	-	17	1	-	-	1	4	47	2	3	3
2012	-	-	19	-	27	1	-	20	-	-	3	2	2	52	6	9	-
2016	-	3	16	-	6	2	-	8	-	3	-	0	2	46	1	1	-
2020	3	-	6	-	11	1	3	13	-	-	-	1	1	62	3	8	-
2025	3	-	-	4	-	-	-	13	-	-	-	-	-	66	6	3	-
year	Average Cover (%)																
2004	-	-	-	-	-	-	-	-	-	-	-	-	0.0	1.0	0.0	0.0	-
2007	-	0.1	-	-	1.0	-	-	0.4	-	-	-	0.0	0.0	1.7	0.0	-	-
2009	-	-	0.4	-	1.2	-	-	0.3	-	-	-	0.0	-	1.5	0.2	0.1	-
2010	-	0.0	1.0	0.0	0.4	-	-	0.9	0.1	-	-	0.0	0.1	1.4	0.0	0.0	0.0
2012	-	-	0.1	-	0.2	0.1	-	1.0	-	-	0.0	0.0	0.0	1.2	0.0	0.0	-
2016	-	0.1	0.1	-	0.0	0.0	-	0.8	-	0.0	-	0.0	0.0	3.0	0.0	0.0	-
2020	0.1	-	0.0	-	0.1	0.2	0.0	0.9	-	-	-	0.0	0.0	3.2	0.0	0.0	-
2025	0.1	-	-	0.0	-	-	-	0.2	-	-	-	-	-	3.5	0.1	0.0	-

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

FORB SPECIES	Polygonum douglasii[a] (Douglas' knotweed)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	Townsendia (Townsend daisy)	Tragopogon dubius[ai] (yellow salsify)	Trifolium longipes (longstalk clover)	unknown annual forb[a] (unknown forb)
year	Nested Frequency								
2004	-	3	-	-	-	-	-	6	-
2007	-	11	6	-	-	5	-	-	-
2009	-	27	1	-	-	-	2	5	0
2010	1	20	0	-	3	1	4	8	-
2012	-	-	6	-	-	4	7	12	-
2016	3	2	-	-	-	4	9	4	-
2020	3	-	-	-	-	-	8	1	-
2025	-	-	-	4	-	-	-	5	-
year	Average Cover (%)								
2004	-	0.0	-	-	-	-	-	0.0	-
2007	-	0.1	0.2	-	-	0.0	-	-	-
2009	-	0.9	0.0	-	-	-	0.0	0.0	0.0
2010	0.0	0.5	0.0	-	0.0	0.0	0.2	0.0	-
2012	-	-	0.1	-	-	0.0	0.0	0.0	-
2016	0.0	0.0	-	-	-	0.1	0.1	0.0	-
2020	0.0	-	-	-	-	-	0.0	0.0	-
2025	-	-	-	0.0	-	-	-	0.0	-

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

Table 09R-04.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. speciosa[p] (rubber rabbitbrush)	Eriogonum microthecum[p] (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)										
2004	2.3	-	-	-	-	-	-	-	39	-	0
2007	2.6	1.6	0.4	-	-	-	-	-	-	-	-
2009	6.3	4.3	0.6	-	-	0.5	-	-	-	-	0.2
2010	4.4	4.6	0.8	-	-	1.1	-	-	-	-	0.1
2012	5.5	6.3	0.9	-	0.2	1.3	-	-	-	-	0.2
2016	6	9.1	-	-	-	1.6	-	0.2	-	-	0.3
2020	7.7	10.6	-	0.3	0.1	2.4	-	0	-	-	0.3
2025	7.8	10.4	-	-	2.7	-	-	0.7	-	0	0.3
year	Quadrat Cover (%)										
2004	3.0	-	-	-	-	-	0.0	-	16.7	0.0	0.0
2007	1.8	1.4	0.0	-	-	0.1	-	-	-	-	-
2009	3.6	2.4	0.0	-	-	0.4	-	0.0	-	-	0.0
2010	3.3	3.8	0.1	-	-	1.0	-	-	-	-	0.0
2012	2.9	4.0	0.6	-	0.6	1.1	-	-	-	-	0.0
2016	5.0	8.2	-	-	-	1.8	0.0	0.0	-	-	0.1
2020	7.5	11.4	-	0.0	0.5	1.4	-	0.2	-	-	0.1
2025	7.5	13.3	-	-	1.9	-	-	0.3	0.0	0.1	0.1

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

Table 09R-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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2004	2560	180	26	53	21	21	44	7	21/39
2007	1700	860	6	91	4	6	0	1	26/46
2009	-	-	-	-	-	-	-	-	29/49
2010	4340	2520	49	51	0	11	12	1	25/53
2012	3620	200	47	53	1	50	1	0	25/52
2016	3300	40	41	58	2	32	10	5	29/61
2020	4540	-	20	72	8	11	7	10	28/53
2025	4160	-	14	85	1	36	9	1	- / -
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	2020	1460	36	64	0	1	0	0	45/53
2009	-	-	-	-	-	-	-	-	52/66
2010	2900	4980	57	43	1	12	11	6	52/73
2012	2080	5300	39	62	0	73	12	4	58/77
2016	4200	-	54	45	1	20	21	1	51/77
2020	3180	20	30	55	15	19	13	15	57/93
2025	2820	20	27	68	5	16	1	5	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Atriplex canescens[P] -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	20	-	0	100	0	0	0	0	75/126
2009	-	-	-	-	-	-	-	-	54/65
2010	20	-	0	100	0	0	0	0	56/86
2012	20	-	0	100	0	100	0	0	92/160
2016	-	-	-	-	-	-	-	-	99/157
2020	-	-	-	-	-	-	-	-	74/129
2025	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	32/56
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	100	-	0	100	0	0	0	0	30/45
2025	-	-	-	-	-	-	-	-	-/-
Eriogonum microthecum[P] -- (slender buckwheat)									
2004	60	-	33	33	33	0	100	0	3/3
2007	20	-	0	100	0	0	0	0	17/15
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	20	-	0	100	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	20	-	0	100	0	0	0	0	62/108
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	83/132
2012	20	-	0	100	0	0	0	0	67/105
2016	-	-	-	-	-	-	-	-	-/-
2020	80	-	0	100	0	0	0	0	84/123
2025	160	-	0	88	13	0	0	13	- / -
Ericameria nauseosa ssp. nauseosa var. speciosa[P] -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	20	-	0	100	0	0	0	0	52/56
2009	-	-	-	-	-	-	-	-	66/96
2010	60	-	0	100	0	0	0	0	71/113
2012	20	-	0	100	0	0	0	0	84/134
2016	100	100	60	40	0	0	0	0	95/131
2020	100	-	0	100	0	0	0	0	98/146
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2004	20	-	100	0	0	0	0	0	- / -
2007	-	-	-	-	-	-	-	-	28/37
2009	-	-	-	-	-	-	-	-	25/38
2010	-	-	-	-	-	-	-	-	23/29
2012	-	-	-	-	-	-	-	-	16/18
2016	260	-	31	69	0	0	0	0	22/28
2020	220	-	0	100	0	0	0	0	22/29
2025	300	-	7	93	0	0	0	0	- / -

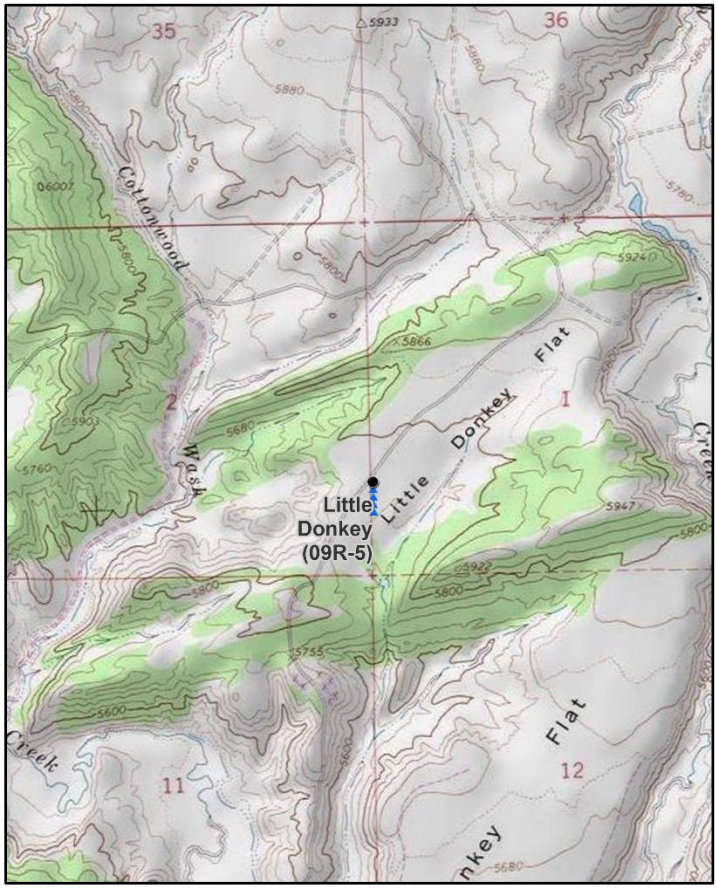
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Juniperus osteosperma[t] -- (Utah juniper)									
2004	500	20	12	76	12	4	0	0	- / -
2007	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	-/-
2010	-	20	0	0	0	0	0	0	- / -
2012	-	20	0	0	0	0	0	0	- / -
2016	-	20	0	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	- / -
2025	20	-	100	0	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2004	40	-	0	100	0	0	0	0	9/40
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	10/26
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	12/35
2016	20	-	0	100	0	0	0	0	12/18
2020	-	-	-	-	-	-	-	-	-/-
2025	160	-	0	100	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2004	60	-	0	67	33	0	100	33	18/120
2007	40	-	0	100	0	0	100	0	21/139
2009	-	-	-	-	-	-	-	-	26/109
2010	40	-	0	100	0	0	100	0	22/94
2012	40	-	0	100	0	0	100	0	22/132
2016	60	-	0	100	0	100	0	0	30/160
2020	60	-	0	100	0	67	0	0	26/155
2025	200	-	0	100	0	0	100	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	27/23
2020	-	-	-	-	-	-	-	-	33/96

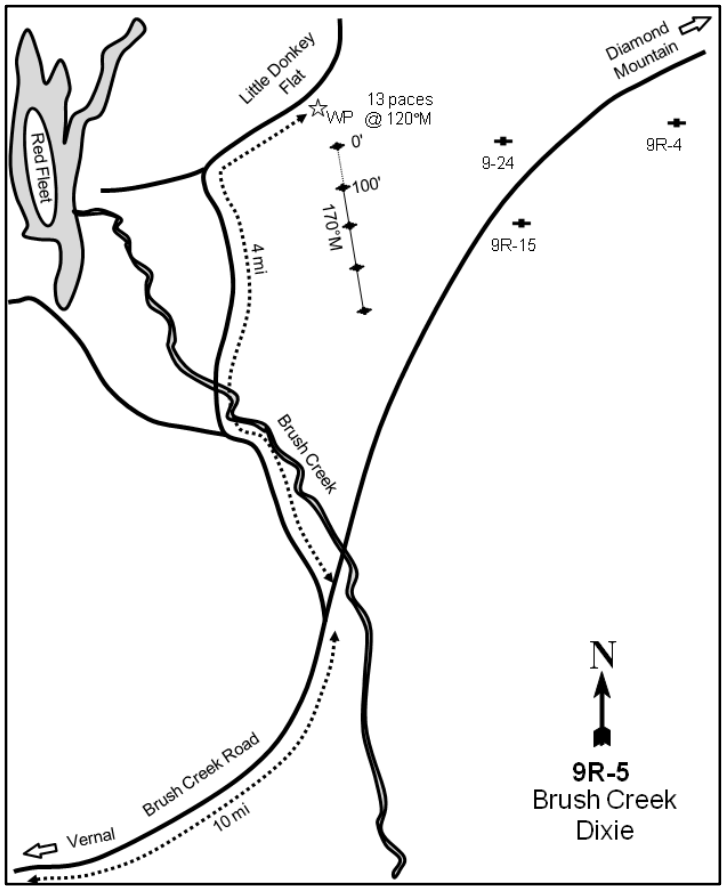
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 09R-04.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2004	444	-	10	20	20	50	33.9
2007	9	57	43	-	-	-	12.9
2009	10	11	89	-	-	-	3.4
2012	7	-	100	-	-	-	16.7
2016	12	83	17	-	-	-	9.5
2020	11	13	75	13	-	-	3.4
2025	18	25	75	-	-	-	2.3

LITTLE DONKEY - STUDY NO. 09R-5





Location Information

USGS 7.5 min Map Info	Donkey Flat NE; Township 3S, Range 22E, Section 01
GPS (0' Stake)	NAD 83 UTM ZONE 12, 635070 East 4493818 North

Transect Information

Browse Tag # (0' Stake)	120
Transect Bearing	170° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

From Vernal, travel northeast on Brush Creek Road heading toward Diamond Mountain. Turn left (north) at the Red Fleet turnoff just before crossing Brush Creek. Follow the road as it turns north toward Little Donkey Flat. There is a witness post on the right-hand (southeast) side of the road. The 0-foot stake is 13 paces from the witness post at 120 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	DONKEY FLAT
Elevation	5,800ft (1,768m)
Aspect	South
Slope	3%
Sample Dates	06/29/2004, 07/31/2007, 06/11/2012, 08/10/2016, 08/04/2020, 07/21/2025

Table 09R-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Roundup	Red Fleet	PDB	October 2004	-
Seeding - Truax Drill	Red Fleet	PDB	November 2004	470
Seeding - Drill	Vernal Cattle Unit Reseeding 1953	LTDL 12308-3321	September-November 1953	765

Table 09R-05.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Red Fleet			Drill	Nov 2004	470
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.83
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.92
F	Achillea millefolium	Western Yarrow		0.11	0.10
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.00	0.90
F	Linum perenne	Blue Flax	Appar	0.11	0.10
F	Medicago sativa	Alfalfa	Ladak+	1.49	1.37
F	Onobrychis viciifolia	Sainfoin	Eski	1.49	1.36
F	Sanguisorba minor	Small Burnet	Delar	2.50	2.36
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.43	0.12
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.53	0.05
S	Atriplex canescens	Fourwing Saltbush	Emery UT	1.00	0.45
S	Bassia prostrata	Forage Kochia	Immigrant	1.06	0.71

Wildlife Habitat and Vegetation History

Table 09R-05.3 - 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

Table 09R-05.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Perennial Grass	No Encroachment
2007	Annual Grass-Forb	No Encroachment
2012	Wyoming Big Sagebrush	No Encroachment
2016	Forage Kochia	No Encroachment
2020	Forage Kochia	Early Phase I
2025	Forage Kochia	No Encroachment

Site Notes

This study is located approximately one mile northeast of the Red Fleet Reservoir Dam.

Soils

Table 09R-05.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.7	60.4	22.1	17.5	0.9	14.7	316.8	0.6	06/29/2004

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2004 - Seeded State: Community Phase 5.1 2007 - Invasive Annual State: Community Phase 4.1 2012 - Seeded State: Community Phase 5.2 2016-2025 - Seeded State: Community Phase Undefined

When the study was established in 2004, the plant community was dominated by the perennial grass species crested wheatgrass (*Agropyron cristatum*) which was targeted for reduction in the fall of 2004 (Table 09R-05.1). In 2007, the annual grass sixweeks fescue (*Vulpia octoflora*) along with the annual forb woolly plantain (*Plantago patagonica*) responded with an increase in both cover and abundance and became the dominant plants in the community (Table 09R-05.7, Table 09R-05.10, Table 09R-05.11). In 2011, the

community transitioned from one influenced by annuals to a community with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) as the major component. In 2016, forage kochia (*Bassia prostrata*) increased significantly in cover and density (Table 09R-05.6, Table 09R-05.12, Table 09R-05.13); the introduced annual grass cheatgrass (*Bromus tectorum*) was also sampled in high abundance that year (Table 09R-05.10). In 2020, annual and perennial grasses and forbs were found to have decreased substantially in both abundance and cover, while forage kochia remained the dominant component in the community: these trends continued into the 2025 sample year. Wyoming big sagebrush also exhibited a notable decrease in cover and density between 2020 and 2025 (Table 09R-05.7, Table 09R-05.12, Table 09R-05.13). The community appears to be dynamic and has had large population shifts between sample years, but forage kochia has remained the dominant vegetation component for the last three samplings. However, with consideration of community variability, it may be difficult to determine outcomes for future land treatment implementations.

Condition of this site as mule deer winter range has varied between very poor and good since 2004; winter range condition is considered to be fair as of 2025. Factors that negatively influence this site's condition include reduced cover and recruitment of preferred browse, low perennial grass and forb cover, and the presence of annual grass (Table 09R-05.6, Table 09R-05.7, Table 09R-05.13, Table 09R-05.15). Pellet transect data indicates that deer presence has been moderate in most sample years, but was high in 2012. During the 2024/25 winter season the area had occasional nearby occurrences of collared mule deer (Wildlife Migration Initiative). Wyoming big sagebrush utilization was very high between 2012 and 2020, and the heaviest post-treatment utilization occurred in 2016. The highest utilization on sagebrush occurred in 2004, but this is a skewed representation of use as the population of sagebrush was quite small. High utilization appeared to shift from sagebrush to forage kochia in 2020 and 2025. Cattle presence has been moderate to high in many sample years (Table 09R-05.9, Table 09R-05.13). On-site observations for 2025 noted heavy utilization (>40%) of crested wheatgrass while little to no utilization was observed on perennial forbs.

Trend Summary Tables

Table 09R-05.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	0.4	2.7	-	0.2	2.8	-
2007	2.8	1.0	-	1.9	1.8	-
2012	13.6	1.4	-	12.2	1.4	-
2016	17.5	3.5	-	22.9	4.5	-
2020	15.6	5.2	0.0	19.3	6.1	-
2025	9.2	7.8	-	11.9	10.1	-

Table 09R-05.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	301	266	237	177	5.3	17.2	3.0	2.7
2007	490	109	450	107	20.5	1.7	16.9	0.6
2012	258	141	263	80	2.1	2.9	1.1	0.3
2016	402	119	275	76	14.5	5.3	3.7	0.2
2020	300	99	386	25	4.5	2.7	3.9	0.1
2025	57	50	-	34	0.1	0.9	-	0.1

Table 09R-05.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	53.7	1.0	17.3	0.1	-	37.9
2007	36.2	0.4	29.0	0.0	0.0	47.3
2012	63.1	0.0	18.9	0.0	0.0	23.0
2016	35.5	0.0	29.6	0.0	-	41.6
2020	58.0	0.0	30.7	0.0	-	29.0
2025	74.2	-	15.6	0.1	-	17.3

Table 09R-05.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Horse	Shiras Moose	Rabbit	White-tailed Prairie Dog
	Quadrat Frequency							
2004	16	35	11	1	-	-	77	-
2007	5	10	1	-	-	-	96	-
2012	5	41	-	-	1	-	21	-
2016	7	30	-	-	-	-	61	-
2020	10	32	-	-	-	-	27	-
2025	14	27	-	-	1	-	20	20
Year	Days Use Per Acre (ha)							
2004	6.5 (16.1)	10.7 (26.5)	7.4 (18.2)	-	-	0.5 (1.2)	-	-
2007	7.2 (17.9)	11.4 (28.1)	6.0 (14.9)	-	-	-	-	-
2012	7.2 (17.9)	40.9 (101.0)	-	-	-	-	-	-
2016	45.7 (113.0)	31.5 (77.8)	-	-	-	-	-	-
2020	14.5 (35.9)	32.2 (79.5)	3.4 (8.3)	-	-	-	-	-
2025	26.2 (64.6)	20.1 (49.7)	-	-	-	-	-	-

Table 09R-05.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus arvensis[ai] (field brome)	Bromus tectorum[ai] (cheatgrass)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency								
2004	3	241	-	-	-	6	42	-	301
2007	-	101	-	145	-	-	4	6	490
2012	9	103	-	187	17	5	18	8	132
2016	-	105	0	402	5	-	4	6	12
2020	-	92	-	279	3	-	9	-	119
2025	-	48	-	49	-	-	7	-	8
year	Average Cover (%)								
2004	0.0	16.3	-	-	-	0.2	0.7	-	5.3
2007	-	1.6	-	1.0	-	-	0.0	0.1	19.6
2012	0.2	2.2	-	1.7	0.1	0.3	0.1	0.1	0.3
2016	-	5.1	0.0	14.5	0.2	-	0.0	0.1	0.1
2020	-	2.6	-	4.2	0.0	-	0.1	-	0.3
2025	-	0.9	-	0.1	-	-	0.0	-	0.0

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

Table 09R-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Arabis (rockcress)	Calochortus nuttallii (sego lily)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Chorispora tenella[ai] (crossflower)	Collinsia parviflora[a] (maiden blue eyed Mary)	Descurainia pinnata[a] (western tansymustard)	Grindelia squarrosa (curlycup gumweed)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa[i] (alfalfa)	Plantago patagonica[a] (woolly plantain)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	unknown perennial forb (unknown forb)
year	Nested Frequency															
2004	-	-	6	48	-	-	-	-	-	31	1	-	207	-	170	3
2007	2	-	-	-	-	-	7	-	-	85	1	7	442	59	99	-
2012	26	-	-	-	3	3	-	-	-	37	11	2	249	7	70	-
2016	41	-	18	2	-	-	-	-	-	52	-	-	254	2	61	-
2020	209	1	-	-	-	1	2	2	1	32	-	-	320	-	23	-
2025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34	-
year	Average Cover (%)															
2004	-	-	0.0	0.1	-	-	-	-	-	0.8	0.0	-	2.1	-	2.6	0.0
2007	0.0	-	-	-	-	-	0.1	-	-	0.9	0.0	0.0	15.4	0.5	0.5	-
2012	0.1	-	-	-	0.0	0.0	-	-	-	0.1	0.0	0.0	0.6	0.3	0.3	-
2016	0.7	-	0.0	0.0	-	-	-	-	-	0.5	-	-	2.5	0.0	0.2	-
2020	1.0	0.0	-	-	-	0.0	0.0	0.0	0.0	0.1	-	-	2.7	-	0.1	-
2025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-

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

Table 09R-05.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Bassia prostrata[pi] (forage kochia)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Grayia spinosa[p] (spiny hopsage)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)								
2004	0.2	-	-	-	-	-	1.2	-	1.6
2007	1.7	-	0.2	-	0	-	1.6	-	0.2
2012	10.2	-	2	-	-	-	0.8	-	0.6
2016	7	-	15.9	-	-	-	3.4	-	1.1
2020	6.2	-	13.1	-	-	-	3.2	-	2.9
2025	1.7	-	10.2	-	-	-	6.4	-	3.7
year	Quadrat Cover (%)								
2004	0.4	-	-	-	-	-	1.2	-	1.5
2007	2.4	-	0.5	0.0	0.0	0.0	0.9	-	0.1
2012	8.2	-	5.4	-	-	-	0.8	-	0.7
2016	4.4	0.1	13.0	-	-	-	1.1	-	2.5
2020	6.0	0.1	9.4	-	-	0.0	2.5	0.0	2.6
2025	1.8	0.1	7.1	-	-	0.1	4.5	-	3.3

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

Table 09R-05.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[P] -- (black sagebrush)									
2004	20	-	0	0	100	0	100	100	25/37
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	120	-	17	17	67	33	67	83	- / -
2025	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. wyomingensis[P] -- (Wyoming big sagebrush)									
2004	80	-	0	75	25	0	100	0	35/58
2007	6440	5380	68	32	0	22	3	0	21/25
2012	10240	60	23	77	0	8	89	74	31/42
2016	5420	20	7	63	30	49	35	31	31/44
2020	3080	20	7	75	18	29	28	23	32/46
2025	500	-	16	68	16	32	8	16	- / -
Atriplex canescens[P] -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	33/43
2016	20	-	0	100	0	0	0	0	65/67
2020	20	-	0	0	100	0	100	100	34/34
2025	20	-	0	0	100	0	100	100	- / -
Bassia prostrata[Pi] -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	2880	540	24	76	0	24	25	0	12/19
2012	36720	54020	87	13	0	12	40	2	15/19
2016	39700	1600	24	76	0	10	0	0	15/24
2020	45300	160	6	94	0	57	34	3	8/19
2025	32180	100	16	74	10	11	85	11	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2004	40	-	0	100	0	0	0	0	10/17
2007	200	20	20	80	0	0	0	0	14/18
2012	-	-	-	-	-	-	-	-	19/28
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	14/26
2025	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	20	-	0	100	0	0	0	0	20/34
2007	100	20	60	40	0	20	0	0	23/27
2012	40	-	0	100	0	100	0	0	41/43
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2004	4520	-	26	74	1	0	0	0	12/15
2007	1800	320	8	68	24	4	0	22	16/21
2012	1860	-	23	77	0	4	8	11	10/14
2016	5680	80	22	79	0	0	0	0	20/19
2020	11340	20	19	78	2	0	0	2	16/17
2025	10520	-	6	91	3	0	0	3	- / -

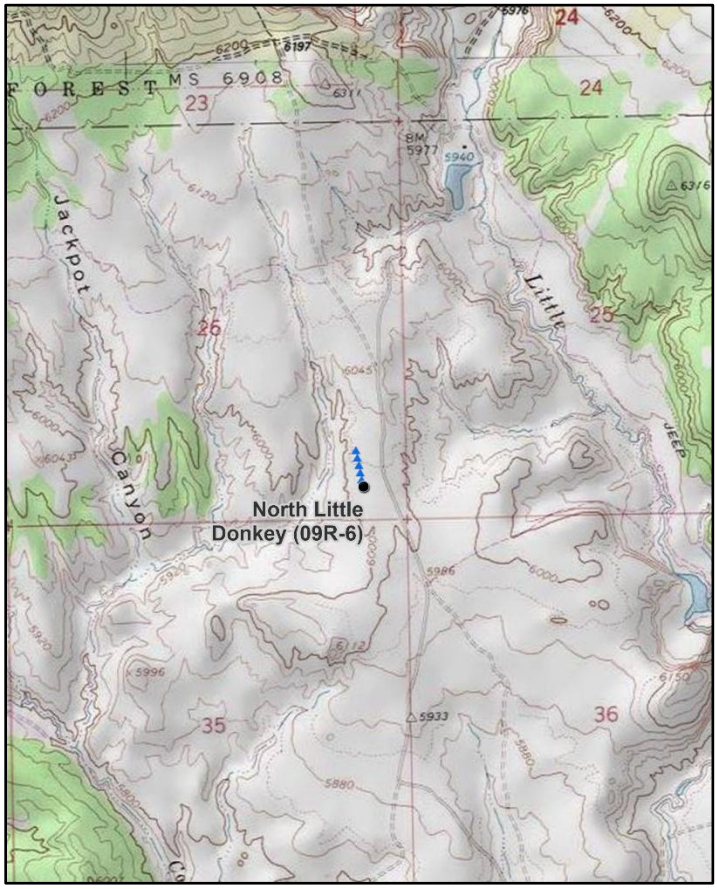
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Juniperus osteosperma[t] -- (Utah juniper)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	20	0	0	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
2004	1260	-	5	91	5	0	0	0	10/45
2007	1000	-	2	54	44	0	0	32	8/31
2012	1220	-	8	90	2	0	0	2	9/30
2016	4380	-	1	99	1	1	0	1	10/39
2020	1060	-	4	94	2	0	0	11	9/56
2025	1780	-	0	91	9	0	1	9	- / -

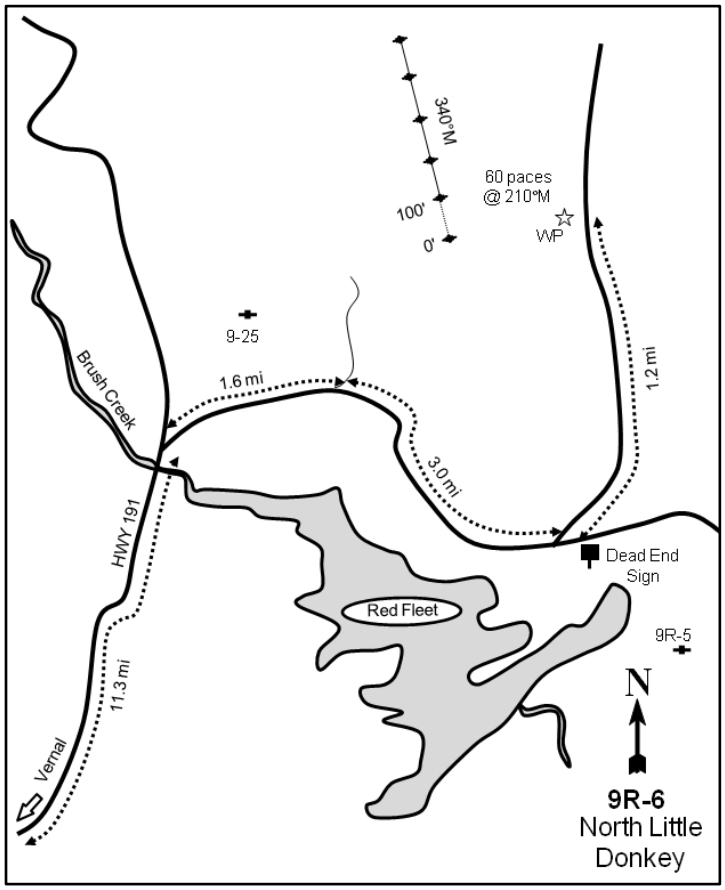
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 09R-05.15 - 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
2004	0.3	0.0	0.0	30.0	-4.0	5.4	0.0	**31.7**	Fair
2007	2.4	0.0	0.0	3.4	-15.4	1.1	0.0	**-8.5**	Very Poor
2012	15.8	14.9	15.0	5.9	-1.6	0.7	0.0	**50.7**	Good
2016	30.0	12.2	9.4	10.6	-10.9	0.5	0.0	**51.8**	Good
2020	27.4	13.3	3.1	5.4	-3.4	0.2	0.0	**46.0**	Fair-Good
2025	17.4	11.7	7.9	1.8	-0.1	0.2	0.0	**38.9**	Fair

NORTH LITTLE DONKEY - STUDY NO. 09R-6





Location Information	
USGS 7.5 min Map Info	Donkey Flat NE; Township 2S, Range 22E, Section 26
GPS (0' Stake)	NAD 83 UTM ZONE 12, 634830 East 4496614 North

Transect Information	
Browse Tag # (0' Stake)	36
Transect Bearing	340° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From Vernal, travel north on Highway 191 for about 11.3 miles to a road that comes in from the right (east). Turn here, travel 1.6 miles to a fork, and stay to the right. Continue for 3.0 miles, passing Red Fleet Reservoir, to another fork with a dead end sign and continue left (north). Drive for 1.2 miles to a witness post on the left (west) side of the road. The 0-foot stake is 60 paces from the witness post at 210 degrees magnetic and is marked with browse tag #36.

Site Information	
Land Ownership	Federal
Land Administrator	BLM
Allotment	DONKEY FLAT
Elevation	6,000ft (1,829m)
Aspect	Southwest
Slope	1-2%
Sample Dates	06/30/2004, 07/31/2007, 06/14/2012, 08/10/2016, 08/04/2020, 07/22/2025

Table 09R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Truax Drill	Red Fleet	PDB	Fall 2004	470
Mechanical - Plow	Brush Creek Flat Reseeding 1963	LTDL 1546-4354	September-December 1963	400
Chaining - Chain Unknown	Brush Creek Flat Reseeding 1963	LTDL 1546-4354	September-December 1963	851
Seeding - Aerial Unknown	Brush Creek Flat Reseeding 1963	LTDL 1546-4352	September-December 1963	851

Table 09R-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Red Fleet			Drill	Nov 2004	470
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.83
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.92
F	Achillea millefolium	Western Yarrow		0.11	0.10
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.00	0.90
F	Linum perenne	Blue Flax	Appar	0.11	0.10
F	Medicago sativa	Alfalfa	Ladak+	1.49	1.37
F	Onobrychis viciifolia	Sainfoin	Eski	1.49	1.36
F	Sanguisorba minor	Small Burnet	Delar	2.50	2.36
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.43	0.12
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.53	0.05
S	Atriplex canescens	Fourwing Saltbush	Emery UT	1.00	0.45
S	Bassia prostrata	Forage Kochia	Immigrant	1.06	0.71

Mix Name			Application Type	Application Date	Acres
			Aerial	Sep 1963	851
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak	2.00	0.00
S	Artemisia tridentata ssp. tridentata	Basin Big Sagebrush		0.25	0.00
S	Atriplex canescens	Fourwing Saltbush		0.50	0.00
S	Ericameria x bolanderi	Goldenbush		0.25	0.00
S	Purshia tridentata	Antelope Bitterbrush		0.50	0.00

Wildlife Habitat and Vegetation History

Table 09R-06.3 - 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

Table 09R-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	Annual Forb	No Encroachment
2007	Perennial Grass	No Encroachment
2012	Perennial Grass	No Encroachment
2016	Perennial Grass/Forage Kochia	Early Phase I
2020	Perennial Grass/Forage Kochia	Early Phase I
2025	Forage Kochia/Perennial Grass	No Encroachment

Site Notes

This study is located approximately two miles north of Little Donkey Flat within a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat.

Soils

Table 09R-06.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.2	33.0	39.5	27.5	1.3	5.0	300.8	0.6	06/30/2004

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2004 - Current Potential State: Community Phase 2.4 2007-2012 - Seeded State: Community Phase 5.1 2016-2025 - Seeded State: Community Phase Undefined

When the study was established in 2004, this site was dominated by the annual forb flatspine stickseed (*Lappula occidentalis*) with the introduced perennial grass crested wheatgrass (*Agropyron cristatum*) as the subordinate species. Annual forb cover decreased following the seeding in 2004 while that of crested wheatgrass increased, and perennial grasses have been a co-dominant vegetation component in all post-treatment sample years (Table 09R-06.10, Table 09R-06.11). Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) cover has remained low throughout the study period and density has steadily decreased since 2012. However, although cover has decreased since 2016, forage kochia (*Bassia prostrata*) has had notable overall increases in cover and density since it was seeded in 2004 (Table 09R-06.1, Table 09R-06.12, Table 09R-06.13). Forage kochia has been a co-dominant vegetation component with perennial grasses since 2016.

Condition of this site as mule deer winter range has varied between poor and excellent since 2004; winter range condition is considered to be good as of 2025. Factors that negatively influence this site's condition include reduced cover of preferred browse, and reduced perennial grass and forb cover (09R-06.6, 09R-06.7, Table 09R-06.15). Pellet transect data indicates that deer presence has been low in most sample years, but was moderate in 2004 and 2020. During the 2024/25 winter season the area had occasional occurrences of collared mule deer (Wildlife Migration Initiative). Over 80% of Wyoming big sagebrush plants were moderately to heavily browsed between 2004 and 2016. However, utilization appears to have shifted from sagebrush to forage kochia in 2020 and 2025 with over 70% of kochia plants receiving moderate to heavy hedging during that time. Cattle presence has been high in many sample years (Table 09R-06.9, Table 09R-06.13). On-site observations for 2025 noted heavy utilization (>40%) on crested wheatgrass while little utilization was observed on perennial forbs.

Trend Summary Tables

Table 09R-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	1.0	0.0	-	1.1	-	-
2007	1.1	0.0	-	1.3	0.1	-
2012	4.2	0.0	-	4.4	-	-
2016	8.9	0.3	-	11.0	0.7	-
2020	8.2	0.7	-	6.3	0.4	-
2025	8.2	0.1	-	6.9	0.1	-

Table 09R-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	-	207	437	156	-	5.1	19.1	2.2
2007	6	407	337	129	0.0	11.6	3.7	0.5
2012	9	381	30	123	0.0	20.6	0.1	0.6
2016	-	378	17	115	-	23.2	0.0	0.4
2020	2	364	2	87	0.0	18.9	0.0	0.5
2025	5	311	36	108	0.0	8.5	0.1	0.4

Table 09R-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	61.9	0.9	17.8	0.5	0.0	28.5
2007	59.8	1.2	31.0	0.1	-	18.9
2012	61.4	0.9	18.8	0.3	-	28.1
2016	53.4	0.2	16.9	0.8	0.0	33.8
2020	56.6	0.3	33.9	0.2	0.4	25.0
2025	70.1	0.1	23.9	0.4	0.0	16.3

Table 09R-06.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2004	9	30	17	-	69
2007	4	7	3	-	91
2012	4	16	1	1	28
2016	19	7	-	-	98
2020	16	11	1	1	25
2025	17	19	3	-	22
Year	Days Use Per Acre (ha)				
2004	24.7 (61.0)	21.5 (53.0)	18.1 (44.7)	-	-
2007	20.3 (50.2)	11.4 (28.1)	7.4 (18.2)	-	-
2012	-	10.7 (26.5)	-	-	-
2016	56.6 (139.9)	2.7 (6.6)	-	-	-
2020	24.0 (59.2)	22.8 (56.3)	-	-	-
2025	32.7 (80.7)	18.1 (44.7)	-	-	-

Table 09R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)
year	Nested Frequency						
2004	1	199	-	-	-	24	8
2007	-	302	6	-	47	194	5
2012	3	369	9	2	-	61	19
2016	-	373	-	13	14	29	-
2020	5	345	2	-	7	86	-
2025	-	280	5	-	7	115	-
year	Average Cover (%)						
2004	0.0	4.6	-	-	-	0.2	0.3
2007	-	10.0	0.0	-	0.2	1.3	0.2
2012	0.0	18.6	0.0	0.0	-	1.2	0.8
2016	-	22.3	-	0.4	0.3	0.2	-
2020	0.1	18.1	0.0	-	0.0	0.6	-
2025	-	7.5	0.0	-	0.0	1.0	-

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

Table 09R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Descurainia pinnata[a] (western tansymustard)	Halogeton glomeratus[ai] (saltlover)	Lappula occidentalis[a] (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Phlox longifolia (longleaf phlox)	Salsola tragus[ai] (prickly Russian thistle)	Sphaeralcea coccinea (scarlet globemallow)	Townsendia (Townsend daisy)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency														
2004	-	-	-	4	-	-	2	2	430	-	10	20	149	3	-
2007	-	-	27	-	1	1	63	9	322	-	9	-	119	-	-
2012	-	-	3	-	8	-	-	5	15	5	3	2	114	2	-
2016	6	3	-	-	-	-	-	-	15	-	7	-	95	20	-
2020	-	-	-	1	-	-	-	-	-	4	5	-	60	25	1
2025	8	-	-	-	-	-	-	-	28	-	11	-	97	9	-
year	Average Cover (%)														
2004	-	-	-	0.0	-	-	0.0	0.0	18.6	-	0.0	0.5	2.2	0.0	-
2007	-	-	0.0	-	0.0	0.0	0.2	0.1	3.3	-	0.0	-	0.5	-	-
2012	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	0.0	0.5	0.0	-
2016	0.0	0.0	-	-	-	-	-	-	0.0	-	0.0	-	0.4	0.0	-
2020	-	-	-	0.0	-	-	-	-	-	0.1	0.0	-	0.3	0.1	0.0
2025	0.0	-	-	-	-	-	-	-	0.1	-	0.0	-	0.3	0.0	-

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

Table 09R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Bassia prostrata[pi] (forage kochia)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)			
2004	1.1	-	-	-
2007	1	0.3	0.1	-
2012	2.3	2.1	-	-
2016	3.1	7.9	0.7	-
2020	1.8	4.5	0.4	-
2025	2.8	4.1	0.1	-
year	Quadrat Cover (%)			
2004	1.0	-	0.0	-
2007	0.8	0.3	0.0	-
2012	1.8	2.4	0.0	-
2016	2.0	6.8	0.3	-
2020	3.0	5.3	0.7	0.0
2025	3.2	5.0	0.1	0.0

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

Table 09R-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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2004	1720	160	1	26	73	4	97	57	27/45
2007	2440	4040	35	45	20	48	36	18	21/28
2012	3760	80	28	67	5	57	41	48	21/29
2016	2640	1020	14	81	5	65	18	5	23/34
2020	1980	460	20	66	14	20	37	30	26/44
2025	1520	740	29	59	12	32	30	17	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	59/64
2007	-	-	-	-	-	-	-	-	64/81
2012	-	-	-	-	-	-	-	-	52/70
2016	-	-	-	-	-	-	-	-	67/65
2020	-	20	0	0	0	0	0	0	59/60
2025	-	-	-	-	-	-	-	-	-/-
Bassia prostrata[pi] -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	2220	2200	41	59	0	3	3	0	10/13
2012	8620	12360	8	92	0	60	34	1	14/18
2016	19520	580	14	86	0	7	5	0	16/28
2020	22260	1400	31	69	0	43	37	1	9/20
2025	20860	820	24	61	15	11	83	16	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	27/35
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	20	-	100	0	0	0	0	100	- / -
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2004	140	-	14	86	0	0	14	0	13/18
2007	220	60	0	46	55	18	0	46	16/24
2012	140	-	0	100	0	0	0	0	13/13
2016	1220	260	38	62	0	0	0	0	23/25
2020	2540	120	6	92	2	0	0	2	14/22
2025	320	-	56	44	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	17/30
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
2004	60	-	0	33	67	0	0	0	9/30
2007	20	-	100	0	0	0	0	0	9/17
2012	-	-	-	-	-	-	-	-	11/24
2016	-	-	-	-	-	-	-	-	10/42
2020	-	40	0	0	0	0	0	0	10/37

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

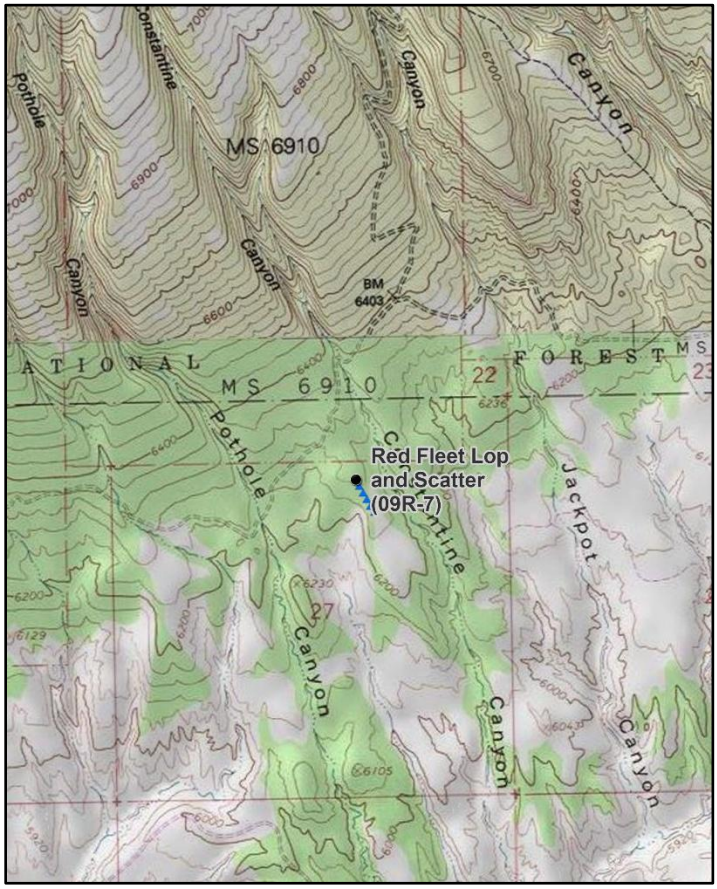
Table 09R-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

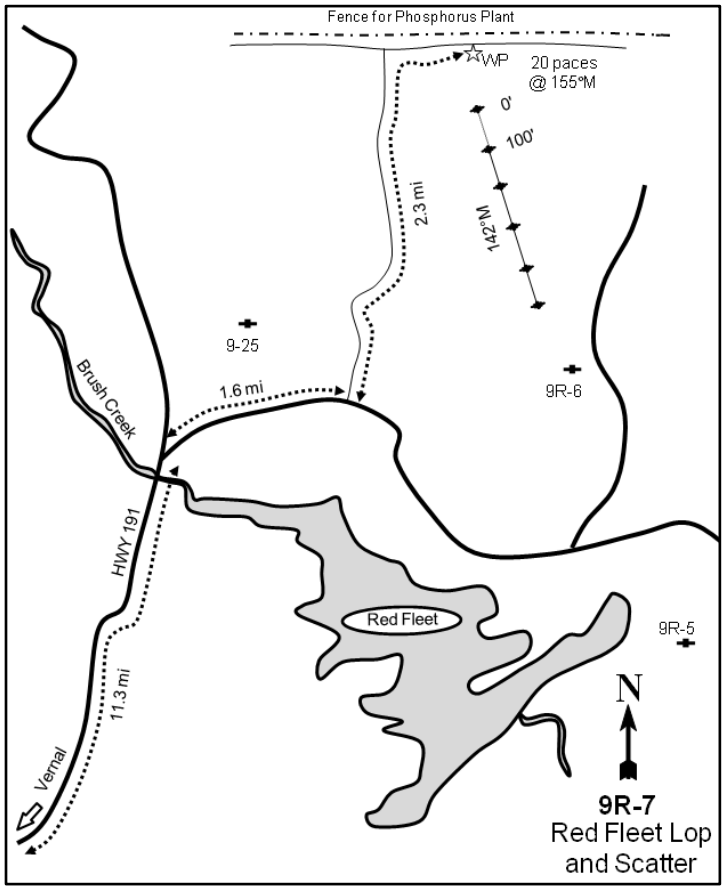
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2016	1	-	100	-	-	-	9.0
2020	1	-	100	-	-	-	5.0

Table 09R-06.15 - 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
2004	1.4	0.0	0.0	10.3	0.0	4.4	0.0	**16.1**	Poor
2007	1.7	0.0	0.0	23.3	0.0	1.1	0.0	**26.1**	Poor-Fair
2012	6.0	0.0	0.0	30.0	0.0	1.1	0.0	**37.1**	Fair
2016	15.7	14.5	7.0	30.0	0.0	0.8	0.0	**68.0**	Excellent
2020	9.0	13.8	13.9	30.0	0.0	0.9	0.0	**67.6**	Excellent
2025	9.7	10.9	12.9	16.9	0.0	0.7	0.0	**51.1**	Good
2004	1.4	0.0	0.0	10.3	0.0	4.4	0.0	**16.1**	Poor

RED FLEET LOP AND SCATTER - STUDY NO. 09R-7





Location Information

USGS 7.5 min Map Info	Donkey Flat NE; Township 2S, Range 22E, Section 27
GPS (0' Stake)	NAD 83 UTM ZONE 12, 632742 East 4497729 North

Transect Information

Browse Tag # (0' Stake)	37
Transect Bearing	142° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From Vernal, travel north on Highway 191 for about 11.3 miles to a road that comes in from the right (east). Turn here and travel 1.6 miles to a fork. Turn left (north) and travel 2.3 miles to a "T" intersection just before a pipeline for the phosphorus plant. Turn right (east) and drive for a short distance to the witness post on the right (south) side of the road. From the witness post, walk down a very faint road at 155 degrees magnetic for about 200 feet to the 0-foot stake marked with browse tag #37.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	DONKEY FLAT
Elevation	6,300ft (1,920m)
Aspect	Southeast
Slope	4-6%
Sample Dates	06/30/2004, 07/31/2007, 06/14/2012, 08/10/2016, 08/03/2020, 07/22/2025

Table 09R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Red Fleet Phase II/Maintenance	2273	Fall 2012	300
Hand Crew - Lop and Scatter	Red Fleet Lop and Scatter	PDB	Fall 2004	-
Hand Crew - Lop and Scatter	Diamond Mountain Maintenance Project	5105	August-October 2020	2903
Chaining - Two-Way Unknown	Red Flat Reseeding 1964	LTDL 9405-25556	July 1964-October 1965	1764
Seeding - Hand Planter After	Red Flat Reseeding 1964	LTDL 9405-25557	July 1964-October 1965	1764

Table 09R-07.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
			Aerial	Jul 1964	1764
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Crested Wheatgrass		0.00	0.00
F	Penstemon speciosus	Sagebrush Penstemon		0.00	0.00
S	Atriplex canescens	Fourwing Saltbush		1.00	0.00
S	Chrysothamnus albidus	Whiteflower Rabbitbrush		1.00	0.00
S	Purshia tridentata	Antelope Bitterbrush		1.00	0.00

Wildlife Habitat and Vegetation History

Table 09R-07.3 - 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

Table 09R-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	Perennial Grass	Phase I
2007	Perennial Grass	Early Phase I
2012	Perennial Grass	Early Phase I
2016	Perennial Grass	Early Phase I
2020	Perennial Grass	Early Phase I
2025	Perennial Grass	Early Phase I

Site Notes

The study is located approximately three miles north of Red Fleet Reservoir. The study monitors an old Utah juniper (*Juniperus osteosperma*) chaining that was treated in the 1960s.

Soils

Table 09R-07.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.2	40.6	35.9	23.5	4.2	13.3	217.6	1.3	06/30/2004

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R047XC320UT
States and Transitions	2004 - State Undefined: Community Phase Undefined 2007-2025 - Black Sagebrush/Introduced Non-Natives State: Community Phase 2.3

Since study establishment in 2004, this site has been dominated by perennial grasses with black sagebrush (*Artemisia nova*) as a subordinate species (Table 09R-07.7, Table 09R-07.12). Crested wheatgrass (*Agropyron cristatum*) has dominated the herbaceous understory and forbs have remained comparatively rare (Table 09R-07.10, Table 09R-07.11). Following a lop and scatter treatment in 2004, cover and density of Utah juniper (*Juniperus osteosperma*) decreased substantially; trees have been further reduced by maintenance lop and scatter treatments in 2012 and 2020. As of 2025, young juniper trees remain on site and may provide a source for future infilling. However, the site has been considered to be within Early Phase I of woodland succession since 2007 due to continued maintenance (Table 09R-07.1, Table 09R-07.4, Table 09R-07.12, Table 09R-07.14); this early stage of succession indicates that infilling is likely not an immediate concern. Although black sagebrush remains a subordinate site component as of the most recentsample year, cover and density values have increased overall between 2004 and 2025 (Table 09R-07.12, Table 09R-07.13). As such, there may be potential for black sagebrush to increase and become a dominant site component in the future.

Condition of this site as mule deer winter range has ranged between very poor-poor and poor since 2004; winter range condition is

considered to be poor as of 2025. Factors that negatively influence this site's condition include a lack of preferred browse, and limited forb cover (Table 09R-07.6, Table 09R-07.7, Table 09R-07.15). Pellet transect data indicates that deer presence has ranged between low and high over the sample years and was high in 2025. During the 2024/25 winter season the area had occasional nearby occurrences of collared mule deer (Wildlife Migration Initiative). Elk presence has displayed a similar range, but presence has generally decreased. Over 80% of Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*) plants were moderately to heavily browsed between 2016 and 2025, but one should consider that this may be in part compounded by the small size of the population on this site. However, utilization of the larger black sagebrush population was disproportionally considered heavy in nearly all sample years except for 2004. Cattle presence was high in many sample years (Table 09R-07.9, Table 09R-07.13). On-site observations for 2025 noted heavy utilization (>40%) on crested wheatgrass and needle and thread (*Hesperostipa comata*) while little utilization was observed on perennial forbs.

Trend Summary Tables

Table 09R-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	2.2	0.7	7.6	0.9	0.7	9.2
2007	1.8	0.3	0.7	0.7	0.4	2.5
2012	2.6	1.7	0.7	1.9	0.8	2.1
2016	2.5	5.3	0.0	2.9	5.5	0.4
2020	3.1	3.1	0.7	4.5	2.0	1.0
2025	3.4	1.9	0.0	4.5	0.7	-

Table 09R-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	-	260	20	102	-	13.2	0.1	3.4
2007	28	417	96	89	0.1	20.3	0.4	1.4
2012	6	398	18	107	0.0	22.9	0.0	1.3
2016	3	380	-	125	0.0	28.7	-	1.1
2020	-	379	14	90	-	30.7	0.1	1.2
2025	3	336	70	106	0.0	17.8	0.4	1.7

Table 09R-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	24.8	3.4	27.6	26.7	2.3	26.6
2007	24.6	0.9	41.1	15.9	1.4	25.6
2012	24.9	0.2	39.4	14.2	1.9	29.8
2016	6.8	0.0	32.5	28.2	2.0	37.7
2020	13.0	0.0	43.0	24.4	4.3	36.1
2025	18.8	0.0	45.0	22.3	2.9	22.7

Table 09R-07.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Horse	Rabbit
	Quadrat Frequency					
2004	2	25	47	-	-	26
2007	6	9	12	-	-	67
2012	7	11	3	-	-	15
2016	10	12	-	-	1	65
2020	4	24	2	-	-	11
2025	19	38	2	-	-	13
Year	Days Use Per Acre (ha)					
2004	21.1 (52.0)	35.5 (87.7)	46.2 (114.2)	-	-	-
2007	19.6 (48.4)	18.1 (44.7)	28.8 (71.2)	-	-	-
2012	-	14.1 (34.8)	2.0 (5.0)	-	0.6 (1.4)	-
2016	36.3 (89.7)	5.3 (13.2)	-	-	1.2 (2.9)	-
2020	12.3 (30.5)	26.2 (64.6)	14.1 (34.8)	8.7 (21.5)*	-	-
2025	39.2 (96.8)	48.3 (119.2)	5.3 (13.2)	-	-	-

*Pellets per acre (ha)

Table 09R-07.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency			
2004	257	-	4	3
2007	416	28	3	19
2012	380	6	-	69
2016	380	3	2	2
2020	378	-	3	6
2025	333	3	-	6
year	Average Cover (%)			
2004	13.2	-	0.0	0.0
2007	20.2	0.1	0.0	0.1
2012	21.0	0.0	-	1.9
2016	28.7	0.0	0.1	0.0
2020	30.6	-	0.0	0.1
2025	17.8	0.0	-	0.0

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

Table 09R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Astragalus convallarius (lesser rushy milkvetch)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Erigeron (fleabane)	Gilia inconspicua[a] (shy gilia)	Ipomopsis congesta (ballhead ipomopsis)	Lappula occidentalis[a] (flatspine stickseed)	Sphaeralcea coccinea (scarlet globemallow)	Townsendia (Townsend daisy)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency												
2004	-	35	19	3	0	-	-	1	10	0	61	3	-
2007	-	7	1	2	41	3	1	-	-	70	80	-	-
2012	-	19	-	12	3	-	-	-	-	18	78	1	-
2016	-	42	-	19	-	-	2	-	-	-	66	-	-
2020	2	2	-	11	-	-	-	-	-	6	76	2	6
2025	38	4	-	3	1	-	-	-	-	57	102	-	-
year	Average Cover (%)												
2004	-	1.1	0.1	0.0	0.0	-	-	0.0	0.1	0.0	2.2	0.0	-
2007	-	0.1	0.0	0.0	0.1	0.0	0.0	-	-	0.3	1.3	-	-
2012	-	0.1	-	0.0	0.0	-	-	-	-	0.0	1.2	0.0	-
2016	-	0.5	-	0.1	-	-	0.0	-	-	-	0.5	-	-
2020	0.0	0.0	-	0.0	-	-	-	-	-	0.0	1.1	0.0	0.0
2025	0.2	0.0	-	0.0	0.0	-	-	-	-	0.2	1.6	-	-

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

Table 09R-07.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Bassia prostrata[pi] (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)							
2004	0.9	-	-	-	-	-	9.2	0.7
2007	0.7	-	-	0.2	-	-	2.5	0.2
2012	1.8	0.1	-	-	-	0.8	2.1	-
2016	2.8	0.1	-	-	-	5.2	0.4	0.3
2020	4.4	0.1	-	-	-	2	1	0
2025	4.5	-	-	-	-	0.7	0	-
year	Quadrat Cover (%)							
2004	2.2	-	-	-	0.1	0.1	7.6	0.5
2007	1.8	-	-	0.0	-	0.1	0.7	0.2
2012	2.2	0.0	0.4	-	-	1.7	0.7	0.0
2016	2.5	0.0	-	0.0	-	5.2	0.0	0.1
2020	3.1	0.0	-	-	-	3.0	0.7	0.2
2025	3.4	-	-	-	-	1.8	0.0	0.1

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

Table 09R-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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2004	1880	-	12	70	18	40	1	12	14/30
2007	2260	240	25	70	5	11	79	5	18/35
2012	3800	2580	37	63	1	0	67	1	14/32
2016	2860	-	31	62	8	25	55	8	17/36
2020	3260	-	29	70	1	9	87	9	14/40
2025	3440	20	10	84	6	8	92	6	- / -
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2004	-	-	-	-	-	-	-	-	26/48
2007	-	-	-	-	-	-	-	-	37/56
2012	20	-	0	100	0	100	0	0	47/63
2016	20	-	0	0	100	100	0	100	44/68
2020	60	20	33	33	33	67	33	33	44/79
2025	20	-	100	0	0	100	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2004	20	-	0	100	0	0	0	0	- / -
2007	20	-	0	100	0	0	0	0	18/30
2012	-	-	-	-	-	-	-	-	-/-
2016	20	-	100	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	20	-	0	100	0	0	0	0	22/32
2007	-	-	-	-	-	-	-	-	40/31
2012	-	-	-	-	-	-	-	-	58/71
2016	-	-	-	-	-	-	-	-	61/49
2020	-	-	-	-	-	-	-	-	54/66
2025	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa ssp. nauseosa var. speciosa[p] -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	115/144
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2004	200	20	20	80	0	0	0	0	16/26
2007	500	1720	8	56	36	4	32	44	20/29
2012	5660	20	1	99	0	0	0	31	11/16
2016	15860	300	10	90	0	0	0	0	19/20
2020	15120	680	35	62	3	0	0	3	13/16
2025	3400	60	17	81	2	11	5	2	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2004	160	-	0	100	0	13	0	0	- / -
2007	100	-	0	80	20	0	0	80	- / -
2012	160	-	75	25	0	0	0	25	- / -
2016	80	-	75	25	0	0	0	0	- / -
2020	80	-	50	50	0	0	0	0	- / -
2025	80	-	0	100	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2004	300	-	0	93	7	0	0	7	10/41
2007	220	20	0	73	27	0	9	18	9/30
2012	180	-	0	89	11	0	0	33	8/23
2016	380	-	0	100	0	0	0	0	9/27
2020	300	-	0	93	7	0	0	27	9/33
2025	300	-	7	87	7	0	0	53	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	37/190
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	26/128

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

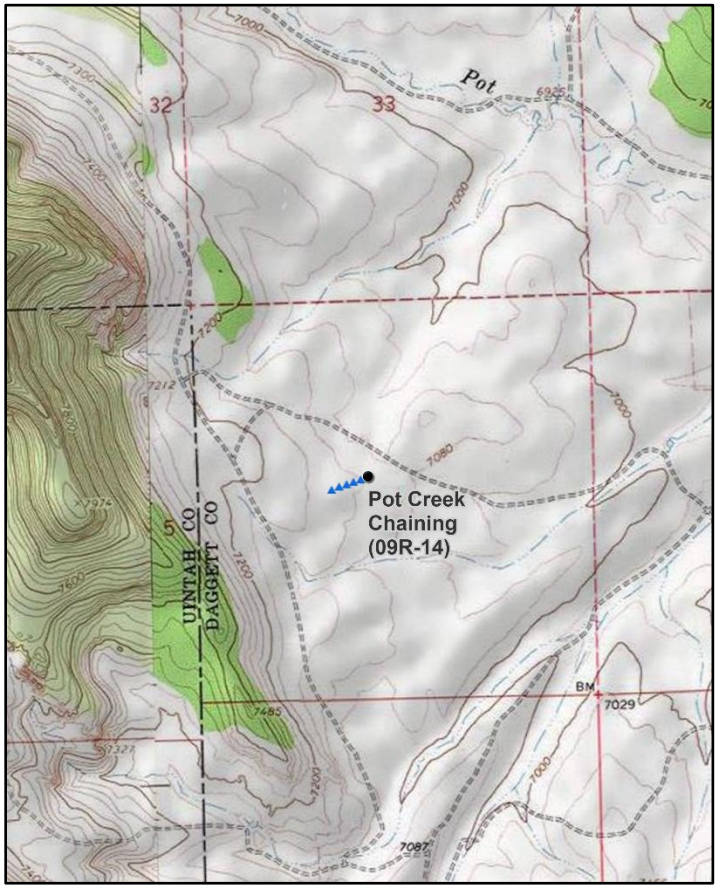
Table 09R-07.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

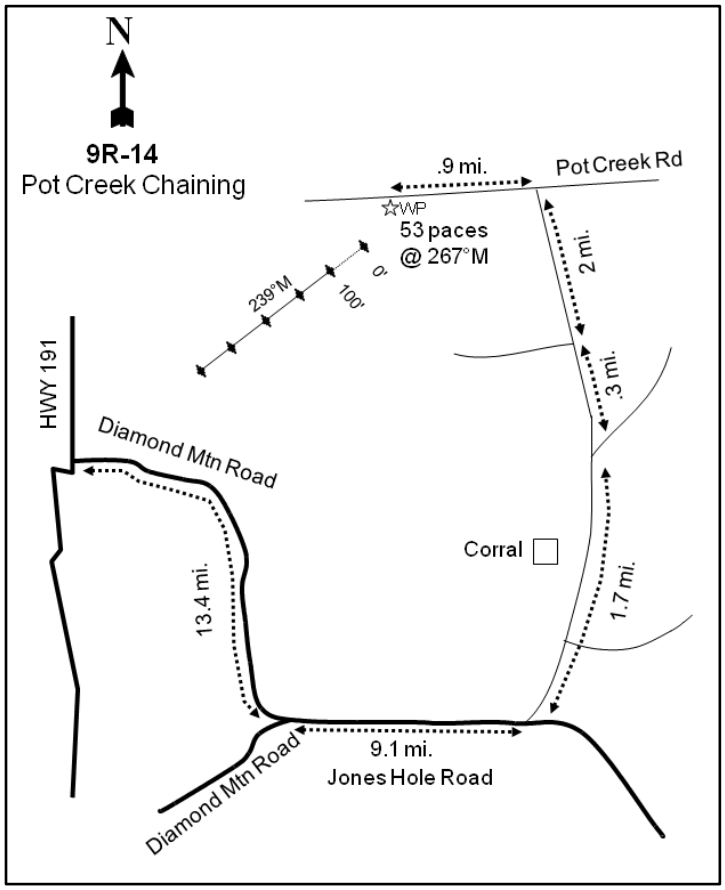
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2004	66	-	50	45	5	-	10.6
2007	35	-	100	-	-	-	8.3
2012	29	-	73	20	7	-	8.3
2016	13	44	44	11	-	-	10.8
2020	14	-	82	18	-	-	4.9
2025	7	17	83	-	-	-	2.8

Table 09R-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	1.1	0.0	0.0	26.5	0.0	6.7	0.0	**34.3**	Very Poor-Poor
2007	0.9	0.0	0.0	30.0	-0.1	2.8	0.0	**33.6**	Very Poor-Poor
2012	2.4	0.0	0.0	30.0	0.0	2.5	0.0	**34.9**	Very Poor-Poor
2016	3.6	0.0	0.0	30.0	0.0	2.3	0.0	**35.9**	Very Poor-Poor
2020	5.6	0.0	0.0	30.0	0.0	2.4	0.0	**38.0**	Poor
2025	5.6	0.0	0.0	30.0	0.0	3.3	0.0	**38.9**	Poor

POT CREEK CHAINING - STUDY NO. 09R-14





Location Information

USGS 7.5 min Map Info	Hoy Mountain SW; Township 2S, Range 25E, Section 04
GPS (0' Stake)	NAD 83 UTM ZONE 12, 659297 East 4504682 North

Transect Information

Browse Tag # (0' Stake)	132
Transect Bearing	239° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	RUPLE CABIN
Elevation	7,100ft (2,164m)
Aspect	North
Slope	2-5%
Sample Dates	08/02/2007, 08/09/2011, 08/19/2014, 08/07/2017, 08/04/2020, 07/08/2025

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Pot Hole	-	June-July 2006	1396
Chaining - One-Way Ely	Ruple Cabin Wildfire Rehabilitation	608	September 2006	1208
Seeding - Aerial Before	Ruple Cabin Wildfire Rehabilitation	608	September 2006	1208
Seeding - Dribbler	Ruple Cabin Wildfire Rehabilitation	608	September 2006	1208
Seeding - Aerial After	Ruple Cabin Wildfire Rehabilitation	608	December 2006	1208
Herbicide - Herbicide Unknown	Ruple Cabin Prescribed fire and Spray 1989	LTDL 9883-26835	May-June 1989	2079
Fire - Prescribed	Ruple Cabin Prescribed fire and Spray 1989	LTDL 9883-26834	1989	1281

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

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

Mix Name			Application Type	Application Date	Acres
Ruple Cabin Wildfire Rehabilitation Dribbler			Dribbler	Sep 2006	1200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet	Delar	0.25	0.23
S	Purshia tridentata	Bitterbrush	Millard UT	0.03	0.02
S	Purshia tridentata	Bitterbrush	Millard UT	0.13	0.10

Mix Name			Application Type	Application Date	Acres
Ruple Cabin Sagebrush			Aerial	Dec 2006	1150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.33	0.07
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.40	0.09
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Piute UT	0.27	0.07

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2007	Perennial Grass	No Encroachment
2011	Perennial Grass	No Encroachment
2014	Perennial Grass	No Encroachment
2017	Perennial Grass/Mountain Big Sagebrush	No Encroachment
2020	Perennial Grass/Mountain Big Sagebrush	No Encroachment
2025	Mountain Big Sagebrush/Perennial Grass	No Encroachment

Site Notes

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

Soils

Table 09R-14.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.6	50.2	25.4	24.5	2.6	17.4	195.2	0.6	08/09/2011

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC430UT
States and Transitions	2007-2014 - Introduced Grassland State: Community Phase 6.1 2017-2025 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase 2.1

Since study establishment in 2007, this site has been dominated by perennial grasses: in 2025 the most abundant species were hard fescue (*Festuca brevipila*) and thickspike wheatgrass (*Elymus lanceolatus*). Perennial forbs have been more common than annual forbs throughout the study period, with lesser rushy milkvetch (*Astragalus convallarius*), alfalfa (*Medicago sativa*), and/or scarlet globemallow (*Sphaeralcea coccinea*) providing much of the cover in many sample years (Table 09R-14.7, Table 09R-14.10, Table 09R-14.11). Much of the mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was removed by the Pot Hole Wildfire (Table 09R-14.1) and density was very low during the initial sampling. However, there has been an increase in both cover and density of sagebrush over the study years and it has been a co-dominant site component since 2017 (Photos, Table 09R-14.12, Table 09R-12.13). Barring a major disturbance, sagebrush will likely continue to be a dominant part of the plant community.

This site likely serves as fair summer range for mule deer due to the moderate amount of shrub and herbaceous components (Table 09R-14.10, Table 09R-14.11, Table 09R-14.12). Deer and elk presence has been low in most sample years according to pellet transect data. Cattle presence has been high since 2017, but it was noted that cattle pats were likely from the previous rotation in 2025. Utilization of preferred browse was at its highest in 2014 and 2017, but was considered to be mostly light in 2020 and 2025 (Table 09R-14.9, Table 09R-14.13). On-site observations for 2025 note that perennial forb (mainly alfalfa) utilization was light (10-20%) while there was little to no grass utilization.

Trend Summary Tables

Table 09R-14.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	0.4	0.0	-	0.1	-	-
2011	0.8	0.0	-	1.2	-	-
2014	1.4	0.0	-	2.1	-	-
2017	2.2	-	-	4.4	-	-
2020	2.8	-	-	5.6	0.1	-
2025	6.7	0.1	-	8.7	0.4	-

Table 09R-14.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	4	330	241	319	0.0	16.9	4.3	11.0
2011	20	424	264	328	0.1	25.6	4.1	24.7
2014	128	456	144	194	2.2	29.7	0.8	3.4
2017	135	462	100	226	3.3	46.0	1.3	11.0
2020	12	454	119	159	0.4	44.1	2.2	7.9
2025	-	456	9	250	-	51.2	0.1	7.3

Table 09R-14.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	65.2	0.1	11.8	0.7	0.1	33.3
2011	22.6	2.1	36.7	0.1	0.0	50.1
2014	16.7	0.0	59.4	0.4	0.0	45.1
2017	8.8	0.2	43.0	0.1	0.4	65.5
2020	17.4	-	49.5	0.2	0.1	52.5
2025	9.7	0.0	43.4	0.9	0.0	55.9

Table 09R-14.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Pronghorn	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
2007	-	2	1	6	-	8
2011	-	14	6	3	-	1
2014	1	19	9	11	-	1
2017	-	18	10	5	1	9
2020	-	13	17	9	-	1
2025	-	2	7	14	-	9
Year	Days Use Per Acre (ha)					
2007	-	1.5 (3.6)	3.4 (8.3)	3.4 (8.3)	-	-
2011	-	7.2 (17.9)	6.0 (14.9)	12.1 (29.8)	-	-
2014	-	1.5 (3.6)	12.8 (31.5)	8.1 (19.9)	-	-
2017	-	69.0 (170.4)	6.7 (16.6)	10.0 (24.8)	34.9 (86.1)*	-
2020	-	26.8 (66.3)	1.3 (3.3)	14.1 (34.8)	-	-
2025	-	42.8 (105.8)	-	8.7 (21.5)	8.7 (21.5)*	-

*Pellets per acre (ha)

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

GRASS SPECIES	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca brevipila[i] (hard fescue)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2007	4	28	-	-	278	-	-	30	216	11
2011	20	13	3	1	364	34	1	3	251	19
2014	128	2	-	1	218	84	-	21	398	49
2017	135	-	-	10	177	289	10	10	298	2
2020	12	3	-	7	301	260	-	14	292	-
2025	-	20	-	1	279	303	5	-	229	-
year	Average Cover (%)									
2007	0.0	0.1	-	-	7.3	-	-	0.4	9.0	0.1
2011	0.1	0.1	0.0	0.0	15.4	1.7	0.0	0.0	7.6	0.7
2014	2.2	0.0	-	0.0	4.0	2.5	-	0.2	22.5	0.5
2017	3.3	-	-	0.4	4.2	25.4	0.7	1.0	14.2	0.2
2020	0.4	0.0	-	0.9	9.8	20.0	-	0.7	12.7	-
2025	-	0.3	-	0.0	12.8	30.7	0.6	-	6.8	-

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

Table 09R-14.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum[ai] (desert madwort)	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus tenellus (looseflower milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chorispora tenella[ai] (crossflower)	Collinsia parviflora[a] (maiden blue eyed Mary)	Collomia linearis[a] (tiny trumpet)	Crepis acuminata (tapertip hawksbeard)	Cymopterus (springparsley)	Delphinium nuttallianum (twolobe larkspur)	Descurainia pinnata[a] (western tansymustard)
year	Nested Frequency																
2007	14	70	-	-	3	140	-	31	7	-	18	223	7	13	7	41	1
2011	81	94	-	-	-	147	3	2	-	1	1	179	28	39	4	-	2
2014	52	19	-	-	-	50	9	-	-	-	25	82	1	23	-	4	-
2017	67	39	-	2	-	104	5	2	-	-	-	4	1	9	-	-	-
2020	45	9	1	2	-	5	-	-	-	-	-	1	5	12	-	-	-
2025	29	33	-	-	-	40	-	-	-	-	-	-	-	49	-	-	-
year	Average Cover (%)																
2007	0.1	0.9	-	-	0.0	4.1	-	0.1	0.0	-	0.7	2.8	0.1	0.5	0.1	0.2	0.0
2011	2.1	2.2	-	-	-	9.2	0.1	0.0	-	0.0	0.0	0.9	0.3	1.1	0.1	-	0.0
2014	0.8	0.1	-	-	-	0.4	0.1	-	-	-	0.1	0.2	0.0	0.2	-	0.0	-
2017	0.8	0.3	-	0.0	-	5.2	0.0	0.0	-	-	-	0.0	0.0	0.1	-	-	-
2020	0.6	0.0	0.0	0.0	-	0.0	-	-	-	-	-	0.0	0.0	0.0	-	-	-
2025	0.5	0.3	-	-	-	0.5	-	-	-	-	-	-	-	0.7	-	-	-

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

FORB SPECIES	Erigeron eatonii (Eaton's fleabane)	Eriogonum (buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Heterotheca villosa (hairy false goldenaster)	Lactuca serriola[ai] (prickly lettuce)	Lepidium[a] (pepperweed)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa[i] (alfalfa)	Microsteris gracilis[a] (slender phlox)	Onobrychis viciifolia[i] (sainfoin)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
2007	-	-	7	-	-	3	-	-	49	21	122	5	149	41	82	-	14
2011	5	3	4	-	2	-	1	4	14	62	54	11	150	101	62	7	34
2014	13	-	-	-	3	-	-	-	32	3	26	8	6	-	-	-	45
2017	3	7	-	-	-	-	-	3	27	-	-	6	6	5	-	-	31
2020	5	-	-	5	-	-	-	-	29	-	-	3	29	4	-	-	46
2025	-	-	-	-	-	-	-	-	33	-	-	4	88	-	-	-	54
year	Average Cover (%)																
2007	-	-	0.2	-	-	0.0	-	-	0.4	0.2	1.8	0.0	1.1	0.2	0.7	-	0.4
2011	0.1	0.0	0.0	-	0.0	-	0.2	0.0	1.2	0.7	2.9	0.3	2.7	0.4	1.7	0.2	0.7
2014	0.1	-	-	-	0.0	-	-	-	0.9	0.0	0.3	0.2	0.0	-	-	-	0.3
2017	0.0	0.1	-	-	-	-	-	0.4	2.7	-	-	0.2	0.0	0.0	-	-	0.5
2020	0.0	-	-	0.2	-	-	-	-	5.6	-	-	0.0	0.1	0.0	-	-	1.3
2025	-	-	-	-	-	-	-	-	1.7	-	-	0.2	0.5	-	-	-	1.4

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

FORB SPECIES	Symphyotrichum (aster)	Tragopogon dubius[ai] (yellow salsify)	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency			
2007	5	-	101	1
2011	-	64	4	7
2014	-	79	-	3
2017	-	92	7	4
2020	-	112	-	3
2025	-	9	86	9
year	Average Cover (%)			
2007	0.0	-	0.5	0.1
2011	-	1.6	0.0	0.0
2014	-	0.5	-	0.0
2017	-	1.2	0.4	0.2
2020	-	2.1	-	0.0
2025	-	0.1	1.6	0.0

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

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

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Opuntia (pricklypear)	Purshia tridentata[p] (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)			
2007	-	-	0.1	-
2011	1.1	-	0.1	-
2014	2.1	-	-	-
2017	4	-	0.4	-
2020	5.6	0.1	-	-
2025	8.7	0.4	-	-
year	Quadrat Cover (%)			
2007	0.0	0.0	0.4	-
2011	0.4	-	0.4	0.0
2014	1.2	-	0.1	0.0
2017	2.1	-	0.1	-
2020	2.8	0.0	-	-
2025	6.7	0.1	-	-

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

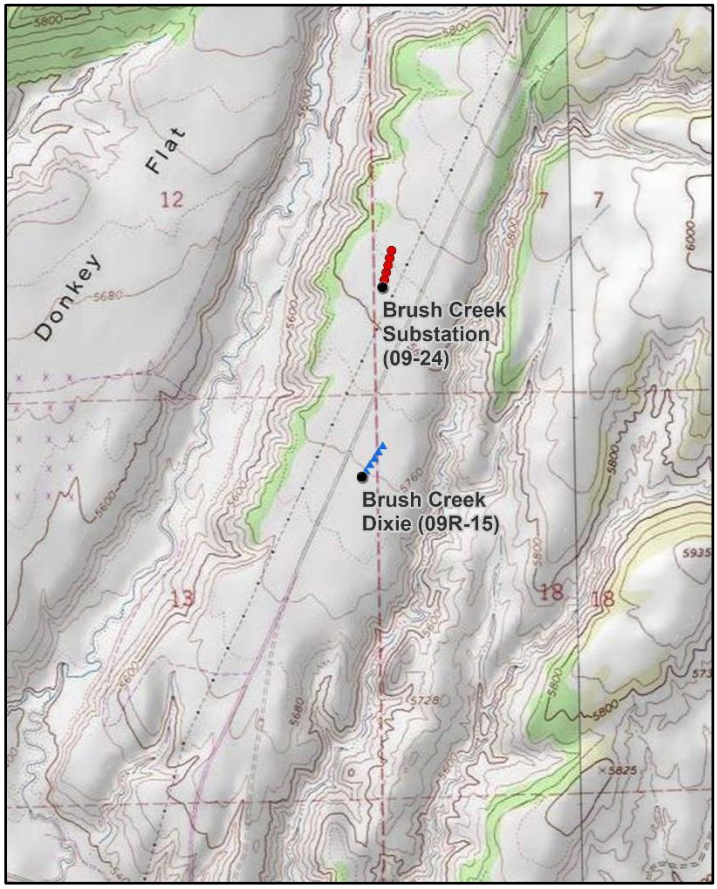
Table 09R-14.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

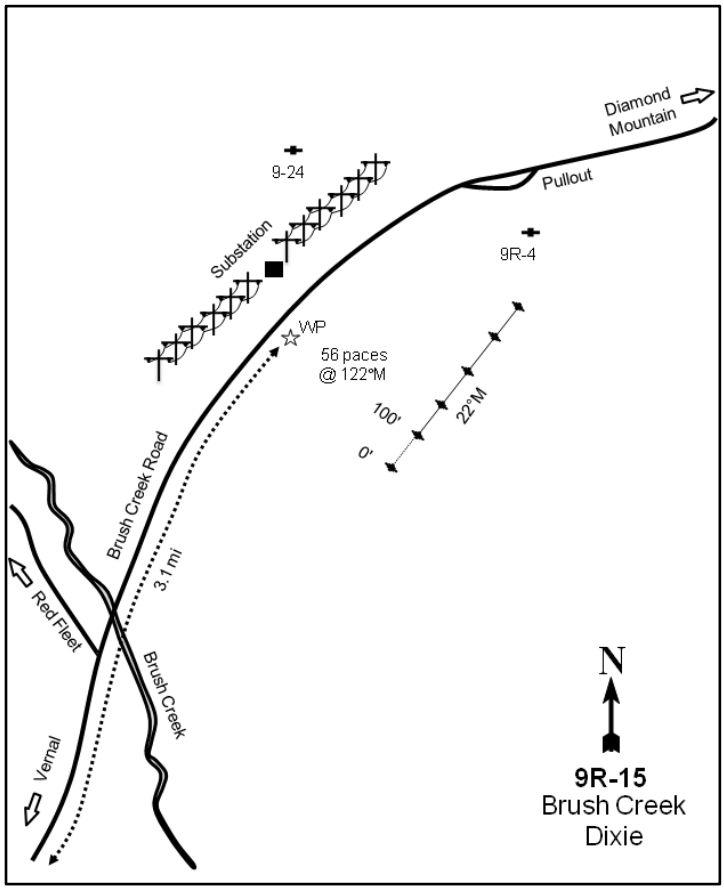
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2007	20	340	100	0	0	0	0	0	- / -
2011	620	-	45	55	0	0	0	0	33/36
2014	800	-	10	90	0	40	35	8	41/59
2017	780	-	5	95	0	10	44	5	51/72
2020	680	-	0	100	0	24	3	12	63/95
2025	800	3940	3	93	5	8	0	5	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2007	20	-	0	100	0	0	0	0	17/22
2011	20	-	0	100	0	0	0	0	18/25
2014	-	-	-	-	-	-	-	-	13/22
2017	20	-	0	100	0	100	0	0	17/26
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2007	40	20	0	100	0	0	0	0	7/19
2011	-	-	-	-	-	-	-	-	7/20
2014	20	-	0	100	0	0	0	0	9/30
2017	20	-	0	100	0	0	0	0	9/25
2020	20	-	0	100	0	0	0	0	10/40
2025	80	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Purshia tridentata[p] -- (antelope bitterbrush)									
2007	20	-	0	100	0	0	100	0	15/71
2011	20	-	0	100	0	0	100	0	43/102
2014	20	-	0	100	0	0	100	0	19/76
2017	20	-	0	100	0	0	100	0	24/76
2020	20	-	0	0	100	0	100	100	- / -
2025	-	-	-	-	-	-	-	-	-/-
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2007	-	-	-	-	-	-	-	-	48/89
2011	-	-	-	-	-	-	-	-	49/98
2014	-	-	-	-	-	-	-	-	41/74
2017	-	-	-	-	-	-	-	-	33/86
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Tetradymia canescens -- (spineless horsebrush)									
2007	-	-	-	-	-	-	-	-	23/31
2011	40	-	0	100	0	0	0	0	30/64
2014	20	-	0	100	0	100	0	0	28/49
2017	20	-	0	100	0	0	0	0	27/57
2020	20	-	0	100	0	0	100	0	38/75

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

BRUSH CREEK DIXIE - STUDY NO. 09R-15





Location Information	
USGS 7.5 min Map Info	Donkey Flat NE; Township 3S, Range 22E, Section 13
GPS (0' Stake)	NAD 83 UTM ZONE 12, 636649 East 4491523 North

Transect Information	
Browse Tag # (0' Stake)	134
Transect Bearing	25° 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 500 North in Vernal, travel north on Brush Creek Road for 3.1 miles to a witness post on the right (east) side of the road. From the witness post, the 0-foot stake is 56 paces away at 122 degrees magnetic and is marked with browse tag #134.

Site Information	
Land Ownership	Federal
Land Administrator	BLM
Allotment	S.J. HATCH
Elevation	5,750ft (1,753m)
Aspect	Southwest
Slope	2%
Sample Dates	08/01/2007, 07/27/2009, 07/26/2010, 06/12/2012, 08/11/2016, 07/27/2020, 07/21/2025

Table 09R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Brush Creek Bench Sage Restoration	315	September 2008	280
Harrow - One-Way Dixie	Brush Creek Bench Sage Restoration	315	September 2008	280
Seeding - Broadcast Before	Brush Creek Bench Sage Restoration	315	December 2008	280
Seeding - Aerial After	Brush Creek Bench Sage Restoration	315	March 2009	280
Seeding - Rangeland Drill	Brush Creek Bench Seeding	1659	October 2010	400
Seeding - Aerial After	Brush Creek Bench Seeding	1659	November 2010	400

Table 09R-15.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Brush Creek Bench Sage Restoration			Broadcast	Dec 2008	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.50	1.23
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.91
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.00	0.87
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.76
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.50	0.42
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.85
F	Medicago sativa	Alfalfa	Ladak	2.00	1.81

Mix Name			Application Type	Application Date	Acres
Brush Creek Bench - Sagebrush/Kochia			Aerial	Mar 2009	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.19
S	Bassia prostrata	Forage Kochia	Lander NV	1.00	0.66

Mix Name			Application Type	Application Date	Acres
Brush Creek Bench Seeding			Drill	Oct 2010	410
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.98	0.92
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.98	0.82
G	Agropyron fragile	Siberian Wheatgrass	Vavilov (NC)	0.49	0.38
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.10	0.87
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.10	0.94
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.49	0.45
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.98	0.79
F	Linum perenne	Blue Flax	Appar	0.98	0.87
F	Medicago sativa	Alfalfa	Ladak Plus	0.49	0.46
F	Medicago sativa	Alfalfa	Ranger	0.49	0.46
F	Medicago sativa	Alfalfa	Spredor 4	0.49	0.43
F	Sanguisorba minor	Small Burnet	Delar	0.98	0.92
S	Atriplex canescens	Fourwing Saltbush	Grand UT	0.16	0.06
S	Atriplex canescens	Fourwing Saltbush	Emery/Grand UT	0.85	0.33

Mix Name			Application Type	Application Date	Acres
Brush Creek Bench Seeding - Browse			Aerial	Nov 2010	410
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.98	0.14
S	Bassia prostrata	Forage Kochia	Sanpete UT	0.73	0.37

Wildlife Habitat and Vegetation History

Table 09R-15.3 - 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

Table 09R-15.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Wyoming Big Sagebrush	No Encroachment
2009	Wyoming Big Sagebrush	No Encroachment
2010	Wyoming Big Sagebrush/Annual Grass	No Encroachment
2012	Wyoming Big Sagebrush/Annual Grass	No Encroachment
2016	Wyoming Big Sagebrush/Annual Grass	No Encroachment
2020	Wyoming Big Sagebrush/Annual Grass	No Encroachment
2025	Wyoming Big Sagebrush	No Encroachment

Site Notes

This study is located approximately two miles to the east of Red Fleet Reservoir on Brush Creek Bench.

Soils

Table 09R-15.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.7	52.2	26.4	21.4	1.1	19.6	176.0	0.5	08/01/2007

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2007-2020 - Current Potential State: Community Phase 2.4 2025 - Seeded State: Community Phase 5.2

When the study was established in 2007, the community was dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Table 09R-15.12) with a poor herbaceous understory mainly comprised of the introduced annual grass species cheatgrass (*Bromus tectorum*) (Table 09R-15.7, Table 09R-15.10). Following the herbicide treatment in 2007 and subsequent seedings (Table 09R-15.1), cheatgrass decreased significantly in abundance and cover and remained comparatively low until 2016 when cheatgrass cover was at its highest. Although cheatgrass was a co-dominant vegetation component from 2010 through 2020, cheatgrass abundance and cover decreased in the years following 2016 and annual grasses were a minor site component in 2025 (Table 09R-15.10). Wyoming big sagebrush cover and density have increased overall since 2007, and sagebrush has (co-)dominated the plant community on this site throughout the study period.

Condition of this site as mule deer winter range has ranged between very poor and fair-good since 2007; winter range condition is considered to be fair-good as of 2025. Factors that negatively influence this site's condition include reduced preferred browse cover and recruitment, and limited perennial grass and forb cover. Attention should also be given to the presence of annual grass, which can negatively affect the resistance and resilience of this site to disturbance (Table 09R-15.6, Table 09R-15.7, Table 09R-15.13, Table 09R-15.15). Pellet transect data indicates that deer presence has been high in nearly every sample year. During the 2024/25 winter season the area had common occurrences of collared mule deer (Wildlife Migration Initiative). Over 80% of Wyoming big sagebrush plants were moderately to heavily browsed in 2007, 2012, and 2016. However, utilization was mostly light in 2020 and 2025. Cattle presence was high in many sample years (Table 09R-15.9, Table 09R-15.13). On-site observations for 2025 noted moderate utilization (20-40%) on crested wheatgrass while little utilization was observed on perennial forbs.

Trend Summary Tables

Table 09R-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
2007	5.9	0.3	-	6.7	0.3	-
2009	7.7	0.2	-	6.1	0.2	-
2010	7.4	0.2	-	12.5	0.4	-
2012	10.4	0.1	-	13.7	0.2	-
2016	6.8	0.4	-	8.5	1.1	-
2020	10.1	1.1	-	13.4	1.3	-
2025	12.0	1.9	-	13.9	0.9	-

Table 09R-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
2007	480	47	225	166	31.5	0.9	1.3	2.3
2009	360	56	5	33	9.3	1.3	0.0	0.7
2010	299	60	206	121	6.3	0.7	6.2	1.8
2012	399	93	79	88	12.2	1.0	0.2	1.2
2016	457	117	242	106	42.5	2.4	3.4	1.0
2020	401	167	46	121	19.8	5.1	0.1	1.5
2025	168	190	12	94	1.3	5.8	0.1	0.6

Table 09R-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
2007	23.0	1.0	45.8	0.2	0.0	41.0
2009	28.4	0.2	47.9	0.1	0.0	22.5
2010	40.0	0.2	45.7	0.1	-	23.2
2012	29.9	0.2	47.2	0.2	0.0	28.6
2016	16.4	-	28.9	2.2	0.2	57.8
2020	33.6	0.0	50.6	0.1	0.1	34.7
2025	48.0	0.2	42.3	0.7	0.1	18.6

Table 09R-15.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
2007	1	-	48	4	1	49
2009	1	-	44	5	-	5
2010	1	-	52	4	-	10
2012	3	-	34	5	-	6
2016	4	-	23	-	-	70
2020	14	-	46	-	-	29
2025	9	-	43	5	2	24
Year	Days Use Per Acre (ha)					
2007	5.8 (14.3)	8.7 (21.5)*	64.3 (158.9)	2.0 (5.0)	-	-
2009	16.7 (41.2)	-	117.3 (289.7)	24.1 (59.6)	-	-
2010	5.1 (12.6)	8.7 (21.5)*	62.3 (153.9)	0.7 (1.7)	-	-
2012	-	-	66.4 (163.9)	2.7 (6.6)	-	-
2016	25.4 (62.8)	-	27.5 (67.9)	-	-	-
2020	18.9 (46.6)	-	42.9 (105.9)	-	-	-
2025	23.2 (57.4)	-	83.8 (206.9)	-	-	-

*Pellets per acre (ha)

Table 09R-15.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa[i] (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency										
2007	5	-	480	13	19	10	-	4	-	-	108
2009	-	-	360	18	26	6	0	8	-	-	-
2010	-	4	299	16	37	3	1	8	-	-	3
2012	3	22	398	4	36	13	-	22	1	-	14
2016	-	79	457	7	18	14	-	12	-	-	-
2020	-	90	401	7	55	5	3	52	2	-	10
2025	3	123	166	1	50	1	-	72	4	1	4
year	Average Cover (%)										
2007	0.0	-	30.3	0.3	0.4	0.1	-	0.0	-	-	1.2
2009	-	-	9.3	0.2	0.6	0.4	0.0	0.1	-	-	-
2010	-	0.0	6.3	0.1	0.5	0.0	0.0	0.1	-	-	0.0
2012	0.0	0.3	12.2	0.0	0.4	0.1	-	0.3	0.0	-	0.0
2016	-	2.0	42.5	0.0	0.3	0.1	-	0.1	-	-	-
2020	-	3.6	19.6	0.1	1.1	0.0	0.0	0.3	0.0	-	0.2
2025	0.1	3.4	1.3	0.0	1.2	0.0	-	1.0	0.0	0.0	0.0

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

Table 09R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum[ai] (desert madwort)	Astragalus convallarius (lesser rushy milkvetch)	Bassia scoparia[ai] (burningbush)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cryptantha[a] (annual cryptantha)	Descurainia pinnata[a] (western tansymustard)	Grindelia squarrosa (curlycup gumweed)	Lappula occidentalis[a] (flatspine stickseed)	Lepidium[a] (pepperweed)	Lygodesmia (skeletonplant)	Machaeranthera canescens (hoary tansyaster)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Plantago patagonica[a] (woolly plantain)	Salsola tragus[ai] (prickly Russian thistle)	Sisymbrium altissimum[ai] (tall tumblemustard)
year	Nested Frequency																
2007	7	-	1	-	-	-	44	-	36	-	-	1	9	1	178	4	-
2009	-	-	0	-	-	-	-	2	2	-	-	1	-	-	3	-	-
2010	4	-	8	173	10	-	1	-	11	-	7	25	-	13	42	22	-
2012	-	-	-	21	-	-	9	3	23	-	-	19	-	17	43	5	-
2016	-	-	3	-	-	3	13	-	12	2	-	20	-	-	216	7	28
2020	-	1	-	-	-	3	9	-	11	-	-	-	-	-	27	-	1
2025	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-	0
year	Average Cover (%)																
2007	0.0	-	0.0	-	-	-	0.1	-	0.1	-	-	0.0	0.0	0.0	1.0	0.0	-
2009	-	-	0.0	-	-	-	-	0.0	0.0	-	-	0.0	-	-	0.0	-	-
2010	0.0	-	0.1	4.8	0.1	-	0.0	-	0.0	-	0.0	0.2	-	0.0	0.6	0.7	-
2012	-	-	-	0.1	-	-	0.0	0.0	0.1	-	-	0.1	-	0.1	0.1	0.0	-
2016	-	-	0.1	-	-	0.0	0.1	-	0.0	0.0	-	0.2	-	-	2.7	0.1	0.5
2020	-	0.0	-	-	-	0.0	0.0	-	0.0	-	-	-	-	-	0.1	-	0.0
2025	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	-	-	0.0

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

FORB SPECIES	Sphaeralcea coccinea (scarlet globemallow)	Townsendia (Townsend daisy)
year	Nested	
2007	159	2
2009	31	-
2010	74	4
2012	65	4
2016	87	10
2020	121	8
2025	94	-
year	Average Cover (%)	
2007	2.3	0.0
2009	0.6	-
2010	1.3	0.1
2012	1.0	0.1
2016	0.6	0.1
2020	1.5	0.0
2025	0.6	-

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

Table 09R-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)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)			
2007	6.7	-	0.1	0.2
2009	6.1	-	0	0.2
2010	12.5	-	0.2	0.2
2012	13.7	-	-	0.2
2016	8.1	0.4	0.1	1
2020	13.2	0.2	0.2	1.1
2025	13.7	0.2	-	0.9
year	Quadrat Cover (%)			
2007	5.9	-	0.1	0.1
2009	7.7	-	0.1	0.1
2010	7.4	0.0	0.0	0.1
2012	10.4	0.0	-	0.1
2016	6.5	0.2	0.1	0.3
2020	9.6	0.5	0.2	0.9
2025	11.5	0.5	0.1	1.7

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

Table 09R-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.

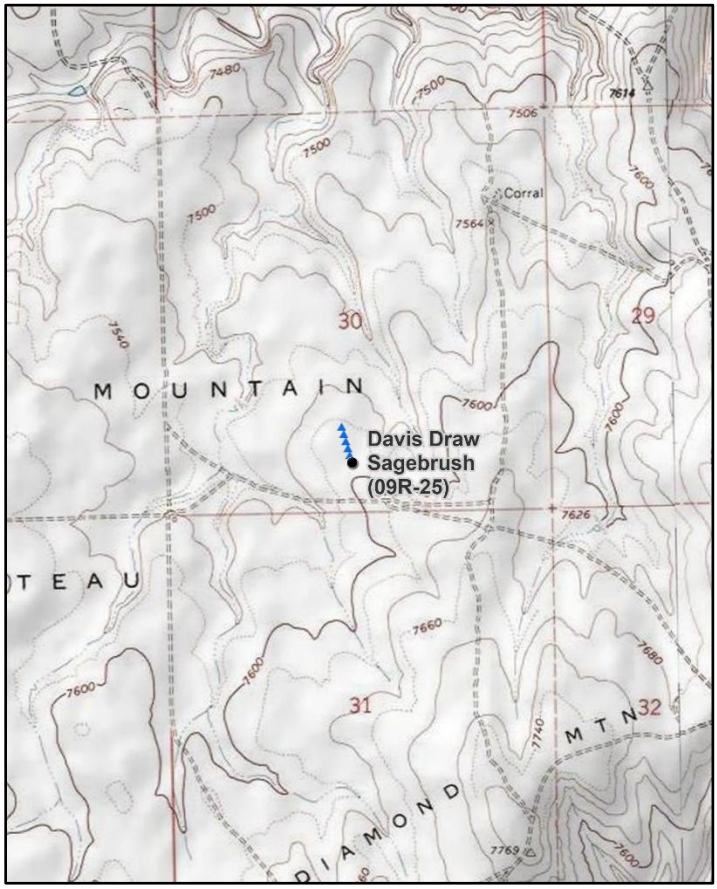
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2007	4420	2640	1	10	90	64	28	62	33/47
2009	-	-	-	-	-	-	-	-	35/51
2010	5100	100	8	71	21	8	41	24	38/53
2012	4340	8760	23	60	17	50	35	21	38/57
2016	4560	-	8	61	31	65	25	35	32/55
2020	4220	1500	7	77	17	22	16	20	33/52
2025	4740	60	10	78	12	27	17	12	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	64/162
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Bassia prostrata[pi] -- (forage kochia)									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	20	100	100	0	0	0	0	0	- / -
2012	20	20	100	0	0	0	100	0	4/7
2016	120	-	0	100	0	0	0	0	24/83
2020	200	140	30	70	0	50	20	0	20/35
2025	640	-	25	75	0	38	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2007	220	-	9	91	0	0	0	0	19/22
2009	-	-	-	-	-	-	-	-	23/32
2010	160	-	0	100	0	0	0	13	29/42
2012	100	-	40	60	0	0	20	0	15/21
2016	260	20	23	77	0	0	0	0	21/23
2020	200	-	0	80	20	0	0	20	19/28
2025	160	-	0	100	0	0	0	0	- / -
Krascheninnikovia lanata[p] -- (winterfat)									
2007	20	-	0	100	0	0	100	0	23/26
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
2007	140	-	0	57	43	0	0	43	11/30
2009	-	-	-	-	-	-	-	-	10/30
2010	240	-	0	92	8	17	0	8	9/34
2012	340	-	18	82	0	0	0	0	8/21
2016	1360	20	0	100	0	0	0	0	11/34
2020	320	-	0	56	44	0	0	75	11/48
2025	1860	-	0	43	57	0	0	57	- / -

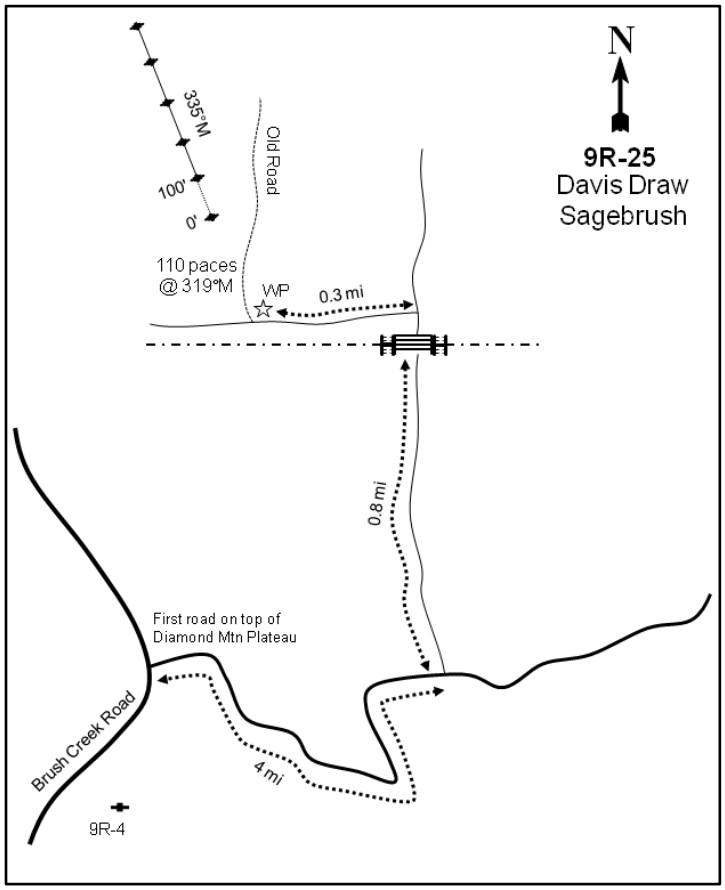
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 09R-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
2007	8.4	-6.9	0.3	1.7	-20.0	4.7	0.0	**-11.8**	Very Poor
2009	7.6	0.0	0.0	2.6	-7.0	1.3	0.0	**4.5**	Very Poor
2010	15.6	8.6	3.9	1.3	-4.7	3.6	0.0	**28.3**	Fair
2012	17.1	9.9	11.5	2.1	-9.2	2.4	0.0	**33.8**	Fair
2016	10.7	6.1	4.0	4.8	-20.0	2.0	0.0	**7.6**	Very Poor
2020	16.8	10.1	3.5	10.3	-14.8	3.0	0.0	**28.9**	Fair
2025	17.4	11.5	5.2	11.6	-1.0	1.2	0.0	**45.9**	Fair-Good

DAVIS DRAW SAGEBRUSH - STUDY NO. 09R-25





Location Information

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

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	335° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	DAVIS DRAW
Elevation	7,610ft (2,320m)
Aspect	Northeast
Slope	5-6%
Sample Dates	06/12/2012, 08/25/2015, 07/22/2019, 07/22/2025

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

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

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2012	Mountain Big Sagebrush/Antelope Bitterbrush/Perennial Grass	No Encroachment
2015	Perennial Grass/Mountain Big Sagebrush/Antelope Bitterbrush	No Encroachment
2019	Mountain Big Sagebrush/Antelope Bitterbrush/Perennial Grass	No Encroachment
2025	Mountain Big Sagebrush/Antelope Bitterbrush	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC430UT
States and Transitions	2012-2025 - Mountain Big Sagebrush-Steppe/Introduced Non-natives State: Community Phase 2.1

Upon study establishment in 2012, this site was dominated by a mixed mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) plant community; sagebrush and bitterbrush cover and density were considerably reduced following the chain harrow treatment later that year (Table 09R-25.1, Table 09R-25.12, Table 09R-25.13). Perennial grasses, particularly muttongrass (*Poa fendleriana*), needle and thread (*Hesperostipa comata*), and thickspike wheatgrass (*Elymus lanceolatus*), increased and were a co-dominant site component from 2012 through the 2019 sample year. Although perennial grass presence was still notable in 2025, cover decreased between the two most recent sample years while preferred browse cover increased, and sagebrush and bitterbrush were the dominant components in 2025. The introduced annual grass cheatgrass (*Bromus tectorum*) contributed moderate cover in 2019, but it decreased in 2025 (Table 09R-25.7, Table 09R-25.10); cheatgrass may have the potential to influence the ecological resilience of this site should it increase again in future sample years.

This site likely serves as adequate summer range for mule deer due to the ample shrub and herbaceous components (Table 09R-25.10, Table 09R-25.11, Table 09R-25.12). Deer presence was high in 2012 and 2015, but has since decreased to moderate levels as of 2025. During the 2024/25 winter season the area had common occurrences of collared mule deer (Wildlife Migration Initiative). Elk presence was high in 2019, but pellet groups haven't been sampled in any other year. Cattle presence has been moderate over the sample period (Table 09R-25.9). Utilization of preferred browse has been focused on bitterbrush with 60% or more of plants sampled in density strips displaying signs of moderate to heavy hedging in most sample years. Utilization on sagebrush has mostly been light (Table 09R-25.13). On-site observations for 2025 noted that the perennial grasses Letterman's needlegrass (*Achnatherum lettermanii*) and needle and thread had light utilization (10-20%) while there was little to no forb utilization.

Trend Summary Tables

Table 09R-25.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	33.6	0.1	-	41.2	0.2	-
2015	8.9	0.2	-	11.6	0.7	-
2019	17.1	0.7	-	18.9	1.2	-
2025	23.9	0.7	-	32.9	1.1	-

Table 09R-25.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	6	414	85	283	0.0	24.4	0.2	7.3
2015	132	400	7	55	2.4	32.3	0.0	1.1
2019	196	428	299	227	7.1	31.8	3.4	5.8
2025	17	432	83	127	0.0	19.1	0.3	1.4

Table 09R-25.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	9.0	0.5	44.6	0.1	0.1	68.0
2015	15.2	-	67.0	0.1	1.6	43.3
2019	9.7	0.1	65.0	0.4	0.1	58.4
2025	9.0	0.2	64.6	2.6	0.0	45.5

Table 09R-25.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2012	2	24	-	-	2
2015	1	35	-	17	31
2019	2	23	7	2	11
2025	9	18	2	3	7
Year	Days Use Per Acre (ha)				
2012	9.4 (23.3)	73.7 (182.1)	-	-	-
2015	-	31.5 (77.8)	-	122.0 (301.3)*	-
2019	17.4 (43.0)	18.7 (46.3)	59.6 (147.3)	122.0 (301.3)*	-
2025	13.8 (34.1)	26.2 (64.6)	-	52.3 (129.1)*	-

*Pellets per acre (ha)

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

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa bulbosa[i] (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency												
2012	52	6	-	13	39	184	173	47	-	174	11	98	-
2015	13	132	20	-	39	166	152	20	-	240	5	31	13
2019	63	196	3	24	121	287	177	40	-	45	-	175	3
2025	81	17	-	54	19	276	147	6	1	66	1	227	-
year	Average Cover (%)												
2012	1.0	0.0	-	0.1	0.4	3.8	8.5	1.1	-	8.0	0.1	1.4	-
2015	0.9	2.4	0.3	-	0.9	5.1	7.3	0.7	-	15.3	0.0	0.9	0.9
2019	1.8	7.1	0.0	0.2	3.4	11.6	8.4	0.6	-	1.3	-	4.6	0.0
2025	2.0	0.0	-	0.4	0.4	5.0	3.9	0.1	0.0	2.0	0.0	5.3	-

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

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

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium acuminatum (tapertip onion)	Alyssum desertorum[ai] (desert madwort)	Antennaria (pussytoes)	Antennaria microphylla (littleleaf pussytoes)	Arabis holboellii[a] (Holboell's rockcress)	Arenaria congesta (ballhead sandwort)	Astragalus convallarius (lesser rushy milkvetch)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Collomia linearis[a] (tiny trumpet)	Cordylanthus[a] (bird's-beak)	Cymopterus longipes (longstalk springparsley)	Delphinium nuttallianum (twolobe larkspur)	Draba[a] (draba)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)
year	Nested Frequency																
2012	10	-	-	131	-	36	55	12	-	21	-	-	25	-	-	6	34
2015	-	-	-	-	48	-	5	1	-	-	-	-	-	-	-	-	-
2019	13	58	-	14	13	-	77	32	6	220	106	2	25	1	-	-	43
2025	13	2	13	-	5	-	31	24	-	50	2	-	8	-	1	5	8
year	Average Cover (%)																
2012	0.1	-	-	4.9	-	0.1	0.4	0.1	-	0.0	-	-	0.1	-	-	0.0	0.1
2015	-	-	-	-	1.0	-	0.0	0.0	-	-	-	-	-	-	-	-	-
2019	0.3	0.5	-	0.3	0.2	-	2.0	1.0	0.0	1.5	0.4	0.0	0.1	0.0	-	-	0.6
2025	0.1	0.0	0.0	-	0.2	-	0.5	0.2	-	0.1	0.0	-	0.0	-	0.0	0.0	0.1

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

FORB SPECIES	Eriogonum heracleoides (parsnipflower buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Mertensia (bluebells)	Penstemon humilis (low beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Silene drummondii (Drummond's campion)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius[ai] (yellow salsify)	Trifolium gymnocarpon (hollyleaf clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency															
2012	-	3	16	-	6	5	-	4	132	55	-	2	3	-	37	-
2015	-	-	-	-	-	7	-	-	-	-	4	1	-	-	-	-
2019	-	3	3	64	-	37	-	8	37	155	8	1	13	2	24	2
2025	3	-	-	19	-	11	2	3	69	13	-	1	-	-	1	1
year	Average Cover (%)															
2012	-	0.0	0.6	-	0.0	0.0	-	0.0	0.8	0.1	-	0.0	0.0	-	0.1	-
2015	-	-	-	-	-	0.0	-	-	-	-	0.0	0.0	-	-	-	-
2019	-	0.1	0.0	0.3	-	0.4	-	0.2	0.1	0.8	0.2	0.0	0.2	0.0	0.0	0.0
2025	0.1	-	-	0.1	-	0.0	0.0	0.0	0.2	0.0	-	0.0	-	-	0.0	0.0

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

Table 09R-25.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Eriogonum microthecum[p] (slender buckwheat)	Opuntia (pricklypear)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)				
2012	23.4	0.2	-	-	17.8
2015	5	0.7	0.3	-	6.3
2019	10.6	1.2	-	-	8.3
2025	19.3	1.1	-	-	13.6
year	Quadrat Cover (%)				
2012	21.5	0.1	-	0.0	12.1
2015	4.7	0.2	0.1	0.0	4.1
2019	9.8	0.7	-	-	7.3
2025	14.3	0.7	-	-	9.6

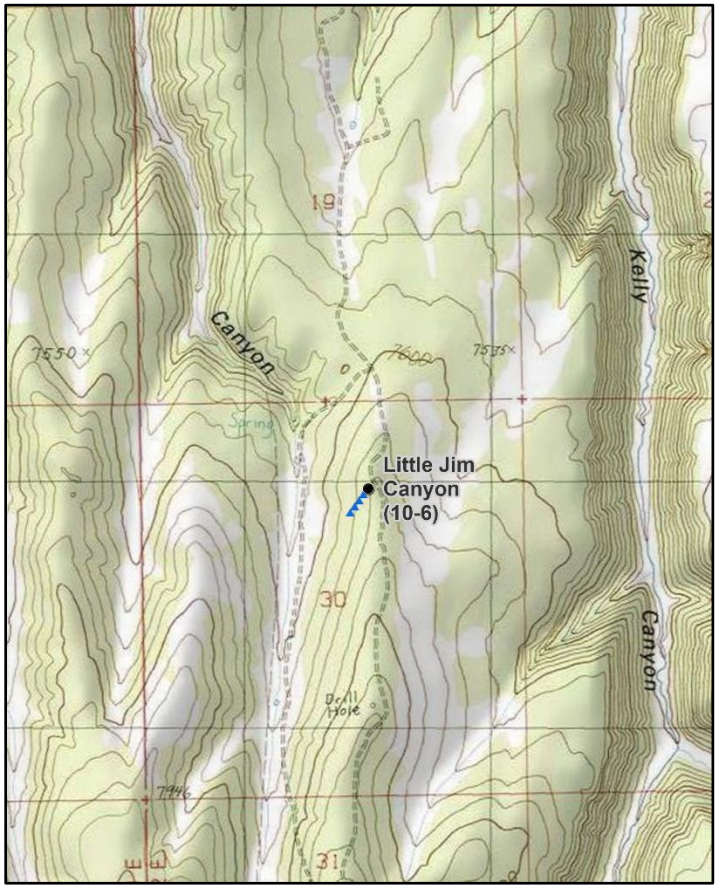
t - Tree Species; p - Preferred Browse; i - Introduced Species

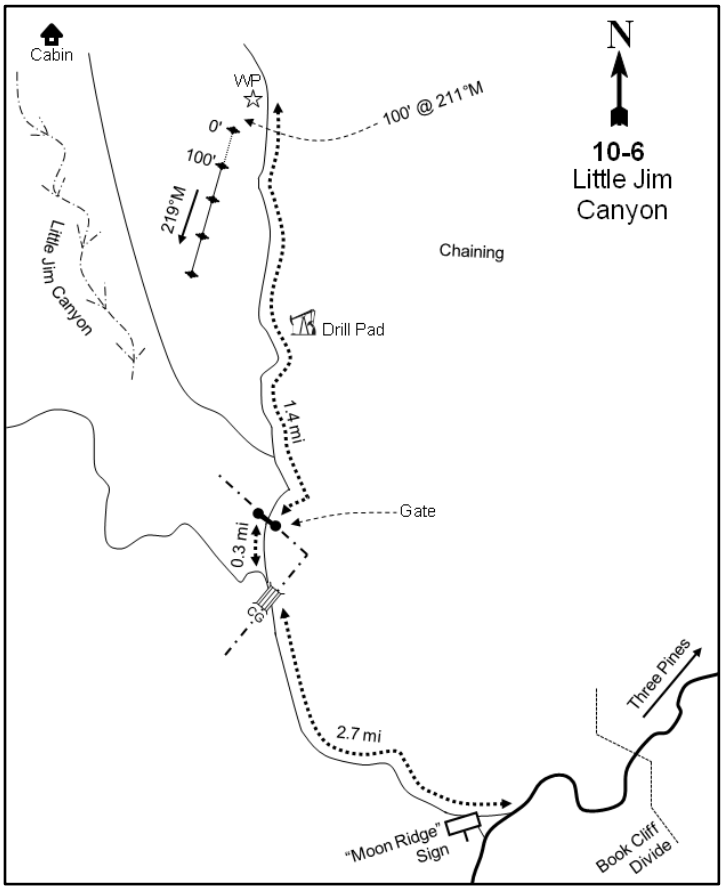
Table 09R-25.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	5920	1820	42	46	12	28	22	9	68/92
2015	3160	160	53	45	2	26	8	10	35/52
2019	2740	1280	3	89	8	12	1	12	47/70
2025	2460	80	6	81	13	15	15	15	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2012	220	-	0	100	0	0	0	9	32/55
2015	240	-	0	83	17	0	100	17	28/37
2019	260	-	0	100	0	0	0	0	33/53
2025	260	-	0	85	15	31	8	15	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2012	-	-	-	-	-	-	-	-	-/-
2015	80	-	0	100	0	0	100	0	18/37
2019	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Linanthus pungens -- (granite prickly phlox)									
2012	40	-	50	50	0	0	0	0	24/37
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	15/31
2025	40	-	0	100	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2012	40	-	50	50	0	0	0	0	7/28
2015	20	-	0	100	0	0	0	100	- / -
2019	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2012	2500	60	8	90	2	38	47	2	51/101
2015	1320	20	14	86	0	36	33	2	40/86
2019	1260	-	5	94	2	51	8	2	38/84
2025	1440	-	4	75	21	33	31	22	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	39/39
2019	-	-	-	-	-	-	-	-	42/72
2025	60	-	0	0	100	0	100	100	- / -
Tetradymia canescens -- (spineless horsebrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	100	0	17/13

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

LITTLE JIM CANYON - STUDY NO. 10-6





Location Information

USGS 7.5 min Map Info	Tenmile Canyon North; Township 16S, Range 22E, Section 30
GPS (0' Stake)	NAD 83 UTM ZONE 12, 626445 East 4361161 North

Transect Information

Browse Tag # (0' Stake)	9099
Transect Bearing	204° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

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

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	MCCLELLAND
Elevation	7,700ft (2,347m)
Aspect	Southwest
Slope	15%
Sample Dates	06/20/1995, 06/22/2000, 08/21/2012, 07/14/2015, 08/15/2017, 07/28/2021, 06/11/2025

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

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

Wildlife Habitat and Vegetation History

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

Species	Habitat	Season
American Bison	crucial	year-long
Mule Deer	substantial	summer
Rocky Mountain Elk	crucial	summer
Greater Sage-Grouse		
Rocky Mountain Bighorn	RMBS	year-long

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

Year	Vegetation Type	Woodland Succession
1988	Mixed Mountain Brush	Early Phase I
1995	Mixed Mountain Brush	Phase I
2000	Mixed Mountain Brush	Phase I
2012	Mixed Mountain Brush	Phase I
2015	Mixed Mountain Brush	Early Phase I
2017	Mixed Mountain Brush	Early Phase I
2021	Mixed Mountain Brush	Early Phase I
2025	Mixed Mountain Brush	Early Phase I

Site Notes

No Notes

Soils

Table 10-06.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.3	38.0	37.4	24.6	6.7	8.3	96.0	0.8	06/22/2000

Site Potential

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

The browse component on this study site has been dominated by mixed mountain brush species such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), alderleaf mountain mahogany (*Cercocarpus montanus*), and mountain snowberry (*Symphoricarpos oreophilus*) since study establishment in 1988 (Photos, Pre-1992 Data, Table 10-06.12, Table 10-06.13). The herbaceous understory has remained somewhat diverse and has consisted mostly of native perennial grasses such as Indian ricegrass (*Achnatherum hymenoides*) and squirreltail (*Elymus elymoides*). The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in the understory, but it has provided limited cover (Table 10-06.10). Forb species have remained rare in comparison with grasses (Table 10-06.7, Table 10-06.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) increased in abundance over the sample period and were becoming co-dominant with the browse component. In 2013, however, the site was treated with a bullhog (Table 10-06.1) that removed nearly all of the pinyon and juniper trees. An extant tree component is present as of 2025, indicating that infilling could occur in the future. However, the site has remained within Early Phase I of woodland succession in all post-treatment sample years, suggesting that infilling is likely not an immediate concern (Table 10-06.4, Table 10--06.14). Sagebrush has steadily increased in both cover and density since the removal of pinyon and juniper. Due to the increased abundance and diversity of sagebrush and grass composition the site is considered to be improving in condition for mule deer summering habitat (Table 10-06.10, Table 10-06.12, Table 10-06.13).

The abundant preferred shrub and grass communities on this site likely provides adequate forage for deer and elk (Beck & Peek, 2005) during the summer months (Table 10-06.3, Table 10-06.6, Table 10-06.7). However, pellet transect data indicates that presence of both deer and elk has ranged between low and moderate since 2000; deer presence was at its highest in 2021. During the 2024/25 winter season the area had occasional common occurrences of collared elk (Wildlife Migration Initiative). Mountain big sagebrush utilization has been light in most sample years, but the heaviest utilization occurred in 2016. However, as a highly preferred species, alderleaf mountain mahogany has had proportionally higher utilization than mountain big sagebrush, though the population is a third of the size of that of sagebrush. Mahogany utilization was at its highest in 2017 with 100% of plants sampled in density strips being either moderately (33%) or heavily (67%) hedged. Utilization pressures have decreased as the population has grown in size. Cattle and/or bison presence has been low over the sample years (Table 10-06.9, Table 10-06.13). On-site observations for 2025 noted little to no utilization on the herbaceous community.

Trend Summary Tables

Table 10-06.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1995	18.2	2.0	4.0	-	-	-
2000	24.2	0.5	3.9	-	-	-
2012	16.3	1.5	8.8	25.4	0.6	12.0
2015	17.0	2.6	0.0	27.0	2.1	-
2017	20.3	1.5	0.0	26.3	2.7	0.1
2021	19.5	2.4	0.0	29.6	2.4	-
2025	24.3	1.8	0.1	34.6	1.8	0.3

Table 10-06.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1995	81	139	115	95	1.6	3.2	1.9	0.9
2000	39	129	3	67	0.1	2.6	0.0	1.2
2012	6	118	4	38	0.0	2.7	0.0	0.3
2015	103	175	17	72	3.1	9.2	0.3	2.1
2017	142	217	1	55	2.1	9.6	0.1	1.8
2021	47	201	1	18	0.3	4.8	0.0	0.2
2025	24	198	3	35	0.1	4.6	0.0	0.5

Table 10-06.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1995	3.3	0.6	49.0	19.2	3.2	33.2
2000	7.8	1.0	54.2	25.2	3.1	31.7
2012	3.6	-	50.7	30.3	1.4	29.7
2015	6.4	-	61.1	18.3	2.1	30.4
2017	15.6	0.0	63.6	13.6	2.5	29.4
2021	8.2	0.8	56.4	21.0	2.2	25.8
2025	11.1	-	56.1	18.9	2.6	29.0

Table 10-06.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle/Bison	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
1995	-	3	4	-	9
2000	-	3	11	-	33
2012	-	12	9	2	5
2015	1	5	7	-	4
2017	1	10	17	2	-
2021	1	15	17	-	1
2025	-	11	14	-	8
Year	Days Use Per Acre (ha)				
1995	-	-	-	-	-
2000	-	7.4 (18.2)	6.0 (14.9)	-	-
2012	-	24.8 (61.2)	19.4 (48.0)	2.3 (5.7)	-
2015	-	16.8 (41.4)	24.8 (61.2)	1.2 (2.9)	-
2017	1.5 (3.6)	22.1 (54.6)	36.2 (89.4)	0.6 (1.4)	-
2021	1.5 (3.6)	24.1 (59.6)	18.1 (44.7)	2.9 (7.2)	-
2025	2.2 (5.4)	12.8 (31.5)	11.4 (28.1)	1.7 (4.3)	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Koeleria macrantha (prairie Junegrass)	Piptatheropsis micrantha (littleseed ricegrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)
year	Nested Frequency									
1995	40	81	21	58	-	-	28	3	4	6
2000	70	39	9	35	2	-	3	2	16	-
2012	82	6	14	23	-	5	-	-	-	3
2015	90	103	18	65	2	-	20	4	6	-
2017	84	142	1	122	8	3	36	0	5	-
2021	99	47	10	71	30	-	25	-	1	-
2025	100	24	4	59	10	11	17	16	-	-
year	Average Cover (%)									
1995	1.3	1.6	0.4	0.7	-	-	0.2	0.0	0.0	0.5
2000	1.6	0.1	0.4	0.4	0.0	-	0.0	0.0	0.1	-
2012	2.2	0.0	0.2	0.3	-	0.0	-	-	-	0.0
2015	4.6	3.1	0.9	1.9	0.0	-	1.3	0.1	0.4	-
2017	4.5	2.1	0.0	2.2	0.1	0.6	2.2	0.0	0.0	-
2021	2.5	0.3	0.1	1.4	0.2	-	0.6	-	0.0	-
2025	2.8	0.1	0.0	0.8	0.1	0.1	0.4	0.3	-	-

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

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

FORB SPECIES	Aliciella latifolia ssp. latifolia[a] (broadleaf gilia)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis (rockcress)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album[a] (lambsquarters)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cryptantha (cryptantha)	Delphinium nuttallianum (twolobe larkspur)	Descurainia[a] (tansymustard)	Draba[a] (draba)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Lappula occidentalis[a] (flatspine stickseed)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)
year	Nested Frequency																
1995	11	-	-	16	1	-	-	-	3	1	74	23	1	-	28	20	16
2000	-	-	4	9	-	-	-	-	-	-	-	-	-	-	3	-	22
2012	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6
2015	-	-	-	1	-	-	3	6	6	-	4	4	3	-	-	-	7
2017	-	-	3	-	-	-	-	-	-	-	1	-	-	3	-	-	11
2021	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	5
2025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	6
year	Average Cover (%)																
1995	0.2	-	-	0.0	0.0	-	-	-	0.0	0.0	1.5	0.1	0.0	-	0.1	0.1	0.6
2000	-	-	0.0	0.0	-	-	-	-	-	-	-	-	-	-	0.0	-	0.2
2012	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0
2015	-	-	-	0.1	-	-	0.0	0.0	0.1	-	0.2	0.0	0.0	-	-	-	0.2
2017	-	-	0.0	-	-	-	-	-	-	-	0.1	-	-	0.0	-	-	0.3
2021	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	0.2
2025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	0.0

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

FORB SPECIES	Melilotus officinalis[i] (sweetclover)	Packera multilobata (lobeleaf groundsel)	Penstemon pachyphyllus (thickleaf beardtongue)	Physaria (twinpod)	Physaria newberryi (Newberry's twinpod)	Polygonum douglasii[a] (Douglas' knotweed)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency						
1995	7	23	-	-	31	5	-
2000	-	1	27	6	9	-	-
2012	-	-	16	-	23	-	-
2015	-	5	37	-	23	-	1
2017	-	-	32	10	-	-	-
2021	-	-	8	-	6	-	-
2025	-	-	18	-	13	-	-
year	Average Cover (%)						
1995	0.0	0.1	-	-	0.1	0.0	-
2000	-	0.0	0.8	0.1	0.1	-	-
2012	-	-	0.2	-	0.1	-	-
2015	-	0.0	1.5	-	0.1	-	0.0
2017	-	-	1.4	0.0	-	-	-
2021	-	-	0.0	-	0.0	-	-
2025	-	-	0.4	-	0.1	-	-

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

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

SHRUB SPECIES	Artemisia frigida[p] (prairie sagewort)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Cercocarpus montanus[p] (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca[p] (rubber rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Juniperus scopulorum[t] (Rocky Mountain juniper)	Mahonia repens (creeping barberry)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Pseudotsuga menziesii[t] (Douglas-fir)	Purshia tridentata[p] (antelope bitterbrush)	Quercus gambelii[p] (Gambel oak)	Ribes cereum var. cereum[p] (wax currant)
year	Line Intercept Cover (%)																
1995	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2012	0.7	4.3	3.3	-	0.1	1.1	-	0.2	3.3	0.9	0.1	0.2	7.8	-	-	4.2	0.7
2015	1.2	4.2	0.8	-	-	3.1	-	0.3	-	-	1.8	-	-	-	-	1.5	0.1
2017	0.8	3.8	0.5	0.1	0.4	3.6	0.2	0.9	0.1	-	1	0.1	-	-	-	2.4	-
2021	0.1	5.3	0.5	0.1	1.2	0.9	-	-	-	-	1.1	-	-	-	-	2.3	1.2
2025	0.1	7.1	1.5	0.1	0.3	2.4	-	0.8	0.3	-	0.6	0	-	-	-	2.4	0.6
year	Quadrat Cover (%)																
1995	-	3.5	3.3	-	-	2.0	-	0.0	2.3	-	1.4	0.6	1.7	-	0.1	1.2	1.7
2000	0.0	6.8	4.2	-	0.0	1.1	-	-	1.8	0.1	0.3	0.2	1.8	0.1	-	2.8	1.3
2012	0.8	4.6	1.8	-	0.4	0.6	-	0.2	1.8	0.0	0.2	0.7	7.0	-	-	2.7	1.3
2015	0.8	3.5	0.4	-	0.1	1.0	-	1.2	-	-	1.3	0.0	0.0	0.0	-	1.4	0.3
2017	0.8	4.7	0.1	0.1	0.0	1.9	0.0	0.4	0.0	-	0.9	0.0	0.0	-	-	3.1	0.1
2021	0.2	5.2	0.8	0.5	1.2	0.3	-	-	-	-	0.6	0.0	0.0	-	-	2.4	1.4
2025	0.6	5.1	0.7	0.0	0.4	0.6	-	0.9	0.1	-	0.5	0.0	-	-	-	1.1	0.7

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

SHRUB SPECIES	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line
1995	-
2000	-
2012	11.1
2015	16.1
2017	15.2
2021	19.3
2025	20.5
year	Quadrat Cover (%)
1995	6.4
2000	8.0
2012	4.6
2015	9.6
2017	9.6
2021	9.3
2025	15.6

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

Table 10-06.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia frigida[p] -- (prairie sagewort)									
1995	20	-	0	100	0	0	0	0	28/29
2000	320	80	25	75	0	0	0	0	12/22
2012	1440	-	0	100	0	10	0	0	13/29
2015	660	-	15	85	0	0	0	0	39/46
2017	740	-	30	70	0	0	0	0	24/34
2021	280	-	7	79	14	29	7	21	- / -
2025	400	-	0	100	0	0	0	0	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
1995	420	-	10	86	5	0	0	0	64/78
2000	520	-	12	89	0	4	0	0	82/91
2012	620	-	7	81	13	26	29	23	60/86
2015	360	-	11	83	6	44	28	11	57/94
2017	420	20	29	67	5	5	10	5	68/99
2021	600	-	3	93	3	0	0	10	- / -
2025	660	-	3	97	0	39	0	6	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
1995	440	-	9	86	5	14	0	0	119/115
2000	460	-	26	74	0	30	9	0	124/117
2012	300	-	20	47	33	33	33	27	113/115
2015	320	40	50	50	0	0	56	0	81/89
2017	180	-	33	67	0	33	67	0	65/72
2021	240	-	25	42	33	42	33	33	- / -
2025	220	-	0	100	0	36	9	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
1995	60	-	67	33	0	67	0	0	56/62
2000	-	-	-	-	-	-	-	-	60/39
2012	-	-	-	-	-	-	-	-	22/23
2015	20	-	0	100	0	0	0	0	36/35
2017	260	-	0	100	0	0	0	0	26/35
2021	400	-	0	90	10	0	0	25	- / -
2025	40	-	0	50	50	0	0	50	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
1995	-	-	-	-	-	-	-	-	-/-
2000	140	-	14	86	0	0	0	0	73/80
2012	20	20	0	100	0	0	0	100	69/99
2015	60	-	0	100	0	0	0	0	73/98
2017	60	-	0	100	0	0	0	0	61/90
2021	460	-	48	26	26	0	0	22	- / -
2025	160	-	0	63	38	0	0	38	- / -
Ericameria nauseosa ssp. nauseosa var. hololeuca[p] -- (rubber rabbitbrush)									
1995	340	-	18	71	12	0	0	6	63/83
2000	200	-	10	80	10	0	10	10	82/82
2012	220	-	0	73	27	18	9	73	73/91
2015	280	20	0	100	0	43	14	0	66/79
2017	200	20	20	80	0	0	0	0	76/94
2021	280	-	21	71	7	7	7	7	- / -
2025	260	-	0	62	39	15	8	39	- / -
Ericameria parryi var. parryi -- (Parry's rabbitbrush)									
1995	-	-	-	-	-	-	-	-	-/-
2000	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	74/96
2017	-	-	-	-	-	-	-	-	78/87
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
1995	-	-	-	-	-	-	-	-	-/-
2000	40	-	0	100	0	0	0	0	19/22
2012	300	-	7	93	0	0	0	0	16/26
2015	860	60	7	93	0	0	0	0	23/30
2017	820	-	7	93	0	0	0	0	19/26
2021	-	-	-	-	-	-	-	-	-/-
2025	2600	20	2	96	2	0	0	2	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
1995	-	-	-	-	-	-	-	-	-/-
2000	60	-	67	33	0	0	0	0	- / -
2012	80	20	0	100	0	0	0	25	- / -
2015	20	20	100	0	0	0	0	0	- / -
2017	20	-	0	100	0	0	0	0	- / -
2021	20	-	0	100	0	0	0	0	- / -
2025	20	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Juniperus scopulorum[t] -- (Rocky Mountain juniper)									
1995	-	-	-	-	-	-	-	-	-/-
2000	40	-	0	100	0	0	0	0	- / -
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Mahonia repens -- (creeping barberry)									
1995	1840	-	24	76	0	0	0	0	7/18
2000	720	-	0	100	0	0	0	0	5/11
2012	1600	-	29	71	0	0	0	0	7/9
2015	1560	-	0	100	0	0	0	0	12/22
2017	2420	-	0	100	0	0	0	0	5/11
2021	2200	-	0	100	0	0	0	0	- / -
2025	3760	-	0	100	0	0	0	0	- / -
Opuntia -- (pricklypear)									
1995	120	-	0	67	33	0	0	33	19/29
2000	240	-	0	100	0	0	0	0	9/31
2012	80	-	0	100	0	0	0	100	10/51
2015	300	-	13	87	0	0	0	0	9/32
2017	200	-	0	100	0	0	0	0	9/26
2021	280	-	14	36	50	0	0	50	- / -
2025	140	-	14	86	0	0	0	43	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
1995	40	-	100	0	0	0	0	0	- / -
2000	320	-	56	44	0	0	0	0	- / -
2012	300	-	13	87	0	0	0	0	- / -
2015	20	40	100	0	0	0	0	0	- / -
2017	20	40	100	0	0	0	0	0	- / -
2021	40	80	100	0	0	0	0	0	- / -
2025	120	-	100	0	0	0	0	0	- / -
Pseudotsuga menziesii[t] -- (Douglas-fir)									
1995	-	-	-	-	-	-	-	-	-/-
2000	20	-	100	0	0	0	0	0	- / -
2012	-	-	-	-	-	-	-	-	-/-
2015	-	20	0	0	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	-/-
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
1995	20	-	0	100	0	0	0	0	68/111
2000	20	-	0	100	0	0	100	0	97/119
2012	-	-	-	-	-	-	-	-	54/93
2015	-	-	-	-	-	-	-	-	1/27
2017	-	-	-	-	-	-	-	-	-/-
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-

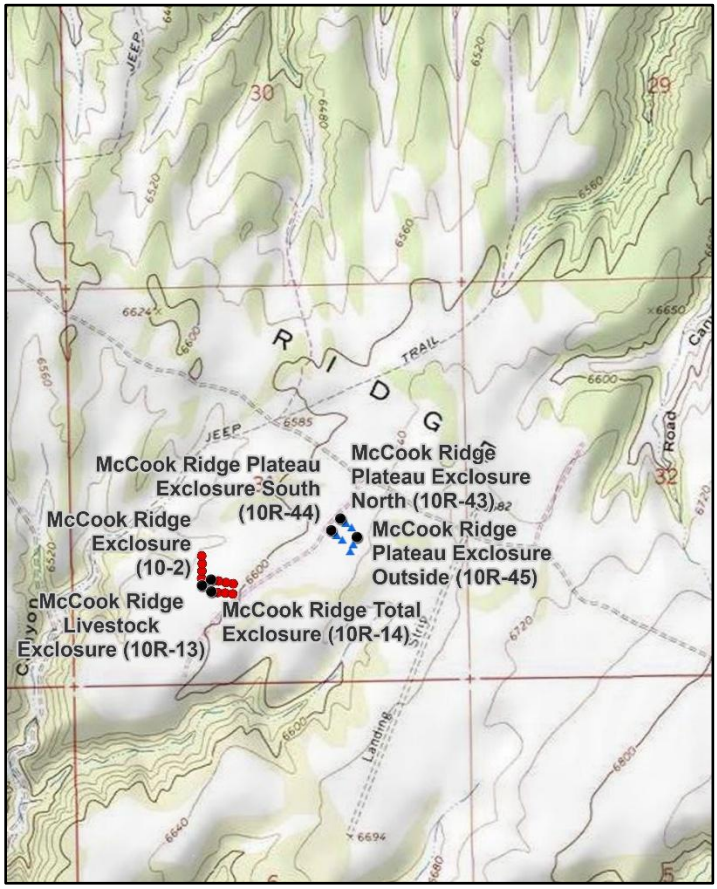
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Quercus gambelii[p] -- (Gambel oak)									
1995	60	-	0	100	0	0	0	0	37/79
2000	1400	-	16	84	0	0	0	0	162/72
2012	820	-	24	76	0	0	0	0	94/51
2015	880	-	27	73	0	0	25	0	69/58
2017	1120	-	18	82	0	18	18	0	42/43
2021	840	-	26	62	12	17	0	12	- / -
2025	1220	-	28	66	7	5	49	7	- / -
Ribes cereum var. cereum[p] -- (wax currant)									
1995	80	60	0	100	0	0	0	0	91/121
2000	100	-	0	100	0	20	0	0	85/100
2012	100	-	40	40	20	40	0	20	78/89
2015	140	20	14	86	0	14	57	0	52/67
2017	100	-	0	100	0	60	0	0	60/72
2021	60	-	33	67	0	0	0	0	- / -
2025	120	-	17	50	33	17	0	33	- / -
Sambucus[p] -- (elderberry)									
1995	-	-	-	-	-	-	-	-	-/-
2000	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	170/130
2015	-	-	-	-	-	-	-	-	147/108
2017	-	-	-	-	-	-	-	-	-/-
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
1995	1340	-	21	79	0	3	0	0	56/108
2000	2080	40	30	68	2	14	2	1	54/93
2012	1620	-	20	72	9	26	5	17	53/109
2015	3280	-	6	95	0	21	13	2	46/98
2017	3520	-	7	92	1	7	7	2	54/92
2021	2720	-	3	88	9	16	2	8	- / -
2025	2980	20	6	93	1	28	10	1	- / -

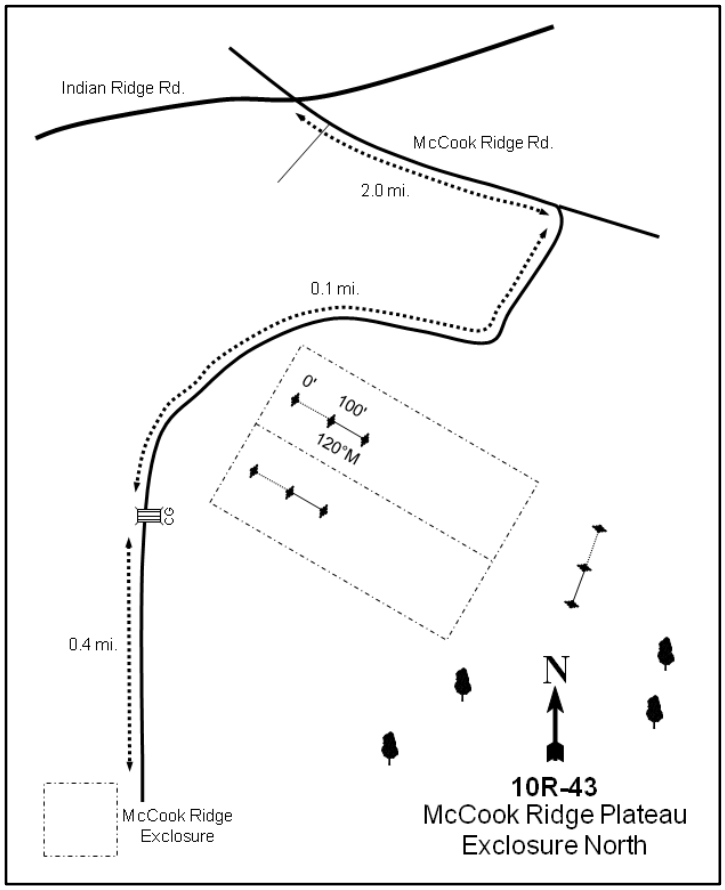
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 10-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
1995	61	-	-	-	-	-	14.8
2000	76	-	-	-	-	-	15.4
2012	79	6	31	25	31	6	6.7
2015	20	33	67	-	-	-	3.0
2017	23	50	50	-	-	-	2.7
2021	29	25	75	-	-	-	3.8
2025	15	22	78	-	-	-	3.8
Juniperus scopulorum (Rocky Mountain juniper)							
2025	1	-	100	-	-	-	3.0
Pinus edulis (twoneedle pinyon)							
1995	174	-	-	-	-	-	4.4
2000	231	-	-	-	-	-	5.7
2012	241	-	30	25	35	10	6.1
2015	3	33	67	-	-	-	2.3
2017	30	30	70	-	-	-	2.3
2021	21	44	56	-	-	-	2.6
2025	38	55	27	18	-	-	2.5
Pseudotsuga menziesii (Douglas-fir)							
1995	3	-	-	-	-	-	10.0
Quercus gambelii (Gambel oak)							
1995	8	-	-	-	-	-	3.0

McCook Ridge Plateau Exclosure North - Study No. 10R-43





Location Information

USGS 7.5 min Map Info	Cooper Canyon SE; Township 13S, Range 24E, Section 31
GPS (0' Stake)	NAD 83 UTM ZONE 12, 648498 East 4389447 North

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	LOWER MCCOOK
Elevation	6,550ft (1,996m)
Aspect	West
Slope	4%
Sample Dates	07/09/2008, 06/08/2010, 08/28/2013, 08/27/2018, 06/24/2025

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

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

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

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

Mix Name			Application Type	Application Date	Acres
McCook Ridge Cheatgrass Control - Sagebrush/Kochia			Drill	Oct 2008	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.50	0.08
S	Bassia prostrata	Forage Kochia	Immigrant	1.00	0.70

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2008	Winterfat/Annual Grass	No Encroachment
2010	Mixed Shrub/Perennial Grass	No Encroachment
2013	Mixed Shrub/Perennial Grass	No Encroachment
2018	Mixed Shrub/Perennial Grass	No Encroachment
2025	Mixed Shrub/Perennial Grass	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Silt Loam (Fourwing Saltbush-Winterfat*)
NRCS Ecological Site #	R034BY329UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2008, the plant community on this site was dominated by winterfat (*Krascheninnikovia lanata*) and the introduced annual grass cheatgrass (*Bromus tectorum*) with little cover from other species (Table 10R-43.10, Table 10R-43.12). Cover of winterfat exhibited an initial decrease following a herbicide and seeding treatment (Table 10R-43.1), but recovered to nearly pre-treatment levels in 2018. Cover of other preferred browse such as prairie sagewort (*Artemisia frigida*) and fourwing saltbush (*Atriplex canescens*) has fluctuated, but other shrubs (including winterfat) have been a co-dominant vegetation component since 2010 (Table 10R-43.12). Decadence of fourwing saltbush and winterfat exhibited a notable increase between 2018 and 2025 (Table 10R-43.13), which can likely be largely attributed to drought conditions. Cheatgrass decreased following treatment, while perennial grasses --

particularly thickspike wheatgrass (*Elymus lanceolatus*) -- increased in cover and became a co-dominant cover type in 2010. Forbs have provided little cover in comparison with grasses, and the introduced annual desert madwort (*Alyssum desertorum*) was the most abundant species in 2025 (Table 10R-43.7, Table 10R-43.10, Table 10R-43.11).

Condition of mule deer winter range on this site has ranged between very poor-poor and good since 2008; winter range condition was considered to be fair in 2025. Negative factors contributing to this fair condition include low cover and a lack of recruitment of young within the preferred browse community; reduced perennial forb cover; and the amount of annual grass cover (Table 10R-43.6, Table 10R-43.7, Table 10R-43.13, Table 10R-43.15). Pellet transect data indicates that deer and elk presence was low in 2008, but they were absent in all sample years as a result of the exclosure. Preferred shrub utilization has been light for most sample years; however, it was estimated that 88% of winterfat plants were either moderately or heavily hedged in 2008 (Table 10R-43.9, Table 10R-43.13). On-site observations for 2025 note that little utilization was evident on herbaceous species. Drought may be having an impact on this community as evidenced by the stunted and chlorotic primary growth.

Trend Summary Tables

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

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	14.6	0.2	-	16.2	-	-
2010	17.2	0.1	-	19.1	0.1	-
2013	13.0	0.2	-	20.0	-	-
2018	17.9	0.2	-	21.7	-	-
2025	19.8	0.0	-	19.1	-	-

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

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	416	208	128	35	13.7	5.8	0.6	0.4
2010	260	263	313	31	3.8	20.0	3.8	0.4
2013	219	281	36	13	5.8	14.8	0.1	0.2
2018	161	284	9	28	4.0	23.7	0.1	0.5
2025	154	315	103	23	6.4	30.5	1.1	0.0

Table 10R-43.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	28.2	0.0	33.6	5.5	0.1	46.1
2010	30.1	0.0	35.6	1.6	0.0	46.9
2013	26.7	0.0	49.3	2.0	0.2	34.2
2018	18.7	0.8	67.7	1.5	0.2	39.1
2025	23.1	1.2	44.4	3.3	0.0	50.9

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

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	2	52	3	74
2010	-	1	-	5
2013	1	-	-	1
2018	-	-	-	9
2025	-	-	-	2
Year	Days Use Per Acre (ha)			
2008	2.2 (5.4)	14.7 (36.4)	2.0 (5.0)	-
2010	-	-	-	-
2013	-	-	-	-
2018	-	-	-	-
2025	-	-	-	-

Table 10R-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)	Elymus lanceolatus (thickspike wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	unknown perennial grass (unknown grass)
year	Nested Frequency								
2008	15	-	416	6	182	18	-	-	-
2010	8	-	260	2	232	37	-	-	18
2013	5	6	219	22	252	-	5	-	-
2018	3	10	161	20	251	3	6	2	-
2025	-	17	154	16	282	8	1	1	-
year	Average Cover (%)								
2008	0.2	-	13.7	0.0	5.4	0.1	-	-	-
2010	0.2	-	3.8	0.0	18.9	0.5	-	-	0.4
2013	0.2	0.3	5.8	0.1	14.0	-	0.2	-	-
2018	0.1	0.2	4.0	1.3	21.6	0.0	0.2	0.2	-
2025	-	0.9	6.4	0.4	29.1	0.1	0.0	0.1	-

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

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

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chenopodium fremontii[a] (Fremont's goosefoot)	Descurainia pinnata[a] (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Townsendia (Townsend daisy)	Tragopogon dubius[ai] (yellow salsify)	Trifolium (clover)
year	Nested Frequency													
2008	-	37	-	-	-	-	113	-	-	33	-	2	-	-
2010	-	38	1	2	-	-	312	-	-	30	-	-	-	1
2013	-	4	4	3	3	-	25	0	-	8	2	-	-	-
2018	-	-	-	1	-	4	-	-	-	24	4	-	4	-
2025	78	28	-	-	-	-	12	-	2	21	-	-	3	-
year	Average Cover (%)													
2008	-	0.1	-	-	-	-	0.6	-	-	0.4	-	0.0	-	-
2010	-	0.2	0.0	0.0	-	-	3.6	-	-	0.4	-	-	-	0.0
2013	-	0.0	0.0	0.0	0.0	-	0.1	0.0	-	0.1	0.0	-	-	-
2018	-	-	-	0.0	-	0.0	-	-	-	0.5	0.0	-	0.0	-
2025	1.0	0.1	-	-	-	-	0.0	-	0.0	0.0	-	-	0.0	-

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

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

SHRUB SPECIES	Artemisia frigida[p] (prairie sagewort)	Atriplex canescens[p] (fourwing saltbush)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata[p] (winterfat)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)				
2008	3.3	0.6	0	12.3	-
2010	9.3	1.1	0.1	8.7	-
2013	5.3	5.3	-	9.4	-
2018	3.3	7.8	-	10.6	-
2025	0.4	8.4	-	10.3	-
year	Quadrat Cover (%)				
2008	4.0	0.7	0.2	10.0	-
2010	6.7	1.1	0.1	9.4	-
2013	4.8	2.1	0.1	6.1	0.0
2018	2.1	5.2	0.0	10.5	0.1
2025	0.5	6.5	-	12.7	0.0

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

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

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia frigida[p] -- (prairie sagewort)									
2008	5360	80	3	85	12	16	0	1	29/30
2010	9980	1440	8	92	0	0	0	0	23/30
2013	10040	640	25	75	0	0	0	0	18/23
2018	3840	-	4	90	6	0	0	6	14/21
2025	2080	-	14	87	0	31	1	1	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	64/93
2025	-	-	-	-	-	-	-	-	-/-
Atriplex canescens[p] -- (fourwing saltbush)									
2008	300	-	7	60	33	27	0	7	84/89
2010	400	-	30	55	15	0	0	0	49/71
2013	540	-	7	93	0	11	0	4	95/130
2018	700	-	3	94	3	0	0	0	100/144
2025	520	-	4	54	42	0	0	42	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2008	100	-	0	100	0	0	0	0	22/18
2010	180	-	0	100	0	0	0	0	20/31
2013	160	-	0	100	0	0	0	0	21/28
2018	40	-	0	0	100	0	0	100	18/20
2025	60	-	0	100	0	0	0	0	- / -

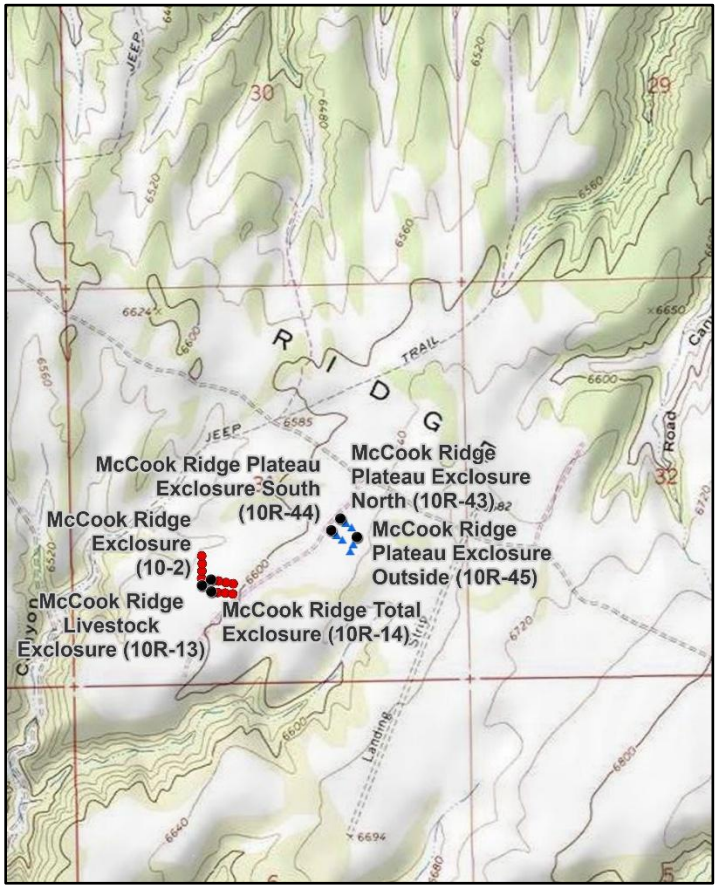
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Krascheninnikovia lanata[p] -- (winterfat)									
2008	23000	240	4	87	10	37	51	1	28/27
2010	20820	360	17	83	0	0	0	0	21/24
2013	14800	100	13	87	0	0	0	2	29/28
2018	13400	-	13	83	4	0	0	10	30/34
2025	15740	200	8	62	30	11	4	31	- / -
Opuntia polyacantha -- (plains pricklypear)									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	40	-	0	100	0	0	0	0	7/4
2018	100	-	0	100	0	0	0	0	12/22
2025	40	-	50	50	0	0	0	0	- / -

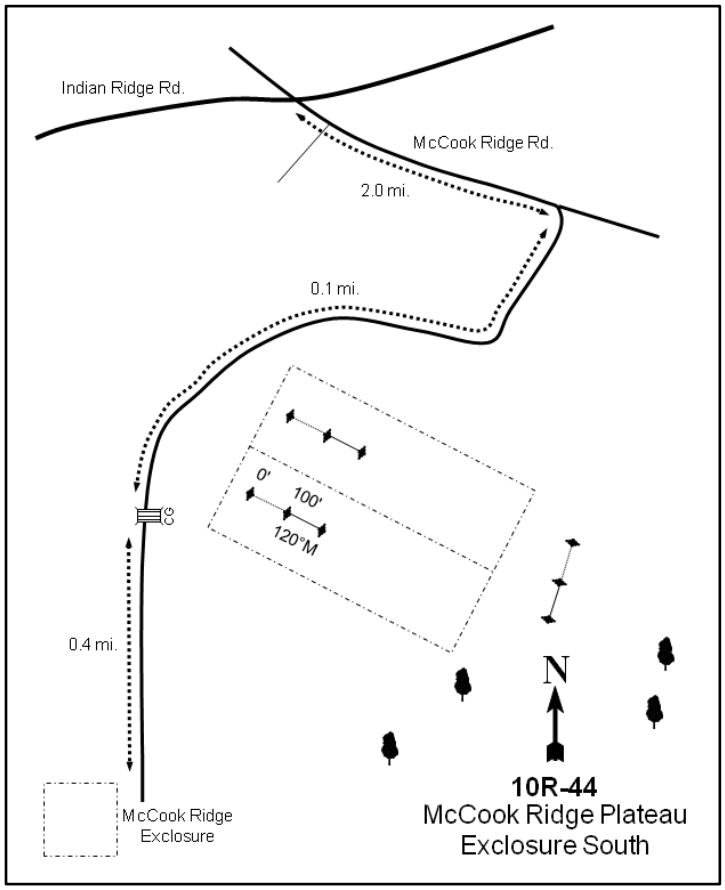
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 10R-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
2008	19.4	11.7	1.9	11.5	-10.2	0.7	0.0	**35.0**	Very Poor-Poor
2010	21.6	14.7	6.6	30.0	-2.8	0.8	0.0	**70.9**	Good
2013	23.7	15.0	7.2	29.6	-4.4	0.4	0.0	**71.5**	Good
2018	26.3	13.8	4.0	30.0	-3.0	1.0	0.0	**72.1**	Good
2025	23.8	4.5	3.1	30.0	-4.8	0.1	0.0	**56.7**	Fair
2008	19.4	11.7	1.9	11.5	-10.2	0.7	0.0	**35.0**	Very Poor-Poor
2010	21.6	14.7	6.6	30.0	-2.8	0.8	0.0	**70.9**	Good

McCook Ridge Plateau Exclosure South - Study No. 10R-44





Location Information

USGS 7.5 min Map Info	Cooper Canyon SE; Township 13S, Range 24E, Section 31
GPS (0' Stake)	NAD 83 UTM ZONE 12, 648461 East 4389399 North

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	LOWER MCCOOK
Elevation	6,550ft (1,996m)
Aspect	West
Slope	4%
Sample Dates	07/09/2008, 06/08/2010, 08/28/2013, 08/28/2018, 06/25/2025

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

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

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

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

Mix Name			Application Type	Application Date	Acres
McCook Ridge Cheatgrass Control - Sagebrush/Kochia			Drill	Oct 2008	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.50	0.08
S	Bassia prostrata	Forage Kochia	Immigrant	1.00	0.70

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2008	Winterfat/Annual Grass	No Encroachment
2010	Mixed Shrub/Annual-Perennial Grass	No Encroachment
2013	Mixed Shrub/Annual-Perennial Grass	No Encroachment
2018	Mixed Shrub/Annual-Perennial Grass	No Encroachment
2025	Mixed Shrub/Annual-Perennial Grass	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Silt Loam (Fourwing Saltbush-Winterfat*)
NRCS Ecological Site #	R034BY329UT
States and Transitions	No state and transition model is available for this ecological site.

This site was dominated by winterfat (*Krascheninnikovia lanata*) and cheatgrass (*Bromus tectorum*) when the study was established in 2008. Covers of other shrubs such as prairie sagewort (*Artemisia frigida*) and fourwing saltbush (*Atriplex canescens*) have fluctuated following the herbicide and seeding treatment (Table 10R-44.1, Table 10R-44.12). However, mixed shrubs have been a co-dominant vegetation component in all post-treatment sample years. Perennial grasses increased following treatment while cheatgrass coverexhibited an overall decrease; perennial and annual grasses have been co-dominant with mixed shrubs following treatment. Forbs have contributed less cover than grasses, and the introduced annual desert madwort (*Alyssum desertorum*) was the most abundant species in 2025 (Table 10R-44.7, Table 10R-44.10, Table 10R-44.11).

Condition of mule deer winter range on this site has ranged between very poor and fair since 2008; winter range condition was considered to be poor-fair in 2025. Negative factors contributing to this fair condition include low cover and a lack of recruitment of young within the preferred browse community; reduced perennial grass and forb cover; and the amount of annual grass cover (Table 10R-44.6, Table 10R-44.7, Table 10R-44.13, Table 10R-44.15). Pellet transect data indicates that deer and elk presence has ranged between low and moderate since 2008. Cattle and/or bison presence has been absent for all sample years (except 2008) as a result of the shorter exclosure. Preferred shrub utilization has been light in most sample years; however, it was estimated that 80% of winterfat plants sampled in density strips were moderately to heavily hedged in 2008 (Table 10R-44.9, Table 10R-44.13). On-site observations for 2025 note that little utilization was evident on herbaceous species. Drought may be having an impact on this community as evidenced by stunted and chlorotic primary growth.

Trend Summary Tables

Table 10R-44.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	17.0	0.0	-	18.5	-	-
2010	20.9	-	-	26.7	-	-
2013	15.9	-	-	22.3	-	-
2018	15.4	0.1	-	17.0	-	-
2025	18.2	0.1	-	19.9	-	-

Table 10R-44.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	429	142	212	4	16.5	2.8	1.5	0.0
2010	311	209	346	6	5.5	8.3	5.7	0.1
2013	321	165	42	10	9.6	6.5	0.2	0.0
2018	278	153	71	1	10.7	8.1	1.1	0.0
2025	221	161	268	14	6.7	8.0	3.4	0.1

Table 10R-44.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	19.3	0.0	40.0	12.2	0.1	43.4
2010	32.9	-	34.8	4.1	0.2	42.0
2013	35.8	-	33.9	4.7	1.0	31.8
2018	22.6	0.1	62.5	6.0	0.9	32.2
2025	33.0	0.1	35.1	11.2	0.8	33.5

Table 10R-44.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	1	35	3	77
2010	-	8	3	10
2013	-	21	10	3
2018	-	17	20	12
2025	1	21	12	4
Year	Days Use Per Acre (ha)			
2008	4.4 (10.8)	24.1 (59.6)	4.0 (9.9)	-
2010	-	-	-	-
2013	-	28.1 (69.5)	25.5 (62.9)	-
2018	-	6.7 (16.6)	34.2 (84.4)	-
2025	-	4.0 (9.9)	4.0 (9.9)	-

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

GRASS SPECIES	Agropyron cristatum[i] (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	unknown perennial grass (unknown grass)
year	Nested Frequency								
2008	-	-	429	-	95	52	-	-	-
2010	-	-	311	3	72	115	-	-	25
2013	28	-	321	8	108	18	3	2	-
2018	7	2	278	-	113	22	-	25	-
2025	4	3	221	9	100	30	1	29	-
year	Average Cover (%)								
2008	-	-	16.5	-	2.1	0.7	-	-	-
2010	-	-	5.5	0.0	5.3	2.0	-	-	1.1
2013	0.5	-	9.6	0.1	5.5	0.2	0.1	0.0	-
2018	0.7	0.0	10.7	-	6.0	0.4	-	0.9	-
2025	0.4	0.0	6.7	0.2	5.8	0.4	0.1	0.9	-

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

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

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Astragalus convallarius (lesser rushy milkvetch)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chenopodium fremontii[a] (Fremont's goosefoot)	Descurainia pinnata[a] (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	Townsendia (Townsend daisy)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency												
2008	29	-	18	-	-	-	-	184	-	-	-	4	-
2010	53	-	20	3	10	-	1	331	-	6	-	-	-
2013	3	4	3	-	-	-	4	32	6	-	-	-	-
2018	63	-	-	-	0	-	3	4	-	-	1	-	3
2025	249	-	36	-	1	2	-	52	6	-	5	4	-
year	Average Cover (%)												
2008	0.1	-	0.0	-	-	-	-	1.4	-	-	-	0.0	-
2010	0.4	-	0.1	0.0	0.0	-	0.0	5.1	-	0.1	-	-	-
2013	0.0	0.0	0.0	-	-	-	0.0	0.2	0.0	-	-	-	-
2018	1.0	-	-	-	0.0	-	0.0	0.0	-	-	0.0	-	0.1
2025	3.1	-	0.1	-	0.0	0.0	-	0.2	0.0	-	0.0	0.0	-

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

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

SHRUB SPECIES	Artemisia frigida[p] (prairie sagewort)	Atriplex canescens[p] (fourwing saltbush)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata[p] (winterfat)	Opuntia polyacantha (plains pricklypear)	Pediocactus simpsonii (mountain ball cactus)
year	Line Intercept Cover (%)					
2008	2.6	1.8	-	14.1	-	-
2010	14.1	1.9	-	10.7	-	-
2013	8.1	3.1	-	11.1	-	-
2018	0.9	6.1	-	10	-	-
2025	0.1	3.7	-	16.1	-	-
year	Quadrat Cover (%)					
2008	4.7	1.7	0.0	10.6	-	-
2010	9.7	2.0	-	9.2	-	-
2013	5.3	1.4	-	9.2	-	-
2018	1.6	4.4	-	9.5	0.1	-
2025	0.5	2.8	-	14.9	0.0	0.0

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

Table 10R-44.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia frigida[p] -- (prairie sagewort)									
2008	7300	200	4	91	5	21	0	1	29/28
2010	13200	4580	5	95	0	19	6	0	24/31
2013	19860	4300	58	42	0	2	1	0	15/19
2018	2200	-	6	91	4	0	0	4	13/18
2025	380	20	5	95	0	21	11	0	- / -
Artemisia nova[p] -- (black sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	160	-	100	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	49/63
2018	-	-	-	-	-	-	-	-	53/61
2025	-	-	-	-	-	-	-	-	-/-
Atriplex canescens[p] -- (fourwing saltbush)									
2008	320	-	0	31	69	31	19	44	72/73
2010	460	-	30	70	0	26	22	0	38/60
2013	600	20	7	93	0	27	0	0	77/92
2018	740	-	8	87	5	5	8	14	90/124
2025	780	40	23	44	33	36	0	33	- / -

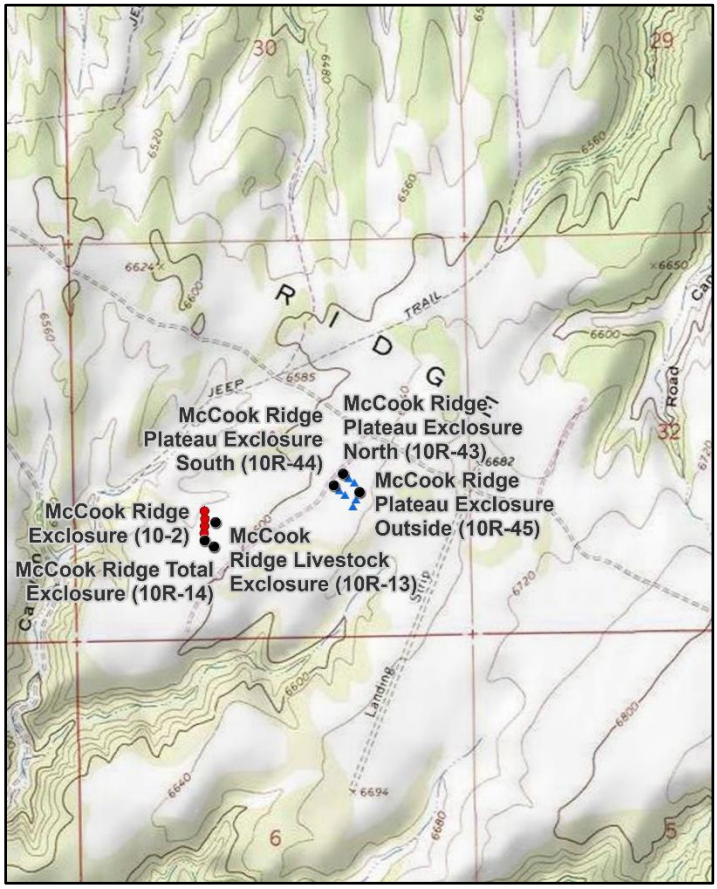
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Gutierrezia sarothrae -- (broom snakeweed)									
2008	80	20	0	75	25	0	0	0	29/30
2010	60	-	0	100	0	0	0	0	12/19
2013	40	-	0	100	0	0	0	0	24/30
2018	20	-	0	100	0	0	0	0	18/29
2025	-	-	-	-	-	-	-	-	-/-
Krascheninnikovia lanata[p] -- (winterfat)									
2008	22620	20	3	86	10	31	49	0	27/28
2010	18780	160	14	87	0	28	37	0	20/26
2013	15560	120	9	89	2	17	1	5	24/27
2018	14780	-	10	84	6	28	5	35	26/29
2025	21560	200	11	69	21	15	1	30	- / -
Opuntia polyacantha -- (plains pricklypear)									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	12/61
2025	20	-	0	100	0	0	0	0	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	- / -
2018	40	-	0	100	0	0	0	0	4/6
2025	20	-	0	100	0	0	0	0	- / -

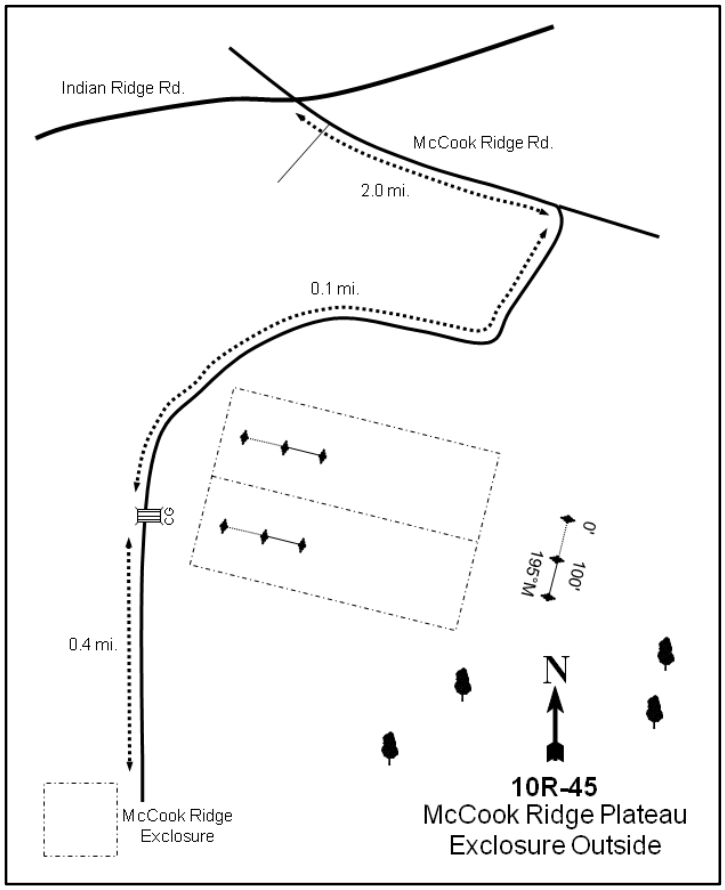
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 10R-44.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2008	22.5	10.5	1.6	5.6	-12.4	0.0	0.0	**27.8**	Very Poor
2010	29.9	15.0	5.2	16.7	-4.1	0.1	0.0	**62.8**	Fair
2013	25.9	14.7	13.3	13.0	-7.2	0.1	0.0	**59.8**	Fair
2018	21.0	13.2	4.6	16.2	-8.0	0.1	0.0	**47.1**	Poor
2025	24.9	8.1	6.4	15.9	-5.0	0.2	0.0	**50.5**	Poor-Fair

McCook Ridge Plateau Exclosure Outside - Study No. 10R-45





Location Information

USGS 7.5 min Map Info	Cooper Canyon SE; Township 13S, Range 24E, Section 31
GPS (0' Stake)	NAD 83 UTM ZONE 12, 648565 East 4389372 North

Transect Information

Browse Tag # (0' Stake)	276
Transect Bearing	120° magnetic
Length	200ft
Belt Placement	Line 1 (11ft, 59ft & 95ft), Line 2 (34ft & 71ft)
Belt Marker Placement	Standard

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	LOWER MCCOOK
Elevation	6,550ft (1,996m)
Aspect	West
Slope	4%
Sample Dates	07/09/2008, 06/08/2010, 08/28/2013, 08/28/2018, 06/25/2025

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

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

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

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

Mix Name			Application Type	Application Date	Acres
McCook Ridge Cheatgrass Control - Sagebrush/Kochia			Drill	Oct 2008	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.50	0.08
S	Bassia prostrata	Forage Kochia	Immigrant	1.00	0.70

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2008	Winterfat/Perennial Grass	No Encroachment
2010	Winterfat/Perennial Grass	No Encroachment
2013	Winterfat/Perennial Grass	No Encroachment
2018	Winterfat/Perennial Grass	No Encroachment
2025	Perennial Grass/Winterfat	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Silt Loam (Fourwing Saltbush-Winterfat)
NRCS Ecological Site #	R034BY329UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2008, the plant community on this site has remained dominated by winterfat (*Krascheninnikovia lanata*) and perennial grasses such as thickspike wheatgrass (*Elymus lanceolatus*) and Sandberg bluegrass (*Poa secunda*). The introduced annual grass species cheatgrass (*Bromus tectorum*) provided moderate cover upon study establishment, but cover and abundance have decreased following the herbicide and seeding treatments (Table 10R-45.1) and are low as of 2025. Abundance of perennial grasseshas largely remained stable over the sample period, but cover has fluctuated. In 2025, however, perennial grass cover exceeded the amounts observed prior to treatment. Forbs have remained rare in comparison with grasses (Table 10R-45.7, Table 10R-45.10, Table 10R-45.11). Winterfat cover decreased following treatment, but both overall density and recruitment of young individuals have

exhibited post-treatment increases (Table 10R-45.12, Table 10R-45.13). Although no trees have been observed on the site itself, photos show that Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) woodlands are adjacent to the transect. Tree encroachment is possible in the future, but it is likely not an immediate concern.

Condition of mule deer winter range on this site has ranged between fair and good since 2008; winter range condition was considered to be good in 2025. Negative factors contributing to this condition include low cover and reduced recruitment of young within the preferred browse community; reduced perennial forb cover; and the presence of annual grasses (Table 10R-45.6, Table 10R-45.7, Table 10R-45.13, Table 10R-45.15). Pellet transect data indicates that deer and elk presence have ranged between low and moderate since 2008. Cattle and/or bison presence has been low for all sample years. Preferred shrub utilization has been light for most sample years; however, it was estimated that over 70% of winterfat plants sampled in density strips were either moderately or heavily hedged in 2008 and 2018 (Table 10R-45.9, Table 10R-45.13). On-site observations for 2025 note that little utilization was evident on herbaceous species. Drought may be having an impact on this community as evidenced by stunted and chlorotic primary growth.

Trend Summary Tables

Table 10R-45.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	16.9	0.2	-	22.4	0.3	-
2010	15.5	0.2	-	15.1	0.7	-
2013	15.1	0.2	-	15.5	0.4	-
2018	11.4	0.7	-	10.1	0.9	-
2025	13.9	0.1	-	11.6	-	-

Table 10R-45.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	340	312	204	3	5.9	11.5	1.2	0.1
2010	218	341	269	2	2.0	18.1	1.9	0.0
2013	233	312	97	9	3.1	7.1	0.4	0.1
2018	65	331	3	17	0.3	9.7	0.0	0.1
2025	43	318	151	21	0.3	21.5	1.0	0.1

Table 10R-45.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	25.7	0.1	33.3	9.7	0.1	43.4
2010	41.8	0.2	26.7	3.8	0.1	38.1
2013	56.6	0.1	20.8	2.3	0.0	24.9
2018	49.5	0.8	36.3	9.2	0.1	22.3
2025	47.9	0.2	23.0	6.7	0.1	34.9

Table 10R-45.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2008	5	30	10	-	65
2010	1	8	11	-	13
2013	5	15	28	-	6
2018	13	15	27	-	18
2025	1	27	15	-	3
Year	Days Use Per Acre (ha)				
2008	2.2 (5.4)	14.7 (36.4)	5.3 (13.2)	-	-
2010	-	-	-	-	-
2013	8.0 (19.7)	8.7 (21.5)	21.5 (53.0)	-	-
2018	3.6 (9.0)	7.4 (18.2)	23.4 (57.9)	1.7 (4.3)	-
2025	0.7 (1.8)	25.5 (62.9)	12.8 (31.5)	1.7 (4.3)	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	unknown perennial grass (unknown grass)
year	Nested Frequency										
2008	2	-	-	340	4	186	138	-	-	-	-
2010	5	5	-	218	2	128	199	-	-	-	98
2013	3	40	-	233	13	239	65	1	7	5	-
2018	-	11	1	65	7	244	107	2	-	7	-
2025	0	8	2	43	1	222	138	1	-	25	-
year	Average Cover (%)										
2008	0.4	-	-	5.9	0.0	7.7	3.4	-	-	-	-
2010	0.0	0.0	-	2.0	0.0	6.9	4.1	-	-	-	7.0
2013	0.0	0.4	-	3.1	0.1	6.0	0.4	0.0	0.0	0.1	-
2018	-	0.2	0.0	0.3	0.1	8.2	0.9	0.0	-	0.2	-
2025	0.0	0.5	0.1	0.3	0.0	18.3	1.5	0.0	-	1.0	-

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

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

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Ceratocephala testiculata[ai] (curveseed butterwort)	Collomia linearis[a] (tiny trumpet)	Delphinium nuttallianum (twolobe larkspur)	Descurainia pinnata[a] (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Lappula occidentalis[a] (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Phlox longifolia (longleaf phlox)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency										
2008	-	19	-	-	-	-	196	-	-	-	3
2010	-	5	4	-	7	-	264	-	-	-	2
2013	-	10	-	-	1	-	87	6	3	-	2
2018	1	-	-	-	-	-	2	-	10	-	7
2025	49	80	-	3	-	3	74	-	-	8	7
year	Average Cover (%)										
2008	-	0.0	-	-	-	-	1.1	-	-	-	0.1
2010	-	0.0	0.0	-	0.0	-	1.8	-	-	-	0.0
2013	-	0.0	-	-	0.0	-	0.4	0.1	0.0	-	0.0
2018	0.0	-	-	-	-	-	0.0	-	0.0	-	0.1
2025	0.3	0.3	-	0.0	-	0.0	0.4	-	-	0.0	0.0

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

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

SHRUB SPECIES	Artemisia frigida[p] (prairie sagewort)	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata[p] (winterfat)
year	Line Intercept Cover (%)					
2008	5.1	-	0.1	-	0.3	17.2
2010	4.4	-	0.1	-	0.7	10.6
2013	5.8	-	0.2	1.5	0.4	8
2018	1.6	0.4	-	0.2	0.9	7.9
2025	0.4	-	0.3	0.5	0	10.4
year	Quadrat Cover (%)					
2008	3.6	0.0	0.0	0.1	0.2	13.2
2010	5.3	-	0.0	0.2	0.2	10.0
2013	4.8	-	0.0	0.9	0.2	9.4
2018	2.5	0.0	-	0.2	0.7	8.7
2025	0.4	-	0.0	0.4	0.1	13.1

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

Table 10R-45.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia frigida[p] -- (prairie sagewort)									
2008	5540	-	3	95	2	12	0	0	29/33
2010	7160	260	10	90	0	9	7	0	18/24
2013	20180	11560	66	34	0	1	0	1	16/21
2018	6420	20	20	79	1	12	2	1	10/14
2025	860	80	2	98	0	14	2	0	- / -
Artemisia nova[p] -- (black sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	80	-	25	50	25	25	75	0	33/55
2025	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2008	100	-	0	40	60	40	60	60	28/38
2010	140	-	57	29	14	14	14	14	31/37
2013	80	-	0	75	25	100	0	25	43/57
2018	-	-	-	-	-	-	-	-	-/-
2025	80	-	25	50	25	0	100	25	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2008	180	-	0	67	33	44	0	22	70/77
2010	400	20	35	55	10	10	10	0	32/37
2013	280	40	21	71	7	7	0	0	74/97
2018	120	-	0	100	0	17	0	0	76/102
2025	260	40	39	39	23	46	8	23	- / -

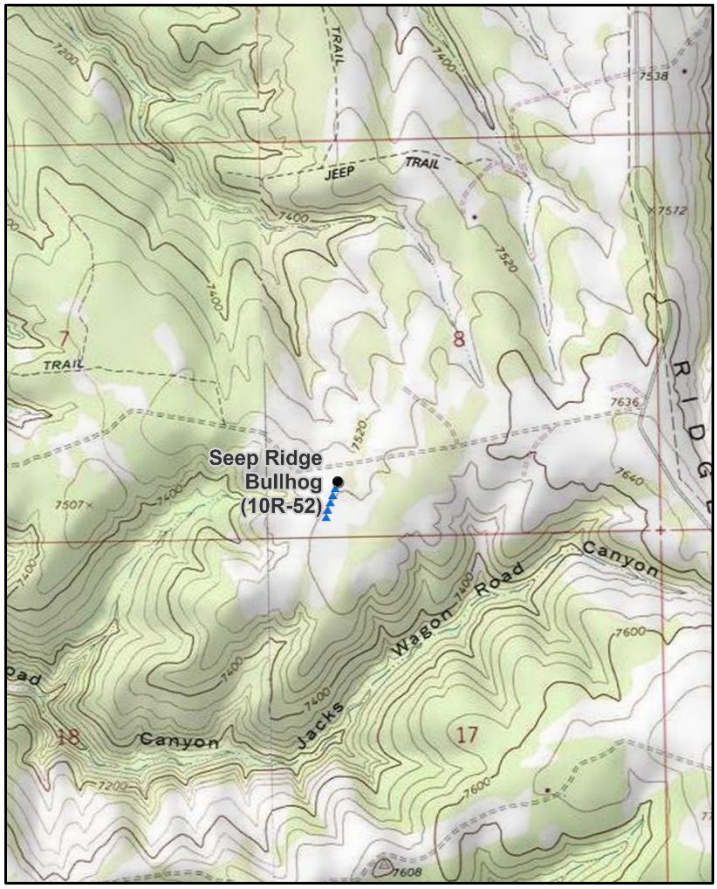
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Gutierrezia sarothrae -- (broom snakeweed)									
2008	1260	-	0	89	11	0	0	0	16/17
2010	1040	-	2	98	0	0	0	0	18/21
2013	1540	20	53	47	0	0	0	0	16/18
2018	1440	-	13	88	0	0	0	0	15/20
2025	440	-	36	36	27	27	0	27	- / -
Krascheninnikovia lanata[p] -- (winterfat)									
2008	26380	-	3	86	11	24	55	0	25/27
2010	23420	840	36	64	1	28	14	0	18/24
2013	17320	60	10	90	0	35	4	2	21/25
2018	19540	-	17	81	2	39	32	14	16/20
2025	31980	540	24	68	7	30	5	8	- / -

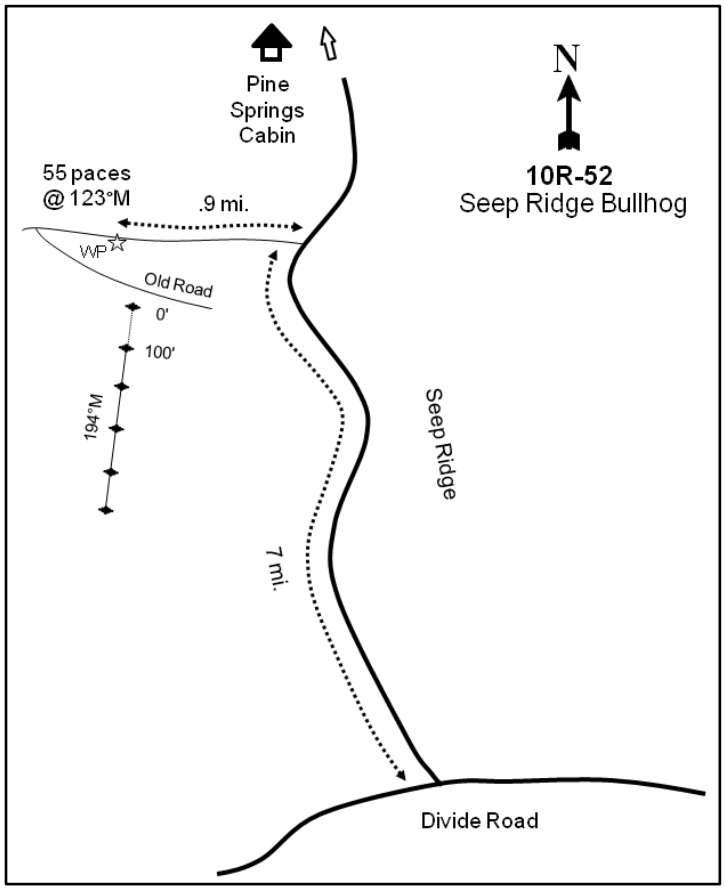
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 10R-45.15 - 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	26.7	12.3	1.4	23.1	-4.4	0.3	0.0	**59.4**	Fair
2010	17.8	14.9	14.2	30.0	-1.5	0.0	0.0	**75.4**	Good
2013	17.9	14.6	15.0	14.2	-2.3	0.2	0.0	**59.6**	Fair
2018	12.2	14.1	8.7	19.3	-0.2	0.2	0.0	**54.3**	Fair
2025	14.4	12.5	12.1	30.0	-0.3	0.1	0.0	**68.8**	Good

SEEP RIDGE BULLHOG - STUDY NO. 10R-52





Location Information	
USGS 7.5 min Map Info	Seep Canyon SW; Township 15S, Range 23E, Section 08
GPS (0' Stake)	NAD 83 UTM ZONE 12, 639910 East 4375992 North

Transect Information	
Browse Tag # (0' Stake)	183
Transect Bearing	188° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (95ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the intersection of Divide Road and Seep Ridge Road, drive north on Seep Ridge Road for 7 miles, then turn left (west). Drive for 0.9 miles to the witness post on the left (south) side of the road. The 0-foot stake is 24 paces away from the witness post at 170 degrees magnetic and is marked with browse tag #183.

Site Information	
Land Ownership	Federal
Land Administrator	BLM
Allotment	SWEET WATER
Elevation	7,550ft (2,301m)
Aspect	West
Slope	0-5%
Sample Dates	08/04/2011, 08/20/2014, 08/15/2017, 08/19/2020, 06/24/2025

Table 10R-52.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Lop and Scatter - Hand Crew	-	-	August 2020-June 2022	-
Seeding - Aerial After	Seep Ridge Bullhog Phase II	1950	December 2011	390
Seeding - Aerial Before	Seep Ridge Bullhog Phase II	1950	October 2011	390
Mechanical - Bullhog	Seep Ridge Bullhog Phase II	1950	November 2011-February 2012	390

Table 10R-52.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Seep Ridge Bullhog Phase II			Aerial	Oct 2011	475
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	1.05	0.80
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.26	1.01
G	Elymus trachycaulus	Slender Wheatgrass	San Luis	1.47	1.35
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.74	0.68
G	Poa secunda	Big Bluegrass	Sherman	0.21	0.19
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.07	0.07
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.14	0.12
G	Poa secunda	Canby Bluegrass	Canbar	0.21	0.10
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	1.26	1.09
F	Linum perenne	Blue Flax	Appar	0.42	0.39
F	Medicago sativa	Alfalfa	Nomad	0.74	0.66
F	Medicago sativa	Alfalfa	Spreador 4	0.74	0.65
F	Nassella viridula	Green Needlegrass	Lodorm	0.74	0.71
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.92
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.88
S	Purshia tridentata	Bitterbrush	Summit UT	0.42	0.31

Mix Name			Application Type	Application Date	Acres
Seep Ridge Bullhog Phase II - Browse			Aerial	Dec 2011	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sevier UT	1.00	0.16

Wildlife Habitat and Vegetation History

Table 10R-52.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 10R-52.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Pinyon-Juniper	Phase III
2014	Perennial Grass-Forb	Early Phase I
2017	Mountain Big Sagebrush/Perennial Grass	Phase I
2020	Mountain Big Sagebrush/Perennial Grass	Early Phase I
2025	Mountain Big Sagebrush/Perennial Grass	Early Phase I

Site Notes

Cattle were seen in 2017 and a pinyon and juniper island on site was being used as a bedding area (likely by livestock).

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048AY405UT
States and Transitions	2011 - State Undefined: Community Phase Undefined 2014-2025 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase 2.1

When this site was established in 2011, it was in Phase III of woodland succession (Table 10R-52.4), being encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with other browse species such as antelope bitterbrush (*Purshia tridentata*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) also present. Tree cover and density were greatly reduced following a bullhog and seeding treatment in 2011-2012, and both values decreased further following a lop and scatter treatment between 2020 (after the site was sampled) and 2022 (Table 10R-52.1). Mountain big sagebrush became a dominant vegetation component in 2017 (Table 10R-52.12, Table 10R-52.13, Table 10R-52.14). Before treatment, the herbaceous understory was depleted and sparse. Afterwards, however, the herbaceous understory became a dominant site component with both forbs and grasses being fairly diverse. Squirreltail (*Elymus elymoides*) and thickspike wheatgrass (*E. lanceolatus*) have contributed most of the perennial grass cover following treatment. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in the understory, but abundance has remained low (Table 10R-52.10, Table 10R-52.11). The extant tree component suggests that there may be potential for infilling in future sample years. However, the site has been considered to be within Early Phase I of woodland succession since 2020, indicating that infilling is likely not an immediate concern (Photos, Table 10R-52.4, Table 10R-52.14).

Condition of mule deer winter range on this site has improved from poor to good-excellent over the course of the study. Factors that could improve condition to excellent include increasing preferred browse and perennial forb cover. The amount of annual grass cover could pose an issue if it increases in the future (Table 10R-52.6, Table 10R-52.7, Table 10R-52.15). Pellet transect data indicates that deer presence has remained low since 2011, while elk presence has ranged between low and moderate over the same period. During the 2024/25 winter season the area had common occurrences of collared elk (Wildlife Migration Initiative). Cattle presence has ranged between moderate and high, but it was low in 2025. Mountain big sagebrush utilization has been light in all sample years. However, bitterbrush has had high utilization since 2014 with over 90% of plants sampled in density strips being moderately to heavily hedged since 2017 (Table 10R-52.9, Table 10R-52.13). On-site observations for 2025 note that there was little to no utilization of the herbaceous community. Drought may be having an effect on the shrub community as of 2025.

Trend Summary Tables

Table 10R-52.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	14.4	0.2	17.5	13.3	-	54.6
2014	5.8	0.4	0.4	5.2	-	-
2017	6.9	0.2	0.7	8.9	0.2	4.3
2020	11.3	0.2	0.9	9.8	-	0.5
2025	16.0	0.1	-	18.4	0.2	-

Table 10R-52.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	-	141	42	19	-	3.9	0.3	0.1
2014	6	331	38	179	0.1	12.0	0.4	7.7
2017	70	368	21	163	0.5	20.2	0.1	5.4
2020	21	365	59	134	0.1	13.0	0.2	2.4
2025	1	355	12	138	0.0	17.2	0.0	2.6

Table 10R-52.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	23.0	4.6	51.4	8.0	2.2	30.7
2014	7.3	0.0	78.0	0.7	1.2	26.1
2017	16.8	0.0	72.0	2.2	1.5	30.6
2020	7.3	0.0	60.3	7.7	1.3	28.4
2025	12.6	-	66.7	1.2	1.9	32.7

Table 10R-52.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2011	-	4	6	-
2014	4	14	12	5
2017	6	9	6	3
2020	6	9	2	8
2025	5	12	29	7
Year	Days Use Per Acre (ha)			
2011	2.2 (5.4)	13.4 (33.1)	21.5 (53.0)	-
2014	21.8 (53.8)	9.4 (23.2)	24.8 (61.2)	-
2017	12.3 (30.5)	7.4 (18.2)	10.7 (26.5)	-
2020	31.9 (78.9)	4.0 (9.9)	10.7 (26.5)	-
2025	-	9.4 (23.2)	24.8 (61.2)	-

Table 10R-52.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Carex obtusata (obtuse sedge)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Leymus cinereus (basin wildrye)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency													
2011	-	20	-	-	3	25	-	-	-	11	-	102	-	-
2014	6	24	6	-	6	164	115	38	-	13	1	49	19	38
2017	1	31	70	-	3	215	183	7	3	24	8	90	-	6
2020	-	18	21	-	11	145	183	31	9	11	8	99	29	50
2025	4	27	1	6	8	140	167	-	5	25	6	107	34	41
year	Average Cover (%)													
2011	-	0.3	-	-	0.0	0.2	-	-	-	0.2	-	3.3	-	-
2014	0.1	0.8	0.1	-	0.2	4.3	3.0	1.1	-	0.2	0.0	1.3	0.3	0.8
2017	0.0	0.6	0.5	-	0.2	8.2	7.1	0.3	0.1	0.9	0.6	2.0	-	0.2
2020	-	0.4	0.1	-	0.1	3.3	3.5	0.6	0.2	0.1	0.8	1.9	0.4	1.9
2025	0.2	1.2	0.0	0.0	0.1	4.8	4.0	-	0.2	0.4	1.0	3.2	0.2	1.8

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

Table 10R-52.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria microphylla (littleleaf pussytoes)	Antennaria parvifolia (small-leaf pussytoes)	Arabis holboellii[a] (Holboell's rockcress)	Astragalus purshii (woollypod milkvetch)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Medicago sativa[i] (alfalfa)	Monolepis nuttalliana[a] (Nuttall's povertyweed)	Onobrychis viciifolia[i] (sainfoin)	Packera multilobata (lobeleaf groundsel)
year	Nested Frequency																
2011	-	4	17	-	5	3	1	-	-	-	-	-	2	-	-	-	-
2014	3	18	11	1	5	-	7	-	-	3	-	4	105	20	6	5	-
2017	-	19	12	7	1	-	3	-	3	4	-	-	91	4	-	8	-
2020	-	19	11	8	1	11	-	2	14	-	3	-	18	7	-	-	6
2025	12	18	4	5	-	11	-	4	9	-	-	-	-	3	-	-	3
year	Average Cover (%)																
2011	-	0.0	0.0	-	0.2	0.0	0.0	-	-	-	-	-	0.0	-	-	-	-
2014	0.0	0.3	0.0	0.0	0.0	-	0.0	-	-	0.0	-	0.0	4.3	0.5	0.3	0.0	-
2017	-	0.9	0.1	0.2	0.0	-	0.0	-	0.0	0.0	-	-	1.3	0.1	-	0.1	-
2020	-	1.0	0.1	0.1	0.0	0.0	-	0.0	0.0	-	0.0	-	0.1	0.1	-	-	0.1
2025	0.3	1.0	0.0	0.2	-	0.0	-	0.0	0.0	-	-	-	-	0.0	-	-	0.0

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

FRB SPECIES	Penstemon caespitosus (mat penstemon)	Penstemon pachyphyllus (thickleaf beardtongue)	Phacelia[a] (phacelia)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Polygonum douglasii[a] (Douglas' knotweed)	Sanguisorba minor[i] (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency									
2011	1	2	-	3	4	21	-	-	-	-
2014	1	7	1	3	14	6	66	4	-	-
2017	6	13	-	3	4	5	55	17	4	-
2020	6	-	-	28	17	45	19	17	1	1
2025	15	1	-	58	7	8	4	18	5	-
year	Average Cover (%)									
2011	0.0	0.0	-	0.0	0.0	0.1	-	-	-	-
2014	0.0	0.2	0.0	0.0	0.1	0.0	2.2	0.1	-	-
2017	0.1	0.2	-	0.0	0.0	0.0	2.1	0.3	0.0	-
2020	0.1	-	-	0.1	0.1	0.1	0.6	0.1	0.0	0.0
2025	0.3	0.0	-	0.2	0.0	0.0	0.0	0.5	0.0	-

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

Table 10R-52.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Cercocarpus montanus[p] (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Juniperus scopulorum[t] (Rocky Mountain juniper)	Opuntia fragilis (brittle pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis[t] (twoneedle pinyon)	Purshia tridentata[p] (antelope bitterbrush)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)											
2011	5.1	0.8	-	-	-	20.3	0.2	0	-	34.1	6.9	0.5
2014	2.1	-	-	-	-	-	-	-	-	0	2.2	0.9
2017	4.3	-	0.1	0.1	-	1.1	-	-	-	3.2	2.8	1.8
2020	5.1	-	-	-	-	0.3	-	-	-	0.2	2.9	1.8
2025	9.6	-	0.1	0.1	-	-	-	-	-	-	4.9	3.9
year	Quadrat Cover (%)											
2011	3.8	1.2	-	-	0.2	5.3	0.2	0.0	-	12.0	8.9	0.4
2014	2.8	-	-	-	0.3	0.2	-	0.1	-	0.2	2.2	0.8
2017	3.2	-	0.1	0.0	-	0.4	-	0.0	-	0.4	2.5	1.3
2020	6.2	-	-	-	-	0.4	-	0.0	0.1	0.5	3.3	1.9
2025	8.3	-	0.0	0.0	0.0	-	-	0.1	-	-	4.9	2.8

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

Table 10R-52.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2011	-	-	-	-	-	-	-	-	7/26
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2011	1060	20	15	53	32	19	2	23	66/81
2014	760	-	32	68	0	34	3	16	53/65
2017	780	680	41	51	8	5	0	5	59/86
2020	2080	1100	60	39	1	12	2	2	63/85
2025	5120	340	54	45	2	10	10	2	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2011	60	-	33	67	0	0	0	0	104/111
2014	60	-	33	67	0	0	100	0	43/52
2017	40	-	50	50	0	0	50	0	39/51
2020	40	-	0	100	0	0	100	0	41/46
2025	20	-	0	100	0	0	100	0	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	10/17
2020	-	-	-	-	-	-	-	-	14/21
2025	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	20	-	0	100	0	0	100	0	25/13
2017	60	-	0	100	0	0	0	0	26/29
2020	20	-	0	100	0	0	100	0	34/28
2025	40	-	0	50	50	50	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2017	40	-	50	50	0	50	0	0	49/79
2020	80	-	50	50	0	25	0	0	36/42
2025	40	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2011	20	-	0	100	0	0	0	0	- / -
2014	60	-	0	100	0	67	0	0	31/47
2017	20	-	0	100	0	0	0	0	21/33
2020	-	-	-	-	-	-	-	-	14/17
2025	40	-	50	50	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2011	220	80	55	46	0	0	0	0	- / -
2014	80	20	100	0	0	0	0	0	- / -
2017	100	40	80	20	0	0	0	0	- / -
2020	160	-	100	0	0	0	0	0	- / -
2025	20	-	100	0	0	0	0	0	- / -
Juniperus scopulorum[t] -- (Rocky Mountain juniper)									
2011	40	20	100	0	0	0	0	0	- / -
2014	20	-	100	0	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Opuntia fragilis -- (brittle pricklypear)									
2011	100	-	0	100	0	0	0	0	10/25
2014	120	-	33	67	0	0	0	0	10/33
2017	100	-	20	80	0	0	0	0	9/38
2020	120	-	33	50	17	0	0	17	6/27
2025	220	-	0	100	0	0	0	0	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2011	-	-	-	-	-	-	-	-	4/4
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2011	580	480	55	45	0	0	0	3	- / -
2014	40	40	100	0	0	0	0	0	- / -
2017	160	-	88	13	0	0	0	0	- / -
2020	60	-	100	0	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2011	1440	80	31	67	3	11	10	6	48/68
2014	1040	60	21	79	0	33	40	2	29/57
2017	1060	40	25	76	0	2	94	2	30/66
2020	1080	340	19	82	0	11	83	0	31/68
2025	1380	40	6	94	0	1	96	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2011	560	-	71	29	0	0	0	11	30/51
2014	760	-	5	95	0	26	3	0	34/67
2017	500	-	0	100	0	4	8	0	42/85
2020	500	-	12	88	0	20	4	0	46/94
2025	660	-	6	94	0	49	24	0	- / -

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

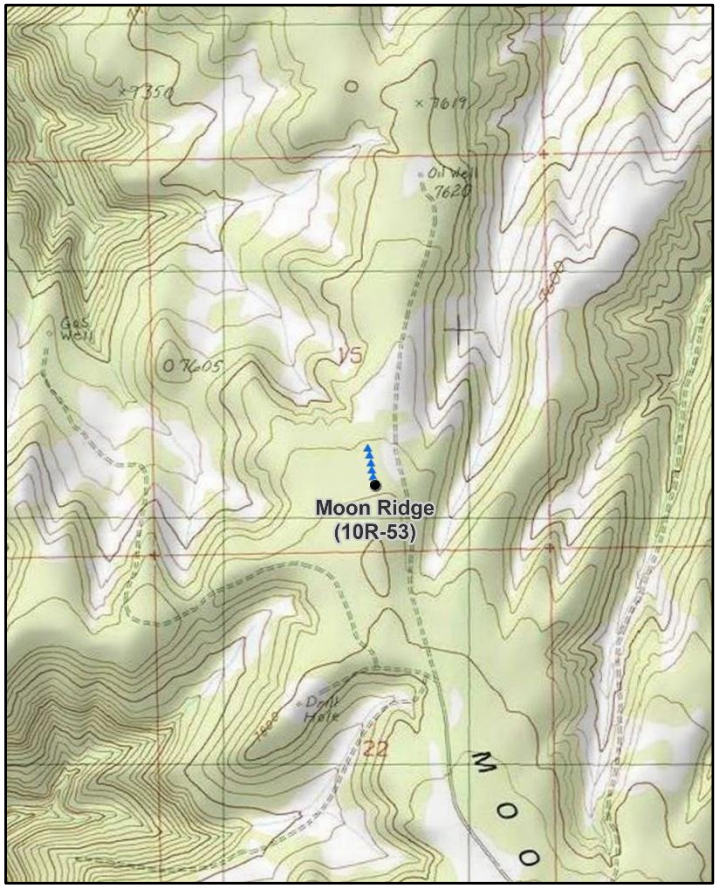
Table 10R-52.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

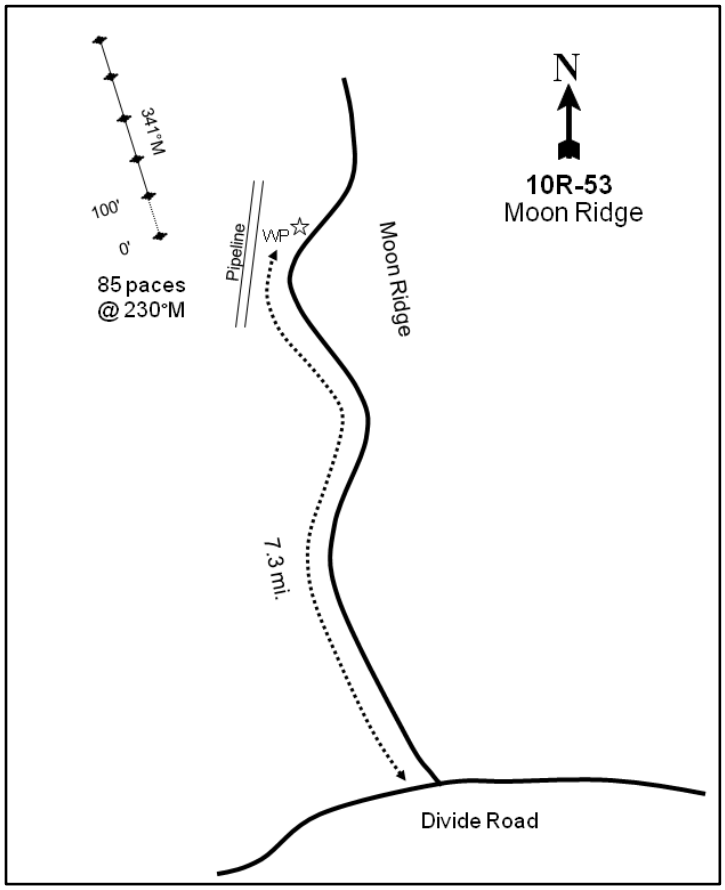
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma & J. scopulorum (Utah and Rocky Mountain juniper)							
2014	76	37	58	-	-	5	5.7
Juniperus osteosperma (Utah juniper)							
2011	285	15	15	30	25	15	9.5
2017	140	10	75	5	10	-	4.4
2020	124	-	72	11	11	6	7.3
2025	45	7	60	13	7	13	9.4
Juniperus scopulorum (Rocky Mountain juniper)							
2011	40	-	22	22	44	11	7.9
2017	7	-	100	-	-	-	2.4
2025	2	-	100	-	-	-	3.0
Pinus edulis (twoneedle pinyon)							
2011	810	20	15	25	30	10	6.0
2014	124	72	22	6	-	-	1.8
2017	275	58	26	-	16	-	3.5
2020	230	17	67	-	17	-	3.3
2025	65	36	43	-	-	21	4.2

Table 10R-52.15 - 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	18.4	10.9	13.2	7.8	0.0	0.2	0.0	**50.5**	Poor
2014	6.8	15.0	11.3	24.1	0.0	10.0	0.0	**67.2**	Fair
2017	11.4	13.8	13.8	30.0	-0.4	10.0	0.0	**78.6**	Good
2020	12.5	14.9	15.0	26.0	-0.1	4.8	0.0	**73.1**	Good
2025	23.3	14.8	15.0	30.0	0.0	5.2	0.0	**88.3**	Good-Excellent

MOON RIDGE - STUDY NO. 10R-53





Location Information	
USGS 7.5 min Map Info	Tenmile Canyon North; Township 16S, Range 21E, Section 15
GPS (0' Stake)	NAD 83 UTM ZONE 12, 621556 East 4363326 North

Transect Information	
Browse Tag # (0' Stake)	182
Transect Bearing	341° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belts 4 & 5: No Rebar

Directions to Site

Starting at the intersection of the Divide Road and Moon Ridge Road, turn north onto Moon Ridge Road. Drive for 7.3 miles to the witness post on the left (west) side of the road. The 0-foot stake is 85 paces away at 230 degrees magnetic and is identified by browse tag #182.

Site Information	
Land Ownership	Federal
Land Administrator	BLM
Allotment	MCCLELLAND
Elevation	7,754ft (2,363m)
Aspect	Northeast
Slope	0-8%
Sample Dates	08/04/2011, 08/20/2014, 08/14/2017, 07/28/2021, 06/10/2025

Table 10R-53.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Winter Ridge FY 25 (Proposed)	7306	2025	5559
Hand Crew - Lop and Scatter	Moon Ridge Chaining Maintenance	3568	September-November 2016	692
Chaining - Two-Way Ely	Moon Ridge Chaining	2218	October-November 2013	540
Seeding - Aerial After	Moon Ridge Chaining	2218	November 2013	540
Seeding - Dribbler	Moon Ridge Chaining	2218	October-November 2013	540
Seeding - Aerial After	Moon Ridge Chaining	2218	December 2013	540

Table 10R-53.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Moon Ridge Chaining			Aerial	Nov 2013	1100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	White River	0.45	0.43
G	Achnatherum hymenoides	Indian Ricegrass	Rio Grande CO	0.55	0.52
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.18	1.03
G	Elymus trachycaulus	Slender Wheatgrass	First Strike	1.50	1.40
G	Leymus cinereus	Great Basin Wildrye	Magnar	0.82	0.55
G	Nassella viridula	Green Needlegrass	Lodorm	0.03	0.03
G	Nassella viridula	Green Needlegrass	Lodorm	0.59	0.56
G	Nassella viridula	Green Needlegrass	Lodorm	0.23	0.18
G	Poa secunda	Big Bluegrass	Sherman	0.20	0.17
G	Poa secunda	Canby Bluegrass	Canbar	0.20	0.17
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.20	0.15
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.50	0.38
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.73	0.66
F	Linum perenne	Blue Flax	Appar	0.50	0.43
F	Medicago sativa	Alfalfa	Ladak	1.50	1.37
F	Onobrychis viciifolia	Sainfoin	Delaney	2.00	1.96
F	Sanguisorba minor	Small Burnet		2.00	1.84

Mix Name			Application Type	Application Date	Acres
Moon Ridge Chaining Dribbler			Dribbler	Nov 2013	1100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Purshia tridentata	Antelope Bitterbrush	Oneida, ID	0.40	0.34

Mix Name			Application Type	Application Date	Acres
Moon Ridge Chaining Sagebrush			Aerial	Dec 2013	920
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Sevier UT	0.27	0.07
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Summit UT	0.74	0.16

Wildlife Habitat and Vegetation History

Table 10R-53.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
American Bison	crucial	year-long
Mule Deer	substantial	summer
Rocky Mountain Elk	crucial	winter
Greater Sage-Grouse		
Rocky Mountain Bighorn	RMBS	year-long

Table 10R-53.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Pinyon-Juniper	Phase III
2014	Pinyon-Juniper	Phase I
2017	Perennial Grass	Early Phase I
2021	Perennial Grass/Mountain Big Sagebrush	Early Phase I
2025	Perennial Grass/Mountain Big Sagebrush	Early Phase I

Site Notes

Due to the large amounts of litter and debris, point-quarter tree density data was not collected in 2014.

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048AY405UT
States and Transitions	2011-2014 - State Undefined: Community Phase Undefined 2017 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase 2.2 2021-2025 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase 2.1

When the study was established in 2011, the site was in Phase III of woodland succession and being encroached by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) as the only major browse species (Table 10R-53.12). The herbaceous understory was fairly abundant, but grasses and forbs were not very diverse. However, the native seed mix has resulted in the establishment of a rich and diverse understory following the chaining and seeding treatments (Table 10R-53.1, Table 10R-53.2). Native perennial grass species in particular responded very well and became a dominant site component in 2017. Although composition has varied between sample years, much of the perennial grass cover has been provided by thickspike wheatgrass (*Elymus lanceolatus*), bluebunch wheatgrass (*Pseudoroegneria spicata*), sedge (*Carex* sp.), and/or muttongrass (*Poa fendleriana*) (Table 10R-53.10). Perennial forbs have remained moderately abundant throughout the sample period, while annual forbs have been rare (Table 10R-53.7, Table 10R-53.11). Overall, the plant community on this site appears to be recovering with general post-treatment increases in preferred browse density and perennial grass cover (Table 10R-53.7, Table 10R-53.13). An extant tree component remains as of 2025 despite the 2013 chaining and a maintenance lop and scatter treatment in 2016. However, the site has remained within Early Phase I of woodland succession since 2017 (Table 10R-53.4) and an additional lop and scatter project has been scheduled (Table 10R-53.1), indicating that infilling is likely not an immediate concern.

The preferred shrub and grass communities on this site may provide adequate forage for deer and elk (Beck & Peek, 2005) during the summer months (Table 10R-53.3, Table 10R-53.6, Table 10R-53.7). However, pellet transect data indicates that presence of both deer and elk have been low since 2011; deer presence has been increasing and was at its highest in 2025. During the 2024/25 winter season the area had infrequent occurrences of collared elk (Wildlife Migration Initiative). Utilization of mountain big sagebrush and other preferred shrubs has been light. However, browsing pressures may resume as preferred browse returns and increases in prominence. Cattle and/or bison presence was high in 2017, but it has been low in all other sample years (Photos, Table 10R-53.9, Table 10R-53.13). On-site observations for 2025 noted light utilization (10-20%) on the herbaceous community.

Trend Summary Tables

Table 10R-53.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	1.7	0.2	15.8	1.9	-	64.0
2014	0.2	-	4.4	1.0	-	7.3
2017	3.0	0.0	0.4	2.4	-	1.7
2021	5.3	0.0	0.7	4.8	-	1.0
2025	9.2	0.5	3.4	9.5	0.4	1.6

Table 10R-53.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	-	188	9	147	-	7.6	0.0	6.2
2014	-	166	37	149	-	3.3	0.2	3.5
2017	2	336	18	120	0.0	22.8	0.1	2.3
2021	1	357	47	172	0.0	16.2	0.2	5.4
2025	-	349	8	177	-	15.7	0.0	5.5

Table 10R-53.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	16.5	7.9	63.3	0.3	-	26.3
2014	16.4	1.3	77.3	0.1	0.0	9.9
2017	12.0	0.3	77.2	0.0	0.0	29.9
2021	13.1	2.3	70.6	0.1	0.2	28.6
2025	12.2	0.0	65.3	0.1	0.0	34.6

Table 10R-53.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2011	-	-	-	-	-
2014	-	-	-	-	1
2017	5	2	12	2	2
2021	-	9	7	11	1
2025	-	6	2	2	9
Year	Days Use Per Acre (ha)				
2011	-	6.7 (16.6)	4.7 (11.6)	0.6 (1.4)	-
2014	0.7 (1.8)	3.4 (8.3)	2.0 (5.0)	-	-
2017	28.3 (69.9)	4.7 (11.6)	24.1 (59.6)	5.8 (14.3)	-
2021	8.7 (21.5)	5.3 (13.2)	11.4 (28.1)	20.9 (51.6)	-
2025	1.5 (3.6)	11.4 (28.1)	12.8 (31.5)	5.8 (14.3)	-

Table 10R-53.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Leymus cinereus (basin wildrye)	Nassella viridula (green needlegrass)	Piptatheropsis micrantha (littleseed ricegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency															
2011	-	-	33	-	16	9	-	1	41	-	-	-	87	41	-	-
2014	-	-	13	-	30	4	-	-	-	-	-	-	109	22	-	-
2017	5	2	49	8	30	146	51	13	8	29	4	4	140	21	1	-
2021	18	1	71	-	26	228	98	14	-	21	0	-	49	43	6	-
2025	3	-	82	5	21	226	7	6	26	12	1	4	31	32	101	13
year	Average Cover (%)															
2011	-	-	0.7	-	0.1	0.0	-	0.0	1.0	-	-	-	3.8	2.0	-	-
2014	-	-	0.2	-	0.7	0.0	-	-	-	-	-	-	1.9	0.4	-	-
2017	0.4	0.0	1.1	0.8	1.1	6.4	2.7	0.4	0.1	1.2	0.1	0.3	7.9	0.5	0.0	-
2021	0.7	0.0	1.6	-	0.5	7.1	3.3	0.3	-	0.9	0.0	-	1.1	0.4	0.2	-
2025	0.0	-	2.2	0.4	0.1	6.3	0.0	0.0	0.6	0.9	0.0	0.2	0.3	0.2	3.9	0.5

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

Table 10R-53.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria parvifolia (small-leaf pussytoes)	Arabis holboellii[a] (Holboell's rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus tenellus (looseflower milkvetch)	Chenopodium album[a] (lambsquarters)	Chenopodium atrovirens[a] (pinyon goosefoot)	Crepis acuminata (tapertip hawksbeard)	Erigeron eatonii (Eaton's fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)
year	Nested Frequency																
2011	9	-	46	4	4	-	2	-	-	1	19	-	-	-	-	6	-
2014	-	4	28	10	2	1	-	-	-	1	4	-	5	-	1	11	-
2017	-	-	38	15	-	-	2	-	-	-	9	-	3	-	20	2	5
2021	2	-	59	13	-	-	1	24	-	-	17	-	-	2	2	25	3
2025	-	-	62	3	-	-	-	-	5	3	21	1	-	-	-	27	1
year	Average Cover (%)																
2011	0.1	-	1.5	0.0	0.1	-	0.0	-	-	0.0	0.2	-	-	-	-	0.7	-
2014	-	0.0	1.0	0.1	0.0	0.0	-	-	-	0.0	0.1	-	0.0	-	0.0	0.3	-
2017	-	-	0.9	0.0	-	-	0.0	-	-	-	0.1	-	0.0	-	0.5	0.0	0.0
2021	0.0	-	1.2	0.0	-	-	0.0	0.1	-	-	0.1	-	-	0.0	0.0	0.7	0.0
2025	-	-	2.6	0.0	-	-	-	-	0.0	0.1	0.2	0.0	-	-	-	0.3	0.0

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

FORB SPECIES	Medicago sativa[i] (alfalfa)	Microsteris gracilis[a] (slender phlox)	Onobrychis viciifolia[i] (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Penstemon watsonii (Watson's penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Sanguisorba minor[i] (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)
year	Nested Frequency												
2011	-	-	-	-	3	94	9	2	8	-	-	-	-
2014	23	-	2	3	6	73	3	9	22	25	-	-	-
2017	9	-	-	-	31	16	9	3	2	12	-	-	1
2021	1	9	-	7	21	94	8	2	6	3	-	5	-
2025	-	-	-	-	1	100	15	24	-	-	3	9	-
year	Average Cover (%)												
2011	-	-	-	-	0.0	3.2	0.5	0.0	0.0	-	-	-	-
2014	0.0	-	0.0	0.0	0.0	1.8	0.0	0.0	0.1	0.1	-	-	-
2017	0.0	-	-	-	0.2	0.2	0.2	0.0	0.0	0.2	-	-	0.0
2021	0.0	0.0	-	0.0	0.1	2.7	0.2	0.0	0.0	0.1	-	0.2	-
2025	-	-	-	-	0.0	1.7	0.3	0.1	-	-	0.0	0.2	-

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

Table 10R-53.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Cercocarpus montanus[p] (alderleaf mountain mahogany)	Chrysothamnus depressus[p] (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma[t] (Utah juniper)	Juniperus scopulorum[t] (Rocky Mountain juniper)	Opuntia fragilis (brittle pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)										
2011	0	1.9	0	-	-	-	20	1.2	-	42.8	-
2014	-	1	0	-	-	-	4.3	0.4	-	2.6	-
2017	-	2.3	0.1	-	-	-	1.2	-	-	0.5	-
2021	-	4.5	0.2	-	-	-	0.6	0.3	-	0.1	0.1
2025	-	8.9	-	0.3	0.4	-	1.2	-	-	0.4	0.3
year	Quadrat Cover (%)										
2011	0.0	1.6	0.1	0.0	-	-	1.7	0.1	0.2	13.9	-
2014	-	0.2	0.0	0.1	-	-	3.5	0.0	-	0.9	-
2017	-	2.8	0.0	0.2	0.0	-	0.3	0.0	-	0.1	-
2021	-	5.1	0.0	0.2	0.0	-	0.6	0.0	-	0.1	0.0
2025	-	8.6	0.2	0.2	0.4	0.0	2.8	-	-	0.6	0.2

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

Table 10R-53.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2011	-	-	-	-	-	-	-	-	14/27
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2011	280	-	29	64	7	0	0	21	61/68
2014	220	-	18	82	0	9	9	0	47/55
2017	1380	60	78	22	0	0	0	0	60/82
2021	2000	1320	59	39	2	2	0	6	- / -
2025	12500	3360	77	23	0	0	0	0	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2011	-	-	-	-	-	-	-	-	99/98
2014	20	-	0	100	0	0	0	0	52/134
2017	20	-	0	0	100	0	100	100	91/92
2021	20	-	0	100	0	0	0	0	- / -
2025	20	20	0	100	0	0	0	0	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2011	60	20	0	100	0	0	0	0	13/20
2014	40	-	50	50	0	0	0	0	10/16
2017	140	-	14	86	0	29	57	0	8/19
2021	100	20	0	100	0	0	80	0	- / -
2025	220	20	0	91	9	36	9	9	- / -

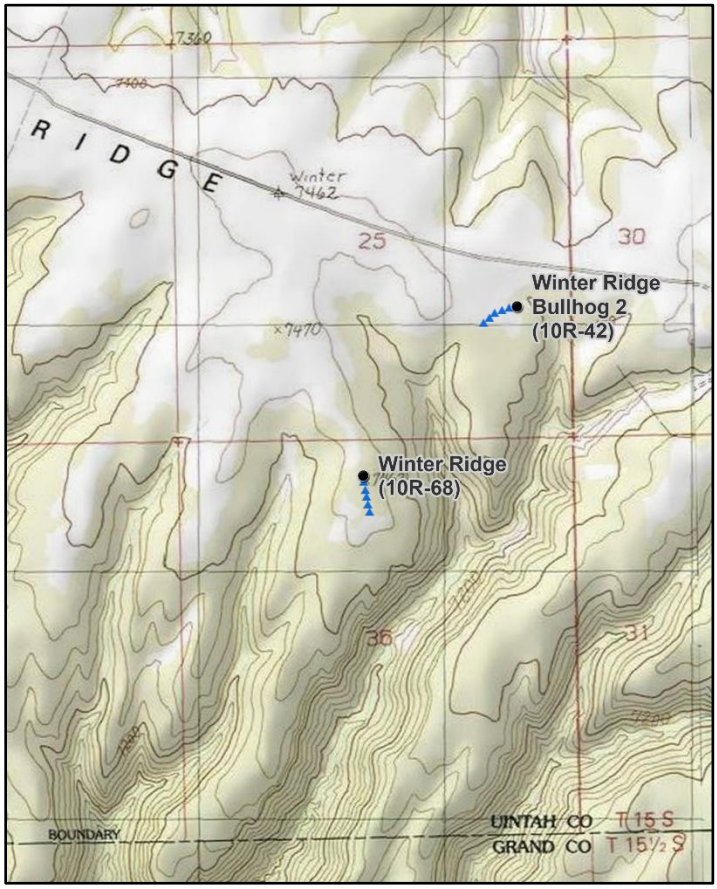
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2011	40	-	50	50	0	0	0	0	64/61
2014	40	-	0	100	0	0	0	0	38/30
2017	60	-	33	67	0	0	0	0	39/52
2021	180	-	44	56	0	0	0	0	- / -
2025	240	-	42	50	8	0	0	17	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2021	20	-	0	100	0	100	0	0	- / -
2025	20	-	0	100	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2011	160	100	63	38	0	0	0	13	- / -
2014	160	-	100	0	0	0	0	13	- / -
2017	160	20	100	0	0	0	0	0	- / -
2021	200	-	70	30	0	0	0	0	- / -
2025	240	-	67	33	0	0	0	0	- / -
Juniperus scopulorum[t] -- (Rocky Mountain juniper)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2017	40	40	100	0	0	0	0	0	- / -
2021	60	-	67	33	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Opuntia fragilis -- (brittle pricklypear)									
2011	60	-	33	67	0	0	0	0	12/45
2014	120	-	0	100	0	0	0	0	11/27
2017	-	-	-	-	-	-	-	-	-/-
2021	40	-	0	100	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2011	500	480	36	64	0	0	0	0	- / -
2014	100	40	60	20	20	0	20	40	- / -
2017	140	40	100	0	0	0	0	14	- / -
2021	100	140	80	20	0	0	0	0	- / -
2025	300	60	53	47	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2011	-	-	-	-	-	-	-	-	37/65
2014	-	-	-	-	-	-	-	-	34/36
2017	-	-	-	-	-	-	-	-	65/97
2021	-	-	-	-	-	-	-	-	-/-
2025	20	-	0	100	0	0	100	0	- / -
Ribes[p] -- (currant)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	115/189
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2011	-	-	-	-	-	-	-	-	37/76
2014	80	-	0	100	0	0	0	0	30/64
2017	-	-	-	-	-	-	-	-	66/115
2021	20	-	0	100	0	100	0	0	- / -
2025	60	-	0	100	0	0	0	0	- / -

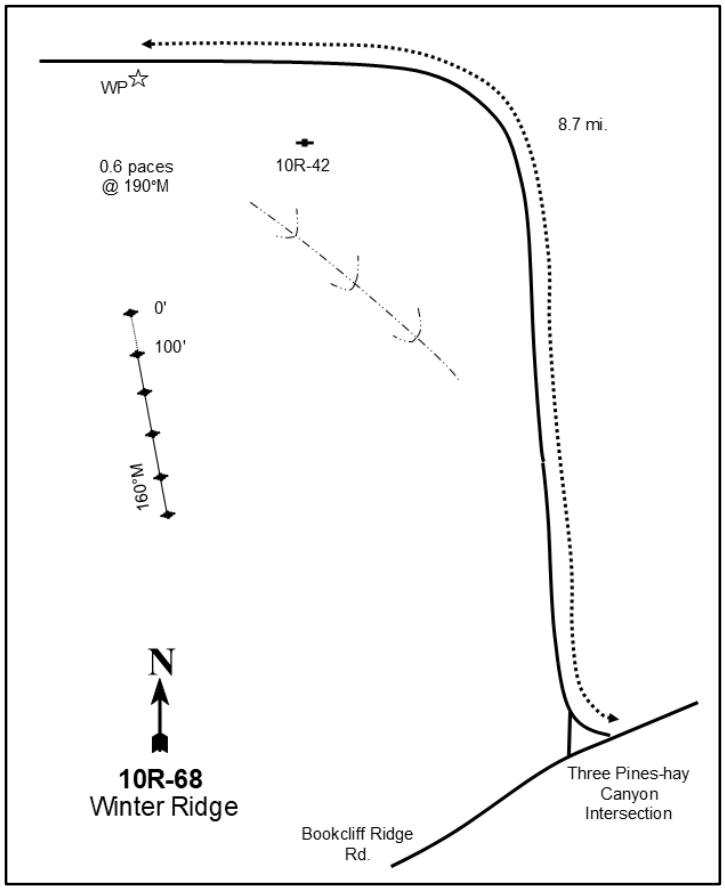
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 10R-53.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2011	442	30	20	10	-	40	24.1
2017	138	28	72	-	-	-	3.4
2021	146	5	95	-	-	-	2.5
2025	191	15	70	15	-	-	5.1
Juniperus scopulorum (Rocky Mountain juniper)							
2017	7	50	50	-	-	-	1.0
2021	59	-	100	-	-	-	2.0
2025	5	-	67	33	-	-	7.7
Pinus edulis (twoneedle pinyon)							
2011	792	30	5	20	30	15	6.0
2017	150	44	44	11	-	-	2.1
2021	128	17	78	6	-	-	2.4
2025	247	20	75	5	-	-	4.1

WINTER RIDGE - STUDY NO. 10R-68





Location Information

USGS 7.5 min Map Info	Tenmile Canyon North; Township 15S, Range 21E, Section 36
GPS (0' Stake)	NAD 83 UTM ZONE 12, 627614 East 4370592 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	160° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From the intersection of the Seep Ridge and Book Cliff Divide Roads, proceed west along the divide for 9.4 miles to the major Three Pines-Hay Canyon intersection. Drive west along Winter Ridge Road for 8.7 miles to a two-track on the left (south). Turn left on to this two-track, travel roughly 0.5 miles, and stop; there is no witness post. Using a GPS to navigate, hike east from the two-track to the 0-foot baseline stake which has no browse tag.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	MCCLELLAND
Elevation	7,460ft (2,274m)
Aspect	South
Slope	3%
Sample Dates	08/06/2025

Table 10R-68.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Willow Watershed Improvements FY2024	6585	October 2023	985
Seeding - Aerial Before	Book Cliffs Wildlife Habitat Improvements (Proposed)	7475	Fall 2025	938
Mechanical - Bullhog	Book Cliffs Wildlife Habitat Improvements (Proposed)	7475	Fall 2025	938

Table 10R-68.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Willow Watershed			Aerial	Oct 2023	1262
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Bouteloua gracilis	Blue Grama	Alma	0.20	0.12
G	Dactylis glomerata	Orchardgrass	Profile	0.24	0.22
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock II	0.91	0.83
G	Elymus trachycaulus	Slender Wheatgrass	First Strike	1.35	1.25
G	Festuca idahoensis	Idaho Fescue	Joseph	0.36	0.33
G	Koeleria macrantha	Prairie Junegrass	UP Sims Mesa	0.06	0.05
G	Pascopyrum smithii	Western Wheatgrass	Recovery	1.35	1.13
G	Phleum pratense	Timothy	Climax	0.08	0.07
G	Poa fendleriana	Muttongrass	Montezuma CO	0.16	0.15
G	Poa secunda	Sandberg Bluegrass	UP Colorado	0.16	0.14
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.35	0.30
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.63	0.55
F	Achillea millefolium	Western Yarrow	Columbia	0.05	0.04
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.48	0.46
F	Eriogonum umbellatum	Sulfur Flower Buckwheat	VNS	0.16	0.12
F	Hedysarum boreale	Utah Sweetvetch	Timp	0.24	0.18
F	Helianthus annuus	Annual Sunflower	Montezuma CO	0.52	0.45
F	Linum perenne	Blue Flax	Appar	0.24	0.21
F	Medicago sativa	Alfalfa	Ladak	0.52	0.48
F	Medicago sativa ssp. falcata	Yellow Alfalfa	Don	0.24	0.23
F	Nicotiana attenuata	Coyote Tobacco	Montezuma CO	0.02	0.02
F	Onobrychis viciifolia	Sainfoin	Shoshone	3.01	2.80
F	Penstemon strictus	Rocky Mountain Penstemon	Bandera	0.12	0.05
F	Phacelia tanacetifolia	Lacy Phacelia	VNS	0.04	0.04
F	Ratibida columnifera	Prairie Coneflower	Stillwater	0.24	0.18
F	Sanguisorba minor	Small Burnet	Delar	1.98	1.84

Wildlife Habitat and Vegetation History

Table 10R-68.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 10R-68.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2025	Pinyon-Juniper	Phase III

Site Notes

The 0 through 500-foot stakes are rebar posts that are approximately three inches out of the ground.

The seed mix for WRI project #6585 was flown on in early October 2023. However, winter weather interrupted the bullhog portion of the project and 983 acres (including the location of the study site) were not masticated before the project was completed, leaving the seed uncovered. The area is scheduled to be seeded again and bullhogged in Fiscal Year 2026 by WRI project #7475 (WRI Database, 2025).

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048AY405UT
States and Transitions	2025 - State Undefined: Community Phase Undefined

Upon study establishment in 2025, the plant community on this site was a twoneedle pinyon (*Pinus edulis*) and juniper (*Juniperus osteosperma* and *J. scopulorum*) woodland that was considered to be in Phase III of woodland succession. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was the main preferred browse species observed, and the limited population was mainly comprised of mature and decadent individuals (Table 10R-68.4, Table 10R-68.12, Table 10R-68.13, Table 10R-68.14). The herbaceous understory was sparse in both diversity and abundance, but native perennial grasses contributed a majority of what little cover was present (Table 10R-68.7, Table 10R-68.10, Table 10R-68.11). This site would likely continue to exist as a pinyon-juniper woodland with a depauperate understory without the occurrence of a major tree-removing disturbance. However, a bullhog and seeding treatment is scheduled to take place in the fall of 2025 (Table 10R-68.1): this will likely remove most of the trees and, as time since treatment passes, amplify and diversify the shrub and herbaceous components.

Condition of deer winter range on this site was very poor in 2025. The main factors negatively affecting winter range condition include the lack of preferred browse, and reduced perennial grass and forb cover (Table 10R-68.6, Table 10R-68.7, Table 10R-68.15). Pellet transect data indicates that deer, elk, horse, and cattle presence was low in 2025. Sagebrush plants were lightly hedged with only 5% of plants being heavily utilized. On-site observations noted that little to no utilization was seen on grass and forb species. It was also noted that the herbaceous and browse communities were all showing signs of stress with stunted growth and chlorotic leaves being observed; 74% of sagebrush plants had signs of poor vigor (Photos, Table 10R-68.9, Table 10R-68.13).

Trend Summary Tables

Table 10R-68.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2025	0.7	0.2	11.4	1.4	0.3	64.6

Table 10R-68.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2025	-	116	2	47	-	1.7	0.0	0.4

Table 10R-68.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2025	17.7	2.9	75.0	1.7	0.8	14.3

Table 10R-68.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle/Bison	Mule Deer	Horse	Rabbit
	Quadrat Frequency			
2025	1	4	1	4
Year	Days Use Per Acre (ha)			
2025	2.2 (5.4)	2.0 (5.0)	4.0 (10.0)	-

Table 10R-68.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bouteloua gracilis (blue grama)	Carex rossii (Ross' sedge)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency						
2025	28	58	5	1	3	9	23
year	Average Cover (%)						
2025	0.3	0.6	0.0	0.0	0.2	0.2	0.2

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

Table 10R-68.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis drummondii (Drummond's rockcress)	Arabis holboellii[a] (Holboell's rockcress)	Astragalus spatulatus (tufted milkvetch)	Cryptantha (cryptantha)	Erigeron eatonii (Eaton's fleabane)	Machaeranthera grindelioides (rayless tansyaster)	Penstemon caespitosus (mat penstemon)	Petradoria pumila (rock goldenrod)	Phlox hoodii (spiny phlox)
year	Nested Frequency								
2025	3	2	8	2	7	5	23	6	17
year	Average Cover (%)								
2025	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2

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

Table 10R-68.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Juniperus scopulorum[t] (Rocky Mountain juniper)	Opuntia fragilis (brittle pricklypear)	Opuntia polyacantha (plains pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Pseudotsuga menziesii[t] (Douglas-fir)
year	Line Intercept Cover (%)							
2025	1.4	-	11.9	1.2	0.1	0.2	49.9	1.6
year	Quadrat Cover (%)							
2025	0.7	0.0	2.2	0.0	0.0	0.1	8.8	0.4

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

Table 10R-68.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2025	760	-	0	53	47	0	5	74	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2025	20	-	100	0	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2025	20	-	0	100	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2025	320	40	69	25	6	0	0	6	- / -
Juniperus scopulorum[t] -- (Rocky Mountain juniper)									
2025	60	-	0	100	0	0	0	0	- / -
Opuntia fragilis -- (brittle pricklypear)									
2025	100	-	0	80	20	0	0	20	- / -
Opuntia polyacantha -- (plains pricklypear)									
2025	120	-	17	17	67	0	0	100	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2025	1040	260	50	48	2	0	0	2	- / -
Pseudotsuga menziesii[t] -- (Douglas-fir)									
2025	20	20	0	100	0	0	0	0	- / -

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

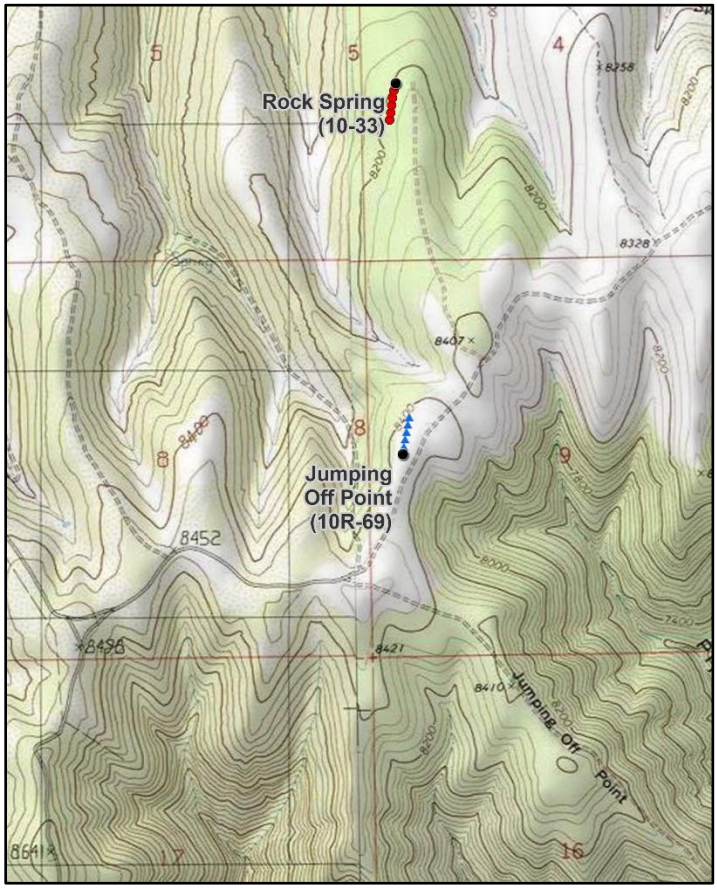
Table 10R-68.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

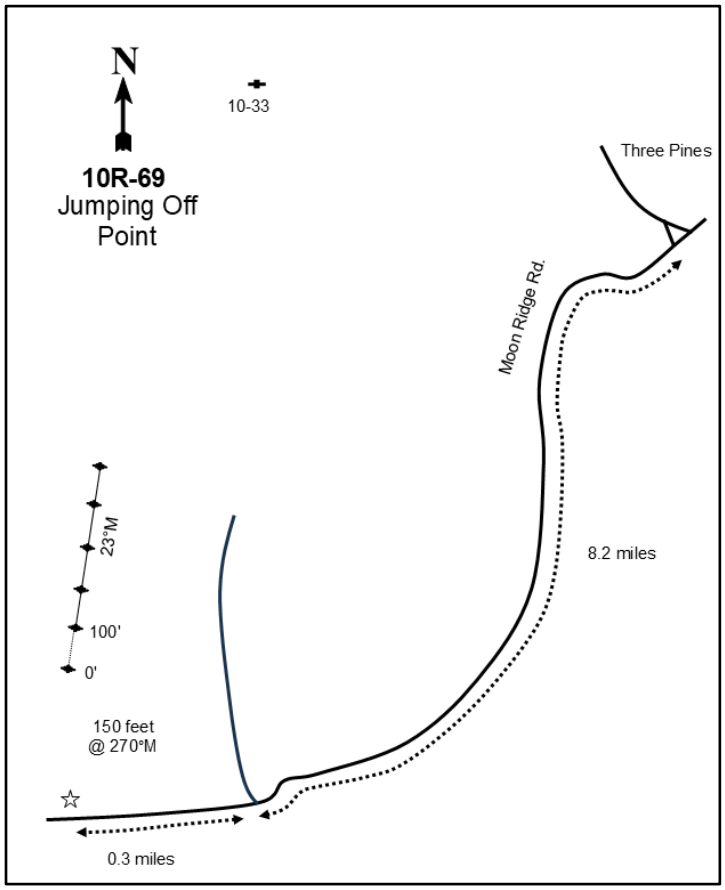
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2025	166	15	30	25	5	25	14.2
Juniperus scopulorum (Rocky Mountain juniper)							
2025	7	-	67	-	33	-	12.0
Pinus edulis (twoneedle pinyon)							
2025	502	40	30	10	5	15	3.9
Pseudotsuga menziesii (Douglas-fir)							
2025	32	10	30	50	-	10	4.8

Table 10R-68.15 - 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
2025	1.8	0.0	0.0	3.3	0.0	0.8	0.0	**5.9**	Very Poor

JUMP OFF POINT - STUDY NO. 10R-69





Location Information

USGS 7.5 min Map Info	Preacher Canyon NW; Township 17S, Range 22E, Section 09
GPS (0' Stake)	NAD 83 UTM ZONE 12, 629411 East 4355866 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	23° 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 major Three Pines intersection on the Book Cliffs Divide, proceed west on the Divide road for roughly 8.5 miles and park. There is no witness post, and the 0-foot baseline stake is approximately 150 feet northwest of the road.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	MCCLELLAND
Elevation	8,400ft (2,560m)
Aspect	West
Slope	2-5%
Sample Dates	08/05/2025

Table 10R-69.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Diamond Creek	-	2002	88420
Harrow - One-Way Chain	Book Cliffs Wildlife Habitat Improvements (Proposed)	7475	Fall 2025	185
Seeding - Broadcast	Book Cliffs Wildlife Habitat Improvements (Proposed)	7475	Fall 2025	185

Wildlife Habitat and Vegetation History

Table 10R-69.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
American Bison	crucial	year-long
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	summer
Greater Sage-Grouse		
Rocky Mountain Bighorn	RMBS	year-long

Table 10R-69.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2025	Mountain Big Sagebrush	Early Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048AY405UT
States and Transitions	2025 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase 2.1

This study site was established in 2025 and was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Additional preferred browse species such as mountain snowberry (*Symphoricarpos oreophilus*), antelope bitterbrush (*Purshia tridentata*), and alderleaf mountain mahogany (*Cercocarpus montanus*) were also present, but they provided substantially less cover than sagebrush (Table 10R-69.12, Table 10R-69.13). The herbaceous understory was abundant and diverse. Furthermore, the herbaceous layer was primarily comprised of native perennial grasses and forbs including (but not limited to) muttongrass (*Poa fendleriana*), obtuse sedge (*Carex obtusata*), and littleleaf and small-leaf pussytoes (*Antennaria microphylla* and *A. parvifolia*) (Table 10R-69.7, Table 10R-69.10, Table 10R-69.11). Rocky Mountain juniper (*Juniperus scopulorum*) was observed in the community, but no cover was recorded, point-quarter density was very low, and all trees were young (Table 10R-69.12, Table 10R-59.14). This site would likely remain in this or a similar state in future sample years without a major shrub-removing disturbance. However, a harrow and seeding treatment scheduled for the fall of 2025 (Table 10R-59.1) will likely remove much of the sagebrush and further amplify and diversify the herbaceous understory.

The diverse and abundant grass community on this site could provide adequate forage for summering mule deer. Pellet transect data indicates that deer and elk presence were moderate in 2025; cattle and/or bison presence was also moderate. During the 2024/25 winter season the area had common occurrences of collared elk (Wildlife Migration Initiative). Seventy seven percent of sagebrush plants sampled in density strips were moderately to heavily utilized, while 72% of Utah serviceberry plants were moderately to heavily hedged. On-site observations state that there was little to no utilization of the herbaceous understory during the most recent sample year (2025). Sagebrush plants were observed displaying signs of drought and limited leader growth; an estimated 83% of sagebrush plants were classified as having poor vigor (Photos, Table 10R-69.9, Table 10R-69.10, Table 10R-69.11, Table 10R-69.13).

Trend Summary Tables

Table 10R-69.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2025	32.7	1.2	-	46.5	0.6	-

Table 10R-69.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2025	-	386	58	240	-	11.6	0.3	10.3

Table 10R-69.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2025	16.9	0.2	48.5	5.7	0.1	47.4

Table 10R-69.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle/Bison	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2025	5	21	23	1	11
Year	Days Use Per Acre (ha)				
2025	16.0 (39.5)	21.5 (53.0)	29.5 (72.8)	-	-

Table 10R-69.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Carex geyeri (Geyer's sedge)	Carex obtusata (obtuse sedge)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency											
2025	49	3	6	136	13	1	95	2	24	211	13	13
year	Average Cover (%)											
2025	0.9	0.1	0.2	2.1	0.2	0.0	1.5	0.0	0.8	5.2	0.2	0.2

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

Table 10R-69.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria microphylla (littleleaf pussytoes)	Antennaria parvifolia (small-leaf pussytoes)	Arabis holboellii[a] (Holboell's rockcress)	Astragalus agrestis (purple milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus miser (timber milkvetch)	Astragalus purshii (woollypod milkvetch)	Collinsia parviflora[a] (maiden blue eyed Mary)	Crepis intermedia (limestone hawksbeard)	Erigeron eatonii (Eaton's fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Microsteris gracilis[a] (slender phlox)	Penstemon caespitosus (mat penstemon)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2025	5	76	60	1	16	2	45	3	20	29	36	34	4	2	4	1	90
year	Average Cover (%)																
2025	0.1	3.9	3.5	0.0	0.1	0.0	0.8	0.0	0.0	0.1	0.3	0.9	0.0	0.0	0.0	0.0	0.4

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

FORB SPECIES	Polygonum douglasii[a] (Douglas' knotweed)	Potentilla concinna var. bicrenata (elegant cinquefoil)	Senecio integerrimus[a] (lambstongue ragwort)	Silene drummondii (Drummond's campion)
year	Nested Frequency			
2025	5	1	28	2
year	Average Cover (%)			
2025	0.0	0.0	0.2	0.0

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

Table 10R-69.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Cercocarpus montanus[p] (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Purshia tridentata[p] (antelope bitterbrush)	Quercus gambelii[p] (Gambel oak)	Symphoricarpos oreophilus[p] (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)							
2025	0.5	38	1	0.6	2.1	0	4.9	-
year	Quadrat Cover (%)							
2025	0.6	26.4	0.1	1.2	2.9	0.1	2.5	0.0

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

Table 10R-69.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

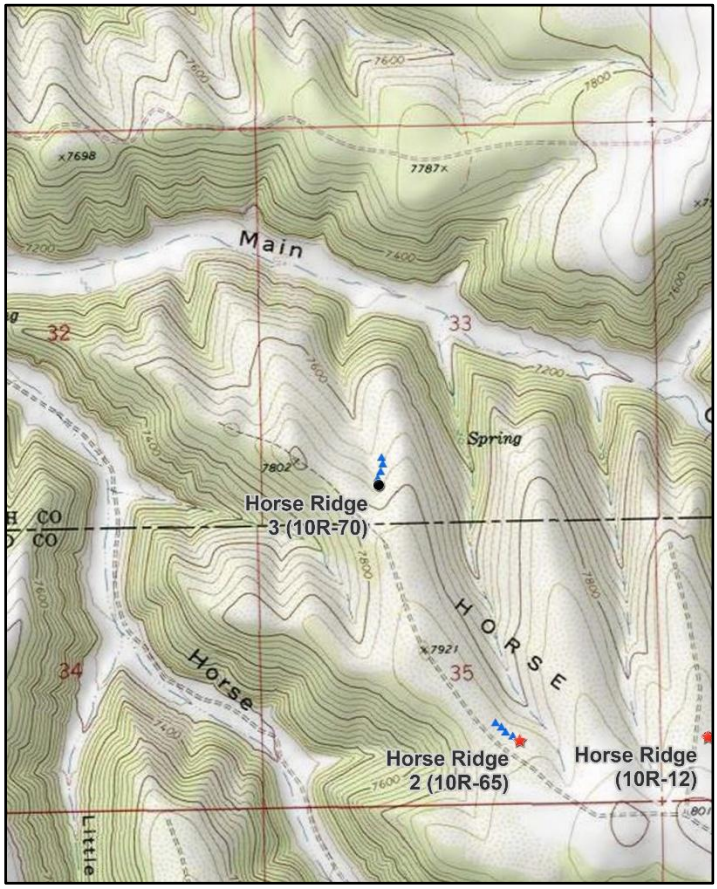
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2025	360	-	33	61	6	22	50	83	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2025	8260	20	6	70	25	40	37	86	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2025	20	-	0	100	0	100	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2025	940	40	19	49	32	2	15	72	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2025	1040	20	8	73	19	15	79	92	- / -
Quercus gambelii[p] -- (Gambel oak)									
2025	120	-	67	33	0	0	0	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2025	2220	60	12	87	2	19	33	53	- / -
Tetradymia canescens -- (spineless horsebrush)									
2025	40	-	0	100	0	0	100	50	- / -

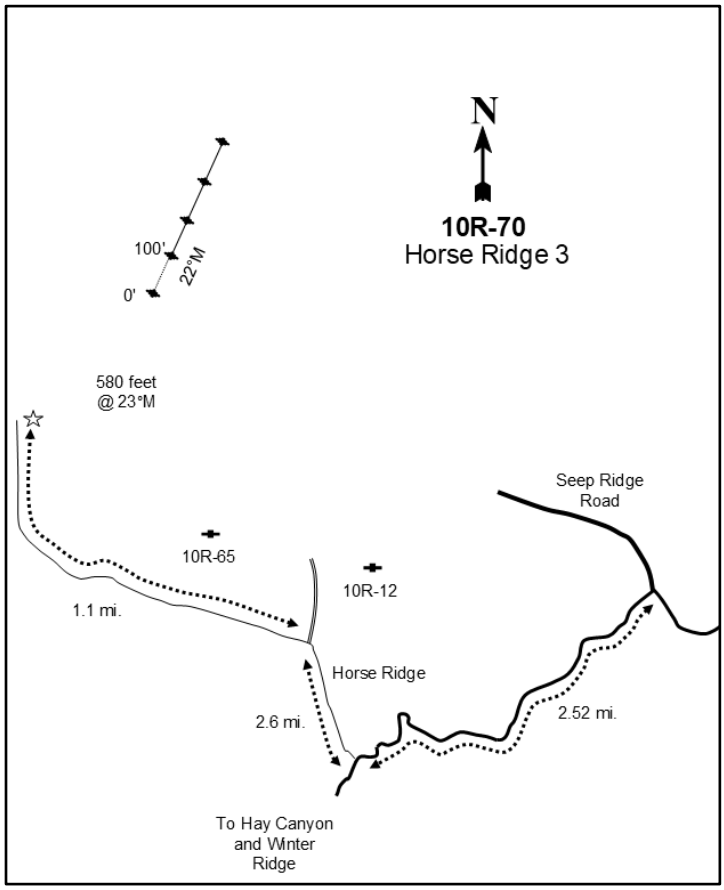
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 10R-69.14 - Tree Characteristics. Point-quarter tree density, size 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)							
2025	1	-	100	-	-	-	3.0

HORSE RIDGE 3 - STUDY NO. 10R-70





Location Information

USGS 7.5 min Map Info	P R Spring NW; Township 15S, Range 23E, Section 33
GPS (0' Stake)	NAD 83 UTM ZONE 12, 641803 East 4369526 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	22° magnetic (Line 2: 339° magnetic, Line 3: 358° magnetic, Line 4: 348° magnetic)
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard; Line 4: 98ft Long

Directions to Site

From the intersection of Seep Ridge Road and the Book Cliffs Divide Road, turn west (right) and drive along the Book Cliffs Divide Road for approximately 2.9 miles to Horse Ridge. Turn north (right) onto Horse Ridge, travel roughly 3.3 miles, and park; there is no witness post. From the road, use a GPS to walk approximately 500 feet north and locate the 0-foot baseline stake.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	BOOKCLIFFS PASTURE
Elevation	7,770ft (2,368m)
Aspect	Northwest
Slope	5%
Sample Dates	06/23/2025

Table 10R-70.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Tebuthiuron	Book Cliffs West Water Developments and Spike Treatment	5376	Fall 2021	461

Wildlife Habitat and Vegetation History

Table 10R-70.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
American Bison	crucial	year-long
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	summer
Greater Sage-Grouse		

Table 10R-70.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2025	Perennial Grass/Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048AY405UT
States and Transitions	2025 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase 2.1

When the study was established in 2025, the shrub component on this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*); other preferred browse species such as mountain snowberry (*Symphoricarpos oreophilus*), Utah serviceberry (*Amelanchier utahensis*), and alderleaf mountain mahogany (*Cercocarpus montanus*) were also present. Decadent plants were the largest single demographic in the sagebrush population, likely in part due to a 2021 herbicide treatment (Table 10R-70.1), and 52% of sagebrush plants displayed signs of poor vigor (Table 10R-70.12, Table 10R-70.13). Perennial grasses were a co-dominant site component and were largely comprised of native species such as needle and thread (*Hesperostipa comata*) and western wheatgrass (*Pascopyrum smithii*) (Table 10R-70.7, Table 10R-70.10). Perennial forbs were moderately abundant, with Watson's penstemon (*Penstemon watsonii*) and small-leaf pussytoes (*Antennaria parvifolia*) providing much of the cover (Table 10R-70.11). A number of tree species including Utah and Rocky Mountain juniper (*Juniperus osteosperma* and *J. scopulorum*) and twoneedle pinyon (*Pinus edulis*) were observed with moderate cover and point-quarter density, placing this site in Phase I of woodland succession (Table 10R-70.4, Table 10R-70.12, Table 10R-70.14).

The diverse and abundant grass and browse communities on this site could provide adequate forage for summering mule deer. Pellet transect data indicates that deer presence was low, but elk presence was moderate in 2025. During the 2024/25 winter season the area had few occurrences of collared elk, though occurrences increase moving closer to the divide (Wildlife Migration Initiative). Cattle and/or bison presence was low. Eighty percent of sagebrush plants were lightly hedged, while 92% of bitterbrush plants were moderately to heavily hedged in 2025. On-site observations state that there was little to no utilization of the herbaceous understory during the most recent sample year (2025) (Photos, Table 10R-70.9, Table 10R-70.10, Table 10R-70.11, Table 10R-70.13).

Trend Summary Tables

Table 10R-70.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2025	11.8	3.4	4.1	20.2	1.8	7.9

Table 10R-70.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2025	-	422	26	198	-	38.0	0.1	4.5

Table 10R-70.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2025	9.7	0.3	50.2	0.2	-	59.8

Table 10R-70.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2025	3	18	11	24
Year	Days Use Per Acre (ha)			
2025	10.2 (25.1)	8.1 (19.9)	26.8 (66.2)	-

Table 10R-70.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus porteri (Porter brome)	Carex (sedge)	Carex rossii (Ross' sedge)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Juncus (rush)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency												
2025	31	20	10	8	180	7	142	8	36	262	71	87	2
year	Average Cover (%)												
2025	2.3	0.8	0.2	0.5	8.1	0.2	10.8	0.2	1.7	8.6	1.6	3.0	0.0

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

Table 10R-70.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria microphylla (littleleaf pussytoes)	Antennaria parvifolia (small-leaf pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Erigeron eatonii (Eaton's fleabane)	Erigeron speciosus (aspen fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Lithospermum ruderale (western stoneseed)	Lupinus argenteus (silvery lupine)	Penstemon (beardtongue)
year	Nested Frequency																
2025	4	18	11	31	2	5	12	13	24	7	47	0	14	3	5	9	3
year	Average Cover (%)																
2025	0.0	0.1	0.2	1.4	0.0	0.2	0.0	0.1	0.1	0.1	0.2	0.0	0.1	0.0	0.0	0.3	0.0

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

FORB SPECIES	Penstemon watsonii (Watson's penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Senecio integerrimus[a] (lambstongue ragwort)	Silene drummondii (Drummond's campion)	Taraxacum officinale (common dandelion)
year	Nested Frequency					
2025	59	50	3	2	14	15
year	Average Cover (%)					
2025	1.4	0.2	0.0	0.0	0.1	0.1

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

Table 10R-70.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Cercocarpus montanus[p] (alderleaf mountain mahogany)	Chrysothamnus depressus[p] (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Juniperus osteosperma[t] (Utah juniper)	Juniperus scopulorum[t] (Rocky Mountain juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Pseudotsuga menziesii[t] (Douglas-fir)	Purshia tridentata[p] (antelope bitterbrush)	Symphoricarpos oreophilus[p] (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)												
2025	3.3	11.9	0.1	-	1.8	1.2	0.4	-	5.9	0.4	1.3	3.6	-
year	Quadrat Cover (%)												
2025	2.2	6.3	0.0	0.2	3.3	1.1	0.9	0.0	2.1	0.0	0.3	2.8	0.0

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

Table 10R-70.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2025	340	-	47	41	12	29	12	12	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2025	2800	180	25	26	49	19	1	52	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2025	20	-	0	100	0	0	0	0	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2025	120	-	0	83	17	33	67	17	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2025	3460	-	8	69	24	24	3	35	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2025	60	-	67	33	0	0	0	0	- / -
Juniperus scopulorum[t] -- (Rocky Mountain juniper)									
2025	60	60	100	0	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2025	40	-	0	100	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2025	20	-	0	100	0	0	0	0	- / -

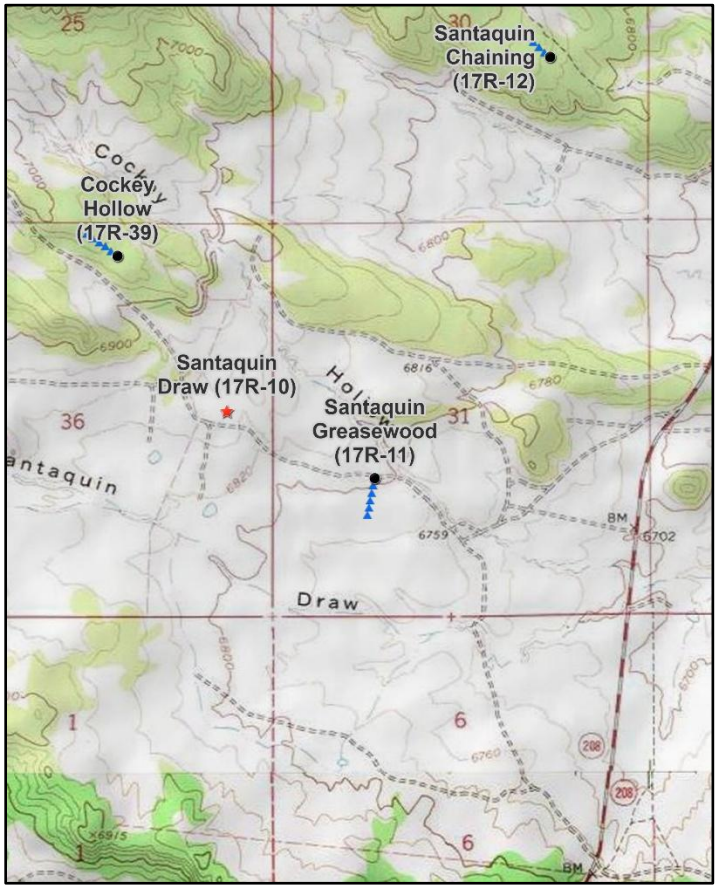
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Purshia tridentata[p] -- (antelope bitterbrush)									
2025	460	-	0	100	0	44	48	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2025	1300	-	26	69	5	37	3	9	- / -
Tetradymia canescens -- (spineless horsebrush)									
2025	20	-	100	0	0	0	0	0	- / -

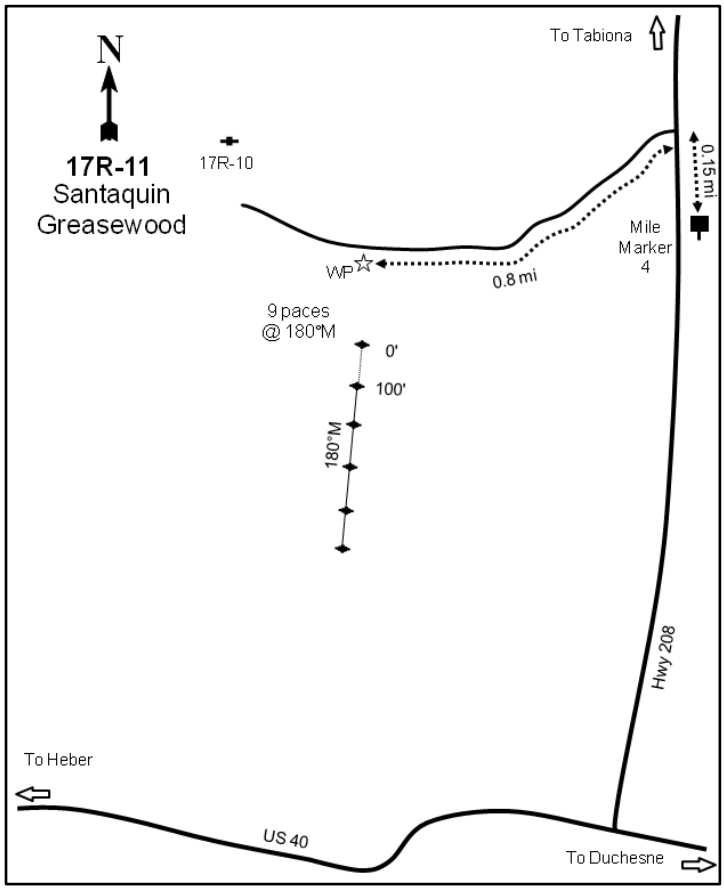
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 10R-70.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2025	38	-	29	29	36	7	9.8
Juniperus scopulorum (Rocky Mountain juniper)							
2025	30	20	20	10	20	30	12.5
Pinus edulis (twoneedle pinyon)							
2025	27	20	20	20	10	30	7.5
Pseudotsuga menziesii (Douglas-fir)							
2025	2	-	100	-	-	-	2.0

SANTAQUIN GREASEWOOD - STUDY NO. 17R-11





Location Information

USGS 7.5 min Map Info	Tabiona SW; Township 2S, Range 7W, Section 31
GPS (0' Stake)	NAD 83 UTM ZONE 12, 523633 East 4456728 North

Transect Information

Browse Tag # (0' Stake)	40
Transect Bearing	180° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From US 40, turn north onto Highway 208. Travel 0.15 miles north of mile marker 4 to a road that comes in from the left (west). Turn onto this road and drive 0.8 miles to a witness post on the left-hand (south) side of the road. The 0-foot stake is 9 paces from the witness post at 180 degrees magnetic and is marked with browse tag #40.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,810ft (2,076m)
Aspect	South
Slope	2%
Sample Dates	07/15/2004, 07/26/2007, 07/07/2009, 06/28/2010, 07/10/2012, 08/02/2016, 07/28/2020, 07/30/2025

Table 17R-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - One-Way Smooth	Santaquin Greasewood	PDB	October-November 2004	380
Seeding - Aerial Before	Santaquin Greasewood	PDB	October 2004	380
Seeding - Dribbler	Santaquin Greasewood	PDB	October-November 2004	380
Seeding - Aerial After	Santaquin Greasewood	PDB	December 2004	1755

Table 17R-11.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Santaquin Greasewood			Aerial	Oct 2004	380
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.05	0.96
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.97	1.85
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.97	1.84
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.97	1.84
F	Medicago sativa	Alfalfa	Ladak+	0.53	0.48
F	Onobrychis viciifolia	Sainfoin		1.05	1.01
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.79	0.40

Mix Name			Application Type	Application Date	Acres
Santaquin Greasewood Shrub			Dribbler	Oct 2004	40
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak+	0.50	0.47
F	Onobrychis viciifolia	Sainfoin		1.00	0.96
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.28

Mix Name			Application Type	Application Date	Acres
Santaquin Sagebrush Browse			Aerial	Dec 2004	1755
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak+	0.57	0.52
F	Onobrychis viciifolia	Sainfoin	Eski	0.57	0.52
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.08	0.01
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.75	0.21
S	Bassia prostrata	Forage Kochia	Immigrant	0.46	0.31
S	Krascheninnikovia lanata	Winterfat	Duchesne/Uintah UT	0.17	0.08

Wildlife Habitat and Vegetation History

Table 17R-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

Table 17R-11.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Black Greasewood-Basin Big Sagebrush	No Encroachment
2007	Black Greasewood-Basin Big Sagebrush	No Encroachment
2009	Black Greasewood-Basin Big Sagebrush	No Encroachment
2010	Black Greasewood-Basin Big Sagebrush	No Encroachment
2012	Black Greasewood-Mountain Big Sagebrush	No Encroachment
2016	Mountain Big Sagebrush-Black Greasewood	No Encroachment
2020	Mountain Big Sagebrush-Black Greasewood/Perennial Grass	No Encroachment
2025	Black Greasewood-Mountain Big Sagebrush	No Encroachment

Site Notes

This study is located eighteen miles northwest of Duchesne within a greasewood (*Sarcobatus vermiculatus*) and big sagebrush (*Artemisia tridentata*) flat.

Soils

Table 17R-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	7.2	49.6	32.9	17.5	1.1	4.5	137.6	1.0	07/15/2004

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC310UT
States and Transitions	2004-2010 - State Undefined: Community Phase Undefined 2012-2025 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase Undefined

Between the 2004 and 2010 sample years, the plant community on this site was dominated by greasewood (*Sarcobatus vermiculatus*) and basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) with mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) as a subordinate species. Basin big sagebrush cover increased through the 2010 sample year but has decreased in each subsequent year. However, mountain big sagebrush cover has increased overall. Although mountain big sagebrush became co-dominant with greasewood in 2020, it has since decreased and became subordinate to greasewood in 2025 (Table 17R-11.12, Table 17R-11.13). The herbaceous understory has been mainly comprised of perennial grasses in most sample years, and forbs have remained depauperate in both composition and quantity. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in most years, but abundance and cover have remained extremely low (Table 17R-11.10, Table 17R-11.11).

Condition of mule deer winter range on this site has ranged between very poor and good since 2004; winter range condition is considered to be fair as of 2025. Factors negatively influencing range condition include reduced preferred browse, and reduced perennial grass and forb cover (Table 17R-11.6, Table 17R-11.7, Table 17R-11.15). Pellet transect data shows that deer presence has decreased; pellet groups abundance was very high in 2004 but low in 2025. Elk presence has been moderate in most sample years, but it was high in 2020 and 2025. During the 2024/25 winter season the area had occurrences of collared elk (Wildlife Migration Initiative). Cattle pat abundance has been consistently low throughout the study period. Mountain big sagebrush has generally decreased in population density, although wide year-to-year variability has occurred. The majority of utilization has been light except in 2020, when 69% of the total mountain big sagebrush population sampled in density strips was either moderately or heavily hedged (Table 17R-11.9, Table 17R-11.13). On-site observations in 2025 noted that there was little to no utilization of the herbaceous community. Despite some signs of drought, preferred browse did have some notable leader growth (Photos).

Trend Summary Tables

Table 17R-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
2004	7.5	11.9	-	4.7	14.4	-
2007	5.1	11.1	-	6.0	19.4	-
2009	8.5	12.5	-	9.0	19.8	-
2010	14.6	8.8	-	20.7	18.2	-
2012	12.3	10.9	-	11.7	12.6	-
2016	10.7	8.6	-	12.6	5.9	-
2020	15.5	11.9	-	18.0	14.4	-
2025	9.4	13.6	-	11.5	17.1	-

Table 17R-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
2004	2	53	233	9	0.0	1.6	3.2	0.0
2007	7	150	261	93	0.0	5.6	1.5	2.3
2009	-	146	39	127	-	6.2	0.2	1.2
2010	8	185	58	95	0.0	5.7	0.5	2.1
2012	1	226	25	57	0.0	6.8	0.1	0.2
2016	2	220	26	16	0.0	8.5	0.1	0.0
2020	13	230	120	32	0.0	15.3	0.8	0.1
2025	3	194	82	76	0.0	7.5	0.3	1.0

Table 17R-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
2004	35.2	10.0	43.7	0.2	0.4	25.2
2007	34.5	3.8	49.7	0.1	0.0	25.2
2009	26.9	1.0	55.4	0.0	0.0	31.9
2010	31.5	1.3	49.7	-	0.1	31.6
2012	33.5	1.1	52.6	0.0	0.2	29.9
2016	37.3	0.8	42.1	0.0	0.0	29.1
2020	26.4	1.4	47.9	0.0	0.1	42.4
2025	27.9	1.8	57.6	0.1	-	30.9

Table 17R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
2004	-	-	49	7	-	13
2007	-	-	33	17	2	42
2009	2	-	27	12	-	35
2010	2	-	10	11	-	14
2012	5	-	13	27	1	42
2016	3	-	34	8	-	68
2020	5	-	26	22	1	37
2025	-	-	10	34	-	29
Year	Days Use Per Acre (ha)					
2004	0.7 (1.8)	-	243.3 (600.9)	27.5 (67.9)	-	-
2007	0.7 (1.8)	-	27.5 (67.9)	28.8 (71.2)	-	-
2009	6.5 (16.1)	-	11.4 (28.1)	47.6 (117.5)	-	-
2010	12.3 (30.5)	-	23.4 (57.9)	28.1 (69.5)	-	-
2012	8.7 (21.5)	-	2.7 (6.6)	34.9 (86.1)	-	-
2016	5.8 (14.3)	-	38.9 (96.0)	31.5 (77.8)	-	-
2020	8.0 (19.7)	17.4 (43.0)*	5.3 (13.2)	46.2 (114.2)	-	-
2025	5.1 (12.6)	-	7.4 (18.2)	40.9 (101.0)	-	-

*Pellets per acre (ha)

Table 17R-11.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron fragile[i] (Siberian wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2004	-	-	2	1	31	-	-	35	-	-
2007	12	7	7	16	36	5	-	78	35	-
2009	7	49	-	13	19	-	1	65	10	20
2010	38	39	8	5	32	12	-	89	11	14
2012	17	69	1	6	35	3	-	109	31	24
2016	4	62	2	27	72	-	-	85	48	-
2020	18	88	13	11	40	-	7	108	27	20
2025	3	3	3	8	73	-	-	102	41	7
year	Average Cover (%)									
2004	-	-	0.0	0.0	1.1	-	-	0.5	-	-
2007	0.7	0.3	0.0	0.3	1.3	0.0	-	1.4	1.6	-
2009	0.1	2.7	-	0.2	0.3	-	0.0	2.0	0.5	0.4
2010	1.3	1.8	0.0	0.0	0.8	0.1	-	1.2	0.2	0.2
2012	0.1	2.9	0.0	0.2	0.5	0.0	-	1.7	0.6	0.8
2016	0.0	1.2	0.0	0.7	1.6	-	-	1.6	3.3	-
2020	0.4	5.9	0.0	0.3	1.2	-	1.1	2.9	2.5	1.0
2025	0.2	0.0	0.0	0.4	1.7	-	-	2.2	3.0	0.0

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

Table 17R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Arabis holboellii[a] (Holboell's rockcress)	Chenopodium album[a] (lambsquarters)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Descurainia pinnata[a] (western tansymustard)	Erigeron (fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Gilia inconspicua[a] (shy gilia)	Lappula occidentalis[a] (flatspine stickseed)	Linum lewisii (Lewis flax)	Phlox longifolia (longleaf phlox)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency														
2004	-	-	27	111	5	199	8	-	-	3	13	-	1	-	-
2007	1	10	-	18	-	242	78	-	-	-	48	3	6	11	2
2009	1	-	4	39	-	-	102	-	-	-	-	4	2	27	4
2010	20	-	3	26	-	7	74	-	-	-	9	2	4	19	-
2012	5	1	-	16	3	6	55	-	-	-	-	-	1	3	-
2016	9	7	-	-	9	11	4	-	-	-	-	-	-	15	-
2020	74	4	-	-	-	56	30	-	-	-	-	-	1	-	1
2025	66	3	-	-	3	4	32	21	3	-	18	2	19	3	4
year	Average Cover (%)														
2004	-	-	0.2	1.0	0.0	1.9	0.0	-	-	0.0	0.1	-	0.0	-	-
2007	0.0	0.0	-	0.0	-	1.2	2.0	-	-	-	0.2	0.2	0.0	0.1	0.0
2009	0.0	-	0.0	0.2	-	-	1.0	-	-	-	-	0.1	0.0	0.1	0.0
2010	0.0	-	0.0	0.4	-	0.0	1.9	-	-	-	0.0	0.0	0.0	0.2	-
2012	0.0	0.0	-	0.0	0.0	0.0	0.2	-	-	-	-	-	0.0	0.0	-
2016	0.0	0.0	-	-	0.0	0.1	0.0	-	-	-	-	-	-	0.0	-
2020	0.6	0.0	-	-	-	0.2	0.1	-	-	-	-	-	0.0	-	0.0
2025	0.2	0.0	-	-	0.0	0.0	0.5	0.3	0.0	-	0.0	0.0	0.3	0.0	0.0

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

Table 17R-11.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. tridentata[p] (basin big sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Atriplex confertifolia[p] (shadscale saltbush)	Bassia prostrata[pi] (forage kochia)	Krascheninnikovia lanata[p] (winterfat)	Opuntia polyacantha (plains pricklypear)	Sarcobatus vermiculatus (greasewood)
year	Line Intercept Cover (%)						
2004	4.4	-	0.3	-	-	0.4	14
2007	5.7	-	0.3	-	-	0.7	18.7
2009	6.5	0.5	0.2	1.8	-	1.2	18.6
2010	10.9	5.2	1.1	3.5	-	0.3	17.9
2012	3.3	7.2	0.3	0.9	-	0.4	12.2
2016	1	8.7	0.1	2.8	-	0.6	5.3
2020	-	12.1	0.5	5.4	-	1.4	13
2025	-	5.5	0.1	5.9	-	1.5	15.6
year	Quadrat Cover (%)						
2004	6.7	0.3	0.5	-	-	0.5	11.4
2007	4.8	-	0.3	0.0	0.0	0.5	10.6
2009	5.8	1.5	0.4	0.8	-	0.2	12.3
2010	5.6	5.8	0.1	3.0	-	0.1	8.7
2012	5.0	6.1	0.4	0.8	-	0.1	10.8
2016	1.0	7.7	0.1	1.8	0.0	0.4	8.2
2020	-	11.4	0.2	3.9	-	0.7	11.2
2025	-	4.1	0.4	4.9	-	1.6	12.1

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

Table 17R-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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. tridentata[p] -- (basin big sagebrush)									
2004	2640	2260	4	11	85	25	7	66	75/77
2007	3760	9860	60	12	29	5	1	27	46/60
2009	-	-	-	-	-	-	-	-	39/41
2010	7000	640	44	53	4	15	0	37	49/55
2012	3520	-	44	53	3	11	0	34	51/49
2016	460	-	0	74	26	13	83	61	47/48
2020	40	-	0	100	0	100	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2004	-	-	-	-	-	-	-	-	45/95
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	29/33
2010	5480	2840	72	27	1	0	0	1	40/48
2012	8040	100	45	51	4	18	28	41	34/37
2016	5100	40	4	52	44	19	20	51	37/43
2020	4620	20	0	58	42	47	22	65	43/52
2025	2720	260	43	41	15	4	39	40	- / -

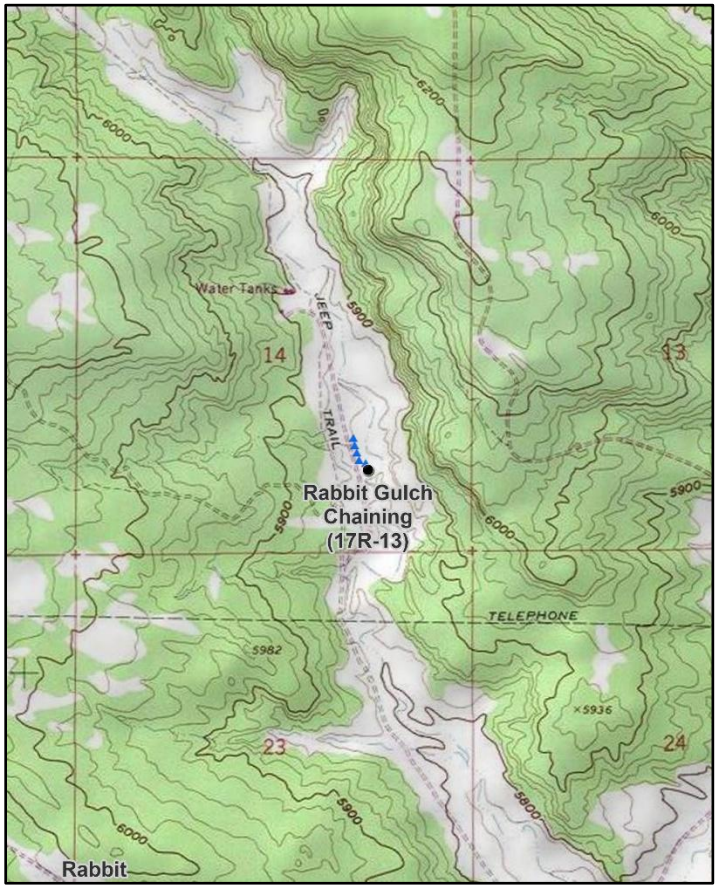
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Atriplex confertifolia[p] -- (shadscale saltbush)									
2004	160	200	13	75	13	0	13	0	31/47
2007	1040	440	75	25	0	0	0	0	23/37
2009	-	-	-	-	-	-	-	-	26/41
2010	780	260	44	56	0	0	0	0	28/42
2012	1080	-	6	93	2	6	6	2	21/31
2016	720	-	33	64	3	3	0	0	11/20
2020	600	-	13	83	3	13	23	7	21/31
2025	280	140	36	64	0	7	0	0	- / -
Bassia prostrata[pi] -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	60	140	33	67	0	0	0	0	12/14
2009	-	-	-	-	-	-	-	-	11/14
2010	8880	200	50	50	0	0	0	0	16/22
2012	4660	60	5	95	0	1	94	0	7/18
2016	4580	-	1	99	0	2	11	0	18/28
2020	6380	120	1	99	0	21	0	35	18/30
2025	12640	11980	55	45	1	15	27	62	- / -
Echinocereus -- (hedgehog cactus)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	2/8
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Krascheninnikovia lanata[p] -- (winterfat)									
2004	-	-	-	-	-	-	-	-	-/-
2007	20	-	100	0	0	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	80	60	100	0	0	0	0	0	12/13
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
2004	1120	-	7	59	34	0	0	16	13/30
2007	920	-	0	74	26	2	0	13	11/25
2009	-	-	-	-	-	-	-	-	13/24
2010	560	-	0	93	7	7	0	14	9/23
2012	1380	-	0	93	7	0	0	7	7/19
2016	1680	20	0	100	0	0	0	0	12/26
2020	940	-	0	100	0	0	0	2	11/38
2025	4040	-	0	80	20	0	0	26	- / -
Sarcobatus vermiculatus -- (greasewood)									
2004	1340	2140	16	79	5	3	0	2	80/128
2007	1280	3060	16	75	9	0	0	16	86/126
2009	-	-	-	-	-	-	-	-	83/112
2010	1380	20	23	77	0	4	0	12	84/115
2012	2260	40	43	57	0	4	5	1	74/103
2016	1700	140	22	69	8	6	9	8	66/90
2020	1340	-	13	79	8	6	0	9	77/108
2025	1480	-	4	89	7	0	3	8	- / -

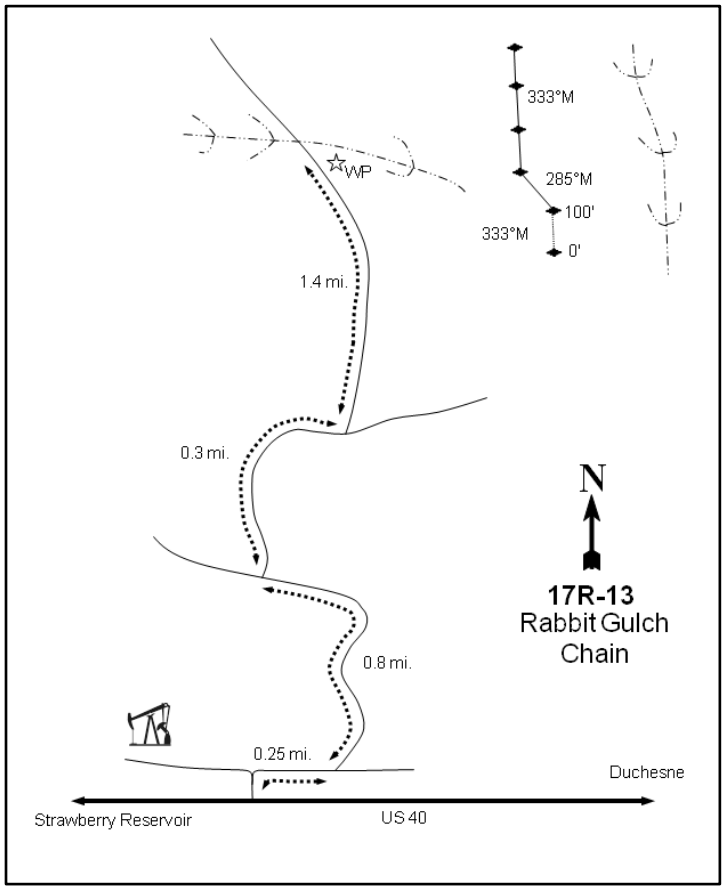
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 17R-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
2004	5.8	0.0	0.0	3.3	0.0	0.1	0.0	**9.2**	Very Poor
2007	7.4	6.9	15.0	11.2	0.0	4.5	0.0	**45.0**	Poor
2009	11.7	0.0	0.0	12.5	0.0	2.4	0.0	**26.6**	Very Poor
2010	26.5	14.3	15.0	11.3	0.0	4.1	0.0	**71.2**	Good
2012	14.8	14.0	15.0	13.7	0.0	0.4	0.0	**57.9**	Fair
2016	16.4	5.3	1.7	16.9	0.0	0.1	0.0	**40.4**	Poor
2020	23.7	6.5	0.4	30.0	0.0	0.2	0.0	**60.8**	Fair
2025	15.8	12.7	15.0	14.9	0.0	2.1	0.0	**60.5**	Fair

RABBIT GULCH CHAINING - STUDY NO. 17R-13





Location Information	
USGS 7.5 min Map Info	Rabbit Gulch NE; Township 3S, Range 6W, Section 14
GPS (0' Stake)	NAD 83 UTM ZONE 12, 540348 East 4451794 North

Transect Information	
Browse Tag # (0' Stake)	Not Available
Transect Bearing	333° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From Strawberry River Road on US 40, drive east for 1.3 miles to a road on the left (north) side of the road (if coming from the east, drive 1.5 miles from the bridge over Starvation Reservoir). Turn left (north) onto this road and immediately turn right, then drive 0.3 miles to a road on the left. Turn left and continue for 0.8 miles to a fork where the pavement will end. From the fork, stay right and proceed for 0.3 miles to another fork. Stay left at the fork and drive 1.4 miles to the witness post on the right (east) side of the road. From the witness post, walk 150 feet at 152 degrees magnetic to the 0-foot stake.

Site Information	
Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,840ft (1,780m)
Aspect	Southeast
Slope	2%
Sample Dates	07/29/2005, 07/29/2008, 06/26/2013, 08/02/2017, 07/29/2020, 07/14/2025

Table 17R-13.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - 2,4-D/Tordon	Rabbit Gulch WMA Range Rehabilitation	66	June 2005	167
Chaining - Two-Way Ely	Rabbit Gulch WMA Range Rehabilitation	66	January 2006	167
Seeding - Aerial Before	Rabbit Gulch WMA Range Rehabilitation	66	November 2005	300
Seeding - Aerial After	Rabbit Gulch WMA Range Rehabilitation	66	January 2006	167

Table 17R-13.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Rabbit Gulch Greasewood			Aerial	Nov 2005	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	2.00	1.62
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.92	1.63
G	Leymus cinereus	Great Basin Wildrye	Trailhead	2.00	1.64
G	Psathyrostachys juncea	Russian Wildrye		2.00	1.70
F	Medicago sativa	Alfalfa	Spredor 4	1.00	0.93
F	Sanguisorba minor	Small Burnet		1.08	1.04
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.94
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	1.50	0.44

Mix Name			Application Type	Application Date	Acres
Rabbit Gulch - Browse			Aerial	Jan 2006	190
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Bassia prostrata	Forage Kochia	Beaver UT	1.05	0.71
S	Ericameria nana	Whitestem Rubber Rabbitbrush	Sanpete/Beaver	0.45	0.11

Wildlife Habitat and Vegetation History

Table 17R-13.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 17R-13.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Greasewood	No Encroachment
2008	Greasewood/Annual Forb	No Encroachment
2013	Greasewood/Annual Forb	No Encroachment
2017	Greasewood/Annual Grass	No Encroachment
2020	Greasewood/Annual Forb	No Encroachment
2025	Greasewood/Annual Forb	No Encroachment

Site Notes

There is an oil/gas pad with storage tanks about 200 feet from this site.

Soils

Table 17R-13.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loamy Fine Sand	7.6	77.7	15.1	7.2	0.2	6.9	121.6	0.7	07/29/2005

Site Potential

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semidesert Alkali Loam (Black Greasewood/Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY213UT
States and Transitions	2005-2025 - Annual Grass State: Community Phase 3.1

This study was established in 2005 in conjunction with a range rehabilitation treatment (Table 17R-13.1). Despite treatment, however, the browse component has remained dominated by greasewood (*Sarcobatus vermiculatus*). Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) has also been present, but has contributed much less cover than greasewood with density decreasingsubstantially since 2005 (Table 17R-13.6, Table 17R-13.12, Table 17R-13.13). The introduced annual forb prickly Russian thistle (*Salsola tragus*) and the introduced annual grass species cheatgrass (*Bromus tectorum*) have had significant fluctuations in

cover and abundance, and at times have been considered to be co-dominant vegetation components with greasewood. Perennial grasses have remained rare, and perennial forbs were only observed in 2025 with very low abundance (Table 17R-13.7, Table 17R-13.10, Table 17R-13.11).

Condition of mule deer winter range on this site has remained very poor since 2005. Factors negatively influencing range condition include a lack of preferred browse; a lack of perennial grass and forb cover; and the presence of cheatgrass (Table 17R-13.6, Table 17R-13.7, Table 17R-13.10, Table 17R-13.15). Pellet transect data shows that deer presence has been moderate in most sample years, but it was low in 2013 and 2025. Elk pellet groups were absent in 2013, but presence was low in all other sample years. Preferred browse species have been too rare to accurately assess utilization (Table 17R-13.9, Table 17R-13.13). On-site observations in 2025 noted that there was light utilization (10-20%) on Russian wildrye (*Psathyrostachys juncea*) and crested wheatgrass (*Agropyron cristatum*) and little to no utilization on forb species. There was good seed production despite the presence of chlorotic leaves. Evidence of wildlife in 2025 included trails and tracks throughout the site.

Trend Summary Tables

Table 17R-13.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	0.5	5.9	-	0.3	9.8	-
2008	0.6	3.9	-	0.7	5.5	-
2013	0.2	6.6	-	3.7	8.1	-
2017	0.2	7.0	-	1.0	11.0	-
2020	0.2	11.1	-	0.1	14.2	-
2025	-	10.0	-	-	13.2	-

Table 17R-13.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	63	20	345	-	0.8	1.0	14.5	-
2008	80	34	337	-	0.6	0.7	35.6	-
2013	136	6	374	-	2.5	0.3	20.0	-
2017	380	17	168	-	25.9	0.6	8.8	-
2020	186	10	292	-	8.5	0.5	20.5	-
2025	203	17	305	2	6.4	1.3	21.2	0.0

Table 17R-13.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	28.3	18.3	44.4	0.2	0.1	18.4
2008	25.3	6.3	42.5	0.1	-	40.0
2013	23.6	5.6	50.7	0.0	-	33.5
2017	13.3	8.7	54.0	-	0.3	42.5
2020	14.4	15.2	64.1	0.0	0.5	39.2
2025	22.3	10.4	49.3	-	-	35.1

Table 17R-13.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2005	-	15	7	-	70
2008	-	13	-	-	54
2013	-	6	-	-	3
2017	-	5	-	-	70
2020	-	18	3	-	31
2025	-	12	1	-	37
Year	Days Use Per Acre (ha)				
2005	-	52.3 (129.1)	10.7 (26.5)	-	-
2008	-	24.8 (61.2)	19.4 (48.0)	-	-
2013	-	5.3 (13.2)	-	-	-
2017	-	30.2 (74.5)	0.7 (1.7)	0.6 (1.4)	-
2020	5.1 (12.6)	33.5 (82.8)	2.0 (5.0)	-	-
2025	-	16.1 (39.7)	-	-	-

Table 17R-13.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Psathyrostachys juncea[i] (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency							
2005	-	3	4	5	-	-	12	63
2008	5	3	4	3	-	7	15	78
2013	1	70	-	1	0	1	3	100
2017	-	367	1	1	4	4	7	82
2020	2	175	2	1	5	-	-	15
2025	-	173	-	4	1	1	11	58
year	Average Cover (%)							
2005	-	0.2	0.2	0.5	-	-	0.3	0.6
2008	0.2	0.0	0.0	0.2	-	0.0	0.3	0.6
2013	0.0	2.3	-	0.1	0.1	0.0	0.1	0.2
2017	-	25.2	0.0	0.0	0.4	0.2	0.1	0.7
2020	0.1	8.3	0.0	0.0	0.3	-	-	0.2
2025	-	6.0	-	0.0	0.4	0.7	0.2	0.4

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

Table 17R-13.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Aliciella[a] (aliciella)	Alyssum desertorum[ai] (desert madwort)	Bassia scoparia[ai] (burningbush)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cleome lutea[a] (yellow spiderflower)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha[a] (annual cryptantha)	Descurainia pinnata[a] (western tansymustard)	Epilobium brachycarpum[a] (tall annual willowherb)	Eriogonum cernuum[a] (nodding buckwheat)	Halogeton glomeratus[ai] (saltlover)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Lepidium[a] (pepperweed)	Malcolmia africana[ai] (African mustard)
year	Nested Frequency																
2005	-	18	1	1	153	23	5	41	-	141	-	12	5	-	200	-	40
2008	-	-	9	-	5	1	1	-	-	11	1	4	89	-	113	-	-
2013	-	-	19	11	6	3	9	2	140	8	1	-	44	4	12	6	18
2017	-	1	11	-	-	-	1	-	13	10	-	-	0	1	75	17	-
2020	-	-	19	4	-	-	-	-	-	-	-	-	22	-	-	-	-
2025	3	4	24	8	12	-	-	-	51	24	-	-	2	-	141	5	22
year	Average Cover (%)																
2005	-	0.2	0.0	0.0	2.8	0.1	0.0	0.1	-	2.0	-	0.1	0.0	-	4.8	-	1.2
2008	-	-	0.3	-	0.0	0.0	0.0	-	-	0.1	0.0	0.1	4.8	-	3.8	-	-
2013	-	-	0.1	0.2	0.1	0.0	0.3	0.0	1.0	0.0	0.0	-	1.0	0.0	0.0	0.0	0.4
2017	-	0.0	0.5	-	-	-	0.0	-	0.1	0.9	-	-	0.1	0.0	1.1	0.1	-
2020	-	-	0.9	0.0	-	-	-	-	-	-	-	-	0.5	-	-	-	-
2025	0.0	0.0	0.5	0.2	0.1	-	-	-	0.6	0.1	-	-	0.0	-	4.9	0.1	0.6

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

FORB SPECIES	Mentzelia albicaulis[a] (whitestem blazingstar)	Oenothera pallida[a] (pale evening primrose)	Plantago patagonica[a] (woolly plantain)	Salsola tragus[ai] (prickly Russian thistle)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)
year	Nested Frequency					
2005	9	44	3	74	-	-
2008	31	1	4	275	1	-
2013	45	2	6	310	21	-
2017	-	24	17	18	44	-
2020	-	-	8	256	4	-
2025	20	-	4	207	-	2
year	Average Cover (%)					
2005	0.2	0.8	0.0	2.2	-	-
2008	1.6	0.4	0.0	24.3	0.0	-
2013	0.7	0.1	0.0	16.0	0.1	-
2017	-	0.8	0.0	2.1	3.2	-
2020	-	-	0.4	18.6	0.0	-
2025	0.3	-	0.0	13.8	-	0.0

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

Table 17R-13.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Atriplex confertifolia[p] (shadscale saltbush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)	Sarcobatus vermiculatus (greasewood)	Suaeda moquinii (Mojave seablite)
year	Line Intercept Cover (%)					
2005	0.3	-	-	1.5	8.3	-
2008	0.7	-	-	-	5.5	-
2013	3.7	-	-	-	8.1	-
2017	1	-	-	-	11	-
2020	0.1	-	-	0.9	13.1	0.2
2025	-	-	0.1	0.3	12.5	0.3
year	Quadrat Cover (%)					
2005	0.5	-	-	0.8	5.0	-
2008	0.5	0.1	-	-	3.9	-
2013	0.2	-	-	-	6.6	-
2017	0.2	-	-	-	7.0	-
2020	0.2	-	-	0.0	10.1	1.0
2025	-	-	0.2	0.4	9.2	0.2

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

Table 17R-13.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[P] -- (Wyoming big sagebrush)									
2005	540	5340	63	4	33	0	0	26	87/82
2008	280	-	64	36	0	0	0	0	67/66
2013	260	-	0	100	0	77	0	77	81/102
2017	220	-	18	46	36	36	9	36	87/94
2020	100	-	40	20	40	60	40	40	88/108
2025	-	-	-	-	-	-	-	-	- / -
Atriplex canescens[P] -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	125/195
2025	-	-	-	-	-	-	-	-	-/-
Atriplex confertifolia[P] -- (shadscale saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	110/125
2017	-	-	-	-	-	-	-	-	84/111
2020	-	-	-	-	-	-	-	-	128/197
2025	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	60/70
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	57/70
2020	-	-	-	-	-	-	-	-	47/39
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	24/33
2020	-	-	-	-	-	-	-	-	-/-
2025	160	-	0	100	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2005	820	-	0	88	12	0	0	7	18/72
2008	20	-	0	0	100	0	0	100	- / -
2013	20	-	0	100	0	0	0	0	13/38
2017	40	-	0	100	0	0	0	0	16/47
2020	100	-	40	60	0	0	0	0	17/66
2025	1140	-	0	88	12	0	0	12	- / -
Sarcobatus vermiculatus -- (greasewood)									
2005	720	420	11	36	53	0	0	94	124/157
2008	320	-	13	88	0	0	0	0	84/115
2013	260	-	0	100	0	0	0	8	109/195
2017	680	20	59	41	0	3	0	0	108/179
2020	400	-	20	80	0	0	0	5	135/212
2025	780	-	39	59	3	0	0	3	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Suaeda moquinii -- (Mojave seablite)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	40	-	0	100	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	-/-
2020	40	20	0	100	0	0	0	100	50/56
2025	360	-	0	100	0	0	0	0	- / -

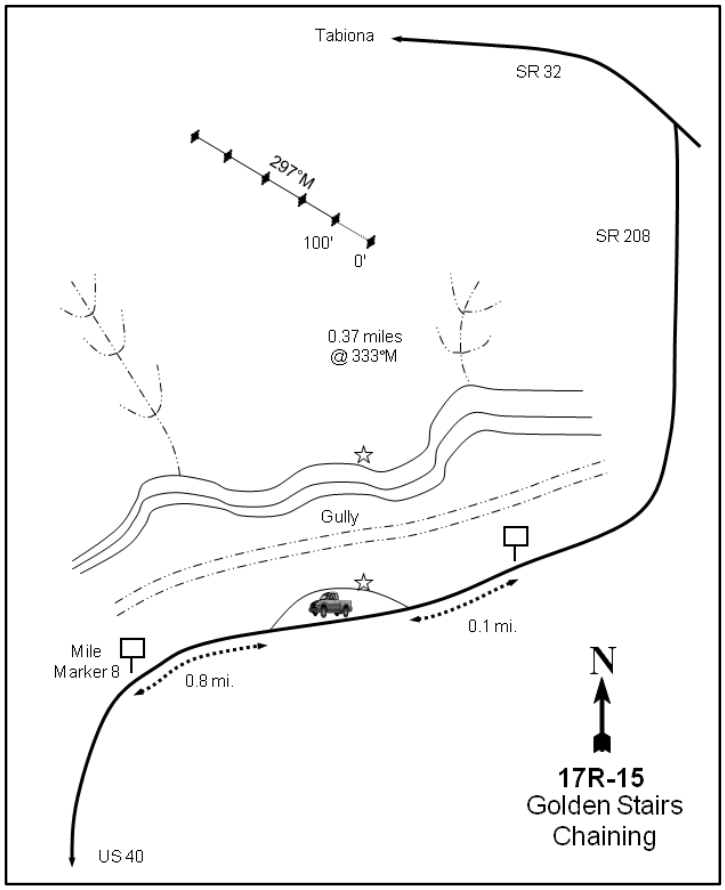
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 17R-13.15 - Deer Desirable Components Index: Semidesert Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2005	0.4	0.0	0.0	2.1	-0.6	0.0	0.0	**1.9**	Very Poor
2008	0.9	0.0	0.0	1.4	-0.5	0.0	0.0	**1.8**	Very Poor
2013	4.6	0.0	0.0	0.7	-1.9	0.0	0.0	**3.4**	Very Poor
2017	1.3	0.0	0.0	1.2	-19.4	0.0	0.0	**-16.9**	Very Poor
2020	0.1	0.0	0.0	1.0	-6.4	0.0	0.0	**-5.3**	Very Poor
2025	0.0	0.0	0.0	2.5	-4.8	0.1	0.0	**-2.2**	Very Poor

GOLDEN STAIRS CHAINING - STUDY NO. 17R-15





Location Information

USGS 7.5 min Map Info	Tabiona NW; Township 2S, Range 7W, Section 08
GPS (0' Stake)	NAD 83 UTM ZONE 12, 526077 East 4464013 North

Transect Information

Browse Tag # (0' Stake)	85
Transect Bearing	297° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From the junction of US 40 and State Route (SR) 208, drive north on SR-208 to mile marker 8. Drive 0.8 miles past the mile marker to a pullout on the left (north) side of the road: park at this pullout (there is a sign just 0.1 miles north of the pullout). From the pullout, walk 0.37 miles at 333 degrees magnetic to the 0-foot stake. There are some steep cliffs to the right and some less steep cliffs on the left: go between the cliffs to a big wash valley. The 0-foot stake is marked with browse tag #85.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,770ft (2,063m)
Aspect	Southeast
Slope	5%
Sample Dates	08/01/2005, 07/31/2008, 06/25/2013, 08/01/2017, 07/27/2020, 07/29/2025

Table 17R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Golden Stairs Range Rehabilitation	52	October-November 2005	170
Seeding - Aerial Before	Golden Stairs Range Rehabilitation	52	September 2005	170
Seeding - Dribbler	Golden Stairs Range Rehabilitation	52	November 2005	170
Seeding - Aerial After	Golden Stairs Range Rehabilitation	52	December 2005	170
Hand Crew - Lop and Scatter	Tabby Mountain Chaining Maintenance	2570	October 2013	2200

Table 17R-15.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Golden Stairs P/J Chaining			Aerial	Sep 2005	190
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.79	0.74
G	Dactylis glomerata	Orchardgrass	Paiute	0.53	0.48
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.05	0.90
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.53	0.49
G	Poa secunda	Canby Bluegrass	Canbar	0.26	0.21
G	Psathyrostachys juncea	Russian Wildrye		1.05	0.95
F	Linum perenne	Blue Flax		0.26	0.23
F	Medicago sativa	Alfalfa	Ladak+	0.53	0.50
F	Onobrychis viciifolia	Sainfoin	Eski	2.11	1.97
F	Sanguisorba minor	Small Burnet	Delar	1.05	0.99
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	1.05	0.51

Mix Name			Application Type	Application Date	Acres
Golden Stairs P/J Chaining Dribbler			Dribbler	Nov 2005	190
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.13	0.06
S	Cercocarpus montanus	True Mountain Mahogany		0.13	0.10
S	Ephedra viridis	Green Ephedra		0.13	0.05
S	Purshia tridentata	Bitterbrush	Ada/Boise ID	0.13	0.11

Mix Name			Application Type	Application Date	Acres
Golden Stair - Browse			Aerial	Dec 2005	190
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.05	0.31
S	Bassia prostrata	Forage Kochia	Millard UT	1.05	0.67

Wildlife Habitat and Vegetation History

Table 17R-15.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 17R-15.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon-Juniper	Phase III
2008	Perennial Grass	Phase I
2013	Perennial Grass	Phase I
2017	Perennial Grass	Early Phase I
2020	Perennial Grass	Early Phase I
2025	Perennial Grass	Phase I

Site Notes

An estimated 55 acres of scattered islands of twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were left unchained within the treatment area to provide wildlife with protective cover. The study transect ran through an untreated island of thetreatment, and as such, parts of belts two and three were not treated.

Soils

Table 17R-15.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.6	57.0	27.4	15.6	2.0	3.5	89.6	0.8	08/01/2005

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC310UT
States and Transitions	2005 - State Undefined: Community Phase Undefined 2008-2025 - Native Perennial Bunchgrass State: Community Phase 5.1

When the study was established in 2005, the plant community on this site was encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase III of woodland succession; very few browse species were present. Following the chaining and seeding treatment and a subsequent lop and scatter treatment (Table 17R-15.1), much of the tree cover was removed and the browse component increased in both diversity and cover. The site has remained in Early Phase I or Phase I of woodland succession in all years following the original treatment (Photos, Table 17R-15.4, Table 17R-15.12, Table 17R-15.13, Table 17R-15.14). A mixture of native and introduced perennial grasses, including thickspike wheatgrass (*Elymus lanceolatus*) and crested wheatgrass (*Agropyron cristatum*), has been the dominant vegetation component in all post-treatment sample years. However, bluebunch wheatgrass (*Pseudoroegneria spicata*) has increased in dominance and was co-dominant with crested wheatgrass in 2025. Annual grasses have remained rare. In addition, perennial and annual forbs have not been abundant in any sample year (Table 17R-15.7, Table 17R-15.10, Table 17R-15.11).

Condition of mule deer winter range on this site has ranged between very poor and very poor-poor since 2005. Winter range condition is considered to be very poor-poor as of 2025. Factors negatively influencing range condition include a lack of preferred browse cover and recruitment; a lack of perennial forb cover; and the presence of cheatgrass (Table 17R-15.6, Table 17R-15.7, Table 17R-15.10, Table 17R-15.13, Table 17R-15.15). Pellet transect data shows that deer presence has been highly variable. Pellet groups were high in 2017 and 2020 but moderate in 2025. Elk presence has had similar variability, but it has been considered to be moderate in most years. During the 2024/25 winter season the area had occasional occurrences of collared elk (Wildlife Migration Initiative). Native preferred browse species have been rare on this site, so forage kochia (*Bassia prostrata*) has been introduced as supplemental browse (Table 17R-15.2). Forage kochia hedging was heavy in 2020 and 2025 (Table 17R-15.9, Table 17R-15.13). On-site observations in 2025 noted that there was little to no utilization of the herbaceous community. These observations also remarked that primary production was good as indicated by good leaf and seed production, and good leader growth on browse species (Photos). Evidence of wildlife in 2025 included pellet groups throughout the site, and pinyon jays and song birds were heard nearby.

Trend Summary Tables

Table 17R-15.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	0.1	1.3	12.6	1.0	1.6	23.5
2008	0.5	1.4	3.0	1.2	1.6	3.3
2013	0.5	0.9	3.8	1.1	2.3	5.7
2017	1.6	2.6	0.9	1.9	4.0	2.4
2020	1.3	2.8	3.1	2.6	2.9	3.1
2025	2.1	2.5	3.1	2.8	3.1	4.6

Table 17R-15.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	18	261	174	52	0.3	9.1	2.4	0.7
2008	70	290	99	66	0.6	15.6	1.6	1.5
2013	61	367	22	101	0.1	12.2	0.1	1.2
2017	38	376	147	83	0.6	18.9	1.5	1.3
2020	53	349	4	42	0.7	24.2	0.0	0.3
2025	14	351	65	18	0.1	20.0	0.4	0.1

Table 17R-15.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	40.2	6.6	39.0	1.6	1.3	22.9
2008	38.8	2.4	47.7	1.2	2.0	20.3
2013	29.5	0.1	54.0	0.5	3.1	25.1
2017	32.0	0.4	43.8	1.8	2.6	29.8
2020	27.6	2.9	51.4	6.4	4.2	33.5
2025	31.1	1.0	47.9	0.7	2.3	28.8

Table 17R-15.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2005	-	6	22	-	56
2008	-	20	15	-	30
2013	-	5	12	2	14
2017	-	10	29	3	29
2020	-	26	14	-	13
2025	-	30	25	-	14
Year	Days Use Per Acre (ha)				
2005	4.4 (10.8)	13.4 (33.1)	41.5 (102.6)	-	-
2008	-	30.8 (76.1)	26.8 (66.2)	-	-
2013	-	8.1 (19.9)	63.7 (157.3)	1.7 (4.3)	-
2017	-	142.1 (350.9)	14.1 (34.8)	-	-
2020	-	45.6 (112.6)	25.5 (62.9)	1.7 (4.3)	-
2025	-	36.8 (91.0)	38.9 (96.0)	-	-

Table 17R-15.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus inermis[i] (smooth brome)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency													
2005	26	-	-	18	8	-	-	-	211	68	41	30	-	-
2008	77	47	1	70	17	-	-	23	154	57	51	20	1	-
2013	108	102	1	61	10	2	1	151	32	135	14	20	16	11
2017	65	85	-	38	8	6	20	258	18	88	7	5	12	2
2020	51	84	3	53	17	-	19	214	11	45	3	29	12	27
2025	25	136	-	14	-	-	-	47	25	76	-	49	50	147
year	Average Cover (%)													
2005	0.5	-	-	0.3	0.6	-	-	-	6.2	0.9	0.2	0.7	-	-
2008	2.6	0.9	0.1	0.6	1.0	-	-	0.7	7.3	1.9	0.7	0.3	0.1	-
2013	1.8	2.6	0.0	0.1	0.2	0.0	0.0	3.0	0.7	3.2	0.2	0.1	0.3	0.1
2017	2.9	3.5	-	0.6	0.2	0.1	0.4	7.9	0.3	3.0	0.1	0.0	0.6	0.1
2020	2.3	6.9	0.0	0.7	0.6	-	1.3	9.4	1.3	1.2	0.0	0.3	0.2	0.7
2025	1.0	5.5	-	0.1	-	-	-	1.5	1.0	2.5	-	0.7	2.0	5.8

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

Table 17R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Arabis (rockcress)	Artemisia dracunculus (tarragon)	Astragalus chamaeleuce var. chamaeleuce (cicada milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Eriogonum cernuum[a] (nodding buckwheat)	Gilia inconspicua[a] (shy gilia)	Ipomopsis congesta (ballhead ipomopsis)
year	Nested Frequency																
2005	-	7	-	-	0	-	-	4	15	10	96	20	55	36	13	-	11
2008	-	3	-	-	-	1	-	1	-	20	6	9	8	4	24	-	13
2013	10	16	1	-	2	-	3	1	-	-	-	26	12	-	-	-	1
2017	41	7	-	2	1	-	-	5	2	-	-	20	78	17	3	4	-
2020	-	1	-	-	7	-	-	3	1	-	3	22	-	-	-	-	-
2025	21	3	-	-	1	-	-	5	1	-	-	10	14	3	2	-	1
year	Average Cover (%)																
2005	-	0.2	-	-	0.0	-	-	0.1	0.5	0.2	0.4	0.1	0.5	0.2	0.0	-	0.1
2008	-	0.0	-	-	-	0.0	-	0.0	-	0.3	0.0	0.7	0.1	0.0	0.2	-	0.1
2013	0.0	0.0	0.0	-	0.1	-	0.0	0.0	-	-	-	0.4	0.0	-	-	-	0.0
2017	0.2	0.0	-	0.0	0.0	-	-	0.1	0.0	-	-	0.2	0.9	0.1	0.0	0.0	-
2020	-	0.0	-	-	0.0	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-	-
2025	0.0	0.0	-	-	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	Lappula occidentalis[a] (flatspine stickseed)	Lepidium montanum[a] (mountain pepperweed)	Linum perenne[i] (blue flax)	Lygodesmia grandiflora (largeflower skeletonplant)	Machaeranthera canescens (hoary tansyaster)	Packera multilobata (lobeleaf groundsel)	Physaria (twinpod)	Polygonum douglasii[a] (Douglas' knotweed)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Townsendia (Townsend daisy)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency												
2005	25	2	-	-	-	-	3	19	-	-	12	-	-
2008	53	4	20	9	-	-	-	7	6	2	17	2	-
2013	2	-	52	-	-	1	-	-	-	-	7	11	-
2017	25	3	39	-	0	1	-	-	-	1	13	10	1
2020	-	-	5	-	-	-	-	-	-	-	-	6	-
2025	29	1	-	-	-	-	-	-	-	-	-	-	-
year	Average Cover (%)												
2005	0.2	0.3	-	-	-	-	0.0	0.1	-	-	0.2	-	-
2008	0.6	0.0	0.4	0.0	-	-	-	0.0	0.5	0.0	0.3	0.0	-
2013	0.0	-	0.6	-	-	0.0	-	-	-	-	0.0	0.0	-
2017	0.2	0.0	0.8	-	0.0	0.0	-	-	-	0.1	0.0	0.0	0.0
2020	-	-	0.0	-	-	-	-	-	-	-	-	0.0	-
2025	0.2	0.1	-	-	-	-	-	-	-	-	-	-	-

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

Table 17R-15.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Atriplex canescens[p] (fourwing saltbush)	Bassia prostrata[pi] (forage kochia)	Cercocarpus montanus[p] (alderleaf mountain mahogany)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum corymbosum (crispleaf buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia polyacantha (plains pricklypear)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)									
2005	-	-	1	-	1.2	-	12.8	-	0.4	10.7
2008	0.3	0.5	0.4	-	0.9	0.5	0.4	0.1	0.1	2.9
2013	-	0.8	0.3	-	2.1	-	1	-	0.2	4.7
2017	-	1.9	-	-	3.1	0.5	0.4	-	0.4	2
2020	0.3	1.9	0.4	0.6	1.1	0.5	0.6	0	0.7	2.5
2025	-	1.8	1	-	1.9	0.4	0.7	-	0.8	3.9
year	Quadrat Cover (%)									
2005	-	-	0.1	-	0.4	0.1	3.2	-	0.7	9.4
2008	0.0	0.5	0.0	-	0.6	0.4	1.0	0.0	0.4	2.0
2013	-	0.5	0.0	-	0.5	0.1	1.5	0.0	0.3	2.3
2017	-	1.4	0.2	-	1.3	0.4	0.2	0.0	0.9	0.8
2020	0.0	1.3	0.0	0.0	1.1	0.7	0.2	0.0	1.1	3.0
2025	0.0	2.1	0.0	-	0.9	0.2	0.4	-	1.4	2.7

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

Table 17R-15.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2005	-	-	-	-	-	-	-	-	53/58
2008	20	-	0	100	0	0	0	0	31/15
2013	40	-	0	100	0	0	0	0	31/38
2017	40	-	0	100	0	0	100	0	33/48
2020	20	-	100	0	0	0	100	0	45/55
2025	-	-	-	-	-	-	-	-	-/-
Atriplex canescens[p] -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	1020	260	28	73	0	0	0	0	41/49
2013	-	-	-	-	-	-	-	-	64/78
2017	-	-	-	-	-	-	-	-	89/101
2020	20	-	0	100	0	0	0	0	96/127
2025	20	-	0	100	0	0	0	0	- / -
Bassia prostrata[pi] -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	1100	180	6	93	2	7	0	0	23/29
2013	4820	300	68	32	0	24	0	0	20/24
2017	5820	20	1	99	0	0	0	0	14/21
2020	3040	20	45	55	0	22	55	0	15/28
2025	4280	120	18	75	7	7	55	8	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2005	60	-	0	0	100	0	100	33	111/92
2008	40	-	0	0	100	100	0	0	88/85
2013	40	-	0	100	0	50	0	0	86/92
2017	60	-	0	100	0	0	0	33	84/94
2020	40	-	0	100	0	0	100	50	74/82
2025	40	-	0	100	0	0	100	0	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	- / -
2017	60	-	0	100	0	0	0	0	18/31
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Eriogonum corymbosum -- (crispleaf buckwheat)									
2005	260	80	0	92	8	31	0	8	45/69
2008	980	200	18	82	0	0	0	0	36/55
2013	1880	40	54	46	0	2	0	0	30/38
2017	1540	-	23	77	0	0	0	0	37/58
2020	1080	40	52	46	2	4	0	2	35/50
2025	880	-	7	84	9	0	0	11	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	30/30
2017	-	-	-	-	-	-	-	-	38/54
2020	-	-	-	-	-	-	-	-	48/80
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2005	480	20	4	96	0	0	0	0	15/19
2008	760	20	0	97	3	0	0	0	18/27
2013	1360	60	84	16	0	0	0	0	14/17
2017	920	100	0	76	24	0	0	24	17/23
2020	1420	-	42	58	0	0	0	0	15/20
2025	2160	20	11	86	3	0	0	3	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2005	120	20	67	0	33	0	0	33	- / -
2008	60	-	33	67	0	0	0	0	- / -
2013	60	20	100	0	0	0	0	0	- / -
2017	80	-	75	25	0	0	0	0	- / -
2020	80	20	100	0	0	0	0	0	- / -
2025	60	20	67	33	0	0	0	0	- / -
Krascheninnikovia lanata[p] -- (winterfat)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	34/52
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Linanthus pungens -- (granite prickly phlox)									
2005	300	-	0	93	7	13	0	0	8/15
2008	160	-	0	100	0	0	0	0	11/15
2013	80	-	50	50	0	0	0	0	12/23
2017	200	-	0	100	0	0	0	0	9/18
2020	40	-	0	100	0	0	0	0	10/14
2025	160	-	0	100	0	0	0	75	- / -
Opuntia polyacantha -- (plains pricklypear)									
2005	1380	40	12	78	10	0	0	1	12/33
2008	1020	60	6	57	37	0	2	10	11/30
2013	1060	-	9	89	2	0	0	0	11/19
2017	1080	20	2	96	2	0	0	2	11/25
2020	1240	-	16	82	2	0	0	0	12/27
2025	1000	-	0	82	18	0	0	18	- / -
Pediocactus -- (pincushion cactus)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	5/7
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2005	260	60	69	31	0	0	0	0	- / -
2008	200	40	70	30	0	0	0	30	- / -
2013	180	20	89	11	0	0	0	0	- / -
2017	60	20	0	100	0	0	0	0	- / -
2020	100	-	100	0	0	0	0	0	- / -
2025	100	-	60	40	0	0	0	0	- / -

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

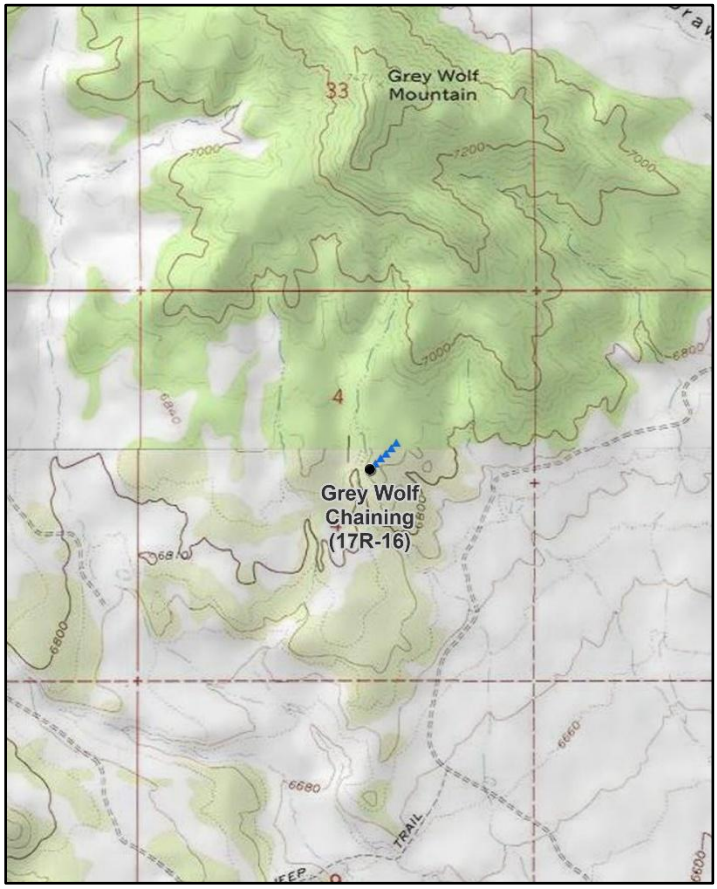
Table 17R-15.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

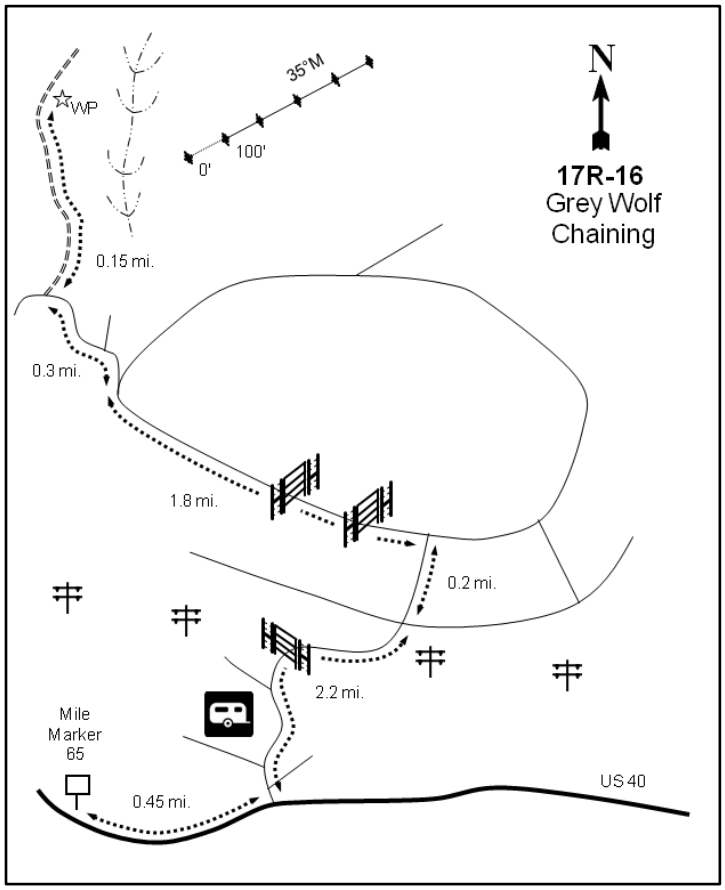
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2005	91	11	33	17	6	33	25.4
2008	76	31	15	15	8	31	26.1
2013	54	8	67	-	-	25	20.9
2017	63	29	36	14	7	14	13.6
2020	70	7	64	7	7	14	19.5
2025	59	8	50	8	-	33	19.3
Pinus edulis (twoneedle pinyon)							
2005	251	10	35	25	10	20	12.7
2008	133	10	45	40	-	5	4.2
2013	70	12	53	29	6	-	5.1
2017	55	7	67	20	-	7	7.1
2020	48	7	71	7	7	7	8.2
2025	58	7	27	47	7	13	8.2

Table 17R-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
2005	1.5	0.0	0.0	18.1	-0.2	1.4	0.0	**20.8**	Very Poor
2008	1.7	0.0	0.0	30.0	-0.4	3.1	0.0	**34.4**	Very Poor-Poor
2013	1.7	0.0	0.0	24.4	-0.1	2.3	0.0	**28.3**	Very Poor
2017	2.9	0.0	0.0	30.0	-0.4	2.7	0.0	**35.2**	Very Poor-Poor
2020	3.8	0.0	0.0	30.0	-0.5	0.6	0.0	**33.9**	Very Poor-Poor
2025	4.2	0.0	0.0	30.0	-0.1	0.2	0.0	**34.3**	Very Poor-Poor

GREY WOLF CHAINING - STUDY NO. 17R-16





Location Information	
USGS 7.5 min Map Info	Fruitland NE; Township 3S, Range 8W, Section 04
GPS (0' Stake)	NAD 83 UTM ZONE 12, 517755 East 4455435 North

Transect Information	
Browse Tag # (0' Stake)	86
Transect Bearing	40° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From Fruitland, drive east on US-40 to mile marker 65. Continue 0.45 miles past the mile marker to a road on the left (north). Turn left onto this road and drive 2.2 miles past several trailers and through a gate to a fork. Stay left at the fork and drive 0.2 miles to another fork, passing through an exclosure. Take the left fork and proceed for 1.8 miles through a gate to a road on the left (west) side. Turn left and continue for 0.3 miles to a two-track on the right (which may be hard to see). Turn right (north) onto the two-track and drive for 0.15 miles to the witness post on the right (east) side of the road. From the witness post, walk 520 feet at 75 degrees magnetic to the 0-foot stake which is marked with browse tag #86.

Site Information	
Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,800ft (2,073m)
Aspect	Southwest
Slope	2-4%
Sample Dates	08/02/2005, 08/04/2008, 06/24/2013, 08/01/2017, 07/28/2020, 07/31/2025

Table 17R-16.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Grey Wolf Mountain Rehabilitation	93	October-November 2005	463
Seeding - Aerial Before	Grey Wolf Mountain Rehabilitation	93	October 2005	463
Seeding - Dribbler	Grey Wolf Mountain Rehabilitation	93	November 2005	463
Seeding - Aerial After	Grey Wolf Mountain Rehabilitation	93	February 2006	463
Hand Crew - Lop and Scatter	Tabby Mountain Chaining Maintenance	2570	October 2013	2200

Table 17R-16.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Grey Wolf Mtn. P/J Chaining			Aerial	Oct 2005	775
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.97	0.77
G	Dactylis glomerata	Orchardgrass	Paiute	0.15	0.13
G	Dactylis glomerata	Orchardgrass	Paiute	0.33	0.30
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.03	0.88
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.52	0.48
G	Poa secunda	Canby Bluegrass	Canbar	0.26	0.21
G	Psathyrostachys juncea	Russian Wildrye		0.97	0.87
F	Linum perenne	Blue Flax		0.26	0.22
F	Medicago sativa	Alfalfa	Ladak+	0.52	0.49
F	Onobrychis viciifolia	Sainfoin	Eski	2.39	2.24
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.89
S	Atriplex canescens	Fourwing Saltbush	Emery UT	0.52	0.27
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.39	0.19

Mix Name			Application Type	Application Date	Acres
Grey Wolf Mtn. P/J Chaining - Dribbler			Dribbler	Nov 2005	775
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.06	0.03
S	Cercocarpus montanus	True Mountain Mahogany		0.03	0.02
S	Ephedra viridis	Green Ephedra		0.06	0.03
S	Purshia tridentata	Bitterbrush	Ada/Boise ID	0.03	0.03

Mix Name			Application Type	Application Date	Acres
Grey Wolf - Browse			Aerial	Feb 2006	610
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.29
S	Bassia prostrata	Forage Kochia	Millard UT	1.00	0.63

Wildlife Habitat and Vegetation History

Table 17R-16.3 - 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

Table 17R-16.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon-Juniper	Phase III
2008	Perennial Grass	Early Phase I
2013	Perennial Grass	Early Phase I
2017	Perennial Grass	Early Phase I
2020	Perennial Grass	Early Phase I
2025	Perennial Grass	Early Phase I

Site Notes

Scattered islands of twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were left unchained within the treatment area to provide wildlife with protective cover. The treatment area is near the Lower Red Creek sage-grouse lek.

Soils

Table 17R-16.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.6	49.4	32.7	17.8	2.4	8.4	115.2	0.4	08/02/2005

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC310UT
States and Transitions	2005 - State Undefined: Community Phase Undefined 2008-2025 - Introduced Grassland State: Community Phase 6.1

This site was in Phase III of woodland succession upon study establishment in 2005 and was being encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*); shrubs were rare. However, diversity and cover of the browse component increased following treatment (Table 17R-16.1), with forage kochia (*Bassia prostrata*) and alderleaf mountain mahogany (*Cercocarpus montanus*) providing most of the cover (Photos, Table 17R-16.4, Table 17R-16.12, Table 17R-16.13, Table 17R-16.14). The herbaceous understory was sparse prior to treatment. However, perennial grasses -- particularly Indian ricegrass (*Achnatherum hymenoides*), thickspike wheatgrass (*Elymus lanceolatus*), and Russian wildrye (*Psathrostachys juncea*) -- have generally increased in cover and have been the dominant vegetation component in all post-treatment sample years. However, Indian ricegrass has decreased in both frequency and cover since 2017. Forbs have remained diverse and, although they initially increased following treatment, have since decreased in both cover and frequency (Table 17R-16.7, Table 17R-16.10, Table 17R-16.11). The community remains in Early Phase I of woodland succession as of 2025. However, tree infilling appears to be active with cover and density increasing following each pinyon and juniper-targeted treatment in 2005 and 2013 (Table 17R-16.1, Table 17R-16.6, Table 17R-16.12, Table 17R-16.13).

Condition of mule deer winter range on this site has ranged between very poor and poor since 2005; winter range condition is considered very poor as of 2025. Factors negatively influencing range condition include a lack preferred browse cover and recruitment, and a lack of perennial forb cover (Table 17R-16.6, Table 17R-16.7, Table 17R-16.13, Table 17R-16.15). Pellet transect data shows that deer presence has been low in most sample years, but it was moderate in 2025. Elk presence was high in 2013 but moderate for nearly all other sample years. During the 2024/25 winter season the area had frequent occurrences of collared elk (Wildlife Migration Initiative). Native preferred browse species have been rare on this site, so forage kochia has been introduced as supplemental browse (Table 17R-16.2). Forage kochia hedging has been light in each year it has been sampled (Table 17R-16.9, Table 17R-16.13). On-site observations in 2025 noted that there was little to no utilization of the herbaceous community. These observations also remarked that primary production was fair as indicated by good seed production, but that stunted growth was observed (Photos).

Trend Summary Tables

Table 17R-16.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	0.3	2.2	0.7	1.8	1.3	21.5
2008	1.5	4.2	0.0	3.6	3.3	-
2013	2.8	1.3	0.4	4.2	2.6	0.5
2017	3.1	4.8	0.0	5.0	4.1	0.1
2020	3.7	6.1	0.0	4.6	4.6	0.2
2025	2.8	4.9	0.2	2.9	4.3	0.2

Table 17R-16.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	-	147	126	73	-	2.3	1.9	1.3
2008	4	221	140	77	0.0	14.2	3.0	2.0
2013	-	324	41	63	-	13.0	0.4	1.0
2017	-	315	58	36	-	19.8	1.0	1.2
2020	0	288	6	24	0.0	18.9	0.1	0.5
2025	-	264	10	39	-	13.3	0.0	0.8

Table 17R-16.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	51.8	2.7	38.3	1.9	1.9	8.0
2008	42.1	-	36.6	1.4	1.6	30.0
2013	42.7	-	41.8	0.1	1.6	24.8
2017	43.3	-	32.9	1.1	1.4	27.1
2020	38.9	-	39.8	0.6	1.7	30.6
2025	48.7	0.0	38.5	1.1	3.1	21.6

Table 17R-16.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Owl	Rabbit
	Quadrat Frequency					
2005	-	-	12	22	-	56
2008	2	-	18	16	-	34
2013	1	-	7	27	-	23
2017	-	-	13	9	-	38
2020	-	-	25	16	-	23
2025	1	-	20	35	-	18
Year	Days Use Per Acre (ha)					
2005	-	-	6.7 (16.6)	34.9 (86.1)	8.7 (21.5)*	-
2008	-	-	5.3 (13.2)	12.8 (31.5)	-	-
2013	2.9 (7.2)	-	6.7 (16.6)	73.0 (180.4)	-	-
2017	-	-	26.2 (64.6)	30.2 (74.5)	-	-
2020	-	8.7 (21.5)*	14.7 (36.4)	38.2 (94.4)	-	-
2025	0.7 (1.8)	-	11.4 (28.1)	36.8 (91.0)	-	-

*Pellets per acre (ha)

Table 17R-16.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency													
2005	88	-	-	6	-	-	-	61	21	2	10	-	3	-
2008	77	44	4	-	3	3	87	3	23	5	5	43	13	-
2013	129	49	-	-	2	17	158	2	35	3	-	79	2	10
2017	108	8	-	3	-	18	150	-	41	16	1	103	1	7
2020	77	32	0	3	-	4	72	5	49	-	10	106	44	-
2025	49	19	-	3	-	-	130	-	22	-	12	115	1	-
year	Average Cover (%)													
2005	0.8	-	-	0.0	-	-	-	0.9	0.5	0.0	0.1	-	0.0	-
2008	2.6	1.3	0.0	-	0.0	0.1	5.4	0.2	1.3	0.0	0.1	2.5	0.7	-
2013	5.3	0.7	-	-	0.0	0.2	3.0	0.1	0.9	0.0	-	2.6	0.0	0.1
2017	6.4	0.1	-	0.0	-	0.3	4.5	-	2.1	0.1	0.0	6.3	0.0	0.1
2020	4.8	1.0	0.0	0.0	-	0.0	2.0	0.0	1.8	-	0.1	7.6	1.6	-
2025	2.2	0.6	-	0.1	-	-	2.8	-	0.8	-	0.4	6.2	0.1	-

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

Table 17R-16.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Arenaria (sandwort)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus miser (timber milkvetch)	Astragalus utahensis (Utah milkvetch)	Caulanthus crassicaulis[a] (thickstem wild cabbage)	Chaetopappa ericoides (rose heath)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Chorispora tenella[ai] (crossflower)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua[a] (shy gilia)
year	Nested Frequency																
2005	-	6	-	-	4	-	-	20	40	-	71	21	-	11	17	3	8
2008	-	6	-	-	1	7	-	14	25	3	-	9	1	10	24	3	18
2013	-	5	0	-	-	-	-	-	2	-	-	14	-	-	-	2	-
2017	-	3	0	-	-	3	1	-	1	-	2	2	-	20	-	-	-
2020	1	-	-	-	-	-	1	-	-	0	-	2	-	4	-	1	-
2025	-	2	-	1	-	-	5	-	-	-	-	6	-	2	-	3	-
year	Average Cover (%)																
2005	-	0.0	-	-	0.0	-	-	0.5	0.3	-	0.5	0.1	-	0.1	0.0	0.1	0.0
2008	-	0.1	-	-	0.0	0.2	-	0.2	0.1	0.0	-	0.4	0.0	0.0	0.3	0.2	0.1
2013	-	0.0	0.0	-	-	-	-	-	0.0	-	-	0.0	-	-	-	0.0	-
2017	-	0.0	0.0	-	-	0.0	0.0	-	0.0	-	0.0	0.0	-	0.6	-	-	-
2020	0.0	-	-	-	-	-	0.0	-	-	0.0	-	0.0	-	0.1	-	0.0	-
2025	-	0.1	-	0.0	-	-	0.0	-	-	-	-	0.0	-	0.0	-	0.0	-

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

FORB SPECIES	Hedysarum boreale (Utah sweetvetch)	Ipomopsis congesta (ballhead ipomopsis)	Lappula occidentalis[a] (flatspine stickseed)	Lepidium montanum[a] (mountain pepperweed)	Linum perenne[i] (blue flax)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Onobrychis viciifolia[i] (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox hoodii (spiny phlox)	Physaria (twinpod)	Polygonum douglasii[a] (Douglas' knotweed)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sisymbrium altissimum[ai] (tall tumblemustard)
year	Nested Frequency																
2005	13	-	10	12	-	-	-	-	12	1	13	-	1	-	-	7	-
2008	7	0	13	7	15	-	3	5	13	5	9	2	1	67	15	9	1
2013	14	-	2	-	16	-	1	-	-	4	3	4	-	41	3	8	-
2017	9	-	21	4	-	-	3	-	3	-	6	-	5	11	-	5	-
2020	-	-	2	0	-	2	4	9	-	3	4	-	-	-	-	-	-
2025	-	-	8	2	-	-	3	10	-	1	8	2	-	-	-	-	-
year	Average Cover (%)																
2005	0.8	-	0.0	0.2	-	-	-	-	0.1	0.0	0.1	-	0.0	-	-	0.0	-
2008	0.3	0.0	0.1	0.0	0.2	-	0.0	0.2	0.1	0.0	0.1	0.0	0.0	1.5	0.5	0.0	0.0
2013	0.5	-	0.0	-	0.1	-	0.0	-	-	0.0	0.1	0.0	-	0.4	0.0	0.0	-
2017	0.7	-	0.3	0.0	-	-	0.1	-	0.0	-	0.0	-	0.0	0.1	-	0.0	-
2020	-	-	0.0	0.0	-	0.0	0.0	0.4	-	0.0	0.0	-	-	-	-	-	-
2025	-	-	0.0	0.0	-	-	0.0	0.5	-	0.0	0.0	0.0	-	-	-	-	-

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

FORB SPECIES	Thelypodium integrifolium[a] (entireleaved thelypody)	Townsendia (Townsend daisy)	Tragopogon dubius[ai] (yellow salsify)	Vicia americana (American vetch)
year	Nested Frequency			
2005	18	-	-	-
2008	2	1	-	-
2013	-	-	-	3
2017	-	-	1	5
2020	-	-	-	0
2025	-	-	-	-
year	Average Cover (%)			
2005	0.2	-	-	-
2008	0.4	0.0	-	-
2013	-	-	-	0.1
2017	-	-	0.0	0.4
2020	-	-	-	0.0
2025	-	-	-	-

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

Table 17R-16.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Bassia prostrata[pi] (forage kochia)	Cercocarpus montanus[p] (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi (Parry's rabbitbrush)	Eriogonum corymbosum (crispleaf buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)											
2005	-	-	-	1.8	-	-	-	1.1	0.2	14.6	-	6.9
2008	0	0.2	3	0.4	-	-	-	2.4	0.9	-	-	-
2013	0.6	0.8	1.5	1.3	-	0.2	-	2.4	-	0.5	-	-
2017	0.7	0.9	2.1	1.3	0	0.2	0.1	3.2	0.6	0.1	-	-
2020	0.8	1	1.6	1.2	-	0.3	-	3.2	1.1	0.1	-	0.1
2025	0.6	1	0.5	0.8	-	-	0.4	3.4	0.5	0.2	-	0
year	Quadrat Cover (%)											
2005	-	-	-	0.3	-	-	-	1.6	0.6	0.7	0.0	0.0
2008	0.0	0.0	1.4	0.0	0.0	-	-	3.4	0.8	-	-	0.0
2013	0.0	0.6	1.2	1.0	-	0.0	-	1.1	0.0	0.4	0.1	0.0
2017	0.1	0.2	1.7	1.0	0.1	0.4	0.1	3.4	0.7	0.0	0.0	-
2020	0.1	1.1	1.7	0.8	-	0.6	-	4.1	1.5	0.0	-	0.0
2025	0.2	1.0	0.9	0.7	-	0.1	0.1	4.3	0.4	0.1	-	0.0

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

Table 17R-16.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[P] -- (black sagebrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	15/36
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	33/68
2025	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[P] -- (mountain big sagebrush)									
2005	-	-	-	-	-	-	-	-	30/32
2008	100	20	100	0	0	0	0	0	27/39
2013	240	-	17	83	0	25	58	8	30/37
2017	200	-	0	100	0	20	0	0	43/57
2020	180	-	0	100	0	56	22	0	56/71
2025	240	-	33	50	17	17	42	17	- / -
Atriplex canescens[P] -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	80	-	50	25	25	0	0	0	80/69
2013	40	-	0	50	50	0	0	50	79/89
2017	60	-	0	100	0	0	0	0	75/85
2020	40	-	0	50	50	50	0	50	89/110
2025	40	-	0	50	50	100	0	50	- / -
Bassia prostrata[Pi] -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	1740	100	26	74	0	2	1	0	44/51
2013	3060	120	24	77	0	9	21	3	16/26
2017	2640	20	1	99	0	0	0	0	19/32
2020	1700	40	6	93	1	0	0	5	17/25
2025	1400	40	10	89	1	4	13	4	- / -
Cercocarpus montanus[P] -- (alderleaf mountain mahogany)									
2005	200	-	0	100	0	20	80	0	95/99
2008	120	-	17	67	17	33	50	0	68/80
2013	140	-	29	71	0	0	57	0	66/78
2017	100	-	0	100	0	0	40	20	76/84
2020	100	-	0	100	0	40	20	0	78/91
2025	100	-	40	60	0	20	40	20	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2005	20	-	0	100	0	0	0	0	16/27
2008	40	60	0	100	0	0	0	0	22/34
2013	20	-	0	100	0	0	0	0	47/73
2017	160	-	0	100	0	0	0	0	14/26
2020	20	-	0	100	0	0	0	0	- / -
2025	20	-	0	100	0	0	0	0	- / -
Eriogonum corymbosum -- (crispleaf buckwheat)									
2005	1300	480	35	62	3	22	11	0	38/47
2008	3560	980	38	57	5	0	0	0	29/45
2013	3760	100	50	51	0	32	9	0	32/43
2017	3700	-	16	84	0	4	1	0	32/40
2020	2640	20	14	83	3	33	5	10	37/46
2025	2740	80	8	91	1	26	4	1	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	120	-	67	33	0	67	17	0	24/34
2017	-	-	-	-	-	-	-	-	61/115
2020	220	-	0	100	0	0	0	0	29/40
2025	-	-	-	-	-	-	-	-	-/-
Ericameria parryi -- (Parry's rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	200	-	0	100	0	0	0	0	19/36
2020	20	-	0	100	0	0	0	0	- / -
2025	200	-	10	90	0	0	0	50	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2005	880	-	7	89	5	0	0	0	15/20
2008	720	-	8	92	0	0	0	0	20/35
2013	220	-	73	27	0	0	0	0	13/17
2017	800	100	3	98	0	0	0	0	15/21
2020	1780	120	25	75	0	0	0	0	17/27
2025	1480	-	0	100	0	0	0	1	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2005	40	-	50	50	0	0	0	0	- / -
2008	20	20	100	0	0	0	0	0	- / -
2013	60	-	67	33	0	0	0	0	- / -
2017	60	80	67	0	33	0	0	0	- / -
2020	120	-	100	0	0	0	0	0	- / -
2025	60	-	100	0	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2005	-	-	-	-	-	-	-	-	7/13
2008	-	-	-	-	-	-	-	-	10/21
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	13/11
2025	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2005	80	-	0	75	25	0	0	25	9/39
2008	40	-	100	0	0	0	0	0	8/20
2013	20	-	0	100	0	0	0	0	9/18
2017	20	-	0	100	0	0	0	0	12/36
2020	-	-	-	-	-	-	-	-	13/30
2025	40	-	0	100	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2005	120	40	67	33	0	0	0	0	- / -
2008	-	40	0	0	0	0	0	0	- / -
2013	40	40	100	0	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	-/-
2020	20	-	100	0	0	0	0	0	- / -
2025	20	20	100	0	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Purshia tridentata[p] -- (antelope bitterbrush)									
2005	-	-	-	-	-	-	-	-	24/155
2008	-	-	-	-	-	-	-	-	42/36
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Sarcobatus vermiculatus -- (greasewood)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	20	-	0	100	0	0	0	0	- / -

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

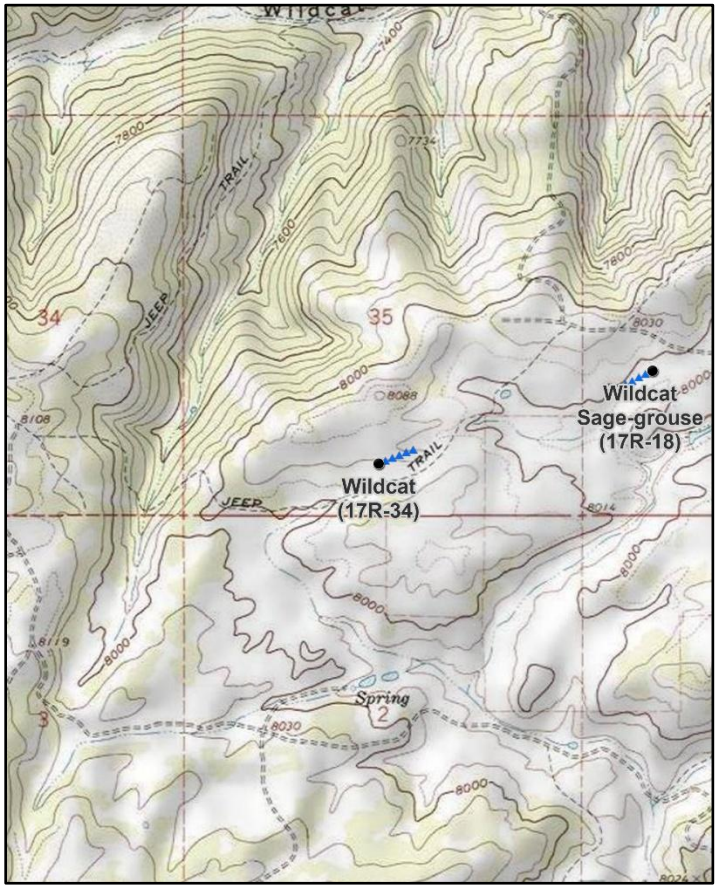
Table 17R-16.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

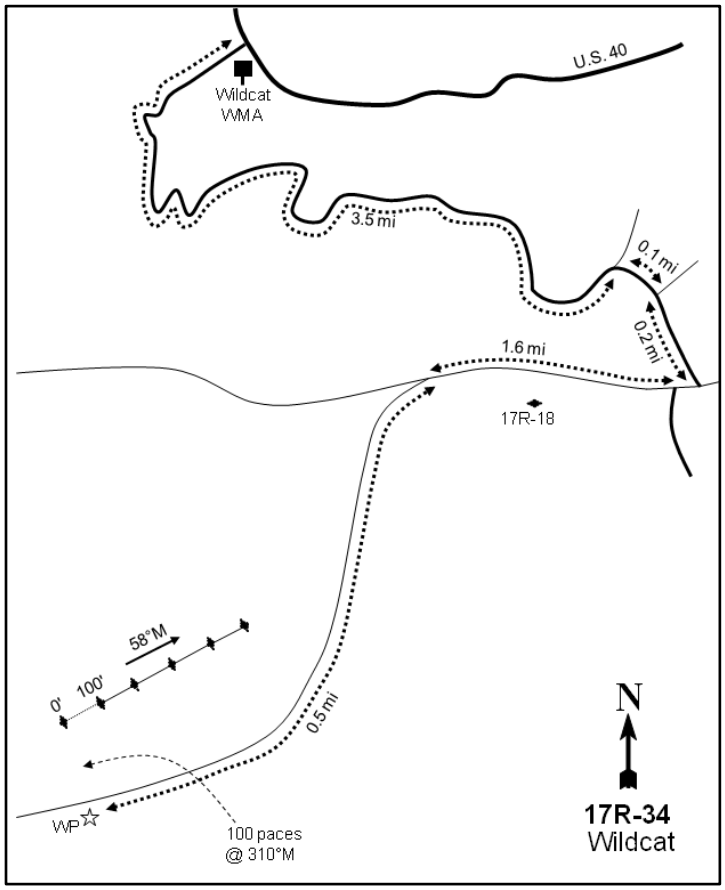
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2005	70	5	-	5	21	68	62.3
2008	5	-	100	-	-	-	31.0
2013	20	45	45	-	-	9	14.2
2017	20	83	17	-	-	-	1.2
2020	8	83	17	-	-	-	1.8
2025	26	45	55	-	-	-	2.3
Pinus edulis (twoneedle pinyon)							
2005	48	20	7	13	7	53	23.3
2008	8	17	83	-	-	-	3.7
2013	16	75	13	13	-	-	3.5
2017	1	-	100	-	-	-	2.0
2020	3	33	67	-	-	-	2.7
2025	3	50	-	50	-	-	2.0

Table 17R-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	2.7	0.0	0.0	4.7	0.0	2.5	0.0	**9.9**	Very Poor
2008	5.4	0.0	0.0	28.4	0.0	3.9	0.0	**37.7**	Poor
2013	6.0	0.0	0.0	26.0	0.0	2.0	0.0	**34.0**	Very Poor-Poor
2017	7.1	0.0	0.0	30.0	0.0	2.5	0.0	**39.6**	Poor
2020	6.5	0.0	0.0	30.0	0.0	1.0	0.0	**37.5**	Poor
2025	4.0	0.0	0.0	26.6	0.0	1.6	0.0	**32.2**	Very Poor

WILDCAT - STUDY NO. 17R-34





Location Information	
USGS 7.5 min Map Info	Deep Creek Canyon SW; Township 3S, Range 10W, Section 35
GPS (0' Stake)	NAD 83 UTM ZONE 12, 501550 East 4446688 North

Transect Information	
Browse Tag # (0' Stake)	9169
Transect Bearing	58° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

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

Site Information	
Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	8,031ft (2,448m)
Aspect	Southeast
Slope	1-3%
Sample Dates	07/11/2012, 08/04/2015, 07/20/2019, 07/28/2025

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

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

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2012	Mountain Big Sagebrush/Bitterbrush/Perennial Grass	No Encroachment
2015	Perennial Grass/Yellow Rabbitbrush/Bitterbrush	No Encroachment
2019	Perennial Grass/Yellow Rabbitbrush/Bitterbrush	No Encroachment
2025	Perennial Grass/Yellow Rabbitbrush-Bitterbrush	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	20 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	2012 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase 2.1 2015-2019 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase Undefined 2025 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase 2.1

When the site was established in 2012, the plant community was in a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*)-dominated state; the site was harrowed in the fall of 2012 (Table 17R-34.1). Following treatment, perennial grass cover increased between 2015 to 2019, with much of that cover provided by needle and thread (*Hesperostipa comata*), squirreltail (*Elymus elymoides*), western wheatgrass (*Pascopyrum smithii*), and Letterman's needlegrass (*Achnatherum lettermanii*), among others. However, overall perennial grass cover decreased in 2025, a trend driven by decreases in squirreltail, and Kentucky and Sandberg bluegrass (*Poa pratensis* and *P. secunda*, respectively) (Table 17R-34.10). Post-treatment forb cover has shown a similar trend to perennial grasses; forb cover increased between 2015 and 2019 but decreased in 2025. More specifically, the decrease in forb cover during the most recent sample year was driven by ballhead sandwort (*Arenaria congesta*) and the cumulative disappearance of many less prominent forbs (Table 17R-34.11). The harrow treatment reduced the cover of antelope bitterbrush (*Purshia tridentata*) and mountain big sagebrush. Yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) increased and was the dominant shrub in 2015 and 2019 with bitterbrush as a subordinate species. However, bitterbrush cover increased notably in 2025 and it was a co-dominant shrub in that year (Table 17R-34.12, Table 17R-34.13).

Condition of mule deer winter range on this site has improved from good to good-excellent between 2012 to 2025, respectively. Factors negatively influencing range condition include reduced preferred browse recruitment (Table 17R-34.13, Table 17R-34.15). Pellet transect data shows that deer and elk presence was low between 2015 and 2025. During the 2024/25 winter season the area had occurrences of collared elk (Wildlife Migration Initiative). There was a notable presence of sage-grouse between 2012 and 2019, but sage-grouse pellets were nearly absent in 2025. Mountain big sagebrush has decreased in population density since 2012. Sagebrush utilization has followed a similarly decreasing trend with only 24% of plants sampled in density strips being moderately to heavily hedged in 2025. Bitterbrush utilization has remained elevated, with between 68% and 77% of the population being moderately to heavily hedged over the duration of the study (Table 17R-34.9, Table 17R-34.13). On-site observations in 2025 noted that there was little to no utilization of the herbaceous community, and that vigor was good as indicated by good seed production by both the herbaceous and browse communities (Photos).

Trend Summary Tables

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

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	27.9	4.5	-	40.4	6.6	-
2015	11.2	10.1	-	14.6	12.7	-
2019	14.1	17.6	-	15.0	19.1	-
2025	21.1	14.3	-	24.2	17.6	-

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

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	-	443	51	257	-	21.6	0.2	8.6
2015	-	453	92	246	-	29.4	0.5	8.4
2019	-	416	316	328	-	29.8	8.4	13.4
2025	-	434	216	232	-	24.0	3.0	7.4

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

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	11.3	1.9	62.6	-	0.0	63.8
2015	9.5	0.1	40.9	0.0	-	61.1
2019	8.9	0.3	59.9	0.1	0.0	59.6
2025	10.7	0.2	58.1	0.0	0.0	60.8

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

Year	Coyote	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Shiras Moose	Rabbit
	Quadrat Frequency					
2012	-	8	-	-	3	-
2015	-	7	3	11	-	2
2019	-	3	10	12	-	3
2025	-	12	3	1	-	4
Year	Days Use Per Acre (ha)					
2012	8.7 (21.5)*	35.5 (87.7)	2.7 (6.6)	156.8 (387.3)*	3.9 (9.6)	-
2015	-	13.4 (33.1)	10.7 (26.5)	322.3 (796.2)*	-	-
2019	-	18.1 (44.7)	12.1 (29.8)	139.4 (344.3)*	-	-
2025	-	14.7 (36.4)	10.0 (24.8)	-	-	-

*Pellets per acre (ha)

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

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus porteri (Porter brome)	Carex (sedge)	Carex obtusata (obtuse sedge)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency														
2012	69	4	53	120	-	-	52	117	158	8	96	-	68	17	76
2015	41	10	43	106	-	-	211	141	149	31	85	-	78	50	54
2019	78	33	12	-	65	26	136	-	70	86	62	159	83	75	56
2025	94	9	2	-	57	12	15	202	75	60	25	1	155	12	20
year	Average Cover (%)														
2012	1.3	0.0	1.2	1.4	-	-	0.9	1.0	7.4	0.2	3.5	-	2.3	0.9	1.5
2015	0.7	0.2	1.2	3.3	-	-	7.5	1.0	5.0	1.3	1.6	-	1.4	3.9	2.3
2019	3.1	1.7	0.3	-	1.2	0.7	3.9	-	2.5	4.4	1.4	3.8	2.7	2.7	1.4
2025	3.8	0.6	0.1	-	0.2	0.1	0.5	3.8	4.4	3.8	0.4	0.0	5.7	0.3	0.3

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

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

FORB SPECIES	Agoseris glauca (pale agoseris)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria dimorpha (low pussytoes)	Antennaria microphylla (littleleaf pussytoes)	Arabis (rockcress)	Arenaria congesta (ballhead sandwort)	Artemisia dracunculus (tarragon)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora[a] (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Descurainia pinnata[a] (western tansymustard)	Draba cuneifolia[a] (wedgeleaf draba)
year	Nested Frequency																
2012	-	19	64	-	2	184	-	11	-	-	3	-	-	-	-	-	17
2015	-	18	90	-	1	173	1	11	-	3	4	-	14	1	-	7	7
2019	18	13	13	47	-	148	-	37	5	-	-	-	134	11	9	-	4
2025	4	2	4	46	5	101	-	27	-	7	-	2	107	2	-	-	-
year	Average Cover (%)																
2012	-	0.1	2.3	-	0.0	5.1	-	0.0	-	-	0.0	-	-	-	-	-	0.0
2015	-	0.1	2.9	-	0.0	3.6	0.0	0.0	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0
2019	0.1	0.2	0.1	0.9	-	4.3	-	0.8	0.0	-	-	-	2.5	0.0	0.1	-	0.0
2025	0.0	0.0	0.0	1.0	0.0	2.9	-	0.3	-	0.2	-	0.0	0.4	0.0	-	-	-

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

FORB SPECIES	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gentiana (gentian)	Linum lewisii (Lewis flax)	Lithophragma tenellum (slender woodland-star)	Lomatium (desertparsley)	Lupinus caespitosus var. utahensis (Utah lupine)	Machaeranthera canescens (hoary tansyaster)	Mertensia (bluebells)	Orthocarpus tolmiei[a] (Tolmie's owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon humilis (low beardtongue)	Penstemon watsonii (Watson's penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Potentilla hippiana (woolly cinquefoil)
year	Nested Frequency																
2012	12	9	3	5	-	-	-	-	-	17	-	-	61	2	-	6	3
2015	17	-	2	19	-	-	-	18	-	52	1	2	55	2	2	8	3
2019	13	40	-	7	6	18	2	1	19	206	-	-	61	123	147	4	-
2025	26	-	-	3	-	-	1	-	5	79	3	2	63	23	108	1	-
year	Average Cover (%)																
2012	0.2	0.0	0.0	0.1	-	-	-	-	-	0.1	-	-	0.6	0.0	-	0.0	0.0
2015	0.3	-	0.0	0.6	-	-	-	0.1	-	0.3	0.0	0.0	0.6	0.0	0.0	0.1	0.0
2019	0.8	0.5	-	0.2	0.0	0.2	0.0	0.0	0.1	3.8	-	-	1.8	2.0	0.6	0.1	-
2025	1.6	-	-	0.0	-	-	0.0	-	0.0	1.6	0.0	0.0	1.3	0.0	0.9	0.0	-

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

FORB SPECIES	Senecio integerrimus[a] (lambstongue ragwort)	Silene drummondii (Drummond's campion)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius[ai] (yellow salsify)	Trifolium gymnocarpon (hollyleaf clover)
year	Nested Frequency					
2012	-	5	17	5	-	28
2015	-	1	-	25	6	16
2019	26	-	2	102	3	72
2025	27	-	-	-	-	28
year	Average Cover (%)					
2012	-	0.0	0.1	0.0	-	0.1
2015	-	0.0	-	0.1	0.0	0.0
2019	0.8	-	0.0	1.2	0.0	0.5
2025	0.1	-	-	-	-	0.1

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

Table 17R-34.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Eriogonum microthecum[p] (slender buckwheat)	Mahonia repens (creeping barberry)	Purshia tridentata[p] (antelope bitterbrush)	Symphoricarpos oreophilus[p] (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)						
2012	21	6.1	-	0.4	19.1	0.3	0.1
2015	5.3	12.1	-	0.4	9.2	0.1	0.2
2019	4.6	17.6	-	1.2	10.1	0.3	0.3
2025	7.4	16.8	-	0.5	16.7	0.1	0.3
year	Quadrat Cover (%)						
2012	13.1	4.3	-	0.1	14.8	0.1	0.1
2015	4.1	9.8	0.4	0.2	6.6	0.1	0.1
2019	4.3	16.8	-	0.4	9.4	0.4	0.4
2025	7.4	13.6	-	0.5	13.7	0.0	0.2

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

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

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2012	-	-	-	-	-	-	-	-	102/87
2015	-	-	-	-	-	-	-	-	59/54
2019	-	-	-	-	-	-	-	-	71/74
2025	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	5440	-	3	72	25	25	2	32	55/76
2015	2160	40	7	66	28	44	15	59	41/64
2019	1800	-	6	91	3	30	1	3	42/66
2025	2160	1100	19	75	6	7	16	6	- / -
Bassia prostrata[pi] -- (forage kochia)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	47/38
2019	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2012	6960	60	1	96	3	0	0	8	21/26
2015	9000	-	5	95	0	0	0	1	22/36
2019	9740	-	5	95	0	0	0	0	22/36
2025	8000	-	5	95	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	100	0	0	- / -
2019	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-

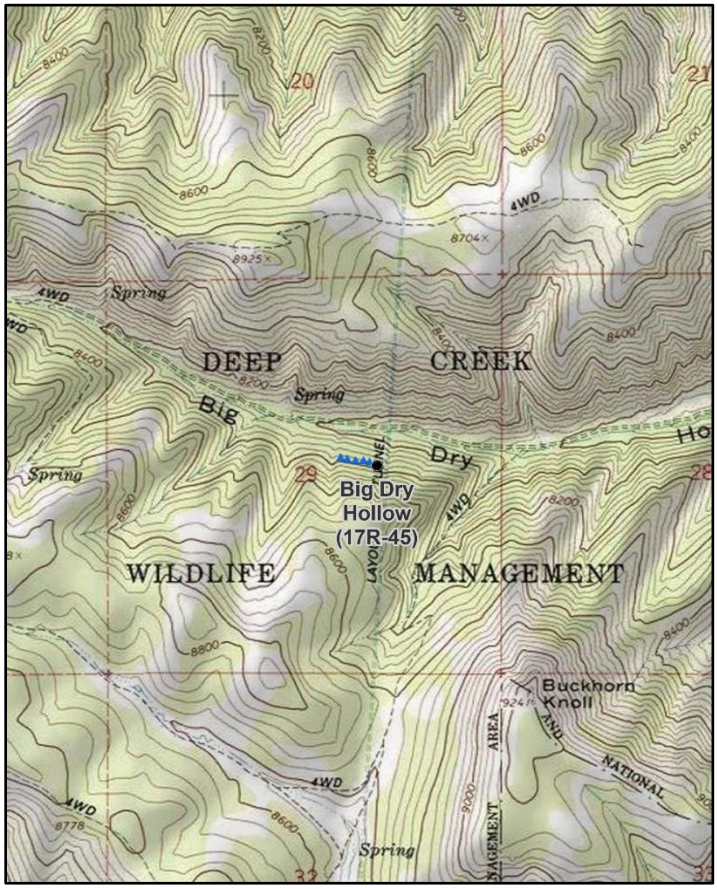
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Mahonia repens -- (creeping barberry)									
2012	3840	-	0	100	0	0	0	0	7/7
2015	2960	-	4	96	0	0	0	0	8/9
2019	2000	-	0	100	0	0	1	0	9/10
2025	4000	-	60	40	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2012	2300	20	1	61	38	57	16	24	56/119
2015	1920	20	16	84	0	48	20	1	42/81
2019	1480	-	4	95	1	31	46	1	42/81
2025	2020	200	4	94	2	32	38	2	- / -
Ribes cereum[p] -- (wax currant)									
2012	20	-	0	100	0	0	0	0	57/83
2015	80	-	0	100	0	0	0	0	109/276
2019	-	-	-	-	-	-	-	-	92/148
2025	-	-	-	-	-	-	-	-	-/-
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2012	60	-	0	100	0	0	0	0	48/53
2015	40	-	50	0	50	100	0	0	43/62
2019	60	-	33	67	0	0	0	0	53/81
2025	60	-	0	100	0	0	67	0	- / -
Tetradymia canescens -- (spineless horsebrush)									
2012	240	-	0	92	8	0	0	0	21/18
2015	280	-	29	64	7	14	0	14	25/33
2019	300	-	0	93	7	0	0	7	23/31
2025	260	-	0	100	0	0	0	0	- / -

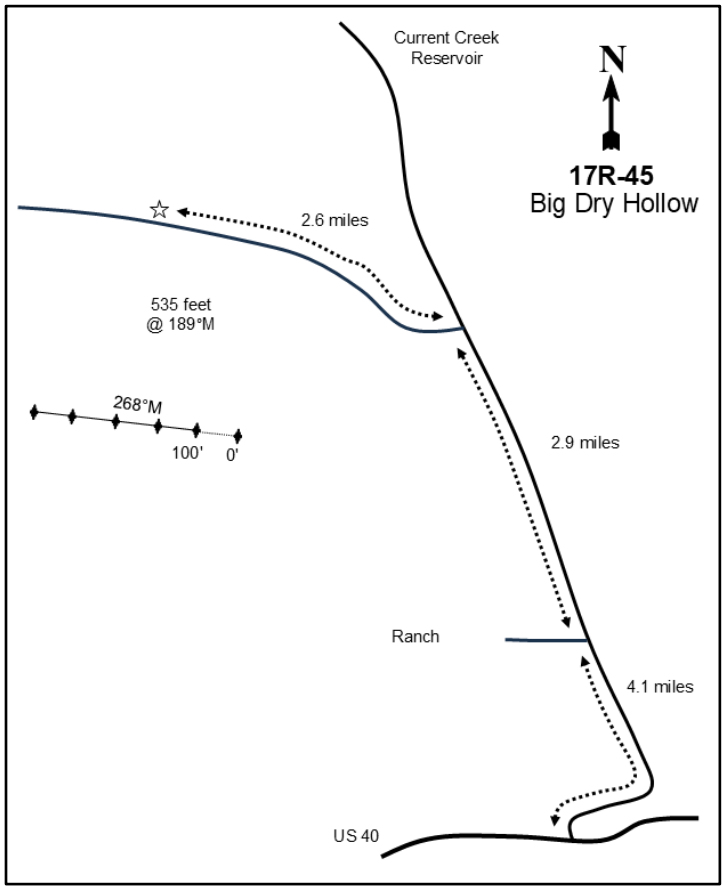
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 17R-34.15 - Deer Desirable Components Index: Mountain Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2012	30.0	5.7	1.1	30.0	0.0	10.0	0.0	**76.8**	Good
2015	20.5	11.9	6.3	30.0	0.0	10.0	0.0	**78.7**	Good
2019	21.2	14.4	2.6	30.0	0.0	10.0	0.0	**78.2**	Good
2025	30.0	14.1	4.3	30.0	0.0	10.0	0.0	**88.4**	Good-Excellent

BIG DRY HOLLOW - STUDY NO. 17R-45





Location Information

USGS 7.5 min Map Info	Jimmies Point SE; Township 2S, Range 10W, Section 29
GPS (0' Stake)	NAD 83 UTM ZONE 12, 497030 East 4458616 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	268° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the intersection of US-40 and S 46000 W in Fruitland, drive west on US-40 for 3.1 miles, then turn right (north) onto Currant Creek Road. Travel north on Currant Creek Road for approximately 3.2 miles, then turn left (west) onto Dry Hollow Road. Drive for 2.7 miles and park; there is no witness post. From the road, hike roughly 500 feet up the steep slope to the south to the 0-foot baseline stake.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	8,200ft (2,499m)
Aspect	North
Slope	55%
Sample Dates	08/04/2025

Table 17R-45.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed	Currant Creek WMA Prescribed Burn (Proposed)	7065	Fall 2025	825

Wildlife Habitat and Vegetation History

Table 17R-45.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	spring/fall
Shiras Moose	crucial	winter

Table 17R-45.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2025	Douglas Fir	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	24 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.

Upon establishment in 2025, this study sampled a plant community dominated by Douglas-fir (*Pseudotsuga menziesii*) with quaking aspen (*Populus tremuloides*) as a minor component. Preferred browse species of interest had high understory densities and included Wolf's currant (*Ribes wolfii*), Saskatoon serviceberry (*Amelanchier alnifolia*), Woods' rose (*Rosa woodsii*), and western and mountain snowberry (*Symphoricarpos* spp.); these populations were comprised of mature, vigorous individuals (Table 17R-45.4, Table 17R-45.12, Table 17R-45.13, Table 17R-45.13a, Table 17R-45.14). The herbaceous understory was largely sparse in both diversity and abundance, but native perennial forbs contributed a majority of the herbaceous cover (Table 17R-45.7, Table 17R-45.10, Table 17R-45.11). Without the occurrence of a major tree-removing disturbance this site would likely continue to exist as a Douglas-fir community with a depauperate understory. However, a prescribed fire treatment is scheduled to take place in the fall of 2025 (Table 17R-45.1): this will likely remove most of the trees and amplify and diversify the shrub and herbaceous components with the intention to improve summer habitat for wildlife.

The diverse and abundant preferred browse community present on this site as of 2025 could provide adequate forage for summering mule deer, though the herbaceous community is lacking in abundance. Pellet transect data indicates that deer and elk presence was low in 2025. There is a diverse group of preferred browse species available to wildlife as of the most recent sample year that includes currant species (*Ribes* spp.), Saskatoon serviceberry, Woods' rose, thimbleberry (*Rubus parviflorus*), and snowberry species, all of which are similarly preferred by wildlife. As an aggregate, these species provide an abundant resource; however, these species received only light utilization in 2025 (Table 17R-45.9, Table 17R-45.10, Table 17R-45.11, Table 17R-45.13). On-site observations state that there was light utilization (10-20%) on a few forb species during the most recent sample year (2025) (Photos). Also noted was that the herbaceous and browse communities showed signs of stress (likely related to drought) as evidenced by stunted growth, restricted flowering and seed production, and chlorotic leaves.

Trend Summary Tables

Table 17R-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
2025	12.7	11.1	2.5	21.3	17.3	64.8

Table 17R-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
2025	-	27	-	93	-	0.5	-	2.5

Table 17R-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
2025	0.9	1.2	78.1	1.0	8.1	26.0

Table 17R-45.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2025	4	-	2
Year	Days Use Per Acre (ha)		
2025	3.4 (8.3)	2.0 (5.0)	-

Table 17R-45.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus porteri (Porter brome)	Carex geyeri (Geyer's sedge)	Carex hoodii (Hood's sedge)
year	Nested Frequency		
2025	5	12	10
year	Average Cover (%)		
2025	0.0	0.3	0.2

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

Table 17R-45.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Castilleja rhexiifolia (splitleaf Indian paintbrush)	Clematis ligusticifolia (western white clematis)	Eucephalus elegans (elegant aster)	Fragaria vesca (woodland strawberry)	Maianthemum racemosum (feathery false lily of the valley)	Orthilia secunda (sidebells wintergreen)	Thalictrum occidentale (western meadow-rue)	Viola adunca (hookedspur violet)
year	Nested Frequency							
2025	2	18	7	6	15	4	26	33
year	Average Cover (%)							
2025	0.2	1.2	0.0	0.0	0.5	0.0	0.3	0.3

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

Table 17R-45.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier alnifolia[p] (Saskatoon serviceberry)	Lonicera utahensis (Utah honeysuckle)	Mahonia repens (creeping barberry)	Paxistima myrsinites (Oregon boxleaf)	Physocarpus alternans (dwarf ninebark)	Populus tremuloides[tp] (quaking aspen)	Pseudotsuga menziesii[t] (Douglas-fir)	Ribes cereum[p] (wax currant)	Ribes wolfii[p] (Wolf's currant)	Rosa woodsii[p] (Woods' rose)	Rubus idaeus (American red raspberry)	Rubus parviflorus (thimbleberry)	Salix scouleriana (Scouler's willow)	Shepherdia canadensis (russet buffaloberry)	Sorbus scopulina (Greene's mountain ash)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)															
2025	1.9	1.8	13.5	0.4	0.3	4.3	60.5	0.3	14.7	1.2	0	0.4	0.1	0.5	0.3	3.2
year	Quadrat Cover (%)															
2025	1.5	1.7	8.1	0.4	0.0	0.3	2.2	0.2	8.5	0.7	0.0	0.6	0.0	0.3	0.0	1.7

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

Table 17R-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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier alnifolia[p] -- (Saskatoon serviceberry)									
2025	1180	80	17	83	0	3	0	0	- / -
Lonicera utahensis -- (Utah honeysuckle)									
2025	540	-	4	96	0	0	4	0	- / -
Mahonia repens -- (creeping barberry)									
2025	23960	880	2	98	0	0	0	0	- / -
Paxistima myrsinites -- (Oregon boxleaf)									
2025	620	20	13	87	0	0	0	0	- / -
Physocarpus alternans -- (dwarf ninebark)									
2025	20	-	0	100	0	0	0	0	- / -
Pseudotsuga menziesii[t] -- (Douglas-fir)									
2025	1020	140	43	45	12	0	0	12	- / -
Ribes cereum[p] -- (wax currant)									
2025	620	-	0	100	0	0	0	0	- / -
Ribes wolfii[p] -- (Wolf's currant)									
2025	4540	-	0	98	2	0	0	2	- / -
Rosa woodsii[p] -- (Woods' rose)									
2025	1820	40	17	82	1	0	0	1	- / -
Rubus parviflorus -- (thimbleberry)									
2025	400	-	0	100	0	0	0	20	- / -
Shepherdia canadensis -- (russet buffaloberry)									
2025	180	-	11	89	0	0	0	22	- / -
Sorbus scopulina -- (Greene's mountain ash)									
2025	80	-	50	50	0	0	0	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2025	1540	-	1	94	5	4	1	5	- / -

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

Table 17R-45.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

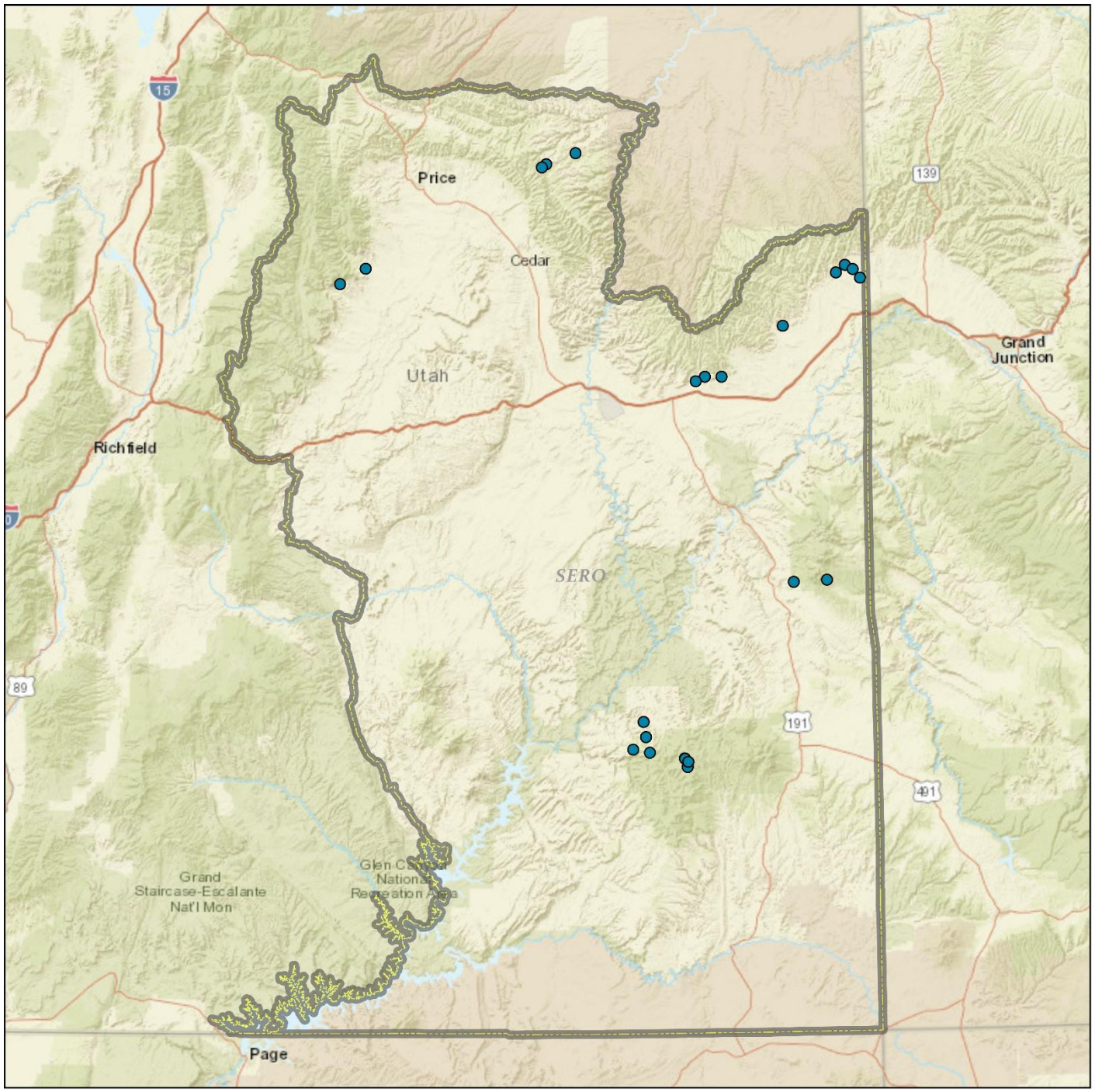
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2025	280	21	64	-	14	9	36	0

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

Table 17R-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' (%)	
Populus tremuloides (quaking aspen)							
2025	163	-	40	10	-	50	8.7
Pseudotsuga menziesii (Douglas-fir)							
2025	1270	35	10	10	-	45	9.1

SOUTHEASTERN REGION



0 10 20 40 60 80 100 120 140 160 Miles

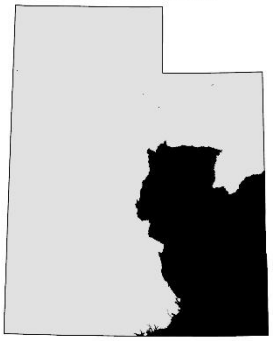
Study Locations

- SERO WRI Study Sites

Administrative Boundaries

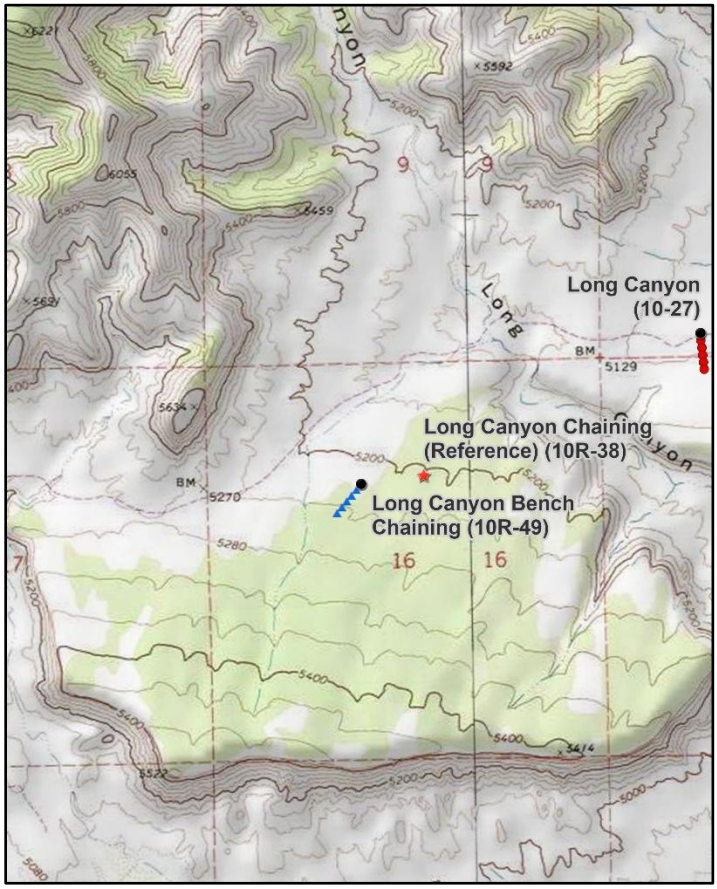
- Southeastern Region

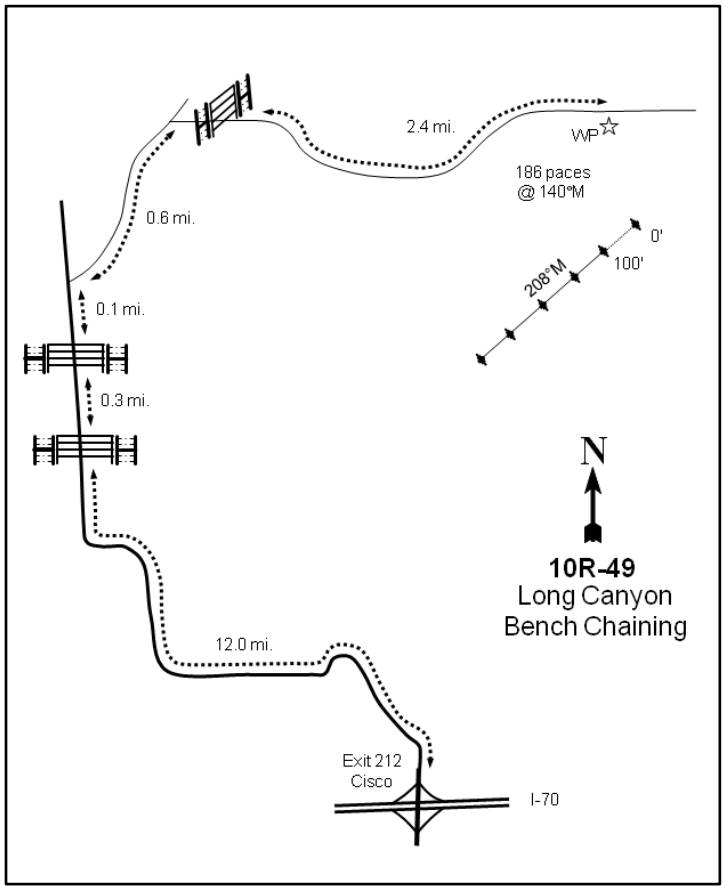
Area of Interest



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

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





Location Information

USGS 7.5 min Map Info	Flume Canyon SE; Township 19S, Range 23E, Section 16
GPS (0' Stake)	NAD 83 UTM ZONE 12, 639911 East 4335426 North

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	CISCO MESA
Elevation	5,156ft (1,572m)
Aspect	North
Slope	5%
Sample Dates	06/02/2010, 06/27/2013, 08/20/2018, 06/02/2025

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	South Bookcliffs Phase 8 (Cottonwood)	5290	January-February 2021	787
Chaining - Two-Way Smooth	Long Canyon Bench Pinyon-Juniper Chaining	29	October 2006	305
Seeding - Aerial After	Long Canyon Bench Pinyon-Juniper Chaining	29	October 2006	305
Herbicide - Imazapic	Long Canyon Bench Pinyon-Juniper Chaining	29	November 2006	305

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

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

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2010	Mountain Big Sagebrush	Early Phase I
2013	Mountain Big Sagebrush	Early Phase I
2018	Mountain Big Sagebrush	Early Phase I
2025	Mountain Big Sagebrush	Early Phase I

Site Notes

Study 10R-38 was established in 2006 prior to treatment, but the study area wasn't included in the final treatment. As a result, study 10R-38 can now be used as a pretreatment reference area. Deer in this area rely heavily on private hay meadows and a narrow sagebrush strip near the mouth of Cottonwood Canyon for winter range (WRI Database, 2025).

Site Potential

981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2010-2025 - Seeded State: Community Phase 5.2

Since study establishment in 2010, the plant community on this site has been dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 10R-49.12, Table 10R-49.13). The herbaceous understory has remained dominated by a mixture of native and introduced perennial grass species throughout the duration of the study with the introduced and seeded species (Table 10R-49.2) crested wheatgrass (*Agropyron cristatum*) contributing a majority of the cover. Cheatgrass (*Bromus tectorum*) has been observed in all years, but has decreased in cover and abundance over time. Forbs have been moderately diverse, but they have remained rare in comparison with grasses (Table 10R-49.7, Table 10R-49.10, Table 10R-49.11). Extant Utah juniper (*Juniperus osteosperma*) trees have been observed in all years (Table 10R-49.14) and suggest that infilling may be possible in future sample years. However, the study site has remained in Early Phase I of woodland succession and a lop and scatter treatment took place in 2021 (Table 10R-49.1, Table 10R-49.4), indicating that infilling is likely not an immediate concern.

Condition of mule deer winter range on this site has ranged between poor and good since 2010; winter range condition was considered to be poor in 2025. Negative factors contributing to this poor condition include a lack of cover and recruitment of young within the preferred browse community; reduced perennial grass and forb cover; and the amount of annual grass cover (Table 10R-49.6, Table 10R-49.7, Table 10R-49.13, Table 10R-49.15). Pellet transect data indicates that deer and elk presence have ranged between low and moderate since site establishment; deer presence was at its highest in 2025. Mountain big sagebrush utilization has been high since 2018; it was estimated that over 90% of sagebrush plants sampled in density strips were moderately to heavily hedged in 2018 and 2025 (Table 10R-49.9, Table 10R-49.13). On-site observations for 2025 noted heavy utilization (>40%) on crested wheatgrass and Indian ricegrass (*Achnatherum hymenoides*). Drought may be having an impact on the shrub community as evidenced by poor seed production.

Trend Summary Tables

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

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2010	7.1	1.4	0.5	5.5	1.8	0.2
2013	5.9	0.2	0.8	5.4	0.2	0.3
2018	6.6	3.0	0.5	5.5	2.3	0.4
2025	4.0	1.2	0.4	3.2	1.1	0.1

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

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2010	289	135	300	72	4.1	10.5	3.3	1.1
2013	84	169	68	11	0.4	11.4	1.1	0.1
2018	9	264	0	5	0.1	17.7	0.1	0.0
2025	42	204	3	2	0.1	6.7	0.0	0.0

Table 10R-49.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2010	29.3	0.7	41.4	5.4	3.3	29.1
2013	40.7	0.0	37.5	1.9	3.5	22.3
2018	43.1	0.1	44.8	5.5	5.3	26.1
2025	43.6	0.2	41.6	7.6	4.9	11.6

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

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2010	-	16	7	-	13
2013	-	27	14	-	13
2018	-	35	9	1	34
2025	-	29	26	-	23
Year	Days Use Per Acre (ha)				
2010	-	22.1 (54.6)	4.0 (9.9)	-	-
2013	-	18.7 (46.3)	38.9 (96.0)	-	-
2018	4.4 (10.8)	11.4 (28.1)	29.5 (72.8)	-	-
2025	-	26.8 (66.2)	8.7 (21.5)	3.5 (8.6)	-

Table 10R-49.10 - 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)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Psathyrostachys juncea[i] (Russian wildrye)	Thinopyrum intermedium[i] (intermediate wheatgrass)	Thinopyrum ponticum[i] (tall wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency									
2010	27	83	288	3	0	15	7	17	-	12
2013	38	115	84	17	6	15	6	6	3	-
2018	33	209	9	5	6	19	14	2	8	-
2025	6	200	36	-	0	-	-	-	4	7
year	Average Cover (%)									
2010	2.6	4.8	4.0	0.2	0.4	0.6	0.5	1.4	-	0.0
2013	2.9	7.1	0.4	0.4	0.4	0.4	0.2	0.1	0.0	-
2018	1.7	13.3	0.1	0.3	0.8	0.4	0.8	0.0	0.6	-
2025	0.0	6.5	0.1	-	0.0	-	-	-	0.2	0.0

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

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

FORB SPECIES	Arabis (rockcress)	Chamaesyce (sandmat)	Chenopodium fremontii[a] (Fremont's goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Gilia inconspicua[a] (shy gilia)	Helianthus annuus[a] (common sunflower)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Lupinus (lupine)	Mentzelia albicaulis[a] (whitestem blazingstar)	Phlox longifolia (longleaf phlox)	Plantago patagonica[a] (woolly plantain)	Salsola tragus[ai] (prickly Russian thistle)
year	Nested Frequency																
2010	10	0	-	-	46	13	142	-	50	-	1	147	3	39	1	3	121
2013	-	4	2	2	-	2	34	2	8	2	-	3	-	4	5	-	26
2018	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
2025	-	2	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
year	Average Cover (%)																
2010	0.0	0.0	-	-	0.1	0.0	0.9	-	0.2	-	0.0	0.6	0.0	0.4	0.0	0.0	1.1
2013	-	0.1	0.0	0.0	-	0.0	0.6	0.0	0.0	0.0	-	0.0	-	0.2	0.0	-	0.3
2018	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1
2025	-	0.0	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-

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

FORB SPECIES	Schoenocrambe linifolia (flaxleaf plainsmustard)	Symphyotrichum (aster)
year	Nested	
2010	13	6
2013	-	-
2018	-	-
2025	-	-
year	Average Cover (%)	
2010	0.9	0.0
2013	-	-
2018	-	-
2025	-	-

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

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

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Ephedra viridis[p] (mormon tea)	Eriogonum microthecum[p] (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)
year	Line Intercept Cover (%)					
2010	5.5	-	-	1.8	0.2	-
2013	5.4	-	-	0.1	0.3	0.1
2018	5.5	-	-	2	0.4	0.3
2025	3.1	0.1	-	1	0.1	0.1
year	Quadrat Cover (%)					
2010	7.1	-	-	1.4	0.5	-
2013	5.9	-	0.0	0.2	0.8	0.0
2018	6.6	-	-	2.9	0.5	0.0
2025	4.0	0.0	-	1.1	0.4	0.1

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

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

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	36/89
2018	-	-	-	-	-	-	-	-	31/81
2025	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2010	6380	35080	79	19	1	7	0	1	42/63
2013	4020	560	63	35	3	14	10	13	38/56
2018	5280	-	50	25	25	13	83	30	43/75
2025	2620	-	1	70	29	0	95	29	- / -
Ephedra viridis[p] -- (mormon tea)									
2010	20	-	0	100	0	0	0	0	51/47
2013	-	-	-	-	-	-	-	-	47/87
2018	60	-	33	33	33	0	67	0	42/54
2025	20	-	0	100	0	0	100	0	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	100	0	0	9/15
2025	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	73/104
2018	-	-	-	-	-	-	-	-	60/79
2025	20	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2010	700	20	14	80	6	0	0	6	32/49
2013	300	-	7	87	7	0	0	7	25/31
2018	5040	-	6	91	3	0	0	3	18/25
2025	5060	-	35	65	0	4	1	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2010	40	20	100	0	0	0	0	0	- / -
2013	80	-	100	0	0	0	0	0	- / -
2018	60	-	100	0	0	0	0	33	- / -
2025	40	-	100	0	0	0	0	0	- / -
Krascheninnikovia lanata[p] -- (winterfat)									
2010	20	-	0	0	100	0	0	100	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2010	120	-	0	100	0	0	0	0	11/46
2013	120	-	33	67	0	0	0	0	13/40
2018	100	-	0	100	0	0	0	0	12/45
2025	100	-	20	20	60	0	0	40	- / -

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

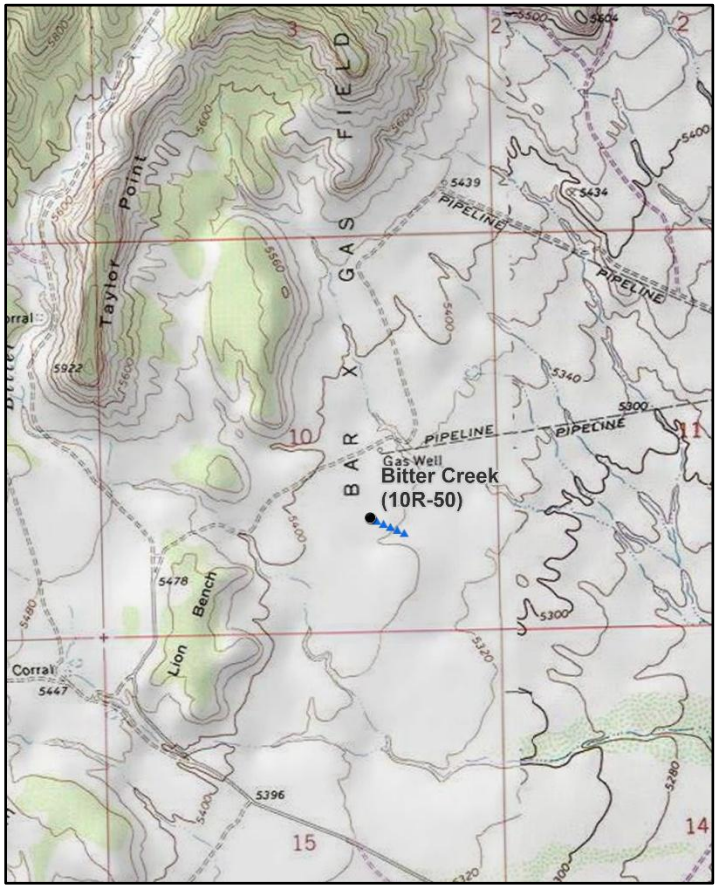
Table 10R-49.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

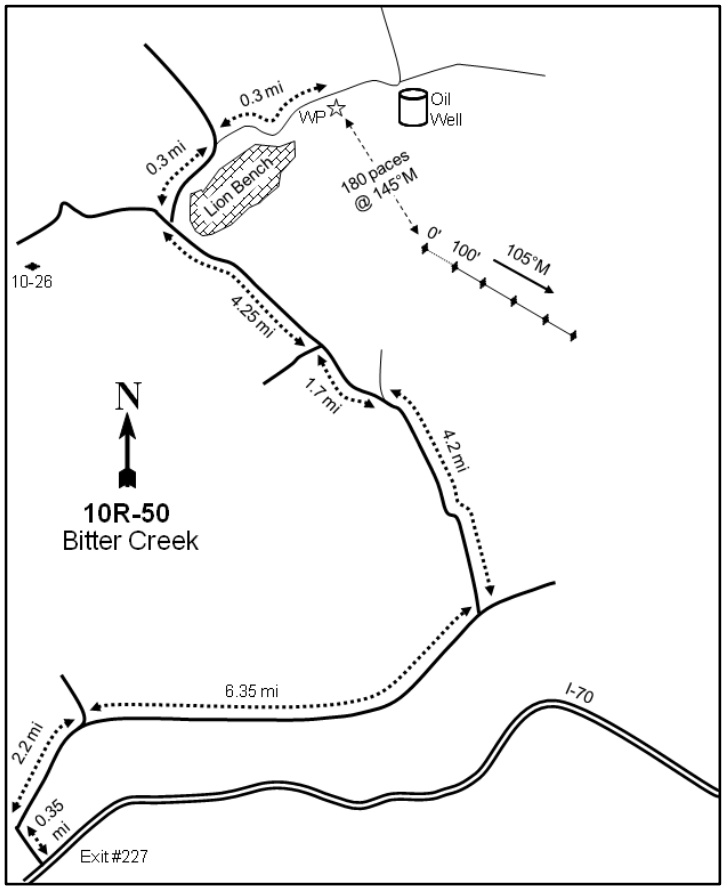
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2010	50	12	12	29	29	18	10.8
2013	45	40	53	7	-	-	10.5
2018	55	18	59	24	-	-	13.8
2025	9	29	71	-	-	-	2.4

Table 10R-49.15 - 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
2010	6.9	14.6	15.0	20.9	-3.1	2.3	0.0	**56.6**	Good
2013	6.8	14.3	15.0	22.9	-0.3	0.2	0.0	**58.9**	Good
2018	6.9	7.6	15.0	30.0	0.0	0.1	0.0	**59.6**	Good
2025	4.0	0.0	0.0	13.5	-0.1	0.0	0.0	**17.4**	Poor

BITTER CREEK - STUDY NO. 10R-50





Location Information

USGS 7.5 min Map Info	Bryson Canyon NE; Township 17S, Range 25E, Section 10
GPS (0' Stake)	NAD 83 UTM ZONE 12, 660944 East 4356145 North

Transect Information

Browse Tag # (0' Stake)	187
Transect Bearing	105° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 1: No Rebar

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SAN ARROYO
Elevation	5,380ft (1,640m)
Aspect	East
Slope	3%
Sample Dates	07/21/2011, 05/27/2015, 07/31/2019, 06/03/2025

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Rangeland Drill	Bitter Creek Restoration Phase 2	2161	October 2012	1580
Fire - Wildfire	Bitter Creek	-	1994	3659
Seeding - Rangeland Drill	Bitter Creek Fire Rehabilitation 1994	LTDL 1030-2817	1994	2595
Herbicide - Imazapic	Bitter Creek Phase 3 Seeding	4673	November 2019	4739
Herbicide - Imazapic	Bitter Creek Restoration Phase 2	2161	September 2012	2250

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

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

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

Mix Name			Application Type	Application Date	Acres
			Drill	Aug 1994	2595
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass		1.25	0.00
G	Pleuraphis jamesii	Galleta Grass	Viva	1.50	0.00
F	Linum lewisii	Lewis Flax		0.50	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.25	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.25	0.00
S	Atriplex canescens	Fourwing Saltbush		0.50	0.00
S	Krascheninnikovia lanata	Winterfat		0.50	0.00

Wildlife Habitat and Vegetation History

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

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

Table 10R-50.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Annual-Perennial Grass	No Encroachment
2015	Annual-Perennial Grass	No Encroachment
2019	Annual Grass	No Encroachment
2025	Perennial Grass	No Encroachment

Site Notes

The 2011 WRI report states that the Bitter Creek Restoration Project occurred in two phases. However, it appears that the site was not captured in the phase I polygon, but within the phase II treatment (WRI #2161) that occurred in 2012 instead. Both phases were comprised of similar treatments that included the application of the herbicide imazapic and a drill seeding (WRI Database, 2025).

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2011-2019 - Invasive Annual State: Community Phase Undefined 2025 - Seeded State: Community Phase 5.2

The introduced annual grass species cheatgrass (*Bromus tectorum*) contributed the most vegetation cover on this site upon study establishment in 2011. Perennial grasses were less abundant, but were still considered to be a co-dominant site component. Perennial grasses provided more cover than annual species in 2015 following treatment (Table 10R-50.1), but both were still co-dominant in the plant community. Perennial grass cover decreased in 2019, and cheatgrass and the native annual grass species sixweeks fescue (*Vulpia octoflora*) were the sole vegetation components. However, annual grass cover decreased substantially in 2025, and perennial grasses dominated this site during the most recent sample year. Forbs remained relatively sparse until the 2019 sample year, when annual forbs contributed a moderate amount of cover. A majority of the forb cover was provided by the introduced annual species prickly Russian thistle (*Salsola tragus*) in 2025 (Table 10R-50.7, Table 10R-50.10, Table 10R-50.11). The shrub component has been very limited, with Wyoming big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) contributing modest amounts of cover in all sample years (Table 10R-50.12, Table 10R-50.13). Annual grasses may affect the ecological resistance and resilience of the plant community and further treatments may be advisable should these grasses increase again in the future.

Condition of mule deer winter range on this site has ranged between poor and poor-fair since 2011; winter range condition was considered to be poor in 2025. Negative factors contributing to this poor condition include a lack of preferred browse; a lack of perennial grass and forb cover; and the amount of annual grass cover (Table 10R-50.6, Table 10R-50.7, Table 10R-50.15). Pellet transect data indicates that deer and elk presence have remained low since 2011. Cattle presence has been moderate in all sample years (excluding 2015). Wyoming big sagebrush utilization has been light throughout the study period (Table 10R-50.9, Table 10R-50.13). On-site observations for 2025 note that utilization was heavy (>40%) on crested wheatgrass (*Agropyron cristatum*) and James' galleta (*Pleuraphis jamesii*). Drought may be having an impact on this community as evidenced by the lack of seed production and reduced primary growth.

Trend Summary Tables

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

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	2.2	-	-	4.1	-	-
2015	3.2	-	-	4.3	-	-
2019	3.3	-	-	4.2	-	-
2025	4.1	0.0	-	4.9	-	-

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

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	413	184	36	56	26.8	12.7	0.4	0.8
2015	415	309	155	26	15.9	22.3	1.0	0.2
2019	455	228	298	9	28.3	7.5	6.0	0.1
2025	96	268	156	18	0.5	7.1	3.2	0.1

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

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	34.9	0.2	22.4	0.3	0.1	44.2
2015	36.2	16.3	30.1	0.7	0.2	38.3
2019	42.0	4.9	34.8	0.5	0.6	33.8
2025	67.9	0.0	24.8	0.9	0.5	14.2

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

Year	Cattle	Coyote	Mule Deer/Pronghorn	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency					
2011	4	-	15	4	-	24
2015	2	-	4	1	-	22
2019	9	-	11	-	-	62
2025	2	-	17	7	-	38
Year	Days Use Per Acre (ha)					
2011	19.6 (48.4)	-	8.7 (21.5)	2.7 (6.6)	-	-
2015	-	-	3.4 (8.3)	-	-	-
2019	16.0 (39.5)	8.7 (21.5)*	6.7 (16.6)	0.7 (1.7)	-	-
2025	12.3 (30.5)	-	3.4 (8.3)	8.1 (19.9)	0.6 (1.4)	-

*Pellets per acre (ha)

Table 10R-50.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum[i] (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency						
2011	112	62	413	10	-	33	12
2015	261	-	353	45	-	54	285
2019	177	12	379	39	-	20	425
2025	204	-	50	78	5	14	77
year	Average Cover (%)						
2011	6.7	3.8	26.7	0.4	-	1.9	0.1
2015	18.2	-	11.3	1.6	-	2.6	4.6
2019	6.5	0.0	14.9	0.5	-	0.4	13.4
2025	5.1	-	0.1	1.9	0.0	0.1	0.4

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

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

FORB SPECIES	Ceratocephala testiculata[ai] (curveseed butterwort)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Chorispora tenella[ai] (crossflower)	Cryptantha[a] (annual cryptantha)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Erodium cicutarium[ai] (redstem stork's bill)	Helianthus annuus[a] (common sunflower)	Lappula occidentalis[a] (flatspine stickseed)	Lepidium[a] (pepperweed)	Machaeranthera canescens (hoary tansyaster)	Plantago patagonica[a] (woolly plantain)	Salsola tragus[ai] (prickly Russian thistle)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency																
2011	9	-	1	-	1	-	2	-	17	-	-	-	-	-	11	56	-
2015	-	-	-	49	2	1	97	-	14	15	1	10	1	2	-	23	2
2019	16	6	-	142	34	16	91	3	104	31	-	18	11	-	12	9	-
2025	-	5	-	1	-	-	2	-	1	-	-	-	155	-	-	18	-
year	Average Cover (%)																
2011	0.0	-	0.0	-	0.0	-	0.0	-	0.1	-	-	-	-	-	0.2	0.8	-
2015	-	-	-	0.2	0.0	0.0	0.7	-	0.1	0.0	0.0	0.0	0.0	0.0	-	0.1	0.0
2019	0.1	0.0	-	1.9	0.3	0.1	1.6	0.0	1.1	0.5	-	0.1	0.0	-	0.3	0.1	-
2025	-	0.0	-	0.0	-	-	0.0	-	0.0	-	-	-	3.1	-	-	0.1	-

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

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

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept	
2011	4.1	-
2015	4.3	-
2019	4.2	-
2025	4.9	-
year	Quadrat Cover (%)	
2011	2.2	-
2015	3.2	-
2019	3.3	-
2025	4.1	0.0

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

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

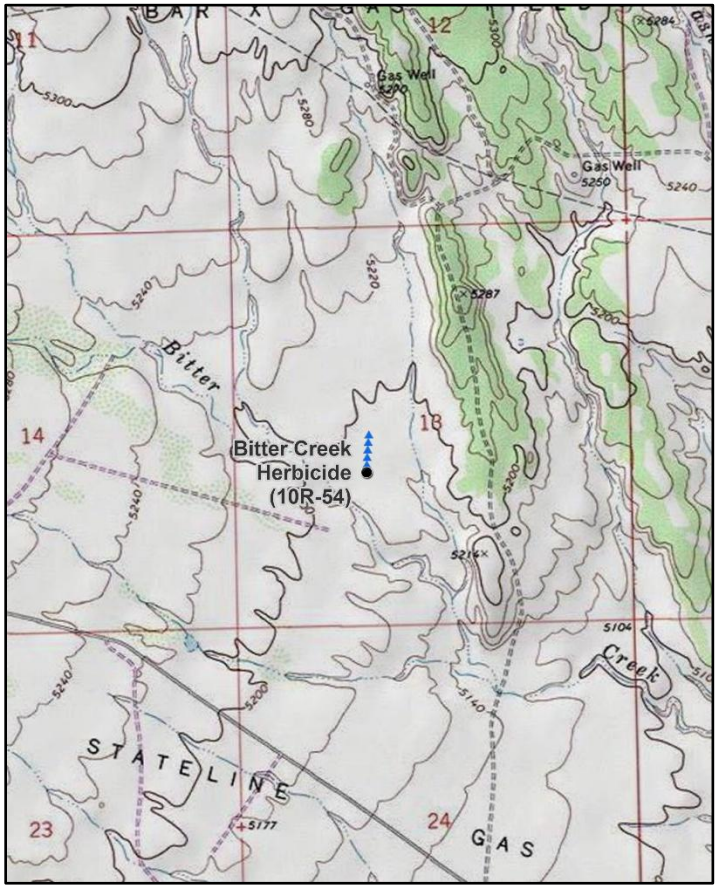
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2011	260	-	0	100	0	39	0	8	53/82
2015	300	3420	0	100	0	7	27	0	54/99
2019	340	-	0	71	29	12	6	41	66/120
2025	320	-	0	94	6	19	6	6	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	26/27
2019	-	-	-	-	-	-	-	-	-/-
2025	120	-	0	50	50	0	0	50	- / -
Opuntia polyacantha -- (plains pricklypear)									
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	10/12

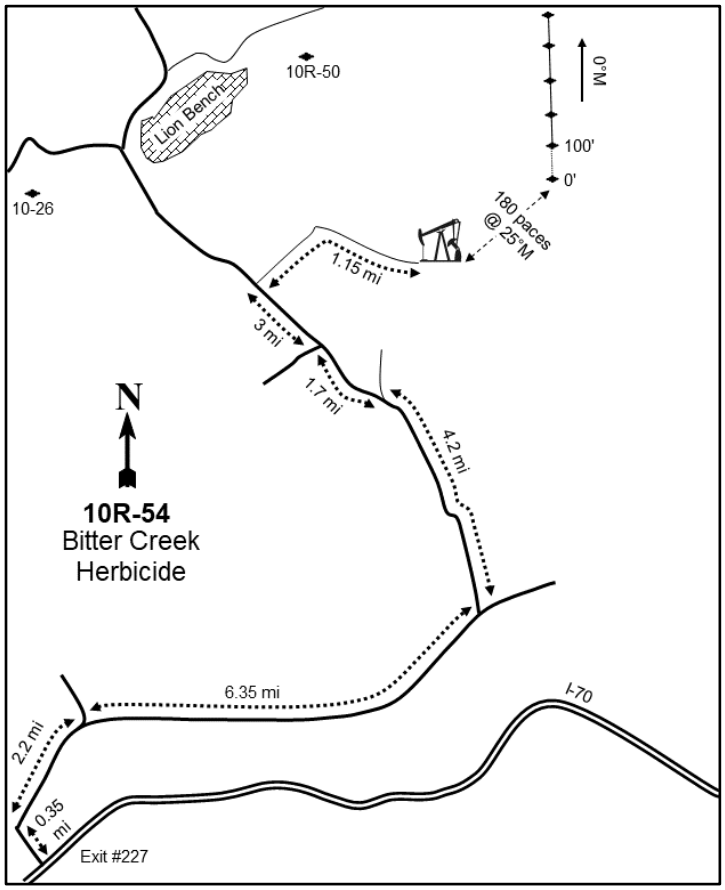
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 10R-50.15 - 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
2011	5.1	0.0	0.0	25.5	-20.0	1.5	0.0	**12.1**	Poor
2015	5.4	0.0	0.0	30.0	-11.9	0.4	0.0	**23.9**	Poor-Fair
2019	5.3	0.0	0.0	14.9	-20.0	0.1	0.0	**0.3**	Very Poor
2025	6.1	0.0	0.0	14.1	-0.4	0.1	0.0	**19.9**	Poor

BITTER CREEK HERBICIDE - STUDY NO. 10R-54





Location Information	
USGS 7.5 min Map Info	Bar X Wash NW; Township 17S, Range 25E, Section 13
GPS (0' Stake)	NAD 83 UTM ZONE 12, 663623 East 4354747 North

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

Directions to Site

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

Site Information	
Land Ownership	Federal
Land Administrator	BLM
Allotment	SAN ARROYO
Elevation	5,197ft (1,584m)
Aspect	Northeast
Slope	0-5%
Sample Dates	08/20/2012, 05/27/2015, 08/01/2019, 06/03/2025

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Imazapic	Bitter Creek Restoration Phase 2	2161	September 2012	2250
Herbicide - Imazapic	Bitter Creek Phase 3 Seeding	4673	November 2019	4739
Fire - Wildfire	Bitter Creek	-	1994	3659
Seeding - Hand Planter	Bitter Creek Fire Rehabilitation 1994	LTDL 1030-2818	1994	480
Seeding - Rangeland Drill	Bitter Creek Restoration Phase 2	2161	October 2012	1580

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

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

Mix Name			Application Type	Application Date	Acres
			Ground	Aug 1994	480
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass		2.00	0.00
G	Pleuraphis jamesii	Galleta Grass	Viva	1.50	0.00
G	Sporobolus airoides	Alkali Sacaton	Salado	0.25	0.00
G	Sporobolus cryptandrus	Sand Drop Seed		0.50	0.00
F	Linum lewisii	Lewis Flax		0.50	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.25	0.00
S	Atriplex canescens	Fourwing Saltbush		1.00	0.00
S	Atriplex confertifolia	Shadscale		0.75	0.00
S	Krascheninnikovia lanata	Winterfat		0.50	0.00

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2012	Annual Grass	No Encroachment
2015	Annual Grass	No Encroachment
2019	Annual Grass	No Encroachment
2025	Annual Grass	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2012-2025 - Invasive Annual State: Community Phase 4.1

Annual grasses have dominated this site since study establishment in 2012, with the introduced species cheatgrass (*Bromus tectorum*) and native species sixweeks fescue (*Vulpia octoflora*) varying in cover from year to year. Diversity within the community improved slightly after treatment with perennial grasses providing moderate amounts of cover in 2015 and 2019. Forb cover also increased in these sample years, but mainly due to the weedy annual species prickly Russian thistle (*Salsola tragus*) and tall tumblemustard (*Sisymbrium altissimum*). In 2025, however, perennial grasses and annual and perennial forbs were low in abundance and contributed little cover (Table 10R-54.7, Table 10R-54.10, Table 10R-54.11). The shrub component has remained limited throughout the study period, with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and fourwing saltbush (*Atriplex canescens*) as the only preferred browse species present. Furthermore, only fourwing saltbush was sampled in line-intercept cover or density measurements in 2025 (Table 10R-54.12, Table 10R-54.13). This site will likely continue to remain dominated by annual grasses without further treatment; high amounts of annual grasses can increase fuel loads and may threaten the ecological resilience of the plant community on this site.

Condition of mule deer winter range on this site has remained very poor over the course of the study. Negative factors contributing to this very poor condition include a lack of preferred browse; a lack of perennial grass and forb cover; and a high amount of annual grass cover (Table 10R-54.6, Table 10R-54.7, Table 10R-54.15). Pellet transect data indicates that deer/pronghorn presence has remained low to absent since 2012, while elk presence has ranged between low and moderate over the same time. During the 2024/25 winter season the area had infrequent occurrences of collared elk (Wildlife Migration Initiative). Cattle presence has ranged from low to moderate, but it was low in 2025. Wyoming big sagebrush utilization has reached 100% in some sample years, but this was due to the populations being comprised of only a few individuals. Sixty-seven percent of fourwing saltbush plants sampled in density strips displayed signs of moderate utilization in 2025, but again, this can be attributed to the small population size (Table 10R-54.9, Table 10R-54.13). On-site observations for 2025 note that there was heavy (>40%) utilization of crested and western wheatgrass (*Agropyron cristatum* and *Pascopyrum smithii*, respectively), while forb utilization was light (10-20%). Drought is likely having an effect on the community as evidenced by stunted primary growth and reduced flowering and seed production of annual and perennial species.

Trend Summary Tables

Table 10R-54.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	-	-	-	-	-	-
2015	0.0	1.2	-	-	0.4	-
2019	0.4	0.2	-	0.5	-	-
2025	0.0	2.2	-	0.1	1.8	-

Table 10R-54.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	426	6	246	107	23.4	0.3	6.0	1.0
2015	449	166	373	45	41.0	8.6	15.2	1.2
2019	473	166	239	121	32.6	5.1	17.3	1.1
2025	438	86	20	7	14.6	0.7	0.1	0.2

Table 10R-54.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	32.4	0.0	52.7	-	0.4	31.3
2015	22.1	0.2	50.5	0.1	-	56.1
2019	29.5	0.0	40.5	0.1	0.0	52.8
2025	18.3	-	72.0	0.1	0.0	17.6

Table 10R-54.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2012	2	5	25	-	5
2015	-	-	-	-	-
2019	6	11	16	-	20
2025	2	3	-	-	23
Year	Days Use Per Acre (ha)				
2012	0.7 (1.8)	3.4 (8.3)	31.5 (77.8)	-	-
2015	0.7 (1.8)	2.7 (6.6)	-	-	-
2019	13.1 (32.3)	-	5.3 (13.2)	0.6 (1.4)	-
2025	7.2 (17.9)	4.0 (9.9)	4.0 (9.9)	-	-

Table 10R-54.10 - 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)	Eremopyrum triticeum[ai] (annual wheatgrass)	Pascopyrum smithii (western wheatgrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium[i] (intermediate wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency										
2012	-	6	426	-	-	-	-	-	-	-	-
2015	-	74	394	3	-	63	28	6	-	23	386
2019	0	50	432	1	2	68	48	-	15	8	422
2025	-	17	422	-	3	68	-	-	3	-	144
year	Average Cover (%)										
2012	-	0.3	23.4	-	-	-	-	-	-	-	-
2015	-	4.7	16.2	0.2	-	1.8	1.3	0.2	-	0.5	24.8
2019	0.0	1.6	21.2	0.0	0.0	1.5	1.3	-	0.4	0.2	11.4
2025	-	0.2	14.1	-	0.0	0.5	-	-	0.0	-	0.5

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

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

FORB SPECIES	Chaetopappa ericoides (rose heath)	Cryptantha (cryptantha)	Cryptantha[a] (annual cryptantha)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Erodium cicutarium[ai] (redstem stork's bill)	Lappula occidentalis[a] (flatspine stickseed)	Lepidium[a] (pepperweed)	Lupinus brevicaulis[a] (shortstem lupine)	Machaeranthera canescens (hoary tansyaster)	Oenothera pallida ssp. pallida (pale evening primrose)	Plantago patagonica[a] (woolly plantain)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea (globemallow)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
2012	-	5	-	-	3	60	-	-	-	-	-	-	-	-	213	77	29
2015	-	-	-	2	2	19	14	6	-	2	5	4	360	3	75	-	-
2019	3	2	2	7	-	26	42	18	4	-	4	-	69	-	175	-	-
2025	3	-	-	-	-	7	-	-	-	-	-	-	13	-	-	-	3
year	Average Cover (%)																
2012	-	0.0	-	-	0.0	0.6	-	-	-	-	-	-	-	-	5.4	0.3	0.3
2015	-	-	-	0.0	0.0	0.1	0.0	0.1	-	0.0	0.1	0.0	12.4	0.4	2.6	-	-
2019	0.1	0.0	0.0	0.2	-	0.8	0.3	0.1	0.0	-	0.0	-	0.6	-	15.2	-	-
2025	0.1	-	-	-	-	0.0	-	-	-	-	-	-	0.0	-	-	-	0.0

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

FORB SPECIES	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Sphaeralcea parvifolia (smallflower globemallow)	Townsendia (Townsend daisy)
year	Nested Frequency		
2012	-	-	5
2015	9	26	-
2019	16	108	-
2025	1	-	-
year	Average Cover (%)		
2012	-	-	0.4
2015	0.2	0.5	-
2019	0.1	0.8	-
2025	0.0	-	-

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

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

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover		
2012	-	-	-
2015	-	-	0.4
2019	0.1	0.4	0
2025	-	0.1	1.8
year	Quadrat Cover (%)		
2012	-	-	-
2015	0.0	-	1.2
2019	0.0	0.4	0.2
2025	0.0	0.0	2.2

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

Table 10R-54.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

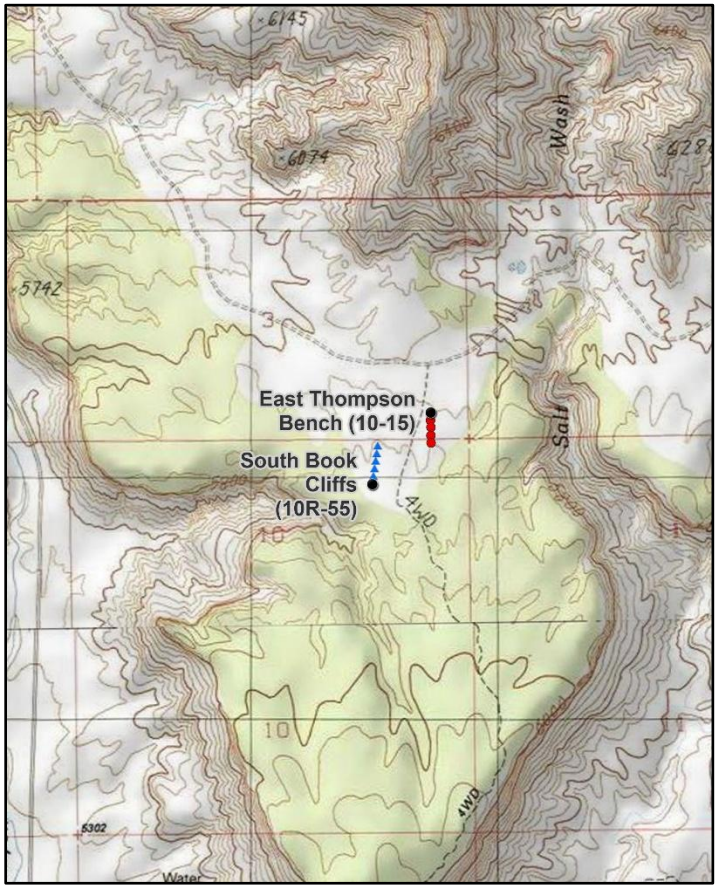
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2012	60	-	0	100	0	0	100	0	36/60
2015	40	-	100	0	0	0	0	0	46/75
2019	20	-	0	100	0	100	0	0	45/83
2025	-	-	-	-	-	-	-	-	-/-
Atriplex canescens[p] -- (fourwing saltbush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	100	0	0	0	0	0	44/43
2019	40	-	0	100	0	0	0	0	85/89
2025	60	-	0	100	0	67	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2012	-	-	-	-	-	-	-	-	- / -
2015	1140	-	0	100	0	0	0	0	31/37
2019	1760	2180	98	0	2	0	0	2	37/47
2025	1500	40	1	64	35	0	0	45	- / -

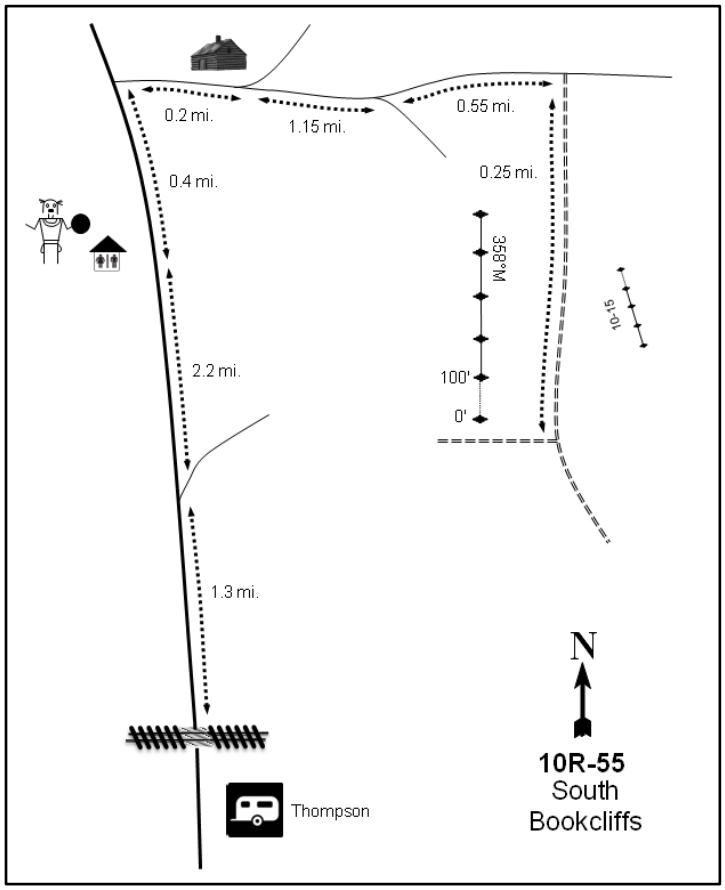
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 10R-54.15 - Deer Desirable Components Index: Semidesert Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2012	0.0	0.0	0.0	0.7	-17.6	1.9	0.0	**-15.0**	Very Poor
2015	0.0	0.0	0.0	17.3	-20.0	2.3	0.0	**-0.4**	Very Poor
2019	0.6	0.0	0.0	10.1	-20.0	2.2	0.0	**-7.1**	Very Poor
2025	0.1	0.0	0.0	1.4	-10.9	0.4	0.0	**-9.0**	Very Poor

SOUTH BOOK CLIFFS - STUDY NO. 10R-55





Location Information	
USGS 7.5 min Map Info	Sego Canyon SW; Township 21S, Range 20E, Section 10
GPS (0' Stake)	NAD 83 UTM ZONE 12, 613435 East 4318158 North

Transect Information	
Browse Tag # (0' Stake)	759
Transect Bearing	358° 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 railroad crossing in the town of Thompson, travel 1.3 miles north on the main road to a fork. Stay left and go 2.2 miles to the Thompson Canyon pictographs, then continue for 0.4 miles. Make a sharp right turn and go 0.2 miles past an old house and a railroad cut to a fork. Turn right, cross a deep gully, and travel 1.15 miles to another fork. Stay left and continue 0.55 miles to a very faint road on the right. Turn on this road and drive south for 0.25 miles; there is no witness post. The stakes are rebar.

Site Information	
Land Ownership	Federal
Land Administrator	BLM
Allotment	CISCO
Elevation	6,253ft (1,906m)
Aspect	North
Slope	7%
Sample Dates	06/27/2013, 08/01/2016, 08/19/2020, 06/03/2025

Table 10R-55.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Book Cliffs Vegetation Phase 1	2593	November 2013	512
Seeding - Aerial Before	South Book Cliffs Vegetation Phase 1	2593	October 2013	512
Seeding - Aerial After	South Book Cliffs Vegetation Phase 1	2593	January 2014	512

Table 10R-55.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Book Cliffs I			Aerial	Oct 2013	315
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.16	0.11
G	Achnatherum hymenoides	Indian Ricegrass	Rio Grande CO	3.02	2.86
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.38	2.13
G	Pleuraphis jamesii	Galleta		0.48	0.35
G	Pleuraphis jamesii	Galleta		0.32	0.19
G	Poa secunda	Sandberg Bluegrass	UP Colorado Plateau	0.63	0.47
G	Sporobolus cryptandrus	Sand Dropseed	Washington CO	0.08	0.08
F	Linum perenne	Blue Flax	Appar	1.59	1.38
F	Sanguisorba minor	Small Burnet		1.59	1.46
F	Sphaeralcea coccinea	Scarlet Globemallow		0.10	0.04
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.11	0.04
S	Atriplex canescens	Fourwing Saltbush	Kane UT	3.02	1.12

Mix Name			Application Type	Application Date	Acres
South Book Cliffs 1 Shrub			Aerial	Jan 2014	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Uintah UT	1.00	0.14

Wildlife Habitat and Vegetation History

Table 10R-55.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 10R-55.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Wyoming Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2016	Wyoming Big Sagebrush/Broom Snakeweed	Early Phase I
2020	Wyoming Big Sagebrush/Annual Grass	Early Phase I
2025	Wyoming Big Sagebrush	Early Phase I

Site Notes

In 2016, a deer carcass was strewn between the 200 and 400-foot stakes.

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2013 - Juniper Encroachment State: Community Phase 3.1 2016-2025 - Current Potential State: Community Phase 2.4

This site was established in 2013 and was dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) with few other shrubs present that provided limited cover. Cover and density of twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees placed the site in Phase I transitioning to Phase II of woodland succession and they were co-dominant with Wyoming big sagebrush (Table 10R-55.4, Table 10R-55.12, Table 10R-55.14). The herbaceous understory was composed of introduced annual grasses and forbs that provided relatively low cover (Table 10R-55.7, Table 10R-55.10, Table 10R-55.11). Tree cover and density decreased following the bullhog and seeding treatments (Table 10R-55.1, Table 10R-55.12, Table 10R-55.14); theremay be the potential for infilling in future sample years. However, the site has remained in Early Phase I of woodland succession in all post-treatment samplings (Table 10R-55.4), indicating that infilling is likely not an immediate concern. Broom snakeweed (*Gutierrezia sarothrae*) increased and was a co-dominant vegetation component during the first post-treatment sample year, but has

since decreased. Cheatgrass (*Bromus tectorum*) increased in cover and abundance following treatment and was a co-dominant vegetation component in 2020, but it decreased in 2025 (Table 10R-55.10).

Condition of mule deer winter range on this site has ranged between poor and fair over the course of the study; winter range condition was considered to be poor-fair in 2025. Negative factors contributing to this poor-fair condition are a lack of preferred browse; a lack of perennial grass and forb cover; and a moderate amount of annual grass cover (Table 10R-55.15). Pellet transect data indicates that deer presence has been high in most sample years, while elk presence has increased and was high in 2025. Wyoming big sagebrush utilization has varied in intensity over the sample years. Over 90% of sagebrush plants sampled in density strips exhibited signs of moderate to heavy utilization in 2013, but that percentage was just over 50% in 2025 (Table 10R-55.9, Table 10R-55.13). On-site observations for 2025 note that there was light utilization (10-20%) of sand dropseed (*Sporobolus cryptandrus*) and squirreltail (*Elymus elymoides*), while there was little to no forb utilization. Drought is likely having an effect on the community as evidenced by stunted primary growth of herbaceous perennial species.

Trend Summary Tables

Table 10R-55.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	10.3	0.3	2.3	12.2	0.1	6.6
2016	7.1	4.0	0.3	7.1	8.7	-
2020	9.5	1.4	0.6	7.6	0.7	0.1
2025	8.8	1.0	0.4	9.4	1.9	0.1

Table 10R-55.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	286	27	324	56	2.1	0.3	5.8	1.2
2016	380	49	369	96	6.0	0.9	2.4	5.0
2020	417	54	344	58	14.1	2.3	4.3	2.4
2025	261	70	110	27	5.5	3.8	0.4	0.2

Table 10R-55.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	46.8	5.7	34.1	-	0.1	26.4
2016	45.9	7.1	37.4	-	-	22.4
2020	22.8	5.1	46.5	-	0.5	31.7
2025	37.9	2.7	53.9	0.0	-	19.3

Table 10R-55.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2013	55	18	14
2016	38	1	57
2020	41	21	27
2025	37	1	46
Year	Days Use Per Acre (ha)		
2013	138.7 (342.6)	4.7 (11.6)	-
2016	50.2 (124.1)	12.8 (31.5)	-
2020	35.5 (87.7)	59.6 (147.3)	-
2025	54.9 (135.7)	-	-

Table 10R-55.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency							
2013	3	1	284	16	-	7	-	5
2016	6	-	380	35	-	-	11	-
2020	3	-	409	47	3	1	3	20
2025	5	-	261	45	9	2	10	-
year	Average Cover (%)							
2013	0.0	0.0	2.1	0.2	-	0.1	-	0.0
2016	0.2	-	6.0	0.6	-	-	0.1	-
2020	0.0	-	14.1	1.7	0.2	0.0	0.3	0.1
2025	0.2	-	5.5	1.8	0.6	0.0	1.2	-

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

Table 10R-55.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Astragalus flexuosus (flexile milkvetch)	Calochortus nuttallii (sego lily)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Erodium cicutarium[ai] (redstem stork's bill)	Gilia inconspicua[a] (shy gilia)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Orobanche fasciculata (clustered broomrape)	Plantago patagonica[a] (woolly plantain)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
2013	324	52	1	1	-	30	-	-	2	20	-	1	-	-	-	-	2
2016	353	66	-	-	3	9	7	6	8	29	31	2	10	-	1	6	-
2020	342	57	-	12	-	-	1	-	-	-	0	-	-	-	-	1	1
2025	102	22	-	-	-	-	-	-	-	6	-	-	-	4	-	-	5
year	Average Cover (%)																
2013	5.5	1.1	0.0	0.0	-	0.2	-	-	0.0	0.1	-	0.0	-	-	-	-	0.0
2016	1.9	3.4	-	-	0.0	0.0	0.2	0.0	0.0	0.1	1.6	0.0	0.0	-	0.1	0.2	-
2020	4.2	2.4	-	0.0	-	-	0.0	-	-	-	0.0	-	-	-	-	0.0	0.0
2025	0.4	0.1	-	-	-	-	-	-	-	0.0	-	-	-	0.0	-	-	0.0

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

Table 10R-55.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Ephedra viridis[p] (mormon tea)	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 (%)							
2013	12.2	-	-	0.1	5.6	0	1	-
2016	6.7	-	0.2	7.4	-	1.3	-	0.2
2020	7.6	-	-	0.3	0.1	0.4	-	-
2025	9.2	-	0.2	0.9	0.1	1	-	-
year	Quadrat Cover (%)							
2013	10.3	-	-	0.1	2.1	0.3	0.1	-
2016	7.1	-	0.0	2.9	0.3	1.1	-	0.0
2020	9.5	-	-	1.1	0.6	0.3	-	-
2025	8.7	0.0	0.0	0.1	0.4	0.9	-	-

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

Table 10R-55.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2013	1880	60	1	60	39	35	61	63	56/80
2016	2760	-	29	48	23	17	41	28	51/86
2020	2060	-	14	53	33	26	38	33	52/86
2025	1640	60	2	74	23	17	35	23	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	87/124
2025	20	-	0	0	100	0	0	100	- / -
Ephedra viridis[p] -- (mormon tea)									
2013	-	-	-	-	-	-	-	-	-/-
2016	20	-	100	0	0	0	0	0	- / -
2020	20	-	0	100	0	0	0	0	48/33
2025	20	-	0	0	100	0	100	100	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2013	160	40	75	13	13	0	13	13	13/17
2016	3800	20	4	96	0	0	0	0	34/49
2020	1060	20	11	89	0	0	0	0	16/24
2025	900	-	2	98	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2013	40	-	50	50	0	0	0	0	- / -
2016	-	100	0	0	0	0	0	0	- / -
2020	20	40	100	0	0	0	0	0	- / -
2025	80	-	50	50	0	75	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Opuntia polyacantha -- (plains pricklypear)									
2013	240	-	0	67	33	0	0	50	12/50
2016	600	-	7	93	0	3	0	10	16/58
2020	480	-	4	83	13	0	0	13	12/59
2025	1360	-	0	81	19	0	0	19	- / -
Yucca -- (yucca)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	20/17

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

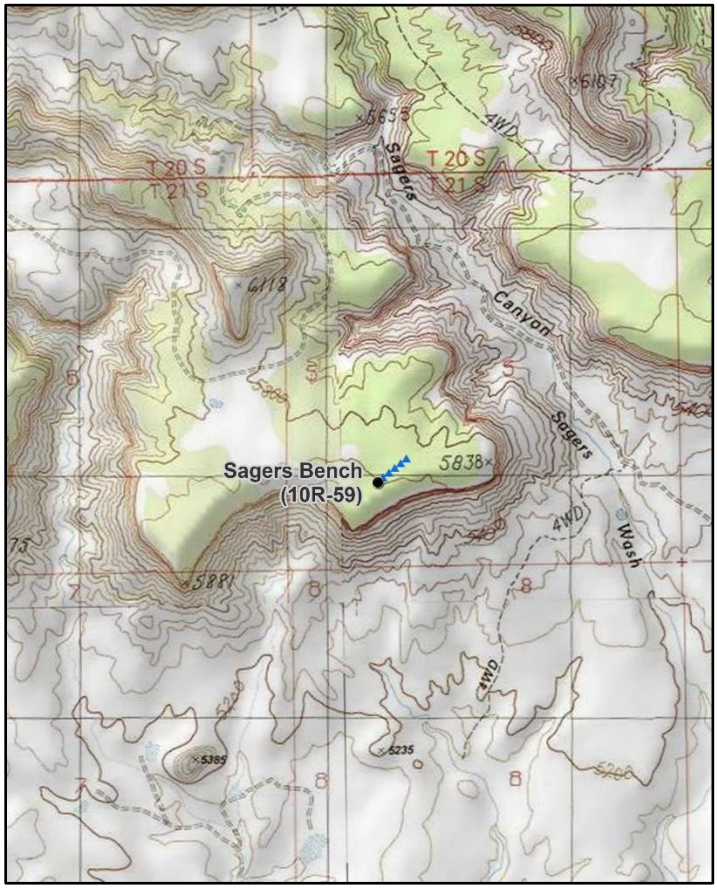
Table 10R-55.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

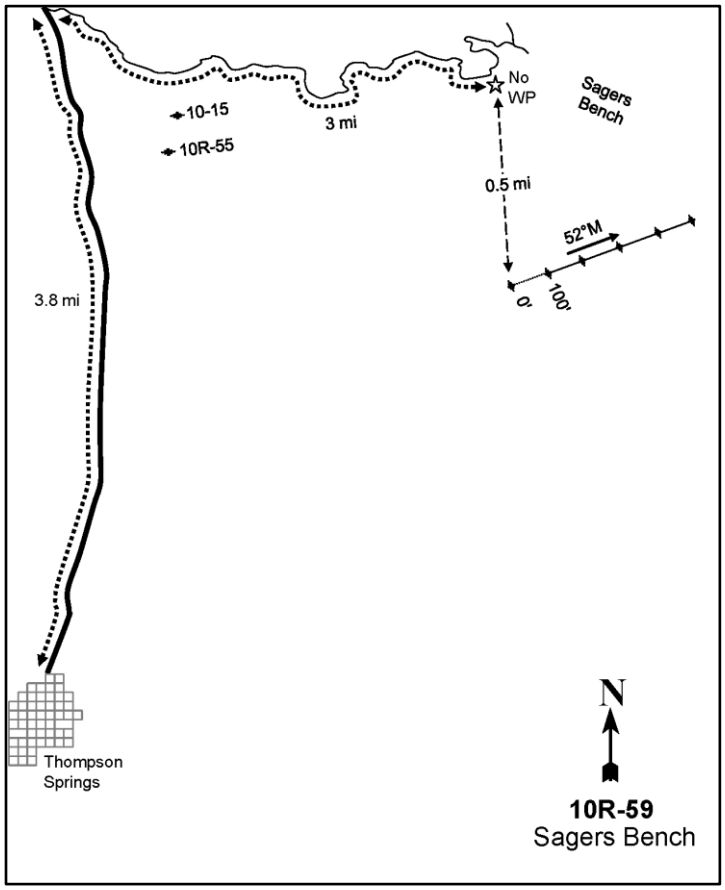
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	24	8	-	42	50	-	16.3
2016	9	-	75	13	13	-	7.3
2020	13	13	63	13	13	-	6.0
2025	10	40	40	20	-	-	6.4
Pinus edulis (twoneedle pinyon)							
2016	1	-	-	-	100	-	10.0
2020	2	-	50	50	-	-	7.5
2025	1	-	100	-	-	-	3.0

Table 10R-55.15 - 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
2013	15.3	3.2	0.6	0.6	-1.6	2.3	0.0	**20.4**	Poor
2016	8.9	8.0	15.0	1.8	-4.5	10.0	0.0	**39.2**	Fair
2020	9.5	5.1	6.8	4.6	-10.6	4.8	0.0	**20.2**	Poor
2025	11.8	7.6	1.2	7.5	-4.1	0.3	0.0	**24.3**	Poor-Fair

SAGERS BENCH - STUDY NO. 10R-59





Location Information

USGS 7.5 min Map Info	Calf Canyon SW; Township 21S, Range 21E, Section 05
GPS (0' Stake)	NAD 83 UTM ZONE 12, 619151 East 4318167 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	40° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 1: 9ft, Belt 2: 17ft, Belt 4: 8ft

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	CISCO
Elevation	5,827ft (1,776m)
Aspect	North
Slope	2-4%
Sample Dates	08/04/2016, 07/29/2019, 05/27/2025

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	South Bookcliffs Phase 4 (Sagers)	3673	December 2016	360
Herbicide - Imazapic	South Bookcliffs Phase 9 (Cottonwood/San Arroyo Bullhog)	5654	November 2021	2711
Mechanical - Bullhog	South Bookcliffs Phase 4 (Sagers)	3673	October-November 2016	360
Seeding - Aerial Before	South Bookcliffs Phase 4 (Sagers)	3673	October 2016	360

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

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

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

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2016	Pinyon-Juniper	Phase III
2019	Broom Snakeweed	Early Phase I
2025	Broom Snakeweed/Perennial Grass	Early Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Shallow Loam (Cliffrose)
NRCS Ecological Site #	R035XY313UT
States and Transitions	2016 - Current Potential State: Community Phase 2.4 2019-2025 - Current Potential State: Community Phase 2.2

Upon study establishment in 2016, this site existed as a degraded Stansbury cliffrose (*Purshia stansburiana*) community dominated by older Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) trees in Phase III of woodland succession (Photos, Table 10R-59.4). A number of other browse species were present, but they provided limited cover. However, a bullhog and seeding treatment in 2016 (Table 10R-59.1) removed most of the trees, and the site transitioned to one dominated by broom snakeweed (*Gutierrezia sarothrae*) in 2019 (Table 10R-59.12, Table 10R-59.13, Table 10R-59.14). Cover and diversity of the herbaceous community were both low prior to treatment. The understory diversified after the bullhog and seeding, however, with perennial and annual forbs providing most of the herbaceous cover in 2019. In 2025, the native perennial grasses Indian ricegrass (*Achnatherum hymenoides*) and squirreltail (*Elymus elymoides*) provided a majority of the herbaceous cover; perennial grasses were co-dominant with broom snakeweed during the most recent sample year. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in all years. Although cheatgrass abundance exhibited an increase following treatment, cover has remained low. Forbs were rare in 2025 in comparison with grasses (Table 10R-59.7, Table 10R-59.10, Table 10R-59.11). The extant tree component present in the community (Table 10R-59.12, Table 10R-59.14) indicates that there may be potential for infilling in future sample years. The site has been considered to be within Early Phase I in all post-treatment sample years (Table 10R-59.4), however, suggesting that infilling is likely not an immediate concern.

Condition of deer winter range on this site has remained very poor since 2016. The main factors negatively affecting winter range condition include the lack of preferred browse, reduced perennial grass and forb cover, and the amount of cheatgrass cover (Table 10R-59.6, Table 10R-59.7, Table 10R-59.15). Pellet transect data indicates that deer presence has increased over time and was considered to be moderate in 2025. Eighty eight percent of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) plants sampled in 2025 density strips were moderately to heavily hedged. Utilization on cliffrose was moderate in 2016 and 2025, but light in 2019 (Photos, Table 10R-59.9, Table 10R-59.13). On-site observations for 2025 noted little to no utilization on grass species, but light utilization (10-20%) on Palmer's penstemon (*Penstemon palmeri*).

Trend Summary Tables

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

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	1.1	3.1	5.7	3.5	5.8	18.5
2019	0.3	9.3	0.0	0.8	11.0	-
2025	1.3	6.9	0.0	2.0	5.4	0.2

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

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	18	0	119	76	0.0	0.0	0.3	1.8
2019	156	87	208	216	1.4	1.7	3.5	4.0
2025	110	94	42	40	1.0	5.3	0.4	0.9

Table 10R-59.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2016	47.8	1.0	34.7	9.6	11.6	10.6
2019	15.9	0.1	55.7	12.1	14.6	20.4
2025	10.0	0.0	53.3	21.6	14.7	15.5

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

Year	Mule Deer	Rabbit
	Quadrat Frequency	
2016	11	32
2019	11	6
2025	23	25
Year	Days Use Per Acre (ha)	
2016	7.4 (18.2)	-
2019	12.8 (31.5)	-
2025	33.5 (82.8)	-

Table 10R-59.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Poa secunda (Sandberg bluegrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency							
2016	0	-	18	-	-	-	-	-
2019	23	1	154	21	34	0	17	3
2025	37	4	110	36	3	-	16	-
year	Average Cover (%)							
2016	0.0	-	0.0	-	-	-	-	-
2019	0.4	0.0	1.4	0.8	0.4	0.0	0.2	0.0
2025	3.2	0.0	1.0	1.6	0.1	-	0.3	-

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

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

FORB SPECIES	Aliciella hutchinsifolia[a] (desert pale gilia)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria dimorpha (low pussytoes)	Arenaria fendleri (Fendler's sandwort)	Calochortus nuttallii (sego lily)	Chamaesyce (sandmat)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cleome serrulata[a] (Rocky Mountain beeplant)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cryptantha[a] (annual cryptantha)	Cymopterus (springparsley)	Dalea purpurea (purple prairie clover)	Draba[a] (draba)	Gilia inconspicua[a] (shy gilia)	Helianthus annuus[a] (common sunflower)	Lactuca serriola[ai] (prickly lettuce)
year	Nested Frequency																
2016	-	2	1	-	-	18	-	-	-	19	2	1	-	114	10	-	-
2019	4	27	-	1	7	9	10	1	4	24	5	-	1	152	67	2	1
2025	-	-	-	-	-	2	-	-	-	14	1	-	-	-	-	-	-
year	Average Cover (%)																
2016	-	0.0	0.0	-	-	0.2	-	-	-	0.3	0.0	0.0	-	0.3	0.0	-	-
2019	0.0	0.6	-	0.0	0.0	0.2	0.2	0.0	0.0	0.2	0.0	-	0.0	1.1	0.9	0.0	0.0
2025	-	-	-	-	-	0.0	-	-	-	0.3	0.0	-	-	-	-	-	-

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

FORB SPECIES	Lappula occidentalis[a] (flatspine stickseed)	Lepidium[a] (pepperweed)	Linum perenne[i] (blue flax)	Machaeranthera grindelioides (rayless tansyaster)	Malcolmia africana[ai] (African mustard)	Medicago sativa[i] (alfalfa)	Penstemon (beardtongue)	Penstemon palmeri (Palmer's penstemon)	Petradoria pumila (rock goldenrod)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Stenotus acaulis (stemless mock goldenweed)	Streptanthus cordatus (heartleaf twistflower)	Tetraneuris acaulis (stemless four-nerve daisy)	Townsendia (Townsend daisy)
year	Nested Frequency														
2016	6	-	-	12	-	-	8	-	21	-	-	4	-	-	2
2019	19	4	166	6	2	7	13	13	11	6	10	23	2	2	-
2025	-	-	2	3	-	-	2	5	3	41	-	2	-	11	-
year	Average Cover (%)														
2016	0.0	-	-	0.1	-	-	0.0	-	1.2	-	-	0.0	-	-	0.0
2019	0.1	0.2	1.2	0.4	0.1	0.1	0.1	0.5	0.6	0.2	0.3	0.3	0.0	0.1	-
2025	-	-	0.0	0.2	-	-	0.0	0.1	0.0	0.4	-	0.2	-	0.1	-

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

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

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ephedra viridis[p] (mormon tea)	Eriogonum microthecum[p] (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Linanthus pungens (granite prickly phlox)	Pinus edulis[t] (twoneedle pinyon)	Purshia stansburiana[p] (Stansbury cliffrose)	Symphoricarpos longiflorus (desert snowberry)	Yucca (yucca)
year	Line Intercept Cover (%)											
2016	-	-	-	0.2	0.1	4.9	16.3	0.1	2.2	3.2	0.8	-
2019	-	0.3	-	-	0.1	9.9	-	0.6	-	0.4	0.3	0.2
2025	0.1	1.1	-	-	0.2	3.9	-	1	0.2	0.6	0.2	0.3
year	Quadrat Cover (%)											
2016	-	-	-	0.1	0.1	3.0	4.3	0.1	1.5	0.8	0.1	-
2019	-	0.0	-	-	0.0	8.3	0.0	0.2	-	0.3	0.4	0.4
2025	0.1	0.8	0.1	-	0.3	5.3	0.0	0.7	0.0	0.1	0.6	0.1

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

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

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2016	-	-	-	-	-	-	-	-	-/-
2019	100	-	100	0	0	0	0	0	26/26
2025	120	-	17	83	0	50	33	0	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2016	-	-	-	-	-	-	-	-	-/-
2019	40	-	0	100	0	0	0	0	68/75
2025	60	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2016	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2025	60	-	0	100	0	0	0	0	- / -
Ephedra viridis[p] -- (mormon tea)									
2016	100	-	20	80	0	20	0	0	74/79
2019	60	-	0	100	0	33	0	0	36/48
2025	20	-	0	100	0	0	0	0	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2016	920	80	20	80	0	28	30	0	11/17
2019	400	-	15	85	0	25	0	0	14/21
2025	500	60	16	84	0	24	8	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2016	17460	80	31	68	1	0	0	1	18/21
2019	11300	3280	37	60	3	0	0	3	24/38
2025	8340	180	30	68	2	0	0	3	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2016	160	-	13	63	25	0	0	38	- / -
2019	20	40	100	0	0	0	0	0	- / -
2025	120	60	100	0	0	0	0	17	- / -
Linanthus pungens -- (granite prickly phlox)									
2016	480	-	29	71	0	25	33	13	8/12
2019	580	40	3	97	0	0	0	0	13/23
2025	540	-	11	89	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2016	60	-	33	67	0	0	0	0	12/30
2019	20	-	0	100	0	0	0	0	7/12
2025	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2016	80	60	75	25	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	-/-
2025	20	-	100	0	0	0	0	0	- / -
Purshia stansburiana[p] -- (Stansbury cliffrose)									
2016	340	20	47	41	12	29	24	12	67/87
2019	220	-	55	36	9	9	0	9	69/90
2025	340	-	41	59	0	53	0	0	- / -
Symphoricarpos longiflorus -- (desert snowberry)									
2016	280	-	7	93	0	43	43	0	39/58
2019	260	-	15	85	0	69	0	0	41/64
2025	380	100	26	63	11	26	16	11	- / -
Yucca -- (yucca)									
2016	-	-	-	-	-	-	-	-	32/42
2019	60	-	0	100	0	0	0	0	27/39
2025	40	-	0	100	0	0	0	0	- / -

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

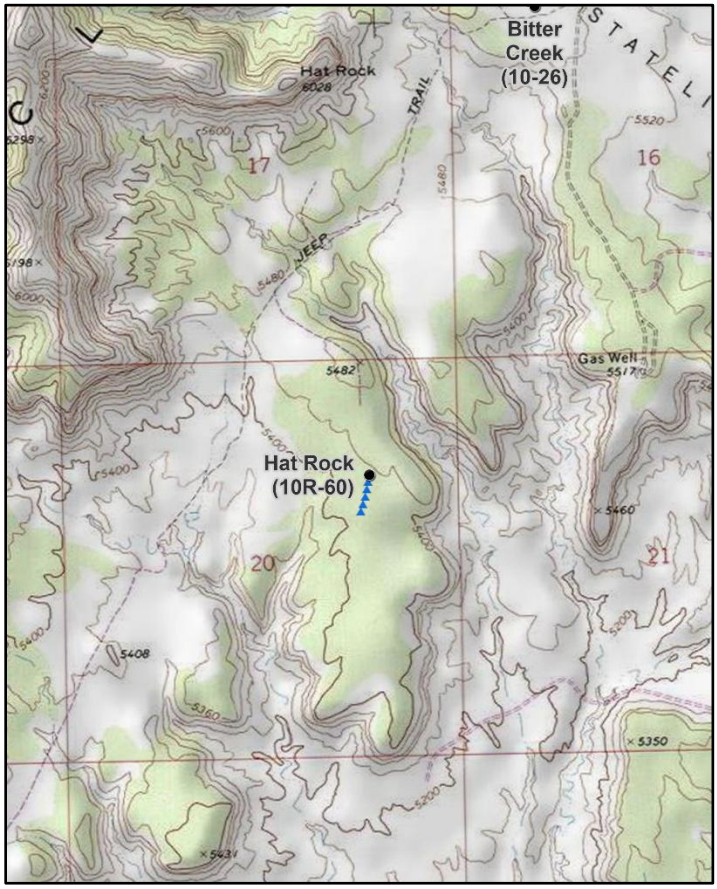
Table 10R-59.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

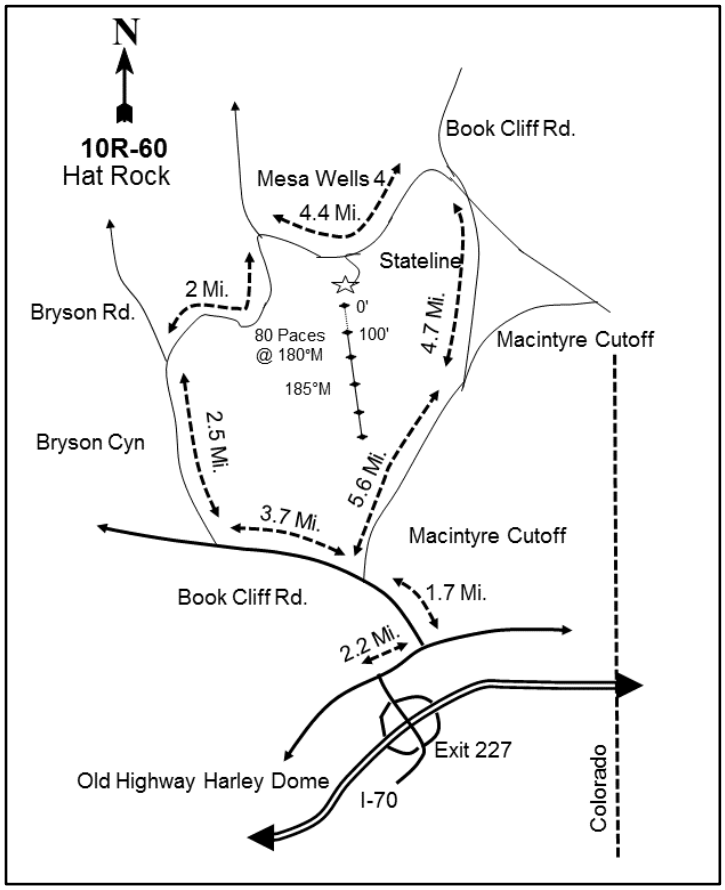
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2016	255	-	15	35	35	15	27.5
2019	15	13	88	-	-	-	11.4
2025	30	42	58	-	-	-	4.3
Pinus edulis (twoneedle pinyon)							
2016	54	-	67	7	7	20	11.9
2019	5	-	100	-	-	-	2.5
2025	13	43	57	-	-	-	4.1

Table 10R-59.15 - 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
2016	5.2	0.0	0.0	0.0	0.0	3.6	0.0	**8.8**	Very Poor
2019	1.1	0.0	0.0	3.5	-1.1	8.0	0.0	**11.5**	Very Poor
2025	2.7	0.0	0.0	10.6	-0.7	1.8	0.0	**14.4**	Very Poor

HAT ROCK - STUDY NO. 10R-60





Location Information

USGS 7.5 min Map Info	Bryson Canyon NE; Township 17S, Range 25E, Section 20
GPS (0' Stake)	NAD 83 UTM ZONE 12, 657938 East 4353537 North

Transect Information

Browse Tag # (0' Stake)	702
Transect Bearing	185° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From I-70, take exit #227 and turn north toward the Old Highway Harley Dome. Turn right on the Old Highway and continue for 2.2 miles to Book Cliff Road. On Book Cliff Road, proceed for 5.4 miles to Bryson Canyon Road. Take this road for 2.5 Miles to a "Y," bear right, continue another 2 miles to a "T," and turn right. Proceed for another 2.1 miles and the site will be on the right (south) side of the road, about 80 paces away at 180 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SAN ARROYO
Elevation	5,435ft (1,657m)
Aspect	West
Slope	5-7%
Sample Dates	07/25/2017, 08/18/2020, 05/28/2025

Table 10R-60.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Bookcliffs Phase 5 (Bryson)	3961	November 2017-January 2018	255
Seeding - Aerial Before	South Bookcliffs Phase 5 (Bryson)	3961	October 2017	325
Herbicide - Imazapic	South Bookcliffs Phase 9 (Cottonwood/San Arroyo Bullhog)	5654	November 2021	2711
Seeding - Aerial After	South Bookcliffs Phase 5 (Bryson)	3961	January 2018	325

Table 10R-60.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Bookcliffs Bryson			Aerial	Oct 2017	325
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery, UT	1.00	0.96
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.00	0.91
G	Poa secunda	Sandberg Bluegrass	UP Colorado Plateau	0.03	0.02
G	Poa secunda	Sandberg Bluegrass	UP Colorado Plateau	0.17	0.15
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.93
F	Achillea millefolium	Western Yarrow	Eagle	0.02	0.02
F	Achillea millefolium	Western Yarrow	Eagle	0.08	0.07
F	Cleome serrulata	Rocky Mountain Beeplant	Davis UT	0.45	0.40
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete UT	0.55	0.47
F	Dalea purpurea	Purple Prairie Clover	Bismark	0.62	0.61
F	Dalea purpurea	Purple Prairie Clover	Bismark	0.15	0.12
F	Helianthus annuus	Annual Sunflower	Montezuma CO	0.62	0.55
F	Linum perenne	Blue Flax	Appar	1.00	0.80
F	Medicago sativa	Alfalfa	Ladak	0.46	0.45
F	Medicago sativa	Alfalfa, Yellow	Don	0.31	0.30
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.87
F	Penstemon palmeri	Palmer Penstemon		0.20	0.13
F	Ratibida columnifera	Prairie Coneflower	Stillwater	1.00	0.81
F	Sanguisorba minor	Small Burnet		1.00	0.90
F	Sphaeralcea coccinea	Scarlet Globemallow	Uintah, UT	0.09	0.03
F	Sphaeralcea munroana	Munro Globemallow	Tooele UT	0.01	0.01
F	Sphaeralcea munroana	Munro Globemallow	Uintah UT	0.10	0.03
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	1.00	0.48

Mix Name			Application Type	Application Date	Acres
South Bookcliffs Bryson Shrub			Aerial	Jan 2018	325
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak	0.46	0.44
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Duchesne UT	0.49	0.10

Wildlife Habitat and Vegetation History

Table 10R-60.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 10R-60.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Pinyon-Juniper	Phase III
2020	Perennial Grass-Forb	Early Phase I
2025	Perennial Grass-Forb	Early Phase I

Site Notes

A midget faded rattlesnake was seen on the site in 2017.

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Semidesert Shallow Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY225UT
States and Transitions	2017 - Juniper Invasion State: Community Phase 3.2 2020-2025 - Seeded State: Community Phase Undefined

At the time of study establishment in 2017, this site was a twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*)-dominated plant community in Phase III of woodland succession with juniper being more common than pinyon. However, a bullhog and seeding treatment in the fall of 2017 (Table 10R-60.1) removed nearly all of the trees, and the site has been considered to be in Early Phase I of woodland succession since 2020 (Table 10R-60.4). There were no grasses sampled in 2017 and only two forb species observed. Perennial grasses and forbs increased in cover following treatment and became the dominant vegetation components. In 2025, much of the herbaceous cover was provided by the native perennial grass species thickspike wheatgrass (*Elymus lanceolatus*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) and the native perennial forb species rose heath (*Chaetopappa ericoides*) (Table 10R-60.7, Table 10R-60.10, Table 10R-60.11). Shrub species have been sparse prior to and after treatment, with broom snakeweed (*Gutierrezia sarothrae*) contributing a majority of the cover. However, cover and density data show that diversity of shrub species increased slightly in 2020 and the cover of fourwing saltbush (*Atriplex canescens*) increased between 2020 and 2025 (Table 10R-60.12, Table 10R-60.13); the site may continue to recover as time since treatment increases.

Condition of deer winter range on this site has ranged between very poor-poor and poor since 2017. The main factors negatively affecting winter range condition include the lack of preferred browse, reduced perennial grass and forb cover, and the presence of cheatgrass (*Bromus tectorum*) (Table 10R-60.6, Table 10R-60.7, Table 10R-60.10, Table 10R-60.15). Pellet transect data indicates that deer presence has remained low since 2017, but elk presence has increased and was considered to be high in 2025. During the 2024/25 winter season the area had scant occurrences of collared elk (Wildlife Migration Initiative). Preferred shrub populations are too small to accurately assess utilization (Photos, Table 10R-60.9, Table 10R-60.13). On-site observations for 2025 noted moderate utilization (20-40%) on bluebunch wheatgrass, but little to no utilization on forbs. It was also noted that herbaceous and browse species were green and doing well.

Trend Summary Tables

Table 10R-60.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2017	0.0	0.4	11.2	-	0.7	28.3
2020	0.0	2.4	0.6	-	3.0	-
2025	0.4	2.3	0.4	1.2	2.2	-

Table 10R-60.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2017	-	-	-	130	-	-	-	4.1
2020	16	91	79	197	0.1	3.4	2.2	9.7
2025	29	166	3	164	0.1	5.1	0.0	3.1

Table 10R-60.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2017	44.3	8.1	32.6	10.9	6.1	14.9
2020	17.3	0.6	49.2	14.6	4.2	18.4
2025	38.9	0.1	52.5	6.2	2.6	10.3

Table 10R-60.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2017	-	1	4	25
2020	-	1	2	18
2025	8	19	20	30
Year	Days Use Per Acre (ha)			
2017	-	-	4.0 (9.9)	-
2020	0.7 (1.8)	2.0 (5.0)	2.0 (5.0)	-
2025	16.7 (41.2)	13.4 (33.1)	45.6 (112.6)	-

Table 10R-60.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency						
2017	-	-	-	-	-	-	-
2020	-	13	3	51	2	45	3
2025	3	29	-	101	3	72	-
year	Average Cover (%)						
2017	-	-	-	-	-	-	-
2020	-	0.1	0.0	1.5	0.1	1.7	0.0
2025	0.0	0.1	-	2.8	0.0	2.2	-

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

Table 10R-60.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum desertorum[ai] (desert madwort)	Chaetopappa ericoides (rose heath)	Chamaesyce fendleri (Fendler's sandmat)	Cleome serrulata[a] (Rocky Mountain beeplant)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Gilia inconspicua[a] (shy gilia)	Helianthus annuus[a] (common sunflower)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Lithospermum incisum (narrowleaf stoneseed)	Lygodesmia (skeletonplant)	Medicago sativa[i] (alfalfa)	Medicago sativa ssp. falcata[i] (yellow alfalfa)	Mirabilis multiflora (Colorado four o'clock)
year	Nested Frequency																
2017	-	-	115	21	-	-	-	-	-	-	-	-	-	-	-	-	-
2020	15	6	137	12	14	12	40	6	8	2	3	55	3	5	0	-	0
2025	7	-	129	13	-	2	-	1	-	-	-	-	-	8	-	2	-
year	Average Cover (%)																
2017	-	-	3.8	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-
2020	0.1	0.0	5.2	0.8	0.9	0.0	0.6	0.0	0.2	0.2	0.0	1.0	0.0	0.0	0.0	-	0.0
2025	0.1	-	2.1	0.0	-	0.0	-	0.0	-	-	-	-	-	0.0	-	0.0	-

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

FORB SPECIES	Penstemon palmeri (Palmer's penstemon)	Physaria (twinpod)	Ratibida columnifera (upright prairie coneflower)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency							
2017	-	-	-	-	-	-	-	-
2020	11	3	12	0	3	6	11	5
2025	10	5	3	2	-	8	-	-
year	Average Cover (%)							
2017	-	-	-	-	-	-	-	-
2020	1.9	0.0	0.3	0.1	0.2	0.2	0.3	0.0
2025	0.5	0.0	0.2	0.0	-	0.1	-	-

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

Table 10R-60.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Ephedra nevadensis[p] (Nevada jointfir)	Eriogonum microthecum[p] (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)							
2017	-	-	-	-	0.7	24.7	0	3.6
2020	-	-	-	-	2.1	-	0.9	-
2025	-	1.2	-	-	2.1	-	0.1	-
year	Quadrat Cover (%)							
2017	0.0	-	-	0.0	0.2	10.9	0.2	0.4
2020	-	-	0.0	0.0	1.6	0.6	0.8	-
2025	-	0.4	-	-	1.7	0.4	0.5	-

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

Table 10R-60.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2017	-	-	-	-	-	-	-	-	55/46
2020	-	-	-	-	-	-	-	-	28/20
2025	20	-	0	100	0	100	0	0	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2017	-	-	-	-	-	-	-	-	-/-
2020	40	-	50	50	0	0	0	0	97/100
2025	40	-	0	100	0	0	100	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Ephedra nevadensis[p] -- (Nevada jointfir)									
2017	-	-	-	-	-	-	-	-	100/112
2020	40	-	50	50	0	100	0	0	54/85
2025	20	-	0	100	0	0	100	0	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2017	40	-	0	100	0	0	50	0	8/13
2020	160	20	38	63	0	0	0	0	12/21
2025	120	-	0	100	0	83	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2017	700	-	6	94	0	0	0	0	20/22
2020	3560	-	4	95	1	0	0	1	24/34
2025	2980	-	12	78	10	0	0	6	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2017	260	-	0	69	31	23	0	31	- / -
2020	20	-	0	100	0	0	0	0	- / -
2025	60	-	33	0	67	0	0	67	- / -
Opuntia polyacantha -- (plains pricklypear)									
2017	180	-	0	100	0	0	0	0	7/17
2020	300	-	13	87	0	0	0	0	8/25
2025	520	-	0	96	4	0	0	4	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2017	60	-	0	100	0	0	0	0	- / -

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

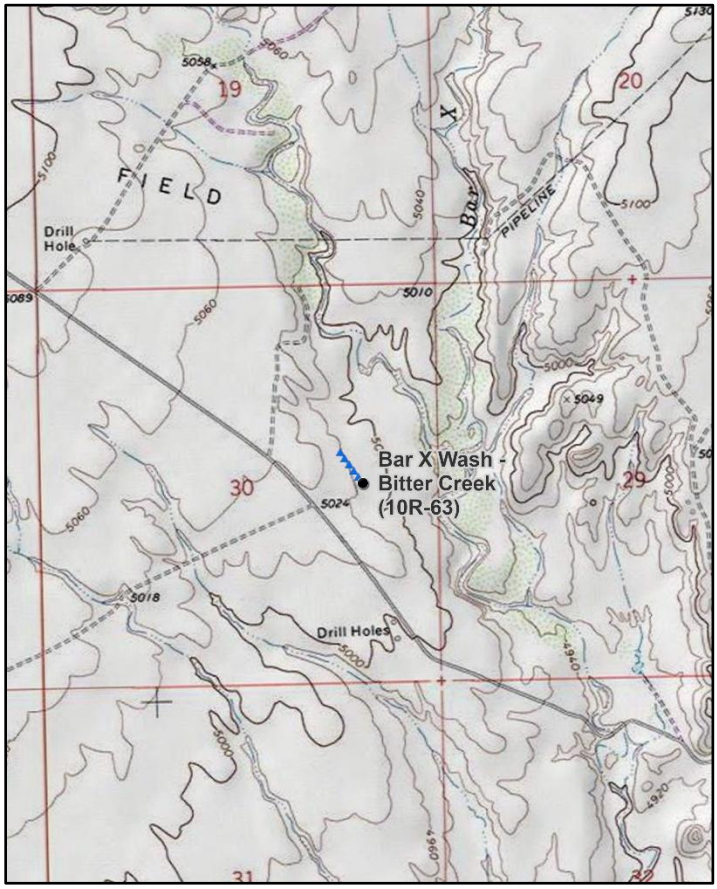
Table 10R-60.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

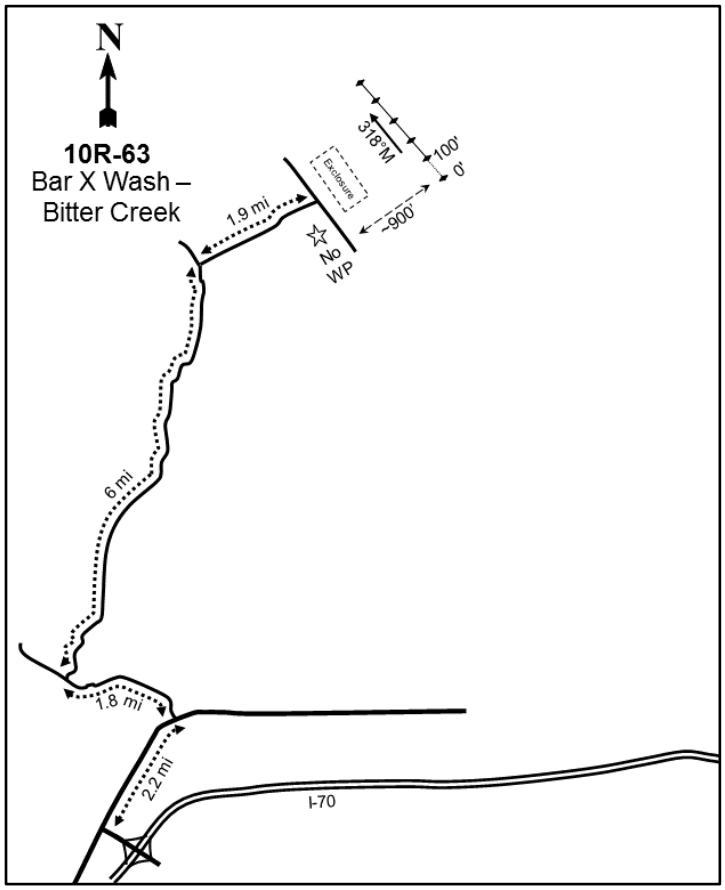
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2017	116	5	10	40	30	15	38.0
2020	13	-	100	-	-	-	8.0
2025	8	-	83	17	-	-	7.3
Pinus edulis (twoneedle pinyon)							
2017	22	22	44	-	-	33	7.3
2020	2	-	100	-	-	-	2.0
2025	7	-	100	-	-	-	3.5

Table 10R-60.15 - 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
2017	0.0	0.0	0.0	0.0	0.0	8.3	0.0	**8.3**	Very Poor-Poor
2020	0.0	0.0	0.0	6.7	-0.1	10.0	0.0	**16.6**	Poor
2025	1.5	0.0	0.0	10.1	-0.1	6.1	0.0	**17.6**	Poor

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





Location Information

USGS 7.5 min Map Info	Bar X Wash SW; Township 17S, Range 26E, Section 30
GPS (0' Stake)	NAD 83 UTM ZONE 12, 666068 East 4351770 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	318° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From I-70, take exit #227 (Harley Dome), go under the interstate, and turn right (east) onto the old Harley Dome highway. Drive 2.2 miles to Book Cliff Road. Turn left and drive for another 1.8 miles to Macintyre Cutoff. Bear right and proceed for 6 miles to a "T"-junction, then turn right. Continue for another 1.9 miles to another "T"-junction near an exclosure. Turn right and park near the south edge of the exclosure; there is no witness post. Walk 300 paces northeast to the transect.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SAN ARROYO
Elevation	5,020ft (1,530m)
Aspect	Northeast
Slope	3-5%
Sample Dates	08/23/2018, 07/28/2021, 05/28/2025

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Bitter Creek	-	1994	3659
Herbicide - Imazapic	Bitter Creek Restoration Phase 3	4465	October 2018	1869
Seeding - Rangeland Drill	Bitter Creek Fire Rehabilitation 1994	LTDL 1030-2817	1994	2595
Herbicide - Imazapic	Bitter Creek Phase 3 Seeding	4673	November 2019	4739

Table 10R-63.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
			Drill	Aug 1994	2595
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass		1.25	0.00
G	Pleuraphis jamesii	Galleta Grass	Viva	1.50	0.00
F	Linum lewisii	Lewis Flax		0.50	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.25	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.25	0.00
S	Atriplex canescens	Fourwing Saltbush		0.50	0.00
S	Krascheninnikovia lanata	Winterfat		0.50	0.00

Wildlife Habitat and Vegetation History

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

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

Table 10R-63.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Annual Grass	No Encroachment
2021	Annual Forb	No Encroachment
2025	Perennial Grass	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2018-2021 - Invasive Annual State: Community Phase 4.1 2025 - Current Potential State: Community Phase 2.5

At the time of study establishment in 2018, the plant community on this site was dominated by the introduced annual grass species cheatgrass (*Bromus tectorum*). The perennial grass species James' galleta (*Pleuraphis jamesii*) provided moderate amounts of cover, and blue grama (*Bouteloua gracilis*) was also observed in very low amounts. James' galleta increased in abundance and cover following the herbicide treatments (Table 10R-63.1) and was the only perennial grass observed; perennial grass was the dominant site component in 2025 (Table 10R-63.10). Forbs exhibited a lack of diversity prior to treatment with most of the cover provided by ruderal annual species. Perennial forb cover in particular was low at 0.9%, and was entirely contributed by rose heath (*Chaetopappa ericoides*) and scarlet globemallow (*Sphaeralcea coccinea*). However, the introduced annual species prickly Russian thistle (*Salsola tragus*) was the sole forb species observed in 2021 and was considered to be the dominant site component in that year. Prickly Russian thistle still contributed a majority of the forb cover in 2025, but rose heath and scarlet globemallow were also observed (Table 10R-63.11). Broom snakeweed (*Gutierrezia sarothrae*) and plains pricklypear (*Opuntia polycantha*) have been the only shrub species sampled throughout the study period, neither of which have contributed much cover (Table 10R-63.12, Table 10R-63.13). Perennial grasses could continue to increase in the future if weedy annual species maintain a relatively limited presence. The shrub component will likely remain limited in size and diversity without further treatment.

Condition of deer winter range on this site has ranged between very poor and poor since 2018. The main factors negatively affecting winter range condition include a lack of preferred browse, reduced perennial grass and forb cover, and the presence of cheatgrass(Table 10R-63.6, Table 10R-63.7, Table 10R-63.10, Table 10R-63.15). Pellet transect data indicates that deer/pronghorn presence was low in 2018 and 2021, but it was moderate in 2025. Elk pellets were observed for the first time in 2025. During the

2024/25 winter season the area had scant, nearby occurrences of collared elk (Wildlife Migration Initiative). Cattle presence has increased over time and was considered to be moderate in 2025 (Photos, Table 10R-63.9). On-site observations for 2025 noted heavy utilization (greater than 40%) on James' galleta, but light utilization (10-20%) on Russian thistle and globemallow. It was also noted that herbaceous and browse species were green and doing well.

Trend Summary Tables

Table 10R-63.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	-	1.7	-	-	0.8	-
2021	-	0.0	-	-	-	-
2025	-	1.6	-	-	2.7	-

Table 10R-63.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	262	193	105	56	10.6	3.5	3.5	0.9
2021	-	270	247	-	-	6.3	7.9	-
2025	190	268	146	37	1.4	9.9	5.0	0.3

Table 10R-63.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	41.8	2.8	51.1	0.1	-	19.7
2021	79.7	0.3	10.6	0.0	-	14.5
2025	35.2	0.2	60.2	0.1	0.0	18.2

Table 10R-63.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2018	1	8	-	-	51
2021	8	8	-	-	13
2025	10	28	3	-	48
Year	Days Use Per Acre (ha)				
2018	0.7 (1.8)	4.7 (11.6)	-	-	-
2021	14.5 (35.9)	2.7 (6.6)	-	0.6 (1.4)	-
2025	18.9 (46.6)	25.5 (62.9)	-	2.9 (7.2)	-

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

GRASS SPECIES	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Pleuraphis jamesii (James' galleta)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency			
2018	1	262	192	-
2021	-	-	270	-
2025	-	76	268	147
year	Average Cover (%)			
2018	0.0	10.6	3.4	-
2021	-	-	6.3	-
2025	-	0.2	9.9	1.3

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

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

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Chaetopappa ericoides (rose heath)	Chenopodium fremontii[a] (Fremont's goosefoot)	Descurainia pinnata[a] (western tansymustard)	Erodium cicutarium[ai] (redstem stork's bill)	Salsola tragus[ai] (prickly Russian thistle)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency						
2018	2	25	62	1	3	51	31
2021	-	-	-	-	-	247	-
2025	-	34	-	-	-	146	3
year	Average Cover (%)						
2018	0.0	0.6	1.1	0.0	0.0	2.3	0.3
2021	-	-	-	-	-	7.9	-
2025	-	0.3	-	-	-	5.0	0.0

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

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

SHRUB SPECIES	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept	
2018	0.8	0
2021	-	-
2025	1.8	0.9
year	Quadrat Cover (%)	
2018	1.7	0.0
2021	0.0	-
2025	1.2	0.4

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

Table 10R-63.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

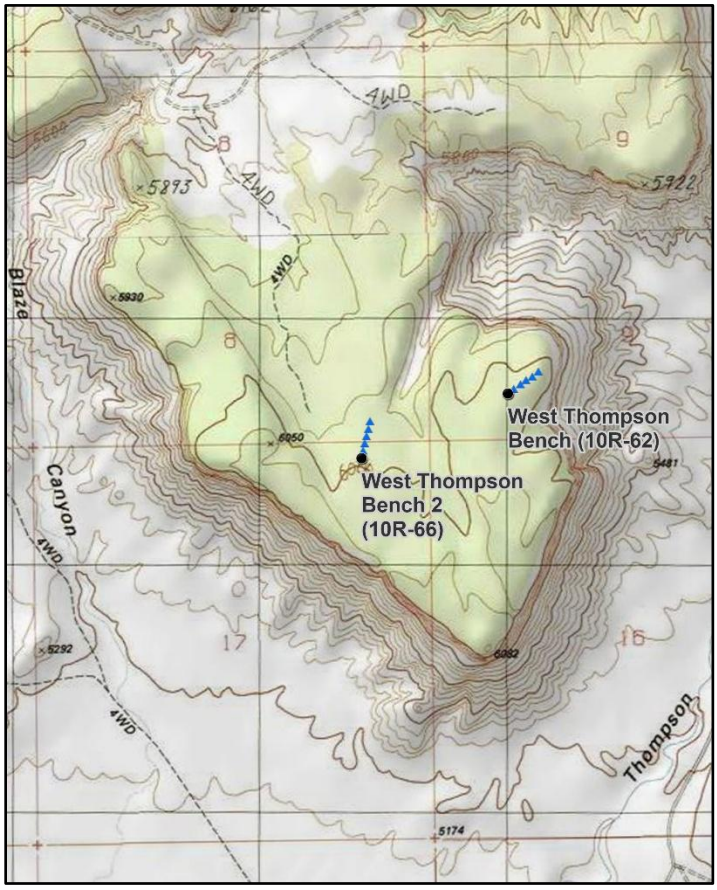
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Gutierrezia sarothrae -- (broom snakeweed)									
2018	1080	-	2	65	33	0	2	41	22/30
2021	240	20	92	8	0	0	0	75	- / -
2025	2900	-	35	64	1	7	1	1	- / -
Opuntia polyacantha -- (plains pricklypear)									
2018	100	-	0	100	0	0	0	0	10/13
2021	40	-	0	100	0	0	0	0	- / -
2025	60	-	0	100	0	0	0	0	- / -

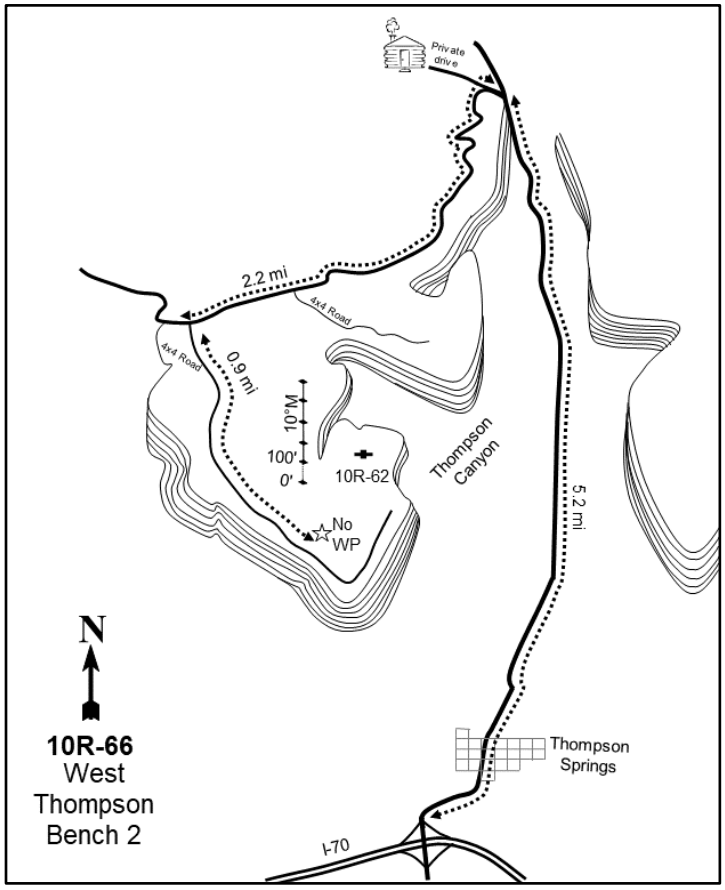
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 10R-63.15 - Deer Desirable Components Index: Semidesert Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2018	0.0	0.0	0.0	6.9	-7.9	1.8	0.0	**0.8**	Very Poor
2021	0.0	0.0	0.0	12.6	0.0	0.0	0.0	**12.6**	Poor
2025	0.0	0.0	0.0	19.8	-1.1	0.6	0.0	**19.3**	Poor

WEST THOMPSON BENCH 2 - STUDY NO. 10R-66





Location Information

USGS 7.5 min Map Info	Thompson Springs NW; Township 21S, Range 20E, Section 17
GPS (0' Stake)	NAD 83 UTM ZONE 12, 610352 East 4316640 North

Transect Information

Browse Tag # (0' Stake)	
Transect Bearing	15° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the town of Thompson Springs, travel north on Thompson Canyon Road for approximately 5.2 miles, crossing through the wash/dry creek bed four times. After the fourth crossing, there will be a four-way split in the road. Turn left at the split and cross the wash. Immediately after the wash there will be a fork: bear left again and follow this road south. After 2.2 miles, turn left onto a two-track road. Follow this two-track for roughly 0.9 miles, at which point the road will fade away. Park here and walk roughly 478 feet east to where the site is located on the bench. There is no witness post.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	CRESCENT CANYON
Elevation	6,000ft (1,829m)
Aspect	South
Slope	No data
Sample Dates	07/27/2021, 06/02/2025

Table 10R-66.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	South Bookcliffs Phase 6 (Blaze)	4522	October 2018	730
Seeding - Aerial After	South Bookcliffs Phase 6 (Blaze)	4522	March 2019	730
Mechanical - Bullhog	South Bookcliffs Phase 6 (Blaze)	4522	January-March 2019	730

Table 10R-66.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Bookcliffs Blaze			Aerial	Oct 2018	730
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery, UT	1.03	0.95
G	Bouteloua gracilis	Blue Grama	Hachita	0.48	0.35
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock II	0.55	0.45
G	Poa secunda	Nevada Bluegrass	Opportunity	0.48	0.41
G	Sporobolus cryptandrus	Sand Dropseed		0.10	0.10
F	Achillea millefolium	Western Yarrow	Eagle	0.01	0.01
F	Cleome serrulata	Rocky Mountain Beeplant		0.68	0.67
F	Dalea purpurea	Purple Prairie Clover		0.21	0.18
F	Dalea purpurea	Purple Prairie Clover		0.27	0.25
F	Helianthus annuus	Annual Sunflower		0.55	0.50
F	Linum perenne	Blue Flax		0.41	0.33
F	Medicago sativa	Alfalfa	Ladak DL	0.48	0.44
F	Onobrychis viciifolia	Sainfoin	Shoshone	1.03	0.90
F	Penstemon palmeri	Palmer Penstemon	Carbon UT	0.07	0.05
F	Ratibida columnifera	Prairie Coneflower	Stillwater	0.75	0.64
F	Sanguisorba minor	Small Burnet	Delar	1.03	0.90
F	Sphaeralcea munroana	Munro Globemallow	Uintah UT	0.07	0.05
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.29	0.12
S	Atriplex canescens	Fourwing Saltbush	Lincoln NV	0.62	0.33

Mix Name			Application Type	Application Date	Acres
South Bookcliffs Blaze Shrub			Aerial	Mar 2019	730
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak DL	0.48	0.41
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Carbon UT	0.12	0.05
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver, UT	0.38	0.11

Wildlife Habitat and Vegetation History

Table 10R-66.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 10R-66.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2021	Broom Snakeweed/Wyoming Big Sagebrush	Early Phase I
2025	Broom Snakeweed/Wyoming Big Sagebrush	Early Phase I

Site Notes

This study site was established to replace 10R-62 which fell outside the treatment area, and is intended to be used as response reference for the bullhog treatment that was supposed to occur on 10R-62.

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2021-2025 - Current Potential State: Community Phase 2.3

Since study establishment in 2021, this site has remained dominated by broom snakeweed (*Gutierrezia sarothrae*) with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and plains pricklypear (*Opuntia polyacantha*) as subordinate species (Table 10R-66.6, Table 10R-66.12). The establishment of this site followed a bullhog treatment (Table 10R-66.1) that was intended for the companion study 10R-62, which was in Phase III of woodland succession (Table 10R-62.4, Table 10R-62.12, Table 10R-62.13, Table 10R-62.14). Judging by the amount of masticated tree litter on the site and the fact that the area was treated, this site was likely in a similar woodland phase prior to treatment. Although not directly comparable, site response is likely similar to how 10R-62 would have responded following tree mastication. Density of Wyoming big sagebrush increased between 2021 and 2025, while decadence and poor vigor within the population decreased over the same period (Table 10R-66.13). Perennial grasses and forbs have remained limited following treatment, and perennial grass diversity in particular has remained low. The introduced annual grass species cheatgrass (*Bromus tectorum*) increased in abundance between 2021 and 2025, but cover remains low as of the most recent sampling (Table 10R-66.7, Table 10R-66.10, Table 10R-66.11). Few Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) have been observed on this site, and those that remained following mastication have mainly been seedlings and young trees (Table 10R-66.14). Infilling is possible over time and future input in tree removal may be necessary to ensure this shrub community's recovery. However, the site is currently in Early Phase I of woodland succession as of 2025 (Table 10R-66.4), indicating that infilling is likely not an immediate concern.

Condition of deer winter range on this site has remained very poor since 2021. The main factors negatively affecting winter range condition include the lack of preferred browse, reduced perennial grass and forb cover, and the presence of cheatgrass (Table 10R-66.6, Table 10R-66.7, Table 10R-66.15). Pellet transect data indicates that deer presence was high in 2021, but it was moderate in 2025. Elk and cattle presence have been low to absent. Utilization of sagebrush plants increased from 30% in 2021 to 90% in 2025 with the majority (67%) being heavily hedged in 2025 (Photos, Table 10R-66.9, Table 10R-66.13). On-site observations for 2025 noted light utilization (10-20%) on grass species, but little to no utilization on forb species. It was also noted that the herbaceous and browse communities were normal and vigorous. Among the wildlife species observed in the area in 2025 were song birds, pinyon jays, and deer.

Trend Summary Tables

Table 10R-66.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and 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	2.3	10.0	-	2.6	9.7	-
2025	3.2	14.2	-	3.5	10.6	-

Table 10R-66.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional 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	38	64	63	103	0.6	0.4	1.6	1.4
2025	138	75	39	28	2.9	2.1	0.4	0.2

Table 10R-66.8 - Basic 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	34.4	3.4	54.0	0.0	0.1	15.4
2025	33.6	0.9	55.0	1.0	0.0	21.6

Table 10R-66.9 - Pellet Group Data. Quadrat 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			
2021	-	39	3	20
2025	-	53	1	54
Year	Days Use Per Acre (ha)			
2021	-	53.0 (130.8)	-	-
2025	4.4 (10.8)	38.9 (96.0)	-	-

Table 10R-66.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency				
2021	36	38	17	12	-
2025	4	124	60	12	50
year	Average Cover (%)				
2021	0.2	0.6	0.1	0.0	-
2025	0.0	2.1	1.4	0.7	0.8

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

Table 10R-66.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus flexuosus (flexile milkvetch)	Calochortus nuttallii (sego lily)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cleome serrulata[a] (Rocky Mountain beeplant)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha gracilis[a] (narrowstem cryptantha)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum[a] (nodding buckwheat)	Gilia sinuata[a] (rosy gilia)	Helianthus annuus[a] (common sunflower)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis[a] (flatspine stickseed)	Lepidium[a] (pepperweed)	Linum perenne[i] (blue flax)	Medicago sativa[i] (alfalfa)	Microsteris gracilis[a] (slender phlox)
year	Nested Frequency																
2021	4	7	1	-	0	3	-	-	35	-	2	3	3	7	3	2	5
2025	-	5	-	1	-	-	2	1	15	4	5	-	1	0	2	-	4
year	Average Cover (%)																
2021	0.2	0.3	0.0	-	0.0	0.0	-	-	1.3	-	0.0	0.0	0.0	0.1	0.2	0.0	0.0
2025	-	0.0	-	0.0	-	-	0.0	0.0	0.2	0.0	0.0	-	0.0	0.0	0.0	-	0.0

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

FORB SPECIES	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon palmeri (Palmer's penstemon)	Penstemon speciosus (royal penstemon)	Salsola tragus[ai] (prickly Russian thistle)	Townsendia incana (hoary Townsend daisy)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency						
2021	76	8	1	3	17	3	-
2025	17	-	-	-	15	5	0
year	Average Cover (%)						
2021	0.6	0.0	0.0	0.0	0.2	0.0	-
2025	0.1	-	-	-	0.0	0.0	0.0

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

Table 10R-66.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Ephedra viridis[p] (mormon tea)	Eriogonum microthecum[p] (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)					
2021	2.5	-	0.1	-	6.5	3.2
2025	3.3	0	0.2	-	7.5	3.1
year	Quadrat Cover (%)					
2021	2.3	-	0.0	-	5.7	4.3
2025	2.9	0.0	0.2	0.1	10.2	4.0

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

Table 10R-66.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2021	980	-	4	35	61	14	16	65	- / -
2025	1040	20	6	64	31	23	67	31	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2021	-	-	-	-	-	-	-	-	-/-
2025	40	-	50	0	50	50	50	50	- / -
Ephedra viridis[p] -- (mormon tea)									
2021	20	-	0	100	0	0	100	0	- / -
2025	20	-	0	0	100	0	100	100	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2021	40	-	0	100	0	0	0	0	- / -
2025	80	-	25	50	25	50	50	25	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2021	9800	-	21	74	6	0	0	6	- / -
2025	19060	-	3	94	3	0	0	3	- / -
Opuntia polyacantha -- (plains pricklypear)									
2021	9240	-	1	71	28	0	0	25	- / -
2025	5360	-	0	91	9	0	0	7	- / -
Symphoricarpos longiflorus -- (desert snowberry)									
2021	-	-	-	-	-	-	-	-	-/-
2025	20	-	0	100	0	100	0	0	- / -

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

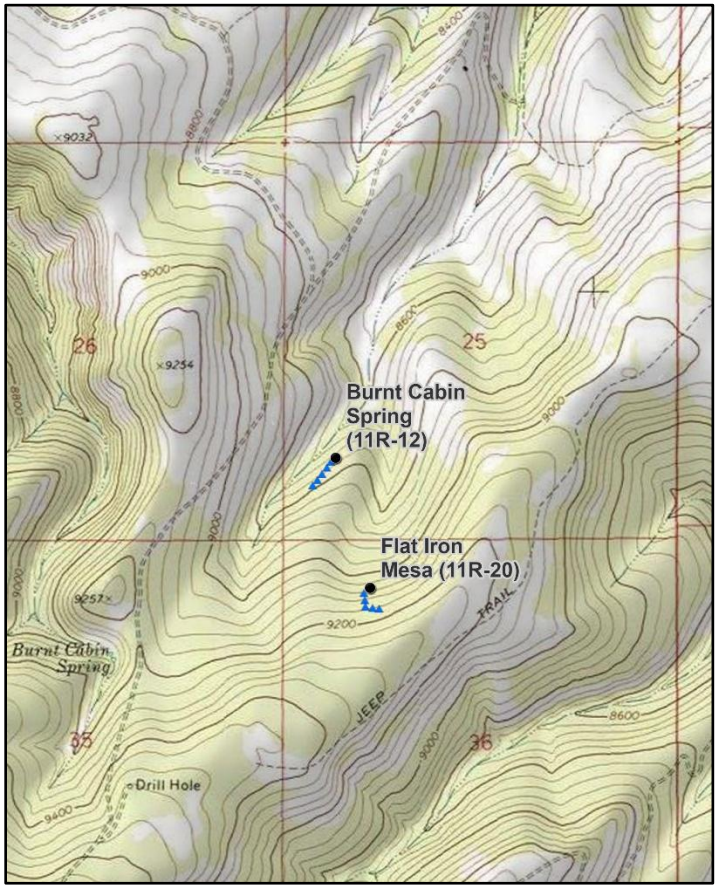
Table 10R-66.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

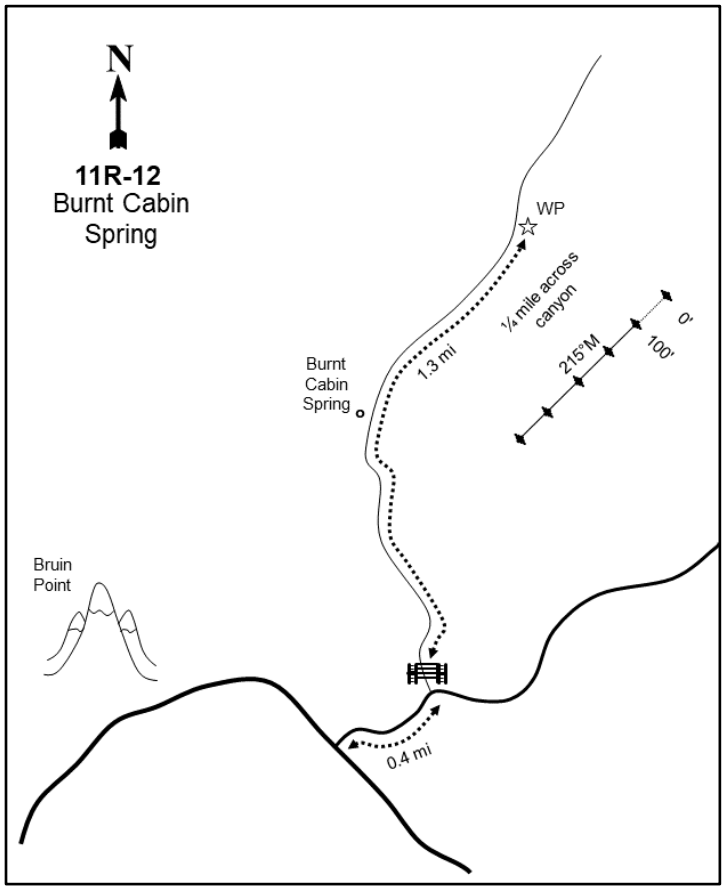
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2021	17	75	13	13	-	-	4.8
2025	15	17	67	17	-	-	5.5
Pinus edulis (twoneedle pinyon)							
2021	2	-	100	-	-	-	2.0
2025	2	-	100	-	-	-	2.0

Table 10R-66.15 - 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
2021	3.3	0.0	0.0	0.8	-0.4	2.8	0.0	**6.5**	Very Poor
2025	4.4	0.0	0.0	4.3	-2.2	0.5	0.0	**7.0**	Very Poor

BURNT CABIN SPRING - STUDY NO. 11R-12





Location Information

USGS 7.5 min Map Info	Bruin Point SE; Township 13S, Range 14E, Section 25
GPS (0' Stake)	NAD 83 UTM ZONE 12, 559658 East 4390313 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	215° magnetic (Line 5: 265° 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 Bruin Point, travel east to the entrance of Range Creek WMA and turn left. Drive 0.4 miles to a locked gate on the left. Proceed through the gate and continue 1.3 miles to a witness post on the right (east) side of the road. The study site is across the canyon to the southeast and on the lower portion of the hill slope. The 0-foot stake is a metal half-high fencepost, while the rest of the stakes are rock cairns with wooden posts; metal stakes should be placed during the next sampling.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	GREEN RIVER
Elevation	8,777ft (2,675m)
Aspect	Northwest
Slope	25%
Sample Dates	08/21/2012, 08/17/2016, 07/19/2022, 07/02/2025

Table 11R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Push	Cold Springs WMA Conifer Removal Aspen Regeneration Phase VI	4840	October 2019-July 2020	129
Fire - Prescribed	Cold Spring Aspen Enhancement Phase 2: Tavaputs Ranch	1932	June 2015	191

Wildlife Habitat and Vegetation History

Table 11R-12.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 11R-12.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Quaking Aspen-Conifer Encroached	NA
2016	Quaking Aspen	NA
2022	Annual-Perennial Forb/Quaking Aspen	NA
2025	Quaking Aspen/Perennial Forb	NA

Site Notes

This study is located two and a half miles northeast of Bruin Point within the Range Creek Wildlife Management Area.

Site Potential

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

At the outset of the study in 2012, this site was a Douglas Fir (*Pseudotsuga menziesii*) and subalpine fir (*Abies lasiocarpa*)-dominated forest. Many fallen and dead quaking aspen (*Populus tremuloides*) trees were present, but few live trees were sampled (Photos, Table 11R-12.13a, Table 11R-12.14). The shrub understory consisted of dense patches of creeping barberry (*Mahonia repens*) (Table 11R-12.12, Table 11R-12.13). The herbaceous understory was very low in abundance and lacked diversity (Table 11R-12.10, Table 11R-12.11). Following the controlled burn in 2015 (Table 11R-12.1), many of the conifer species were removed and aspen became a dominant species in the community (Table 11R-12.12, Table 11R-12.13). Species diversity increased significantly among the herbaceous understory. However, the noxious annual weed species gypsyflower (*Cynoglossum officinale*) was observed with low abundance in all post-treatment sample years (Table 11R-12.11). An additional treatment removed the standing dead timber in 2019 (Table 11R-12.1). Aspen increased in cover following treatment and has been the dominant woody species since 2016; Wood's rose (*Rosa woodsii*) and mountain snowberry (*Symphoricarpos oreophilus*) have also provided notable cover (Table 11R-12.12, Table 11R-12.13). Native annual and perennial forbs contributed much of the herbaceous cover during the first two post-treatment sample years and were co-dominant with aspen in 2022. Annual forb cover decreased during the most recent sampling, leaving perennial forbs to co-dominate with aspen in 2025 (Table 11R-12.7).

Summer range for deer has been improving; the diverse and abundant grass and browse communities on this site could provide adequate forage for summering mule deer as of 2025. Pellet transect data indicates that deer presence has been low over the course of the study. During the 2024/25 winter season the area had frequent, nearby occurrences of collared mule deer (Wildlife Migration Initiative). Elk presence has been similar to that of deer, but it was moderate in 2016. Cattle presence has been low to absent over the same period. Utilization has remained unremarkable (Photos, Table 11R-12.9, Table 11R-12.10, Table 11R-12.11, Table 11R-12.13). On-site observations state that there was moderate utilization (20-40%) of Ross' sedge (*Carex rossii*) during the most recent sample year (2025), while there was little to no utilization of forb species. Sagebrush showed good leader and leaf growth.

Trend Summary Tables

Table 11R-12.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	2.8	2.7	62.9	4.6	3.3	101.3
2016	4.1	1.7	6.7	4.7	2.6	12.3
2022	11.8	1.5	10.2	16.1	1.3	13.9
2025	18.3	0.8	10.0	23.6	1.1	19.7

Table 11R-12.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	-	47	1	152	-	0.6	0.0	5.7
2016	-	68	150	157	-	0.9	17.6	5.2
2022	14	110	210	224	0.4	5.7	16.1	11.8
2025	14	200	144	288	0.1	8.8	2.0	17.6

Table 11R-12.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	0.6	1.1	85.3	-	-	65.9
2016	4.6	-	69.1	1.2	0.3	31.2
2022	33.3	0.2	48.4	4.2	2.9	43.5
2025	17.3	-	52.9	5.0	2.5	49.4

Table 11R-12.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency					
2012	-	-	1	-	-	-
2016	-	-	4	6	-	1
2022	-	-	3	9	2	-
2025	-	-	6	11	-	-
Year	Days Use Per Acre (ha)					
2012	-	8.7 (21.5)*	8.7 (21.5)	5.3 (13.2)	-	-
2016	5.8 (14.3)	-	12.8 (31.5)	30.8 (76.1)	0.6 (1.4)	-
2022	-	-	8.1 (19.9)	5.3 (13.2)	-	-
2025	-	-	2.7 (6.6)	14.1 (34.8)	2.9 (7.2)	-

*Pellets per acre (ha)

Table 11R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus porteri (Porter brome)	Bromus tectorum[ai] (cheatgrass)	Carex rossii (Ross' sedge)	Elymus trachycaulus (slender wheatgrass)	Poa fendleriana (muttongrass)	Poa palustris (fowl bluegrass)	Poa pratensis[i] (Kentucky bluegrass)
year	Nested Frequency								
2012	-	-	20	-	24	-	-	-	11
2016	-	8	4	-	56	-	-	-	2
2022	-	15	31	14	73	-	6	0	3
2025	5	53	56	14	115	4	5	2	10
year	Average Cover (%)								
2012	-	-	0.2	-	0.2	-	-	-	0.2
2016	-	0.1	0.0	-	0.8	-	-	-	0.0
2022	-	0.9	1.1	0.4	3.3	-	0.2	0.0	0.1
2025	0.1	1.4	0.7	0.1	6.1	0.3	0.0	0.0	0.1

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

Table 11R-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum desertorum[ai] (desert madwort)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Aquilegia coerulea (Colorado blue columbine)	Arabis drummondii (Drummond's rockcress)	Arnica cordifolia (heartleaf arnica)	Astragalus miser var. oblongifolius (timber milkvetch)	Calochortus gunnisonii (Gunnison's mariposa lily)	Chenopodium atrovirens[a] (pinyon goosefoot)	Cirsium (thistle)	Collomia linearis[a] (tiny trumpet)	Corydalis[a] (fumewort)	Cymopterus (springparsley)	Cynoglossum officinale[ani] (gypsyflower)	Descurainia californica[a] (Sierra tansymustard)	Dracocephalum parviflorum (American dragonhead)	Epilobium (willowherb)
year	Nested Frequency																
2012	8	-	-	-	-	-	10	-	-	-	-	-	-	-	1	-	-
2016	8	13	1	11	-	-	5	-	64	3	-	76	-	3	21	3	1
2022	31	-	2	4	-	16	6	13	51	7	5	4	-	1	136	58	1
2025	63	-	19	17	9	52	13	4	76	109	28	-	2	21	-	5	4
year	Average Cover (%)																
2012	0.1	-	-	-	-	-	0.2	-	-	-	-	-	-	-	0.0	-	-
2016	0.5	0.2	0.0	0.4	-	-	0.1	-	2.4	0.0	-	10.1	-	0.1	4.2	0.0	0.0
2022	1.1	-	0.1	0.3	-	0.6	0.0	1.0	2.3	0.4	0.0	0.1	-	0.1	10.9	1.8	0.0
2025	1.5	-	0.3	2.0	0.0	0.6	0.1	0.0	0.3	5.7	0.1	-	0.0	0.7	-	0.0	0.0

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

FORB SPECIES	Eucephalus engelmannii (Engelmann's aster)	Fragaria virginiana (Virginia strawberry)	Hackelia patens (spotted stickseed)	Heliomeris multiflora (showy goldeneye)	Iliamna rivularis (streambank wild hollyhock)	Ipomopsis aggregata (scarlet gilia)	Ligusticum (licorice-root)	Maianthemum racemosum ssp. amplexicaule (feathery false lily of the valley)	Maianthemum stellatum (starry false lily of the valley)	Osmorhiza berteroi (sweetcicely)	Penstemon strictus (Rocky Mountain penstemon)	Phacelia sericea[a] (silky phacelia)	Polygonum douglasii[a] (Douglas' knotweed)	Ranunculus inamoenus (graceful buttercup)	Silene menziesii (Menzies' campion)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)
year	Nested Frequency																
2012	12	13	-	-	-	-	-	9	39	47	-	-	-	-	-	-	-
2016	6	7	-	-	2	3	1	2	13	15	-	16	-	10	10	3	1
2022	2	21	34	4	-	-	-	-	14	25	-	15	51	6	-	27	44
2025	27	18	24	20	1	-	3	4	14	-	1	8	63	7	6	-	68
year	Average Cover (%)																
2012	0.1	0.3	-	-	-	-	-	0.6	1.7	0.4	-	-	-	-	-	-	-
2016	0.1	0.2	-	-	0.1	0.0	0.0	0.1	0.1	0.3	-	0.6	-	0.1	0.3	0.0	0.0
2022	0.1	0.9	1.5	0.3	-	-	-	-	0.4	0.8	-	0.9	1.7	0.0	-	0.6	0.6
2025	1.1	0.7	0.7	0.4	0.4	-	0.1	0.2	0.5	-	0.0	0.3	0.2	0.0	0.0	-	1.4

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

FORB SPECIES	Thalictrum fendleri (Fendler's meadow-rue)	Tragopogon[ai] (goatsbeard)	Viola adunca (hookedspur violet)
year	Nested Frequency		
2012	38	-	80
2016	38	-	106
2022	5	-	54
2025	21	3	67
year	Average Cover (%)		
2012	1.2	-	1.2
2016	0.9	-	2.0
2022	0.3	-	1.0
2025	0.9	0.0	1.2

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

Table 11R-12.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies lasiocarpa[t] (subalpine fir)	Acer negundo var. negundo[t] (boxelder)	Amelanchier utahensis[p] (Utah serviceberry)	Arctostaphylos patula (greenleaf manzanita)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Mahonia repens (creeping barberry)	Paxistima myrsinites (Oregon boxleaf)	Populus tremuloides[tp] (quaking aspen)	Pseudotsuga menziesii[t] (Douglas-fir)	Ribes[p] (currant)	Ribes cereum var. cereum[p] (wax currant)	Rosa woodsii[p] (Woods' rose)	Rubus (blackberry)	Sambucus nigra ssp. cerulea[p] (blue elderberry)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)														
2012	73.8	-	-	-	-	0.3	3	21.4	6.1	0.1	-	1.1	-	-	3.4
2016	2.9	-	-	-	-	2.2	0.4	9.4	-	-	0	2.9	-	0	1.8
2022	-	-	-	-	-	1.3	-	13.9	-	-	-	7.9	-	1	7.2
2025	-	0.3	-	-	0.2	1	0.1	19.4	-	-	0.4	11.5	-	1.1	10.4
year	Quadrat Cover (%)														
2012	49.3	0.0	-	-	-	0.7	2.0	2.7	10.9	0.0	0.0	0.8	-	-	1.9
2016	2.4	-	0.0	0.3	0.0	1.0	0.3	4.3	-	-	0.0	2.2	0.0	0.1	1.7
2022	-	-	-	0.1	-	1.0	0.3	10.2	-	0.1	-	5.8	-	0.0	5.9
2025	-	0.0	-	-	0.4	0.7	0.1	10.0	-	-	0.6	9.7	-	0.5	7.1

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

Table 11R-12.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Abies lasiocarpa[t] -- (subalpine fir)									
2012	3500	920	78	15	6	0	0	9	- / -
2016	20	80	100	0	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	- / -
2025	-	-	-	-	-	-	-	-	-/-
Amelanchier utahensis[p] -- (Utah serviceberry)									
2012	-	-	-	-	-	-	-	-	-/-
2016	-	20	0	0	0	0	0	0	24/20
2022	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	-	-	-	-	-	-	-	-	-/-
2016	40	-	100	0	0	0	0	0	- / -
2022	20	-	0	100	0	0	0	0	- / -
2025	100	60	60	40	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
2012	1540	-	0	100	0	0	0	0	14/13
2016	1820	-	0	100	0	0	0	0	15/21
2022	5740	360	0	100	0	0	0	0	- / -
2025	2680	-	1	99	0	0	0	0	- / -
Paxistima myrsinites -- (Oregon boxleaf)									
2012	6860	-	11	88	1	0	0	0	12/14
2016	3320	320	40	60	0	0	0	0	9/9
2022	280	340	50	50	0	0	0	0	- / -
2025	960	-	13	88	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Pseudotsuga menziesii[t] -- (Douglas-fir)									
2012	180	-	22	56	22	0	44	11	- / -
2016	-	-	-	-	-	-	-	-	- / -
2022	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Ribes[p] -- (currant)									
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2022	80	-	0	100	0	0	0	0	- / -
2025	20	-	0	100	0	0	0	0	- / -
Ribes cereum var. cereum[p] -- (wax currant)									
2012	60	-	67	33	0	0	0	0	63/50
2016	20	180	100	0	0	0	0	0	11/13
2022	-	-	-	-	-	-	-	-	-/-
2025	100	-	0	100	0	20	0	0	- / -
Rosa woodsii[p] -- (Woods' rose)									
2012	2780	-	9	91	0	0	0	0	25/22
2016	4320	100	27	73	0	1	0	2	24/28
2022	4120	20	15	85	0	1	0	0	- / -
2025	5820	-	4	93	3	10	0	3	- / -
Rubus -- (blackberry)									
2012	-	-	-	-	-	-	-	-	-/-
2016	80	-	25	75	0	0	0	0	7/11
2022	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Sambucus nigra ssp. cerulea[p] -- (blue elderberry)									
2012	-	-	-	-	-	-	-	-	-/-
2016	20	200	100	0	0	0	0	0	26/24
2022	20	-	0	100	0	0	0	0	- / -
2025	40	-	0	100	0	0	0	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2012	3560	-	4	96	0	0	0	1	48/37
2016	2200	60	36	65	0	32	12	0	25/38
2022	2080	380	12	89	0	5	1	0	- / -
2025	3480	-	5	95	0	35	0	0	- / -

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

Table 11R-12.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

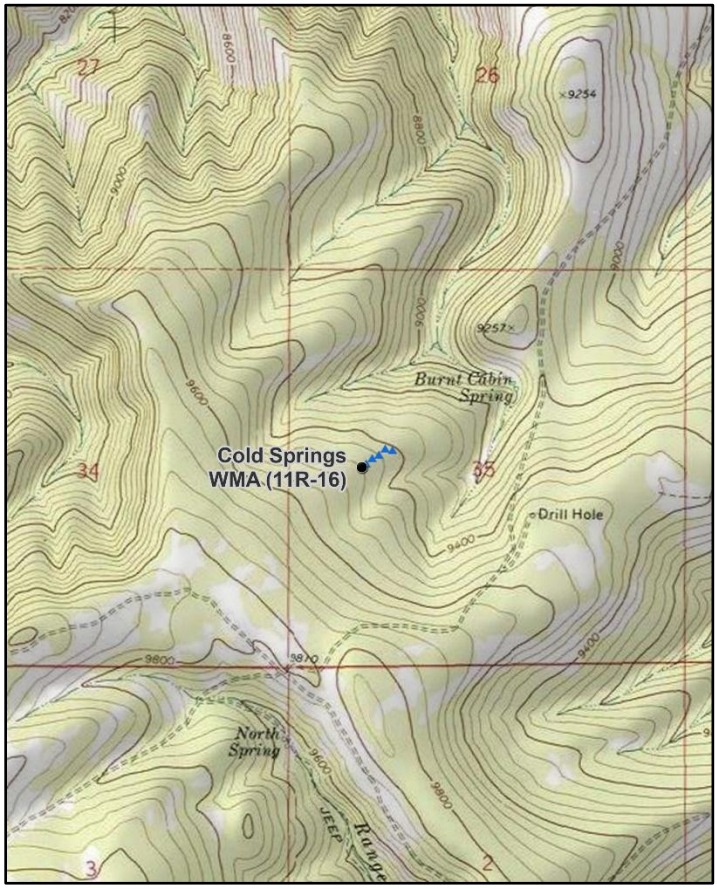
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2012	960	46	10	44	-	0	0	0
2016	4580	23	70	7	1	20	49	5
2022	2280	4	59	37	-	2	0	0
2025	2140	1	31	27	41	3	0	0

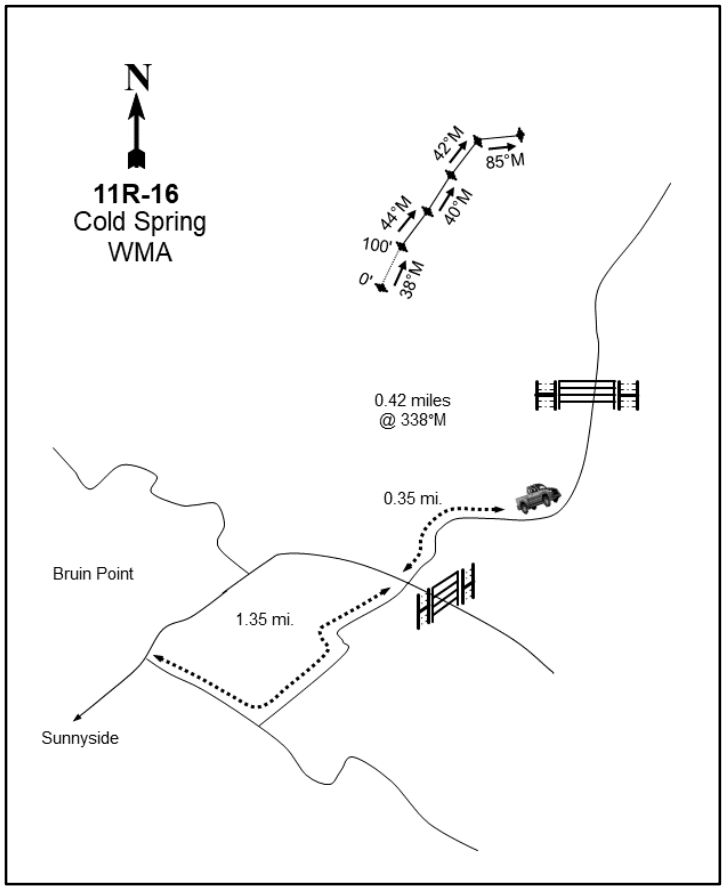
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

Table 11R-12.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Abies lasiocarpa (subalpine fir)							
2012	2569	60	15	10	5	10	2.6
2016	9	-	50	50	-	-	2.3
Populus tremuloides (quaking aspen)							
2012	287	6	28	6	-	61	8.6
2016	1097	30	60	-	-	10	3.3
2022	455	-	75	25	-	-	2.2
2025	471	-	30	65	5	-	2.7

COLD SPRINGS WMA - STUDY NO. 11R-16





Location Information	
USGS 7.5 min Map Info	Bruin Point SW; Township 13S, Range 14E, Section 35
GPS (0' Stake)	NAD 83 UTM ZONE 12, 558133 East 4389177 North

Transect Information	
Browse Tag # (0' Stake)	Not Available
Transect Bearing magnetic)	38° magnetic (Line 2: 44° magnetic, Line 3: 40° magnetic, Line 4: 42° magnetic, Line 5: 85°
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 5: 15ft

Directions to Site

From Bruin Point, travel east to the entrance to Range Creek WMA and turn left. Drive 0.4 miles to a locked gate on the left. The study site is across the canyon to the northwest on the ridge approximately one half mile away.

Site Information	
Land Ownership	State
Land Administrator	UDWR
Allotment	GREEN RIVER
Elevation	9,305ft (2,836m)
Aspect	Northeast
Slope	8-10%
Sample Dates	07/02/2013, 08/17/2016, 07/19/2022, 07/01/2025

Table 11R-16.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Push	Cold Springs Conifer Removal/Aspen Regeneration Phase II	2637	July 2013-June 2014	45

Wildlife Habitat and Vegetation History

Table 11R-16.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 11R-16.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Subalpine Fir	NA
2016	Quaking Aspen	NA
2022	Quaking Aspen/Perennial Grass-Forb	NA
2025	Quaking Aspen/Perennial Grass-Forb	NA

Site Notes

The lines of this transect were shifted in 2016 to avoid large piles of litter from the push treatment. However, the site was shifted back to an orientation closer to that of the original transect in 2022. There was also a doe carcass found near the site in 2016.

Site Potential

1981 - 2010 Average Annual Precipitation	23 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2012, this site was a subalpine fir (*Abies lasiocarpa*)-dominated forest. Many fallen and dead quaking aspen (*Populus tremuloides*) trees were present, but few live trees were sampled (Photos, Table 11R-16.12, Table 11R-16.13). The herbaceous understory had moderate abundance, but lacked diversity (Table 11R-16.7, Table 11R-16.10, Table 11R-16.11). Many conifers were removed by the push treatment in 2015, and aspen has been a dominant site component since 2016. Shrubs have also increased, with Woods' rose (*Rosa woodsii*) contributing most of the browse cover in all post-treatment sample years (Table 11R-16.12, Table 11R-16.13, Table 11R-16.13a, Table 11R-16.14). In addition, species diversity increased substantially among the herbaceous understory following the push treatment (Table 11R-16.10, Table 11R-16.11).

Summer range for deer has been improving over time; the diverse and abundant grass and browse communities on this site could provide adequate forage for summering mule deer as of 2025. Pellet transect data indicates that deer presence has been low over the course of the study. During the 2024/25 winter season the area had frequent occurrences of collared mule deer (Wildlife Migration Initiative). Elk presence has been similar to that of deer, but it was moderate in 2025. Cattle presence has been low to absent over the same period. As a whole, utilization has remained relatively unremarkable. However, mountain snowberry had notable utilization in 2016 and 2022 (Photos, Table 11R-16.9, Table 11R-16.10, Table 11R-16.11, Table 11R-16.13). On-site observations stated that there was little to no utilization on grass species during the most recent sample year (2025), while there was light utilization (10-20%) on showy goldeneye (*Heliomeris multiflora*). Sagebrush showed good leader and leaf growth. Among the wildlife species that had evidence observed in the area in 2025 were song birds, bear, elk, and deer; feral horses were also observed on the hike to the study site.

Trend Summary Tables

Table 11R-16.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	1.5	0.2	29.3	1.5	0.2	75.1
2016	1.1	-	8.0	1.9	-	10.7
2022	11.6	0.6	21.2	12.0	0.9	33.8
2025	12.3	2.1	14.9	14.9	3.6	41.8

Table 11R-16.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	42	7	149	-	0.5	0.1	7.5
2016	-	205	318	257	-	8.1	10.0	13.4
2022	-	339	196	348	-	24.2	3.7	18.7
2025	-	324	92	327	-	22.7	0.8	23.4

Table 11R-16.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	0.5	0.1	86.0	0.2	0.1	40.6
2016	17.8	0.4	46.6	2.3	0.4	35.0
2022	19.0	0.1	48.9	2.6	1.1	55.7
2025	8.9	-	55.3	2.5	0.8	58.0

Table 11R-16.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Black Bear	Cattle	Mule Deer	Rocky Mountain Elk	Horse
	Quadrat Frequency				
2013	-	-	-	1	-
2016	-	2	6	2	-
2022	-	-	3	5	1
2025	-	-	3	7	-
Year	Days Use Per Acre (ha)				
2013	8.7 (21.5)*	1.5 (3.6)	0.7 (1.7)	3.4 (8.3)	-
2016	-	3.6 (9.0)	6.0 (14.9)	2.0 (5.0)	-
2022	8.7 (21.5)*	2.9 (7.2)	18.1 (44.7)	1.3 (3.3)	-
2025	-	-	2.7 (6.6)	20.8 (51.3)	1.7 (4.3)

*Pellets per acre (ha)

Table 11R-16.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency									
2013	-	9	4	-	31	-	-	-	-	-
2016	4	10	5	-	200	2	1	-	2	0
2022	4	30	4	25	311	-	5	-	7	-
2025	-	52	-	39	268	-	6	2	15	5
year	Average Cover (%)									
2013	-	0.0	0.0	-	0.4	-	-	-	-	-
2016	0.1	0.3	0.1	-	7.4	0.0	0.0	-	0.1	0.0
2022	0.1	1.8	0.0	1.9	19.6	-	0.2	-	0.4	-
2025	-	2.1	-	0.7	18.4	-	0.2	0.1	1.1	0.0

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

Table 11R-16.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Alyssum desertorum[ai] (desert madwort)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria microphylla (littleleaf pussytoes)	Antennaria parvifolia (small-leaf pussytoes)	Aquilegia coerulea (Colorado blue columbine)	Arabis drummondii (Drummond's rockcress)	Arnica cordifolia (heartleaf arnica)	Astragalus miser var. oblongifolius (timber milkvetch)	Carduus nutans[ani] (nodding plumeless thistle)	Chenopodium atrovirens[a] (pinyon goosefoot)	Cirsium (thistle)	Collomia linearis[a] (tiny trumpet)	Descurainia californica[a] (Sierra tansymustard)	Dracocephalum parviflorum (American dragonhead)	Eucephalus engelmannii (Engelmann's aster)
year	Nested Frequency																
2013	13	6	-	6	-	-	-	4	59	14	-	-	-	-	-	-	58
2016	41	-	1	32	5	-	2	20	57	61	-	179	-	61	0	1	3
2022	47	8	-	2	3	-	4	36	62	13	8	8	4	124	15	5	-
2025	87	3	-	22	4	4	1	34	63	29	7	10	-	38	-	-	3
year	Average Cover (%)																
2013	0.1	0.0	-	0.0	-	-	-	0.0	1.6	0.5	-	-	-	-	-	-	1.8
2016	2.3	-	0.0	0.3	0.2	-	0.0	0.2	0.9	1.1	-	3.1	-	0.9	0.0	0.1	0.0
2022	1.5	0.2	-	0.0	0.4	-	0.2	0.2	1.4	0.2	0.5	0.0	0.0	1.9	0.1	0.0	-
2025	2.5	0.0	-	0.3	0.1	0.3	0.1	0.2	1.9	0.8	0.1	0.0	-	0.1	-	-	0.1

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

FORB SPECIES	Fragaria virginiana (Virginia strawberry)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gentianella amarella ssp. heterosepala[a] (autumn dwarf gentian)	Heliomeris multiflora var. multiflora (showy goldeneye)	Ligusticum (licorice-root)	Lupinus argenteus (silvery lupine)	Oreochrysum parryi (Parry's goldenrod)	Osmorhiza berteroi (sweetcicely)	Phacelia sericea[a] (silky phacelia)	Polygonum douglasii[a] (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Pseudostellaria jamesiana (tuber starwort)	Ranunculus inamoenus (graceful buttercup)	Silene menziesii (Menzies' campion)	Stenotus acaulis (stemless mock goldenweed)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)
year	Nested Frequency																
2013	8	-	-	-	-	38	-	-	1	-	-	-	-	17	-	-	11
2016	32	61	15	1	7	75	-	2	48	207	-	-	34	2	1	17	144
2022	57	86	3	13	-	139	-	2	6	86	5	14	4	10	33	42	151
2025	69	42	-	36	-	161	14	-	2	4	-	-	16	8	-	96	179
year	Average Cover (%)																
2013	0.2	-	-	-	-	2.4	-	-	0.0	-	-	-	-	0.0	-	-	0.3
2016	0.6	1.0	0.3	0.0	0.0	3.0	-	0.0	0.9	3.5	-	-	0.9	0.0	0.0	0.5	2.8
2022	1.7	0.6	0.0	0.7	-	4.5	-	0.0	0.0	0.5	0.1	0.3	0.0	0.1	0.8	1.0	4.3
2025	1.1	0.1	-	0.4	-	8.9	0.3	-	0.0	0.0	-	-	0.1	0.0	-	2.5	3.1

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

FORB SPECIES	Tragopogon dubius[ai] (yellow salsify)	Viola adunca (hookedspur violet)
year	Nested	
2013	-	16
2016	-	38
2022	-	80
2025	6	40
year	Average Cover (%)	
2013	-	0.6
2016	-	0.6
2022	-	1.1
2025	0.0	0.6

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

Table 11R-16.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies lasiocarpa[t] (subalpine fir)	Paxistima myrsinites (Oregon boxleaf)	Physocarpus malvaceus (mallow ninebark)	Picea engelmannii[t] (Engelmann spruce)	Populus tremuloides[tp] (quaking aspen)	Ribes cereum[p] (wax currant)	Ribes montigenum[p] (gooseberry currant)	Rosa woodsii[p] (Woods' rose)	Rubus idaeus (American red raspberry)	Sambucus nigra ssp. cerulea[p] (blue elderberry)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)										
2013	63.4	0.2	-	1.6	10.1	-	-	0.9	-	-	0.6
2016	-	-	-	-	10.7	0.1	-	1.6	-	-	0.2
2022	0.8	-	-	-	33	1.7	0.9	7.3	0.9	0.7	1.4
2025	0.5	-	1.4	0.2	41.1	0.2	1.8	8.9	2.2	0.3	3.7
year	Quadrat Cover (%)										
2013	28.5	0.2	-	0.2	0.6	-	-	1.1	-	-	0.4
2016	-	-	-	-	8.0	0.0	-	0.9	-	-	0.2
2022	0.9	0.1	-	-	20.3	1.4	1.0	7.9	0.5	0.1	1.2
2025	0.4	-	0.5	0.1	14.4	0.0	1.2	8.6	1.6	0.0	2.5

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

Table 11R-16.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Abies lasiocarpa[t] -- (subalpine fir)									
2013	3900	1740	70	25	6	6	7	10	- / -
2016	20	-	100	0	0	0	0	0	- / -
2022	120	-	100	0	0	0	0	0	- / -
2025	100	-	80	20	0	0	0	0	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	42/37
2022	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Paxistima myrsinites -- (Oregon boxleaf)									
2013	520	-	0	100	0	0	0	0	11/28
2016	-	-	-	-	-	-	-	-	12/11
2022	20	-	0	100	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Physocarpus malvaceus -- (mallow ninebark)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
2025	160	-	0	100	0	0	0	0	- / -
Picea engelmannii[t] -- (Engelmann spruce)									
2013	60	-	33	33	33	0	0	0	- / -
2016	-	-	-	-	-	-	-	-	-/-
2022	20	-	100	0	0	0	0	0	- / -
2025	20	-	100	0	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Ribes cereum[p] -- (wax currant)									
2013	-	-	-	-	-	-	-	-	64/28
2016	40	20	100	0	0	0	0	0	41/26
2022	160	-	38	63	0	0	13	0	- / -
2025	40	-	0	100	0	0	0	0	- / -
Ribes montigenum[p] -- (gooseberry currant)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2022	100	-	40	60	0	60	0	0	- / -
2025	220	-	9	82	9	0	0	9	- / -
Rosa woodsii[p] -- (Woods' rose)									
2013	1340	20	33	67	0	3	0	0	29/29
2016	1300	-	5	95	0	25	0	0	32/36
2022	2560	160	9	89	2	6	10	2	- / -
2025	2740	20	10	87	4	0	0	3	- / -
Rubus idaeus -- (American red raspberry)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2022	2620	-	11	89	0	0	5	0	- / -
2025	840	-	24	76	0	14	0	0	- / -
Sambucus nigra ssp. cerulea[p] -- (blue elderberry)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	44/39
2022	40	-	0	100	0	0	50	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2013	540	-	41	59	0	4	0	0	52/52
2016	440	-	23	77	0	91	0	0	47/79
2022	140	-	14	86	0	0	57	0	- / -
2025	400	-	15	80	5	10	0	5	- / -

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

Table 11R-16.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

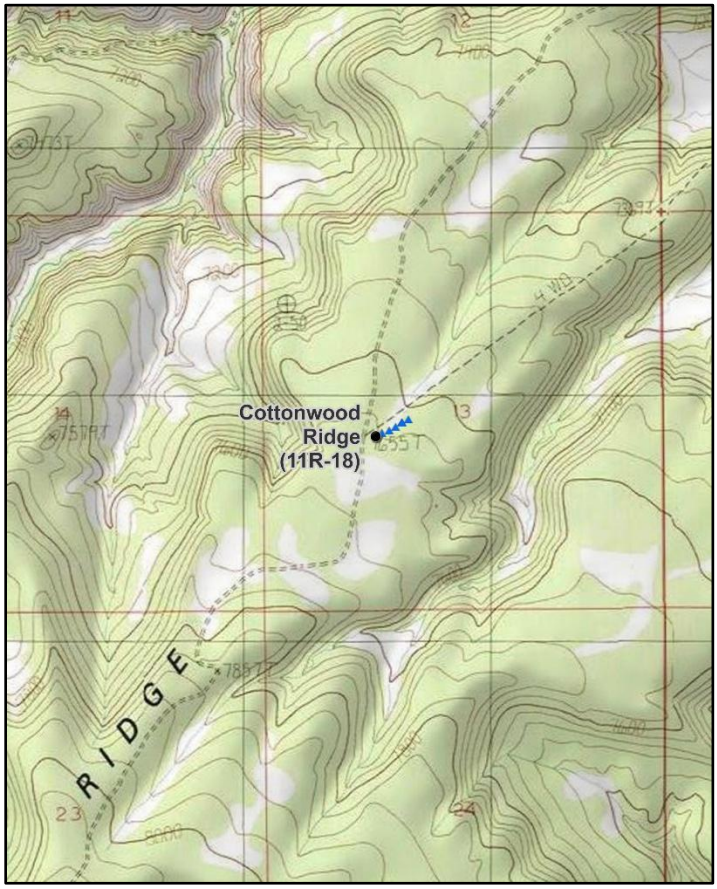
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2013	500	4	20	36	40	8	0	4
2016	5400	12	86	1	-	38	10	0
2022	6660	3	32	63	2	1	3	1
2025	4900	2	15	35	48	0	0	2

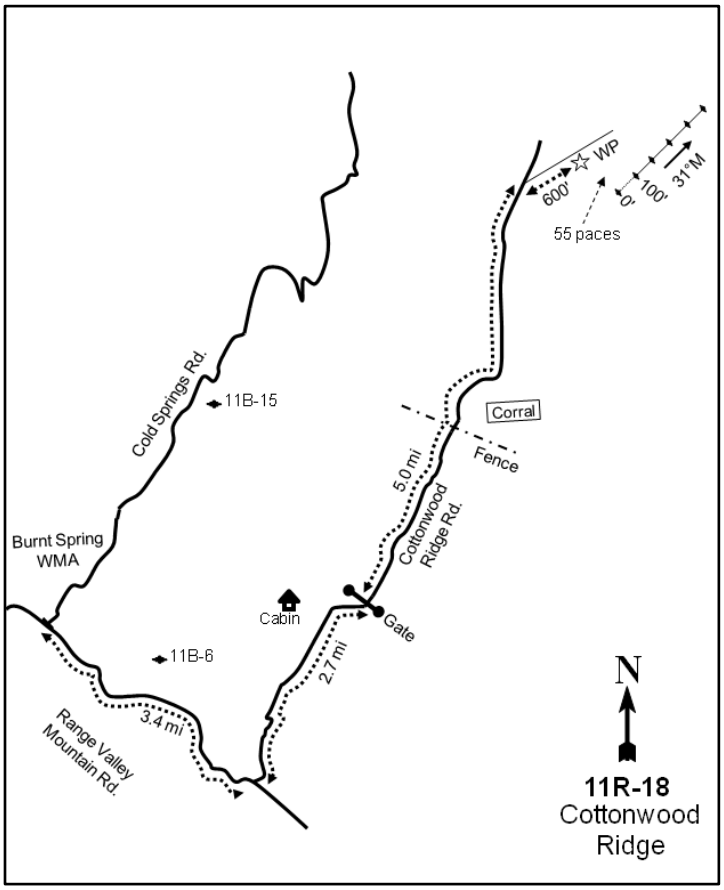
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

Table 11R-16.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Abies lasiocarpa (subalpine fir)							
2013	1451	30	20	35	5	10	5.2
2022	49	57	29	14	-	-	1.7
2025	55	43	57	-	-	-	1.6
Picea engelmannii (Engelmann spruce)							
2013	28	-	31	15	-	54	17.3
2022	11	25	25	25	-	25	4.0
2025	28	-	75	-	-	25	4.5
Populus tremuloides (quaking aspen)							
2013	357	-	-	-	-	-	11.8
2016	7291	5	95	-	-	-	1.1
2022	491	-	40	50	10	-	3.0
2025	913	-	21	37	26	16	3.9

COTTONWOOD RIDGE - STUDY NO. 11R-18





Location Information

USGS 7.5 min Map Info	Twin Hollow NW; Township 13S, Range 15E, Section 13
GPS (0' Stake)	NAD 83 UTM ZONE 12, 569591 East 4394086 North

Transect Information

Browse Tag # (0' Stake)	550
Transect Bearing	55° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 5: 1ft

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	GREEN RIVER
Elevation	7,612ft (2,320m)
Aspect	North
Slope	5-15%
Sample Dates	07/21/2015, 08/15/2018, 07/01/2025

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Cottonwood Ridge PJ Removal	3267	October 2015-January 2016	1048
Seeding - Aerial Before	Cottonwood Ridge PJ Removal	3267	October 2015-January 2016	1048
Seeding - Aerial After	Cottonwood Ridge PJ Removal	3267	January 2016-July 2017	1048
Herbicide - Imazapic/2,4-D	Cottonwood Ridge Maintenance	5404	June 2020	1048

Wildlife Habitat and Vegetation History

Table 11R-18.3 - 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	substantial	year-long
Pronghorn	substantial	year-long
Rocky Mountain Bighorn	RMBS	year-long

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

Year	Vegetation Type	Woodland Succession
2015	Pinyon-Juniper	Phase II transitioning to Phase III
2018	Perennial Grass-Forb	Early Phase I
2025	Mixed Mountain Brush/Perennial Grass	Early Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R048AY433UT
States and Transitions	2015 - State Undefined: Community Phase Undefined 2018 - Black Sagebrush/Introduced Non-Natives State: Community Phase 2.2 2025 - Black Sagebrush/Introduced Non-Natives State: Community Phase 2.1

When the study was established in 2015, the plant community on this site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) in the overstory and was considered to be within Phase II transitioning to Phase III of woodland succession. Shrubs were present but contributed less cover than trees, with black sagebrush (*Artemisia nova*) and alderleaf mountain mahogany (*Cercocarpus montanus*) as the dominant species. Many of the trees were removed by a bullhog project (Table 11R-18.1), and preferred browse cover exhibited an initial post-treatment decrease between 2015 and 2018. However, preferred browse cover exceeded pre-treatment levels in 2025 with black sagebrush providing the most cover of any single species; mixed mountain brush species were a dominant site component in 2025 (Photos, Table 11R-18.4, Table 11R-18.12, Table 11R-18.13, Table 11R-18.14). The herbaceous understory has remained diverse and moderately abundant. Perennial grasses and forbs provided the most herbaceous cover during the first two sample years and were co-dominant vegetation components in 2018. Perennial forb cover has since decreased, however, leaving perennial grasses and mixed mountain brush species as the dominant site components in 2025 (Table 11R-18.7, Table 11R-18.10, Table 11R-18.11). The site has remained within Early Phase I of woodland succession since 2018, and only seedlings and young trees have been observed in point-quarter density following treatment. However, pinyon and juniper increased between the two most recent sample years and had notable density in 2025, indicating that further infilling may occur in the future (Table 11R-18.4, Table 11R-18.14).

Condition of deer winter range on this site has ranged between very poor and fair since 2015; winter range condition was considered to be fair in 2025. The main factors negatively affecting winter range condition include reduced preferred browse cover, and reduced perennial grass and forb cover (Table 11R-18.6, Table 11R-18.7, Table 11R-18.15). Pellet transect data indicates that deer presence has increased since pinyon-juniper removal, while elk presence has decreased. During the 2024/25 winter season the area had infrequent occurrences of collared mule deer (Wildlife Migration Initiative). Sage-grouse pellets were seen for the first time in 2025. Wild horse presence has increased and was considered to be high during the most recent sampling (Table 11R-18.9). On-site observations for 2025 noted light utilization (10-20%) on needle and thread (*Hesperostipa comata*) and Indian ricegrass (*Achnatherum hymenoides*), but little to no utilization on forb species. It was also noted that herbaceous and browse species were normal and vigorous in 2025 (Photos).

Trend Summary Tables

Table 11R-18.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2015	9.7	0.1	4.8	10.6	0.4	24.5
2018	3.6	5.9	0.5	4.3	4.1	0.4
2025	10.3	0.4	1.6	11.5	0.5	1.3

Table 11R-18.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2015	4	243	17	247	0.0	9.3	0.1	7.6
2018	-	233	10	241	-	8.3	0.1	9.0
2025	-	273	3	182	-	7.8	0.0	3.9

Table 11R-18.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2015	10.3	3.2	55.5	7.4	8.8	31.0
2018	15.9	1.3	68.3	5.1	4.2	25.5
2025	14.3	0.3	63.8	3.4	4.8	21.8

Table 11R-18.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Horse	Rabbit
	Quadrat Frequency					
2015	-	4	10	-	-	17
2018	-	2	11	-	1	-
2025	1	5	15	2	5	6
Year	Days Use Per Acre (ha)					
2015	-	8.1 (19.9)	18.7 (46.3)	-	-	-
2018	-	0.7 (1.7)	10.0 (24.8)	-	1.7 (4.3)	-
2025	-	55.6 (137.4)	-	-	19.1 (47.3)	-

Table 11R-18.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Leymus salinus (saline wildrye)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency											
2015	3	4	52	-	0	9	66	-	-	65	50	106
2018	6	-	39	-	-	6	55	-	-	56	56	112
2025	17	-	24	2	7	32	21	18	30	3	77	144
year	Average Cover (%)											
2015	0.0	0.0	2.2	-	0.0	0.3	1.1	-	-	2.7	0.3	2.6
2018	0.3	-	0.9	-	-	0.2	1.2	-	-	1.6	0.5	3.6
2025	0.8	-	0.2	0.0	0.1	0.4	0.3	1.2	0.6	0.0	0.5	3.8

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

Table 11R-18.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Antemaria microphylla (littleleaf pussytoes)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus miser (timber milkvetch)	Astragalus spatulatus (tufted milkvetch)	Castilleja flava (yellow Indian paintbrush)	Chenopodium fremontii[a] (Fremont's goosefoot)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)
year	Nested Frequency																
2015	-	28	37	25	21	42	5	3	9	9	2	25	2	-	9	37	2
2018	1	8	5	16	1	26	-	-	7	3	3	17	-	3	-	21	1
2025	9	1	3	35	15	15	-	2	1	8	-	15	-	1	-	40	-
year	Average Cover (%)																
2015	-	0.4	0.2	0.1	0.4	0.4	0.0	0.0	0.2	0.1	0.0	0.2	0.0	-	0.1	0.6	0.0
2018	0.0	0.1	0.0	0.2	0.0	0.3	-	-	0.0	0.1	0.0	0.2	-	0.0	-	0.3	0.0
2025	0.0	0.0	0.0	0.2	0.4	0.1	-	0.0	0.0	0.2	-	0.1	-	0.0	-	0.3	-

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

FORB SPECIES	Hedysarum boreale (Utah sweetvetch)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Lithospermum incisum (narrowleaf stoneseed)	Lomatium (desertparsley)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Orthocarpus[a] (owl's-clover)	Packera multilobata (lobeleaf groundsel)	Pedicularis centranthera (dwarf lousewort)	Penstemon (beardtongue)	Penstemon caespitosus (mat penstemon)	Petradoria pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Sanguisorba minor[i] (small burnet)
year	Nested Frequency																
2015	26	14	10	-	-	-	-	22	-	11	55	-	29	8	91	5	-
2018	-	2	-	97	1	-	1	26	1	31	-	-	20	22	66	5	15
2025	0	-	-	5	-	2	-	45	-	1	11	5	37	15	68	1	1
year	Average Cover (%)																
2015	1.5	0.0	0.0	-	-	-	-	0.6	-	0.1	1.6	-	0.1	0.2	0.9	0.0	-
2018	-	0.0	-	4.1	0.0	-	0.0	1.6	0.0	0.3	-	-	0.2	0.5	0.7	0.0	0.2
2025	0.0	-	-	0.0	-	0.0	-	0.6	-	0.0	0.3	0.0	0.4	0.2	0.6	0.0	0.1

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

FORB SPECIES	Schoenocrambe linifolia (flaxleaf plainsmustard)	Stenotus acaulis (stemless mock goldenweed)	Tetraneuris acaulis (stemless four-nerve daisy)
year	Nested Frequency		
2015	10	-	15
2018	9	-	3
2025	-	4	1
year	Average Cover (%)		
2015	0.0	-	0.1
2018	0.0	-	0.1
2025	-	0.2	0.0

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

Table 11R-18.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Cercocarpus montanus[p] (alderleaf mountain mahogany)	Chrysothamnus depressus[p] (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)									
2015	4.1	0.6	4.3	1.6	0.1	-	0.3	10.4	-	14.1
2018	2.7	0.4	1.2	-	0.3	3.3	0.5	0.1	-	0.3
2025	6.5	1.8	1.7	1.5	0.4	0.1	-	0.4	-	0.9
year	Quadrat Cover (%)									
2015	3.3	0.2	4.0	2.1	0.1	-	0.0	2.1	0.0	2.7
2018	2.2	0.2	1.2	-	0.0	4.9	1.0	0.5	-	0.1
2025	6.2	0.3	1.3	2.4	0.2	0.2	0.1	1.1	0.0	0.6

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

Table 11R-18.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	45/57
2025	-	-	-	-	-	-	-	-	-/-
Artemisia nova[p] -- (black sagebrush)									
2015	2680	120	13	69	18	35	5	45	23/38
2018	2760	-	38	58	4	0	0	1	24/37
2025	5740	940	33	61	6	3	3	13	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2015	240	-	25	33	42	8	17	58	50/68
2018	140	20	29	71	0	0	0	0	48/70
2025	280	-	43	57	0	0	0	14	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	67/69
2025	-	-	-	-	-	-	-	-	-/-
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2015	280	-	29	71	0	29	7	29	127/139
2018	140	-	0	71	29	43	14	29	103/135
2025	160	20	13	88	0	25	0	0	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2015	4060	20	5	93	2	37	1	2	12/20
2018	100	-	0	100	0	0	0	0	9/24
2025	5040	-	13	66	21	23	10	21	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2015	160	-	25	75	0	25	13	0	31/41
2018	100	-	20	60	20	0	0	20	41/60
2025	200	-	10	50	40	10	0	40	- / -
Ericameria parryi -- (Parry's rabbitbrush)									
2015	-	-	-	-	-	-	-	-	-/-
2018	5100	-	6	91	4	5	0	0	15/26
2025	60	-	67	0	33	33	0	33	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2015	360	-	28	72	0	0	0	0	18/16
2018	840	-	7	93	0	0	0	0	18/20
2025	660	-	27	70	3	0	0	3	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2015	400	60	70	30	0	0	0	15	- / -
2018	180	20	100	0	0	11	0	22	- / -
2025	260	20	85	15	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2015	40	-	0	100	0	0	0	0	8/18
2018	-	-	-	-	-	-	-	-	7/55
2025	20	-	0	100	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2015	460	160	61	35	4	0	0	4	- / -
2018	80	160	75	25	0	0	0	25	- / -
2025	220	20	91	9	0	0	0	0	- / -

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

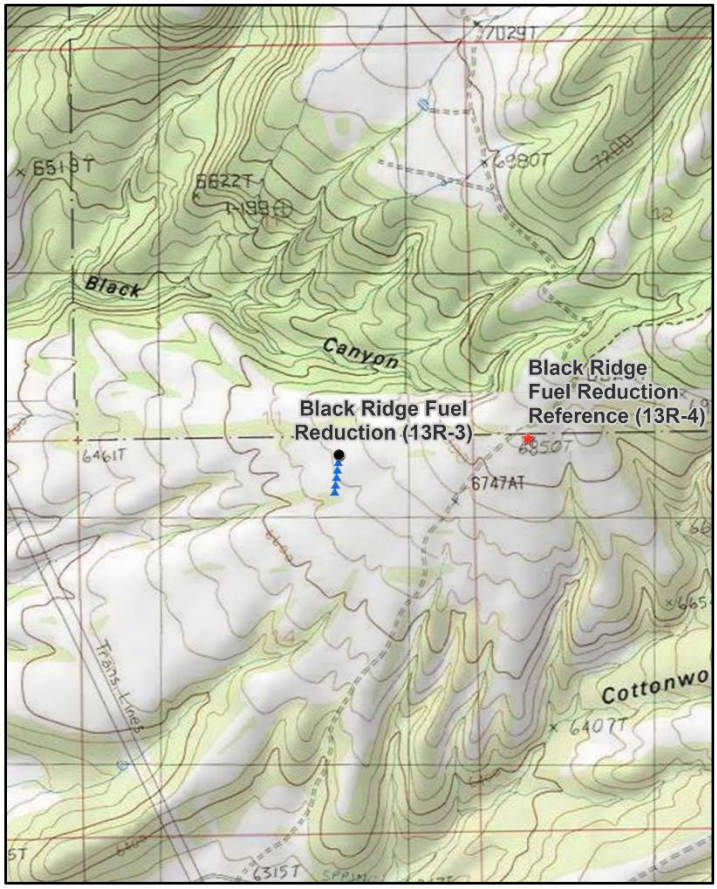
Table 11R-18.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

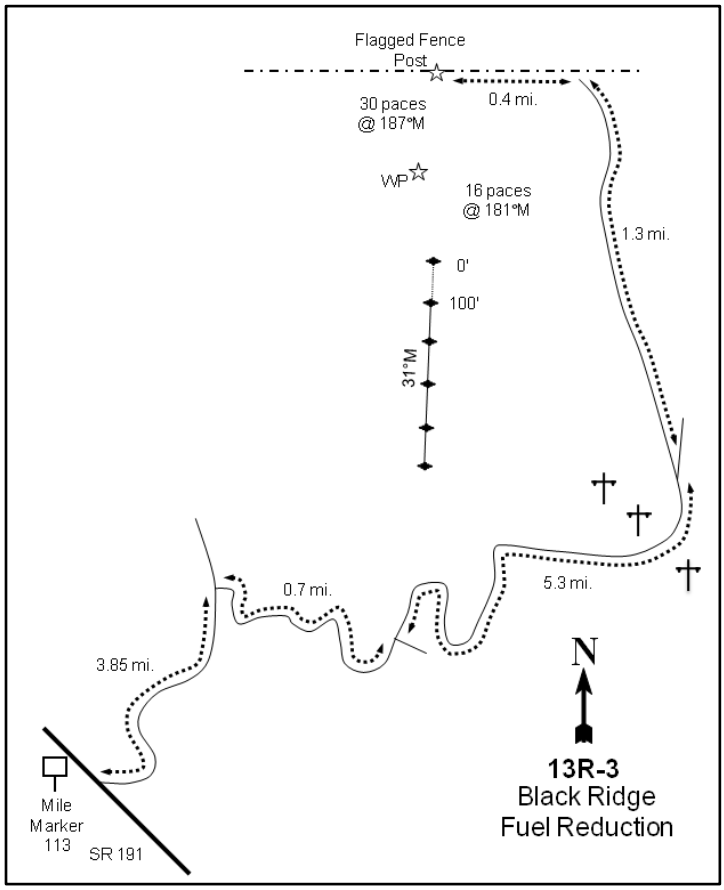
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2015	285	30	10	30	5	25	16.2
2018	86	61	39	-	-	-	3.4
2025	117	20	80	-	-	-	3.1
Pinus edulis (twoneedle pinyon)							
2015	405	20	35	20	15	10	9.0
2018	105	63	37	-	-	-	2.1
2025	127	40	60	-	-	-	2.5

Table 11R-18.15 - 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
2015	14.3	12.1	9.4	18.6	0.0	10.0	0.0	**64.4**	Fair
2018	5.7	0.0	0.0	16.6	0.0	10.0	0.0	**32.3**	Very Poor
2025	14.8	13.2	14.6	15.7	0.0	7.9	0.0	**66.2**	Fair

BLACK RIDGE FUEL REDUCTION - STUDY NO. 13R-3





Location Information

USGS 7.5 min Map Info	La Sal West NW; Township 28S, Range 23E, Section 14
GPS (0' Stake)	NAD 83 UTM ZONE 12, 643665 East 4248461 North

Transect Information

Browse Tag # (0' Stake)	285
Transect Bearing	180° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From Moab, travel south on State Route 191 just past mile marker 113 where a road turns off to Black Ridge and Yellow Circle Mine. Turn left (east) and go 3.85 miles on the main road. Turn right and continue 0.7 miles up the ridge to a fork. Go left and stay on the main road for 5.3 miles (passing a gate at 2.6 miles). Turn left onto a jeep trail 0.1 miles after crossing under some power lines, and continue on the main trail for 1.3 miles to a cattleguard at the Forest Service boundary. Turn left before the cattleguard onto a two-track and continue for 0.4 miles (a fence post should be wrapped in flagging). From the marked post, walk 30 paces at 187 degrees magnetic to a witness post. From the witness post, walk 16 paces at 181 degrees magnetic to the 0-foot stake that is marked with browse tag #285.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	BLACK RIDGE
Elevation	6,635ft (2,022m)
Aspect	West
Slope	10%
Sample Dates	06/17/2010, 06/26/2013, 08/03/2016, 08/05/2021, 08/20/2025

Table 13R-03.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Black Ridge Tree Chaining and Seeding	LTDL 1096-3015	September-December 1966	3043
Chaining - Two-Way Ely	Black Ridge Tree Chaining and Seeding	LTDL 1096-3014	September-December 1966	3043
Mechanical - Bullhog	Black Ridge Fuels Reduction and Vegetation Restoration	1408	November 2010-January 2011	1803
Seeding - Aerial Before	Black Ridge Fuels Reduction and Vegetation Restoration	1408	September 2010	1471

Table 13R-03.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Black Ridge Phase 1			Aerial	Sep 2010	1473
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	×Triticosecale rimpaui	Sterile Triticale	Quickguard	0.68	0.66
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	1.73	1.43
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.07	0.06
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.17	0.15
G	Bouteloua gracilis	Blue Grama	Alma	0.68	0.52
G	Hesperostipa comata	Needle and Threadgrass	Utah UT	0.07	0.05
G	Hesperostipa comata	Needle and Threadgrass	Kane UT	0.68	0.49
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.75	2.27
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.41	0.38
G	Sporobolus cryptandrus	Sand Dropseed		0.05	0.05
G	Sporobolus cryptandrus	Sand Dropseed		0.07	0.07
G	Sporobolus cryptandrus	Sand Dropseed		0.03	0.03
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.49	1.36
F	Linum perenne	Blue Flax	Appar	0.58	0.56
F	Linum perenne	Blue Flax	Appar	0.14	0.11
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.90
F	Penstemon strictus	Rocky Mountain Penstemon		0.14	0.12
F	Sanguisorba minor	Small Burnet	Delar	0.88	0.84
F	Sanguisorba minor	Small Burnet	Delar	0.14	0.12
F	Sanguisorba minor	Small Burnet	Delar	0.22	0.19
S	Atriplex canescens	Fourwing Saltbush	Emery UT	1.73	0.87
S	Atriplex canescens	Fourwing Saltbush	Emery UT	0.27	0.13
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.09	0.07
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.05	0.04
S	Purshia tridentata	Bitterbrush		0.10	0.07
S	Purshia tridentata	Bitterbrush	Beaver UT	0.80	0.62
S	Purshia tridentata	Bitterbrush	Elko NV	0.19	0.13

Mix Name			Application Type	Application Date	Acres
			Aerial	Sep 1966	3043
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Crested Wheatgrass		5.00	0.00
S	Atriplex canescens	Fourwing Saltbush		0.20	0.00
T	Purshia	Bitterbrush		0.08	0.00

Wildlife Habitat and Vegetation History

Table 13R-03.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 13R-03.4 - 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 II transitioning to Phase III
2013	Broom Snakeweed/Green Ephedra	Early Phase I
2016	Perennial Grass/Broom Snakeweed	Early Phase I
2021	Broom Snakeweed	Early Phase I
2025	Perennial Grass/Green Ephedra	Early Phase I

Site Notes

In 2013 the transect was moved slightly to better represent the treatment.

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Gravelly Loam (Pinyon-Utah Juniper)
NRCS Ecological Site #	R035XY303UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2010, this site was in Phase II transitioning to Phase III of woodland succession (Table 13R-03.4), being encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*); shrubs and forbs provided minimal cover (Table 13R-03.12). Crested wheatgrass (*Agropyron cristatum*) was the dominant herbaceous species prior to treatment (Table 13R-03.10). The bullhog treatment (Table 13R-03.1) removed most of the trees from the study area, setting woodland succession back to Early Phase I. Some of the shrubs increased in cover following treatment. Broom snakeweed (*Gutierrezia sarothrae*) in particular increased substantially in cover and density in 2021, but had decreased as of 2025. In addition, Mormon tea (*Ephedra viridis*) density responded well and it was considered to be co-dominant with perennial grasses in 2025 (Table 13R-03.12, Table 13R-03.13). Few seeded species (Table 13R-03.2) were sampled in the browse or herbaceous understory with the exception of crested wheatgrass, which was present at pre-treatment and has consistently provided the majority of understory cover (Table 13R-03.10). With the removal of pinyon and juniper, the herbaceous and shrub layers will likely increase in abundance. Point-quarter density shows that trees are still present as of 2025, and the extant tree component indicates that infilling could occur in future sample years without further management. However, tree density is low as of the most recent sampling and the site has been considered to be within Early Phase I of woodland succession since 2013 (Table 13R-03.4, Table 13R-03.14): this suggests that infilling may not be an immediate concern.

This site's condition as mule deer winter range has ranged between very poor and fair since 2010; winter range condition was considered to be fair in 2025. Factors that negatively influence condition as deer winter range include reduced preferred browse and forb cover, and the presence of cheatgrass (*Bromus tectorum*) (Table 13R-03.6, Table 13R-03.10, Table 13R-03.11, Table 13R-03.15). According to pellet transect data deer presence has decreased over the course of the study from high to low, while elk presence has remained low over the same period. During the 2024/25 winter season the area had frequent occurrences of collared mule deer (Wildlife Migration Initiative). Utilization of preferred browse species has been unremarkable as the populations have been too small to provide a meaningful assessment. On-site observations for 2025 noted little to no utilization of the herbaceous community. It was also noted that herbaceous and browse species may have been affected by drought as evidenced by stunted growth and chlorotic leaves (Photos, Table 13R-03.9, Table 13R-03.13).

Trend Summary Tables

Table 13R-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
2010	4.2	0.5	15.3	4.7	0.2	20.6
2013	0.8	1.6	-	4.3	5.4	-
2016	1.1	3.4	-	4.3	4.3	-
2021	2.4	10.1	-	5.9	13.3	-
2025	2.9	4.5	-	5.1	3.3	-

Table 13R-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
2010	27	249	24	46	0.3	11.1	0.1	2.5
2013	7	231	2	84	0.0	8.8	0.0	3.4
2016	47	289	6	101	0.4	16.8	0.1	5.2
2021	32	212	2	86	0.1	5.8	0.0	3.4
2025	96	272	-	77	0.5	12.8	-	2.8

Table 13R-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
2010	24.1	0.2	54.5	7.4	6.1	31.2
2013	17.8	0.0	62.2	3.6	4.5	15.2
2016	19.1	0.0	60.7	4.0	3.7	26.0
2021	11.9	0.0	63.3	7.4	5.3	20.1
2025	14.4	0.4	58.9	8.1	4.2	23.0

Table 13R-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	Black Bear	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2010	-	-	26	1	4
2013	-	2	10	7	9
2016	-	2	10	8	44
2021	-	7	37	5	2
2025	-	-	28	4	10
Year	Days Use Per Acre (ha)				
2010	-	3.6 (9.0)	63.7 (157.3)	2.0 (5.0)	-
2013	-	5.1 (12.6)	35.5 (87.7)	8.1 (19.9)	-
2016	-	7.2 (17.9)	19.4 (48.0)	3.4 (8.3)	-
2021	8.7 (21.5)*	2.9 (7.2)	30.8 (76.1)	4.7 (11.6)	-
2025	-	-	5.3 (13.2)	-	-

*Pellets per acre (ha)

Table 13R-03.10 - 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)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Psathyrostachys juncea[i] (Russian wildrye)
year	Nested Frequency						
2010	-	249	-	27	-	-	-
2013	10	218	-	7	1	15	-
2016	10	277	-	47	1	24	4
2021	7	190	-	32	-	40	2
2025	0	265	3	96	4	6	-
year	Average Cover (%)						
2010	-	11.1	-	0.3	-	-	-
2013	0.1	8.5	-	0.0	0.1	0.1	-
2016	0.0	16.0	-	0.4	0.1	0.5	0.1
2021	0.0	5.4	-	0.1	-	0.4	0.0
2025	0.0	12.1	0.3	0.5	0.2	0.2	-

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

Table 13R-03.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Astragalus (milkvetch)	Astragalus cicer[i] (chickpea milkvetch)	Chamaesyce (sandmat)	Chenopodium fremontii[a] (Fremont's goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cordylanthus[a] (bird's-beak)	Draba[a] (draba)	Gilia inconspicua[a] (shy gilia)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Lepidium[a] (pepperweed)	Linum perenne[i] (blue flax)	Lithospermum ruderale (western stoneseed)	Packera multilobata (lobeleaf groundsel)	Penstemon strictus (Rocky Mountain penstemon)
year	Nested Frequency																
2010	-	-	-	-	5	4	-	5	12	-	-	3	-	-	-	-	-
2013	3	-	2	16	-	-	1	-	-	-	-	-	-	15	2	-	1
2016	1	-	7	41	-	-	-	5	-	3	1	-	0	1	2	-	-
2021	-	5	1	41	2	-	-	-	-	-	-	-	-	-	1	1	-
2025	-	3	-	23	-	-	-	-	-	-	-	-	-	-	-	-	-
year	Average Cover (%)																
2010	-	-	-	-	0.0	0.0	-	0.0	0.1	-	-	0.0	-	-	-	-	-
2013	0.0	-	0.0	0.1	-	-	0.0	-	-	-	-	-	-	0.3	0.0	-	0.0
2016	0.0	-	0.9	0.4	-	-	-	0.0	-	0.0	0.0	-	0.0	0.0	0.0	-	-
2021	-	0.0	0.0	0.8	0.0	-	-	-	-	-	-	-	-	-	0.0	0.0	-
2025	-	0.0	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-

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

FORB SPECIES	Petradoria pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Salsola tragus[ai] (prickly Russian thistle)	Tetraneuris acaulis (stemless four-nerve daisy)	Townsendia (Townsend daisy)
year	Nested Frequency					
2010	45	-	4	-	-	-
2013	53	-	-	1	3	1
2016	64	-	-	-	-	6
2021	56	3	-	-	-	-
2025	51	-	-	-	8	-
year	Average Cover (%)					
2010	2.5	-	0.0	-	-	-
2013	2.9	-	-	0.0	0.0	0.0
2016	3.8	-	-	-	-	0.0
2021	2.5	0.0	-	-	-	-
2025	2.4	-	-	-	0.2	-

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

Table 13R-03.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida[p] (prairie sagewort)	Atriplex canescens[p] (fourwing saltbush)	Ephedra viridis[p] (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)						
2010	-	-	4.7	0.2	5.9	-	14.7
2013	-	0.1	4.2	5.4	-	-	-
2016	-	1.2	3.1	4.3	-	-	-
2021	-	1.6	4.3	13.2	-	0.1	-
2025	-	0.5	4.6	3.3	-	-	-
year	Quadrat Cover (%)						
2010	0.4	-	3.8	0.5	4.6	-	10.7
2013	-	0.0	0.8	1.6	-	0.0	-
2016	-	0.2	0.9	3.4	-	0.0	-
2021	-	0.5	1.9	10.0	-	0.1	-
2025	-	0.4	2.5	4.5	-	0.0	-

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

Table 13R-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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia frigida[p] -- (prairie sagewort)									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	23/32
2016	-	-	-	-	-	-	-	-	-/-
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Atriplex canescens[p] -- (fourwing saltbush)									
2010	-	-	-	-	-	-	-	-	46/55
2013	40	-	50	50	0	0	0	0	64/76
2016	100	40	40	60	0	40	20	0	63/76
2021	160	-	50	50	0	13	0	0	- / -
2025	140	-	14	57	29	57	0	43	- / -
Echinocereus -- (hedgehog cactus)									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	2/5
2016	-	-	-	-	-	-	-	-	14/13
2021	20	-	0	0	100	0	100	100	- / -
2025	-	-	-	-	-	-	-	-	-/-
Ephedra viridis[p] -- (mormon tea)									
2010	380	-	26	74	0	0	11	0	107/142
2013	860	-	30	70	0	0	0	0	69/86
2016	700	-	26	74	0	0	17	0	68/86
2021	1400	-	0	96	4	16	0	4	- / -
2025	580	-	10	79	10	35	3	10	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Gutierrezia sarothrae -- (broom snakeweed)									
2010	520	40	19	81	0	0	0	0	16/21
2013	2340	20	23	77	0	1	0	0	22/29
2016	5080	40	17	79	4	0	0	4	21/30
2021	27360	-	1	99	1	0	0	1	- / -
2025	8380	60	4	42	54	0	0	79	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2010	160	20	0	100	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2010	-	-	-	-	-	-	-	-	13/100
2013	40	-	0	100	0	0	0	50	10/28
2016	40	-	0	100	0	0	0	0	8/34
2021	140	-	0	100	0	0	0	0	- / -
2025	20	-	0	0	100	0	0	100	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2010	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	- / -
2016	-	-	-	-	-	-	-	-	-/-
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2010	160	-	25	75	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana[p] -- (Stansbury cliffrose)									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	57/61

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

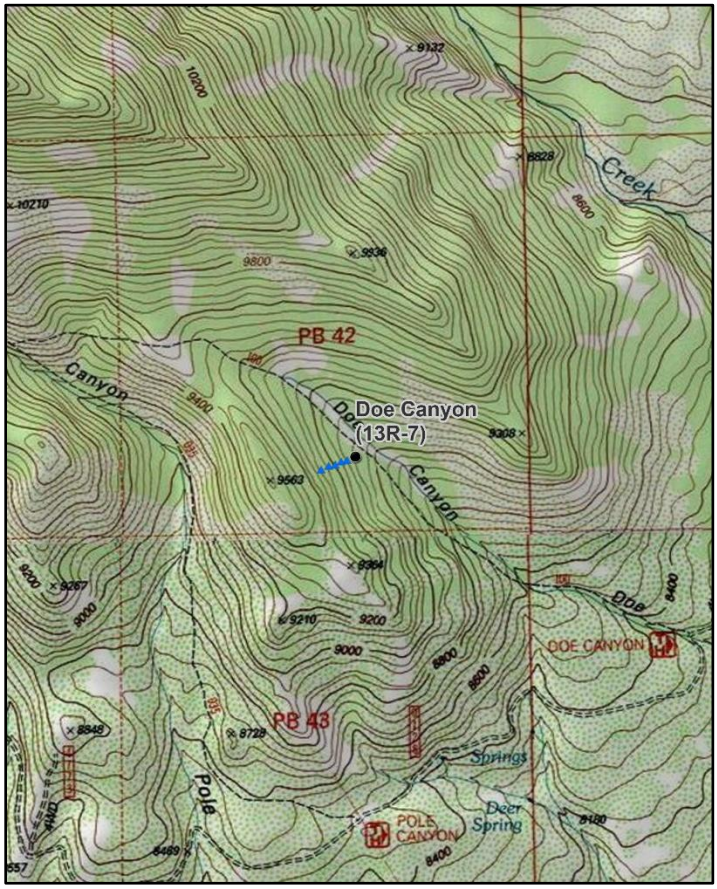
Table 13R-03.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

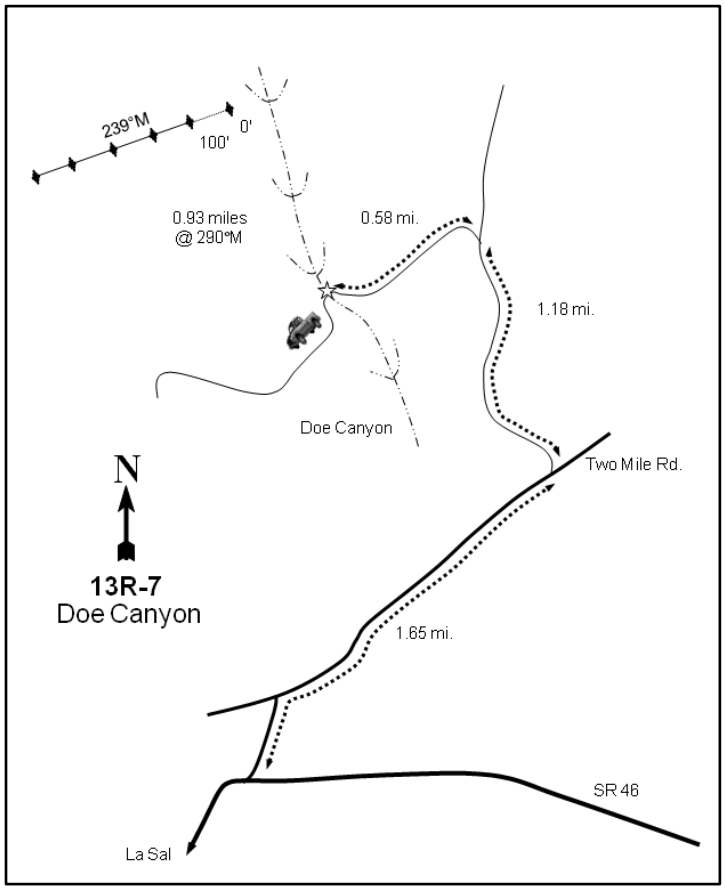
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2010	71	-	22	67	6	6	7.1
2013	33	-	100	-	-	-	5.5
2016	39	-	100	-	-	-	12.1
2021	34	10	70	20	-	-	6.6
2025	2	-	100	-	-	-	2.0
Pinus edulis (twoneedle pinyon)							
2010	178	-	10	45	35	10	9.3
2013	5	-	100	-	-	-	3.0
2016	7	-	100	-	-	-	9.5
2021	8	-	100	-	-	-	3.8
2025	29	-	100	-	-	-	2.0

Table 13R-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
2010	5.9	0.0	0.0	22.2	-0.2	4.9	0.0	**32.8**	Very Poor
2013	5.4	0.0	0.0	17.6	0.0	6.7	0.0	**29.7**	Very Poor
2016	5.4	0.0	0.0	30.0	-0.3	10.0	0.0	**45.1**	Poor
2021	7.4	14.1	6.8	11.6	-0.1	6.8	0.0	**46.6**	Poor
2025	6.4	11.3	5.3	25.5	-0.4	5.6	0.0	**53.7**	Fair

DOE CANYON - STUDY NO. 13R-7





Location Information	
USGS 7.5 min Map Info	Mount Peale SW; Township 28S, Range 24E, Section 12
GPS (0' Stake)	NAD 83 UTM ZONE 12, 654901 East 4249242 North

Transect Information	
Browse Tag # (0' Stake)	Not Available
Transect Bearing	244° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From La Sal, travel on Highway 46 to Upper Two Mile Road. Turn left (north), continue for 1.65 miles, and turn left onto La Sal Pass Road. Continue for another 1.18 miles at which point the road will fork. Keep left and drive for 0.58 miles to Doe Canyon trail. Hike 0.93 miles up the canyon and the study should be to the left at a bearing of 290 degrees magnetic.

Site Information	
Land Ownership	Federal
Land Administrator	USFS
Allotment	LASAL
Elevation	9,347ft (2,849m)
Aspect	Northeast-East
Slope	40%
Sample Dates	06/26/2013, 08/21/2018, 08/18/2025

Table 13R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed	Lackey Basin Aspen Restoration	2620	June 2016	665

Wildlife Habitat and Vegetation History

Table 13R-07.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 13R-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Quaking Aspen-Conifer Encroached	NA
2018	Quaking Aspen	NA
2025	Quaking Aspen	NA

Site Notes

Game trails were observed across the site in 2013.

Site Potential

1981 - 2010 Average Annual Precipitation	28 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2013, the plant community on this study site was dominated by Douglas-fir (*Pseudotsuga menziesii*) with a lesser component of quaking aspen (*Populus tremuloides*); understory browse species were sparse. A prescribed burn in 2016 (Table 13R-07.1) removed most of the Douglas-fir, and aspen became the dominant vegetation type in 2018. The shrub component also diversified, with red elderberry (*Sambucus racemosa*) contributing the most cover (Table 13R-07.12, Table 13R-07.13). The herbaceous understory was moderately abundant, but not very diverse prior to treatment. Herbaceous diversity and abundance increased following the burn, with mainly native perennial grass and forb species providing the most cover (Table 13R-07.7, Table 13R-07.10, Table 13R-07.11). Although most conifer trees were removed by the fire, they were observed in point-quarter measurements in 2018 (Table 13R-07.14). This continued tree presence indicates that given enough time, the aspen stand on this site may again be encroached by conifers.

This site may serve as adequate summer range for mule deer due to the diversity and abundance of the herbaceous community (Table 13R-07.3, Table 13R-07.10, Table 13R-07.11, Table 13R-07.12). The area is also known for the fall and winter occurrence of deer during the 24/25 season (Wildlife Tracker). However, pellet group data indicates that deer and elk presence has remained low since 2013 (Table 13R-07.9). Quaking aspen and forb provide the bulk of the summer forage for wildlife. Gambel oak and Wood's rose provide additional forage for wildlife, but to a lesser extent. Aspen utilization has remained light since study establishment (Table 13R-07.13, Table 13R-07.13a). On-site observations noted little to no utilization of herbaceous species.

Trend Summary Tables

Table 13R-07.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	0.0	1.0	4.7	0.1	0.9	73.5
2018	5.5	3.5	30.7	10.4	2.0	54.7
2025	2.0	3.4	14.0	1.5	2.2	60.9

Table 13R-07.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	171	-	44	-	6.2	-	1.1
2018	3	113	25	136	0.2	6.6	2.5	8.3
2025	-	154	-	249	-	7.2	-	21.7

Table 13R-07.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	1.6	0.1	87.5	-	3.1	14.7
2018	14.5	0.4	72.7	1.2	6.8	46.7
2025	2.4	-	68.3	0.0	3.4	39.5

Table 13R-07.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk
	Quadrat Frequency		
2013	-	-	-
2018	1	4	8
2025	1	-	-
Year	Days Use Per Acre (ha)		
2013	-	4.7 (11.6)	5.3 (13.2)
2018	2.2 (5.4)	20.1 (49.7)	6.7 (16.6)
2025	-	-	-

Table 13R-07.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus porteri (Porter brome)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Carex geyeri (Geyer's sedge)	Carex rossii (Ross' sedge)	Elymus trachycaulus (slender wheatgrass)
year	Nested Frequency					
2013	-	-	171	-	-	-
2018	13	3	-	94	16	1
2025	30	-	3	133	-	0
year	Average Cover (%)					
2013	-	-	6.2	-	-	-
2018	0.8	0.2	-	5.4	0.2	0.2
2025	1.3	-	0.1	5.7	-	0.0

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

Table 13R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Chenopodium atrovirens[a] (pinyon goosefoot)	Cirsium (thistle)	Corydalis[a] (fumewort)	Goodyera oblongifolia (western rattlesnake plantain)	Lactuca serriola[ai] (prickly lettuce)	Lathyrus lanszwertii (Nevada pea)	Lomatium (desertparsley)	Maianthemum stellatum (starry false lily of the valley)	Orobanche fasciculata (clustered broomrape)	Polygonum douglasii[a] (Douglas' knotweed)	Senecio eremophilus (desert ragwort)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Thermopsis montana (mountain goldenbanner)	Vicia americana (American vetch)	Viola (violet)
year	Nested Frequency																
2013	-	-	-	-	2	-	-	11	14	2	-	-	-	22	-	-	5
2018	2	15	0	4	-	1	26	-	5	-	5	32	1	4	26	61	5
2025	5	-	-	-	5	-	198	6	-	-	-	20	-	26	92	3	11
year	Average Cover (%)																
2013	-	-	-	-	0.0	-	-	0.2	0.3	0.0	-	-	-	0.6	-	-	0.0
2018	0.0	1.6	0.1	0.8	-	0.1	1.8	-	0.2	-	0.0	1.9	0.0	0.7	0.6	2.9	0.0
2025	0.3	-	-	-	0.1	-	12.8	0.3	-	-	-	0.4	-	2.2	5.3	0.0	0.2

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

Table 13R-07.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies lasiocarpa[t] (subalpine fir)	Mahonia repens (creeping barberry)	Populus tremuloides[tp] (quaking aspen)	Pseudotsuga menziesii[t] (Douglas-fir)	Purshia tridentata[p] (antelope bitterbrush)	Ribes cereum[p] (wax currant)	Ribes montigenum[p] (gooseberry currant)	Rubus idaeus ssp. strigosus (grayleaf red raspberry)	Sambucus racemosa[p] (red elderberry)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)									
2013	-	0.9	25	48.5	-	-	-	-	-	0.1
2018	0.2	1.9	51.6	2.9	-	1.4	0.2	0.1	8.8	-
2025	0.9	2.2	60	-	-	-	-	-	0.9	0.6
year	Quadrat Cover (%)									
2013	-	1.0	1.8	2.9	0.0	-	-	-	-	0.0
2018	0.2	3.0	30.5	0.0	-	0.3	0.0	0.4	5.1	0.1
2025	0.0	3.2	13.9	0.1	0.5	0.0	0.4	0.2	1.1	0.1

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

Table 13R-07.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Abies lasiocarpa[t] -- (subalpine fir)									
2013	-	-	-	-	-	-	-	-	-/-
2018	-	40	0	0	0	0	0	0	- / -
2025	100	20	80	20	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
2013	7040	160	0	99	0	1	0	1	11/12
2018	4060	-	1	100	0	0	0	0	13/17
2025	7200	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Pseudotsuga menziesii[t] -- (Douglas-fir)									
2013	240	60	8	92	0	0	0	0	- / -
2018	-	140	0	0	0	0	0	0	- / -
2025	60	100	100	0	0	0	0	33	- / -
Quercus gambelii[p] -- (Gambel oak)									
2013	-	20	0	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Ribes cereum[p] -- (wax currant)									
2013	-	-	-	-	-	-	-	-	-/-
2018	160	-	50	50	0	0	0	13	34/32
2025	220	-	0	100	0	0	0	18	- / -
Ribes montigenum[p] -- (gooseberry currant)									
2013	-	-	-	-	-	-	-	-	-/-
2018	40	-	50	50	0	0	0	0	45/52
2025	-	-	-	-	-	-	-	-	-/-
Rubus idaeus ssp. strigosus -- (grayleaf red raspberry)									
2013	-	-	-	-	-	-	-	-	-/-
2018	320	-	0	100	0	44	6	0	28/22
2025	480	-	4	75	21	0	0	21	- / -
Sambucus racemosa[p] -- (red elderberry)									
2013	-	-	-	-	-	-	-	-	-/-
2018	420	-	10	91	0	0	0	0	96/110
2025	240	-	33	67	0	0	0	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2013	100	-	40	60	0	60	0	0	20/41
2018	40	-	100	0	0	0	0	0	- / -
2025	420	-	5	95	0	0	0	0	- / -

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

Table 13R-07.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

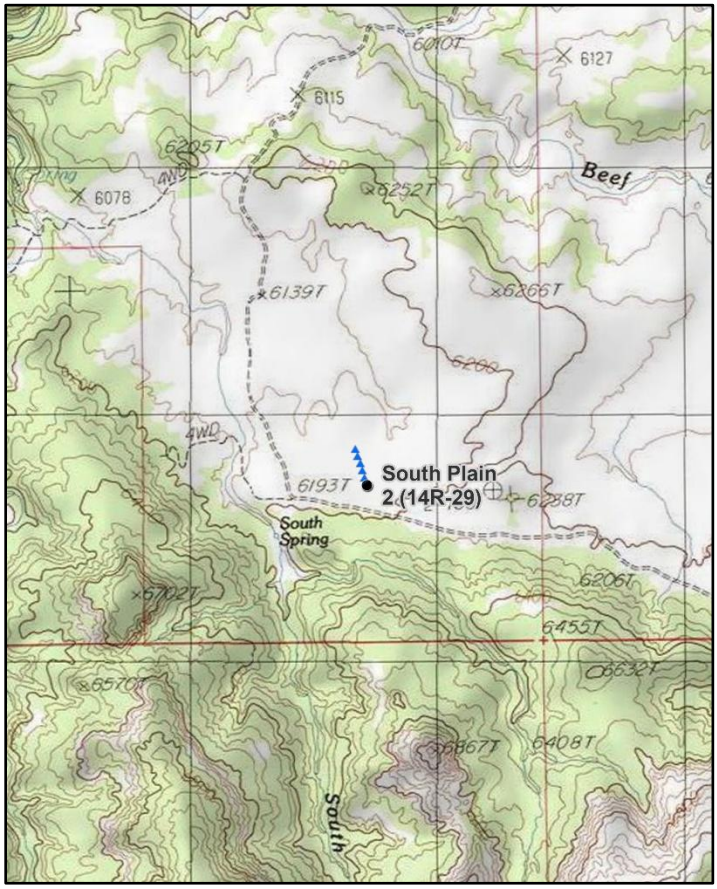
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2013	1560	73	12	3	13	10	5	10
2018	14500	4	47	49	0	5	0	0
2025	9860	8	26	40	26	0	0	0

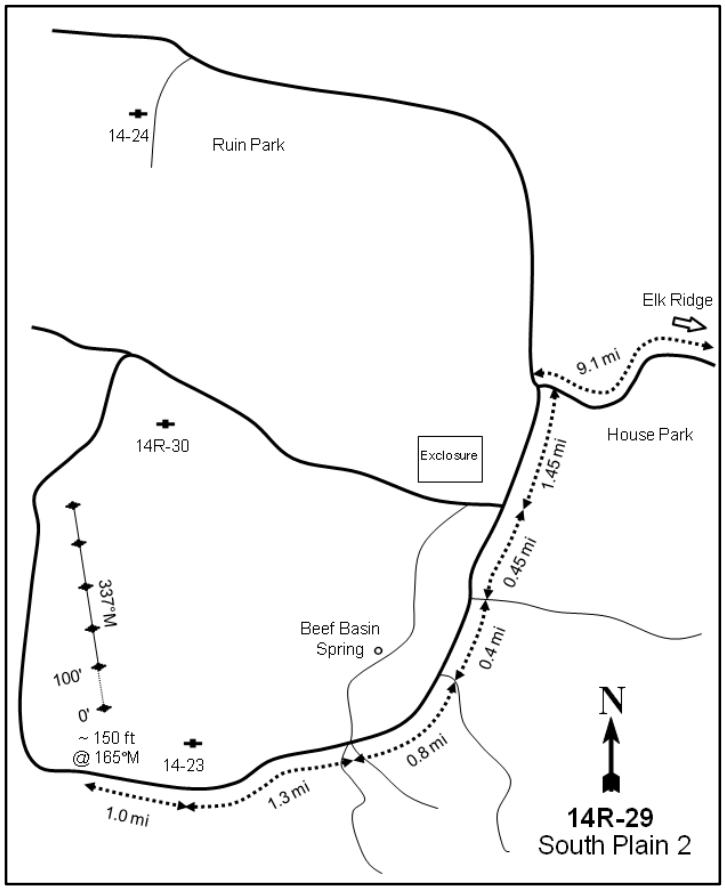
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

Table 13R-07.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Abies lasiocarpa (subalpine fir)							
2018	53	88	-	-	13	-	1.6
2025	10	-	100	-	-	-	0.8
Populus tremuloides (quaking aspen)							
2013	576	45	10	-	-	45	11.1
2018	1195	-	75	25	-	-	1.5
2025	505	-	40	15	25	20	2.6
Pseudotsuga menziesii (Douglas-fir)							
2013	421	-	10	-	5	85	21.4
2018	258	100	-	-	-	-	0.3
2025	141	60	40	-	-	-	0.7

SOUTH PLAIN 2 - STUDY NO. 14R-29





Location Information

USGS 7.5 min Map Info	Fable Valley NW; Township 32S, Range 18E, Section 63
GPS (0' Stake)	NAD 83 UTM ZONE 12, 592659 East 4200914 North

Transect Information

Browse Tag # (0' Stake)	682
Transect Bearing	332° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

At the junction of the Rocky Mountain Elk Ridge-Salt Creek Mesa-Beef Basin Roads, proceed north down into the Beef Basin area. Follow the main road for 9.1 miles, passing the FS/BLM boundary down to an intersection where there is a BLM register box. Stay left on County Road #104 and proceed 1.45 miles to the turnoff to an exclosure. Stay left for 0.45 miles to a fork. Stay right and go 0.4 miles to another fork. Go right at the intersection with the Beef Basin Canyon Road and continue 0.8 miles to a five-way intersection. Take the west fork straight through the intersection (left fork goes to Native American ruins) and continue 1.3 miles to a large pinyon pine on the right. Travel 1.0 mile and stop. The study site is approximately 150 feet to the north at 165 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	INDIAN CREEK
Elevation	6,198ft (1,889m)
Aspect	North
Slope	2-3%
Sample Dates	08/29/2012, 08/21/2017, 08/17/2022, 08/18/2025

Table 14R-29.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial	Beef Basin Phase I	2939	January 2015	272
Seeding - Drill	Beef Basin Phase I	2939	October-November 2014	254
Herbicide - Plateau	Beef Basin Phase I	2939	November 2014	272

Table 14R-29.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Beef Basin			Drill	Oct 2014	875
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.80	0.73
G	Hesperostipa comata	Needle and Threadgrass	Iron UT	0.97	0.72
G	Poa secunda	Sandberg Bluegrass	UP Colorado Plateau	0.51	0.42
G	Sporobolus cryptandrus	Sand Dropseed	Washington CO	0.10	0.09
F	Onobrychis viciifolia	Sainfoin	Eski	0.29	0.28
F	Penstemon palmeri	Palmer Penstemon	Sevier UT	0.29	0.22
F	Sphaeralcea coccinea	Scarlet Globemallow	Sanpete UT	0.03	0.01
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Iron/Millard UT	0.11	0.08

Mix Name			Application Type	Application Date	Acres
Beef Basin - Fluffy			Drill	Nov 2014	875
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.46	0.18
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.56	0.25
S	Krascheninnikovia lanata	Winterfat	Torrance NM	0.29	0.04

Mix Name			Application Type	Application Date	Acres
Beef Basin Sagebrush			Aerial	Jan 2015	875
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.57	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Paiute UT	1.06	0.20

Wildlife Habitat and Vegetation History

Table 14R-29.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 14R-29.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Perennial Grass	No Encroachment
2017	Perennial Grass	No Encroachment
2022	Perennial Grass/Mixed Salt Desert Shrub	No Encroachment
2025	Perennial Grass/Mixed Salt Desert Shrub	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Sand (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY307UT
States and Transitions	No state and transition model is available for this ecological site.

The plant community on this site has had perennial grasses -- namely blue grama (*Bouteloua gracilis*), needle and thread (*Hesperostipa comata*), and/or sand dropseed (*Sporobolus cryptandrus*) -- as a dominant vegetation component since 2012 (Table 14R-29.7, Table 14R-29.10). Browse species have been scattered throughout the area, with winterfat (*Krascheninnikovia lanata*) as the most abundant preferred species in both pre- and the initial post-treatment sample years. Fourwing saltbush (*Atriplex canescens*)became co-dominant with winterfat in 2022 and has remained a dominant component since that time (Table 14R-29.12, Table 14R-29.13). Annual and perennial forbs were rare in 2012, but annual forbs have increased in abundance since treatment and provide low amounts of cover as of 2025. Perennial forbs have fluctuated in cover and abundance following treatment and were sparse

during the most recent sample year (Table 14R-29.11). The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed throughout the study period and provided moderate understory cover in 2025 (Table 14R-29.10).

Condition of deer winter range on this site has ranged between very poor and good since 2012. Current winter range condition as of 2025 is estimated to be fair. The main factors negatively affecting winter range condition include the reduced amount of preferred browse cover, reduced perennial forb cover, and the amount of cheatgrass cover (Table 14R-29.6, Table 14R-29.7, Table 14R-29.10, Table 14R-29.15). Pellet transect data indicates that deer and elk presence has been low since study establishment. The site during the 2024/25 winter season was absent of collared mule deer occurrences, however, frequent observations are found just north of the site near House Park Butte (Wildlife Migration Initiative). Cattle presence was high in 2022, but it was moderate in all other years. Utilization of fourwing saltbush plants has remained mostly light. Winterfat utilization was mostly heavy between 2012 and 2022, but it was light in 2025. On-site observations for 2025 noted that little to no utilization occurred on herbaceous species. It was also noted that the herbaceous and browse communities were likely drought-affected with all species showing stunted growth and poor seed production (Photos, Table 14R-29.9, Table 14R-29.13).

Trend Summary Tables

Table 14R-29.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	1.7	0.5	-	1.5	0.2	-
2017	1.8	0.6	-	1.8	0.1	-
2022	3.5	1.5	-	5.3	1.8	-
2025	10.1	1.8	-	10.7	1.7	-

Table 14R-29.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	64	406	92	15	0.3	29.1	0.7	0.3
2017	138	370	268	50	3.2	22.9	3.8	0.2
2022	165	309	243	218	1.9	13.4	2.4	3.8
2025	105	352	106	17	5.8	23.1	1.4	0.1

Table 14R-29.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	41.6	1.2	38.8	0.2	-	32.8
2017	35.3	-	38.9	0.0	-	34.9
2022	64.3	-	27.2	0.0	0.0	25.0
2025	41.9	0.0	36.4	0.1	-	35.3

Table 14R-29.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2012	9	8	1	8
2017	8	6	-	37
2022	6	14	2	12
2025	9	8	17	29
Year	Days Use Per Acre (ha)			
2012	10.9 (26.9)	8.1 (19.9)	0.7 (1.7)	-
2017	12.3 (30.5)	1.3 (3.3)	8.7 (21.5)	-
2022	45.0 (111.2)	16.8 (41.4)	11.4 (28.1)	-
2025	16.0 (39.5)	8.1 (19.9)	5.3 (13.2)	-

Table 14R-29.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency							
2012	4	320	64	9	172	-	56	-
2017	2	264	131	4	209	8	54	10
2022	8	164	162	-	70	18	117	25
2025	-	200	105	8	83	90	128	3
year	Average Cover (%)							
2012	0.0	19.3	0.3	0.1	7.2	-	2.4	-
2017	0.1	14.6	3.1	0.0	6.8	0.0	1.3	0.1
2022	0.0	9.0	1.8	-	2.0	0.1	2.3	0.2
2025	-	11.2	5.8	0.2	3.8	2.1	5.8	0.0

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

Table 14R-29.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cordylanthus[a] (bird's-beak)	Cryptantha (cryptantha)	Cryptantha[a] (annual cryptantha)	Descurainia pinnata[a] (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Erodium cicutarium[ai] (redstem stork's bill)	Gilia inconspicua[a] (shy gilia)	Lappula occidentalis[a] (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Plantago patagonica[a] (woolly plantain)	Portulaca oleracea[ai] (little hogweed)	Salsola tragus[ai] (prickly Russian thistle)	Sphaeralcea parvifolia (smallflower globemallow)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency																
2012	1	23	4	-	7	1	2	-	-	-	12	-	-	58	9	-	-
2017	3	15	-	6	21	38	1	76	134	11	42	-	164	7	5	-	3
2022	-	-	2	7	26	12	-	19	-	67	207	-	181	-	16	35	-
2025	-	76	-	-	-	3	-	-	-	-	1	4	29	-	13	12	-
year	Average Cover (%)																
2012	0.0	0.3	0.0	-	0.0	0.0	0.0	-	-	-	0.3	-	-	0.1	0.2	-	-
2017	0.0	0.1	-	0.0	0.1	0.2	0.0	1.1	1.2	0.0	0.1	-	0.9	0.0	0.0	-	0.0
2022	-	-	0.0	0.0	0.1	0.0	-	0.1	-	0.6	3.7	-	1.3	-	0.1	0.1	-
2025	-	0.9	-	-	-	0.1	-	-	-	-	0.0	0.0	0.3	-	0.1	0.1	-

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

Table 14R-29.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata[p] (winterfat)	Opuntia fragilis (brittle pricklypear)	Opuntia polyacantha (plains pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Sclerocactus whipplei (Whipple's fishhook cactus)
year	Line Intercept Cover (%)							
2012	0.6	-	-	0.9	-	0.2	-	-
2017	0.4	0.3	-	1.1	-	0.1	-	-
2022	0.5	2.6	0.2	2.2	-	1.6	0	-
2025	0.6	8	-	2.1	-	1.7	-	-
year	Quadrat Cover (%)							
2012	0.5	-	-	1.2	-	0.5	-	0.0
2017	0.8	0.2	-	0.8	-	0.6	0.0	-
2022	0.6	1.4	0.3	1.5	0.0	1.1	0.0	-
2025	0.6	6.7	0.1	2.8	-	1.7	0.0	-

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

Table 14R-29.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	260	-	0	39	62	0	62	62	29/57
2017	280	-	7	64	29	50	50	21	27/59
2022	220	-	0	100	0	36	55	0	- / -
2025	260	-	8	92	0	39	8	31	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2012	-	-	-	-	-	-	-	-	105/188
2017	1320	-	80	20	0	29	0	0	62/90
2022	3660	4280	82	18	1	10	0	1	- / -
2025	5540	20	27	48	25	34	8	64	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2012	-	-	-	-	-	-	-	-	28/70
2017	-	-	-	-	-	-	-	-	28/52
2022	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2012	-	-	-	-	-	-	-	-	-/-
2017	120	-	33	67	0	0	0	0	22/41
2022	440	-	5	96	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	- / -
Krascheninnikovia lanata[p] -- (winterfat)									
2012	1280	160	33	67	0	17	45	3	27/33
2017	1760	-	0	100	0	30	35	0	28/32
2022	1620	40	11	89	0	21	53	9	- / -
2025	4720	-	3	97	0	16	0	59	- / -

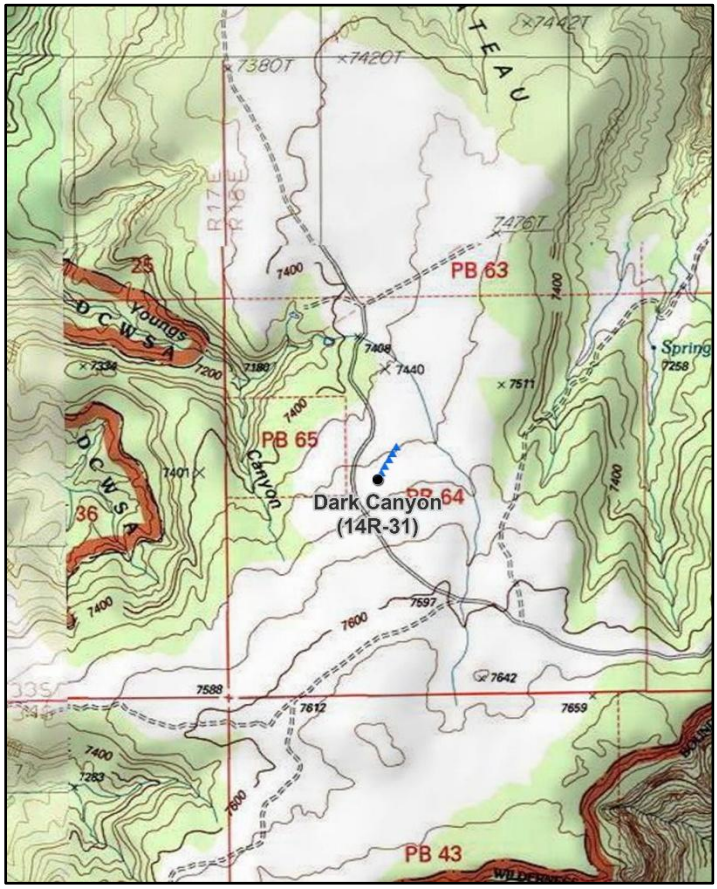
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Opuntia fragilis -- (brittle pricklypear)									
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2022	80	20	100	0	0	0	0	0	- / -
2025	20	-	0	100	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2012	280	-	29	57	14	0	0	21	14/54
2017	320	-	6	94	0	0	0	6	11/28
2022	340	20	0	100	0	0	0	0	- / -
2025	420	-	0	81	19	0	0	33	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2012	40	-	0	100	0	0	0	0	6/11
2017	80	-	0	100	0	0	0	0	4/6
2022	280	-	7	93	0	0	0	0	- / -
2025	40	-	0	100	0	0	0	0	- / -
Sclerocactus whipplei -- (Whipple's fishhook cactus)									
2012	20	20	0	100	0	0	0	0	11/13
2017	20	-	0	100	0	0	0	0	8/8
2022	-	20	0	0	0	0	0	0	- / -
2025	20	-	0	100	0	0	0	0	- / -

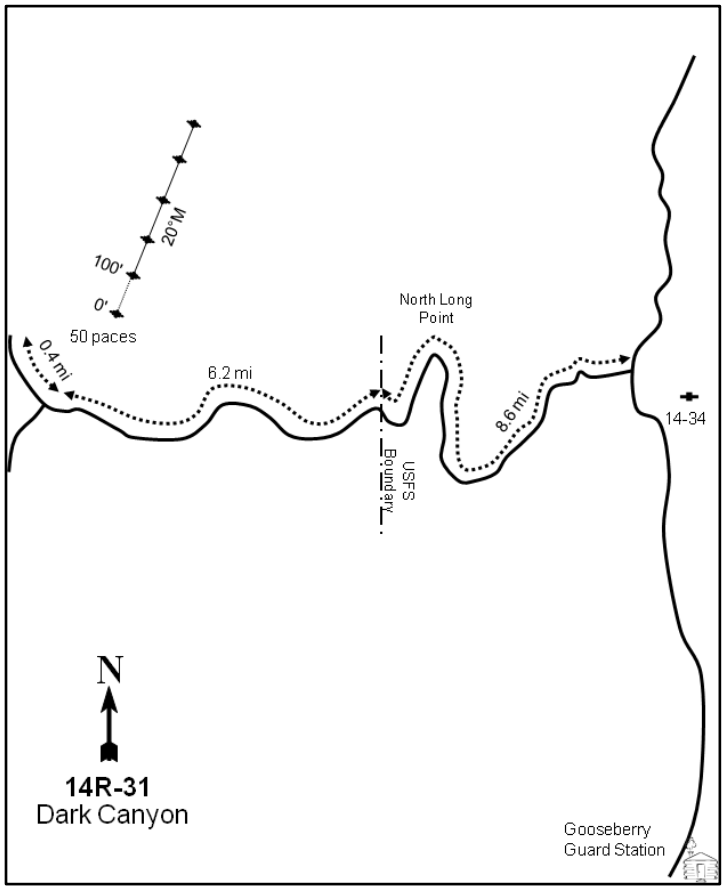
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 14R-29.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2012	1.9	0.0	0.0	30.0	-0.2	0.5	0.0	**32.2**	Very Poor
2017	2.3	0.0	0.0	30.0	-2.4	0.4	0.0	**30.3**	Very Poor
2022	6.6	14.9	15.0	26.8	-1.4	7.6	0.0	**69.5**	Good
2025	13.4	9.2	10.6	30.0	-4.4	0.2	0.0	**59.0**	Fair

DARK CANYON - STUDY NO. 14R-31





Location Information	
USGS 7.5 min Map Info	Warren Canyon NW; Township 33S, Range 18E, Section 64
GPS (0' Stake)	NAD 83 UTM ZONE 12, 589169 East 4191477 North

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

Directions to Site

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

Site Information	
Land Ownership	Federal
Land Administrator	BLM
Allotment	INDIAN CREEK
Elevation	7,506ft (2,288m)
Aspect	Northwest
Slope	5%
Sample Dates	08/29/2012, 09/01/2015, 07/29/2019, 08/18/2025

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

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

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2012	Pinyon	Phase II transitioning to Phase III
2015	Perennial Grass/Mountain Big Sagebrush	Early Phase I
2019	Perennial Grass/Mountain Big Sagebrush	Early Phase I
2025	Perennial Grass/Mountain Big Sagebrush	Early Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048AY306UT
States and Transitions	2012 - State Undefined: Community Phase Undefined 2015-2025 - Seeded State: Community Phase 5.2

When the study was established in 2012, the site was in a conifer-encroached state with twoneedle pinyon (*Pinus edulis*) as the dominant species (Table 14R-31.12); the site was considered to be within Phase II transitioning to Phase III of woodland succession (Table 14R-31.4). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was sampled in the community, but the majority of sagebrush plants were considered to be decadent (Table 14R-31.13). The herbaceous understory was not overly diverse with the introduced grass species crested wheatgrass (*Agropyron cristatum*) as the dominant species; other species were rare (Table 14R-31.10, Table 14R-31.11). Following the bullhog treatment (Table 14R-31.1), the site transitioned to an introduced seeded grass and sagebrush community type with crested wheatgrass as the dominant species (Table 14R-31.10). Most of the pinyon and Utah juniper (*Juniperus osteosperma*) trees were removed by the treatment. There has been an extant tree component in all post-treatment sample years (Table 14R-31.14), suggesting that there may be potential for future infilling. However, the site has remained within Early Phase I of woodland succession since 2015 (Table 14R-31.4), indicating that infilling may not be an immediate concern. Although sagebrush exhibited an initial decrease in the first post-treatment sample year, density and cover have increased to levels roughly equal to those observed prior to treatment (Table 14R-31.12, Table 14R-31.13). Sagebrush will likely continue to increase in future sample years.

Condition of deer winter range on this site has steadily improved and has ranged between poor and fair-good since 2012. The main factors negatively affecting winter range condition include reduced cover of and recruitment of young to the browse community, reduced perennial forb cover, and the presence of cheatgrass (*Bromus tectorum*) (Table 14R-31.6, Table 14R-31.7, Table 14R-31.10, Table 14R-31.13, Table 14R-31.15). Pellet transect data indicates that deer and elk presence has remained low since 2012, while cattle presence has fluctuated between low and moderate. Moderate to heavy utilization of sagebrush plants has not reached 60% since study establishment. Eighty-six percent of longflower rabbitbrush (*Chrysothamnus depressus*) plants sampled in density strips were moderately to heavily utilized in 2012, but the population has received mostly light utilization since 2015 (Photos, Table 14R-31.9, Table 14R-31.13). On-site observations for 2025 noted little to no utilization on grass and forb species. It was also noted that there was some discoloration of leaves but that there was still good seed production, which may indicate some stress on both the herbaceous and browse communities.

Trend Summary Tables

Table 14R-31.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	8.8	0.7	20.3	11.3	0.4	27.5
2015	5.7	0.4	0.0	8.2	1.2	-
2019	9.0	0.2	-	13.5	0.1	-
2025	10.3	0.1	0.0	13.2	0.2	-

Table 14R-31.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	22	212	-	61	0.1	9.4	-	0.8
2015	214	250	10	116	2.4	14.4	0.4	1.5
2019	253	281	143	140	4.4	19.6	0.9	2.2
2025	16	300	-	140	0.2	19.2	-	2.7

Table 14R-31.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	27.2	3.5	59.0	0.0	0.6	36.1
2015	15.1	0.3	69.9	0.0	1.1	23.8
2019	22.7	0.1	66.3	0.0	1.4	32.7
2025	21.0	0.1	62.3	0.7	1.1	28.8

Table 14R-31.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2012	2	8	1	1	14
2015	-	2	4	-	4
2019	4	6	3	-	4
2025	3	14	3	-	6
Year	Days Use Per Acre (ha)				
2012	-	13.4 (33.1)	0.7 (1.7)	-	-
2015	3.6 (9.0)	9.4 (23.2)	0.7 (1.7)	-	-
2019	14.5 (35.9)	6.0 (14.9)	6.0 (14.9)	-	-
2025	7.2 (17.9)	7.4 (18.2)	9.4 (23.2)	-	-

Table 14R-31.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum[i] (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency											
2012	151	7	22	11	1	-	17	-	35	5	11	-
2015	181	-	191	-	45	1	12	2	42	-	7	53
2019	214	3	237	-	44	7	8	-	45	-	2	77
2025	261	-	16	-	13	-	4	-	51	-	-	-
year	Average Cover (%)											
2012	7.0	0.2	0.1	0.4	0.0	-	0.3	-	1.1	0.0	0.3	-
2015	10.4	-	2.1	-	1.5	0.1	0.6	0.0	1.7	-	0.1	0.3
2019	17.1	0.0	4.0	-	1.3	0.0	0.4	-	0.7	-	0.0	0.5
2025	16.3	-	0.2	-	0.7	-	0.2	-	2.0	-	-	-

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

Table 14R-31.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Arabis (rockcress)	Astragalus calycosus (Torrey's milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Astragalus purshii (woollypod milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chenopodium fremontii[a] (Fremont's goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cordylanthus kingii[a] (King's bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)
year	Nested Frequency																
2012	-	-	10	-	-	1	-	3	1	-	-	-	1	-	-	-	4
2015	-	-	24	4	7	21	-	-	4	2	-	6	-	2	-	2	10
2019	8	21	1	-	22	-	-	2	0	4	2	22	-	10	8	3	5
2025	-	-	1	-	-	52	1	-	8	-	-	-	-	-	-	2	4
year	Average Cover (%)																
2012	-	-	0.0	-	-	0.0	-	0.0	0.0	-	-	-	0.0	-	-	-	0.2
2015	-	-	0.1	0.0	0.1	0.1	-	-	0.0	0.0	-	0.3	-	0.0	-	0.0	0.1
2019	0.2	0.2	0.0	-	0.1	-	-	0.0	0.2	0.0	0.0	0.3	-	0.0	0.0	0.0	0.6
2025	-	-	0.0	-	-	1.4	0.0	-	0.0	-	-	-	-	-	-	0.0	0.0

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

FORB SPECIES	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Heterotheca villosa (hairy false goldenaster)	Lappula occidentalis[a] (flatspine stickseed)	Lomatium (desertparsley)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Microsteris gracilis[a] (slender phlox)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)
year	Nested Frequency												
2012	-	-	-	-	-	-	-	-	11	-	-	34	-
2015	-	-	0	-	-	-	11	-	14	1	15	29	-
2019	-	8	4	4	1	5	8	105	27	3	9	76	20
2025	4	-	0	-	-	7	3	-	3	-	6	84	-
year	Average Cover (%)												
2012	-	-	-	-	-	-	-	-	0.3	-	-	0.2	-
2015	-	-	0.1	-	-	-	0.1	-	0.4	0.0	0.3	0.2	-
2019	-	0.1	0.0	0.0	0.0	0.0	0.0	0.5	0.1	0.1	0.1	0.5	0.1
2025	0.0	-	0.0	-	-	0.2	0.1	-	0.0	-	0.2	0.7	-

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

Table 14R-31.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus depressus[p] (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Purshia tridentata[p] (antelope bitterbrush)	Quercus gambelii[p] (Gambel oak)
year	Line Intercept Cover (%)									
2012	0.3	8.1	1.6	-	0	-	0.4	27.5	0.5	0.8
2015	-	5.5	2.7	-	1.1	0.1	-	-	-	-
2019	0.3	9.6	3.6	-	-	0.1	-	-	-	-
2025	0.8	9.4	3	-	0.2	-	-	-	-	-
year	Quadrat Cover (%)									
2012	0.0	5.4	2.6	-	0.2	-	0.5	20.3	0.7	0.0
2015	-	3.4	2.3	0.1	0.2	0.0	0.0	0.0	-	-
2019	0.0	6.1	2.8	0.1	-	0.0	0.0	-	0.0	-
2025	0.6	7.3	2.3	-	0.1	-	-	0.0	-	-

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

Table 14R-31.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2012	20	-	0	100	0	100	0	0	169/170
2015	20	-	0	0	100	100	0	100	88/90
2019	20	-	0	100	0	100	0	0	138/174
2025	20	-	0	0	100	0	0	100	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	1520	-	3	43	54	41	16	38	54/85
2015	860	-	5	63	33	28	7	28	57/89
2019	1080	-	6	78	17	44	2	17	65/104
2025	1340	20	6	82	12	46	3	18	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2012	3440	-	5	89	6	80	6	8	12/27
2015	1800	-	1	98	1	33	12	1	19/37
2019	1720	-	0	98	2	27	0	2	17/40
2025	1820	-	7	88	6	15	18	68	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	44/61
2019	-	-	-	-	-	-	-	-	49/68
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2012	100	20	20	80	0	0	0	0	16/25
2015	500	-	0	100	0	0	0	0	21/29
2019	100	-	0	100	0	0	0	0	23/32
2025	540	-	0	70	30	0	0	30	- / -
Linanthus pungens -- (granite prickly phlox)									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	- / -
2019	80	-	0	50	50	0	0	50	7/21
2025	-	-	-	-	-	-	-	-	-/-
Opuntia fragilis -- (brittle pricklypear)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	60	-	0	100	0	0	0	0	8/11
2025	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	8/14
2025	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2012	80	-	0	100	0	0	0	0	9/31
2015	80	-	0	75	25	0	0	25	7/16
2019	20	-	100	0	0	0	0	0	8/11
2025	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2012	500	160	8	92	0	0	0	0	- / -
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2025	20	-	100	0	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Purshia tridentata[p] -- (antelope bitterbrush)									
2012	140	-	0	57	43	43	57	29	53/96
2015	-	-	-	-	-	-	-	-	49/97
2019	-	20	0	0	0	0	0	0	60/138
2025	-	-	-	-	-	-	-	-	-/-
Quercus gambelii[p] -- (Gambel oak)									
2012	120	-	100	0	0	0	0	0	56/51
2015	-	-	-	-	-	-	-	-	71/77
2019	-	-	-	-	-	-	-	-	102/53
2025	-	-	-	-	-	-	-	-	-/-
Yucca -- (yucca)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	48/60

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

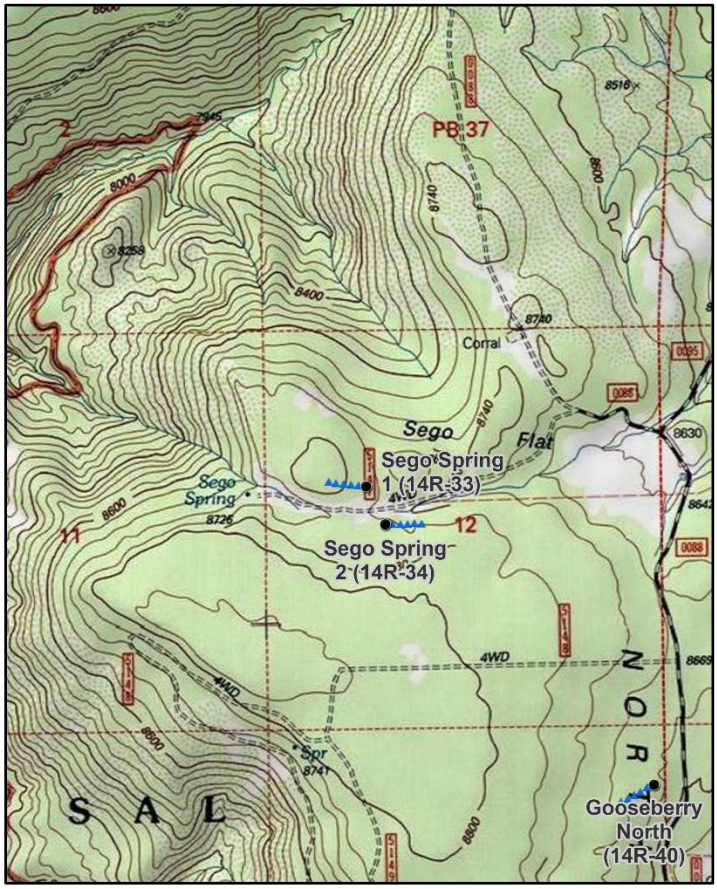
Table 14R-31.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

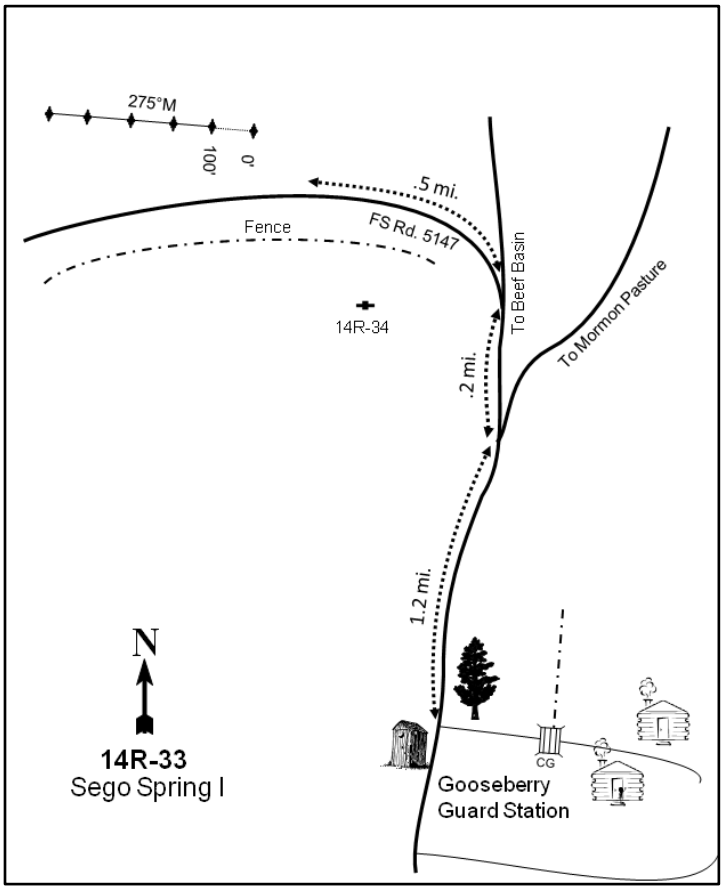
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2015	2	-	100	-	-	-	4.0
2019	2	-	100	-	-	-	8.0
2025	2	-	-	100	-	-	7.0
Pinus edulis (twoneedle pinyon)							
2012	543	-	5	5	30	60	16.9
2015	18	14	86	-	-	-	3.9
2019	20	-	100	-	-	-	5.6
2025	21	9	55	36	-	-	3.1

Table 14R-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
2012	14.1	2.7	4.8	18.8	-0.1	1.6	0.0	**41.9**	Poor
2015	10.3	8.3	1.8	28.8	-1.8	3.0	0.0	**50.4**	Poor-Fair
2019	17.0	11.2	2.0	30.0	-3.3	4.3	0.0	**61.2**	Fair
2025	16.7	10.2	2.9	30.0	-0.2	5.5	0.0	**65.1**	Fair-Good

SEGO SPRING 1 - STUDY NO. 14R-33





Location Information

USGS 7.5 min Map Info	Poison Canyon NE; Township 34S, Range 19E, Section 12
GPS (0' Stake)	NAD 83 UTM ZONE 12, 606679 East 4188573 North

Transect Information

Browse Tag # (0' Stake)	3900
Transect Bearing	270° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (35ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From Gooseberry Guard Station, travel north for 1.2 miles to Beef Basin Road and take the left fork of the road. Drive for 0.2 miles to Forest Service Road #5147 and again take the left fork. After 0.5 miles, the site will be on the right (north) side of the road. Study 14R-34 is on the south side of the road.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	COTTONWOOD
Elevation	8,766ft (2,672m)
Aspect	Southeast
Slope	4-8%
Sample Dates	08/26/2014, 08/25/2020, 08/19/2025

Table 14R-33.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fencing - Exclosure	North Elk Ridge Aspen Restoration Phase II	3773	Fall 2016	84

Wildlife Habitat and Vegetation History

Table 14R-33.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 14R-33.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Quaking Aspen/Gambel Oak/Snowberry	NA
2020	Quaking Aspen/Gambel Oak/Snowberry	NA
2025	Gambel Oak/Snowberry/Quaking Aspen	NA

Site Notes

This site was located within an exclosure, but fencing had been recently removed (fencing rolls were lying by the road) when the study was sampled in 2025.

Site Potential

1981 - 2010 Average Annual Precipitation	26 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

The plant community on this site has been dominated by quaking aspen (*Populus tremuloides*) in the overstory with a shrub understory of Gambel oak (*Quercus gambelii*) and mountain snowberry (*Symphoricarpos oreophilus*) since study establishment in 2014 (Photos, Table 14R-33.12, Table 14R-33.13). The herbaceous understory has remained diverse and abundant. Perennial grasses, primarily the introduced species smooth brome (*Bromus inermis*), intermediate wheatgrass (*Thinopyrum intermedium*), Kentucky bluegrass (*Poa pratensis*), and orchardgrass (*Dactylis glomerata*), have provided a majority of the herbaceous cover, although perennial forbs contributed notable cover in 2014 (Table 14R-33.7, Table 14R-33.10, Table 14R-33.11). This site will likely remain in this or a similar state in future years without a major disturbance.

The preferred shrub and herbaceous communities on this site may provide adequate forage for deer and elk (Beck & Peek, 2005) during the summer months, though diversity of shrub species is low (Table 14R-33.3, Table 14R-33.6, Table 14R-33.7). However, pellet transect data indicates that presence of deer has ranged between low and high since 2014. Elk presence has remained low over the same timeframe. Utilization of oak and snowberry has been mostly light. As aspen has aged, utilization has decreased; only 10% of aspen were moderately utilized with the remaining population considered to be lightly hedged in 2025. Cattle utilization pressures appear to be light as presence has ranged from low to moderate. On-site observations for 2025 noted moderate utilization (20-40%) on smooth brome, while little to no utilization was observed on forb species (Photos, Table 14R-33.9, Table 14R-33.13, Table 14R-33.13a); current utilization is likely due to the removal of the exclosure structure surrounding the site.

Trend Summary Tables

Table 14R-33.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2014	9.2	0.1	0.6	29.6	-	11.2
2020	10.2	0.4	2.2	31.4	-	10.2
2025	11.5	0.1	3.5	35.4	0.5	7.5

Table 14R-33.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2014	-	436	27	360	-	26.6	0.3	17.1
2020	-	406	92	200	-	22.5	0.4	3.8
2025	-	405	57	230	-	27.0	0.8	8.8

Table 14R-33.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2014	8.1	0.0	63.2	0.2	0.6	55.6
2020	10.0	0.0	58.1	0.1	0.7	40.0
2025	8.5	0.7	52.8	0.1	0.3	43.3

Table 14R-33.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2014	11	5	16	-
2020	8	17	21	3
2025	6	6	3	5
Year	Days Use Per Acre (ha)			
2014	5.8 (14.3)	17.4 (43.0)	18.1 (44.7)	-
2020	14.5 (35.9)	67.0 (165.5)	7.4 (18.2)	-
2025	5.1 (12.6)	4.0 (9.9)	11.4 (28.1)	-

Table 14R-33.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Bromus inermis[i] (smooth brome)	Bromus porteri (Porter brome)	Carex (sedge)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Koeleria macrantha (prairie Junegrass)	Phleum pratense[i] (timothy)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency												
2014	16	193	2	-	208	18	84	7	11	2	238	-	3
2020	45	233	-	14	93	12	69	4	-	9	150	-	61
2025	10	309	13	4	21	1	21	1	4	15	136	3	53
year	Average Cover (%)												
2014	0.2	4.7	0.0	-	8.3	0.3	3.1	0.2	0.2	0.0	9.7	-	0.0
2020	0.7	10.3	-	0.1	2.2	0.2	2.2	0.0	-	0.2	2.3	-	4.2
2025	0.2	17.1	1.0	0.0	1.7	0.0	0.6	0.0	0.0	0.6	3.2	0.0	2.6

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

Table 14R-33.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis holboellii[a] (Holboell's rockcress)	Chenopodium[a] (goosefoot)	Cirsium (thistle)	Collinsia parviflora[a] (maiden blue eyed Mary)	Descurainia pinnata[a] (western tansymustard)	Dracocephalum parviflorum (American dragonhead)	Erigeron flagellaris (trailing fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Heterotheca villosa (hairy false goldenaster)	Lathyrus lanszwertii (Nevada pea)	Lupinus (lupine)	Microsteris gracilis[a] (slender phlox)	Packera neomexicana (New Mexico groundsel)	Penstemon comarrhenus (dusty beardtongue)	Phacelia heterophylla[a] (varileaf phacelia)
year	Nested Frequency																
2014	59	3	-	3	2	11	4	213	1	2	5	108	14	-	34	7	2
2020	42	10	2	-	16	-	-	76	2	-	7	46	13	-	7	11	-
2025	46	10	-	-	14	-	5	147	4	4	18	54	10	21	4	9	9
year	Average Cover (%)																
2014	1.1	0.0	-	0.0	0.0	0.3	0.0	11.6	0.0	0.0	0.1	1.5	0.2	-	0.5	0.2	0.0
2020	0.2	0.1	0.0	-	0.1	-	-	0.7	0.0	-	0.4	0.3	0.5	-	0.1	0.1	-
2025	0.5	0.0	-	-	0.1	-	0.2	4.2	0.3	0.2	0.3	1.5	0.4	0.6	0.2	0.2	0.0

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Pseudostellaria jamesiana (tuber starwort)	Silene drummondii (Drummond's campion)	Taraxacum officinale (common dandelion)	Thermopsis montana (mountain goldenbanner)	Trifolium (clover)	Vicia americana (American vetch)	Zigadenus elegans (mountain deathcamas)
year	Nested Frequency								
2014	26	10	24	2	146	5	3	15	-
2020	47	79	16	16	72	-	-	2	1
2025	43	11	6	0	12	1	5	8	-
year	Average Cover (%)								
2014	0.1	0.0	0.1	0.0	1.5	0.1	0.0	0.1	-
2020	0.5	0.2	0.1	0.1	0.7	-	-	0.0	0.0
2025	0.6	0.1	0.1	0.0	0.2	0.0	0.0	0.0	-

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

Table 14R-33.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Mahonia repens (creeping barberry)	Populus tremuloides[tp] (quaking aspen)	Quercus gambelii[ip] (Gambel oak)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)			
2014	-	11.2	17.2	12.4
2020	0	10.2	20.6	10.8
2025	0.5	7.5	22	13.4
year	Quadrat Cover (%)			
2014	0.1	0.6	1.2	8.0
2020	0.4	2.2	2.3	7.9
2025	0.1	3.5	1.5	10.0

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

Table 14R-33.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Mahonia repens -- (creeping barberry)									
2014	60	-	0	100	0	0	0	0	10/13
2020	300	-	33	67	0	0	0	0	8/11
2025	700	-	0	100	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2014	-	40	0	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Quercus gambelii[p] -- (Gambel oak)									
2014	1140	180	70	30	0	16	0	7	29/30
2020	1940	40	28	72	0	55	0	0	132/72
2025	1100	-	44	56	0	7	0	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2014	3340	60	25	72	3	29	2	10	58/81
2020	3700	40	8	90	2	12	18	2	63/89
2025	4140	40	9	87	5	30	9	9	- / -

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

Table 14R-33.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

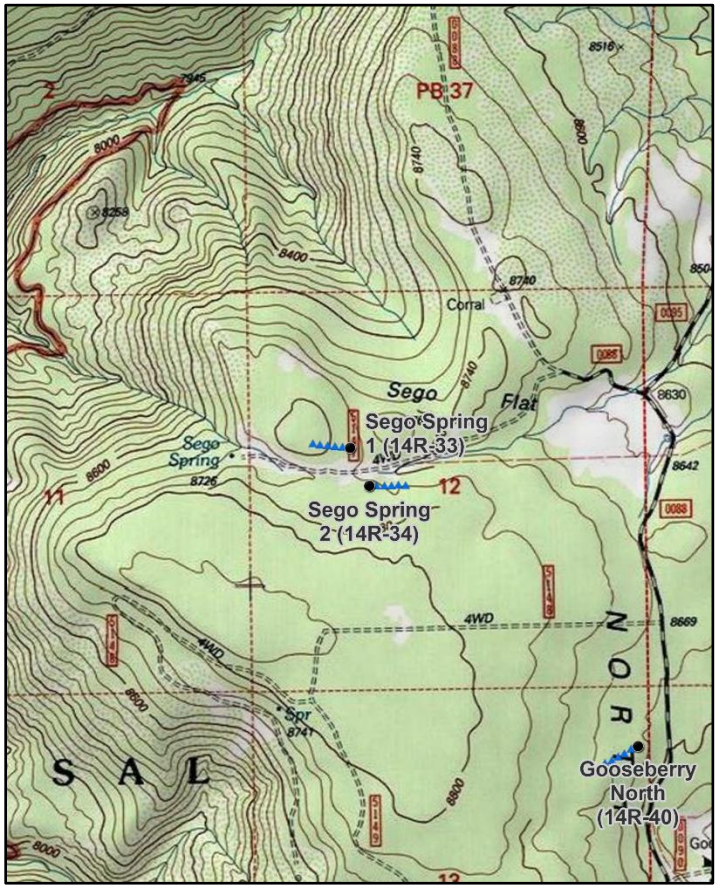
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2014	1220	38	57	-	5	45	5	11
2020	1220	48	38	13	2	34	22	13
2025	960	15	71	8	6	10	0	5

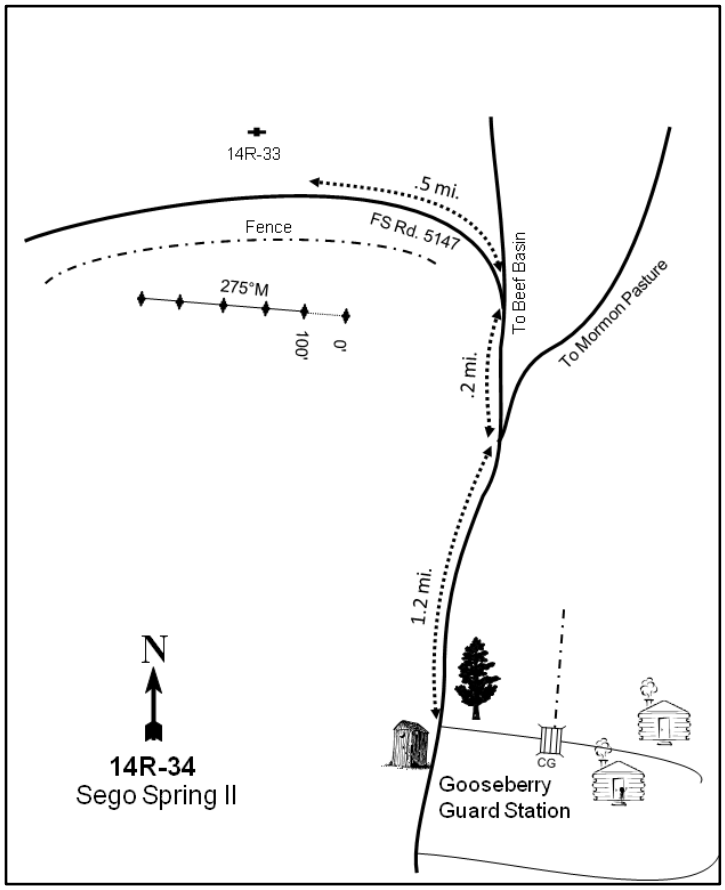
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

Table 14R-33.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Pinus ponderosa (ponderosa pine)							
2014	3	-	-	-	-	100	32.0
2020	1	-	-	-	-	100	27.0
Populus tremuloides (quaking aspen)							
2014	222	-	63	-	-	37	17.3
2020	520	15	60	15	-	10	4.9
2025	304	25	55	15	-	5	3.5
Quercus gambelii (Gambel oak)							
2014	141	-	-	-	100	-	14.6

SEGO SPRING 2 - STUDY NO. 14R-34





Location Information	
USGS 7.5 min Map Info	Poison Canyon NE; Township 34S, Range 19E, Section 12
GPS (0' Stake)	NAD 83 UTM ZONE 12, 606757 East 4188419 North

Transect Information	
Browse Tag # (0' Stake)	605
Transect Bearing	85° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 3: 1ft

Directions to Site

From Gooseberry Guard Station, travel north for 1.2 miles to Beef Basin Road and take the left fork of the road. Drive for 0.2 miles to Forest Service Road #5147 and again take the left fork. After 0.5 miles the site will be on the left (south) side of the road. Study 14R-33 is on the north side of the road.

Site Information	
Land Ownership	Federal
Land Administrator	USFS
Allotment	GOOSEBERRY
Elevation	8,766ft (2,672m)
Aspect	East
Slope	2-5%
Sample Dates	08/26/2014, 08/25/2020, 08/19/2025

Table 14R-34.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Duck Lake	-	2009	723
Fire - Widlfire	Poison Canyon	-	August 2019	1423

Wildlife Habitat and Vegetation History

Table 14R-34.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 14R-34.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Quaking Aspen/Snowberry	NA
2020	Quaking Aspen/Snowberry	NA
2025	Perennial Grass/Snowberry/Quaking Aspen	NA

Site Notes

This site is being read in conjunction with 14R-33.

Site Potential

1981 - 2010 Average Annual Precipitation	26 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2014, this site has remained dominated by quaking aspen (*Populus tremuloides*) in the overstory and mountain snowberry (*Symphoricarpos oreophilus*) in the understory, although cover and density of aspen exhibited notable decreases between 2020 and 2025. Other shrubs have been present, but have contributed much less cover than snowberry and aspen (Table 14R-34.1, Table 14R-34.12, Table 14R-34.13). The perennial herbaceous understory has remained abundant with a diverse number of grasses and forbs. Perennial grasses -- including (but not limited to) the introduced species smooth brome (*Bromus inermis*) and orchardgrass (*Dactylis glomerata*), and the native species Columbia needlegrass (*Achnatherum nelsonii*) -- have provided a majority of the herbaceous cover throughout the study period. The introduced perennial grass species bulbous bluegrass (*Poa bulbosa*) has also been observed throughout the duration of the study, but abundance has remained low (Table 14R-34.7, Table 14R-34.10, Table 14R-34.11). This study site will likely remain in this or a similar state in future sample years without further disturbance. If aspen continues to decrease, however, a shift to a community solely dominated by snowberry and perennial grasses is probable.

The preferred shrub and herbaceous communities on this site may provide adequate forage for deer and elk (Beck & Peek, 2005) during the summer months, though diversity of shrub species is low (Table 14R-34.3, Table 14R-34.6, Table 14R-34.7, Table 14R-34.12). However, pellet transect data indicates that presence of deer has been low since 2014. Elk presence has ranged between low and high over the same time frame; elk presence was high in 2020. Utilizations of Gambel oak (*Quercus gambelii*) and Woods' rose (*Rosa woodsii*) have been mostly moderate, although there were only a few individual plants sampled in density strips. Snowberry has had the largest population size of all preferred browse species. This larger population size of snowberry has likely displaced utilization across the site; utilization of snowberry has remained light since 2014. Aspen utilization has been considered to be mostly light, although overall utilization has increased over time. Cattle utilization pressures appear to be light as presence has been low to absent (Photos, Table 14R-34.9, Table 14R-34.13). On-site observations for 2025 noted heavy utilization (>40%) on Letterman's needlegrass (*Achnatherum lettermanii*), Columbia needlegrass, Thurber's fescue (*Festuca thurberi*), and Kentucky bluegrass (*Poa pratensis*) while little to no utilization was seen on forb species.

Trend Summary Tables

Table 14R-34.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2014	13.2	1.2	0.2	21.2	1.8	37.9
2020	12.6	0.9	0.6	16.1	0.9	33.3
2025	11.6	0.9	0.3	19.6	1.7	10.3

Table 14R-34.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2014	-	399	7	397	-	25.1	0.0	23.2
2020	-	361	141	274	-	17.3	0.9	6.4
2025	-	419	87	283	-	30.8	0.4	9.6

Table 14R-34.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2014	8.4	0.1	59.5	0.3	2.2	58.7
2020	15.4	0.0	60.0	0.1	2.0	38.9
2025	7.9	0.0	63.3	0.4	2.2	47.6

Table 14R-34.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk
	Quadrat Frequency		
2014	2	5	11
2020	1	11	21
2025	1	9	10
Year	Days Use Per Acre (ha)		
2014	1.5 (3.6)	12.8 (31.5)	9.4 (23.2)
2020	-	6.0 (14.9)	40.2 (99.3)
2025	5.1 (12.6)	6.7 (16.6)	6.7 (16.6)

Table 14R-34.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus inermis[i] (smooth brome)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex phaeocephala (dunhead sedge)	Carex rossii (Ross' sedge)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Festuca thurberi (Thurber's fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Muhlenbergia richardsonis (mat muhly)	Phleum pratense[i] (timothy)	Poa bulbosa[i] (bulbous bluegrass)
year	Nested Frequency																
2014	-	6	25	22	7	-	-	62	69	33	44	22	8	5	-	1	17
2020	11	34	69	-	4	5	12	69	99	30	26	18	10	3	-	-	29
2025	55	54	63	-	3	5	11	39	36	-	49	24	-	2	10	-	7
year	Average Cover (%)																
2014	-	0.2	1.5	0.4	0.2	-	-	2.9	2.1	1.4	1.8	1.4	0.6	0.2	-	0.0	0.2
2020	0.4	1.4	2.6	-	0.0	0.0	0.2	2.8	2.7	0.5	0.8	1.1	0.6	0.0	-	-	0.5
2025	2.1	2.1	4.3	-	0.0	0.2	0.2	1.5	1.9	-	2.7	1.4	-	0.0	0.3	-	0.3

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

GRASS SPECIES	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency		
2014	325	2	1
2020	178	20	2
2025	244	2	-
year	Average Cover (%)		
2014	12.0	0.0	0.0
2020	3.3	0.3	0.0
2025	13.7	0.1	-

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

Table 14R-34.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium (onion)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Arabis drummondii (Drummond's rockcress)	Castilleja linariifolia (Wyoming Indian paintbrush)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cymopterus (springparsley)	Erigeron flagellaris (trailing fleabane)	Erigeron formosissimus (beautiful fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Heterotheca villosa (hairy false goldenaster)	Lathyrus lanszwertii (Nevada pea)	Lupinus (lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis[a] (slender phlox)	Noccaea fendleri (Fendler's pennycress)
year	Nested Frequency																
2014	183	3	5	-	2	-	4	186	17	2	1	19	79	1	3	-	-
2020	51	-	-	-	-	19	4	58	-	-	3	8	60	-	-	-	-
2025	98	1	-	2	-	34	-	88	25	-	1	21	37	-	-	1	4
year	Average Cover (%)																
2014	3.3	0.0	0.0	-	0.1	-	0.0	12.6	0.1	0.0	0.0	0.6	2.3	0.0	0.2	-	-
2020	0.5	-	-	-	-	0.1	0.0	1.1	-	-	0.0	0.3	0.4	-	-	-	-
2025	1.1	0.0	-	0.0	-	0.1	-	2.2	0.4	-	0.0	1.1	0.8	-	-	0.0	0.0

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

FORB SPECIES	Osmorhiza depauperata (bluntseed sweetroot)	Packera neomexicana (New Mexico groundsel)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Pseudostellaria jamesiana (tuber starwort)	Senecio integerrimus[a] (lambstongue ragwort)	Silene drummondii (Drummond's campion)	Symphyotrichum (aster)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Thermopsis montana (mountain goldenbanner)	Tragopogon dubius[ai] (yellow salsify)	Trifolium longipes (longstalk clover)
year	Nested Frequency												
2014	3	8	15	2	34	-	6	5	-	207	-	0	155
2020	1	8	34	132	36	1	4	21	27	84	4	-	103
2025	2	5	54	66	62	6	13	-	79	8	-	-	99
year	Average Cover (%)												
2014	0.0	0.1	0.1	0.0	0.2	-	0.0	0.2	-	2.5	-	0.0	0.8
2020	0.0	0.1	0.3	0.8	0.1	0.0	0.0	0.4	0.9	1.3	0.0	-	0.7
2025	0.1	0.0	0.4	0.2	0.6	0.1	0.1	-	1.7	0.0	-	-	1.0

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

Table 14R-34.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Mahonia repens (creeping barberry)	Pinus ponderosa[t] (ponderosa pine)	Populus tremuloides[tp] (quaking aspen)	Pseudotsuga menziesii[t] (Douglas-fir)	Quercus gambelii[p] (Gambel oak)	Rosa woodsii[p] (Woods' rose)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)							
2014	0.1	1.8	-	37.7	0.2	0.7	0.1	20.3
2020	-	0.9	-	33.3	-	0.1	-	16
2025	-	1.7	-	10.3	-	1.2	0	18.4
year	Quadrat Cover (%)							
2014	0.0	1.2	0.0	0.0	0.1	0.1	0.0	13.1
2020	-	0.9	-	0.6	-	0.0	-	12.6
2025	-	0.9	-	0.3	-	0.0	0.0	11.6

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

Table 14R-34.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2014	20	-	100	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Mahonia repens -- (creeping barberry)									
2014	2000	-	7	93	0	0	0	73	11/15
2020	4180	-	0	100	0	0	0	0	10/13
2025	6180	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Pinus ponderosa[t] -- (ponderosa pine)									
2014	-	40	0	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	-/-
2025	120	-	100	0	0	0	0	0	- / -
Pseudotsuga menziesii[t] -- (Douglas-fir)									
2014	20	-	100	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	- / -
2025	-	-	-	-	-	-	-	-	-/-
Quercus gambelii[p] -- (Gambel oak)									
2014	80	80	100	0	0	0	0	0	27/19
2020	60	-	100	0	0	67	0	33	23/17
2025	80	-	100	0	0	75	0	0	- / -
Rosa woodsii[p] -- (Woods' rose)									
2014	80	-	75	0	25	50	0	0	52/43
2020	60	-	67	33	0	33	67	0	50/29
2025	80	-	0	100	0	75	0	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2014	5740	120	25	75	0	25	5	2	49/75
2020	5840	20	33	64	3	12	15	3	45/70
2025	6560	-	8	87	6	29	24	14	- / -

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

Table 14R-34.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

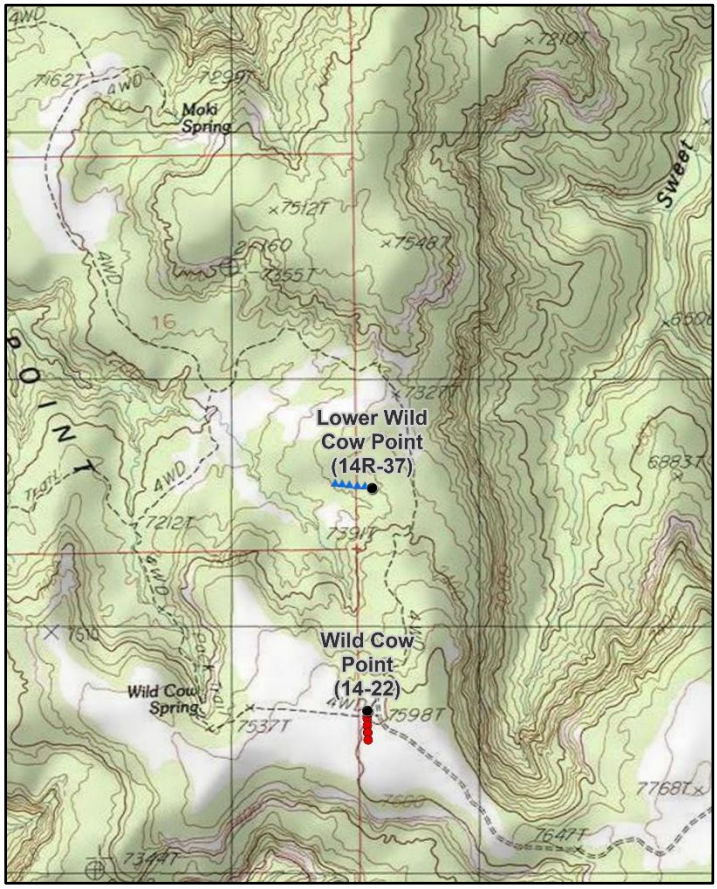
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2014	580	38	28	-	34	11	28	50
2020	860	77	9	2	12	10	30	0
2025	440	82	9	-	9	25	25	50

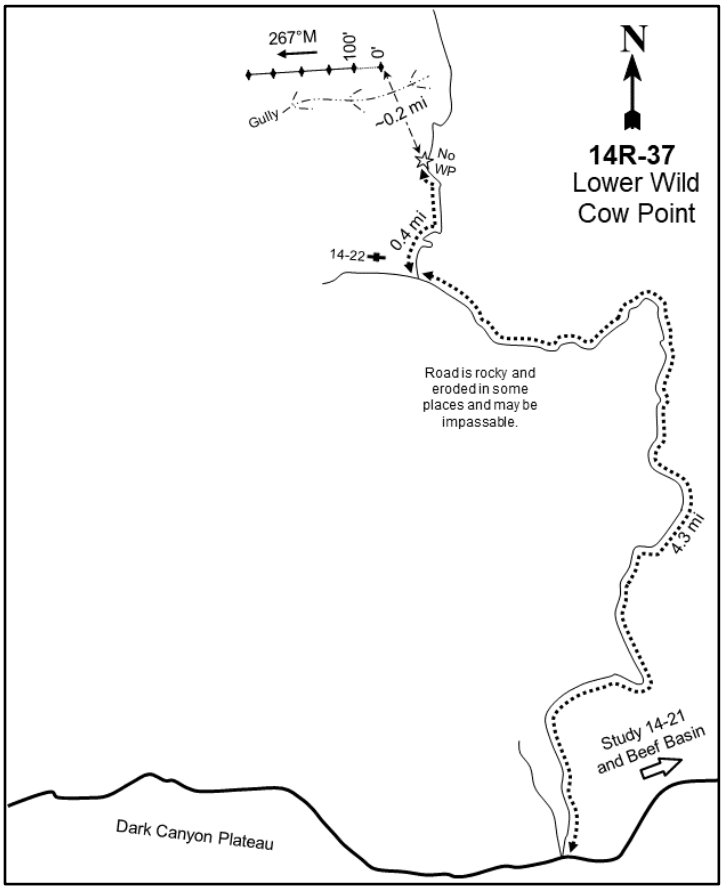
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

Table 14R-34.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Pinus ponderosa (ponderosa pine)							
2014	4	-	-	-	-	100	45.3
2020	17	29	29	-	-	43	15.9
2025	27	9	55	9	-	27	17.1
Populus tremuloides (quaking aspen)							
2014	243	30	-	-	5	65	21.9
2020	351	25	20	-	-	55	20.5
2025	110	12	12	-	-	76	25.6
Quercus gambelii (Gambel oak)							
2014	3	-	-	-	33	67	13.9

LOWER WILD COW POINT - STUDY NO. 14R-37





Location Information

USGS 7.5 min Map Info	Fable Valley SE; Township 33S, Range 18E, Section 50
GPS (0' Stake)	NAD 83 UTM ZONE 12, 593513 East 4195753 North

Transect Information

Browse Tag # (0' Stake)	109
Transect Bearing	267° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belts 3, 4: 3ft

Directions to Site

Drive to the North Long Point study (14-21). From the west rim of North Long Point, proceed west down the dugway on the Dark Canyon Plateau Road for 5.4 miles. Turn north on the Wild Cow Point Road and go 4.3 miles to a chaining and a faint road on the left (west): this is the Wild Cow Point study (14-22). Continue down the road for another 0.4 miles, park on the road and hike down to the study, crossing a gully.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	INDIAN CREEK
Elevation	7,349ft (2,240m)
Aspect	South
Slope	3-6%
Sample Dates	08/27/2014, 08/22/2017, 08/17/2022, 08/20/2025

Table 14R-37.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Dark Canyon Plateau Phase II	2938	May 2015	238

Wildlife Habitat and Vegetation History

Table 14R-37.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 14R-37.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Pinyon-Juniper	Phase III
2017	Mixed Mountain Brush/Pinyon-Juniper	Phase II
2022	Mixed Mountain Brush/Pinyon-Juniper	Phase II
2025	Mixed Mountain Brush/Pinyon-Juniper	Phase II

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048AY306UT
States and Transitions	2014 - Juniper Invasion State: Community Phase 3.2 2017-2025 - Juniper Invasion State: Community Phase 3.1

This site was encroached by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and considered to be in Phase III of woodland succession upon study establishment in 2014; mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and other browse species such as littleleaf mountain mahogany (*Cercocarpus intricatus*) provided limited cover. A bullhog treatment in 2015 (Table 14R-37.1) removed some of the trees, causing the site to transition into one co-dominated by Phase II pinyon-juniper and mixed mountain brush species (Table 14R-37.4, Table 14R-37.12, Table 14R-37.13, Table 14R-37.14). The herbaceous understory provided moderate cover in 2014, but cover increased following treatment. Native perennial grasses such as muttongrass (*Poa fendleriana*), needle and thread (*Hesperostipa comata*), blue grama (*Bouteloua gracilis*), and/or Indian ricegrass (*Achnatherum hymenoides*) have been the dominant herbaceous species since 2017. Forbs have remained rare in comparison with grasses (Table 14R-37.7, Table 14R-37.10, Table 14R-37.11).

Condition of mule deer winter range on this site has ranged between poor and fair since 2014; winter range condition was considered to be fair in 2025. Negative factors contributing to this fair condition include reduced preferred browse cover and recruitment; reduced perennial forb cover; and the amount of annual grass cover (Table 14R-37.6, Table 14R-37.7, Table 14R-37.13, Table 14R-37.15). Pellet transect data indicates that deer and elk presence has remained mostly low since 2014. Cattle presence has been low to absent throughout the study period. For most preferred browse populations, utilization has been light in most sample years. However, all black sagebrush (*Artemisia nova*) plants sampled in density strips were heavily hedged in 2025. In addition, 100% of the population of littleleaf mountain mahogany has been moderately hedged in most years. It is important to note that these preferred browse population are smaller in size, but when analyzed as an aggregate, they provide a notable contribution to total forage availability (Table 14R-37.9, Table 14R-37.13). On-site observations for 2025 noted that little to no utilization occurred within the herbaceous community. Drought may be having an impact on this community as evidenced by the lack of seed production, reduced primary growth, and chlorotic leaves.

Trend Summary Tables

Table 14R-37.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2014	2.9	0.6	8.8	6.3	0.4	47.4
2017	3.2	1.2	3.1	7.5	0.2	27.4
2022	3.1	0.6	6.3	8.8	0.6	23.7
2025	4.6	1.1	2.6	6.7	0.5	24.1

Table 14R-37.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2014	36	230	38	137	0.1	9.3	0.2	2.1
2017	14	277	27	162	0.1	15.3	0.1	5.9
2022	90	251	18	78	1.8	16.6	0.1	1.8
2025	42	276	15	77	0.2	21.1	0.2	2.7

Table 14R-37.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2014	26.4	15.0	50.9	0.5	2.9	22.1
2017	34.1	2.0	57.4	0.5	3.1	23.8
2022	31.2	0.7	51.4	0.3	3.6	31.1
2025	28.5	0.5	51.0	0.3	2.6	30.0

Table 14R-37.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2014	3	11	1	36
2017	-	6	4	5
2022	1	15	3	5
2025	1	25	13	24
Year	Days Use Per Acre (ha)			
2014	-	5.3 (13.2)	6.0 (14.9)	-
2017	2.9 (7.2)	15.4 (38.1)	8.7 (21.5)	-
2022	-	22.8 (56.3)	11.4 (28.1)	-
2025	0.7 (1.8)	21.5 (53.0)	9.4 (23.2)	-

Table 14R-37.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency								
2014	13	-	68	9	49	31	108	3	29
2017	14	3	68	9	18	100	125	-	5
2022	29	3	78	38	15	90	96	-	69
2025	40	3	54	15	38	84	108	-	29
year	Average Cover (%)								
2014	0.1	-	4.0	0.0	0.6	1.6	3.0	0.0	0.1
2017	0.7	0.1	4.6	0.1	0.6	2.9	6.3	-	0.0
2022	3.4	0.1	2.6	0.8	0.7	5.5	4.3	-	1.0
2025	4.4	0.4	2.4	0.1	1.3	8.4	4.3	-	0.1

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

Table 14R-37.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus mollissimus (woolly locoweed)	Camelina microcarpa[ai] (littlepod false flax)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium atrovirens[a] (pinyon goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cordylanthus[a] (bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Erigeron flagellaris (trailing fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua[a] (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Ipomopsis aggregata (scarlet gilia)
year	Nested Frequency																
2014	22	4	12	-	8	-	-	2	3	12	-	1	11	5	19	-	6
2017	-	35	15	-	-	8	-	4	-	2	-	5	9	9	13	8	1
2022	-	8	4	2	2	-	-	3	9	1	-	6	8	8	-	-	-
2025	-	12	4	-	-	-	3	1	-	2	5	2	9	-	4	-	-
year	Average Cover (%)																
2014	0.1	0.0	0.1	-	0.1	-	-	0.0	0.2	0.1	-	0.0	0.2	0.1	0.0	-	0.0
2017	-	0.8	0.3	-	-	0.0	-	0.0	-	0.0	-	0.1	0.5	0.4	0.0	0.3	0.0
2022	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1	0.0	-	0.1	0.2	0.1	-	-	-
2025	-	0.2	0.0	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.3	-	0.0	-	-

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

FORB SPECIES	Lappula occidentalis[a] (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Petradoria pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Physaria rectipes (straight bladderpod)	Polygonum douglasii[a] (Douglas' knotweed)	Stenotus acaulis (stemless mock goldenweed)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency										
2014	7	45	3	35	-	12	4	18	5	3	-
2017	-	35	2	38	1	10	6	31	2	10	1
2022	6	19	2	7	-	6	9	3	6	-	-
2025	5	3	11	4	-	10	9	13	-	-	5
year	Average Cover (%)										
2014	0.0	0.6	0.0	0.2	-	0.4	0.1	0.1	0.0	0.0	-
2017	-	0.9	0.0	1.0	0.0	0.5	0.2	0.9	0.0	0.1	0.0
2022	0.1	0.4	0.0	0.0	-	0.2	0.6	0.0	0.0	-	-
2025	0.2	0.2	0.1	0.3	-	0.6	0.7	0.2	-	-	0.0

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

Table 14R-37.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Cercocarpus intricatus[p] (littleleaf mountain mahogany)	Cercocarpus montanus[p] (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia fragilis (brittle pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Purshia stansburiana[p] (Stansbury cliffrose)	Purshia tridentata[p] (antelope bitterbrush)	Sclerocactus parviflorus (smallflower fishhook cactus)
year	Line Intercept Cover (%)														
2014	-	0.4	3.9	0.8	-	-	-	0.2	13.1	0.2	0	34.3	-	1.2	-
2017	-	0.2	3.4	1.5	-	-	-	0.1	10.5	0.1	-	16.9	0.4	2	0
2022	0.5	2.1	2.9	1.4	-	-	-	0.3	9.9	0.2	-	13.8	-	1.9	0.1
2025	-	0.6	2.1	1.5	-	-	-	0.5	13.7	-	-	10.4	-	2.5	-
year	Quadrat Cover (%)														
2014	0.0	0.4	1.3	0.6	-	-	-	0.2	1.9	0.2	0.2	7.0	-	0.6	0.0
2017	0.1	0.2	1.7	0.8	-	-	0.0	0.3	1.7	0.8	-	1.5	0.0	0.4	0.1
2022	0.2	0.4	1.3	0.9	0.1	-	0.0	0.1	1.1	0.3	-	5.3	-	0.3	0.1
2025	0.1	0.2	2.7	0.8	0.4	0.3	-	0.2	0.7	0.6	-	1.9	-	0.4	0.0

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

Table 14R-37.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2014	-	20	0	0	0	0	0	0	139/136
2017	20	20	0	100	0	0	0	100	107/116
2022	60	-	0	100	0	100	0	0	- / -
2025	20	-	100	0	0	0	0	100	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[P] -- (black sagebrush)									
2014	260	-	46	54	0	8	0	0	19/57
2017	180	-	0	100	0	0	0	0	18/38
2022	560	20	18	79	4	21	0	4	- / -
2025	300	-	27	53	20	0	100	20	- / -
Artemisia tridentata ssp. vaseyana[P] -- (mountain big sagebrush)									
2014	400	-	15	65	20	5	0	20	47/88
2017	420	-	10	67	24	38	19	14	48/82
2022	400	-	0	70	30	25	0	30	- / -
2025	420	-	5	62	33	10	5	76	- / -
Cercocarpus intricatus[P] -- (littleleaf mountain mahogany)									
2014	160	-	0	100	0	100	0	0	61/70
2017	120	-	0	67	33	0	0	0	47/83
2022	140	-	0	100	0	100	0	0	- / -
2025	140	-	0	100	0	100	0	0	- / -
Cercocarpus montanus[P] -- (alderleaf mountain mahogany)									
2014	-	-	-	-	-	-	-	-	142/154
2017	-	-	-	-	-	-	-	-	-/-
2022	20	-	0	100	0	100	0	0	- / -
2025	20	-	0	100	0	0	100	100	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	34/31
2022	20	-	0	0	100	0	0	100	- / -
2025	140	-	0	86	14	0	0	100	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2014	-	-	-	-	-	-	-	-	31/34
2017	20	-	100	0	0	0	0	0	46/85
2022	40	-	50	50	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Ephedra viridis[P] -- (mormon tea)									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	49/52
2022	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2014	-	-	-	-	-	-	-	-	41/57
2017	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
2025	20	-	0	100	0	100	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2014	400	20	60	35	5	0	0	0	15/23
2017	800	-	0	100	0	0	0	0	20/35
2022	120	-	0	100	0	0	0	0	- / -
2025	280	-	0	57	43	0	0	71	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	20	0	0	0	0	0	0	- / -
2022	20	-	100	0	0	0	0	0	- / -
2025	20	-	100	0	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Linanthus pungens -- (granite prickly phlox)									
2014	680	-	0	65	35	6	0	3	10/20
2017	640	-	3	78	19	0	0	19	15/24
2022	420	-	0	81	19	0	0	29	- / -
2025	440	-	0	27	73	0	0	100	- / -
Mahonia fremontii -- (Fremont's mahonia)									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	40/55
2022	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Opuntia fragilis -- (brittle pricklypear)									
2014	300	-	60	40	0	0	0	27	6/15
2017	100	-	0	100	0	0	0	0	4/15
2022	40	-	50	50	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Peraphyllum ramosissimum[p] -- (wild crab apple)									
2014	-	-	-	-	-	-	-	-	87/113
2017	-	-	-	-	-	-	-	-	84/145
2022	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2014	160	20	13	88	0	0	0	0	- / -
2017	40	100	100	0	0	0	0	50	- / -
2022	20	-	0	100	0	0	0	0	- / -
2025	60	-	100	0	0	0	0	33	- / -
Purshia stansburiana[p] -- (Stansbury cliffrose)									
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	103/133
2022	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2014	300	-	0	80	20	80	7	40	25/51
2017	220	-	0	100	0	0	0	9	47/92
2022	80	-	0	100	0	100	0	25	- / -
2025	240	-	0	50	50	17	67	100	- / -
Sclerocactus parviflorus -- (smallflower fishhook cactus)									
2014	220	-	0	100	0	0	0	0	14/12
2017	180	-	11	89	0	0	0	0	12/10
2022	100	-	0	100	0	0	0	0	- / -
2025	60	-	0	100	0	0	0	0	- / -
Yucca -- (yucca)									
2014	-	-	-	-	-	-	-	-	27/37

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

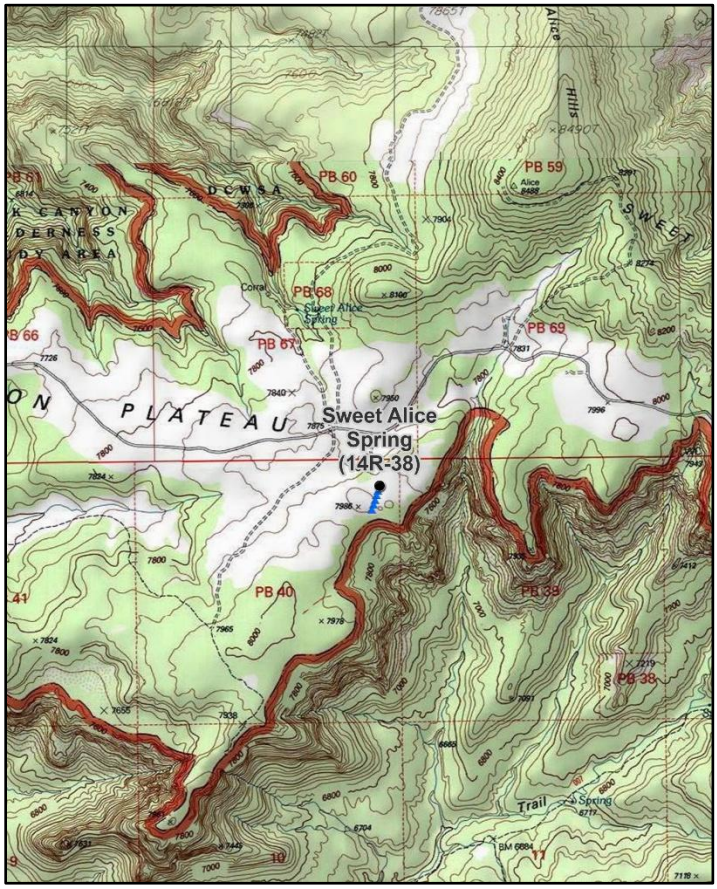
Table 14R-37.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

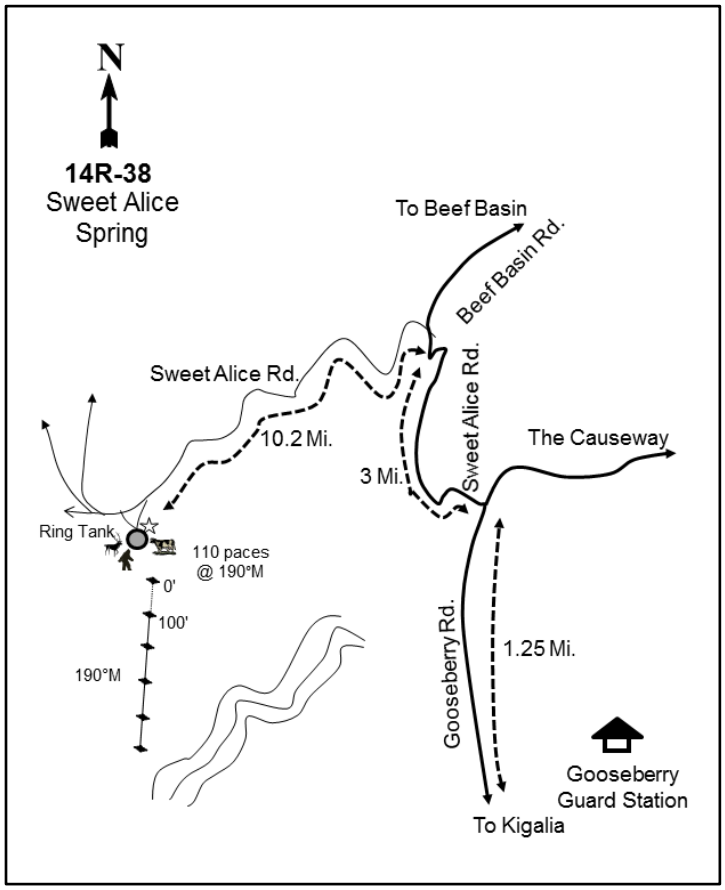
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2014	42	-	-	20	50	30	33.4
2017	14	-	22	-	-	78	61.2
2022	18	-	17	-	17	67	38.3
2025	16	-	20	-	-	80	62.2
Pinus edulis (twoneedle pinyon)							
2014	254	5	20	15	25	35	25.1
2017	65	47	7	13	-	33	27.1
2022	57	27	40	7	-	27	15.0
2025	65	20	47	7	-	27	19.6

Table 14R-37.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2014	8.4	10.2	6.1	18.6	-0.1	4.2	0.0	**47.4**	Poor
2017	10.4	9.0	2.2	30.0	0.0	10.0	0.0	**61.6**	Fair
2022	12.0	11.8	2.1	30.0	-1.4	3.5	0.0	**58.0**	Fair
2025	9.4	5.8	1.9	30.0	-0.1	5.3	0.0	**52.3**	Fair

SWEET ALICE SPRING - STUDY NO. 14R-38





Location Information

USGS 7.5 min Map Info	Warren Canyon NE; Township 34S, Range 18E, Section 40
GPS (0' Stake)	NAD 83 UTM ZONE 12, 594855 East 4190505 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	190° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the Gooseberry Guard Station on Elk Ridge, drive north for 1.3 miles on Gooseberry Road, then turn left onto Sweet Alice Road. Proceed for 3 miles, where there will be an intersection with Beef Basin Road to the right. Continue straight on Sweet Alice Road for 10.2 miles. There will be a pullout with a ring tank for cattle on the left (south) side of the road: park here. The study site is about 110 paces at an azimuth of 190 degrees magnetic from the ring tank.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	INDIAN CREEK
Elevation	7,900ft (2,408m)
Aspect	North
Slope	5-7%
Sample Dates	08/22/2017, 08/24/2020, 08/19/2025

Table 14R-38.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Dark Canyon Plateau Phase 5	4163	November 2018-January 2019	913

Wildlife Habitat and Vegetation History

Table 14R-38.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 14R-38.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Manzanita	Phase I
2020	Manzanita	Early Phase I
2025	Manzanita	Early Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Sand (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY307UT
States and Transitions	No state and transition model is available for this ecological site.

The vegetation community on this site has been dominated by greenleaf manzanita (*Arctostaphylos patula*) since study establishment in 2017, although preferred browse species such as Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and antelope bitterbrush (*Purshia tridentata*) have also been present to a lesser extent (Table 14R-38.12, Table 14R-38.13). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were scattered throughout the area in 2017, but many trees were removed by a 2018-2019 bullhog treatment (Table 14R-38.1). Pinyon and juniper have been observed following treatment, indicating that there may be potential for infilling over time. However, point-quarter density remains low and the site is considered to be within Early Phase I of woodland succession as of 2025 (Table 14R-38.4, Table 14R-38.14), suggesting that infilling is likely not an immediate concern. The herbaceous understory has been mainly composed of native perennial grasses and forbs and has remained moderately diverse. Herbaceous cover is moderate as of 2025, but may continue to increase as time since treatment passes. Annual grasses have not been observed in any sample year (Table 14R-38.7, Table 14R-38.10, Table 14R-39.11).

Condition of mule deer winter range on this site has ranged between poor-fair and fair since 2017; winter range condition was considered to be fair in 2025. Negative factors contributing to this fair condition are reduced preferred browse cover and recruitment, and reduced perennial grass and forb cover (Table 14R-38.6, Table 14R-38.7, Table 14R-38.13, Table 14R-38.15). Pellet transect data indicates that deer presence has decreased over time. More specifically, deer presence was high in 2017 and low in 2025. Elk presence has been low since 2017. Utilization on most preferred browse populations has been light in most sample years. However, 66% of bitterbrush plants sampled in density strips were moderately to heavily hedged in 2025. It is important to note that these preferred browse population are smaller in size, but when analyzed as an aggregate, they provide a notable contribution to forage availability on this site (Table 14R-38.9, Table 14R-38.13). On-site observations for 2025 noted that little to no utilization occurred within the herbaceous community. Drought may be having an impact on this community as of 2025 as evidenced by the lack of seed production, reduced primary growth, and chlorotic leaves.

Trend Summary Tables

Table 14R-38.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2017	13.0	40.0	8.1	15.8	48.6	12.2
2020	9.6	27.5	0.0	13.4	34.0	-
2025	9.0	30.4	-	15.3	30.3	-

Table 14R-38.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2017	-	118	1	93	-	3.8	0.0	3.3
2020	-	122	28	99	-	4.4	0.3	2.5
2025	-	143	5	70	-	6.4	0.0	2.7

Table 14R-38.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2017	14.1	1.2	77.8	0.1	0.3	58.1
2020	10.9	0.8	63.8	0.1	1.2	42.7
2025	10.3	0.3	68.0	0.0	0.2	45.8

Table 14R-38.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2017	-	3	-	4
2020	1	7	2	17
2025	-	4	8	20
Year	Days Use Per Acre (ha)			
2017	-	40.9 (101.0)	4.7 (11.6)	-
2020	1.5 (3.6)	18.1 (44.7)	1.3 (3.3)	-
2025	-	14.7 (36.4)	11.4 (28.1)	-

Table 14R-38.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum[i] (crested wheatgrass)	Bouteloua gracilis (blue grama)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)
year	Nested Frequency					
2017	4	-	2	6	-	110
2020	8	5	4	10	5	104
2025	17	2	12	12	12	100
year	Average Cover (%)					
2017	0.0	-	0.2	0.0	-	3.6
2020	0.2	0.4	0.1	0.1	0.2	3.5
2025	1.1	0.0	0.2	0.3	0.4	4.3

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

Table 14R-38.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Astragalus lentiginosus (freckled milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Cordylanthus[a] (bird's-beak)	Cryptantha (cryptantha)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Frasera albomarginata (desert frasera)	Galium[a] (bedstraw)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lithospermum ruderale (western stoneseed)	Lomatium parryi (Utah desertparsley)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)
year	Nested Frequency																
2017	2	-	-	1	-	6	3	10	3	-	-	-	-	1	-	0	4
2020	-	-	3	6	8	1	-	8	10	7	2	-	1	6	4	-	3
2025	-	0	-	2	3	8	-	4	4	4	-	3	-	7	2	-	2
year	Average Cover (%)																
2017	0.0	-	-	0.0	-	0.1	0.1	0.1	0.0	-	-	-	-	0.0	-	0.0	0.0
2020	-	-	0.0	0.2	0.1	0.0	-	0.1	0.2	0.0	0.0	-	0.0	0.0	0.2	-	0.4
2025	-	0.0	-	0.0	0.2	0.0	-	0.1	0.2	0.0	-	0.0	-	0.2	0.1	-	0.0

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

FORB SPECIES	Packera multilobata (lobeleaf groundsel)	Petradoria pumila (rock goldenrod)	Phacelia heterophylla[a] (varileaf phacelia)	Phlox austromontana (mountain phlox)	Physaria (twinpod)	Polygonum douglasii[a] (Douglas' knotweed)
year	Nested Frequency					
2017	21	29	-	37	7	-
2020	31	16	5	20	1	17
2025	9	17	-	21	13	-
year	Average Cover (%)					
2017	0.3	1.5	-	1.1	0.0	-
2020	0.5	0.6	0.0	0.5	0.0	0.0
2025	0.0	0.8	-	1.0	0.0	-

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

Table 14R-38.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Arctostaphylos patula (greenleaf manzanita)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Mahonia repens (creeping barberry)	Opuntia fragilis (brittle pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Purshia tridentata[p] (antelope bitterbrush)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)								
2017	7	48.1	3.7	0.5	0	-	12.2	2	3.1
2020	7.9	33.6	1.9	0.4	-	-	-	2.7	0.9
2025	6.9	29.8	2.4	0.5	-	-	-	3.9	2.1
year	Quadrat Cover (%)								
2017	6.1	39.1	2.4	0.4	0.0	0.5	8.1	2.2	2.3
2020	4.8	27.1	2.0	0.1	0.0	0.3	0.0	2.1	0.7
2025	2.8	29.7	3.0	0.5	-	0.2	-	2.7	0.5

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

Table 14R-38.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2017	480	-	8	83	8	8	8	0	176/186
2020	360	-	17	72	11	39	6	11	136/123
2025	340	-	12	71	18	35	0	29	- / -
Arctostaphylos patula -- (greenleaf manzanita)									
2017	9600	-	2	97	1	0	0	0	50/79
2020	5320	-	4	93	3	2	0	4	45/92
2025	6180	-	2	93	5	0	0	5	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2017	620	-	7	74	19	0	7	19	57/90
2020	460	-	26	52	22	0	0	17	63/93
2025	620	20	23	58	19	7	3	19	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	13/27
2025	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2017	20	-	100	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2017	1440	20	0	100	0	0	0	0	17/26
2020	460	-	0	100	0	0	0	0	28/35
2025	940	-	0	92	9	0	0	9	- / -
Mahonia repens -- (creeping barberry)									
2017	40	-	0	100	0	0	0	0	5/8
2020	40	-	0	100	0	0	0	0	3/6
2025	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Opuntia fragilis -- (brittle pricklypear)									
2017	220	-	0	100	0	0	0	0	9/37
2020	320	-	6	94	0	0	0	19	9/41
2025	240	-	0	100	0	0	0	17	- / -
Paxistima myrsinites -- (Oregon boxleaf)									
2017	-	-	-	-	-	-	-	-	15/5
2020	20	-	0	100	0	0	0	0	- / -
2025	20	-	0	100	0	100	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2017	40	20	0	100	0	0	0	0	- / -
2020	-	40	0	0	0	0	0	0	- / -
2025	-	20	0	0	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2017	260	-	0	100	0	15	39	0	78/123
2020	280	-	0	86	14	36	7	21	71/114
2025	300	-	0	100	0	53	13	40	- / -
Quercus gambelii[p] -- (Gambel oak)									
2017	-	-	-	-	-	-	-	-	71/94
2020	-	-	-	-	-	-	-	-	88/86
2025	-	-	-	-	-	-	-	-	-/-
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2017	720	-	0	100	0	0	0	0	50/64
2020	380	-	11	79	11	0	0	37	42/63
2025	460	-	4	96	0	17	4	78	- / -
Yucca baccata -- (banana yucca)									
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	21/29

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

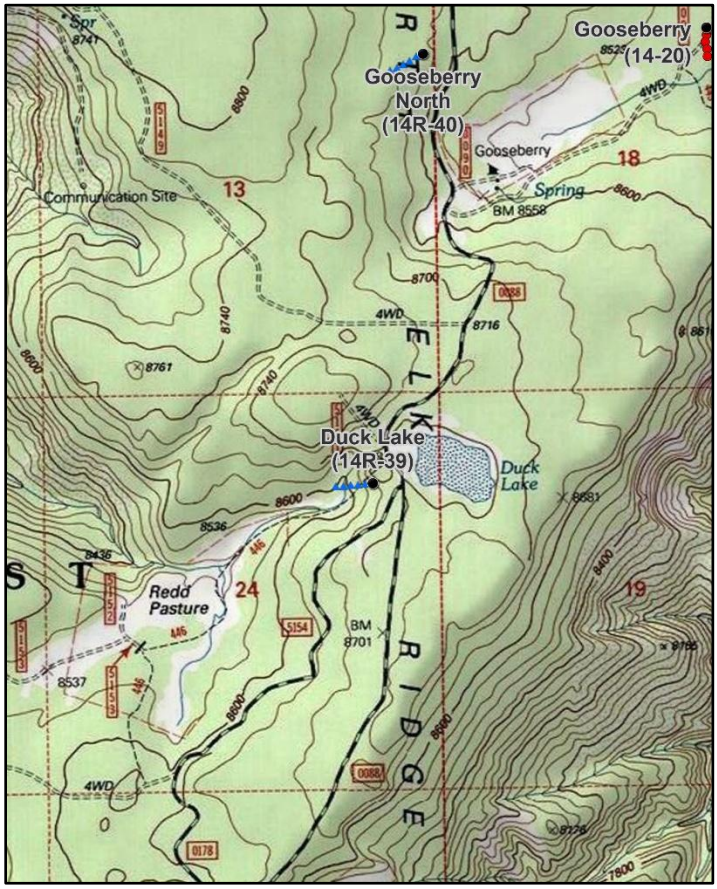
Table 14R-38.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

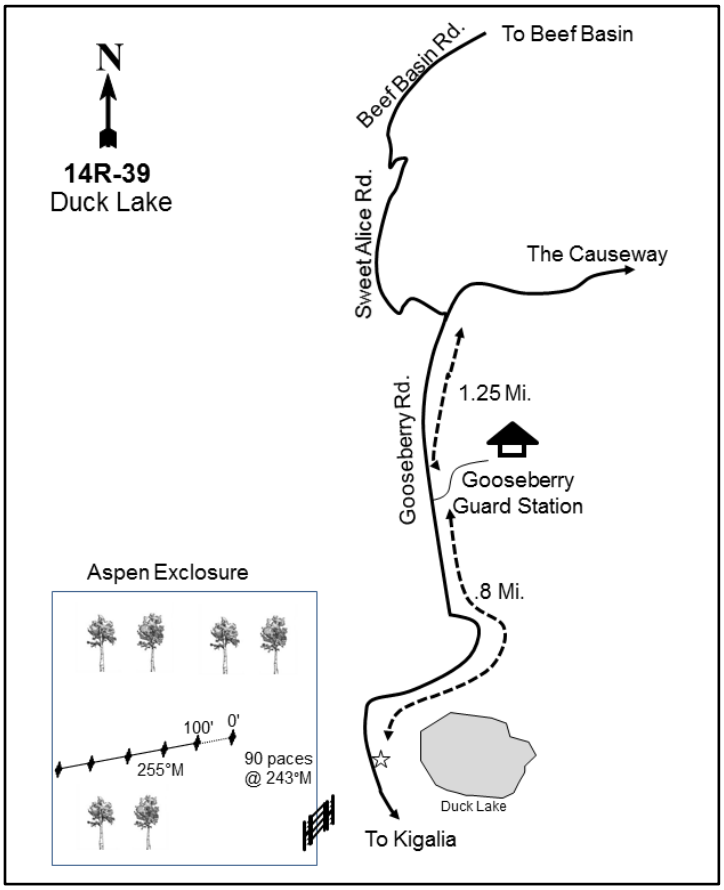
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2017	1	-	-	-	-	100	45.0
2025	1	-	100	-	-	-	2.0
Pinus edulis (twoneedle pinyon)							
2017	48	-	-	24	35	41	21.3
2020	2	50	50	-	-	-	9.5
2025	8	33	67	-	-	-	2.3

Table 14R-38.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2017	21.2	12.4	2.6	7.7	0.0	6.5	0.0	**50.4**	Poor-Fair
2020	19.2	11.1	7.1	8.9	0.0	5.1	0.0	**51.4**	Poor-Fair
2025	21.3	11.7	4.7	12.8	0.0	5.4	0.0	**55.9**	Fair

DUCK LAKE - STUDY NO. 14R-39





Location Information

USGS 7.5 min Map Info	Poison Canyon SE; Township 34S, Range 19E, Section 24
GPS (0' Stake)	NAD 83 UTM ZONE 12, 607642 East 4185622 North

Transect Information

Browse Tag # (0' Stake)	533
Transect Bearing	248° 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 Gooseberry Guard Station on Elk Ridge, proceed south for approximately 0.8 miles to Duck Lake (there will be a sign): park here. The study is approximately 90 paces from the road at an azimuth of 243 degrees magnetic, inside an exclosure and slightly downhill.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	GOOSEBERRY
Elevation	8,620ft (2,627m)
Aspect	Southwest
Slope	10-30%
Sample Dates	08/23/2017, 08/25/2020, 08/18/2025

Table 14R-39.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Selective	North Elk Ridge Aspen Restoration Phase II	3773	June 2016-June 2017	84
Fire - Prescribed	Abajo Mountains Prescribed Fire FY2026-FY2028 (Proposed)	7515	2025-2027	12193

Wildlife Habitat and Vegetation History

Table 14R-39.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 14R-39.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Quaking Aspen/Perennial Grass	Early Phase I
2020	Quaking Aspen/Perennial Grass	Early Phase I
2025	Quaking Aspen/Perennial Grass	Early Phase I

Site Notes

This study site is located inside a total exclosure which was constructed in 2015 to exclude big game and livestock (WRI Project #3004).

Site Potential

1981 - 2010 Average Annual Precipitation	25 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

Quaking aspen (*Populus tremuloides*) and mountain snowberry (*Symphoricarpos oreophilus*) have been the dominant tree and shrub species since study establishment in 2017; lesser amounts of other browse species including Utah serviceberry (*Amelanchier utahensis*) and Gambel oak (*Quercus gambelii*) have also been present (Table 14R-39.12, Table 14R-39.13). The herbaceous understory has been abundant (Table 14R-39.7). A majority of the cover has been contributed by the introduced perennial grasses orchardgrass (*Dactylis glomerata*) and Kentucky bluegrass (*Poa pratensis*), although the native species Thurber's fescue (*Festuca thurberi*) provided more cover than orchardgrass in 2025 (Table 14R-39.10). Forbs have contributed much less cover in comparison, with the native perennial forb Nevada pea (*Lathyrus lanszwertii*) as the most abundant species (Table 14R-39.11). Although a majority of the ponderosa pine (*Pinus ponderosa*) trees were removed by a logging treatment (Table 14R-39.1), point-quarter data reveals that they were still present in low density during the sample period. Rocky Mountain juniper (*Juniperus osteosperma*) has also been observed: this indicates that there may be potential for conifer infilling in the future. However, ponderosa and juniper densities are low as of 2025 and the site has been considered to be within Early Phase I of woodland succession throughout the study period (Table 14R-39.4, Table 14R-39.14), suggesting that infilling may not be an immediate concern.

The preferred shrub and herbaceous communities on this site may provide adequate forage for deer and elk (Beck & Peek, 2005) during the summer months, though diversity of shrub species is low (Table 14R-39.3, Table 14R-39.6, Table 14R-39.7, Table 14R-39.13). However, pellet transect data indicates that presence of deer and elk has been low since 2017. Utilization of oak, serviceberry, and Woods' rose (*Rosa woodsii*) has been mostly light over the course of the study. It should be noted that the populations of these species have been small. Snowberry has had the largest population size and has likely displaced utilization across the site. Utilization of snowberry has been light in most years but was moderate in 2025. Aspen utilization has been considered to be mostly light, though overall utilization has increased over time. On-site observations for 2025 noted moderate utilization (20-40%) on Thurber's fescue (*Festuca thurberi*) and orchardgrass while little to no utilization was observed on forb species (Photos, Table 14R-39.9, Table 14R-39.13).

Trend Summary Tables

Table 14R-39.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2017	12.0	1.7	0.5	28.8	1.4	23.8
2020	17.1	2.0	0.3	27.8	1.2	26.4
2025	20.7	1.9	-	30.5	1.6	26.2

Table 14R-39.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2017	-	444	-	211	-	63.1	-	6.5
2020	-	372	10	207	-	35.7	0.1	7.5
2025	-	380	3	189	-	30.1	0.0	8.2

Table 14R-39.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2017	2.3	0.1	72.0	0.0	4.6	70.8
2020	5.3	-	52.3	0.1	3.8	54.0
2025	6.2	-	44.6	0.0	6.0	51.0

Table 14R-39.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk
	Quadrat Frequency		
2017	-	2	-
2020	-	7	10
2025	1	2	8
Year	Days Use Per Acre (ha)		
2017	-	0.7 (1.7)	-
2020	0.7 (1.8)	22.1 (54.6)	19.4 (48.0)
2025	-	10.0 (24.8)	10.0 (24.8)

Table 14R-39.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Bromus inermis[i] (smooth brome)	Bromus porteri (Porter brome)	Carex rossii (Ross' sedge)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Festuca thurberi (Thurber's fescue)	Hesperostipa comata (needle and thread)	Muhlenbergia montana (mountain muhly)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)
year	Nested Frequency											
2017	12	33	2	4	306	1	6	-	-	-	-	355
2020	62	16	-	9	250	8	2	23	8	-	1	233
2025	7	31	17	10	141	6	105	9	9	1	8	176
year	Average Cover (%)											
2017	1.2	2.5	0.0	0.0	31.8	0.0	0.1	-	-	-	-	27.4
2020	3.4	1.4	-	0.1	19.6	0.1	0.0	1.8	0.2	-	0.0	9.2
2025	0.6	1.6	0.4	0.2	7.3	0.0	9.1	0.3	0.6	0.0	0.8	9.2

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

Table 14R-39.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Arenaria (sandwort)	Cirsium (thistle)	Collinsia parviflora[a] (maiden blue eyed Mary)	Erigeron flagellaris (trailing fleabane)	Frasera speciosa (elkweed)	Heterotheca villosa (hairy false goldenaster)	Lathyrus lanszwertii (Nevada pea)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Pseudostellaria jamesiana (tuber starwort)	Solidago multiradiata (Rocky Mountain goldenrod)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Thermopsis montana (mountain goldenbanner)
year	Nested Frequency																
2017	31	14	-	-	-	22	2	1	114	-	-	9	22	8	73	3	-
2020	6	7	1	-	2	-	-	2	142	14	6	18	25	7	11	-	-
2025	8	-	-	0	-	9	-	24	130	16	3	5	3	-	2	-	5
year	Average Cover (%)																
2017	1.1	0.1	-	-	-	0.1	0.0	0.1	2.9	-	-	0.1	0.8	0.1	0.6	0.1	-
2020	0.1	0.0	0.0	-	0.0	-	-	0.1	5.2	0.1	0.0	0.0	1.7	0.1	0.1	-	-
2025	0.1	-	-	0.0	-	0.1	-	1.8	5.7	0.2	0.0	0.0	0.0	-	0.1	-	0.2

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

FORB SPECIES	Tragopogon dubius[ai] (yellow salsify)	Trifolium longipes (longstalk clover)	Vicia americana (American vetch)
year	Nested Frequency		
2017	-	23	49
2020	2	10	17
2025	-	-	16
year	Average Cover (%)		
2017	-	0.1	0.5
2020	0.0	0.0	0.2
2025	-	-	0.1

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

Table 14R-39.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Juniperus scopulorum[t] (Rocky Mountain juniper)	Mahonia repens (creeping barberry)	Populus tremuloides[tp] (quaking aspen)	Quercus gambelii[p] (Gambel oak)	Rosa woodsii[p] (Woods' rose)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)						
2017	0.1	-	1.4	23.8	2.3	-	26.4
2020	0.1	-	1.2	26.4	1.6	-	26.1
2025	-	0.3	1.6	25.9	1.9	-	28.6
year	Quadrat Cover (%)						
2017	0.0	-	1.7	0.5	0.8	0.1	11.0
2020	0.0	-	2.0	0.3	0.6	0.1	16.4
2025	-	0.0	1.9	0.0	1.3	-	19.4

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

Table 14R-39.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2017	20	-	100	0	0	0	0	0	278/396
2020	80	-	100	0	0	25	0	25	118/107
2025	60	-	33	67	0	0	0	0	- / -
Juniperus scopulorum[t] -- (Rocky Mountain juniper)									
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	20	-	100	0	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
2017	3780	-	1	100	0	0	0	0	12/15
2020	5600	-	13	86	1	0	0	1	14/15
2025	5280	-	0	100	0	0	0	14	- / -
Pinus ponderosa[t] -- (ponderosa pine)									
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	20	-	100	0	0	0	0	0	- / -
Prunus virginiana[p] -- (chokecherry)									
2017	-	-	-	-	-	-	-	-	66/69
2020	-	-	-	-	-	-	-	-	94/100
2025	-	-	-	-	-	-	-	-	-/-
Quercus gambelii[p] -- (Gambel oak)									
2017	600	60	70	30	0	0	3	0	128/86
2020	580	-	76	24	0	31	3	0	126/98
2025	840	-	5	95	0	5	0	0	- / -
Rosa woodsii[p] -- (Woods' rose)									
2017	20	-	0	100	0	0	0	0	83/59
2020	120	-	0	100	0	67	0	0	34/51
2025	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2017	5100	-	9	90	1	19	6	2	67/80
2020	4500	20	28	72	0	23	12	0	64/83
2025	7100	40	15	82	3	56	10	3	- / -

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

Table 14R-39.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

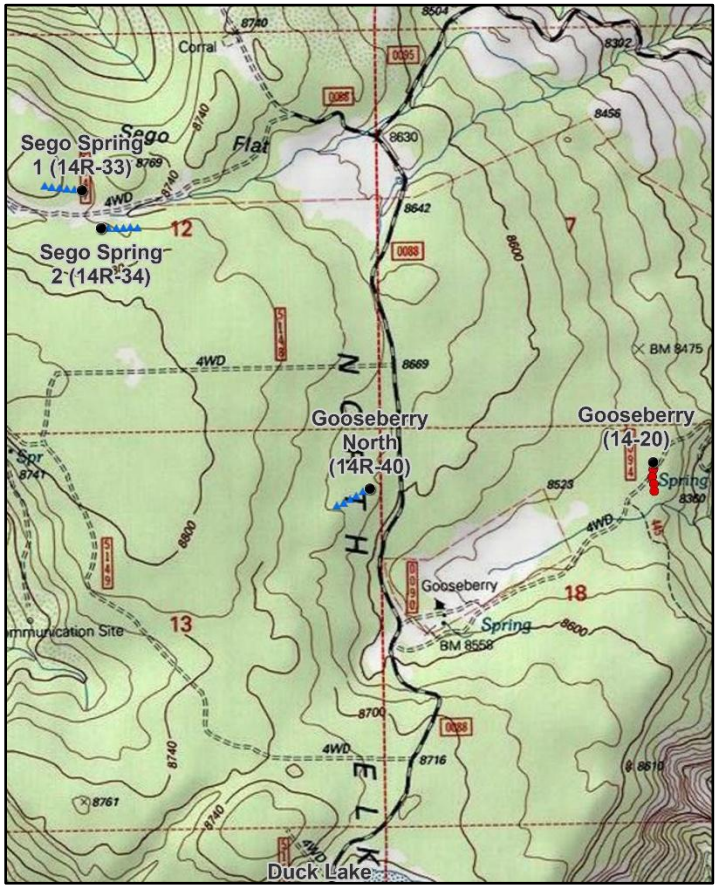
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2017	180	56	-	-	44	0	0	0
2020	200	40	10	-	50	17	0	17
2025	60	-	33	-	67	33	0	0

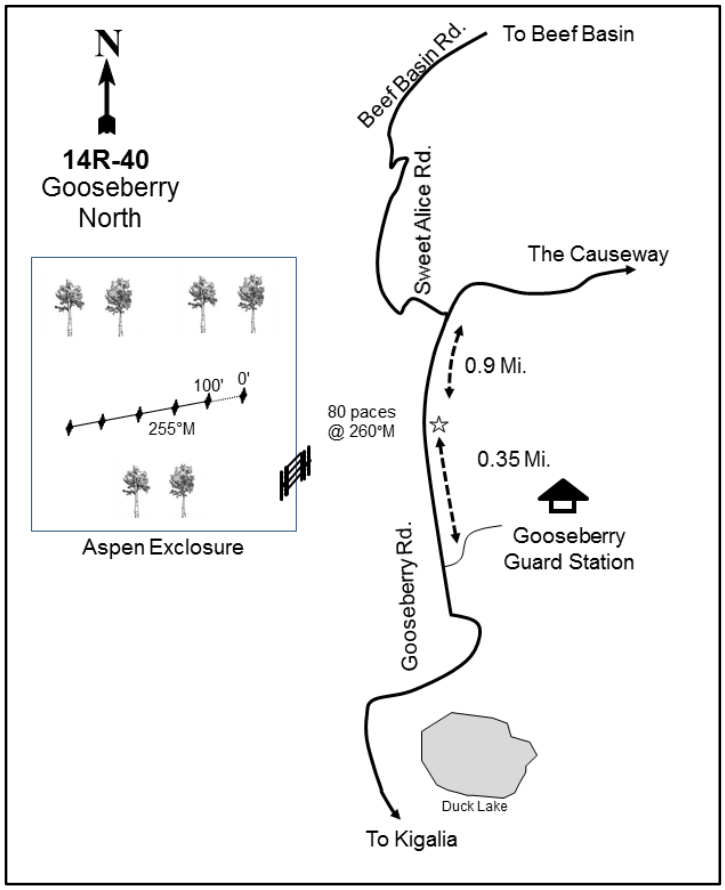
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

Table 14R-39.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2017	6	-	-	100	-	-	6.0
2020	5	-	50	50	-	-	5.0
2025	5	-	-	100	-	-	15.0
Pinus ponderosa (ponderosa pine)							
2017	1	-	-	-	-	100	58.0
2020	9	33	33	33	-	-	2.3
2025	9	-	100	-	-	-	3.5
Populus tremuloides (quaking aspen)							
2017	127	-	-	-	-	100	38.6
2020	193	15	15	-	-	70	30.4
2025	53	-	-	-	-	100	47.2

GOOSEBERRY NORTH - STUDY NO. 14R-40





Location Information

USGS 7.5 min Map Info	Poison Canyon NE; Township 34S, Range 19E, Section 13
GPS (0' Stake)	NAD 83 UTM ZONE 12, 607846 East 4187363 North

Transect Information

Browse Tag # (0' Stake)	154
Transect Bearing	236° 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 Gooseberry Guard Station on Elk Ridge, drive north for 0.35 miles and park on the side of the road; there is no witness post. The study site is on the left-hand (west) side of the road inside of an exclosure and is about 80 paces at 260 degrees magnetic away from the road.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	GOOSEBERRY
Elevation	8,680ft (2,646m)
Aspect	Northeast
Slope	13%
Sample Dates	08/23/2017, 08/26/2020, 08/19/2025

Table 14R-40.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Selective	North Elk Ridge Aspen Restoration Phase II	3773	June 2016-June 2017	84
Fire - Prescribed	Abajo Mountains Prescribed Fire FY2026-FY2028 (Proposed)	7515	2025-2027	12193
Fire - Wildfire	Duck Lake	2009-UTMLF-009183	September 2009	723

Wildlife Habitat and Vegetation History

Table 14R-40.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 14R-40.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Ponderosa Pine/Mountain Snowberry	NA
2020	Ponderosa Pine/Mountain Snowberry	NA
2025	Ponderosa Pine/Mountain Snowberry	NA

Site Notes

This study site is located inside a total exclosure which was constructed in 2015 to exclude big game and livestock (WRI Project #3004). A buck mule deer and deer beds were seen on site in 2017. In 2025, it was noted that there may have been some confusion between the identification of Thurber's fescue (*Festuca thurberi*) and Columbia needlegrass (*Achnatherum nelsonii*).

Site Potential

1981 - 2010 Average Annual Precipitation	26 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

Ponderosa pine (*Pinus ponderosa*) and mountain snowberry (*Symphoricarpos oreophilus*) have dominated this site since study establishment in 2017 with other shrub species as minor components (Table 14R-40.12, Table 14R-40.13). Quaking aspen (*Populus tremuloides*) has been observed throughout the study period, although density decreased between 2020 and 2025 (Table 14R-40.13a). The herbaceous understory has remained diverse and abundant. Perennial grasses including Thurber's fescue (*Festuca thurberi*), Columbia needlegrass (*Achnatherum nelsonii*), and/or Porter brome (*Bromus porteri*) have provided a majority of the herbaceous cover in all sample years (Table 14R-40.7, Table 14R-40.10). Most forb cover has been contributed by native perennial species, namely Nevada pea (*Lathyrus lanszwertii*) and common yarrow (*Achillea millefolium*) (Table 14R-40.11). Although a selective logging treatment prior to study establishment (Table 14R-40.1) removed some of the ponderosa pine trees, their presence post-treatment (Table 14R-40.14) indicates that this site has the potential to become conifer-encroached in the future. However, a prescribed fire scheduled to occur sometime between 2025 and 2027 (Table 14R-40.1) will likely remove many of the trees and could reset the plant community to an early seral state.

The preferred shrub and herbaceous communities on this site may provide adequate forage for deer and elk (Beck & Peek, 2005) during the summer months, though diversity of shrub species is low (Table 14R-40.3, Table 14R-40.6, Table 14R-40.7, Table 14R-40.12). However, pellet transect data indicates that presence of deer and elk has been low since 2017. Utilization of Gambel oak (*Quercus gambelii*), Utah serviceberry (*Amelanchier utahensis*), Woods' rose (*Rosa woodsii*), and snowberry has been light over the course of the study. Excluding snowberry, however, it should be noted that these browse populations have been small and decreasing in size. Snowberry has remained the largest population which has likely displaced utilization across the site; utilization of snowberry has been light in all sample years. When aspen plants were young, utilization was high with most of the population being moderately to heavily hedged. However, overall utilization has decreased over time as the aspen population has aged. On-site observations for 2025 noted that little to no utilization was observed on herbaceous species (Photos, Table 14R-40.9, Table 14R-40.13, Table 14R-40.13a).

Trend Summary Tables

Table 14R-40.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2017	17.1	3.8	0.3	21.5	2.4	15.6
2020	20.7	5.3	0.8	26.8	3.0	16.8
2025	24.6	4.5	1.9	37.8	3.9	21.0

Table 14R-40.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2017	-	421	3	308	-	34.2	0.1	12.6
2020	-	360	-	304	-	31.7	-	11.5
2025	-	335	5	223	-	21.6	0.0	6.7

Table 14R-40.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2017	0.5	1.3	84.9	0.0	-	55.7
2020	0.4	0.9	63.4	-	0.4	56.6
2025	1.0	-	53.7	0.0	0.1	49.7

Table 14R-40.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk
	Quadrat Frequency	
2017	-	1
2020	6	1
2025	3	1
Year	Days Use Per Acre (ha)	
2017	1.3 (3.3)	0.7 (1.7)
2020	5.3 (13.2)	9.4 (23.2)
2025	8.7 (21.5)	9.4 (23.2)

Table 14R-40.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex (sedge)	Carex rossii (Ross' sedge)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Festuca thurberi (Thurber's fescue)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa pratensis[i] (Kentucky bluegrass)
year	Nested Frequency										
2017	236	53	69	10	23	12	17	56	10	27	187
2020	188	57	55	34	22	3	13	77	-	43	121
2025	34	1	92	32	24	3	2	120	-	25	84
year	Average Cover (%)										
2017	11.0	1.9	4.5	0.4	0.5	0.4	0.2	7.0	0.7	0.9	6.7
2020	12.1	2.3	1.1	1.0	1.0	0.0	0.4	9.3	-	1.6	2.8
2025	2.0	0.0	5.8	0.5	0.5	0.2	0.0	10.4	-	0.3	1.8

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

Table 14R-40.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Antennaria parvifolia (small-leaf pussytoes)	Arenaria (sandwort)	Collinsia parviflora[a] (maiden blue eyed Mary)	Erigeron flagellaris (trailing fleabane)	Gayophytum racemosum[a] (blackfoot groundsmoke)	Gentiana (gentian)	Lathyrus lanszwertii (Nevada pea)	Ligusticum porteri (Porter's licorice-root)	Osmorhiza occidentalis (western sweetroot)	Packera cana (woolly groundsel)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Pseudocymopterus montanus (alpine false springparsley)	Pseudostellaria jamesiana (tuber starwort)	Silene (catchfly)
year	Nested Frequency																
2017	156	13	7	3	-	6	3	1	79	1	-	33	6	-	26	30	-
2020	85	-	4	3	-	10	-	-	165	1	0	29	52	1	11	68	2
2025	67	1	5	-	5	7	-	-	170	3	-	-	20	-	-	9	-
year	Average Cover (%)																
2017	3.0	0.1	0.8	0.0	-	0.2	0.1	0.0	2.5	0.2	-	0.3	0.1	-	0.3	0.4	-
2020	2.3	-	0.6	0.0	-	0.3	-	-	4.4	0.1	0.0	0.4	0.3	0.0	0.4	0.4	0.0
2025	0.4	0.0	0.2	-	0.0	0.0	-	-	5.3	0.1	-	-	0.2	-	-	0.1	-

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

FORB SPECIES	Solidago multiradiata (Rocky Mountain goldenrod)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Thermopsis montana (mountain goldenbanner)	Trifolium longipes (longstalk clover)	Vicia americana (American vetch)
year	Nested Frequency						
2017	-	8	112	22	-	39	25
2020	-	3	44	24	7	50	27
2025	5	-	2	5	8	4	18
year	Average Cover (%)						
2017	-	0.2	3.1	0.7	-	0.3	0.4
2020	-	0.0	0.7	0.5	0.2	0.3	0.6
2025	0.0	-	0.0	0.0	0.2	0.0	0.1

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

Table 14R-40.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Mahonia repens (creeping barberry)	Pinus ponderosa[t] (ponderosa pine)	Populus tremuloides[tp] (quaking aspen)	Quercus gambelii[p] (Gambel oak)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)					
2017	0	2.4	15.6	-	0.7	20.8
2020	-	3	15.1	1.7	1.5	25.3
2025	0.1	3.9	20.2	0.8	3.4	34.3
year	Quadrat Cover (%)					
2017	0.0	3.8	0.3	-	1.0	16.1
2020	-	5.3	0.3	0.5	0.3	20.4
2025	0.0	4.5	1.8	0.1	0.0	24.5

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

Table 14R-40.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2017	20	-	100	0	0	0	0	0	40/47
2020	20	20	100	0	0	0	0	0	- / -
2025	40	-	100	0	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
2017	14000	-	0	100	0	0	0	0	12/12
2020	13640	-	1	99	0	0	0	0	8/13
2025	15760	-	1	97	2	0	0	4	- / -
Pinus ponderosa[t] -- (ponderosa pine)									
2017	140	560	71	29	0	0	0	0	- / -
2020	500	100	96	4	0	0	0	0	- / -
2025	660	280	91	9	0	0	0	0	- / -
Quercus gambelii[p] -- (Gambel oak)									
2017	300	460	93	7	0	0	0	0	57/64
2020	340	60	59	41	0	6	53	0	104/71
2025	60	-	33	33	33	0	0	33	- / -
Rosa woodsii[p] -- (Woods' rose)									
2017	60	-	33	67	0	0	0	0	34/17
2020	-	-	-	-	-	-	-	-	-/-
2025	20	-	100	0	0	0	0	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2017	8580	-	7	93	0	1	0	1	53/57
2020	6860	-	18	82	1	4	0	1	55/72
2025	8740	-	4	95	1	20	4	1	- / -

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

Table 14R-40.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

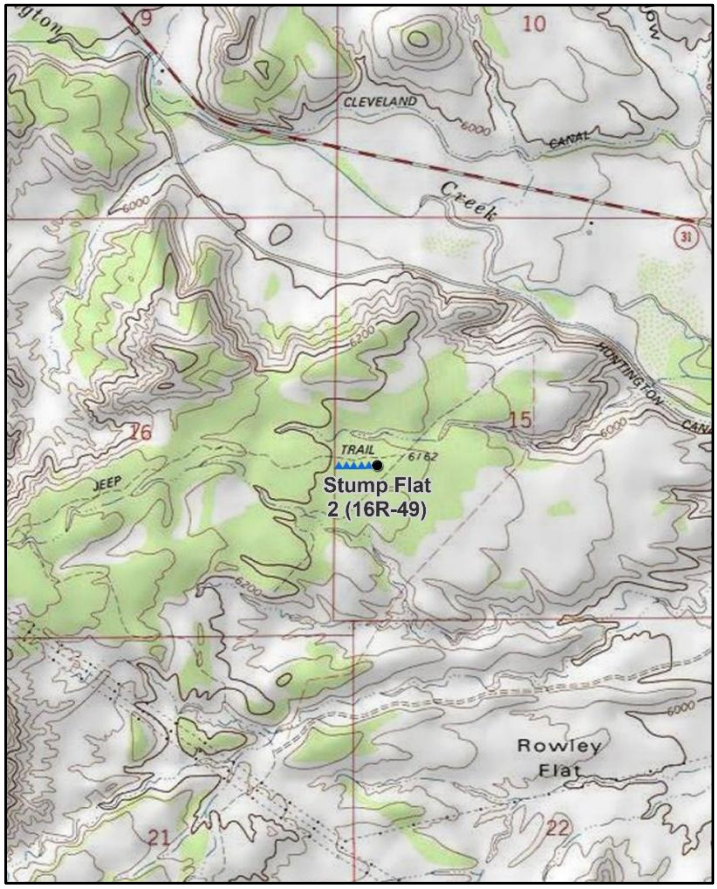
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2017	120	50	50	-	-	33	33	0
2020	640	16	66	19	-	44	4	4
2025	160	13	38	50	-	0	0	0

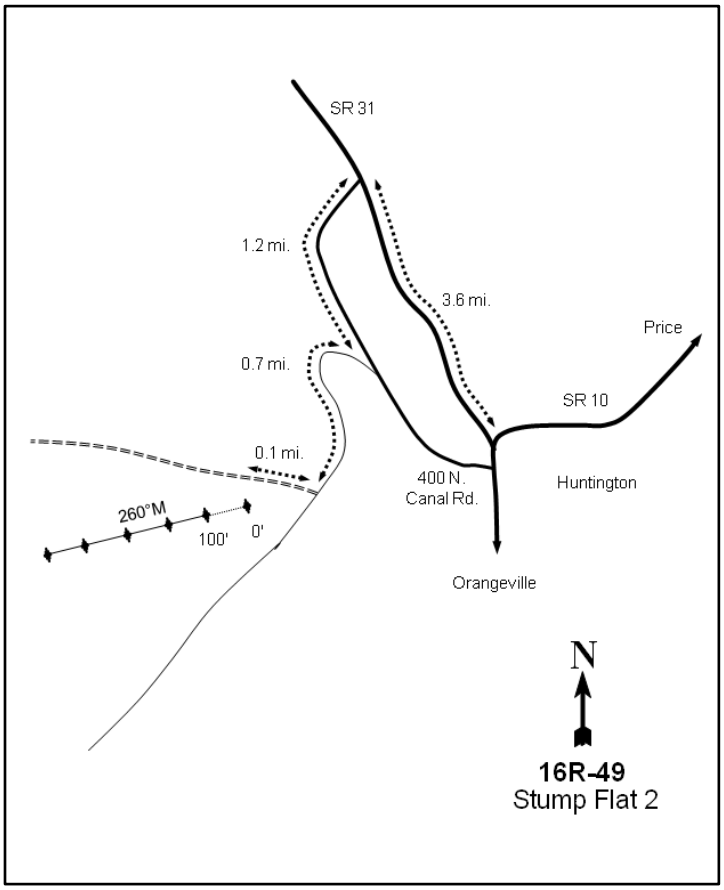
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

Table 14R-40.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2017	1	-	100	-	-	-	5.0
Pinus ponderosa (ponderosa pine)							
2017	59	55	18	-	9	18	13.5
2020	285	53	40	7	-	-	1.3
2025	340	6	75	19	-	-	2.4
Populus tremuloides (quaking aspen)							
2017	50	14	79	-	-	7	3.2
2020	173	-	47	53	-	-	2.1
2025	86	-	33	58	8	-	4.1

STUMP FLAT 2 - STUDY NO. 16R-49





Location Information

USGS 7.5 min Map Info	Red Point NE; Township 17S, Range 8E, Section 15
GPS (0' Stake)	NAD 83 UTM ZONE 12, 498338 East 4354819 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	260° 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 State Route 10 between Price and Huntington, turn west onto Huntington Canyon Road (State Route 31). Drive for 3.6 miles and turn left onto 400 N (Canal Road). Travel for 1.2 miles and turn right onto an unnamed road. Continue for 0.7 miles, turn right (west) onto another unnamed road, and drive for 0.1 miles. The transect will be to the left (south) of the road.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	WEST HUNTINGTON
Elevation	6,164ft (1,879m)
Aspect	Southeast
Slope	3-4%
Sample Dates	07/03/2013, 08/16/2016, 07/22/2021, 05/29/2025

Table 16R-49.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	Stump Flat Pinyon/Juniper Removal Project	2693	December 2013	460
Mechanical - Bullhog	Stump Flat Pinyon/Juniper Removal Project	2693	October 2013	460
Seeding - Aerial Before	Stump Flat Pinyon/Juniper Removal Project	2693	October 2013	460

Table 16R-49.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Stump Flat			Aerial	Oct 2013	460
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	1.41	1.00
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.56	0.47
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	0.60	0.52
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.60	0.44
F	Achillea millefolium	Western Yarrow	Hanford WA	0.11	0.10
F	Linum perenne	Blue Flax	Appar	0.65	0.49
F	Medicago sativa	Alfalfa	Ranger (NC)	1.58	1.50
F	Melilotus officinalis	Yellow Sweetclover		1.52	1.34
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Beaver UT	0.33	0.27
S	Atriplex canescens	Fourwing Saltbush	Juab/Utah/Carbon	1.09	0.53
S	Krascheninnikovia lanata	Winterfat	Torrance NM	0.48	0.25

Mix Name			Application Type	Application Date	Acres
Stump Flat Shrub			Aerial	Dec 2013	460
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.50	0.09
S	Bassia prostrata	Forage Kochia	Beaver UT	0.50	0.33

Wildlife Habitat and Vegetation History

Table 16R-49.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 16R-49.4 - 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	Annual Forb	Early Phase I
2021	Mixed Shrub/Juniper	Early Phase I
2025	Mixed Shrub/Juniper	Early Phase I

Site Notes

Several dead deer carcasses were found near the site in 2013. There is also oil and gas development in this area.

Site Potential

1981 - 2010 Average Annual Precipitation 9 inches

NRCS Ecological Site	Semidesert Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R034BY227UT
States and Transitions	2013 - State Undefined: Community Phase Undefined 2016 - Introduced Annuals/Biennials State: Community Phase 3.2 2021-2025 - Black Sagebrush/Introduced Non-Natives State: Community Phase Undefined

When the study was established in 2013, this site was dominated by encroaching twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and in Phase III of woodland succession (Table 16R-49.4). Other browse species were present, but they provided little cover (Table 16R-49.12, Table 16R-49.13). The herbaceous understory was also sparse (Table 16R-49.7). Following the bullhog treatment in the fall of 2013 (Table 16R-49.1), cover and density of conifer trees decreased substantially, but shrubs were also sampled in lower abundance. The density of seedling and young juniper trees has increased since treatment, and juniper has been considered to be a co-dominant site component since 2021 (Table 16R-49.4, Table 16R-49.13, Table 16R-49.14). The herbaceousunderstory increased significantly in cover in 2016, but it was sparse again in subsequent sample years. However, much of the herbaceous understory was comprised of annual species in 2016 (Table 16R-49.7, Table 16R-49.11). The preferred browse community, particularly black sagebrush (*Artemisia nova*) and slender buckwheat (*Eriogonum microthecum*), has increased in density

and cover following the bullhog treatment (Table 16R-49.12, Table 16R-49.13). However, rehabilitation will likely be slow due to the lower potential of the site. Continued tree removal will likely need to occur in the future to avoid infilling and the associated loss of gained shrub and herbaceous communities.

Condition of mule deer winter range on this site has ranged between very poor and very poor-poor since 2013. Winter range condition is considered to be very poor-poor as of 2025. Factors negatively influencing range condition include a lack of preferred browse, and a lack of perennial grass and forb cover (Table 16R-49.6, Table 16R-49.7, Table 16R-49.15). Pellet transect data shows that deer presence was moderate in 2013 and 2025 and has displayed an increasing trend since 2016. The site during the 2024/25 winter season was absent of collared mule deer and elk occurrences, however, frequent observations of both species were found just west of the site near Red Point (Wildlife Migration Initiative). Elk presence has been absent in most sample years, but it was low during the most recent sampling. As of 2025, black sagebrush is the one population of preferred browse with a notable population size that provides forage for wildlife. Black sagebrush has been increasing in population density while age classes have reset to a more mature demographic with improved vigor. Overall utilization has increased over time; utilization was heavy in 2025 with 82% of the plants sampled in density strips falling into this category. Black sagebrush plants were also heavily clubbed in appearance (Photos, Table 16R-49.9, Table 16R-49.13). On-site observations in 2025 noted that there was little to no utilization of the herbaceous community; that primary production was good as indicated by good flower and seed production; and that there was lush green growth of both herbaceous and browse species. Evidence of wildlife in 2025 included trails and tracks throughout the site, and pinyon jays and larks were heard nearby.

Trend Summary Tables

Table 16R-49.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	0.4	0.1	10.6	0.2	0.2	18.7
2016	0.7	0.6	0.0	0.3	0.4	0.6
2021	1.9	1.9	0.8	1.9	2.0	0.8
2025	2.3	0.8	1.0	2.7	0.8	1.4

Table 16R-49.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	2	9	11	-	0.0	0.2	0.1
2016	-	13	355	62	-	0.5	12.2	1.0
2021	-	86	134	127	-	0.8	0.9	1.5
2025	-	39	176	118	-	0.5	0.9	3.6

Table 16R-49.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	55.5	1.5	19.3	10.6	10.2	11.1
2016	53.6	0.2	25.7	8.5	4.0	13.2
2021	42.1	0.3	35.8	14.3	6.4	8.0
2025	50.5	0.0	25.4	14.9	7.6	9.5

Table 16R-49.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2013	-	13	1	7
2016	-	4	-	41
2021	2	23	-	44
2025	1	37	-	37
Year	Days Use Per Acre (ha)			
2013	-	22.8 (56.3)	-	-
2016	-	8.7 (21.5)	-	-
2021	7.2 (17.9)	13.4 (33.1)	-	-
2025	2.9 (7.2)	28.8 (71.2)	2.0 (5.0)	-

Table 16R-49.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Pleuraphis jamesii (James' galleta)
year	Nested Frequency			
2013	-	-	2	-
2016	4	1	8	-
2021	22	7	60	1
2025	15	-	24	1
year	Average Cover (%)			
2013	-	-	0.0	-
2016	0.3	0.0	0.1	-
2021	0.1	0.0	0.7	0.0
2025	0.2	-	0.3	0.0

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

Table 16R-49.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Caulanthus crassicaulis[a] (thickstem wild cabbage)	Chamaesyce fendleri (Fendler's sandmat)	Cryptantha (cryptantha)	Cryptantha flava (Brenda's yellow cryptantha)	Cryptantha humilis (roundspike cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriogonum (buckwheat)	Eriogonum alatum (winged buckwheat)	Eriogonum cernuum[a] (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Euphorbia (spurge)	Halogeton glomeratus[ai] (saltlover)	Ipomopsis congesta (ballhead ipomopsis)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Lepidium[a] (pepperweed)
year	Nested Frequency																
2013	-	2	3	8	-	-	-	-	-	-	-	-	-	-	-	-	3
2016	6	2	11	5	-	-	22	6	-	9	-	10	32	-	20	-	36
2021	-	4	21	85	-	-	-	2	-	4	-	-	-	-	-	-	-
2025	-	-	26	-	37	56	4	-	3	0	4	-	-	1	-	2	-
year	Average Cover (%)																
2013	-	0.0	0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	0.1
2016	0.1	0.0	0.1	0.3	-	-	0.1	0.0	-	0.1	-	0.1	0.1	-	0.5	-	0.8
2021	-	0.0	0.1	1.2	-	-	-	0.0	-	0.0	-	-	-	-	-	-	-
2025	-	-	0.1	-	1.7	1.6	0.0	-	0.0	0.0	0.0	-	-	0.0	-	0.0	-

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

FORB SPECIES	Lomatium (desertparsley)	Melilotus officinalis[i] (sweetclover)	Penstemon pachyphyllus (thickleaf beardtongue)	Physaria (twinpod)	Salsola tragus[ai] (prickly Russian thistle)	Taraxacum officinale (common dandelion)	Thelesperma subnudum (Navajo tea)	Townsendia incana (hoary Townsend daisy)
year	Nested Frequency							
2013	-	-	-	-	4	-	0	-
2016	5	-	2	-	350	4	23	-
2021	-	1	7	3	131	2	-	21
2025	-	-	6	-	173	-	7	6
year	Average Cover (%)							
2013	-	-	-	-	0.0	-	0.0	-
2016	0.1	-	0.2	-	10.6	0.1	0.1	-
2021	-	0.0	0.1	0.0	0.8	0.0	-	0.1
2025	-	-	0.2	-	0.9	-	0.0	0.0

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

Table 16R-49.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Bassia prostrata[pi] (forage kochia)	Ephedra nevadensis[p] (Nevada jointfir)	Eriogonum microthecum[p] (slender buckwheat)	Glossopetalon spinescens var. aridum (spiny greasebush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)									
2013	0.2	-	-	-	0	0.1	0	14.9	0.1	3.8
2016	0.1	-	-	0	0.2	0.1	0.3	0.6	-	-
2021	0.5	0.3	-	0.1	1	-	2	0.7	-	0.1
2025	0.9	0.5	0	0.1	1.2	-	0.8	1.4	-	-
year	Quadrat Cover (%)									
2013	0.4	-	-	0.0	0.0	0.0	0.0	8.9	0.0	1.7
2016	0.2	-	-	0.0	0.5	0.2	0.5	0.0	-	-
2021	0.2	0.0	-	0.0	1.6	0.4	1.5	0.8	-	0.0
2025	0.3	0.4	0.0	0.1	1.4	-	0.8	1.0	-	-

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

Table 16R-49.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova[p] -- (black sagebrush)									
2013	500	-	8	32	60	8	36	56	10/26
2016	160	-	25	38	38	38	0	0	17/41
2021	420	-	48	43	10	10	24	19	- / -
2025	780	-	31	64	5	5	82	5	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	140	-	14	86	0	0	0	0	36/28
2021	40	-	0	100	0	0	0	0	- / -
2025	80	-	0	100	0	0	100	0	- / -
Bassia prostrata[pi] -- (forage kochia)									
2013	-	-	-	-	-	-	-	-	-/-
2016	40	-	0	100	0	0	50	0	7/17
2021	40	-	0	100	0	0	100	0	- / -
2025	20	-	0	100	0	0	100	0	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	52/54
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Ephedra nevadensis[p] -- (Nevada jointfir)									
2013	80	-	100	0	0	0	0	0	22/24
2016	20	-	0	100	0	100	0	0	33/48
2021	20	-	0	100	0	0	100	0	- / -
2025	20	-	0	100	0	100	0	0	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2013	720	-	25	75	0	8	0	3	7/8
2016	1420	100	0	100	0	1	0	0	11/19
2021	10900	420	43	46	11	14	3	26	- / -
2025	15060	-	20	79	1	13	5	1	- / -
Glossopetalon spinescens var. aridum -- (spiny greasebush)									
2013	140	-	0	100	0	0	43	0	14/25
2016	180	-	11	89	0	0	89	0	16/36
2021	360	-	22	44	33	0	44	50	- / -
2025	40	-	0	100	0	0	100	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2013	260	-	100	0	0	0	0	0	13/17
2016	240	-	0	100	0	0	0	0	27/36
2021	6120	-	6	86	9	0	0	48	- / -
2025	2180	-	19	76	5	0	0	5	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2013	800	40	63	35	3	0	0	3	- / -
2016	280	120	71	14	14	7	29	21	- / -
2021	460	-	83	17	0	0	0	4	- / -
2025	580	40	41	59	0	3	0	0	- / -
Opuntia -- (pricklypear)									
2013	20	-	0	0	100	0	0	0	9/18
2016	40	-	0	100	0	0	0	0	8/24
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2013	200	-	70	20	10	0	0	20	- / -
2016	-	-	-	-	-	-	-	-	-/-
2021	20	-	100	0	0	0	0	0	- / -

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

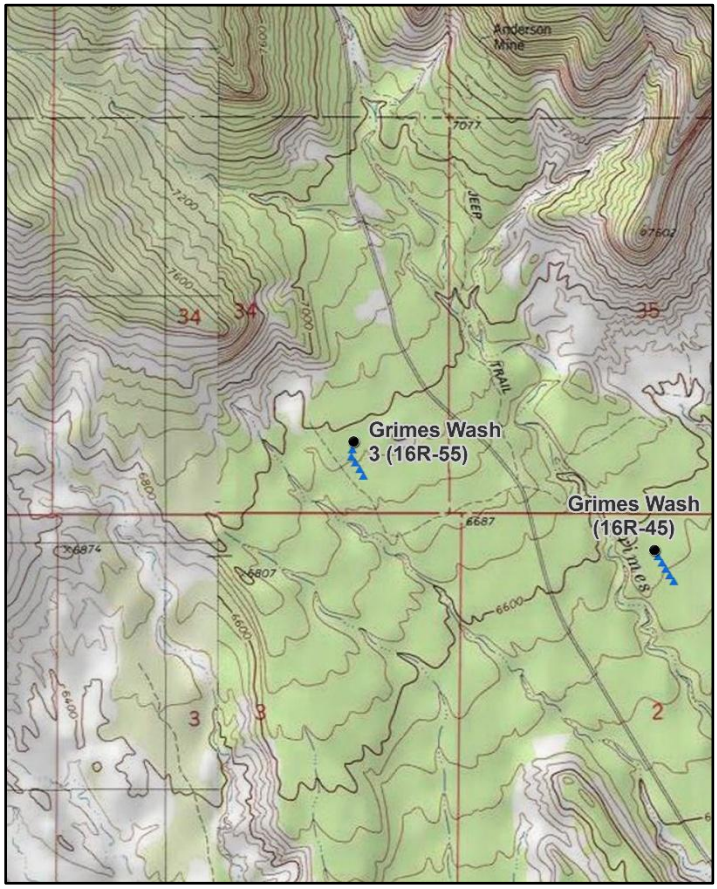
Table 16R-49.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

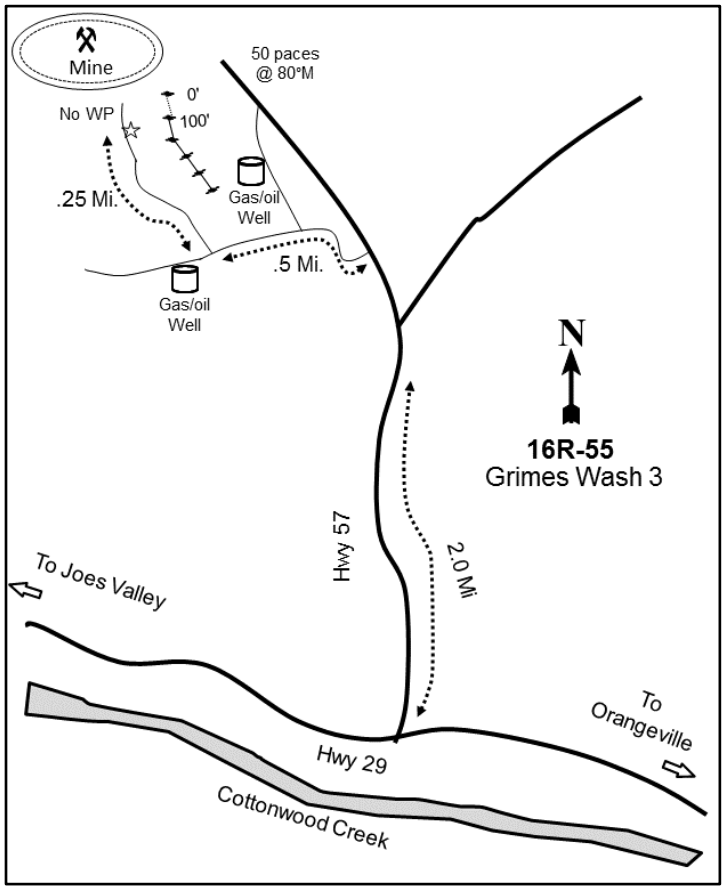
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	561	5	55	25	15	-	8.0
2016	242	35	65	-	-	-	5.5
2021	436	42	58	-	-	-	2.9
2025	622	35	50	15	-	-	2.3
Pinus edulis (twoneedle pinyon)							
2013	97	11	37	42	11	-	7.1
2016	8	-	100	-	-	-	5.3
2021	7	-	100	-	-	-	4.3
2025	3	-	100	-	-	-	3.5

Table 16R-49.15 - 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
2013	0.3	0.0	0.0	0.0	0.0	0.1	0.0	**0.4**	Very Poor
2016	0.4	0.0	0.0	0.9	0.0	2.1	0.0	**3.4**	Very Poor
2021	2.4	0.0	0.0	1.7	0.0	3.0	0.0	**7.1**	Very Poor
2025	3.4	0.0	0.0	1.1	0.0	7.3	0.0	**11.8**	Very Poor-Poor

GRIMES WASH 3 - STUDY NO. 16R-55





Location Information

USGS 7.5 min Map Info	Red Point SW; Township 17S, Range 7E, Section 34
GPS (0' Stake)	NAD 83 UTM ZONE 12, 489712 East 4349604 North

Transect Information

Browse Tag # (0' Stake)	228
Transect Bearing	175° magnetic (Lines 3-5: 130° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From Orangeville, travel west on Highway 29 for 3.25 miles to North Coal Haul Road. Turn right and proceed for 2.8 miles. There is a road on the left that runs past an oil pad: take this road for 0.34 miles, bearing left at a "Y". There is a small road heading north: take this road and proceed for 0.2 miles to the site, which will be on the right-hand (east) side of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	WEST GRIMES
Elevation	6,776ft (2,065m)
Aspect	Southeast
Slope	3-5%
Sample Dates	08/15/2017, 07/22/2021, 05/28/2025

Table 16R-55.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Grimes Wash Phase 2	4041	October-November 2017	111
Seeding - Aerial Before	Grimes Wash Phase 2	4041	October 2017	111
Seeding - Aerial After	Grimes Wash Phase 2	4041	January 2018	111

Table 16R-55.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Grimes Wash			Aerial	Oct 2017	181
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	1.10	1.06
G	Agropyron fragile	Siberian Wheatgrass	Vavilov II	0.28	0.24
G	Agropyron fragile	Siberian Wheatgrass	Vavilov II	0.28	0.25
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock II	0.55	0.48
G	Poa secunda	Canby Bluegrass	Canbar	0.55	0.45
G	Poa secunda	Sandberg Bluegrass	UP Colorado Plateau	0.55	0.48
F	Achillea millefolium	Western Yarrow	Yakima	0.11	0.09
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete UT	0.66	0.55
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete UT	0.44	0.42
F	Helianthus annuus	Annual Sunflower		0.55	0.49
F	Linum perenne	Blue Flax	Appar	1.10	0.86
F	Medicago sativa	Alfalfa	Ladak	0.41	0.39
F	Medicago sativa ssp. falcata	Yellow Alfalfa	Don	0.41	0.41
F	Penstemon palmeri	Palmer Penstemon	Carbon UT	0.22	0.14
F	Ratibida columnifera	Prairie Coneflower	Stillwater	0.83	0.67
F	Sanguisorba minor	Small Burnet	Delar	0.83	0.76
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Grand UT	0.41	0.28
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Uintah UT	0.14	0.04
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	1.10	0.54

Mix Name			Application Type	Application Date	Acres
Grimes Wash Shrub			Aerial	Jan 2018	352
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak	0.43	0.40
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Duchesne UT	0.42	0.08
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sevier UT	0.08	0.03

Wildlife Habitat and Vegetation History

Table 16R-55.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 16R-55.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Pinyon-Juniper	Phase III
2021	Mixed Shrub	Early Phase I
2025	Mixed Shrub	Early Phase I

Site Notes

Oil and gas development is occurring in the area.

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Stony Loam (Pinyon-Utah Juniper)
NRCS Ecological Site #	R034BY330UT
States and Transitions	No state and transition model is available for the above ecological site.

This site was established in 2017 to monitor the Grimes Wash Phase 2 treatment (Table 16R-55.1) that removed twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and seeded shrub and herbaceous species (Table 16R-55.2). In 2017, the site had very little herbaceous cover, and no introduced species were sampled. Perennial grasses have been the dominant herbaceous component following treatment, with the seeded and introduced species Siberian wheatgrass (*Agropyron fragile*) and seeded native species thickspike wheatgrass (*Elymus lanceolatus*) (Table 16R-55.2) providing much of the cover. Forb diversity increased following treatment, but they still provided little cover in 2025 (Table 16R-55.10, 16R-55.11). Prior to treatment, browse species were depleted and had low amounts of cover: Mormon tea (*Ephedra viridis*) was the dominant species and black sagebrush (*Artemisia nova*) was a subordinate ally. Young, seeded Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*) and fourwing saltbush (*Atriplex canescens*) appeared on site following treatment. However, black sagebrush and Mormon tea still dominate the shrub component as of 2025 (Table 16R-55.12, Table 16R-55.13). Tree cover was high in 2017, placing the site in Phase III of woodland succession. Tree cover and density decreased substantially after the bullhog treatment and the site has been considered to be in Early Phase I of woodland succession since 2021 (Table 16R-55.4, Table 16R-55.12, Table 16R-55.14). The open canopy is expected to continue to improve the health of the browse and herbaceous understory while bolstering wildlife habitat.

Condition of mule deer winter range on this site has ranged between very poor and poor since 2017. Winter range condition is considered poor as of 2025. Factors negatively influencing range condition include reduced preferred browse cover and recruitment, and reduced perennial grass and forb cover (Table 16R-55.6, Table 16R-55.7, Table 16R-55.13, 16R-55.15). Pellet transect data shows that deer presence has been increasing with pellet groups low in 2017 but high in 2025. Elk presence was absent in 2017 but low in all other years sampled. As of 2025, black sagebrush is the one population of preferred browse with a notable population size that provides forage for wildlife. Black sagebrush has been increasing in population density while age classes have reset to a more mature demographic with improved vigor. Overall utilization has increased over time. More specifically, black sagebrush utilization was heavy in 2025 with 88% of the plants sampled in density strips falling into this category. On-site observations in 2025 noted that there was little to no utilization of the herbaceous community. These observations also remarked that primary production was good as indicated by good flower and seed production, and lush green growth of both herbaceous and browse species (Photos, Table 16R-55.9, Table 16R-55.13). Evidence of wildlife in 2025 included trails and tracks throughout the site, and pinyon jays and larks were heard nearby.

Trend Summary Tables

Table 16R-55.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2017	3.9	-	10.5	5.1	-	32.4
2021	4.7	-	-	5.1	-	-
2025	6.9	-	0.0	8.2	-	0.3

Table 16R-55.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2017	-	1	33	27	-	0.0	0.1	0.1
2021	-	128	11	93	-	2.2	0.0	1.9
2025	-	228	15	42	-	6.9	0.0	0.9

Table 16R-55.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2017	20.2	0.5	46.6	18.5	12.9	17.0
2021	20.5	0.1	55.5	5.9	9.0	9.0
2025	24.5	0.0	53.2	9.0	9.9	15.3

Table 16R-55.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2017	-	13	-	34
2021	1	32	2	24
2025	1	63	4	12
Year	Days Use Per Acre (ha)			
2017	-	16.8 (41.4)	-	-
2021	1.5 (3.6)	33.5 (82.8)	2.0 (5.0)	-
2025	-	48.9 (120.8)	1.3 (3.3)	-

Table 16R-55.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron fragile[i] (Siberian wheatgrass)	Elymus lanceolatus (thickspike wheatgrass)	Leymus salinus (saline wildrye)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency					
2017	-	-	-	-	1	-
2021	6	76	47	-	-	25
2025	11	108	154	4	6	-
year	Average Cover (%)					
2017	-	-	-	-	0.0	-
2021	0.1	1.6	0.4	-	-	0.1
2025	0.1	4.2	2.4	0.2	0.1	-

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

Table 16R-55.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis holboellii[a] (Holboell's rockcress)	Caulanthus crassicaulis[a] (thickstem wild cabbage)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriogonum alatum (winged buckwheat)	Helianthus annuus[a] (common sunflower)	Lepidium[a] (pepperweed)	Linum perenne[i] (blue flax)	Medicago sativa[i] (alfalfa)	Medicago sativa ssp. falcata[i] (yellow alfalfa)	Penstemon (beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Penstemon palmeri (Palmer's penstemon)	Physaria (twinpod)	Ratibida columnifera (upright prairie coneflower)	Salsola tragus[ai] (prickly Russian thistle)
year	Nested Frequency																
2017	1	1	1	4	23	1	-	8	-	-	-	18	-	-	-	-	-
2021	-	-	4	-	-	3	4	-	62	16	3	-	2	22	1	10	3
2025	-	-	-	5	-	2	-	1	2	18	-	-	10	3	-	11	14
year	Average Cover (%)																
2017	0.0	0.0	0.0	0.0	0.1	0.0	-	0.0	-	-	-	0.1	-	-	-	-	-
2021	-	-	0.0	-	-	0.0	0.0	-	0.9	0.2	0.2	-	0.0	0.5	0.0	0.1	0.0
2025	-	-	-	0.1	-	0.0	-	0.0	0.1	0.3	-	-	0.1	0.0	-	0.3	0.0

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

FORB SPECIES	Sanguisorba minor[i] (small burnet)	Stanleya viridiflora (green princesplume)	Trifolium (clover)
year	Nested Frequency		
2017	-	4	-
2021	1	-	0
2025	-	-	-
year	Average Cover (%)		
2017	-	0.0	-
2021	0.0	-	0.0
2025	-	-	-

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

Table 16R-55.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Ephedra nevadensis[p] (Nevada jointfir)	Ephedra viridis[p] (mormon tea)	Eriogonum microthecum[p] (slender buckwheat)	Juniperus osteosperma[t] (Utah juniper)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)							
2017	1.4	-	-	-	3.6	0.1	10.5	21.9
2021	1	-	-	-	3.8	0.3	-	-
2025	2.1	0.2	0.2	-	5.1	0.6	-	0.3
year	Quadrat Cover (%)							
2017	0.5	-	-	-	3.2	0.1	1.0	9.5
2021	1.2	0.0	0.0	-	3.1	0.4	-	-
2025	1.7	0.1	0.0	0.0	4.5	0.6	-	0.0

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

Table 16R-55.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2017	900	-	0	51	49	27	7	33	12/37
2021	1040	120	42	42	15	4	27	17	- / -
2025	1880	20	32	67	1	3	88	1	- / -
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2017	-	-	-	-	-	-	-	-	-/-
2021	420	-	91	10	0	14	10	0	- / -
2025	200	-	20	80	0	20	60	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Atriplex canescens[p] -- (fourwing saltbush)									
2017	-	-	-	-	-	-	-	-	-/-
2021	80	-	25	75	0	0	0	0	- / -
2025	60	-	0	100	0	0	100	0	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2017	-	-	-	-	-	-	-	-	84/92
2021	20	-	0	0	100	0	100	100	- / -
2025	-	-	-	-	-	-	-	-	-/-
Ephedra nevadensis[p] -- (Nevada jointfir)									
2017	-	-	-	-	-	-	-	-	-/-
2021	-	-	-	-	-	-	-	-	-/-
2025	20	-	0	100	0	100	0	0	- / -
Ephedra viridis[p] -- (mormon tea)									
2017	600	-	17	63	20	20	0	7	78/98
2021	740	-	3	78	19	22	0	35	- / -
2025	460	-	0	100	0	22	0	0	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2017	1920	-	13	88	0	3	1	0	5/7
2021	4320	980	54	41	5	1	0	5	- / -
2025	6300	-	41	58	0	16	2	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2017	140	20	29	57	14	0	0	0	- / -
2021	20	-	100	0	0	0	0	0	- / -
2025	40	-	50	50	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2017	-	-	-	-	-	-	-	-	6/11
2021	-	-	-	-	-	-	-	-	-/-
2025	20	-	0	100	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2017	300	20	53	40	7	0	0	0	- / -
2021	100	-	100	0	0	0	0	0	- / -
2025	80	-	50	50	0	0	0	0	- / -

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

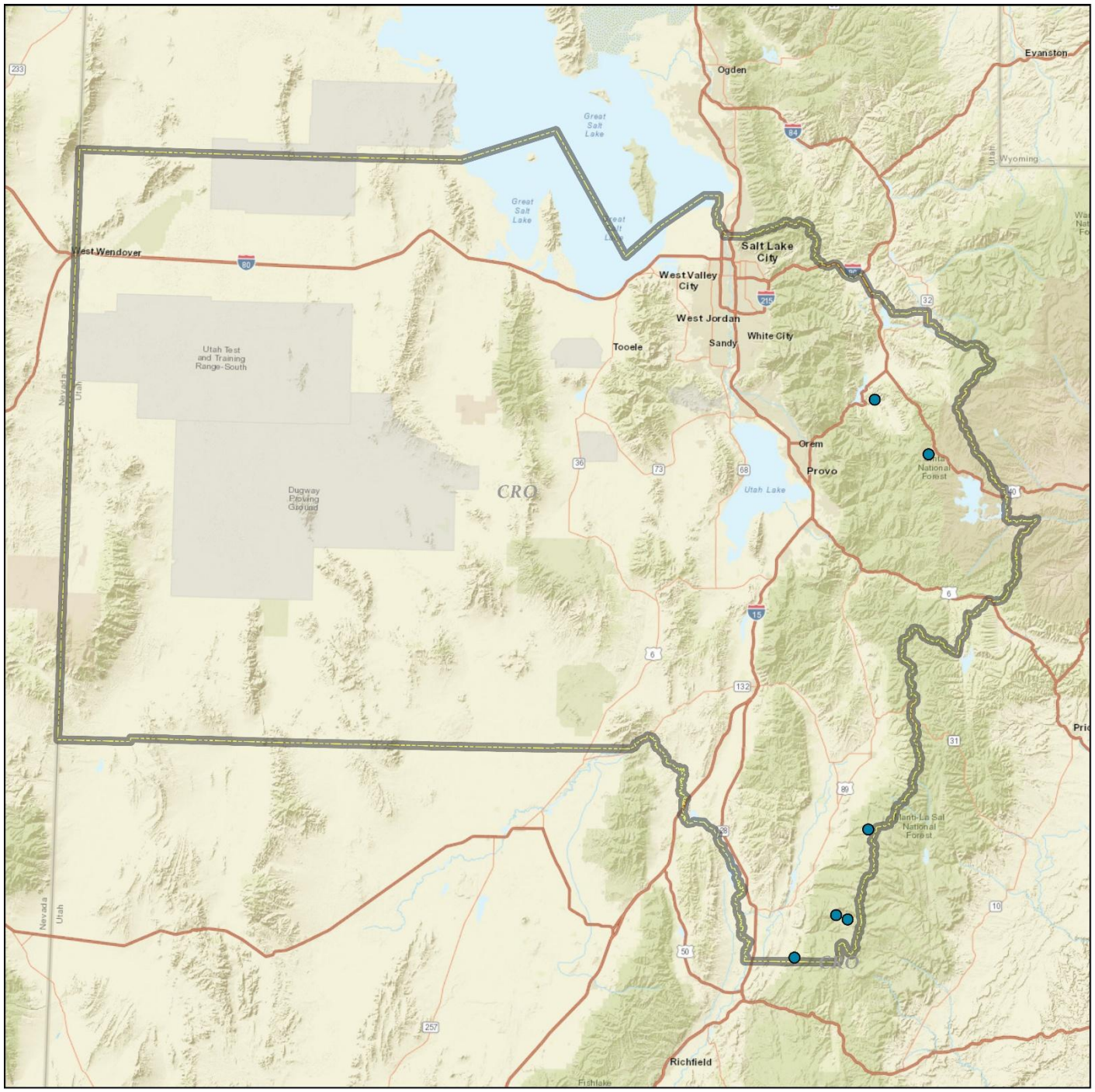
Table 16R-55.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2017	177	10	10	30	35	15	44.9
2021	48	50	25	6	6	13	17.7
2025	38	60	27	-	-	13	8.5
Pinus edulis (twoneedle pinyon)							
2017	221	15	40	30	15	-	12.3
2021	108	35	60	-	5	-	2.5
2025	102	-	90	5	-	5	3.0

Table 16R-55.15 - Deer Desirable Components Index: Upland Potential Scale.

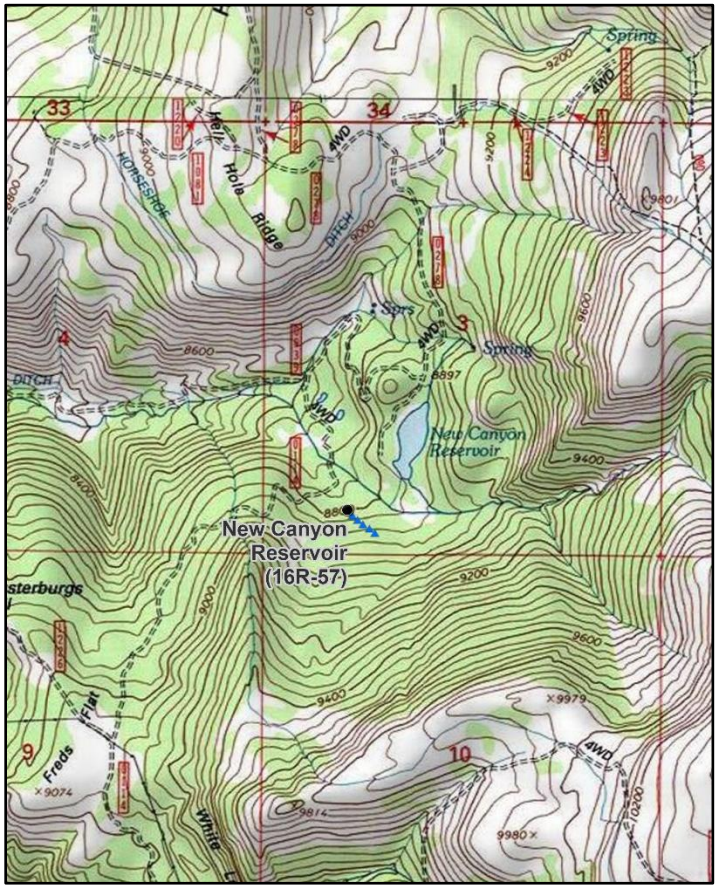
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2017	6.4	6.8	6.0	0.0	0.0	0.2	0.0	**19.4**	Very Poor
2021	6.4	9.8	6.7	4.4	0.0	3.8	0.0	**31.1**	Very Poor
2025	10.3	15.0	5.8	13.7	0.0	1.8	0.0	**46.6**	Poor

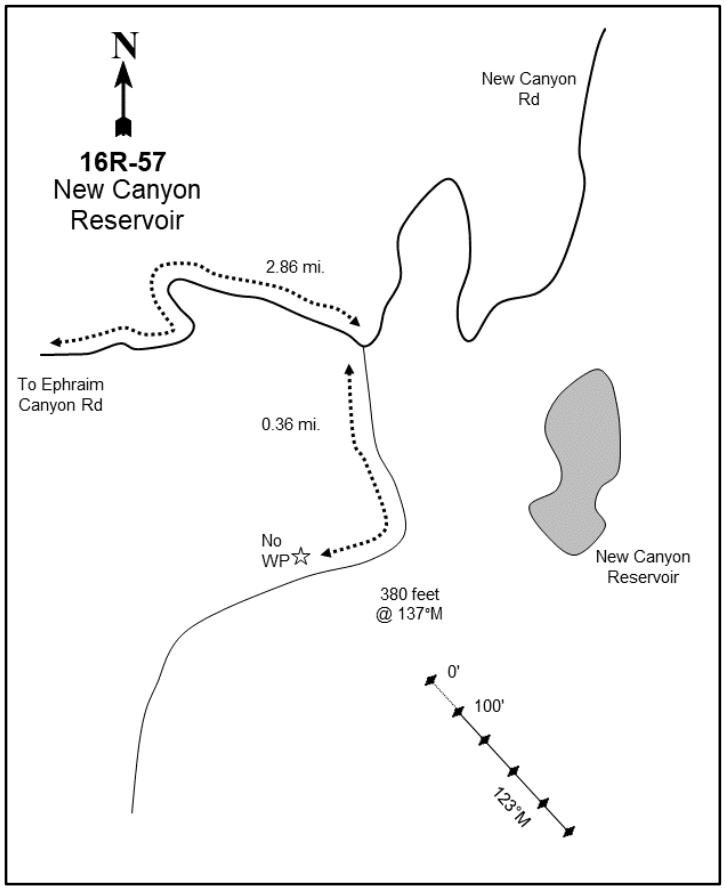
CENTRAL REGION



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

NEW CANYON RESERVOIR - STUDY NO. 16R-57





Location Information

USGS 7.5 min Map Info	Danish Knoll NW; Township 17S, Range 4E, Section 03
GPS (0' Stake)	NAD 83 UTM ZONE 12, 460023 East 4356829 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	123° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the intersection of Ephraim Canyon Road and New Canyon Road, turn left onto New Canyon Road and travel 2.8 miles to a right (south) turn (the turn is just before the turn for New Canyon Reservoir). Turn right and travel for another 0.36 miles and park adjacent to the GPS point. From the road, the 0-foot baseline stake is approximately 380 feet away at 137 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	BROWNS HOLE S & G
Elevation	8,800ft (2,682m)
Aspect	Northwest
Slope	25%
Sample Dates	08/09/2021, 08/13/2025

Table 16R-57.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Selective	Ephraim Watershed Restoration Phase 4 (FY24)	6584	Spring 2024	171

Wildlife Habitat and Vegetation History

Table 16R-57.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing

Table 16R-57.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2021	Quaking Aspen-Conifer Encroached	NA
2025	Quaking Aspen-Conifer Encroached	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	25 inches
NRCS Ecological Site	High Mountain Stony Loam (Aspen)
NRCS Ecological Site #	F047XA531UT
States and Transitions	2021-2025 - State Undefined: Community Phase Undefined

This study was established in 2021 to monitor a logging treatment that occurred in 2024 (Table 16R-57.1). The understory was sparse in some locations along the transect due to overstory shading and duff accumulation; few grasses were present in the community (Table 16R-57.10). However, perennial forbs were prevalent in areas where light reached the understory with Canadian white violet (*Viola canadensis*) and tuber starwort (*Pseudostellaria jamesiana*) as the most abundant species. Tuber starwort was also abundant following treatment, and the herbaceous understory in 2025 was similar to that observed in 2021 (Table 16R-57.7, Table 16R-57.11). Decadent or aged subalpine fir (*Abies lasiocarpa*) and quaking aspen (*Populus tremuloides*) were in competition in 2021, which was suppressing aspen recruitment. Conifer cover and density decreased following the treatments, but subalpine fir still maintained a notable presence and was a co-dominant vegetation component during the most recent sampling. Cover of aspen decreased between 2021 and 2025, but density increased and the population shifted to a slightly younger age class (Table 16R-57.12, Table 16R-57.13, Table 16R-57.13a, Table 16R-57.14).

Condition of mule deer winter range on this site has ranged between fair and fair-good since 2021. Winter range condition is considered to be fair-good as of 2025. Factors negatively influencing range condition include reduced perennial grass cover and the presence of the noxious weed gypsyflower (*Cynoglossum officinale*) (Table 16B-57.7, Table 16B-57.11, Table 16B-57.15), which is toxic to wildlife. Pellet transect data shows that deer and elk presence has been low since 2021. Currant species (*Ribes* spp.) have decreased in density since logging occurred. However, mountain snowberry (*Symphoricarpos oreophilus*) density has increased substantially since treatment. Utilization of snowberry has been light throughout the study period. Quaking aspen density has increased with utilization remaining light. On-site observations in 2025 noted that there was little to no utilization of grass species, but that there was light utilization (10-20%) on feathery false lily of the valley (*Maianthemum racemosum*) (Photos, Table 16R-57.9, Table 16R-57.13). Evidence of wildlife in 2025 included an observed porcupine and chickadee songs heard nearby.

Trend Summary Tables

Table 16R-57.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2021	20.5	-	6.9	35.8	-	68.2
2025	10.2	-	3.3	15.2	-	39.9

Table 16R-57.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2021	-	34	49	283	-	0.5	0.9	18.6
2025	-	24	36	275	-	1.4	0.7	17.8

Table 16R-57.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2021	3.0	0.3	70.7	0.0	0.2	42.1
2025	3.6	-	78.1	0.0	0.5	28.7

Table 16R-57.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Shiras Moose	Rabbit
	Quadrat Frequency			
2021	1	-	-	-
2025	-	1	-	1
Year	Days Use Per Acre (ha)			
2021	4.7 (11.6)	3.4 (8.3)	0.5 (1.2)	-
2025	5.3 (13.2)	11.4 (28.1)	-	-

Table 16R-57.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex (sedge)
year	Nested Frequency		
2021	4	28	3
2025	22	2	-
year	Average Cover (%)		
2021	0.2	0.2	0.1
2025	1.4	0.0	-

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

Table 16R-57.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Actaea rubra (red baneberry)	Aquilegia coerulea (Colorado blue columbine)	Artemisia ludoviciana (white sagebrush)	Chenopodium fremontii[a] (Fremont's goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Collomia linearis[a] (tiny trumpet)	Crepis acuminata (tapertip hawksbeard)	Cynoglossum officinale[ani] (gypsyflower)	Delphinium barbeyi (subalpine larkspur)	Descurainia californica[a] (Sierra tansymustard)	Erigeron speciosus (aspen fleabane)	Fragaria virginiana (Virginia strawberry)	Galium aparine[a] (stickywilly)	Gentianella amarella ssp. heterosepala[a] (autumn dwarf gentian)	Geranium richardsonii (Richardson's geranium)	Hackelia patens (spotted stickseed)
year	Nested Frequency																
2021	22	6	-	-	13	3	8	6	11	26	15	2	5	9	5	26	3
2025	-	5	3	7	19	-	16	-	1	-	18	-	1	-	-	14	-
year	Average Cover (%)																
2021	1.1	0.6	-	-	0.0	0.0	0.1	0.3	0.2	0.6	0.2	0.1	0.0	0.4	0.0	1.6	0.4
2025	-	0.7	0.0	0.2	0.1	-	0.1	-	0.1	-	0.4	-	0.0	-	-	0.3	-

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

FORB SPECIES	Heliomeris multiflora (showy goldeneye)	Heuchera parvifolia (littleleaf alumroot)	Lathyrus lanszwertii (Nevada pea)	Lupinus argenteus (silvery lupine)	Maianthemum racemosum (feathery false lily of the valley)	Mertensia oblongifolia (oblongleaf bluebells)	Osmorhiza depauperata (bluntseed sweetroot)	Polemonium pulcherrimum (Jacob's-ladder)	Pseudostellaria jamesiana (tuber starwort)	Ranunculus inamoenus (graceful buttercup)	Rudbeckia occidentalis (western coneflower)	Symphyotrichum eatonii (Eaton's aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Vicia americana (American vetch)	Viola (violet)	Viola canadensis (Canadian white violet)
year	Nested Frequency																
2021	3	27	-	9	-	4	71	10	110	2	35	-	3	2	19	58	166
2025	3	9	11	-	22	1	100	8	178	-	9	2	3	26	-	99	8
year	Average Cover (%)																
2021	0.0	0.9	-	0.7	-	0.2	1.4	0.1	2.4	0.0	2.7	-	0.0	0.0	0.7	0.5	4.2
2025	0.1	0.1	0.1	-	1.4	0.0	2.7	0.1	8.2	-	1.1	0.0	0.0	0.8	-	1.8	0.2

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

Table 16R-57.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies lasiocarpa[t] (subalpine fir)	Picea engelmannii[t] (Engelmann spruce)	Populus tremuloides[tp] (quaking aspen)	Ribes cereum[p] (wax currant)	Ribes montigenum[p] (gooseberry currant)	Sambucus racemosa[p] (red elderberry)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)						
2021	28.7	15.5	24	12.3	16	5.9	1.6
2025	21.9	-	18	1.1	5.6	2.4	6.1
year	Quadrat Cover (%)						
2021	2.3	1.7	2.9	7.4	7.3	4.6	1.3
2025	0.7	-	2.6	0.5	4.3	0.9	4.5

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

Table 16R-57.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Abies lasiocarpa[t] -- (subalpine fir)									
2021	180	-	44	33	22	0	0	22	- / -
2025	320	-	31	50	19	0	0	19	- / -
Picea engelmannii[t] -- (Engelmann spruce)									
2021	240	-	25	75	0	0	0	25	- / -
2025	-	-	-	-	-	-	-	-	-/-
Pseudotsuga menziesii[t] -- (Douglas-fir)									
2021	120	-	0	100	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Ribes cereum[p] -- (wax currant)									
2021	2200	40	6	95	0	0	0	0	- / -
2025	180	-	44	56	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Ribes montigenum[p] -- (gooseberry currant)									
2021	3380	240	11	89	0	0	0	0	- / -
2025	1820	220	22	78	0	0	0	0	- / -
Sambucus racemosa[p] -- (red elderberry)									
2021	1220	-	10	89	2	0	0	2	- / -
2025	140	-	0	100	0	43	57	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2021	260	-	15	85	0	0	0	0	- / -
2025	2320	60	10	91	0	29	0	0	- / -

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

Table 16R-57.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

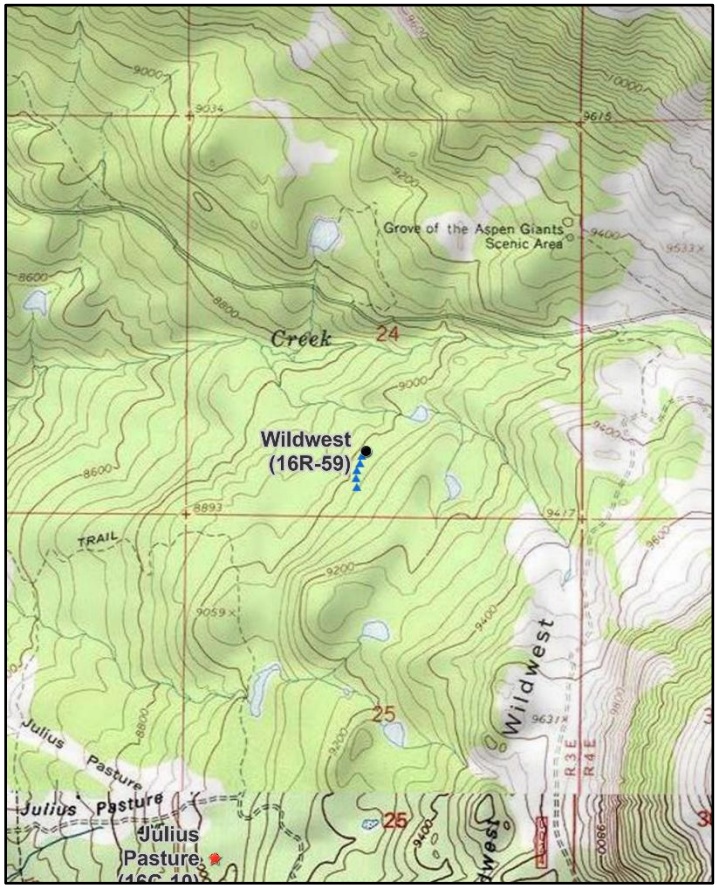
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2021	1920	22	63	4	11	1	0	5
2025	2460	25	67	6	2	7	0	0

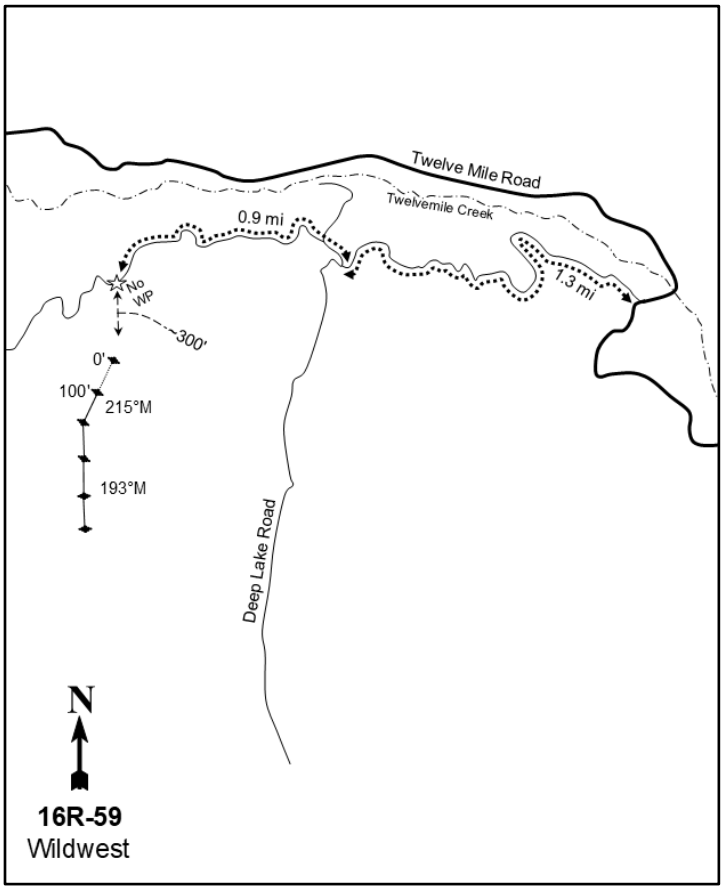
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

Table 16R-57.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Abies lasiocarpa (subalpine fir)							
2021	186	-	15	10	-	75	30.8
2025	76	13	31	6	-	50	28.4
Picea engelmannii (Engelmann spruce)							
2021	23	-	-	-	20	80	39.0
Populus tremuloides (quaking aspen)							
2021	157	-	42	25	-	33	13.8
2025	442	11	50	22	11	6	4.1
Pseudotsuga menziesii (Douglas-fir)							
2025	22	-	-	-	-	100	44.0

WILDWEST - STUDY NO. 16R-59





Location Information	
USGS 7.5 min Map Info	Black Mountain SE; Township 19S, Range 3E, Section 24
GPS (0' Stake)	NAD 83 UTM ZONE 12, 454373 East 4332161 North

Transect Information	
Browse Tag # (0' Stake)	Not Available
Transect Bearing	204° magnetic (Line 2: 193° magnetic, Lines 3-4: 175° magnetic, Line 5: 161° 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 6-Mile Road and Twelve Mile Road, travel for 0.6 miles to an intersection. Turn right (west) on to Old Baldy Guard Station Road and drive for another 1.14 miles to another intersection. Turn right and then turn left at the first opportunity (Cowboy Camp Road). Continue along Cowboy Camp Road for 0.82 miles to the first available parking spot. Use a GPS to locate the 0-foot stake location.

NOTE: A UTV is recommended for accessing this study site.

Site Information	
Land Ownership	Federal
Land Administrator	USFS
Allotment	TWELVE-MILE C & H
Elevation	9,000ft (2,743m)
Aspect	Northwest
Slope	3-10%
Sample Dates	08/18/2022, 08/11/2025

Table 16R-59.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed	Twelve Mile Watershed Restoration Project FY 23	5916	October 2022-June 2023	406

Wildlife Habitat and Vegetation History

Table 16R-59.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 16R-59.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2022	Subalpine Fir	NA
2025	Quaking Aspen	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	2022 - State Undefined: Community Phase Undefined 2025 - Current Potential State: Community Phase 2.2

When the study was established in 2022, the plant community on this site was composed mainly of subalpine fir (*Abies lasiocarpa*) and Douglas-fir (*Pseudotsuga menziesii*) with a scattered and young quaking aspen (*Populus tremuloides*) population found throughout the understory. However, aspen density increased notably after a prescribed burn between 2022 and 2023 (Table 16R-59.1) removed the conifers; aspen was the dominant vegetation component in 2025 (Photos, Table 16R-59.13, Table 16R-59.13a, 16R-59.14). In 2022, the herbaceous understory consisted of a single grass species, Columbia needlegrass (*Achnatherum nelsonii*), and a diversified forb community. When the site was sampled in 2025, the herbaceous component was similar to the one observed prior to treatment (Table 16R-59.10, 16R-59.11).

Condition of mule deer winter range on this site has remained fair-good since 2022. The main factor negatively influencing range condition is the reduced perennial grass cover (Table 16R-59.7, Table 16R-59.15). Pellet transect data shows that deer and elk presence has been low since 2021, but cattle presence was moderate in 2025. Mountain snowberry (*Symphoricarpos oreophilus*) density has decreased substantially since the burn, and snowberry utilization has been light in all sample years. Quaking aspen density has exhibited a notable increase with utilization remaining light. On-site observations in 2025 noted that there was little to no utilization of grass and forb species (Photos, Table 16R-59.9, Table 16R-59.13). Cattle were in the area when the site was sampled in 2025.

Trend Summary Tables

Table 16R-59.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2022	4.6	0.0	9.1	9.7	0.2	78.7
2025	4.4	-	12.4	8.3	-	28.8

Table 16R-59.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2022	-	10	77	265	-	0.1	1.6	22.7
2025	-	4	87	304	-	0.0	3.4	24.3

Table 16R-59.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2022	0.2	0.2	85.1	0.0	0.4	29.2
2025	13.0	0.4	49.7	4.0	2.3	42.7

Table 16R-59.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2022	2	4	1	4
2025	4	5	8	-
Year	Days Use Per Acre (ha)			
2022	4.4 (10.8)	2.0 (5.0)	2.0 (5.0)	-
2025	16.0 (39.5)	4.7 (11.6)	10.7 (26.5)	-

Table 16R-59.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Elymus glaucus (blue wildrye)
year	Nested	
2022	10	-
2025	-	4
year	Average Cover (%)	
2022	0.1	-
2025	-	0.0

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

Table 16R-59.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Aquilegia coerulea (Colorado blue columbine)	Arnica cordifolia (heartleaf arnica)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chenopodium atrovirens[a] (pinyon goosefoot)	Cirsium vulgare[a i] (bull thistle)	Cirsium wheeleri (Wheeler's thistle)	Collomia linearis[a] (tiny trumpet)	Erigeron eatonii (Eaton's fleabane)	Erigeron speciosus (aspen fleabane)	Eucephalus engelmannii (Engelmann's aster)	Frasera speciosa (elkweed)	Galium[a] (bedstraw)	Geranium richardsonii (Richardson's geranium)	Lathyrus lanszwertii (Nevada pea)	Lupinus argenteus (silvery lupine)	Maianthemum stellatum (starry false lily of the valley)
year	Nested Frequency																
2022	19	10	5	-	-	-	23	-	7	6	34	9	77	44	81	6	21
2025	16	6	-	3	11	2	36	3	3	4	60	-	74	22	150	6	10
year	Average Cover (%)																
2022	0.4	0.3	0.2	-	-	-	1.2	-	0.1	0.3	0.9	0.4	1.6	1.2	4.3	0.6	0.2
2025	0.3	0.1	-	0.1	0.2	0.2	1.1	0.0	0.1	0.1	1.4	-	3.0	0.3	10.2	0.7	0.2

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

FORB SPECIES	Mertensia oblongifolia (oblongleaf bluebells)	Osmorhiza depauperata (bluntseed sweetroot)	Pseudostellaria jamesiana (tuber starwort)	Rudbeckia occidentalis (western coneflower)	Silene menziesii (Menzies' campion)	Symphyotrichum ascendens (western aster)	Symphyotrichum eatonii (Eaton's aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Vicia americana (American vetch)	Viola (violet)	Viola adunca (hookedspur violet)
year	Nested Frequency											
2022	7	82	85	19	-	5	1	30	13	2	164	-
2025	1	1	30	27	4	1	22	6	16	87	61	6
year	Average Cover (%)											
2022	0.1	1.7	2.9	0.6	-	0.3	0.0	1.3	0.7	0.1	5.0	-
2025	0.0	0.0	0.5	1.0	0.0	0.0	0.8	0.1	0.7	5.7	0.7	0.0

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

Table 16R-59.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies lasiocarpa[t] (subalpine fir)	Paxistima myrsinites (Oregon boxleaf)	Populus tremuloides[tp] (quaking aspen)	Pseudotsuga menziesii[t] (Douglas-fir)	Ribes montigenum[p] (gooseberry currant)	Rosa woodsii[p] (Woods' rose)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)						
2022	51.2	0.2	19.8	7.7	0.1	0.4	9.2
2025	0.2	-	28.6	-	-	0.4	7.9
year	Quadrat Cover (%)						
2022	5.5	0.0	1.5	2.1	0.3	0.9	3.4
2025	0.0	-	12.4	-	-	0.4	4.1

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

Table 16R-59.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Abies lasiocarpa[t] -- (subalpine fir)									
2022	900	160	51	47	2	0	0	2	- / -
2025	-	-	-	-	-	-	-	-	- / -
Mahonia repens -- (creeping barberry)									
2022	120	-	0	100	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Paxistima myrsinites -- (Oregon boxleaf)									
2022	680	20	15	85	0	0	0	0	- / -
2025	20	-	0	100	0	0	0	0	- / -
Pseudotsuga menziesii[t] -- (Douglas-fir)									
2022	140	-	29	71	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Ribes montigenum[p] -- (gooseberry currant)									
2022	440	-	14	86	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Rosa woodsii[p] -- (Woods' rose)									
2022	1160	-	14	86	0	0	0	0	- / -
2025	540	-	22	78	0	0	0	0	- / -
Sambucus[p] -- (elderberry)									
2022	-	-	-	-	-	-	-	-	-/-
2025	20	-	100	0	0	0	100	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2022	3100	20	8	90	2	11	0	2	- / -
2025	2400	-	10	89	1	16	8	0	- / -

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

Table 16R-59.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

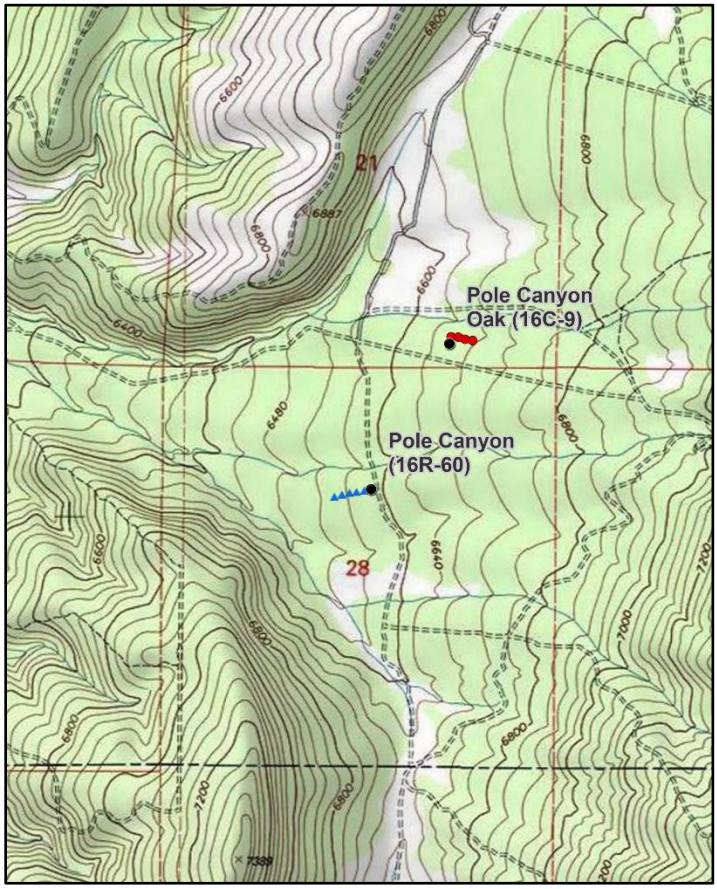
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2022	1880	44	51	-	5	2	11	19
2025	13320	7	80	13	-	14	0	1

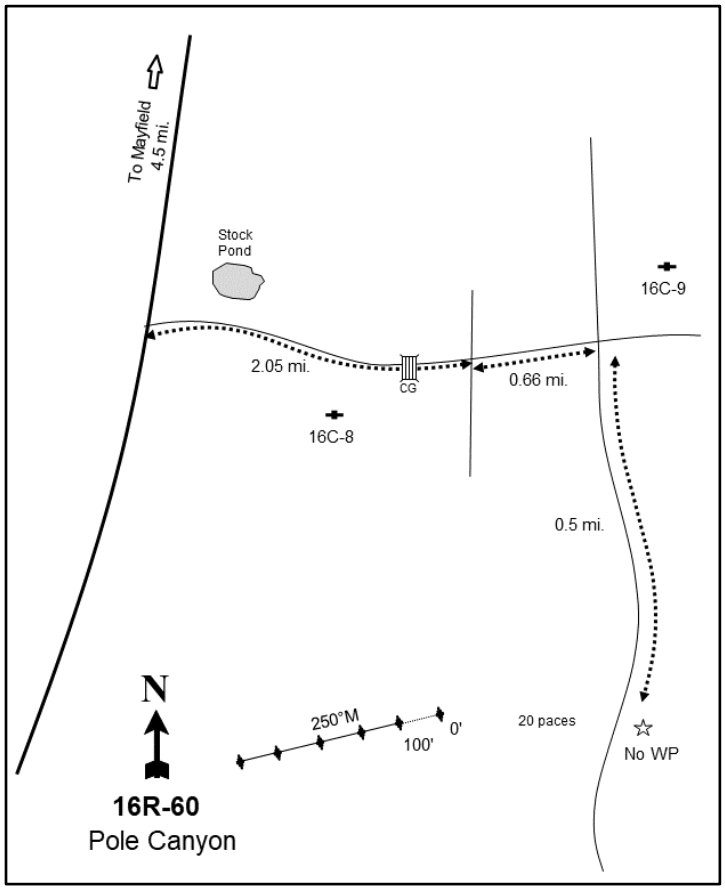
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

Table 16R-59.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Abies lasiocarpa (subalpine fir)							
2022	85	25	25	-	-	50	14.3
Populus tremuloides (quaking aspen)							
2022	931	5	55	10	-	30	8.6
2025	7006	20	70	10	-	-	1.5
Pseudotsuga menziesii (Douglas-fir)							
2022	5	-	-	-	-	100	53.6

POLE CANYON - STUDY NO. 16R-60





Location Information

USGS 7.5 min Map Info	Mayfield SW; Township 20S, Range 2E, Section 28
GPS (0' Stake)	NAD 83 UTM ZONE 12, 439854 East 4321739 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	250° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Go south from Main Street in Mayfield through Arapien Valley for 4.5 miles to the Pole Canyon Road. Turn east and travel for 2.05 miles, passing study 16C-08 (Pole Canyon Chaining) and crossing a cattle guard to a four-way intersection (South Hollow Road). From the intersection, turn south (right), travel for another 0.5 miles, and park on the east side of the road in the first available pull off. The baseline is located about 10 paces due west; there is no browse tag.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,600ft (2,012m)
Aspect	West
Slope	5%
Sample Dates	08/30/2022, 06/02/2025

Table 16R-60.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Twelve Mile Watershed Restoration Project	5916	November-December 2022	759
Seeding - Aerial Before	Twelve Mile Watershed Restoration Project	5916	November 2022	759

Table 16R-60.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Twelve Mile			Aerial	Nov 2022	760
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.46	0.43
G	Bromus marginatus	Mountain Brome	Bromar	0.99	0.97
G	Pascopyrum smithii	Western Wheatgrass	Recovery	0.92	0.83
G	Poa secunda	Big Bluegrass	Sherman	0.53	0.36
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.99	0.91
F	Achillea millefolium	Western Yarrow	Eagle	0.10	0.08
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.92	0.88
F	Cleome serrulata	Rocky Mountain Beeplant	Weld CO	0.20	0.19
F	Linum perenne	Blue Flax	Appar	0.46	0.42
F	Medicago sativa	Alfalfa	Big Sky Ladak	0.66	0.58
F	Medicago sativa ssp. falcata	Yellow Alfalfa	Don	0.26	0.26
F	Onobrychis viciifolia	Sainfoin	Shoshone	1.97	1.54
F	Penstemon pachyphyllus	Thickleaf Penstemon	White Pine NV	0.20	0.17
F	Sanguisorba minor	Small Burnet	Delar	1.97	1.79
S	Artemisia nova	Black Sagebrush	Lincoln NV	0.07	0.01
S	Artemisia nova	Black Sagebrush	Beaver, UT	0.92	0.24
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	White Pine NV	0.60	0.11
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver, UT	0.39	0.13

Wildlife Habitat and Vegetation History

Table 16R-60.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 16R-60.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2022	Pinyon-Juniper	Phase III
2025	Gambel Oak	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Gravelly Loam (Oak)
NRCS Ecological Site #	R047XA410UT
States and Transitions	2022 - Current Potential State: Community Phase 2.3 2025 - Current Potential State: Community Phase 2.2

Upon study establishment in 2022, this site was dominated by Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) and was considered to be within Phase III of woodland succession. However, juniper and pinyon trees decreased in density and cover following a mastication and seeding treatment in 2022 (Table 16R-60.1). Between 2022 and 2025 the plant community transitioned from a tree-dominated community phase (Phase III) to one dominated by sprouting Gambel oak (*Quercus gambelii*) and a vigorous herbaceous understory (Phase I). Browse species such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), alderleaf mountain mahogany (*Cercocarpus montanus*), antelope bitterbrush (*Purshia tridentata*), and Gambel oak were present in 2022, but they contributed moderate cover. Notable, however, was that few shrubs were considered to be decadent. Again, followingtreatment, density and cover increased for mountain big sagebrush, bitterbrush, and oak (Table 16R-60.4, Table 16R-60.12, Table 16R-60.13, Table 16R-60.14). The herbaceous understory present in 2022 was low in frequency and cover, but both values increased following treatment. The perennial grass species crested wheatgrass (*Agropyron cristatum*) contributed the majority of

herbaceous cover in 2022. Crested wheatgrass remained the dominant species following treatment, and smooth brome (*Bromus inermis*) also had a notable increase in frequency and cover (Table 16R-60.7, Table 16R-60.10, Table 16R-60.11). As expected, competition between pinyon-juniper, shrubs, and herbaceous communities diminished and forage improved for wildlife following the bullhog and seeding treatment.

Condition of mule deer winter range on this site has ranged between fair and excellent since 2022. Winter range condition is considered to be excellent as of 2025 (Table 16B-60.15). Pellet transect data shows that deer presence has been high since 2022, and cattle presence was low in 2025. The site during the 2024/25 winter season had frequent observations of mule deer and elk (Wildlife Migration Initiative). Mountain big sagebrush density has increased since the mastication disturbance; utilization of sagebrush was light in 2025. Bitterbrush density also increased following treatment with utilization shifting from moderate to heavy in 2025 despite the increase in density (Table 16R-60.9, Table 16R-60.13). On-site observations in 2025 noted that there was little to no utilization of grass and forb species. The herbaceous and browse communities were observed to have good primary production as evidenced by good flower and seed production, and good leader growth.

Trend Summary Tables

Table 16R-60.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2022	19.2	0.0	8.9	31.4	-	24.5
2025	21.7	0.3	0.4	30.3	0.3	6.4

Table 16R-60.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2022	-	183	117	24	-	4.2	0.4	0.2
2025	1	278	167	77	0.0	16.2	1.4	4.6

Table 16R-60.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2022	23.3	0.9	52.0	14.3	5.8	30.3
2025	16.4	0.1	67.2	4.1	2.7	41.1

Table 16R-60.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2022	1	13	2	11
2025	-	11	3	9
Year	Days Use Per Acre (ha)			
2022	-	57.0 (140.7)	0.7 (1.7)	-
2025	5.1 (12.6)	45.6 (112.6)	5.3 (13.2)	-

Table 16R-60.10 - 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 geyeri (Geyer's sedge)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency									
2022	0	105	101	-	1	-	9	6	-	0
2025	6	152	162	1	-	6	4	16	14	20
year	Average Cover (%)									
2022	0.2	2.9	0.8	-	0.1	-	0.1	0.0	-	0.0
2025	0.5	7.9	6.5	0.0	-	0.2	0.0	0.1	0.5	0.5

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

Table 16R-60.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum desertorum[ai] (desert madwort)	Arabis holboellii[a] (Holboell's rockcress)	Astragalus calycosus (Torrey's milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus eurekensis (Eureka milkvetch)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chenopodium fremontii[a] (Fremont's goosefoot)	Comandra umbellata (bastard toadflax)	Cymopterus longipes (longstalk springparsley)	Delphinium nuttallianum (twolobe larkspur)	Epilobium brachycarpum[a] (tall annual willowherb)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Lactuca serriola[ai] (prickly lettuce)	Linum perenne[i] (blue flax)	Medicago sativa[i] (alfalfa)
year	Nested Frequency																
2022	-	117	-	4	1	-	4	-	-	-	-	-	5	2	-	-	-
2025	8	134	1	10	-	1	26	2	6	1	1	4	5	5	33	15	18
year	Average Cover (%)																
2022	-	0.4	-	0.0	0.0	-	0.0	-	-	-	-	-	0.0	0.0	-	-	-
2025	0.4	1.1	0.0	0.1	-	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	1.5	1.2

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

FORB SPECIES	Microsteris gracilis[a] (slender phlox)	Onobrychis viciifolia[i] (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon strictus (Rocky Mountain penstemon)	Phlox longifolia (longleaf phlox)	Sanguisorba minor[i] (small burnet)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency						
2022	-	-	-	-	12	-	1
2025	3	7	3	1	12	8	-
year	Average Cover (%)						
2022	-	-	-	-	0.1	-	0.0
2025	0.0	0.4	0.2	0.0	0.2	0.5	-

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

Table 16R-60.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Cercocarpus montanus[p] (alderleaf mountain mahogany)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia fragilis (brittle pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Purshia tridentata[p] (antelope bitterbrush)	Quercus gambelii[p] (Gambel oak)
year	Line Intercept Cover (%)							
2022	0.1	7.1	-	19.1	-	5.4	1.2	23
2025	0.5	0.9	0.3	0.1	-	6.3	4.2	24.7
year	Quadrat Cover (%)							
2022	0.4	3.5	0.0	7.1	-	1.8	2.1	13.2
2025	0.2	0.5	0.3	0.0	0.1	0.4	3.4	17.6

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

Table 16R-60.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2022	80	-	0	50	50	0	75	50	- / -
2025	780	160	44	39	18	26	18	18	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2022	300	60	27	53	20	13	13	13	- / -
2025	280	-	36	64	0	21	57	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2022	160	-	50	50	0	0	0	0	- / -
2025	400	-	0	100	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2022	360	-	50	50	0	0	0	0	- / -
2025	120	-	50	50	0	0	17	0	- / -
Opuntia fragilis -- (brittle pricklypear)									
2022	-	-	-	-	-	-	-	-	-/-
2025	100	-	0	100	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2022	60	20	67	33	0	0	0	0	- / -
2025	60	-	67	33	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2022	220	-	9	82	9	64	27	27	- / -
2025	640	-	22	75	3	3	81	3	- / -
Quercus gambelii[p] -- (Gambel oak)									
2022	3740	140	45	40	15	2	0	9	- / -
2025	4140	-	32	67	1	2	0	1	- / -

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

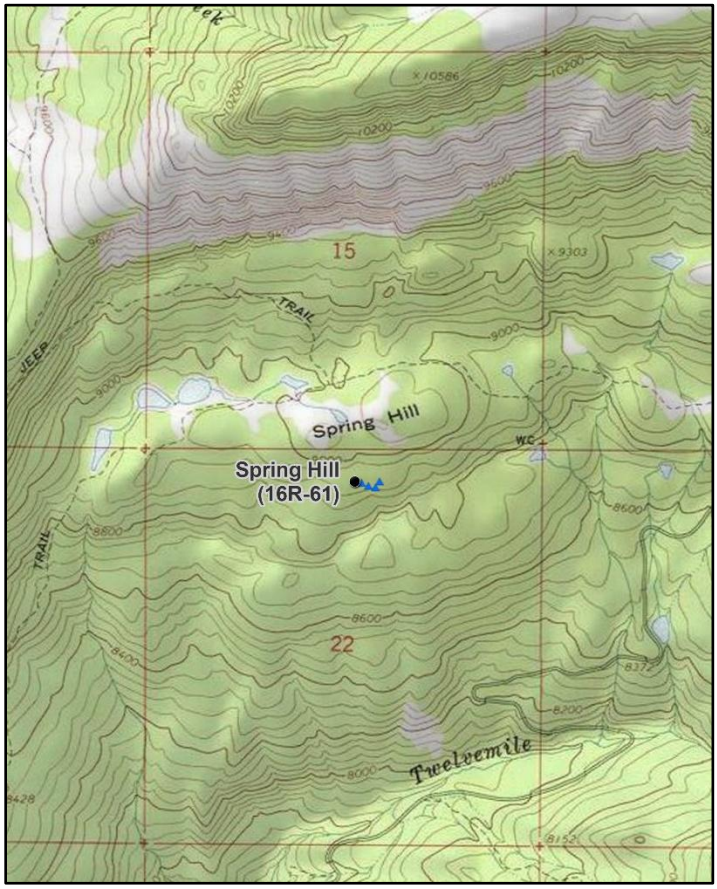
Table 16R-60.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

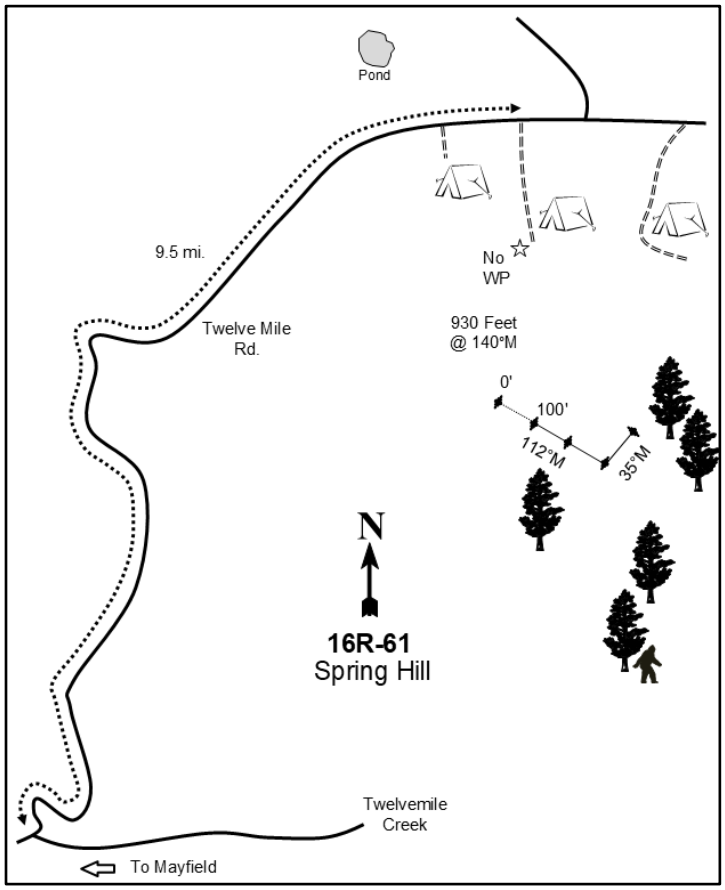
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2022	238	-	21	5	42	32	14.0
2025	45	33	58	8	-	-	5.6
Pinus edulis (twoneedle pinyon)							
2022	39	-	11	11	-	78	15.7
2025	14	-	-	43	29	29	19.9

Table 16R-60.15 - Deer Desirable Components Index: Mountain Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2022	30.0	10.2	15.0	8.3	0.0	0.5	0.0	**64.0**	Fair
2025	30.0	14.5	15.0	30.0	0.0	9.2	0.0	**98.7**	Excellent

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 (Line 4: 35° magnetic)° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

From the 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.

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, 08/11/2025

Table 16R-61.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed	Twelve Mile Watershed Restoration Project FY 24	6536	Winter 2024	751
Logging - Cut and Pile	Twelve Mile Watershed Restoration Project FY 24	6536	September 2023-June 2024	751

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
2025	White Fir/Perennial Forb	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	2022 - Current Potential State: Community Phase 2.4 2025 - Current Potential State: Community Phase 2.2

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. Following cut and pile logging and prescribed fire treatments in 2024, the community transitioned to one dominated by aspen seedlings with a reduced overstory of white fir (Photos, Table 16R-61.12, Table 16R-61.13a, Table 16R-61.14). The browse component was largely composed of mountain snowberry (*Symphoricarpos oreophilus*) in 2023, although other species such as Utah serviceberry (*Amelanchier utahensis*) and chokecherry (*Prunus virginiana*) were also present to a lesser extent. Following treatment, mountain snowberry had a notable decrease in cover when the site was sampled in 2025 (Table 16R-61.12, Table 16R-61.13). The herbaceous understory has remained abundant in both pre- and post-treatment sample years with a vast majority of the cover being provided by a diverse perennial forb component. Annual forbs and perennial grasses have remained rare, but the noxious weed gypsyflower (*Cynoglossum officinale*) was observed for the first time following the treatment (Table 16R-61.7, Table 16R-61.10, Table 16R-61.11). As expected, the conifer removal treatment likely allowed for the aspen stand to re-establish.

Condition of mule deer winter range on this site has ranged between poor and fair since 2023; winter range condition is considered poor as of 2025. Factors negatively influencing range condition include reduced preferred browse cover; reduced perennial grass cover; and the presence of the noxious weed gypsyflower, which is poisonous to wildlife (Table 16R-61.6, Table 16R-61.7, Table 16R-61.11, Table 16R-61.15). Pellet transect data shows that deer and elk presence has been low since 2023. Cattle presence was low in 2023, but pellet groups were not observed in 2025. Quaking aspen utilization increased from light in 2023 to moderate in 2025 despite the post-treatment increase in density (Table 16R-61.9, Table 16R-61.13). On-site observations in 2025 noted that there was little to no utilization of grass and forb species. In addition, the herbaceous and browse communities were observed to have good primary production as evidenced by good flower and seed production, and good leader growth.

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
2025	4.7	-	2.3	5.9	-	12.9

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
2025	-	29	48	229	-	0.4	3.1	11.7

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
2025	13.1	-	68.8	0.3	1.7	20.9

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
2025	-	2	-	-
Year	Days Use Per Acre (ha)			
2023	2.9 (7.2)	6.7 (16.6)	2.7 (6.6)	-
2025	-	3.4 (8.3)	1.3 (3.3)	-

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
2025	11	0	19
year	Average Cover (%)		
2023	0.1	0.1	0.1
2025	0.1	0.0	0.3

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)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium atrovirens[a] (pinyon goosefoot)	Cirsium wheeleri (Wheeler's thistle)	Collomia linearis[a] (tiny trumpet)	Cynoglossum officinale[ani] (gypsyflower)	Draba aurea (golden draba)	Frasera speciosa (elkweed)	Geranium richardsonii (Richardson's geranium)	Heliomeris multiflora (showy goldeneye)	Lathyrus lanszwertii (Nevada pea)	Maianthemum racemosum (feathery false lily of the valley)	Mertensia (bluebells)	Orthocarpus tolmiei[a] (Tolmie's owl's-clover)
year	Nested Frequency																
2023	1	3	3	-	-	-	2	-	-	19	14	29	8	122	7	-	-
2025	7	-	-	2	19	31	13	1	17	-	1	13	12	146	0	3	3
year	Average Cover (%)																
2023	0.0	0.0	0.0	-	-	-	0.0	-	-	0.3	0.3	0.3	0.3	8.3	0.1	-	-
2025	0.2	-	-	0.0	0.3	2.7	0.5	0.0	0.3	-	0.0	0.1	0.7	5.5	0.0	0.0	0.1

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

FORB SPECIES	Osmorhiza depauperata (bluntseed sweetroot)	Polemonium foliosissimum (towering Jacob's-ladder)	Pseudostellaria jamesiana (tuber starwort)	Rudbeckia occidentalis (western coneflower)	Sidalcea candida (white checkerbloom)	Symphyotrichum foliaceum (alpine leafybract aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Veronica biloba[ai] (twolobe speedwell)	Viola adunca (hookedspur violet)	Viola purpurea (goosefoot violet)
year	Nested Frequency										
2023	30	7	66	6	1	17	0	60	-	82	44
2025	6	9	64	-	-	31	5	52	3	31	1
year	Average Cover (%)										
2023	0.5	0.1	1.0	0.0	0.0	0.4	0.0	2.3	-	2.9	1.4
2025	0.1	0.2	1.0	-	-	1.6	0.0	1.1	0.0	0.2	0.0

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	Abies concolor[t] (white fir)	Amelanchier utahensis[p] (Utah serviceberry)	Mahonia repens (creeping barberry)	Pinus flexilis[t] (limber pine)	Populus tremuloides[tp] (quaking aspen)	Prunus virginiana[p] (chokecherry)	Rosa woodsii[p] (Woods' rose)	Sambucus nigra ssp. cerulea[p] (blue elderberry)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)								
2023	48.9	0.2	0.3	22.6	7.7	0.3	-	-	11.4
2025	10.5	-	-	-	2.4	-	-	0.8	5.1
year	Quadrat Cover (%)								
2023	4.8	0.1	1.4	7.1	1.2	1.5	-	0.4	8.1
2025	1.4	-	-	-	0.9	-	0.0	0.5	4.2

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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Abies concolor[t] -- (white fir)									
2023	660	-	18	79	3	0	0	3	- / -
2025	100	40	20	80	0	0	0	0	- / -
Amelanchier utahensis[p] -- (Utah serviceberry)									
2023	100	-	100	0	0	20	60	20	- / -
2025	-	-	-	-	-	-	-	-	-/-
Mahonia repens -- (creeping barberry)									
2023	1360	-	0	100	0	0	0	0	- / -
2025	120	-	0	100	0	0	0	0	- / -
Pinus flexilis[t] -- (limber pine)									
2023	220	40	0	100	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Prunus virginiana[p] -- (chokecherry)									
2023	80	-	75	25	0	0	0	0	- / -
2025	-	-	-	-	-	-	-	-	-/-
Rosa woodsii[p] -- (Woods' rose)									
2023	60	-	67	33	0	0	0	0	- / -
2025	80	-	100	0	0	100	0	0	- / -
Sambucus nigra ssp. cerulea[p] -- (blue elderberry)									
2023	20	-	100	0	0	0	0	0	- / -
2025	200	-	70	30	0	0	0	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2023	5080	-	27	65	8	8	4	15	- / -
2025	3780	200	24	76	0	28	7	0	- / -

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.

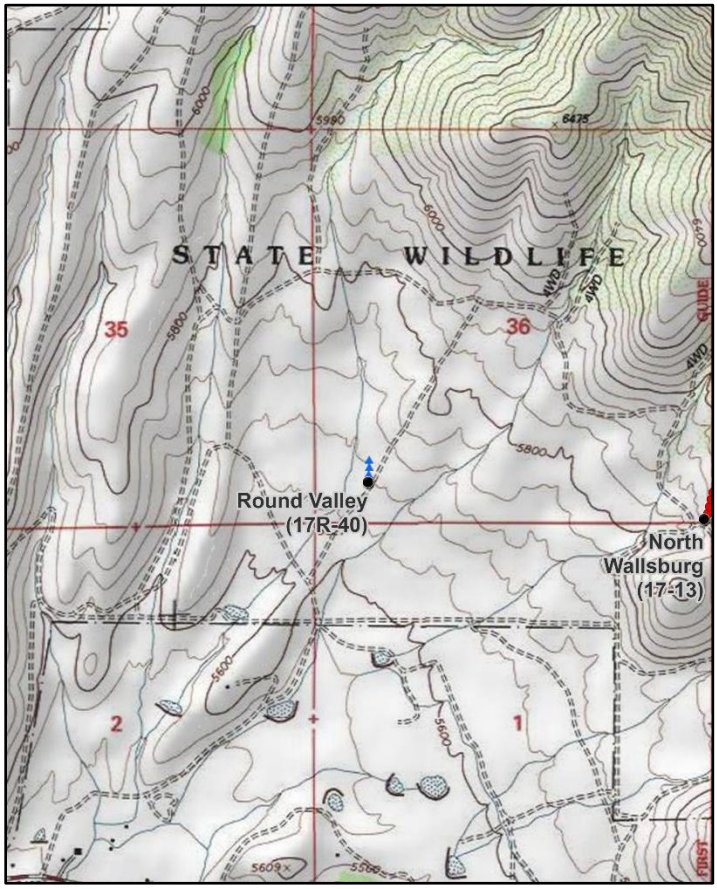
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2023	240	58	17	8	17	0	20	40
2025	1140	98	2	-	-	100	0	0

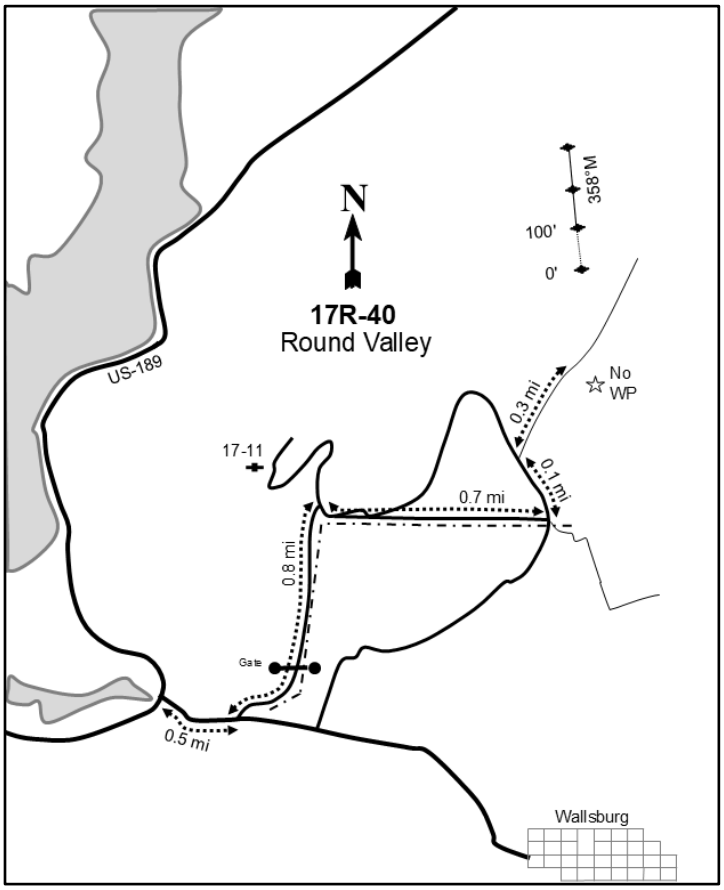
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

Table 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
2025	24	-	100	-	-	-	1.0
Pinus flexilis (limber pine)							
2023	465	-	-	-	-	100	44.0
2025	6	-	-	-	-	100	80.5
Populus tremuloides (quaking aspen)							
2023	73	-	50	-	-	50	11.2
2025	162	59	35	-	-	6	2.5

ROUND VALLEY - STUDY NO. 17R-40





Location Information

USGS 7.5 min Map Info	Charleston SW; Township 4S, Range 4E, Section 36
GPS (0' Stake)	NAD 83 UTM ZONE 12, 461831 East 4474631 North

Transect Information

Browse Tag # (0' Stake)	561
Transect Bearing	358° magnetic
Length	300ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft & 71ft), Line 3 (59ft)
Belt Marker Placement	Standard

Directions to Site

Beginning at the intersection of US-189 and the Wallsburg turnoff, proceed 0.50 miles towards Wallsburg to an intersection. Turn left at the intersection and proceed northerly for 0.8 miles to an intersection, passing through a DWR gate. Turn right at the intersection and drive for 0.7 miles to another intersection and turn left (north). Drive for 0.1 miles to a fork and bear right. Proceed for 0.3 miles and park; there is no witness post. The transect is on the left (west) side of the road.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,700ft (1,737m)
Aspect	Southwest
Slope	4-7%
Sample Dates	09/06/2018, 06/24/2021, 08/05/2025

Table 17R-40.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Scalper	Wallsburg WMA Shrub Planting	4556	October 2019	9
Seeding - Broadcast	Wallsburg WMA Shrub Planting	4556	October 2019	9
Seeding - Transplant	Wallsburg WMA Shrub Restoration Project	5618	July 2020-June 2021	52
Seeding - Transplant	Wallsburg WMA Shrub Planting	4556	November 2019	9
Seeding - Seed Unknown	-	-	Historic	-

Table 17R-40.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Pole Creek Fire Dribbler			Broadcast	Oct 2019	200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Onobrychis viciifolia	Sainfoin	Shoshone	0.25	0.23
F	Sanguisorba minor	Small Burnet	Delar	0.50	0.47
S	Atriplex canescens	Fourwing Saltbush		0.50	0.38
S	Purshia tridentata	Bitterbrush	Elko NV	0.50	0.48

Mix Name			Application Type	Application Date	Acres
Wallsburg WMA Shrub Planting			Seedling Transplant	Nov 2019	9
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush		0.00	0.00
S	Cercocarpus montanus	Alderleaf Mountain Mahogany		0.00	0.00
S	Purshia tridentata	Antelope Bitterbrush		0.00	0.00

Mix Name			Application Type	Application Date	Acres
Wallsburg WMA Shrub Restoration Project - FY-22			Seedling Transplant	Oct 2020	52
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush		0.00	0.00
S	Atriplex canescens	Fourwing Saltbush		0.00	0.00
S	Purshia tridentata	Antelope Bitterbrush		0.00	0.00
S	Shepherdia argentea	Silver Buffaloberry		0.00	0.00

Wildlife Habitat and Vegetation History

Table 17R-40.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 17R-40.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Perennial Grass	No Encroachment
2021	Perennial Grass	No Encroachment
2025	Perennial Grass	No Encroachment

Site Notes

In 2021, the study was moved to the opposite side of the two-track and shortened to 300 feet in length to stay within the treatment area and to avoid crossing the two-track. In addition, it was noted in 2021 that differentiating between bulbous bluegrass (*Poa bulbosa*) and Sandberg bluegrass (*P. secunda*) was extremely difficult.

Site Potential

	19 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	2018-2025 - Introduced Grassland State: Community Phase 4.1

Upon study establishment in 2018, the plant community on this site was dominated by the introduced perennial grass species crestedwheatgrass (*Agropyron cristatum*) with a minor component of the native species Sandberg bluegrass (*Poa secunda*) and Idaho fescue (*Festuca idahoensis*). Crested wheatgrass had a notable decrease in abundance and cover in 2021, and bulbous bluegrass (*Poa bulbosa*) was observed for the first time that same year. However, this shift could partially be due to the fact that the study site was

moved to the other side of the two-track road in 2021 to stay within the treatment area. In 2025, crested wheatgrass rebounded in cover. Species diversity in the herbaceous understory overall has been low, and forbs have not been abundant. The introduced perennial forb and noxious weed squarrose knapweed (*Centaurea virgata*) was observed in 2021, but was not observed in 2025. Drought conditions in the years surrounding 2021 likely contributed to the decrease in the abundance of the herbaceous understory in that sample year (Table 17R-40.7, Table 17R-40.10, Table 17R-40.11). Shrubs were rare prior to treatment; although it was present with a limited population size, broom snakeweed (*Gutierrezia sarothrae*) dominated the shrub component in 2018. Shrub planting projects occurred in the fall of 2019 and 2020 (17R-40.1) that augmented the shrub component by increasing mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) density and cover (Table 17R-40.12, Table 17R-40.13).

Condition of mule deer winter range on this site has remained very poor since 2018. Factors negatively influencing range condition include a lack of preferred browse and reduced perennial forb cover. The noxious weed squarrose knapweed has also been observed in past samplings (Table 17R-40.6, Table 17R-40.7, Table 17R-40.11, Table 17R-40.15); squarrose knapweed can form dense stands that displace other valuable forage species. Pellet transect data shows that deer and elk presence has been low since 2018. During the 2024/25 winter season the area had occurrences of collared mule deer and occasionally collared elk (Wildlife Migration Initiative). Cattle presence was moderate in 2018, but it has since decreased as of 2025. Sagebrush density has increased substantially since the seeding and shrub transplants. However, utilization of sagebrush has remained light in each sample year (Table 17R-40.9, Table 17R-40.13). On-site observations in 2025 noted that there was light utilization (10-20%) on smooth brome (*Bromus inermis*), crested wheatgrass, alfalfa (*Medicago sativa*), and scarlet globemallow (*Sphaeralcea coccinea*). In 2025, many plants appeared to be drought-affected (Photos) as indicated by stunted primary growth and reduced flowering and seed production.

Trend Summary Tables

Table 17R-40.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	0.1	0.1	-	0.1	0.8	-
2021	1.3	0.2	-	0.7	-	-
2025	1.7	2.5	-	0.9	2.1	-

Table 17R-40.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	-	427	105	77	-	39.8	0.4	1.8
2021	-	362	-	62	-	16.8	-	1.6
2025	-	391	237	96	-	37.0	2.9	3.0

Table 17R-40.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	25.6	0.3	47.4	4.7	2.1	41.8
2021	36.6	0.1	47.0	2.3	3.7	19.1
2025	28.8	0.4	34.6	2.7	2.3	44.6

Table 17R-40.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	7	7	6	5
2021	12	14	7	13
2025	2	5	-	5
Year	Days Use Per Acre (ha)			
2018	24.0 (59.2)	10.7 (26.5)	18.7 (46.3)	-
2021	16.7 (41.2)	6.0 (14.9)	10.0 (24.8)	-
2025	6.5 (16.1)	2.0 (5.0)	-	-

Table 17R-40.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum[i] (crested wheatgrass)	Bromus inermis[i] (smooth brome)	Festuca idahoensis (Idaho fescue)	Poa bulbosa[i] (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)
year	Nested Frequency					
2018	395	-	10	-	293	-
2021	224	7	-	293	119	2
2025	340	7	-	277	16	1
year	Average Cover (%)					
2018	33.0	-	0.4	-	6.5	-
2021	5.0	0.0	-	9.0	2.9	0.0
2025	27.9	0.3	-	8.3	0.3	0.1

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

Table 17R-40.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Centaurea virgata[ni] (squarrose knapweed)	Chenopodium atrovirens[a] (pinyon goosefoot)	Descurainia pinnata[a] (western tansymustard)	Eriogonum racemosum (redroot buckwheat)	Erodium cicutarium[ai] (redstem stork's bill)	Lathyrus brachycalyx (Bonneville pea)	Linum perenne[i] (blue flax)	Medicago sativa[i] (alfalfa)	Oenothera (evening primrose)	Phlox longifolia (longleaf phlox)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
2018	105	-	-	-	-	-	1	-	9	-	67	-	-	-	-	-	-
2021	-	2	6	2	-	-	-	-	-	-	54	-	-	-	-	-	-
2025	230	-	3	-	8	1	-	9	-	7	73	3	7	1	4	2	8
year	Average Cover (%)																
2018	0.4	-	-	-	-	-	0.0	-	0.3	-	1.4	-	-	-	-	-	-
2021	-	0.0	0.1	0.0	-	-	-	-	-	-	1.5	-	-	-	-	-	-
2025	2.8	-	0.0	-	0.0	0.0	-	0.1	-	0.1	2.7	0.0	0.0	0.0	0.1	0.0	0.1

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

FORB SPECIES	Tragopogon dubius[ai] (yellow salsify)
year	Nested
2018	-
2021	-
2025	1
year	Average Cover (%)
2018	-
2021	-
2025	0.0

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

Table 17R-40.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata[p] (winterfat)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)				
2018	-	-	0.5	0.1	0.3
2021	0.7	-	-	-	-
2025	0.4	0.5	2.1	-	-
year	Quadrat Cover (%)				
2018	-	-	0.0	0.1	0.0
2021	1.2	0.1	0.2	-	-
2025	1.4	0.3	2.5	-	0.0

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

Table 17R-40.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2018	20	-	0	0	100	0	0	100	36/46
2021	540	-	44	37	19	0	0	22	- / -
2025	1000	100	48	48	4	2	0	26	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2018	-	-	-	-	-	-	-	-	-/-
2021	60	-	100	0	0	0	0	0	- / -
2025	100	-	40	60	0	0	0	0	- / -

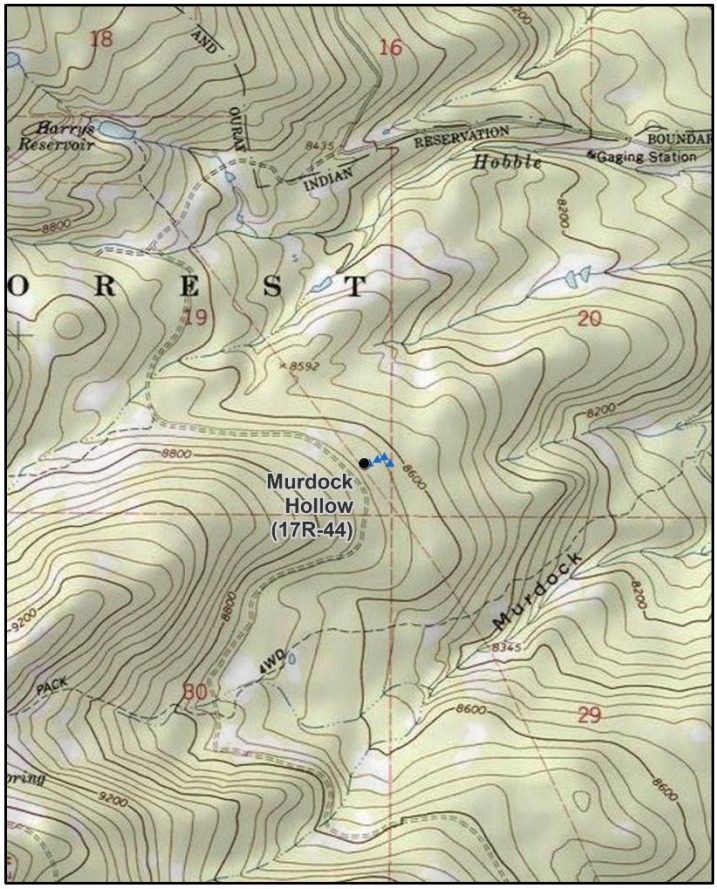
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Gutierrezia sarothrae -- (broom snakeweed)									
2018	380	-	11	79	11	0	0	53	23/27
2021	80	-	0	100	0	0	0	0	- / -
2025	2380	-	0	98	3	0	0	34	- / -
Krascheninnikovia lanata[p] -- (winterfat)									
2018	100	-	0	100	0	0	0	0	20/28
2021	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
2018	80	-	0	100	0	0	0	0	15/44
2021	-	-	-	-	-	-	-	-	-/-
2025	20	-	0	100	0	0	0	0	- / -

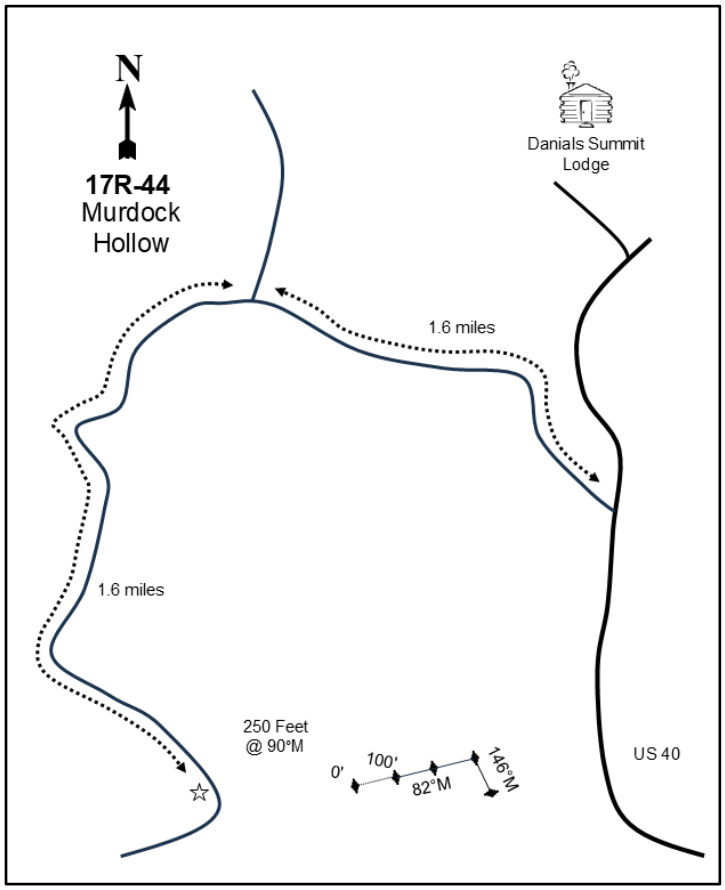
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 17R-40.15 - Deer Desirable Components Index: Mountain Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2018	0.1	0.0	0.0	30.0	0.0	3.6	0.0	**33.7**	Very Poor
2021	0.9	0.0	0.0	15.8	0.0	3.1	-2.0	**17.8**	Very Poor
2025	1.1	0.0	0.0	30.0	0.0	6.1	0.0	**37.2**	Very Poor

MURDOCK HOLLOW - STUDY NO. 17R-44





Location Information

USGS 7.5 min Map Info	Twin Peaks SE; Township 2S, Range 12W, Section 19
GPS (0' Stake)	NAD 83 UTM ZONE 12, 476556 East 4459637 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	118° magnetic (Line 4: 65° 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

Traveling southeast on US-40 near Daniels Pass, turn right (west) onto East Main Canyon Road. Follow E Main Canyon Road for 1.6 miles to a fork with Murdoch Bench Road. Proceed left at the fork onto Murdoch Bench Road, then continue on this road for approximately 0.6 miles to another fork. Stay left at this fork, drive for roughly 1.07 miles, and park on the side of the road; there is no witness post. There are no stakes or rebar markers, so use a GPS to navigate approximately 250 feet northwest of the road to the transect.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	WEST DANIELS
Elevation	8,680ft (2,646m)
Aspect	North
Slope	5%
Sample Dates	08/05/2025

Table 17R-44.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed	Strawberry Ridge Watershed Restoration FY26 (3 year project) (Proposed)	7360	Fall 2025	272
Hand Crew - Lop and Pile	Strawberry Ridge Watershed Restoration FY26 (3 year project) (Proposed)	7360	Fall 2025	272

Wildlife Habitat and Vegetation History

Table 17R-44.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer
Rocky Mountain Elk	crucial	spring/fall
Shiras Moose	crucial	spring/fall

Table 17R-44.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2025	White Fir/Quaking Aspen	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	33 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	F047XA508UT
States and Transitions	2025 - Current Potential State: Community Phase Undefined

Upon study establishment in 2025, the plant community on this site was dominated by subalpine fir (*Abies lasiocarpa*) with quaking aspen (*Populus tremuloides*) as a subordinate component. Preferred browse species of interest included Utah serviceberry (*Amelanchier utahensis*), Woods' rose (*Rosa woodsii*), and mountain snowberry (*Symphoricarpos oreophilus*); these species were comprised of small populations of mature and young individuals (Table 17R-44.4, Table 17R-44.12, Table 17R-44.13, Table 17R-44.13a, Table 17R-44.14). The herbaceous understory was largely sparse in both diversity and abundance, but native perennial forbs contributed a majority of what herbaceous cover was present (Table 17R-44.7, Table 17R-44.10, Table 17R-44.11). Without the occurrence of a major tree-removing disturbance this site would likely continue to exist as a subalpine fir community with a depauperate understory. However, a lop-pile-burn treatment is scheduled to take place in the fall of 2025 (Table 17R-44.1): this will likely remove most of the trees and amplify and diversify the shrub and herbaceous components with the intention to improve summer habitat for wildlife.

As of 2025, the understory on this study site lacks the needed abundance and/or cover needed to provide adequate forage for summering mule deer. Pellet transect data indicates that deer and elk presence was low in 2025. Furthermore, the area had very few occurrences of nearby collared mule deer during the 2024/25 winter season (Wildlife Migration Initiative). Quaking aspen density showed that much of the population was comprised of young trees with 22% of plants sampled in density strips receiving moderate hedging (Photos, Table 17R-44.9, Table 17R-44.10, Table 17R-44.11, Table 17R-44.13). On-site observations stated that there was little to no utilization of the herbaceous community during the most recent sample year (2025).

Trend Summary Tables

Table 17R-44.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2025	0.3	-	32.5	0.7	-	93.8

Table 17R-44.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2025	-	42	-	196	-	0.4	-	6.5

Table 17R-44.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2025	3.1	0.1	87.0	0.2	0.5	34.8

Table 17R-44.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2025	1	1	25
Year	Days Use Per Acre (ha)		
2025	1.3 (3.3)	-	-

Table 17R-44.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Carex rossii (Ross' sedge)	Elymus glaucus (blue wildrye)	Poa pratensis[i] (Kentucky bluegrass)
year	Nested Frequency		
2025	9	34	3
year	Average Cover (%)		
2025	0.0	0.3	0.0

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

Table 17R-44.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Aquilegia coerulea (Colorado blue columbine)	Arnica cordifolia (heartleaf arnica)	Erigeron speciosus (aspen fleabane)	Erythronium grandiflorum (yellow avalanche-lily)	Eucephalus engelmannii (Engelmann's aster)	Geum aleppicum (yellow avens)	Lathyrus lanszwertii (Nevada pea)	Ligusticum porteri (Porter's licorice-root)	Osmorhiza depauperata (bluntseed sweetroot)	Pseudostellaria jamesiana (tuber starwort)	Spiranthes (lady's tresses)	Symphyotrichum (aster)	Thalictrum fendleri (Fendler's meadow-rue)	Viola vallicola (sagebrush violet)
year	Nested Frequency														
2025	9	40	89	5	16	14	2	6	0	120	28	2	4	10	5
year	Average Cover (%)														
2025	0.1	0.2	2.5	0.4	0.1	0.5	0.0	0.0	0.0	1.7	0.3	0.0	0.0	0.5	0.1

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

Table 17R-44.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies lasiocarpa[t] (subalpine fir)	Populus tremuloides[tp] (quaking aspen)	Rosa woodsii[p] (Woods' rose)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)			
2025	77.3	16.5	0.4	0.3
year	Quadrat Cover (%)			
2025	27.3	5.1	0.2	0.1

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

Table 17R-44.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Abies lasiocarpa[t] -- (subalpine fir)									
2025	4420	1220	55	42	3	0	0	3	- / -
Amelanchier utahensis[p] -- (Utah serviceberry)									
2025	20	-	100	0	0	0	0	0	- / -
Rosa woodsii[p] -- (Woods' rose)									
2025	160	-	0	100	0	25	0	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2025	200	-	20	80	0	10	0	0	- / -

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

Table 17R-44.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

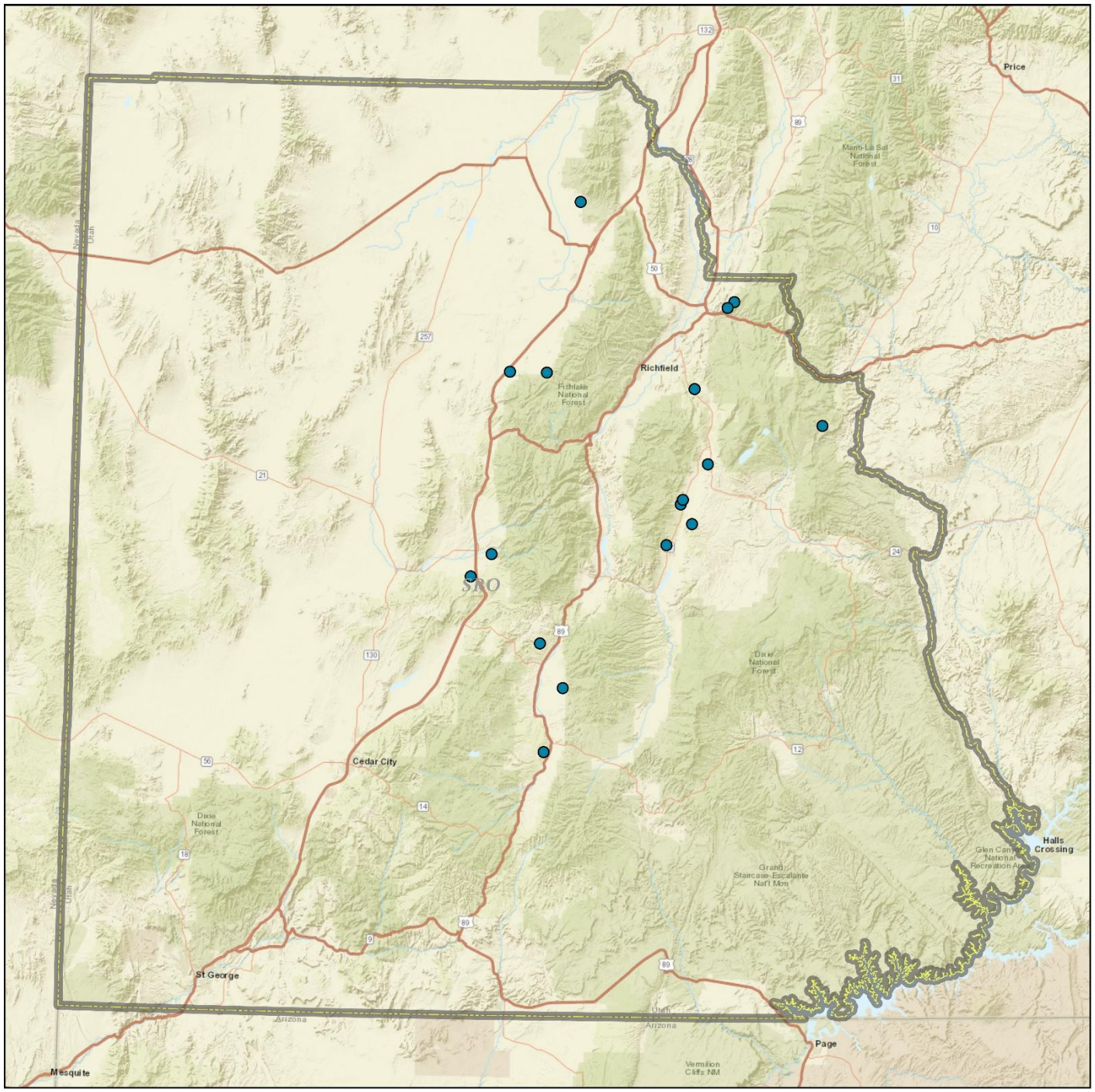
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2025	2140	52	34	5	9	22	6	2

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 17R-44.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Abies lasiocarpa (subalpine fir)							
2025	1314	-	25	10	5	60	12.8
Populus tremuloides (quaking aspen)							
2025	533	25	55	5	-	15	6.0

SOUTHERN REGION



0 5 10 20 30 40 50 60 70 80 Miles

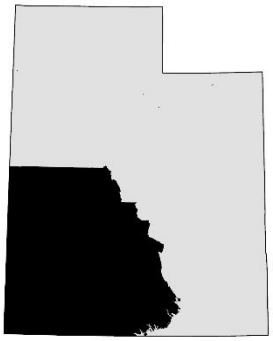
Study Locations

- SRO WRI Study Sites

Administrative Boundaries

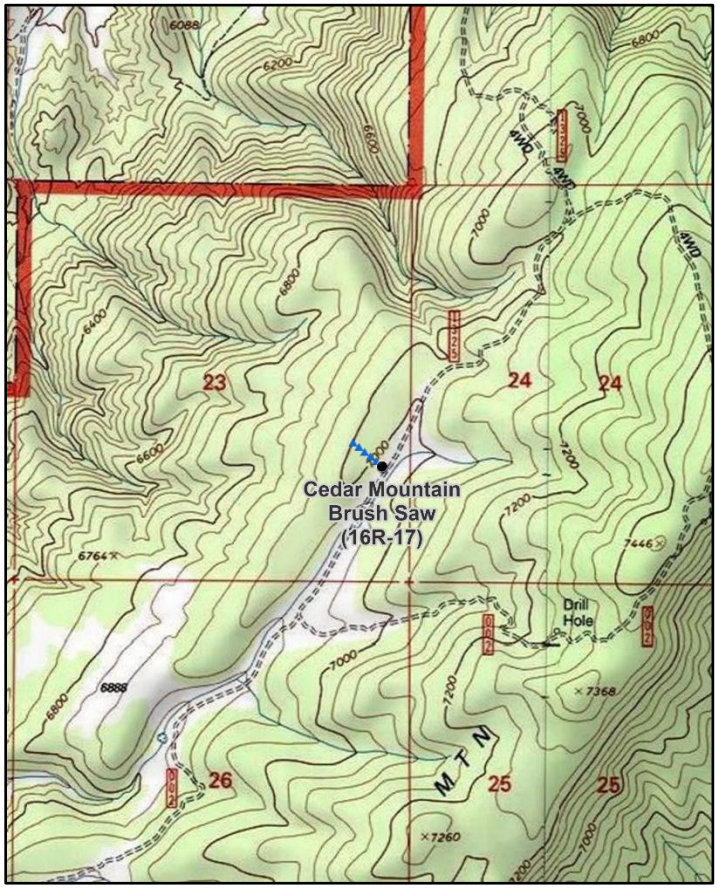
- Southern Region

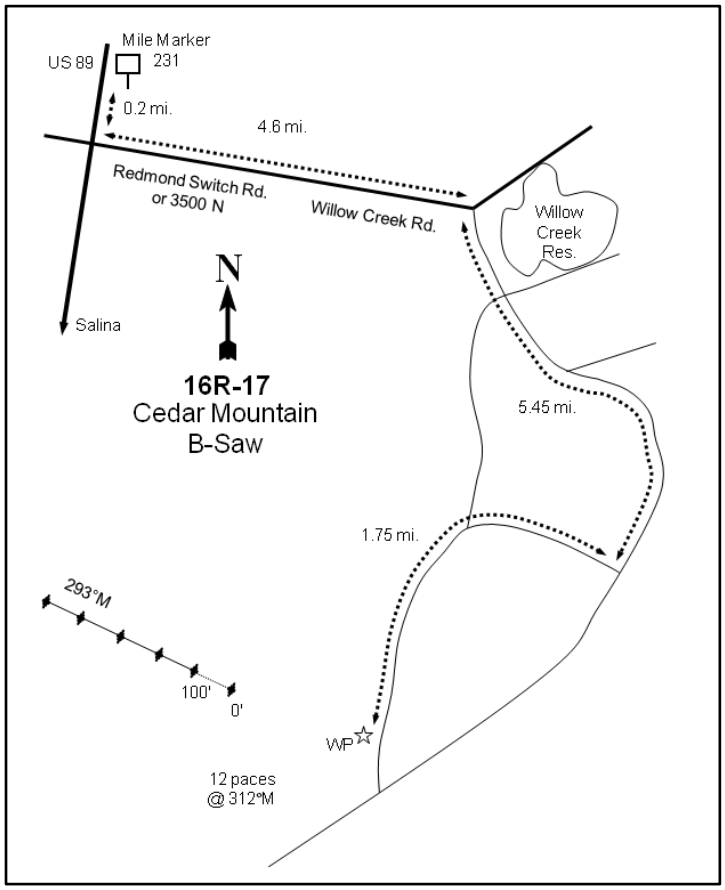
Area of Interest



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, 05/29/2025

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 - Bullhog	-	-	Between 2008 and 2013	-
Seeding - Seed Unknown	-	-	1970s	-

Wildlife Habitat and Vegetation History

Table 16R-17.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	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
2025	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	2005-2008 - State Undefined: Community Phase Undefined 2013-2025 - State Undefined: Community Phase Undefined

When the study was established in 2005, this site 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 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 moderate as of 2025, 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 co-dominant vegetation component since 2008. Forbs have provided little cover in most sample years, although the weedy annual species desert madwort (*Alyssum desertorum*) and curveseed butterwort (*Ceratocephala testiculata*) contributed moderate cover in 2025 (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 2025. 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 (*Bromus tectorum*) (Table 16R-17.6, Table 16R-17.7, Table 16R-17.10, Table 16R-17.15). Pellet transect data shows that mule deer presence has ranged from low to high over the sample period, but it was considered to be low in 2025. Elk presence has had similar variation, but presence was considered to be moderate during the most recent sample year (Table 16R-17.9). During the 2024/25 winter season the site had common occurrences of collared elk (Wildlife Migration Initiative). Black sagebrush and oak utilization has been light in most sample years (Table 16R-17.9, Table 16R-17.13). On-site observations for 2025 noted that there was little to no utilization of herbaceous species.

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
2025	9.2	0.5	9.0	12.3	0.3	12.0

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
2025	42	314	327	48	0.2	23.9	7.6	1.1

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
2025	12.5	-	46.8	12.7	10.4	44.5

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
2025	9	7	6
Year	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)	-
2025	2.7 (6.6)	20.8 (51.3)	-

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
2025	7	113	2	42	-	14	15	252
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
2025	0.5	7.9	0.0	0.2	-	0.3	0.7	14.5

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	Agoseris glauca (pale agoseris)	Alyssum alyssoides[ai] (pale madwort)	Alyssum desertorum[ai] (desert madwort)	Arenaria (sandwort)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Carduus nutans[ani] (nodding plumeless thistle)	Caulanthus crassicaulis[a] (thickstem wild cabbage)	Ceratocephala testiculata[ai] (curveseed 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)
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
2013	-	-	248	5	-	-	5	-	19	-	11	3	-	3	8	5	-
2018	-	-	273	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2023	-	-	227	2	-	-	-	-	-	-	7	-	-	-	-	-	1
2025	1	0	279	2	1	1	-	-	-	-	254	-	-	27	-	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
2013	-	-	1.4	0.0	-	-	0.0	-	0.2	-	0.0	0.0	-	0.0	0.0	0.0	-
2018	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2023	-	-	0.9	0.0	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0
2025	0.0	0.0	3.7	0.0	0.0	0.0	-	-	-	-	3.5	-	-	0.1	-	0.2	-

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

FORB SPECIES	Lomatium (desertparsley)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa[i] (alfalfa)	Microsteris gracilis[a] (slender phlox)	Penstemon humilis (low beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Tragopogon dubius[ai] (yellow salsify)	Trifolium (clover)	Veronica biloba[ai] (twolobe speedwell)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency										
2005	-	-	-	41	-	1	4	-	1	1	-
2008	17	-	-	51	-	12	3	-	1	5	2
2013	-	-	-	25	-	9	4	6	-	3	-
2018	-	-	1	-	-	7	-	-	-	-	-
2023	6	3	-	-	3	6	3	-	-	-	-
2025	28	5	-	22	6	4	5	-	1	9	-
year	Average Cover (%)										
2005	-	-	-	0.2	-	0.0	0.1	-	0.0	0.0	-
2008	0.1	-	-	0.2	-	0.2	0.0	-	0.0	0.0	0.0
2013	-	-	-	0.1	-	0.1	0.0	0.0	-	0.0	-
2018	-	-	0.0	-	-	0.2	-	-	-	-	-
2023	0.0	0.0	-	-	0.0	0.1	0.0	-	-	-	-
2025	0.7	0.0	-	0.1	0.1	0.0	0.0	-	0.0	0.2	-

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	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus depressus[p] (longflower rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (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
2025	-	3.2	0.6	-	0.3	3.9	8.1	0.1	8.4	-
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
2025	-	2.2	1.0	0.1	0.5	3.7	5.3	0.4	5.2	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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[P] -- (Utah serviceberry)									
2005	20	-	0	100	0	0	100	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
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	- / -
2025	580	-	59	38	3	0	0	10	- / -
Artemisia tridentata ssp. vaseyana[P] -- (mountain big sagebrush)									
2005	-	-	-	-	-	-	-	-	49/70
2008	-	-	-	-	-	-	-	-	51/86
2013	-	-	-	-	-	-	-	-	56/107
2018	-	-	-	-	-	-	-	-	44/79
2023	-	-	-	-	-	-	-	-	-/-
2025	80	60	75	25	0	0	0	75	- / -
Cercocarpus montanus[P] -- (alderleaf mountain mahogany)									
2005	-	-	-	-	-	-	-	-	34/47
2008	-	-	-	-	-	-	-	-	36/40
2013	-	-	-	-	-	-	-	-	47/51
2018	-	-	-	-	-	-	-	-	45/50
2023	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
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	- / -
2025	20	-	0	100	0	0	0	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	- / -
2025	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	48/34
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	56/47
2023	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
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	- / -
2025	1840	-	26	73	1	0	0	1	- / -
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	- / -
2025	80	-	25	75	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	- / -
2025	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	- / -
2025	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	- / -
2025	1080	40	20	78	2	0	0	2	- / -
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	- / -
2025	40	-	50	50	0	0	0	0	- / -

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

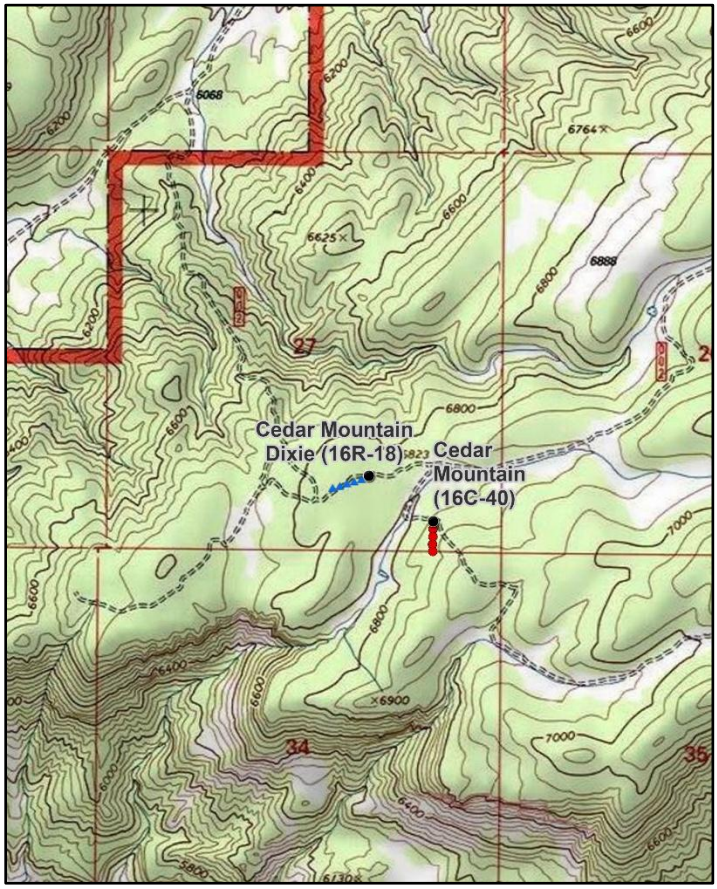
Table 16R-17.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

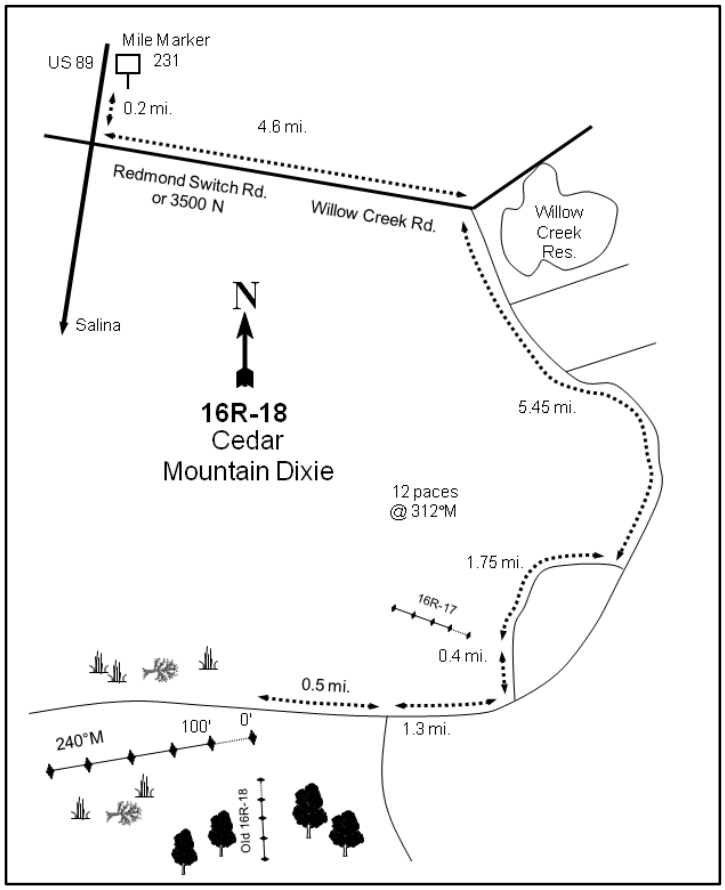
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	117	-	15	45	40	-	13.7
2013	49	13	60	27	-	-	3.9
2018	52	13	44	38	6	-	5.4
2023	68	18	12	71	-	-	6.7
2025	64	6	24	65	6	-	7.8
Pinus 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	**60.9**	Fair
2023	13.0	14.4	15.0	30.0	-0.3	0.3	0.0	**72.4**	Good
2025	13.3	14.3	15.0	30.0	-0.1	2.1	0.0	**74.6**	Good

CEDAR MOUNTAIN DIXIE - STUDY NO. 16R-18





Location Information

USGS 7.5 min Map Info	Salina NE; Township 21S, Range 1E, Section 27
GPS (0' Stake)	NAD 83 UTM ZONE 12, 432256 East 4311372 North

Transect Information

Browse Tag # (0' Stake)	89
Transect Bearing	240° 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 5.5 miles to a road to the right (north). Turn right and drive 1.7 miles to the witness post of 16R-17 (Cedar Mountain Brush Saw) 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	Federal
Land Administrator	USFS
Allotment	North Post Mountain Allo
Elevation	6,830ft (2,082m)
Aspect	Southwest
Slope	0-3%
Sample Dates	08/04/2005, 06/18/2008, 07/02/2013, 08/01/2018, 08/28/2023, 05/29/2025

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	Fall 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	Bromus marginatus	Mountain Brome	Bromar	0.13	0.00
G	Bromus marginatus	Mountain Brome	Bromar	1.88	0.00
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	2.00	0.00
G	Elymus trachycaulus	Slender Wheatgrass	Pryor	1.45	0.00
G	Elymus trachycaulus	Slender Wheatgrass		0.56	0.00
F	Linum perenne	Blue Flax		0.88	0.00
F	Medicago sativa	Alfalfa	Nomad	1.00	0.00
F	Onobrychis viciifolia	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	Early Phase I
2018	Perennial Grass	Early Phase I
2023	Perennial Grass	Early Phase I
2025	Perennial Grass	Early 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	2005-2008 - State Undefined: Community Phase Undefined 2013-2025 - Current Potential State: Community Phase 2.3

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 very 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*) and/or smooth brome (*Bromus inermis*), throughout the duration of the study. Perennial grasses have been a (co-)dominant site component in all sample years, with cover exhibiting an increase following theharrow 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-18.12, Table 16R-18.14).

Condition of mule deer winter range on this site has remained very poor since 2005. Factors negatively influencing range condition are a lack of preferred browse and perennial forb cover, and the presence of cheatgrass (*Bromus tectorum*) (Table 16R-18.6, Table 16R-18.7, Table 16R-18.10, Table 16R-18.15). Pellet transect data shows that deer presence was high in 2018, but presence has been low in most sample years. However, elk presence has been moderate in most sample years. During the 2024/25 winter season the site had common occurrences of collared elk (Wildlife Migration Initiative). Preferred browse has remained severely limited on this site, so any utilization estimations have been skewed due to few individuals representing the population. Therefore, the majority of utilization by wildlife is likely focused on the herbaceous community (Table 16R-18.9, Table 16R-18.13). On-site observations in 2025 noted that there was little to no utilization of the herbaceous community. These observations also noted that primary production was good as indicated by good flower and seed production, and that there was lush green growth of both herbaceous and browse species (Photos).

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
2025	1.0	-	0.8	-	-	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
2025	26	403	412	33	0.2	40.8	14.4	0.7

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
2025	15.7	0.0	37.7	10.0	1.8	51.7

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
2025	-	4	32	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)	-
2025	-	0.7 (1.7)	33.5 (82.8)	-

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
2025	3	73	132	26	36	-	36	-	-	341
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
2025	0.1	3.7	11.1	0.2	1.4	-	0.8	-	-	23.8

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 convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Ceratocephala testiculata[ai] (curveseed 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)	Lewisia rediviva (bitter root)	Lomatium (desertparsley)	Microsteris gracilis[a] (slender phlox)	Nicotiana[a] (tobacco)	Phlox austromontana (mountain phlox)
year	Nested Frequency																
2005	-	336	-	-	-	254	-	38	-	-	-	-	-	-	2	-	11
2008	8	286	3	-	1	83	3	-	-	2	-	1	-	6	1	-	14
2013	2	322	-	-	4	69	-	1	1	-	8	-	-	2	9	-	14
2018	-	285	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
2023	-	324	-	-	-	79	-	3	-	-	-	-	-	-	-	-	4
2025	3	374	-	5	-	318	-	9	-	-	-	-	2	11	-	2	5
year	Average Cover (%)																
2005	-	4.7	-	-	-	3.9	-	0.5	-	-	-	-	-	-	0.0	-	0.3
2008	0.0	1.6	0.0	-	0.0	0.3	0.0	-	-	0.0	-	0.0	-	0.1	0.0	-	0.2
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
2025	0.0	7.6	-	0.1	-	6.6	-	0.2	-	-	-	-	0.0	0.2	-	0.0	0.2

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

FORB SPECIES	Tragopogon dubius[ai] (yellow salsify)	Trifolium gymnocarpon (hollyleaf clover)
year	Nested	
2005	-	3
2008	-	10
2013	-	-
2018	-	-
2023	5	-
2025	-	10
year	Average Cover (%)	
2005	-	0.0
2008	-	0.1
2013	-	-
2018	-	-
2023	0.0	-
2025	-	0.2

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	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Juniperus osteosperma[t] (Utah juniper)	Pinus edulis[t] (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	-
2025	-	-	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	-
2025	1.0	-	0.8	-

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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
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	- / -
2025	40	-	0	100	0	50	50	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	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Ephedra viridis[P] -- (mormon tea)									
2005	-	-	-	-	-	-	-	-	65/69
2008	-	-	-	-	-	-	-	-	59/85
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	83/85
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	94/130
2023	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	34/41
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	22/37
2023	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma[t] -- (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	- / -
2025	20	-	0	100	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2005	80	-	0	100	0	0	0	0	- / -
2008	60	20	0	100	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
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

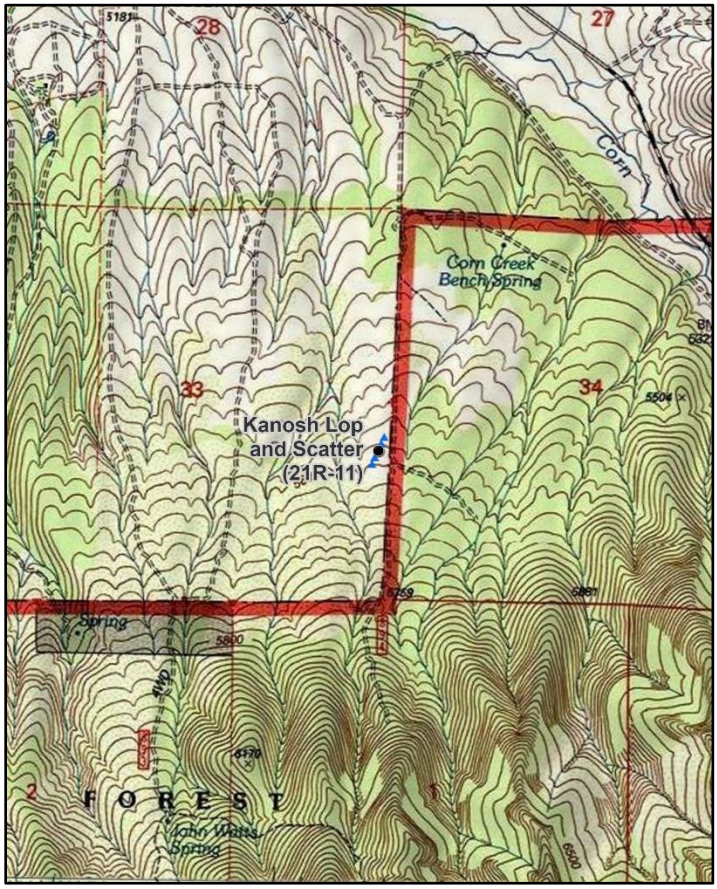
Table 16R-18.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

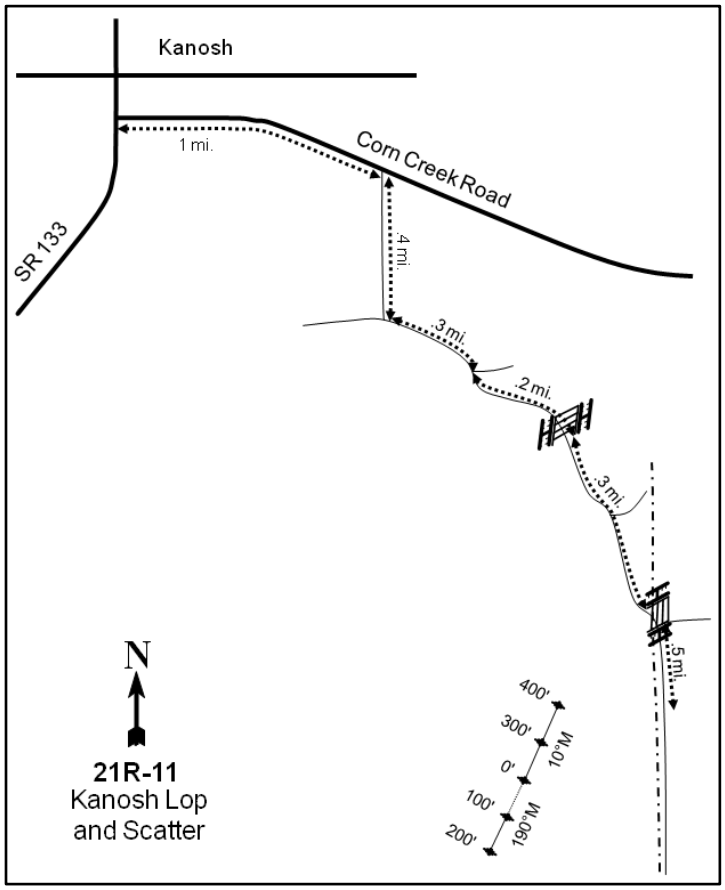
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	144	5	5	68	21	-	12.6
2013	36	13	87	-	-	-	4.7
2018	33	6	56	38	-	-	16.3
2023	39	-	35	59	6	-	16.6
2025	39	-	19	75	6	-	8.4
Pinus 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	**30.9**	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	**30.8**	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	**30.0**	Very Poor
2025	0.0	0.0	0.0	30.0	-0.1	1.3	0.0	**31.2**	Very Poor

KANOSH LOP AND SCATTER - STUDY NO. 21R-11





Location Information	
USGS 7.5 min Map Info	Kanosh SE; Township 23S, Range 5W, Section 33
GPS (0' Stake)	NAD 83 UTM ZONE 12, 377260 East 4291728 North

Transect Information	
Browse Tag # (0' Stake)	Not Available
Transect Bearing	190° magnetic (Lines 3-4: 10° magnetic)
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

From Main Street in Kanosh, turn onto 300 South and drive 1.0 mile to a road on the right (south). Turn right and follow this road 0.4 miles to where the road turns sharply to the left. From this point, drive 0.3 miles to a fork and stay right. Drive on the main road for 0.2 miles to a gate. Continue driving straight along a fenceline for 0.3 miles to another gate. Turn right and drive 0.5 miles to the site on the right (west) side of the road. There is no witness post or browse tag; use a GPS unit to locate the 0-foot stake.

Site Information	
Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,600ft (1,707m)
Aspect	Northwest
Slope	13%
Sample Dates	08/27/2008, 06/22/2011, 08/11/2014, 08/01/2019, 08/11/2025

Table 21R-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1960s	-
Seeding - Seed Unknown	-	-	1960s	-
Hand Crew - Lop and Scatter	Fillmore WMA Juniper thinning	408	Fall 2008	575

Wildlife Habitat and Vegetation History

Table 21R-11.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 21R-11.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Juniper/Mountain Big Sagebrush	Phase I transitioning to Phase II
2011	Mountain Big Sagebrush/Bitterbrush	Early Phase I
2014	Mountain Big Sagebrush/Bitterbrush	Early Phase I
2019	Mountain Big Sagebrush/Bitterbrush	Phase I
2025	Mountain Big Sagebrush/Bitterbrush	Phase I

Site Notes

The study was established to monitor a lop and scatter treatment on the Kanosh (Corn Creek) Unit within the Fillmore Wildlife Management Area (WMA) complex. Part of the study transect was not treated, and untreated sample transects were moved within the treated portion of the project area in 2011.

Site Potential

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Upland Stony Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY334UT
States and Transitions	2008 - Tree State: Community Phase 4.1 2011-2025 - Shrub State: Community Phase 3.1

Upon study establishment in 2008, the plant community on this site existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) stand that was being encroached by Utah juniper (*Juniperus osteosperma*). However, a lop and scatter treatment occurred in the fall of 2008 that removed most of the juniper trees (Table 21R-11.1). The herbaceous understory has been dominated by perennial grasses and/or annual grasses in all sample years (Table 21R-11.7). Perennial grasses have been comprised of a mixture of introduced and native species with crested wheatgrass (*Agropyron cristatum*), Sandberg bluegrass (*Poa secunda*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) as some of the most common species in many sample years, although intermediate wheatgrass (*Thinopyrum intermedium*) and bulbous bluegrass (*Poa bulbosa*) had notable increases in cover in 2025 (Table 21R-11.10). Annual grasses have fluctuated, but they had high amounts of cover during the 2011 and 2019 sample years (Table 21R-11.10). Forbs have generally remained depleted and have not provided consistent cover. The exception to this, however, is the introduced annual species desert madwort (*Alyssum desertorum*) which has displayed consistent, elevated cover and frequency (Table 21R-11.11). Mountain big sagebrush and bitterbrush have shown moderate increases in cover following the lop and scatter treatment. Utah juniper has been present in density measurements in all sample years despite treatment, although it has not been sampled in cover measurements until 2025 (Table 21R-11.12, Table 21R-11.13, Table 21R-11.14).

This site's condition as mule deer winter range has ranged between poor and good since 2008; winter range condition was considered to be good in 2025. Factors that negatively influence condition as deer winter range include reduced preferred browse recruitment, reduced perennial forb cover, and the presence of annual grass (Table 21R-11.7, Table 21R-11.13, Table 21R-11.15). According to pellet transect data deer presence has been high but decreasing over time. During the 2024/25 winter season the area had frequent occurrences of collared mule deer (Wildlife Migration Initiative). Elk presence has ranged between absent and moderate, although presence was low in most sample years (Table 21R-11.9). In 2014, over 70% of sagebrush plants sampled in density strips showed signs of moderate to heavy use, but utilization was considered mostly light in 2019 and 2025. Bitterbrush has been well-utilized since study establishment, but it was heaviest in 2019 with 96% of the population being moderately to heavily used (Table 21R-11.13). On-site observations state that there was little to no utilization of the perennial grass and forb communities during the most recent sample year (2025). The herbaceous and preferred browse communities appeared to be adversely affected by drought as seen on stressed, chlorotic leaves (Photos). Prolonged exposure to heavy utilization in combination with drought could reduce the long term utility of the site for wildlife.

Trend Summary Tables

Table 21R-11.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	16.8	0.3	7.9	24.7	0.1	19.3
2011	25.9	0.4	-	45.2	0.1	-
2014	21.5	0.4	-	35.4	0.7	-
2019	24.8	0.3	-	36.5	0.3	-
2025	26.6	-	-	32.0	-	-

Table 21R-11.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	310	255	127	63	4.2	7.2	0.4	2.1
2011	394	347	334	85	15.6	16.8	7.1	1.4
2014	266	310	208	25	6.6	13.8	2.6	0.4
2019	461	250	302	26	47.1	9.8	7.9	0.2
2025	176	413	335	66	5.3	31.9	8.6	1.3

Table 21R-11.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	11.7	1.2	57.9	6.1	3.9	42.2
2011	4.9	1.1	51.9	2.3	3.0	60.6
2014	5.2	0.3	61.9	2.4	2.2	51.2
2019	1.3	0.3	73.6	1.1	1.6	74.0
2025	7.6	0.3	37.5	2.3	1.9	57.6

Table 21R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Dusky Grouse	Rocky Mountain Elk	Rabbit
	Quadrat Frequency					
2008	-	-	44	-	1	30
2011	-	-	31	-	7	4
2014	-	-	45	1	2	10
2019	-	-	25	-	1	2
2025	-	-	24	-	-	20
Year	Days Use Per Acre (ha)					
2008	-	8.7 (21.5)*	206.4 (509.8)	-	0.7 (1.7)	-
2011	2.2 (5.4)	-	140.1 (346.0)	-	24.1 (59.6)	-
2014	-	-	146.8 (362.5)	-	0.7 (1.7)	-
2019	-	-	60.3 (149.0)	-	2.0 (5.0)	-
2025	-	-	50.2 (124.1)	-	-	-

*Pellets per acre (ha)

Table 21R-11.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum[i] (crested wheatgrass)	Bromus arvensis[ai] (field brome)	Bromus inermis[i] (smooth brome)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa[i] (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency										
2008	24	-	-	310	77	22	-	-	157	14	22
2011	57	57	3	365	92	-	5	22	201	81	20
2014	74	86	-	240	69	-	6	6	134	93	15
2019	91	110	3	449	34	6	-	54	48	53	25
2025	103	140	3	36	67	19	-	212	83	40	84
year	Average Cover (%)										
2008	1.0	-	-	4.2	1.3	0.1	-	-	2.5	0.9	1.4
2011	3.7	2.0	0.0	13.6	3.8	-	0.1	0.3	4.3	3.4	1.1
2014	3.6	1.6	-	5.1	1.8	-	0.0	0.1	3.5	4.6	0.2
2019	4.0	4.7	0.0	42.4	0.4	0.0	-	0.8	0.6	2.0	1.9
2025	10.0	3.9	0.0	1.4	1.5	0.2	-	9.1	2.0	2.7	6.3

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

Table 21R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum[ai] (desert madwort)	Antennaria (pussytoes)	Arenaria (sandwort)	Astragalus (milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata[ai] (curveseed butterwort)	Claytonia perfoliata ssp. perfoliata (miner's lettuce)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cymopterus (springparsley)	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)
year	Nested Frequency																
2008	-	-	104	-	20	10	-	-	10	-	12	-	-	-	1	5	-
2011	2	1	264	1	-	5	-	27	5	10	79	-	9	8	3	1	15
2014	-	-	198	-	-	-	-	8	-	-	5	-	-	-	-	1	29
2019	-	-	291	-	-	-	-	14	-	-	4	-	9	-	-	1	3
2025	12	1	272	1	-	-	0	26	23	-	146	3	41	-	-	-	-
year	Average Cover (%)																
2008	-	-	0.3	-	1.6	0.2	-	-	0.0	-	0.0	-	-	-	0.0	0.0	-
2011	0.0	0.0	4.4	0.0	-	0.0	-	0.1	0.0	0.1	0.9	-	0.0	0.0	0.0	0.0	0.1
2014	-	-	2.2	-	-	-	-	0.0	-	-	0.0	-	-	-	-	0.0	0.3
2019	-	-	7.4	-	-	-	-	0.1	-	-	0.0	-	0.1	-	-	0.0	0.0
2025	0.0	0.0	5.0	0.0	-	-	0.0	0.1	0.1	-	1.6	0.0	0.4	-	-	-	-

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

FORB SPECIES	Galium aparine[a] (stickywilly)	Lactuca serriola[ai] (prickly lettuce)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stoneseed)	Microsteris gracilis[a] (slender phlox)	Orogenia linearifolia (Great Basin Indian potato)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Silene antirrhina[a] (sleepy silene)	unknown annual forb[a] (unknown forb)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency										
2008	-	-	-	2	5	-	15	8	-	-	16
2011	33	50	22	1	1	6	14	-	82	3	8
2014	10	3	11	1	1	-	3	-	-	-	1
2019	11	-	4	2	-	-	1	-	8	-	6
2025	26	-	-	1	-	-	13	-	131	-	24
year	Average Cover (%)										
2008	-	-	-	0.0	0.0	-	0.1	0.0	-	-	0.2
2011	0.9	0.3	0.2	0.4	0.0	0.0	0.2	-	0.3	0.0	0.3
2014	0.1	0.0	0.1	0.1	0.0	-	0.0	-	-	-	0.0
2019	0.4	-	0.0	0.0	-	-	0.0	-	0.0	-	0.0
2025	0.3	-	-	0.1	-	-	0.2	-	1.2	-	0.8

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

Table 21R-11.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Purshia stansburiana[p] (Stansbury cliffrose)	Purshia tridentata[p] (antelope bitterbrush)	Quercus gambelii[p] (Gambel oak)	Rhus trilobata var. trilobata[p] (skunkbush sumac)	Ribes[p] (currant)
year	Line Intercept Cover (%)							
2008	10.5	0.1	19.3	-	10.4	2.2	1.1	0.5
2011	20	0.1	-	-	22.2	-	3	-
2014	15.3	0.7	-	-	18.7	-	1.4	-
2019	15.2	0.3	-	-	19.9	-	1.4	-
2025	14.2	-	-	-	17.5	0.3	-	-
year	Quadrat Cover (%)							
2008	8.4	0.3	7.9	-	6.5	0.5	1.0	0.4
2011	15.0	0.4	-	-	9.5	-	1.4	-
2014	12.6	0.4	-	-	7.4	-	1.5	-
2019	12.3	0.3	-	0.0	11.2	-	1.3	-
2025	15.3	-	-	-	11.3	0.0	-	-

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

Table 21R-11.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[P] -- (mountain big sagebrush)									
2008	1580	-	0	34	66	13	4	49	58/86
2011	2240	80	3	75	22	49	5	5	93/107
2014	2580	-	6	78	16	61	17	23	67/108
2019	2240	-	11	68	21	38	5	22	70/93
2025	1960	-	3	67	30	32	0	30	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	-	-	-	-	-	-	-	-	26/49
2011	-	-	-	-	-	-	-	-	27/58
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	57/116
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2008	160	-	0	75	25	0	0	13	24/31
2011	220	120	36	64	0	0	0	0	26/30
2014	640	-	0	100	0	41	0	0	25/37
2019	280	-	0	100	0	0	0	0	26/29
2025	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma[t] -- (Utah juniper)									
2008	180	20	0	100	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	20	0	0	0	0	0	0	- / -
2025	40	-	100	0	0	0	0	0	- / -
Purshia stansburiana[P] -- (Stansbury cliffrose)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	205/220
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	229/236
2025	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[P] -- (antelope bitterbrush)									
2008	560	-	0	43	57	79	7	54	84/151
2011	740	-	3	78	19	76	3	5	104/171
2014	1140	-	5	90	5	46	42	25	95/151
2019	1040	-	2	87	12	29	67	8	94/159
2025	1200	-	3	75	22	60	15	40	- / -
Quercus gambelii[P] -- (Gambel oak)									
2008	280	-	7	93	0	0	0	0	90/63
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2025	60	-	0	100	0	100	0	0	- / -
Rhus trilobata var. trilobata[P] -- (skunkbush sumac)									
2008	40	-	0	50	50	0	0	50	99/137
2011	20	-	0	100	0	0	0	0	118/228
2014	20	-	0	100	0	0	0	0	133/318
2019	20	-	0	100	0	0	100	0	108/148
2025	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Ribes[p] -- (currant)									
2008	20	-	0	0	100	0	0	0	94/300
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Tetradymia canescens -- (spineless horsebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	48/132

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

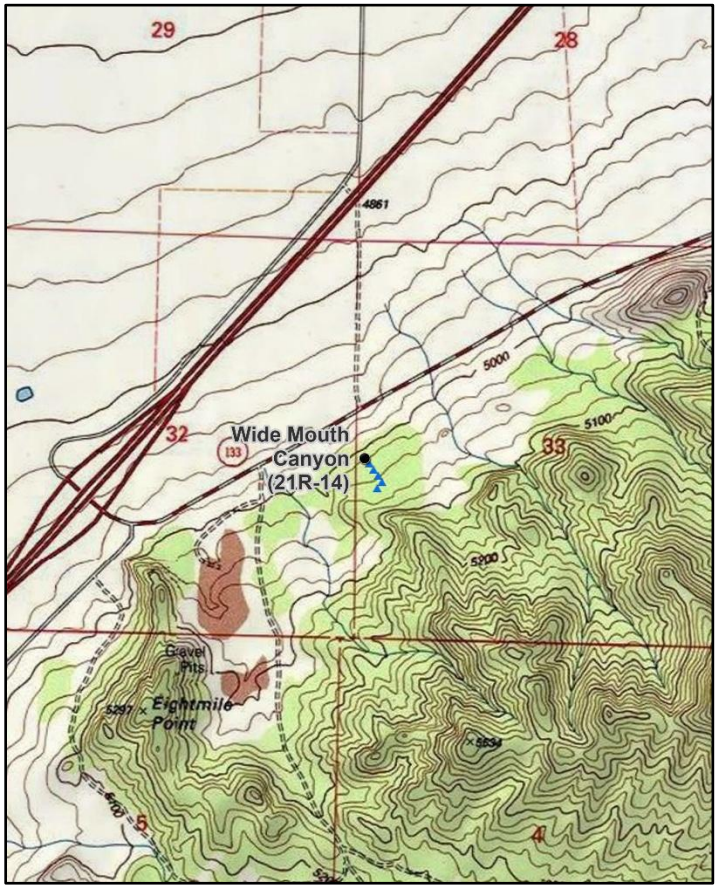
Table 21R-11.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

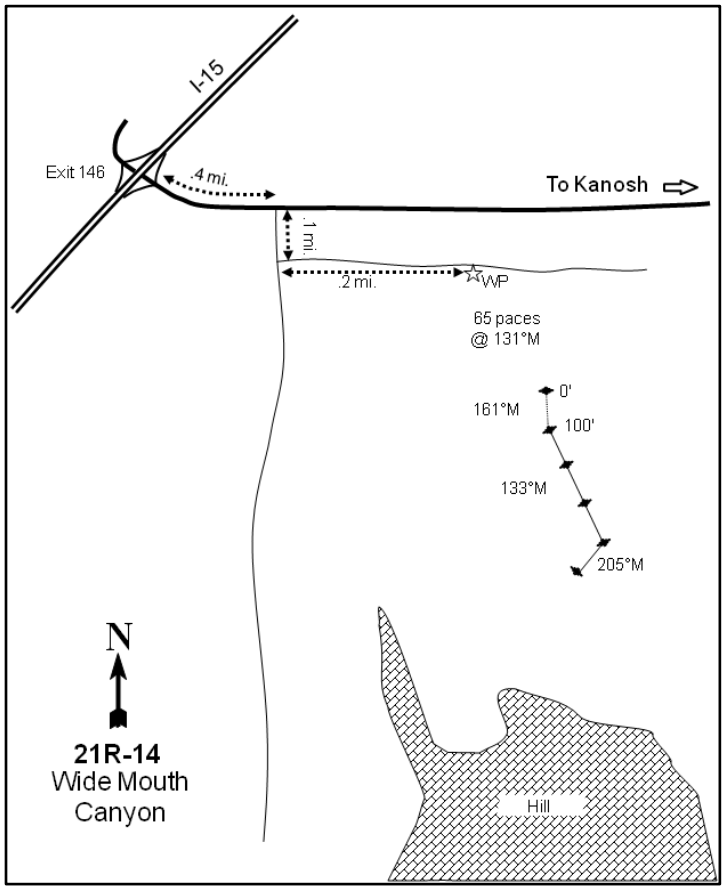
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	220	-	5	30	50	15	13.3
2011	16	14	71	-	14	-	9.4
2014	62	-	33	67	-	-	16.9
2019	40	-	9	36	27	27	15.5
2025	49	-	-	20	60	20	19.7
Juniperus scopulorum (Rocky Mountain juniper)							
2025	1	-	-	100	-	-	12.0

Table 21R-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
2008	30.0	-1.9	0.3	14.3	-3.2	4.3	0.0	**43.8**	Poor
2011	30.0	9.3	1.3	30.0	-11.7	2.8	0.0	**61.7**	Fair
2014	30.0	12.2	2.7	27.5	-5.0	0.7	0.0	**68.1**	Good
2019	30.0	10.5	2.7	18.0	-20.0	0.3	0.0	**41.5**	Poor
2025	30.0	7.4	1.6	30.0	-3.9	2.6	0.0	**67.7**	Good

WIDE MOUTH CANYON - STUDY NO. 21R-14





Location Information

USGS 7.5 min Map Info	Sixmile Point SE; Township 23S, Range 6W, Section 33
GPS (0' Stake)	NAD 83 UTM ZONE 12, 366026 East 4291976 North

Transect Information

Browse Tag # (0' Stake)	146
Transect Bearing	161° magnetic (Lines 2-4: 133° magnetic, Line 5: 205° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

Take exit 146 on from I-15 and travel east towards Kanosh. Drive 0.4 miles to a gravel road on the right (south) side of the road. Turn right and travel south on the gravel road for 0.1 miles to a two-track road on the left (east) side of the road. Turn left and travel 0.2 miles to the witness post on the right (south) side of the road. The 0-foot stake is 65 paces away from the witness post at a bearing of 161 degrees magnetic and is marked with browse tag #146.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	4,953ft (1,510m)
Aspect	Northwest
Slope	6%
Sample Dates	06/23/2011, 08/11/2014, 08/07/2019, 08/12/2025

Table 21R-14.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Wide Mouth Canyon Chaining Phase III Project	1972	August 2011-February 2012	237
Herbicide - Plateau	Wide Mouth Canyon Chaining Phase III Project	1972	August 2011-February 2012	237
Seeding - Aerial Before	Wide Mouth Canyon Chaining Phase III Project	1972	August 2011-February 2012	237
Seeding - Dribbler	Wide Mouth Canyon Chaining Phase III Project	1972	August 2011-February 2012	237
Seeding - Aerial After	Wide Mouth Canyon Chaining Phase III Project	1972	February 2012	237

Table 21R-14.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Widemouth Canyon Chaining Phase III			Aerial	Sep 2011	240
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.46	1.34
G	Agropyron cristatum	Crested Wheatgrass	Hycrest II	2.08	1.84
G	Elymus elymoides	Bottlebrush Squirreltail	Millard UT	1.04	0.81
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.88	1.74
G	Poa secunda	Canby Bluegrass	Canbar	0.42	0.20
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.63	0.56
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	2.08	1.89
F	Achillea millefolium	Western Yarrow	Eagle Mountain	0.10	0.09
F	Linum perenne	Blue Flax	Appar	0.21	0.15
F	Medicago sativa	Alfalfa	Nomad	1.04	0.94
F	Sanguisorba minor	Small Burnet	Delar	2.08	1.96

Mix Name			Application Type	Application Date	Acres
Widemouth Canyon Chaining Phase III - Dribbler Mix			Aerial	Sep 2011	240
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.25	0.09
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.13	0.10
S	Purshia tridentata	Bitterbrush	Rocky Mountain	0.13	0.08

Mix Name			Application Type	Application Date	Acres
Widemouth Canyon Chaining Phase III - Browse Mix			Aerial	Jan 2012	270
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Nomad	0.50	0.45
S	Bassia prostrata	Forage Kochia	Beaver UT	1.04	0.60

Wildlife Habitat and Vegetation History

Table 21R-14.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 21R-14.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Juniper/Wyoming Big Sagebrush/Annual Grass	Phase I transitioning to Phase II
2014	Annual Grass	Early Phase I
2019	Annual Grass	Early Phase I
2025	Annual Grass-Forb	Early Phase I

Site Notes

The study was established to monitor the effects of a two-way chaining project. It was noted in 2025 that there may have been some confusion when distinguishing between purple threeawn (*Aristida purpurea*) and needle and thread (*Hesperostipa comata*), although observers noted needle and thread was by far the most abundant grass in comparison to purple threeawn.

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY309UT
States and Transitions	2011 - Utah Juniper Invasion State: Community Phase 3.2 2014-2025 - Invasive Annual Grass State: Community Phase 5.1

Upon study establishment in 2011, the plant community on this site existed as a stand of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) that was being encroached by Utah juniper (*Juniperus osteosperma*). After treatment (Table 21R-14.1), juniper and sagebrush cover were greatly reduced, making the introduced annual grass species cheatgrass (*Bromus tectorum*) the dominant vegetation component (Table 21R-14.6, Table 21R-14.7). Perennial grasses have remained depleted and lacking in diversity. Purple threeawn (*Aristida purpurea*) was the most abundant perennial grass species in 2019, but needle and thread (*Hesperostipa comata*) became the most abundant in 2025 (Table 21R-14.10). Forbs have also been lacking in cover and diversity with the weedy annual species redstem stork's bill (*Erodium cicutarium*) as the dominant species in 2025 (Table 21R-14.11). As previously mentioned, Wyoming big sagebrush has displayed a slowly increasing trend in quadrat cover since 2014. With time and favorable climatic conditions, however, sagebrush may have the potential to increase (Table 21R-14.12, Table 21R-14.13). Additional treatments could be needed to reduce the amount of cheatgrass and restore the function and diversity of the plant community.

This site's condition as mule deer winter range has remained very poor since 2011. Factors that negatively influence condition as deer winter range include reduced preferred browse recruitment, reduced perennial forb cover, and the presence of annual grass (Table 21R-11.6, Table 21R-11.7, Table 21R-11.10, Table 21R-11.13, Table 21R-11.15). According to pellet transect data deer and elk presences have been low since study establishment. Furthermore, the area had infrequent occurrences of collared mule deer during the 2024/25 winter season (Wildlife Migration Initiative). Cattle presence has increased over time, being low in most sample years but high in 2025 (Table 21R-14.9). Sagebrush densities have decreased over time and there are few individuals as of 2025, so on a community scale it is difficult to estimate the impact that wildlife utilization has on the population. However, if heavy hedging persists, there may be the danger of losing valuable wildlife forage. Sagebrush has either been moderately or heavily hedged in most sample years, but l00% of plants sampled in density strips showed signs of little to no hedging in 2025 (Table 21R-14.9, Table 21R-14.10, Table 21R-14.11, Table 21R-11.13). On-site observations stated that there was moderate utilization (20-40%) on the perennial grass sand dropseed (*Sporobolus cryptandrus*), while there was little to no use on forb species as of the most recent sample year (2025). The herbaceous and preferred browse communities appeared to be adversely affected by drought as evidenced by stressed, chlorotic leaves, reduced primary growth, and restricted flowering (Photos). Should utilization pressures increase in the future, prolonged exposure to heavy hedging on preferred browse populations with low densities in combination with drought could reduce the long term utility of the site for wildlife.

Trend Summary Tables

Table 21R-14.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	3.7	0.3	5.4	7.5	0.2	13.7
2014	0.5	0.2	0.0	1.4	0.8	-
2019	0.8	0.2	-	1.1	0.3	-
2025	1.1	0.1	-	1.6	-	-

Table 21R-14.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	463	265	243	26	28.9	9.5	2.2	0.2
2014	395	160	246	10	31.1	4.0	4.6	0.2
2019	450	183	356	6	41.6	6.1	8.1	0.1
2025	385	260	350	12	17.6	11.0	15.2	0.2

Table 21R-14.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	2.4	5.5	30.5	20.6	0.2	50.4
2014	18.5	0.0	38.2	21.4	0.1	43.6
2019	8.3	0.1	65.8	12.6	0.1	49.1
2025	16.6	0.4	36.2	19.7	0.8	35.3

Table 21R-14.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2011	4	20	1	-	9
2014	-	3	1	-	10
2019	5	13	1	-	14
2025	2	3	-	-	11
Year	Days Use Per Acre (ha)				
2011	0.7 (1.8)	13.4 (33.1)	1.3 (3.3)	-	-
2014	2.2 (5.4)	8.1 (19.9)	2.0 (5.0)	-	-
2019	4.4 (10.8)	2.0 (5.0)	0.7 (1.7)	1.2 (2.9)	-
2025	30.5 (75.3)	6.7 (16.6)	0.7 (1.7)	-	-

Table 21R-14.10 - 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 threawn)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Muhlenbergia (muhly)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Poa bulbosa[i] (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Secale cereale[ai] (cereal rye)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency															
2011	-	-	111	460	-	12	-	-	-	56	1	1	215	-	-	158
2014	-	-	81	389	1	5	3	3	1	30	10	-	57	2	-	52
2019	1	1	117	433	3	-	-	-	-	46	40	1	38	-	10	260
2025	-	3	13	370	-	155	-	-	-	12	66	5	41	-	41	89
year	Average Cover (%)															
2011	-	-	4.2	28.4	-	0.3	-	-	-	1.3	0.0	0.0	3.8	-	-	0.5
2014	-	-	2.1	30.3	0.0	0.1	0.0	0.0	0.0	0.5	0.7	-	0.6	0.0	-	0.8
2019	0.0	0.0	3.6	36.4	0.0	-	-	-	-	0.9	0.6	0.0	0.6	-	0.2	5.2
2025	-	0.0	1.1	16.9	-	6.5	-	-	-	0.1	2.0	0.0	0.7	-	0.6	0.7

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

Table 21R-14.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium acuminatum (tapertip onion)	Alyssum desertorum[ai] (desert madwort)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata[ai] (curveseed butterwort)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Eriastrum sparsiflorum[a] (Great Basin woollystar)	Eriogonum cernuum[a] (nodding buckwheat)	Erodium cicutarium[ai] (redstem stork's bill)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Lactuca serriola[ai] (prickly lettuce)	Lygodesmia grandiflora (largeflower skeletonplant)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Plantago patagonica[a] (woolly plantain)	Salsola tragus[ai] (prickly Russian thistle)
year	Nested Frequency																
2011	-	13	26	3	12	21	-	3	1	60	-	9	2	8	-	122	-
2014	3	-	-	-	9	-	3	-	-	72	-	33	1	-	3	176	7
2019	5	-	16	-	4	-	-	-	-	179	2	-	-	1	-	314	-
2025	2	-	42	-	9	53	9	-	-	279	-	-	-	1	-	206	-
year	Average Cover (%)																
2011	-	0.0	0.1	0.0	0.4	0.2	-	0.0	0.0	0.6	-	0.0	0.0	0.2	-	0.5	-
2014	0.2	-	-	-	0.0	-	0.0	-	-	0.4	-	0.5	0.0	-	0.0	3.5	0.2
2019	0.1	-	0.0	-	0.0	-	-	-	-	1.7	0.0	-	-	0.0	-	6.3	-
2025	0.1	-	0.5	-	0.0	0.5	0.1	-	-	10.5	-	-	-	0.0	-	1.9	-

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

FORB SPECIES	Silene antirrhina[a] (sleepy silene)
year	Nested
2011	77
2014	-
2019	16
2025	115
year	Average Cover (%)
2011	0.3
2014	-
2019	0.1
2025	1.8

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

Table 21R-14.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)				
2011	7.5	0.1	13.7	0.1	-
2014	1.4	0.2	-	0.6	-
2019	1.1	0.1	-	0.2	-
2025	1.6	-	-	-	-
year	Quadrat Cover (%)				
2011	3.7	0.0	5.4	0.3	0.0
2014	0.5	0.0	0.0	0.2	-
2019	0.8	0.0	-	0.2	0.0
2025	1.1	-	-	0.1	-

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

Table 21R-14.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2011	840	-	2	64	33	50	5	12	60/98
2014	460	40	9	78	13	46	25	21	47/80
2019	280	-	7	50	43	50	0	43	53/87
2025	260	-	0	100	0	0	0	8	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2011	-	-	-	-	-	-	-	-	36/51
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	30/32
2025	-	-	-	-	-	-	-	-	-/-
Ephedra nevadensis[p] -- (Nevada jointfir)									
2011	20	-	0	0	100	0	0	0	53/119
2014	-	-	-	-	-	-	-	-	40/117
2019	-	-	-	-	-	-	-	-	30/93
2025	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	77/144
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2011	20	-	0	100	0	0	0	0	23/28
2014	280	-	7	93	0	79	0	0	25/37
2019	180	-	0	89	11	0	0	11	20/27
2025	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Juniperus osteosperma[t] -- (Utah juniper)									
2011	40	20	0	100	0	0	0	0	- / -
2014	-	20	0	0	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Linanthus pungens -- (granite prickly phlox)									
2011	240	20	0	50	50	0	0	0	20/35
2014	180	-	0	100	0	56	44	0	21/35
2019	100	-	0	100	0	0	0	0	23/30
2025	100	-	0	0	100	0	0	100	- / -
Opuntia polyacantha -- (plains pricklypear)									
2011	80	-	0	75	25	0	0	0	16/37
2014	-	-	-	-	-	-	-	-	7/13
2019	20	-	100	0	0	0	0	0	15/30
2025	-	-	-	-	-	-	-	-	-/-
Tetradymia glabrata -- (littleleaf horsebrush)									
2011	-	-	-	-	-	-	-	-	46/79

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

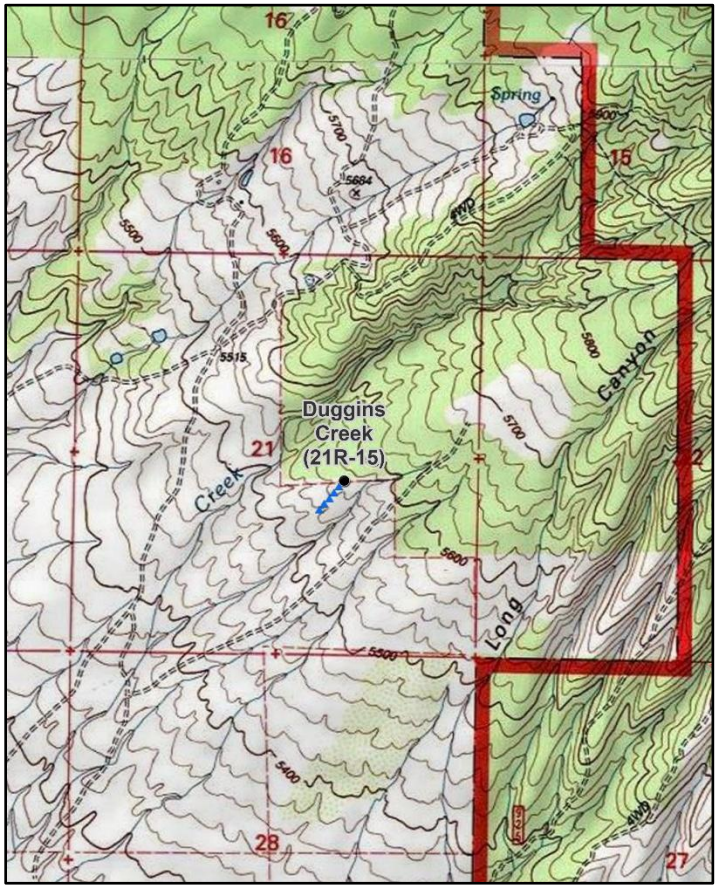
Table 21R-14.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

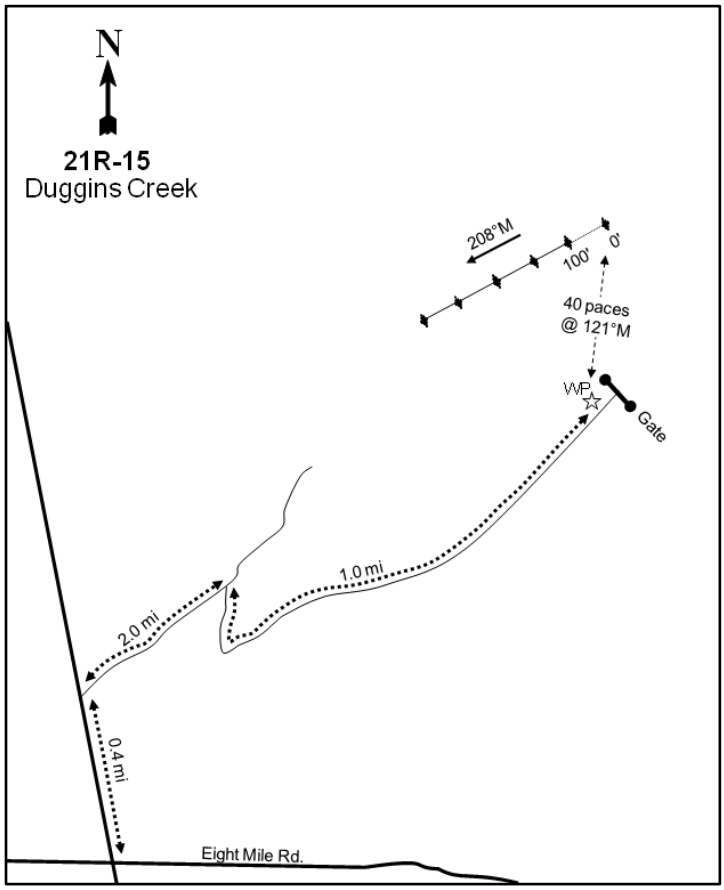
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2011	27	-	-	15	46	38	37.1
2014	5	-	100	-	-	-	4.7
2019	4	-	67	33	-	-	5.7
2025	4	-	50	50	-	-	9.0

Table 21R-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
2011	9.4	5.0	1.2	19.0	-20.0	0.4	0.0	**15.0**	Very Poor
2014	1.8	0.0	0.0	6.6	-20.0	0.4	0.0	**-11.2**	Very Poor
2019	1.4	0.0	0.0	11.0	-20.0	0.1	0.0	**-7.5**	Very Poor
2025	2.0	0.0	0.0	18.0	-13.2	0.5	0.0	**7.3**	Very Poor

DUGGINS CREEK - STUDY NO. 21R-15





Location Information	
USGS 7.5 min Map Info	Duggins Creek NE; Township 18S, Range 4W, Section 21
GPS (0' Stake)	NAD 83 UTM ZONE 12, 387523 East 4343629 North

Transect Information	
Browse Tag # (0' Stake)	Not Available
Transect Bearing	208° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belts 2, 3: No Rebar

Directions to Site

From the intersection of Eight Mile Road and Whiskey Creek Road, drive north for 0.4 miles, turn right, and continue for 2.0 miles. Turn right and drive 1.0 mile to gate and witness post on the right (north) side of the road and park. From the witness post walk 40 paces at 121 degrees magnetic to the 0-foot stake. The 0-foot stake is not marked with a browse tag.

Site Information	
Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	5,562ft (1,695m)
Aspect	Southwest
Slope	6%
Sample Dates	08/27/2012, 08/24/2015, 07/15/2019, 08/14/2025

Table 21R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Early 1980s	-
Seeding - Seed Unknown	-	-	Early 1980s	-
Hand Crew - Lop and Scatter	Whiskey Creek Lop n Scatter Project Phase I	2197	July-August 2012	1902

Wildlife Habitat and Vegetation History

Table 21R-15.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	winter

Table 21R-15.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Stansbury Cliffrose/Wyoming Big Sagebrush/Perennial Grass	Phase I
2015	Stansbury Cliffrose/Wyoming Big Sagebrush/Perennial Grass	Early Phase I
2019	Stansbury Cliffrose/Wyoming Big Sagebrush/Annual Grass	Early Phase I
2025	Wyoming Big Sagebrush/Stansbury Cliffrose/Annual-Perennial Grass	Early Phase I

Site Notes

The site underwent a lop and scatter treatment a few weeks prior to the establishment of the study. For the purposes of gaining pre-treatment data, the canopies of felled trees were included in line-intercept measurements. The stumps of these felled trees were used and height was estimated for point-centered quarter data.

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Gravelly Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY307UT
States and Transitions	2012 - Utah Juniper/Invasive Annual State: Community Phase 3.1 2015-2025 - Seeded Range State: Community Phase 6.1

At the time of study establishment in 2012, the plant community on this site was a stand of Stansbury cliffrose (*Purshia stansburiana*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) that was being encroached by Utah juniper (*Juniperus osteosperma*). Wyoming big sagebrush and Stansbury cliffrose have been co-dominant shrubs species throughout the study period with a decreasing trend being noted in cover and density for cliffrose (Table 21R-15.12, Table 21R-15.13). Utah juniper decreased substantially following the lop and scatter treatment (Table 21R-15.1) and has been scarce in density and cover measurements in the post-treatment sample period (Table 21R-15.12, Table 21R-15.14). Prior to the 2019 sample year, the understory was dominated by perennial grass species including crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Thinopyrum intermedium*), and Sandberg bluegrass (*Poa secunda*). In 2019, annual grasses became dominant with cheatgrass (*Bromus tectorum*) as the primary species. However, cover and frequency of intermediate wheatgrass and Sandberg bluegrass increased in 2025, and perennial grasses were co-dominant with annual grasses during the most recent sampling. Forbs have not been a significant part of the community in any of the sample years (Table 21R-15.7, Table 21R-15.10, Table 21R-15.11).

This site's mule deer winter range condition has ranged between very poor and good since 2012. Winter range conditions were considered poor in 2025. Factors that negatively influence condition as deer winter range include reduced preferred browse cover and recruitment, a lack of perennial forb cover, and the presence of annual grass (Table 21R-15.6, Table 21R-15.7, Table 21R-15.13, Table 21R-15.15). According to pellet transect data deer presence has remained low since study establishment. Cattle presence has varied, but it has been high in most sample years (Table 21R-15.9). Sagebrush densities have remained stable over time, but there are few individuals as of 2025, so it is difficult to estimate the impact that wildlife utilization has in the community. However, if persistent heavy hedging were to occur, there could be the danger of the community losing valuable forage for wildlife. Sagebrush utilization has decreased over time from much of the population being moderately hedged in 2012 and 2015 to mainly light utilization in 2019 and 2025 (Table 21R-15.9, Table 21R-15.13). On-site observations stated that there was light utilization (10-20%) on the perennial grass intermediate wheatgrass, while there was little to no use on forb species as of the most recent sample year (2025). The herbaceous and preferred browse communities appeared to have good vigor as evidenced by good leader growth, and seed and leaf production (Photos).

Trend Summary Tables

Table 21R-15.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	7.9	1.1	3.1	9.9	1.1	5.0
2015	8.3	1.1	0.4	13.9	2.1	0.1
2019	7.4	1.4	0.8	7.5	1.5	0.3
2025	6.7	0.4	1.0	8.0	0.4	0.7

Table 21R-15.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	272	352	31	-	6.9	23.5	0.1	-
2015	70	344	11	-	0.6	16.2	0.1	-
2019	402	289	342	2	27.3	9.0	8.1	0.0
2025	355	311	453	-	12.9	17.2	14.0	-

Table 21R-15.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	20.6	0.1	51.2	7.4	3.1	38.2
2015	30.0	0.0	46.1	11.5	3.4	24.3
2019	21.5	0.2	50.2	3.4	3.2	48.8
2025	17.8	0.1	41.6	12.7	3.0	46.1

Table 21R-15.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2012	2	7	36
2015	6	5	33
2019	13	7	9
2025	3	12	25
Year	Days Use Per Acre (ha)		
2012	21.1 (52.0)	8.7 (21.5)	-
2015	11.6 (28.7)	12.1 (29.8)	-
2019	35.6 (87.9)	3.4 (8.3)	-
2025	1.5 (3.6)	6.7 (16.6)	-

Table 21R-15.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency					
2012	77	269	135	0	274	3
2015	23	70	9	8	335	-
2019	32	402	41	-	261	2
2025	12	352	159	3	249	12
year	Average Cover (%)					
2012	4.2	6.9	3.0	0.0	16.3	0.0
2015	0.9	0.6	0.0	0.0	15.3	-
2019	1.5	27.3	0.9	-	6.6	0.0
2025	0.8	12.8	3.6	0.1	12.8	0.0

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

Table 21R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum alyssoides[ai] (pale madwort)	Alyssum desertorum[ai] (desert madwort)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chamaesyce (sandmat)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Erodium cicutarium[ai] (redstem stork's bill)	Microsteris gracilis[a] (slender phlox)
year	Nested Frequency							
2012	-	24	7	-	-	-	-	-
2015	-	11	-	-	-	-	-	-
2019	3	299	119	2	-	9	13	3
2025	54	446	147	-	7	-	44	8
year	Average Cover (%)							
2012	-	0.1	0.0	-	-	-	-	-
2015	-	0.1	-	-	-	-	-	-
2019	0.0	6.8	0.8	0.0	-	0.0	0.5	0.0
2025	0.5	11.5	1.4	-	0.0	-	0.6	0.0

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

Table 21R-15.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ephedra nevadensis[p] (Nevada jointfir)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Linanthus pungens (granite prickly phlox)	Purshia stansburiana[p] (Stansbury cliffrose)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)							
2012	3.2	0.4	-	0.6	5	0.1	5.8	0.9
2015	5.7	0.9	-	1.2	0.1	-	8.2	-
2019	4.3	0.9	0	0.6	0.3	-	3.2	-
2025	4.3	0.4	-	-	0.7	-	2.7	1
year	Quadrat Cover (%)							
2012	2.9	0.2	0.0	0.9	3.1	0.0	4.3	0.6
2015	3.1	0.4	0.0	0.7	0.4	-	5.2	-
2019	5.6	0.7	0.0	0.5	0.8	0.1	1.8	-
2025	4.1	0.4	0.0	-	1.0	0.0	1.6	1.0

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

Table 21R-15.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2012	260	-	15	77	8	62	8	15	85/138
2015	240	-	17	75	8	25	25	0	94/151
2019	220	-	0	73	27	0	9	27	96/144
2025	260	-	8	85	8	15	8	15	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2012	120	-	33	33	33	0	0	67	45/80
2015	160	-	13	63	25	29	14	63	45/75
2019	100	-	0	20	80	0	0	80	44/70
2025	140	-	0	14	86	0	0	86	- / -
Ephedra nevadensis[p] -- (Nevada jointfir)									
2012	20	-	0	100	0	0	0	100	57/67
2015	80	-	0	100	0	75	25	100	59/65
2019	80	-	0	50	50	0	100	50	62/105
2025	40	-	0	50	50	0	100	50	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2012	480	-	0	92	8	0	0	13	24/35
2015	640	-	28	69	3	0	3	3	28/43
2019	1140	20	4	91	5	0	0	4	24/27
2025	20	-	0	100	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2012	40	-	50	50	0	0	0	0	- / -
2015	40	-	100	0	0	0	0	0	- / -
2019	20	-	0	100	0	0	0	0	- / -
2025	40	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Linanthus pungens -- (granite prickly phlox)									
2012	20	-	0	100	0	0	0	100	13/24
2015	-	-	-	-	-	-	-	-	-/-
2019	80	-	25	50	25	0	0	25	10/13
2025	20	-	0	0	100	0	0	100	- / -
Opuntia -- (pricklypear)									
2012	20	-	0	100	0	0	0	0	12/31
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	11/12
2025	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana[p] -- (Stansbury cliffrose)									
2012	200	-	0	90	10	40	0	20	187/181
2015	280	-	7	93	0	50	21	0	171/154
2019	220	60	0	36	64	46	27	64	191/185
2025	100	20	0	80	20	20	20	20	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2012	20	-	0	100	0	0	100	100	74/123
2015	20	-	100	0	0	0	0	0	160/203
2019	-	-	-	-	-	-	-	-	-/-
2025	20	-	0	0	100	0	100	100	- / -
Rhus trilobata[p] -- (skunkbush sumac)									
2012	-	-	-	-	-	-	-	-	75/76
2015	-	-	-	-	-	-	-	-	110/92
2019	-	-	-	-	-	-	-	-	70/80

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

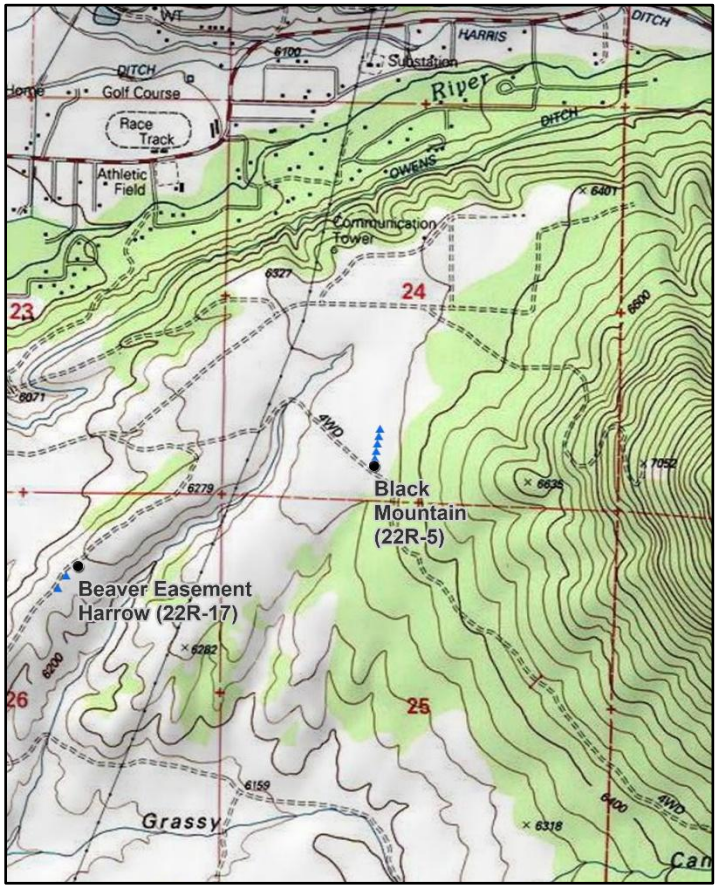
Table 21R-15.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

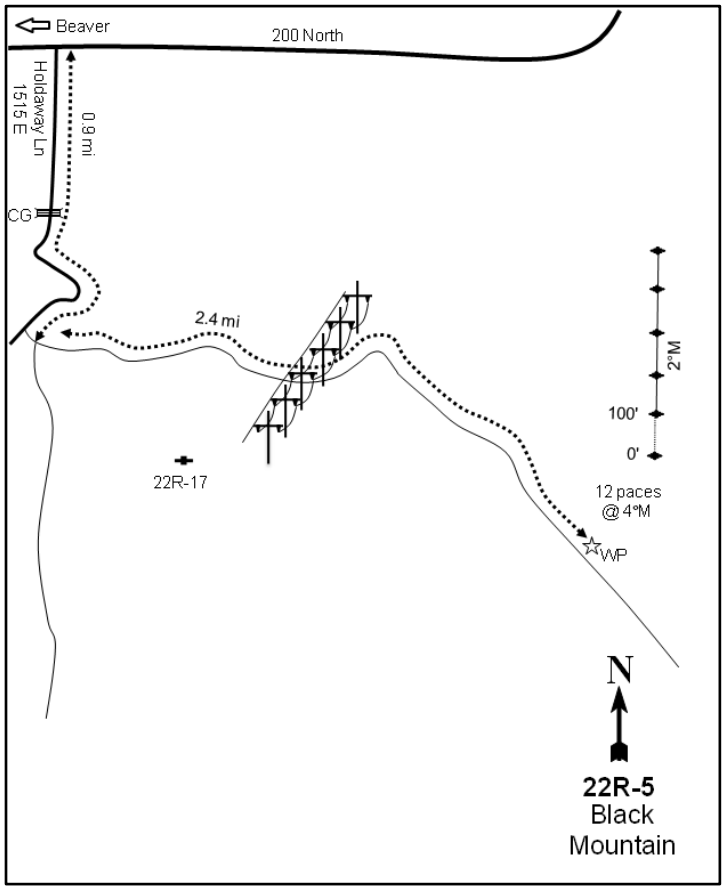
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	58	-	6	53	35	6	10.8
2015	5	-	100	-	-	-	2.5
2019	6	-	67	33	-	-	7.3
2025	3	-	33	67	-	-	25.3

Table 21R-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
2012	14.1	12.5	2.5	30.0	-5.1	0.0	0.0	**54.0**	Fair
2015	19.4	13.9	5.5	30.0	-0.4	0.0	0.0	**68.4**	Good
2019	10.2	2.2	0.0	18.1	-20.0	0.1	0.0	**10.6**	Very Poor
2025	10.9	7.9	2.1	30.0	-9.7	0.0	0.0	**41.2**	Poor

BLACK MOUNTAIN - STUDY NO. 22R-5





Location Information

USGS 7.5 min Map Info	Black Ridge SW; Township 29S, Range 7W, Section 24
GPS (0' Stake)	NAD 83 UTM ZONE 12, 360424 East 4236501 North

Transect Information

Browse Tag # (0' Stake)	42
Transect Bearing	2° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From Beaver, drive east on 200 North. Holdaway Lane (1515 East) comes in from the south: turn onto this road, drive for 0.9 miles, and turn left. Travel 1 mile to the power lines. At the power lines, turn south and travel 0.1 miles to a fork. Go left at the fork and proceed 0.4 miles to a witness post on the left (north) side of the road. The 0-foot stake is 12 paces from the witness post at 4 degrees magnetic and is marked with browse tag #42.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	LEE SPRINGS
Elevation	6,350ft (1,935m)
Aspect	Southwest
Slope	3%
Sample Dates	07/20/2004, 06/21/2007, 06/25/2012, 08/09/2016, 08/10/2020, 08/12/2025

Table 22R-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial	Black Mountain	PDB	September-December 2004	-
Hand Crew - Lop and Scatter	-	-	Between 2004 and 2007	-
Harrow - Two-Way Dixie	Beaver Easement Property Treatment	1294	September-December 2008	205
Seeding - Broadcast Before	Beaver Easement Property Treatment	1294	November 2008	205
Seeding - Aerial After	Beaver Easement Property Treatment	1294	January 2009	205
Seeding - Transplant	SR Shrub Seedlings	81	January-June 2006	238
Herbicide - Indaziflam	Beaver WMA's Cheatgrass Control Project	5751	August-September 2021	732
Seeding - Transplant	SR Shrub Seedlings Year 2	469	January-June 2007	238

Table 22R-05.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Beaver Easement			Broadcast	Nov 2008	210
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	2.14	1.97
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.43	1.17
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	2.14	1.94
F	Cleome serrulata	Rocky Mountain Beeplant	Iron UT	0.48	0.43
F	Medicago sativa	Alfalfa	Ladak	1.43	1.30
F	Melilotus officinalis	Yellow Sweetclover		0.48	0.43
F	Onobrychis viciifolia	Sainfoin	Eski	3.10	2.72
F	Sanguisorba minor	Small Burnet	Delar	1.90	1.80
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Lincoln NV	0.12	0.09

Mix Name			Application Type	Application Date	Acres
Beaver Easement - Kochia			Aerial	Jan 2009	200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak 65	1.00	0.89
S	Bassia prostrata	Forage Kochia	Lander NV	1.00	0.66

Wildlife Habitat and Vegetation History

Table 22R-05.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 22R-05.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Wyoming Big Sagebrush	Phase I
2007	Wyoming Big Sagebrush	Early Phase I
2012	Wyoming Big Sagebrush/Perennial Grass	Early Phase I
2016	Wyoming Big Sagebrush/Perennial Grass	Early Phase I
2020	Wyoming Big Sagebrush/Perennial Grass	Early Phase I
2025	Wyoming Big Sagebrush/Perennial Grass	Early Phase I

Site Notes

The study is located approximately one mile southeast of Beaver within a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat.

Soils

Table 22R-05.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.4	41.0	31.5	27.5	2.2	5.6	163.2	0.7	07/20/2004

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY309UT
States and Transitions	2004-2025 - Current Potential State: Community Phase 2.2

Since study establishment in 2004, the dominant browse species on this site has been Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Table 22R-05.12). The seeding success of forage kochia (*Bassia prostrata*) appears to have been brief; there was a flush of mature plants in density measurements in 2012 and 2016, but density decreased substantially with very few plants being sampled in 2020 and 2025 (Table 22R-05.13). The herbaceous understory was initially lacking in cover, but perennial grasses increased and became a co-dominant vegetation component in 2012 (Table 22R-05.7, Table 22R-05.10). Although twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were sparsely scattered throughout the site in 2004, cover decreased after a lop and scatter treatment between 2004 and 2007 (Table 22R-05.1, Table 22R-05.12). Density data indicates that trees have been present in all sample years, suggesting that there may be the potential for infilling in the future (Table 22R-05.14). However, the site has remained within Early Phase I of woodland succession since 2007 (Table 22R-05.4), indicating that infilling may not be an immediate concern.

Condition of mule deer winter range on this site has ranged between very poor-poor and good since 2004; winter range condition is considered to be good as of 2025. Factors negatively influencing range condition include a lack of preferred browse recruitment, reduced perennial forb cover, and the occasional flush of cheatgrass (*Bromus tectorum*) (Table 22R-05.7, Table 22R-05.10, Table 22R-05.13, Table 22R-05.15). Pellet transect data shows that deer presence was moderate in 2004 and 2007, but presence has been low since 2012. Cattle presence has been variable, but it has been low in most sample years. Sagebrush density has varied but was at its highest in 2016. Utilization of sagebrush has been mostly light over the sample period (Table 22R-05.9, Table 22R-05.13). On-site observations in 2025 noted that there was little to no utilization of grass and forb species. Scarlet globemallow (*Sphaeralcea coccinea*) and rose heath (*Chaetopappa ericoides*) were both observed to have poor vigor as indicated by chlorotic leaves. Preferred shrubs also appeared to be affected by drought in 2025 (Photos).

Trend Summary Tables

Table 22R-05.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	14.7	-	2.2	17.7	-	4.7
2007	12.5	0.0	0.0	17.3	-	-
2012	11.8	-	0.0	17.8	-	-
2016	13.8	-	-	16.4	-	-
2020	13.1	0.0	-	18.6	-	-
2025	13.5	-	-	21.7	0.2	-

Table 22R-05.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	16	208	219	142	0.0	4.0	1.1	1.2
2007	260	221	413	146	2.2	5.1	3.5	1.1
2012	210	256	310	163	4.5	12.9	1.8	3.1
2016	90	272	297	203	0.8	13.5	1.4	4.1
2020	160	247	344	96	1.6	9.8	2.5	0.7
2025	-	259	-	113	-	14.5	-	1.5

Table 22R-05.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	39.0	0.4	28.6	20.4	2.9	23.0
2007	34.1	0.4	26.1	16.3	3.8	27.2
2012	22.3	0.0	51.9	5.5	4.4	38.2
2016	42.0	0.0	31.4	7.0	2.1	31.9
2020	22.1	0.1	44.6	8.8	3.3	31.0
2025	28.3	0.1	37.7	13.0	5.8	28.1

Table 22R-05.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2004	3	11	4
2007	1	7	58
2012	-	2	8
2016	1	6	26
2020	3	14	29
2025	1	7	7
Year	Days Use Per Acre (ha)		
2004	5.1 (12.6)	27.5 (67.9)	-
2007	11.6 (28.7)	22.1 (54.6)	-
2012	-	0.7 (1.7)	-
2016	7.2 (17.9)	1.3 (3.3)	-
2020	3.6 (9.0)	4.7 (11.6)	-
2025	0.7 (1.8)	10.0 (24.8)	-

Table 22R-05.10 - 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)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2004	148	16	4	52	24	9	-	6
2007	168	260	26	35	27	-	5	15
2012	176	210	54	29	44	5	5	4
2016	147	90	69	133	41	5	1	3
2020	164	160	28	66	35	8	-	9
2025	179	-	21	52	34	2	-	5
year	Average Cover (%)							
2004	2.8	0.0	0.1	0.9	0.1	0.0	-	0.0
2007	3.6	2.2	0.2	1.0	0.2	-	0.0	0.1
2012	9.7	4.5	0.7	0.6	1.5	0.2	0.0	0.2
2016	6.5	0.8	1.0	5.3	0.4	0.1	0.0	0.1
2020	6.6	1.6	0.4	2.4	0.3	0.0	-	0.1
2025	11.4	-	0.6	1.8	0.4	0.0	-	0.1

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

Table 22R-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaetopappa ericoides (rose heath)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Gilia inconspicua[a] (shy gilia)	Orobanche fasciculata (clustered broomrape)	Penstemon comarrhenus (dusty beardtongue)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Sanguisorba minor[i] (small burnet)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency															
2004	-	-	-	193	52	0	-	10	5	56	-	-	11	23	-	75
2007	96	2	2	404	44	8	-	-	-	12	-	-	16	35	2	77
2012	173	6	5	228	70	3	5	-	-	-	5	3	10	29	-	84
2016	242	3	10	9	116	-	1	-	-	152	-	3	7	26	-	100
2020	233	-	5	168	42	4	-	68	-	-	-	-	-	13	-	55
2025	-	-	-	-	34	-	-	-	-	-	1	-	5	26	-	66
year	Average Cover (%)															
2004	-	-	-	0.9	0.5	0.0	-	0.0	0.0	0.2	-	-	0.1	0.1	-	0.6
2007	0.2	0.0	0.0	3.2	0.4	0.0	-	-	-	0.0	-	-	0.1	0.1	0.0	0.6
2012	0.8	0.0	0.0	1.0	1.8	0.0	0.0	-	-	-	0.0	0.0	0.2	0.1	-	0.9
2016	0.8	0.0	0.0	0.0	2.4	-	0.0	-	-	0.6	-	0.0	0.2	0.1	-	1.3
2020	1.6	-	0.0	0.6	0.2	0.0	-	0.3	-	-	-	-	-	0.0	-	0.5
2025	-	-	-	-	0.3	-	-	-	-	-	0.0	-	0.1	0.2	-	0.8

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

Table 22R-05.12 - 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[ai] (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Juniperus osteosperma[t] (Utah juniper)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)				
2004	17.7	-	-	1.4	3.3
2007	17.3	-	-	-	-
2012	17.5	0.3	-	-	-
2016	15.9	0.5	-	-	-
2020	18.6	-	-	-	-
2025	21.7	-	0.2	-	-
year	Quadrat Cover (%)				
2004	14.7	-	-	1.0	1.2
2007	12.4	0.0	0.0	0.0	-
2012	11.4	0.4	-	0.0	-
2016	13.1	0.7	-	-	-
2020	13.1	0.0	0.0	-	-
2025	13.5	0.0	0.0	-	-

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

Table 22R-05.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2004	3860	60	1	62	38	32	11	17	50/75
2007	3160	-	0	66	34	25	31	44	51/83
2012	3680	160	38	50	13	15	0	40	46/78
2016	4820	-	14	74	12	31	3	7	42/76
2020	4380	-	7	57	36	42	2	37	48/72
2025	4040	-	3	80	17	18	24	17	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	69/95
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	- / -
Bassia prostrata[pi] -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	40	0	0	0	0	0	0	- / -
2012	2120	640	40	60	0	5	59	12	9/17
2016	1200	-	7	93	0	13	28	5	14/22
2020	40	-	0	50	50	50	0	50	10/22
2025	120	-	0	83	17	0	0	17	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	33/39
2007	-	40	0	0	0	0	0	0	- / -
2012	60	-	0	100	0	0	0	0	24/36
2016	-	-	-	-	-	-	-	-	33/59
2020	60	-	0	67	33	0	0	33	26/49
2025	80	-	0	0	100	0	0	100	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	20	-	100	0	0	0	0	0	16/10
2016	40	-	0	100	0	0	0	0	23/27
2020	-	-	-	-	-	-	-	-	-/-
2025	100	-	20	80	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2004	60	-	67	33	0	0	0	0	- / -
2007	40	-	50	50	0	0	0	0	- / -
2012	20	-	0	100	0	0	0	0	- / -
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Linanthus pungens -- (granite prickly phlox)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	16/43
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Opuntia -- (pricklypear)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	13/15
2025	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2004	20	-	0	100	0	0	0	0	- / -
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	20	0	0	0	0	0	0	- / -
2020	20	-	100	0	0	0	0	0	- / -

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

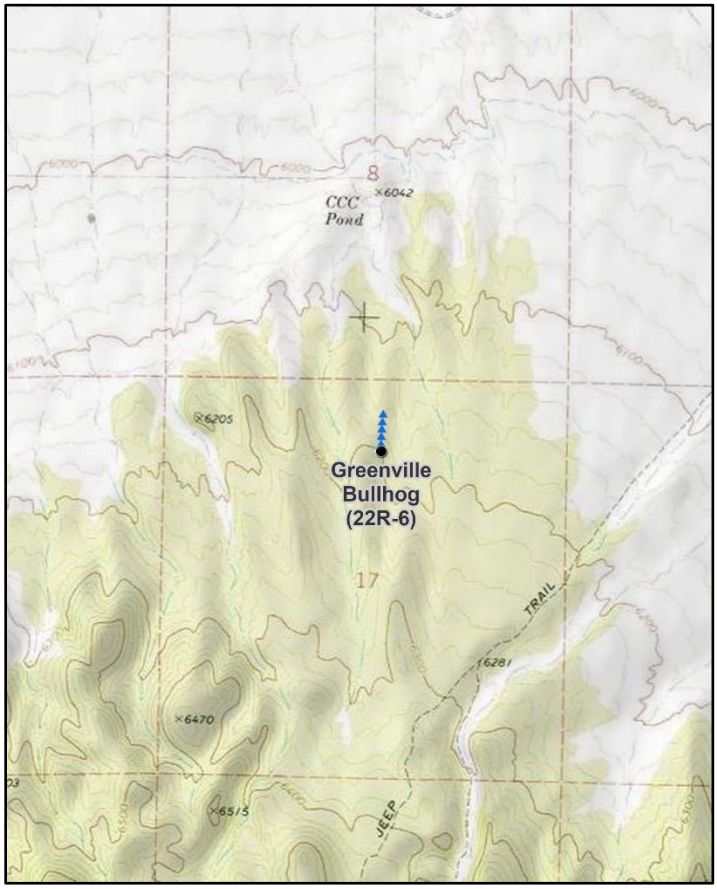
Table 22R-05.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

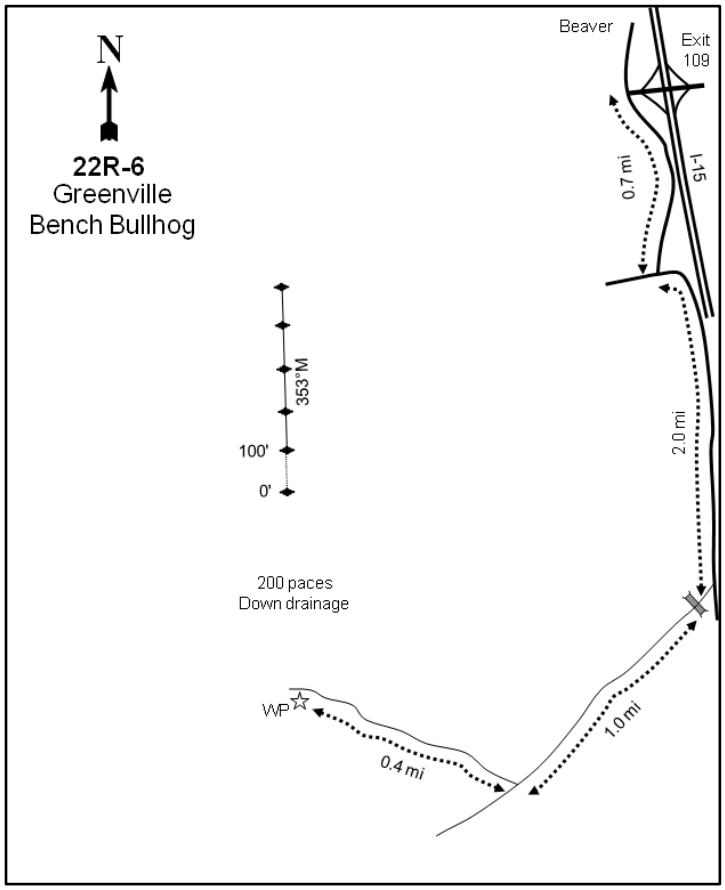
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2004	29	7	71	14	7	-	6.6
2007	25	7	86	7	-	-	5.0
2012	16	-	100	-	-	-	3.0
2016	11	-	100	-	-	-	3.3
2020	6	-	100	-	-	-	3.5
2025	4	33	67	-	-	-	4.0
Pinus edulis (twoneedle pinyon)							
2004	12	-	75	25	-	-	5.6
2007	4	-	100	-	-	-	3.3
2012	4	25	75	-	-	-	3.0
2016	3	-	100	-	-	-	2.7
2020	3	-	67	33	-	-	3.7
2025	3	-	67	33	-	-	3.7

Table 22R-05.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2004	22.1	3.7	0.3	8.1	0.0	2.5	0.0	**36.7**	Very Poor-Poor
2007	21.6	4.7	0.0	10.2	-1.7	2.3	0.0	**37.1**	Poor
2012	22.3	11.2	15.0	25.9	-3.3	6.2	0.0	**77.3**	Good
2016	20.6	11.7	7.1	27.1	-0.6	8.2	0.0	**74.1**	Good
2020	23.3	4.2	3.4	19.7	-1.2	1.4	0.0	**50.8**	Poor-Fair
2025	27.1	10.0	1.5	28.9	0.0	3.0	0.0	**70.5**	Good

GREENVILLE BULLHOG - STUDY NO. 22R-6





Location Information

USGS 7.5 min Map Info	Greenville Bench NE; Township 30S, Range 7W, Section 17
GPS (0' Stake)	NAD 83 UTM ZONE 12, 354091 East 4229693 North

Transect Information

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

Directions to Site

From exit 109 off of I-15, go west on the overpass toward a Chevron Station. From the Chevron Station, travel south on 600 West for 0.7 miles to the motocross track and turn left. Stay to the left and travel south for 2 miles. Turn right and drive 1 mile to another road that comes in from the right. Turn right (west) here and travel 0.4 miles to a drainage. Stop here and walk 200 paces north, down the drainage, to the baseline off to the left. The 0-foot stake is marked with browse tag #188.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SAND HOLLOW
Elevation	6,000ft (1,829m)
Aspect	Northeast
Slope	5-10%
Sample Dates	07/20/2004, 06/21/2007, 06/26/2012, 08/09/2016, 08/11/2020, 08/11/2025

Table 22R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Greenville Bench	PDB	August-December 2004	1500
Seeding - Truax Drill	Greenville Bench	PDB	November 2004	1500
Seeding - Aerial After	Greenville Bench	PDB	November 2004	1500
Hand Crew - Lop and Scatter	Bone Hollow and Greenville Bench Project Maintenance	4513	September-December 2018	3368

Table 22R-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Greenville Bench			Drill	Sep 2004	1500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.07	1.00
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.13	1.02
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	2.00	1.77
G	Poa secunda	Sandberg Bluegrass	SID MT	0.25	0.20
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.99	1.76
F	Achillea millefolium	Western Yarrow		0.10	0.09
F	Linum perenne	Blue Flax	Appar	0.80	0.67
F	Medicago sativa	Alfalfa	Ladak+	1.00	0.95
F	Melilotus officinalis	Yellow Sweetclover		0.07	0.06
F	Sanguisorba minor	Small Burnet	Delar	0.97	0.92
S	Purshia tridentata	Bitterbrush	Ada/Boise ID	0.25	0.21

Mix Name			Application Type	Application Date	Acres
Greenville Bench Sagebrush			Aerial	Oct 2004	1500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.27	0.03

Wildlife Habitat and Vegetation History

Table 22R-06.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Greater Sage-Grouse		

Table 22R-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	Pinyon-Juniper	Phase III
2007	Annual-Perennial Grass	Early Phase I
2012	Perennial Grass	Early Phase I
2016	Mixed Shrub/Perennial Grass	Early Phase I
2020	Annual-Perennial Grass/Mixed Shrub	Early Phase I
2025	Wyoming Big Sagebrush	Early Phase I

Site Notes

This study is located approximately five miles south of Beaver within a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community invaded by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*).

Soils

Table 22R-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	7.3	61.7	20.5	17.8	2.5	6.8	99.2	0.6	07/20/2004

Site Potential

	12 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY309UT
States and Transitions	2004 - Utah Juniper Invasion State: Community Phase 3.2 2007-2020 - Yellow Rubber Rabbit Brush/Invasive Annual State: Community Phase 4.2 2025 - Seeded Range State: Community Phase 6.2

When the study was established in 2004, the plant community on this site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase III of woodland succession (Table 22R-06.4, Table 22R-06.12). When sampled in 2007 after the bullhog and seeding treatment (Table 22R-06.1), tree cover had decreased significantly and the site transitioned to an annual-perennial grassland. Cover of annual grass decreased in 2012 and the understory remained dominated by perennial grasses until 2020 when the understory was dominated by the introduced annual grass species cheatgrass (*Bromus tectorum*). However, cheatgrass had a notable decrease in cover in 2025 (Table 22R-06.7, Table 22R-06.10). Total preferred browse cover in this community has increased each sample year since treatment. More specifically Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) has steadily increased in cover and density over the duration of the study, causing the community to transition to one dominated by native shrubs in 2025. Line-intercept cover and density of juniper have exhibited an inverse relationship: juniper cover has increased each year between 2007 and 2025, while density has generally decreased over the same period (Table 22R-06.12, Table 22R-06.13, Table 22R-06.14). This may indicate that woodland succession remains dynamic and the community could infill in the future.

Condition of mule deer winter range on this site has ranged between very poor and fair since 2004. Winter range condition is considered fair as of 2025. Factors negatively influencing range condition include reduced preferred browse cover and recruitment; reduced perennial grass cover; a lack of perennial forbs, and the presence cheatgrass (Table 22R-06.6, Table 22R-06.7, Table 22R-06.10, Table 22R-06.13, Table 22R-06.15). Pellet transect data shows that deer presence has varied between moderate and low since 2004. Cattle presence has increased over time from low in previous sample years to moderate in 2025. Sagebrush density has increased over time, and was at its highest in 2025. Utilization of sagebrush has also followed an increasing trend with the majority (62%) of plants sampled in density strips being either moderately or heavily hedged in 2025 (Table 22R-06.9, Table 22R-06.13). On-site observations in 2025 noted that there was moderate utilization (20-40%) of Snake River wheatgrass (*Elymus wawawaiensis*), but little to no utilization on forb species. The herbaceous community displayed poor vigor as indicated by chlorotic leaves and stunted growth. Preferred shrubs also displayed signs of drought in 2025 (Photos).

Trend Summary Tables

Table 22R-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	0.2	1.3	19.3	-	1.1	32.3
2007	0.4	6.5	1.7	0.5	5.7	2.9
2012	2.9	1.5	1.1	4.3	1.2	4.1
2016	4.1	6.7	1.4	8.0	7.3	4.9
2020	4.2	0.5	2.5	9.1	-	5.4
2025	7.9	2.4	1.6	14.1	3.2	6.2

Table 22R-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	10	6	25	13	0.0	0.0	0.2	0.1
2007	372	172	34	60	9.5	6.6	0.3	1.5
2012	270	265	25	35	6.2	15.3	0.2	0.7
2016	234	235	16	47	3.6	8.0	0.3	0.4
2020	372	183	8	11	15.3	9.0	0.1	0.2
2025	164	189	41	2	4.1	9.2	0.7	0.0

Table 22R-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	24.1	1.0	39.6	31.8	7.4	21.3
2007	22.9	0.3	45.9	6.4	5.4	29.4
2012	19.6	0.0	62.8	2.1	3.3	30.7
2016	23.3	0.4	45.2	15.1	5.4	22.7
2020	16.4	0.0	52.3	7.1	4.2	34.2
2025	16.4	-	42.8	23.5	4.6	24.8

Table 22R-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2004	-	-	4	-	10
2007	-	-	7	1	75
2012	1	-	4	-	9
2016	2	-	5	-	60
2020	4	-	22	-	72
2025	1	-	20	1	42
Year	Days Use Per Acre (ha)				
2004	-	-	8.1 (19.9)	-	-
2007	-	-	15.4 (38.1)	-	-
2012	1.5 (3.6)	-	23.4 (57.9)	-	-
2016	4.4 (10.8)	-	4.0 (9.9)	-	-
2020	2.9 (7.2)	8.7 (21.5)*	21.5 (53.0)	-	-
2025	11.6 (28.7)	-	19.4 (48.0)	-	-

*Pellets per acre (ha)

Table 22R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency										
2004	-	-	-	10	6	-	-	-	-	-	-
2007	5	15	-	372	66	75	-	-	10	-	54
2012	4	76	-	270	89	126	-	-	10	-	49
2016	9	44	10	234	70	60	3	3	13	-	99
2020	12	17	12	372	45	67	4	1	1	-	67
2025	19	23	34	164	23	59	4	4	10	8	48
year	Average Cover (%)										
2004	-	-	-	0.0	0.0	-	-	-	-	-	-
2007	0.0	0.3	-	9.5	1.9	2.6	-	-	0.7	-	1.2
2012	0.1	4.1	-	6.2	2.2	7.5	-	-	0.5	-	0.9
2016	0.2	0.8	0.2	3.6	1.5	2.7	0.0	0.0	0.5	-	1.9
2020	0.3	0.5	0.6	15.3	0.6	5.0	0.0	0.0	0.0	-	2.0
2025	1.1	0.9	1.8	4.1	0.3	2.6	0.2	0.0	0.2	0.3	1.9

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

Table 22R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Chenopodium fremontii[a] (Fremont's goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (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)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Medicago sativa[i] (alfalfa)
year	Nested Frequency																
2004	-	8	-	1	-	-	-	-	24	1	-	1	1	-	0	-	-
2007	-	6	10	4	-	-	-	8	-	-	-	-	4	12	2	19	5
2012	-	12	3	-	-	2	2	1	6	1	-	-	-	4	6	-	-
2016	4	8	-	9	2	-	17	2	4	-	7	-	1	-	8	-	-
2020	-	-	-	2	-	-	5	4	-	-	4	-	-	-	-	-	-
2025	-	-	-	1	3	-	-	-	-	1	-	-	-	-	-	-	-
year	Average Cover (%)																
2004	-	0.0	-	0.0	-	-	-	-	0.2	0.0	-	0.0	0.0	-	0.0	-	-
2007	-	0.0	0.2	0.0	-	-	-	0.0	-	-	-	-	0.0	0.1	0.0	0.6	0.1
2012	-	0.2	0.0	-	-	0.0	0.0	0.0	0.0	0.1	-	-	-	0.0	0.1	-	-
2016	0.0	0.0	-	0.1	0.0	-	0.1	0.0	0.0	-	0.1	-	0.0	-	0.1	-	-
2020	-	-	-	0.0	-	-	0.1	0.0	-	-	0.1	-	-	-	-	-	-
2025	-	-	-	0.0	0.0	-	-	-	-	0.0	-	-	-	-	-	-	-

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

FORB SPECIES	Penstemon leiophyllus (smoothleaf beardtongue)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Streptanthus cordatus (heartleaf twistflower)	Symphyotrichum (aster)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency						
2004	-	-	-	-	4	-	-
2007	2	4	22	10	0	-	4
2012	2	0	16	-	-	-	6
2016	1	6	2	-	-	2	-
2020	-	3	-	1	-	-	-
2025	-	39	-	2	-	-	-
year	Average Cover (%)						
2004	-	-	-	-	0.0	-	-
2007	0.2	0.0	0.5	0.1	0.0	-	0.0
2012	0.0	0.0	0.3	-	-	-	0.0
2016	0.0	0.2	0.0	-	-	0.0	-
2020	-	0.0	-	0.0	-	-	-
2025	-	0.7	-	0.0	-	-	-

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

Table 22R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Ericameria nauseosa ssp. nauseosa var. speciosa[p] (rubber rabbitbrush)	Eriogonum microthecum[p] (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Polygala subspinosa (spiny milkwort)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)								
2004	-	-	-	1.1	18.8	-	13.5	-	-
2007	0.3	-	-	5.7	2.9	-	-	-	0.2
2012	2	0.5	0	1.2	3.9	-	0.2	-	1.8
2016	2.8	0.6	-	7.2	4.9	-	-	0.1	4.6
2020	5.3	0.9	-	-	5.4	-	-	-	2.9
2025	11	0.3	-	3.2	6.2	-	-	-	2.8
year	Quadrat Cover (%)								
2004	0.2	-	0.0	1.3	11.5	-	7.8	0.0	-
2007	0.0	-	0.0	6.5	1.5	-	0.1	-	0.3
2012	0.4	0.1	0.2	1.5	0.7	-	0.4	0.0	2.1
2016	1.4	0.6	0.1	6.7	1.0	-	0.4	0.0	2.1
2020	2.3	0.4	0.0	0.4	2.5	0.0	-	0.0	1.5
2025	5.4	0.0	0.2	2.4	1.6	-	-	0.0	2.4

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

Table 22R-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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2004	180	20	0	11	89	33	22	78	51/57
2007	500	60	76	24	0	4	4	4	34/34
2012	700	40	43	57	0	23	0	37	54/66
2016	880	80	21	73	7	14	18	7	60/94
2020	1060	-	32	64	4	32	6	6	71/107
2025	1640	280	23	76	1	50	12	1	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	23/19
2016	-	-	-	-	-	-	-	-	-/-
2020	20	-	100	0	0	0	0	0	36/55
2025	-	-	-	-	-	-	-	-	-/-
Eriogonum microthecum[p] -- (slender buckwheat)									
2004	360	-	0	100	0	39	28	0	10/12
2007	40	-	50	50	0	50	50	0	14/15
2012	280	20	7	93	0	7	21	0	19/31
2016	200	-	0	100	0	0	0	0	21/32
2020	80	-	0	100	0	75	0	0	16/18
2025	260	-	0	100	0	31	54	39	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Ericameria nauseosa ssp. nauseosa var. speciosa[p] -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	0	0	0	55/91
2016	20	-	0	100	0	0	0	0	64/83
2020	20	-	0	0	100	0	0	100	85/135
2025	20	-	0	0	100	100	0	100	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2004	2600	20	25	75	0	0	0	0	17/20
2007	2840	440	4	94	1	0	0	1	29/39
2012	3720	640	24	73	4	0	0	38	17/22
2016	11960	-	0	100	0	0	0	0	24/32
2020	2020	-	15	81	4	0	1	5	12/12
2025	4060	-	2	97	2	0	0	2	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2004	180	-	56	44	0	0	0	0	- / -
2007	-	40	0	0	0	0	0	0	- / -
2012	20	80	100	0	0	0	0	0	- / -
2016	60	20	100	0	0	0	0	0	- / -
2020	20	-	100	0	0	0	0	0	- / -
2025	60	-	100	0	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2004	20	-	0	100	0	0	0	0	12/26
2007	-	-	-	-	-	-	-	-	11/34
2012	20	-	0	100	0	0	0	0	10/28
2016	20	-	0	100	0	0	0	0	11/20
2020	40	-	0	50	50	0	0	50	11/33
2025	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2004	80	-	25	75	0	0	0	0	- / -
2007	20	-	100	0	0	0	0	0	- / -
2012	20	20	100	0	0	0	0	0	- / -
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	- / -
2025	-	-	-	-	-	-	-	-	-/-
Polygala subspinosa -- (spiny milkwort)									
2004	260	-	0	100	0	8	0	0	5/8
2007	-	-	-	-	-	-	-	-	-/-
2012	120	-	17	67	17	17	0	0	9/15
2016	120	-	0	100	0	17	0	0	6/11
2020	100	-	20	80	0	20	0	0	7/10
2025	100	-	0	100	0	0	80	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	1320	100	100	0	0	42	49	0	9/13
2012	1520	-	33	67	0	63	7	0	32/40
2016	1160	20	10	83	7	41	43	9	43/59
2020	1100	-	0	84	16	24	75	16	40/61
2025	620	-	0	84	16	3	97	16	- / -

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

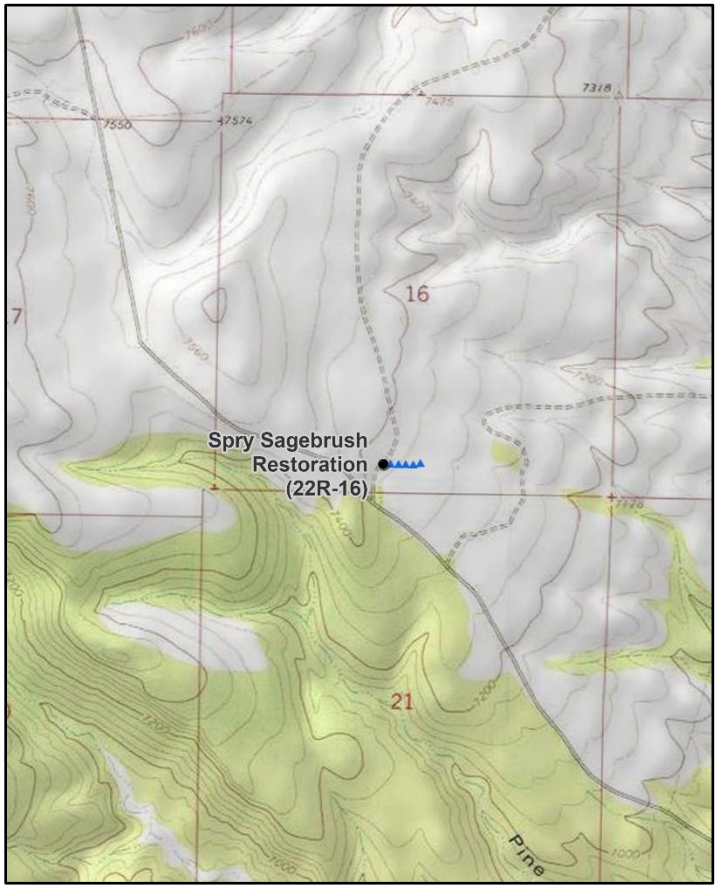
Table 22R-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

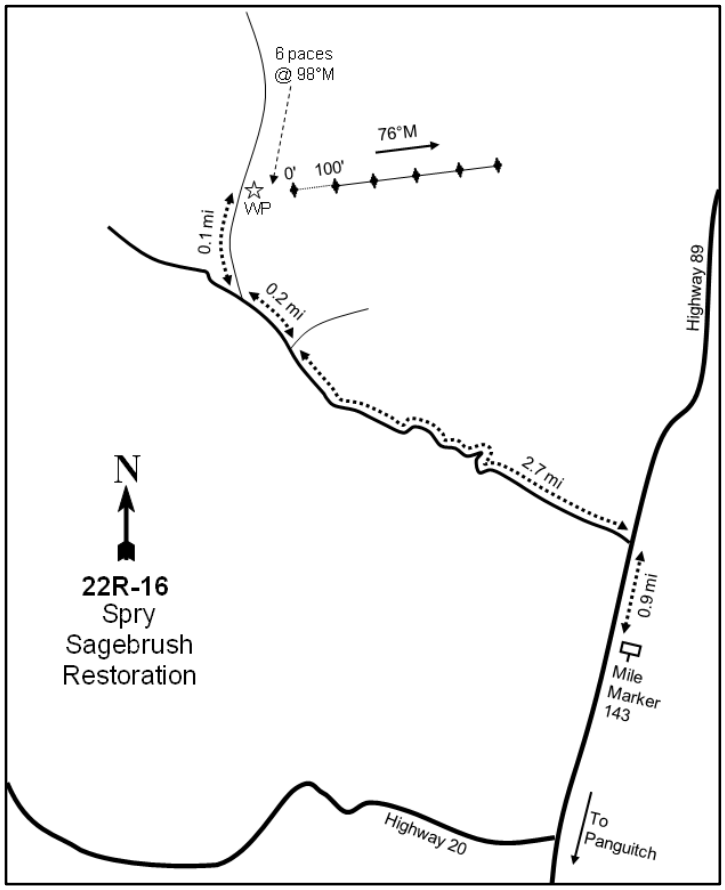
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2004	132	5	10	20	35	30	22.3
2007	44	38	38	-	-	25	20.8
2012	50	6	81	-	6	6	9.9
2016	89	53	35	-	-	12	13.6
2020	13	33	33	-	-	33	13.5
2025	9	20	60	-	-	20	19.2
Pinus edulis (twoneedle pinyon)							
2004	104	11	16	21	47	5	13.3
2007	18	71	29	-	-	-	4.6
2012	17	-	89	11	-	-	4.2
2016	16	17	67	17	-	-	7.7
2020	3	-	-	-	100	-	20.0
2025	3	-	-	-	100	-	18.0

Table 22R-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	0.0	0.0	0.0	0.0	0.0	0.1	0.0	**0.1**	Very Poor
2007	0.7	0.0	0.0	13.3	-7.1	2.9	0.0	**9.8**	Very Poor
2012	5.8	0.0	0.0	30.0	-4.6	1.5	0.0	**32.7**	Very Poor
2016	11.2	13.0	6.5	16.0	-2.7	0.8	0.0	**44.8**	Poor
2020	12.1	9.8	9.3	17.9	-11.4	0.3	0.0	**38.0**	Poor
2025	18.3	13.1	9.0	18.5	-3.1	0.0	0.0	**55.8**	Fair

SPRY SAGEBRUSH RESTORATION - STUDY NO. 22R-16





Location Information	
USGS 7.5 min Map Info	Fremont Pass SE; Township 32S, Range 5W, Section 16
GPS (0' Stake)	NAD 83 UTM ZONE 12, 375116 East 4209324 North

Transect Information	
Browse Tag # (0' Stake)	107
Transect Bearing	76° 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 State Route 20 and US-89 north of Panguitch, proceed north to mile marker 143 and drive 0.9 miles to a road on the left. From the cattle guard, drive 2.7 miles (past a second cattle guard) to a fork and stay left. From the fork, go 0.2 miles to another fork, go right, and proceed 0.1 miles to the witness post on the right (east) side of the road. From the witness post, walk 6 paces to the 0-foot stake at 98 degrees magnetic. The 0-foot stake is marked with browse tag #107.

Site Information	
Land Ownership	State
Land Administrator	SITLA
Allotment	HAWKINS WASH
Elevation	7,356ft (2,242m)
Aspect	East
Slope	2-5%
Sample Dates	06/10/2008, 06/30/2011, 07/30/2015, 08/11/2020, 08/12/2025

Table 22R-16.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Unknown	Hawkins Wash Seeding 1965	LTDL 5148-14325	July 1965-May 1966	1137
Seeding - Aerial Before	Hawkins Wash Seeding 1965	LTDL 5148-14324	July 1965-May 1966	1137
Hand Crew - Lop and Scatter	Spry Sagebrush Restoration	1173	April-June 2009	1745

Table 22R-16.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
			Aerial	Jul 1965	1137
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass		0.01	0.00
F	Medicago sativa	Alfalfa	Ladak	0.00	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.00	0.00

Wildlife Habitat and Vegetation History

Table 22R-16.3 - 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 22R-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	Mountain Big Sagebrush/Pinyon-Juniper/Perennial Grass	Phase II
2011	Mountain Big Sagebrush/Perennial Grass	Early Phase I
2015	Mountain Big Sagebrush/Perennial Grass	Early Phase I
2020	Mountain Big Sagebrush/Perennial Grass	Early Phase I
2025	Mountain Big Sagebrush/Perennial Grass	Early Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB336UT
States and Transitions	2004 - Utah Juniper Invasion State: Community Phase 3.2 2007-2012 - Seeded Range State: Community Phase 6.1 2016-2025 - Seeded Range State: Community Phase 6.2

When the study was established in 2008, this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees scattered throughout the area (Photos, Table 22R-16.12). A lop and scatter treatment (Table 22R-16.1) removed much of the pinyon and juniper, and both density and cover of mountain big sagebrush have increased over the post-treatment sample years (Table 22R-16.12, Table 22R-16.13). The herbaceous understory has generally remained stable over the sample period (Table 22R-16.7) and has been dominated by the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) (Table 22R-16.10). Forbs have remained fairly diverse overall, yet they have not been very abundant (Table 22R-16.11). Barring infilling by pinyon and juniper or a major disturbance (and in combination with proper management and good precipitation), it is possible that this site could transition to a state dominated by sagebrush with a balance of native grasses and forbs.

Condition of mule deer winter range on this site has ranged between poor and good-excellent since 2008; winter range condition is considered to be good as of 2025. Factors negatively influencing range condition include a lack of preferred browse recruitment and a lack of perennial forbs (Table 22R-16.7, Table 22R-16.13, Table 22R-16.15). Pellet transect data shows that deer and elk presence has been low since 2008. Cattle presence has been low in most sample years. Sagebrush density increased between 2008 and 2020, but it decreased in 2025. Utilization of sagebrush has been light most sample years, but it was at its highest in 2015 with the majority of plants sampled in density strips (78%) being either moderately or heavily hedged (Table 22R-16.9, Table 22R-16.13). On-site observations in 2025 noted that there was little to no utilization on grass and forb species (Photos).

Trend Summary Tables

Table 22R-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	7.3	0.4	3.1	9.7	0.2	1.9
2011	15.1	0.2	0.5	16.3	0.2	0.7
2015	13.9	5.0	1.3	18.2	5.6	1.5
2020	13.1	0.3	1.2	18.4	0.1	1.5
2025	17.8	4.6	2.2	19.9	4.5	2.5

Table 22R-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	2	337	4	46	0.0	13.7	0.0	0.5
2011	6	318	91	45	0.0	20.6	0.4	1.0
2015	-	315	5	78	-	17.9	0.0	0.9
2020	2	291	8	22	0.0	16.2	0.2	0.1
2025	-	307	2	8	-	19.8	0.0	0.1

Table 22R-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	27.4	0.9	30.7	19.7	9.9	23.4
2011	22.6	0.2	24.7	17.5	6.3	34.0
2015	18.9	0.6	37.6	14.2	9.2	36.5
2020	16.7	0.2	40.1	7.9	13.0	31.6
2025	22.0	0.1	33.2	8.6	15.8	36.8

Table 22R-16.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	11	18	-	95
2011	3	3	1	16
2015	2	5	-	36
2020	2	16	2	51
2025	-	6	-	8
Year	Days Use Per Acre (ha)			
2008	13.8 (34.1)	4.7 (11.6)	1.3 (3.3)	-
2011	5.8 (14.3)	14.7 (36.4)	2.0 (5.0)	-
2015	1.5 (3.6)	0.7 (1.7)	-	-
2020	9.4 (23.3)	17.4 (43.0)	0.7 (1.7)	-
2025	2.2 (5.4)	2.0 (5.0)	-	-

Table 22R-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 tectorum[ai] (cheatgrass)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency										
2008	3	332	10	2	7	3	9	6	-	-	-
2011	9	309	-	6	5	3	7	8	-	-	1
2015	-	307	1	-	18	-	4	-	6	-	-
2020	0	280	-	2	19	-	-	-	-	-	-
2025	1	297	7	-	9	-	2	-	-	1	-
year	Average Cover (%)										
2008	0.0	12.9	0.6	0.0	0.0	0.0	0.1	0.1	-	-	-
2011	0.0	20.3	-	0.0	0.1	0.0	0.2	0.0	-	-	0.0
2015	-	17.5	0.0	-	0.3	-	0.1	-	0.1	-	-
2020	0.0	15.8	-	0.0	0.4	-	-	-	-	-	-
2025	0.1	19.4	0.2	-	0.1	-	0.0	-	-	0.0	-

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

Table 22R-16.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Amaranthus blitoides[ai] (mat amaranth)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata[ai] (curveseed butterwort)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Erigeron (fleabane)	Erigeron aphanactis[a] (rayless shaggy fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Lomatium (desertparsley)
year	Nested Frequency																
2008	9	-	-	4	7	1	-	8	-	2	-	-	-	2	-	2	2
2011	2	-	1	10	9	5	2	2	38	-	7	3	3	48	3	2	-
2015	-	-	2	-	4	-	-	25	5	-	-	1	39	-	-	-	-
2020	-	3	-	-	-	-	-	7	3	-	-	-	3	2	-	-	-
2025	-	2	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
year	Average Cover (%)																
2008	0.1	-	-	0.0	0.1	0.0	-	0.0	-	0.0	-	-	-	0.0	-	0.0	0.0
2011	0.0	-	0.0	0.2	0.3	0.0	0.0	0.1	0.1	-	0.0	0.0	0.0	0.3	0.0	0.0	-
2015	-	-	0.0	-	0.0	-	-	0.2	0.0	-	-	0.0	0.5	-	-	-	-
2020	-	0.1	-	-	-	-	-	0.0	0.0	-	-	-	0.0	0.0	-	-	-
2025	-	0.0	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-

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

FORB SPECIES	Microsteris gracilis[a] (slender phlox)	Oenothera (evening primrose)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)	Sphaeralcea coccinea (scarlet globemallow)	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency							
2008	-	-	1	4	2	2	10	7
2011	2	-	1	4	4	-	7	2
2015	-	2	1	9	-	1	3	3
2020	-	-	1	6	-	4	2	-
2025	-	-	-	-	-	4	1	-
year	Average Cover (%)							
2008	-	-	0.0	0.0	0.0	0.0	0.2	0.0
2011	0.0	-	0.0	0.1	0.1	-	0.0	0.0
2015	-	0.0	0.0	0.0	-	0.0	0.0	0.0
2020	-	-	0.0	0.0	-	0.0	0.0	-
2025	-	-	-	-	-	0.0	0.0	-

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

Table 22R-16.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	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 (%)						
2008	9.1	-	0.2	1.2	-	0.7	0.6
2011	15.1	-	0.2	0.7	-	-	1.2
2015	15.8	-	5.6	0.9	-	0.6	2.4
2020	16.5	-	0	0.7	0.1	0.8	1.9
2025	16.6	-	4.3	0.7	0.2	1.8	3.3
year	Quadrat Cover (%)						
2008	6.4	-	0.3	1.5	0.0	1.6	0.9
2011	13.8	-	0.2	0.3	0.0	0.2	1.3
2015	12.0	-	4.9	1.0	0.0	0.3	1.9
2020	11.3	0.0	0.1	0.5	0.2	0.7	1.9
2025	15.0	-	4.3	0.8	0.3	1.4	2.8

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

Table 22R-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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2008	1640	300	1	62	37	16	13	16	71/85
2011	2000	2380	36	62	2	9	0	4	75/91
2015	2440	40	20	66	15	48	30	28	72/90
2020	2520	-	10	67	23	12	0	21	79/107
2025	2160	60	4	87	9	45	0	42	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2020	20	-	0	100	0	0	0	0	46/58
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2008	1660	280	2	87	11	8	0	5	15/14
2011	840	80	57	43	0	0	0	2	23/26
2015	13280	480	30	70	0	0	0	0	23/25
2020	320	-	19	69	13	0	0	13	18/12
2025	5760	80	5	95	0	0	0	9	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2008	20	-	0	100	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	- / -
2020	20	-	0	100	0	0	0	0	- / -
2025	20	-	0	100	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2008	40	40	0	100	0	0	0	0	13/34
2011	40	-	0	100	0	0	0	0	13/32
2015	80	-	25	75	0	0	0	0	14/32
2020	60	-	0	100	0	0	0	0	13/29
2025	100	-	0	100	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2008	60	40	100	0	0	0	0	0	- / -
2011	60	-	67	33	0	0	0	33	- / -
2015	180	-	78	11	11	0	0	11	- / -
2020	200	-	90	10	0	0	10	30	- / -
2025	160	20	63	38	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2008	120	-	0	67	33	0	100	33	44/97
2011	100	-	0	100	0	60	40	0	62/126
2015	140	-	14	86	0	57	43	0	78/160
2020	160	-	0	50	50	50	50	50	88/160
2025	260	-	8	92	0	69	0	15	- / -

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

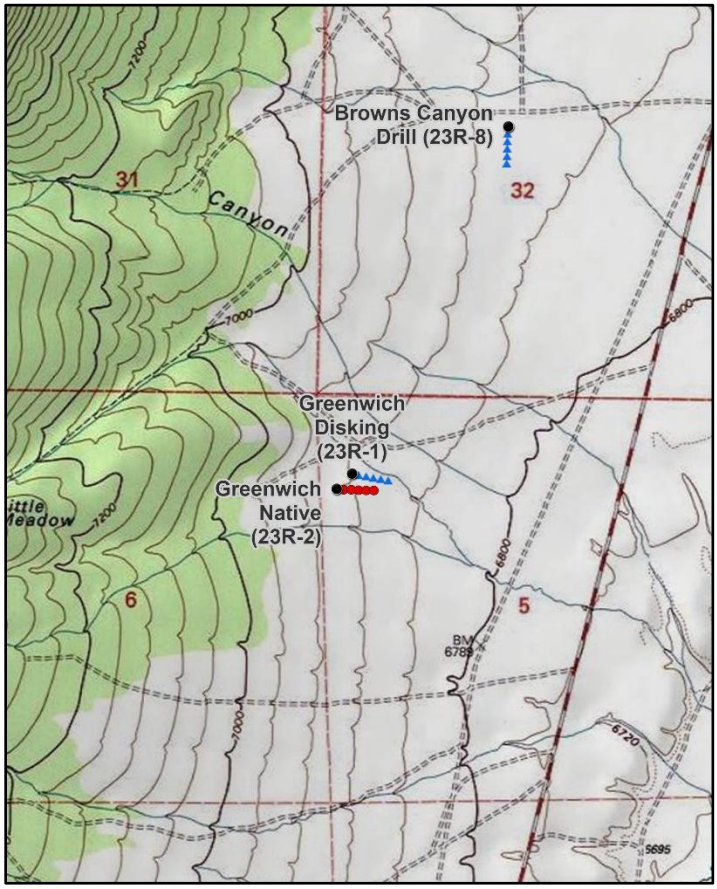
Table 22R-16.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

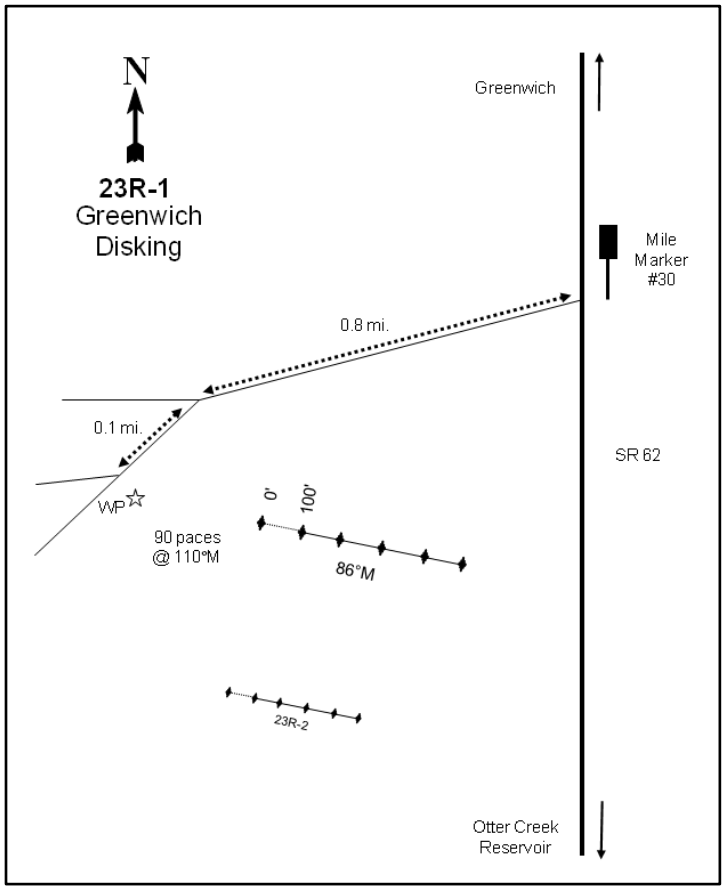
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	15	-	11	44	44	-	17.6
2011	3	-	67	33	-	-	5.3
2015	2	-	67	33	-	-	3.3
2020	3	-	75	25	-	-	5.8
2025	3	-	25	25	50	-	6.0
Pinus edulis (twoneedle pinyon)							
2008	82	-	47	6	35	12	13.5
2011	31	-	100	-	-	-	2.8
2015	39	36	21	43	-	-	2.6
2020	40	7	60	33	-	-	3.6
2025	57	-	50	31	19	-	4.0

Table 22R-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	12.3	4.1	0.6	27.4	0.0	1.0	0.0	**45.4**	Poor
2011	20.7	14.4	15.0	30.0	0.0	1.9	0.0	**82.0**	Good-Excellent
2015	23.4	11.2	9.5	30.0	0.0	1.8	0.0	**75.9**	Good
2020	23.5	7.3	4.6	30.0	0.0	0.3	0.0	**65.7**	Fair-Good
2025	25.7	12.7	2.2	30.0	0.0	0.2	0.0	**70.8**	Good

GREENWICH DISKING - STUDY NO. 23R-1





Location Information

USGS 7.5 min Map Info	Greenwich SW; Township 28S, Range 1W, Section 05
GPS (0' Stake)	NAD 83 UTM ZONE 12, 417971 East 4251597 North

Transect Information

Browse Tag # (0' Stake)	103
Transect Bearing	86° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

Start on Highway 62 between Greenwich and Otter Creek Reservoir. At mile marker 30 there is a road going west: take this road for 0.8 miles to a fork. Stay right at the fork and continue for 0.1 miles to a witness post on the left (south) side of the road. Walk 90 paces at 110 degrees magnetic into the disking to the 0-foot stake. The study is marked with green, steel fenceposts approximately 12-18 inches in height.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	NORTH NARROWS
Elevation	6,870ft (2,094m)
Aspect	Northeast
Slope	5-8%
Sample Dates	08/13/1997, 08/21/2003, 08/10/2004, 06/19/2008, 08/07/2012, 08/26/2019, 08/13/2025

Table 23R-01.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Disc - Disc Unknown	-	PDB	Fall 1996	-
Seeding - Seed Unknown	-	PDB	Fall 1996	-
Harrow - One-Way Dixie	Narrows Project	PDB	November 2004	3600
Seeding - Broadcast Before	Narrows Project	PDB	November 2004	3600
Seeding - Aerial Unknown	Narrows Project	PDB	December 2004	1650

Table 23R-01.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Narrows Project			Broadcast	Nov 2004	3600
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass		0.21	0.00
G	Achnatherum hymenoides	Indian Ricegrass		0.50	0.00
G	Agropyron cristatum	Crested Wheatgrass		1.00	0.00
G	Festuca ovina	Sheep Fescue		0.83	0.00
G	Festuca ovina	Sheep Fescue		0.08	0.00
G	Festuca ovina	Sheep Fescue		0.08	0.00
G	Leymus cinereus	Great Basin Wildrye		0.50	0.00
G	Poa secunda	Sandberg Bluegrass		0.17	0.00
G	Poa secunda	Sandberg Bluegrass		0.83	0.00
G	Psathyrostachys juncea	Russian Wildrye		0.17	0.00
G	Psathyrostachys juncea	Russian Wildrye		0.83	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.00	0.00
F	Achillea millefolium	Western Yarrow		0.07	0.06
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.15	0.13
F	Helianthus annuus	Annual Sunflower		0.04	0.03
F	Lactuca serriola	Prickly Lettuce	Sanpete UT	0.01	0.01
F	Linum perenne	Blue Flax		0.43	0.00
F	Linum perenne	Blue Flax		0.56	0.00
F	Medicago sativa	Alfalfa	Ladak +	1.50	1.42
F	Melilotus officinalis	Yellow Sweetclover		1.00	0.00
F	Onobrychis viciifolia	Sainfoin		1.50	1.37
F	Sanguisorba minor	Small Burnet		2.00	0.00
S	Atriplex canescens	Fourwing Saltbush		0.28	0.00
S	Atriplex canescens	Fourwing Saltbush		0.50	0.00
S	Atriplex canescens	Fourwing Saltbush		0.22	0.00

Mix Name			Application Type	Application Date	Acres
Narrows Project Browse			Aerial	Dec 2004	1650
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.33	0.09
S	Bassia prostrata	Forage Kochia	Immigrant	0.67	0.00

Wildlife Habitat and Vegetation History

Table 23R-01.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		

Table 23R-01.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1997	Annual-Perennial Forb-Grass	No Encroachment
2003	Annual Forb	No Encroachment
2004	Annual Forb	No Encroachment
2008	Annual-Perennial Forb-Grass	No Encroachment
2012	Perennial Grass	No Encroachment
2019	Perennial Grass/Wyoming Big Sagebrush	No Encroachment
2025	Wyoming Big Sagebrush	No Encroachment

Site Notes

No Notes

Soils

Table 23R-01.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.4	57.6	25.1	17.3	1.0	22.7	288.0	0.5	08/13/1997

Site Potential

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R047XB222UT
States and Transitions	1997 - Seeded State: Community Phase 5.2 2003-2008 - Invasive Annual State: Community Phase 4.1 2012-2025 - Seeded State: Community Phase 5.2

This site was dominated by introduced annual forbs, such as burningbush (*Bassia scoparia*), and perennial forbs and grasses -- mainly crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Thinopyrum intermedium*), and alfalfa (*Medicago sativa*) -- upon study establishment in 1997. Perennial grasses and forbs decreased in 2003 and 2004, and the annual forb cutleaf nightshade (*Solanum triflorum*) contributed the most vegetation cover in 2003 and 2004. Annual forbs and perennial grasses and forbs again dominated in 2008. The plant community transitioned again in 2012 to one solely dominated by perennial grasses, primarily the introduced species Russian wildrye (*Psathrostachys juncea*). However, cover of perennial grasses decreased in 2025 and it became a minor community component in that year (Table 23R-01.7, Table 23R-01.10, Table 23R-01.11). Shrubs were initially rare on this study site. Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), however, increased in cover following treatment and it has been a (co-)dominant vegetation component since 2019 (Table 23R-01.12, Table 23R-01.13).

Condition of mule deer winter range on this site has ranged between very poor and good since 1997; winter range condition is considered to be fair as of 2025. Factors negatively influencing range condition include reduced preferred browse cover and a lack of recruitment; and a lack of perennial grasses and forbs (Table 23R-01.6, Table 23R-01.7, Table 23R-01.13, Table 23R-01.15). Pellet transect data shows that deer and/or domestic sheep and elk presence has been low since 1997. During the 2024/25 winter season the area had very few occurrences of nearby collared elk (Wildlife Migration Initiative). Cattle presence has also been low in most sample years (Table 23R-01.9). Sagebrush density increased between 2003 and 2012, but it decreased in 2019 and remained similar in 2025. Utilization of sagebrush has been light, but the percentage of plants sampled in density strips with moderate and heavy utilization has been increasing over time. Utilization was at its highest in 2025 with moderate or heavy hedging at 12% and 32%, respectively (Table 23R-01.13). On-site observations in 2025 noted that there was moderate utilization (20-40%) on Russian wildrye, and little to no utilization on forb species. The community appeared to be drought-affected with poor leader growth on browse species, and little to no seed production in the herbaceous community (Photos).

Trend Summary Tables

Table 23R-01.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1997	0.7	0.1	-	-	-	-
2003	-	-	-	-	-	-
2004	-	-	-	-	-	-
2008	0.7	-	-	-	-	-
2012	5.5	-	-	4.0	-	-
2019	8.3	-	-	9.9	-	-
2025	8.2	-	-	10.8	-	-

Table 23R-01.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1997	2	239	162	228	0.0	4.7	5.8	6.4
2003	-	-	5	-	-	-	4.9	-
2004	-	-	158	6	-	-	32.8	0.2
2008	-	221	261	34	-	7.5	3.6	4.2
2012	-	230	106	4	-	10.7	0.8	0.2
2019	4	190	209	11	0.0	13.6	2.6	0.1
2025	-	135	-	-	-	5.0	-	-

Table 23R-01.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1997	51.2	0.2	20.3	4.5	4.4	15.5
2003	49.2	0.1	36.3	3.8	9.3	5.2
2004	46.2	0.0	22.1	5.4	4.3	33.4
2008	53.4	-	34.9	4.1	5.2	15.2
2012	48.1	0.0	31.4	4.9	2.3	16.9
2019	54.3	0.0	30.2	6.3	5.2	23.5
2025	56.6	0.0	31.0	5.4	5.4	14.5

Table 23R-01.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
1997	-	6	-	-	11
2003	1	-	4	-	91
2004	-	3	3	-	64
2008	-	-	2	-	94
2012	1	4	5	-	54
2019	5	1	1	1	66
2025	2	1	7	-	82
Year	Days Use Per Acre (ha)				
1997	-	-	-	-	-
2003	-	-	0.7 (1.7)	-	-
2004	2.9 (7.2)	-	7.4 (18.2)	-	-
2008	-	-	6.0 (14.9)	-	-
2012	8.7 (21.5)	-	11.4 (28.1)	-	-
2019	7.2 (17.9)	1.3 (3.3)	2.7 (6.6)	-	-
2025	13.1 (32.3)	2.7 (6.6)	7.4 (18.2)	-	-

Table 23R-01.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Leymus cinereus (basin wildrye)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency								
1997	-	209	2	-	-	-	-	-	83
2003	-	-	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	-	-	-
2008	6	21	-	12	64	2	41	159	5
2012	19	27	-	8	26	12	64	143	-
2019	3	0	4	-	-	-	37	166	-
2025	-	2	-	3	-	-	-	131	-
year	Average Cover (%)								
1997	-	3.5	0.0	-	-	-	-	-	1.2
2003	-	-	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	-	-	-
2008	0.1	0.1	-	0.1	0.6	0.1	0.1	6.3	0.1
2012	0.4	0.7	-	0.0	0.7	0.3	0.9	7.6	-
2019	0.0	0.0	0.0	-	-	-	0.3	13.2	-
2025	-	0.0	-	0.0	-	-	-	4.9	-

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

Table 23R-01.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Bassia scoparia[ai] (burningbush)	Ceratocephala testiculata[ai] (curveseed butterwort)	Cleome serrulata[a] (Rocky Mountain beeplant)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Epilobium brachycarpum[a] (tall annual willowherb)	Eriogonum cernuum[a] (nodding buckwheat)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Linum lewisii (Lewis flax)	Marrubium vulgare[i] (horehound)	Medicago sativa[i] (alfalfa)	Mentzelia albicaulis[a] (whitestem blazingstar)	Nicotiana attenuata[a] (coyote tobacco)	Orobanche fasciculata (clustered broomrape)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
1997	2	156	-	-	-	-	7	-	-	-	-	-	226	-	-	-	-
2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2004	0	-	-	4	-	0	-	-	-	1	-	-	6	-	1	-	-
2008	-	-	-	-	-	-	-	4	-	107	34	0	-	3	-	-	-
2012	1	-	3	-	3	3	-	-	1	84	-	-	-	-	-	-	-
2019	2	2	-	-	3	87	-	-	-	170	-	-	-	10	-	4	2
2025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
year	Average Cover (%)																
1997	0.0	5.7	-	-	-	-	0.1	-	-	-	-	-	6.1	-	-	-	-
2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2004	0.0	-	-	1.2	-	0.0	-	-	-	0.0	-	-	0.2	-	0.1	-	-
2008	-	-	-	-	-	-	-	0.0	-	2.2	4.1	0.1	-	0.0	-	-	-
2012	0.1	-	0.0	-	0.0	0.0	-	-	0.0	0.6	-	-	-	-	-	-	-
2019	0.0	0.0	-	-	0.1	0.7	-	-	-	1.8	-	-	-	0.0	-	0.0	0.0
2025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

FORB SPECIES	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Solanum triflorum[a] (cutleaf nightshade)
year	Nested Frequency			
1997	-	33	-	-
2003	-	-	-	5
2004	6	-	-	152
2008	233	-	-	-
2012	41	-	1	1
2019	-	-	3	2
2025	-	-	-	-
year	Average Cover (%)			
1997	-	0.2	-	-
2003	-	-	-	4.9
2004	0.2	-	-	31.2
2008	1.3	-	-	-
2012	0.1	-	0.0	0.0
2019	-	-	0.0	0.0
2025	-	-	-	-

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

Table 23R-01.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Atriplex confertifolia[p] (shadscale saltbush)	Bassia prostrata[pi] (forage kochia)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
1997	-	-	-	-	-
2003	-	-	-	-	-
2004	-	-	-	-	-
2008	0	-	-	-	-
2012	3.9	-	-	0.1	-
2019	9.9	-	-	-	-
2025	10.8	-	-	-	-
year	Quadrat Cover (%)				
1997	0.6	0.0	0.1	-	0.1
2003	-	-	-	-	-
2004	-	-	-	-	-
2008	0.7	-	-	-	-
2012	5.4	-	-	0.1	-
2019	8.3	-	-	-	-
2025	8.2	-	-	-	-

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

Table 23R-01.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

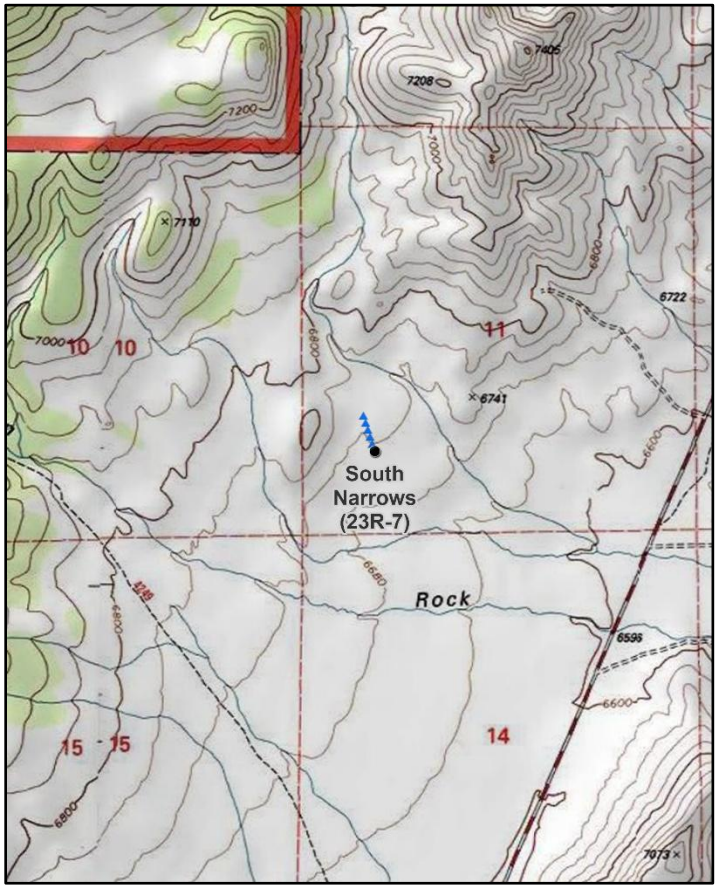
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
1997	740	20	65	30	5	0	0	0	35/60
2003	-	-	-	-	-	-	-	-	52/78
2004	20	20	100	0	0	0	0	0	53/69
2008	300	20	20	80	0	20	0	20	32/43
2012	3740	1800	72	28	1	8	0	3	76/76
2019	2480	20	9	88	3	24	11	14	52/69
2025	2460	-	0	91	9	12	32	38	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
1997	720	20	100	0	0	0	0	0	28/24
2003	-	-	-	-	-	-	-	-	-/-
2004	20	-	100	0	0	0	100	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Bassia prostrata[pi] -- (forage kochia)									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	420	80	100	0	0	38	0	0	- / -
2019	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	37/44
2012	20	-	0	100	0	0	0	100	10/7
2019	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	81/130
2019	-	-	-	-	-	-	-	-	70/135
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	22/36
2019	-	-	-	-	-	-	-	-	24/25
2025	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
1997	20	-	0	100	0	0	0	0	14/29

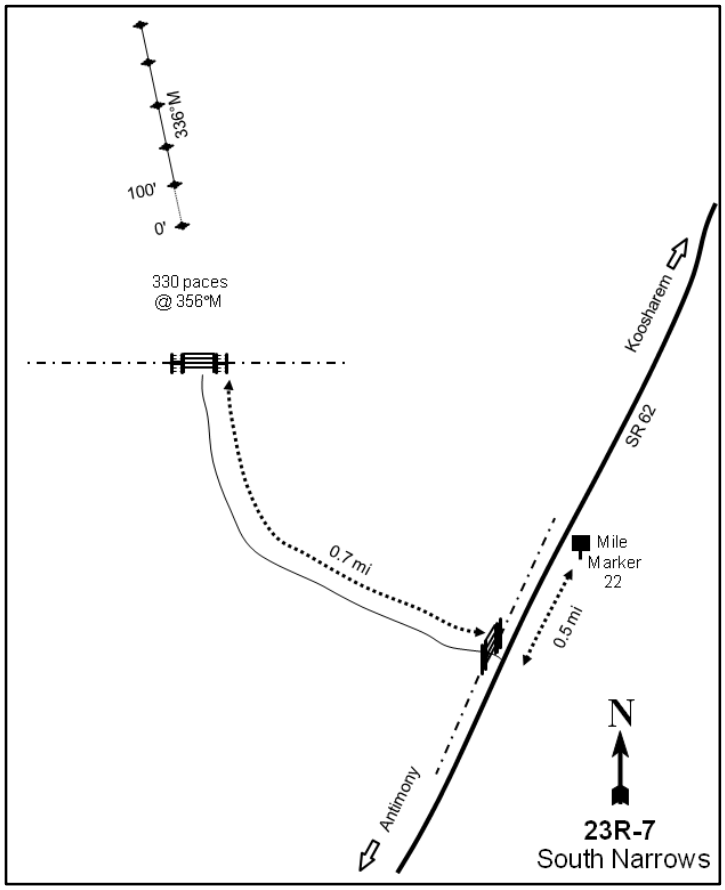
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 23R-01.15 - Deer Desirable Components Index: 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
1997	0.9	0.0	0.0	9.4	0.0	10.0	0.0	**20.3**	Poor
2003	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	Very Poor
2004	0.0	0.0	0.0	0.0	0.0	0.5	0.0	**0.5**	Very Poor
2008	0.0	0.0	0.0	15.1	0.0	8.4	0.0	**23.5**	Poor-Fair
2012	5.0	0.0	0.0	21.5	0.0	0.4	0.0	**26.9**	Poor-Fair
2019	12.4	14.0	4.5	27.2	0.0	0.2	0.0	**58.3**	Good
2025	13.5	12.3	0.0	9.9	0.0	0.0	0.0	**35.7**	Fair

SOUTH NARROWS - STUDY NO. 23R-7





Location Information	
USGS 7.5 min Map Info	Parker Knoll SW; Township 29S, Range 2W, Section 11
GPS (0' Stake)	NAD 83 UTM ZONE 12, 413604 East 4239187 North

Transect Information	
Browse Tag # (0' Stake)	191
Transect Bearing	336° 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 State Route 62 south of Koosharem, there will be a road coming in from the west 0.5 miles south of mile marker 22. Turn onto this road, pass through a gate, and travel 0.7 to another fence with a gate. From here, walk about 1,000 feet at 356 degrees magnetic to the 0-foot stake that is marked with browse tag #191.

Site Information	
Land Ownership	Federal
Land Administrator	BLM
Allotment	SOUTH NARROWS
Elevation	6,700ft (2,042m)
Aspect	South
Slope	4-5%
Sample Dates	08/05/2004, 06/25/2007, 08/07/2012, 08/16/2016, 08/05/2020, 08/13/2025

Table 23R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	-	PDB	1996	-
Seeding - Seed Unknown	-	PDB	1996	-
Harrow - Two-Way Dixie	South Narrows Dixie Harrow - West Side	210	September-November 2005	1740
Seeding - Broadcast Before	South Narrows Dixie Harrow - West Side	210	November 2005	1740
Seeding - Aerial Unknown	South Narrows Dixie Harrow - West Side	210	December 2005	2300

Table 23R-07.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Narrows			Broadcast	Nov 2005	2300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.50	0.40
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.50	0.45
G	Festuca ovina	Sheep Fescue	Covar	1.00	0.95
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.76	0.62
G	Poa secunda	Sandberg Bluegrass	SID OR	0.40	0.32
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.85
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.00	1.67
F	Helianthus annuus	Annual Sunflower		0.33	0.20
F	Linum perenne	Blue Flax		0.24	0.21
F	Linum perenne	Blue Flax		0.22	0.20
F	Medicago sativa	Alfalfa	Ladak +	1.00	0.95
F	Melilotus officinalis	Yellow Sweetclover		0.57	0.40
F	Onobrychis viciifolia	Sainfoin	Eski	1.50	1.41
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.88
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.32	0.15
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.24	0.11

Mix Name			Application Type	Application Date	Acres
South Narrows- Kochia			Aerial	Dec 2005	2300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Bassia prostrata	Forage Kochia	Beaver UT	1.00	0.64

Wildlife Habitat and Vegetation History

Table 23R-07.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		

Table 23R-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	Annual Forb	No Encroachment
2007	Annual Forb	No Encroachment
2012	Annual Forb	No Encroachment
2016	Annual Forb	No Encroachment
2020	Annual Forb	No Encroachment
2025	Annual Forb	No Encroachment

Site Notes

This study is located approximately three and a half miles north of Otter Creek Reservoir within a treated Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat.

Soils

Table 23R-07.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.5	55.0	27.5	17.5	1.1	12.5	604.8	0.7	08/05/2004

Site Potential

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY220UT
States and Transitions	2004-2025 - Annual State: Community Phase 4.1

This study site has remained in poor condition and has been dominated by annual forbs since establishment in 2004. Cover of perennial grasses and forbs has remained low and could be related to rabbit grazing, as quadrat frequency of pellets indicates high presence (Table 23R-07.7, Table 23R-07.9, Table 23R-07.10, Table 23R-07.11). Browse has remained extremely limited and all line-intercept cover has been contributed by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), or more recently, rubber rabbitbrush (*Ericameria nauseosa*) (Table 23R-07.12). This site is expected to remain in a degraded state if current conditions (as of 2025) persist. Without fire or similar disturbance, however, this site may have the potential for slowly increasing sagebrush presence (Jornada, 2025).

Condition of mule deer winter range on this site has ranged between very poor and very poor-poor since 2004; winter range condition is considered to be very poor as of 2025. Factors negatively influencing range condition include a lack of preferred browse cover and recruitment; and a lack of perennial grasses and forbs (Table 23R-07.6, Table 23R-07.7, Table 23R-07.13, Table 23R-07.15). Pellet transect data shows that deer, elk, and cattle presence has been low to absent since 2004 (Table 23R-07.9). During the 2024/25 winter season the area had very few occurrences of nearby collared elk (Wildlife Migration Initiative). Preferred browse density has remained too low to accurately assess utilization (Table 23R-07.13). On-site observations in 2025 noted that there was moderate utilization (20-40%) on Russian wildrye, and little to no utilization on forb species.

Trend Summary Tables

Table 23R-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	0.1	-	-	-	-	-
2007	0.0	-	-	-	-	-
2012	0.2	-	-	0.2	-	-
2016	0.0	-	-	0.1	-	-
2020	-	-	-	-	-	-
2025	0.5	0.8	-	-	0.6	-

Table 23R-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	-	16	53	38	-	0.1	8.2	4.7
2007	-	8	335	19	-	0.0	14.6	0.0
2012	3	25	431	98	0.0	0.5	15.8	0.8
2016	-	9	206	37	-	0.0	6.4	1.5
2020	-	6	85	14	-	0.2	3.9	1.5
2025	-	8	180	-	-	0.6	16.9	-

Table 23R-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	43.7	0.3	22.4	21.4	7.8	14.0
2007	34.8	0.2	45.3	8.0	5.4	14.3
2012	15.2	0.0	55.3	11.4	4.6	18.1
2016	47.0	0.0	33.6	16.9	7.4	7.9
2020	37.2	0.9	35.9	19.7	10.8	5.5
2025	39.3	0.0	37.5	9.3	9.5	18.0

Table 23R-07.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2004	1	1	1	70
2007	2	-	-	97
2012	-	4	-	29
2016	-	-	-	93
2020	2	-	1	41
2025	-	6	-	32
Year	Days Use Per Acre (ha)			
2004	1.5 (3.6)	4.7 (11.6)	3.4 (8.3)	-
2007	-	-	-	-
2012	-	2.0 (5.0)	-	-
2016	-	-	-	-
2020	3.6 (9.0)	-	-	-
2025	6.5 (16.1)	8.1 (19.9)	0.7 (1.7)	-

Table 23R-07.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Leymus cinereus (basin wildrye)	Psathyrostachys juncea[i] (Russian wildrye)
year	Nested Frequency					
2004	-	-	-	16	-	-
2007	-	-	-	8	-	-
2012	3	10	3	13	-	3
2016	1	1	-	5	-	2
2020	-	-	-	-	0	6
2025	-	-	-	-	6	2
year	Average Cover (%)					
2004	-	-	-	0.1	-	-
2007	-	-	-	0.0	-	-
2012	0.0	0.4	0.0	0.1	-	0.0
2016	0.0	0.0	-	0.0	-	0.0
2020	-	-	-	-	0.0	0.2
2025	-	-	-	-	0.6	0.0

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

Table 23R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Astragalus lentiginosus (freckled milkvetch)	Chamaesyce (sandmat)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Helianthus annuus[a] (common sunflower)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Nicotiana attenuata[a] (coyote tobacco)	Salsola tragus[ai] (prickly Russian thistle)	Sisymbrium altissimum[ai] (tall tumblemustard)	Solanum triflorum[a] (cutleaf nightshade)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency																
2004	-	38	-	-	11	4	3	-	-	5	-	0	22	-	14	0	-
2007	-	13	-	-	-	115	45	-	3	230	6	-	262	3	4	-	-
2012	0	1	2	-	2	72	-	12	146	367	-	-	276	95	-	97	3
2016	-	17	-	-	-	10	5	-	10	-	-	27	96	130	-	20	-
2020	-	9	5	-	-	-	9	-	-	-	-	-	3	67	6	-	-
2025	-	-	-	0	-	-	1	-	-	-	-	-	180	0	-	-	-
year	Average Cover (%)																
2004	-	4.0	-	-	2.5	0.1	0.1	-	-	0.5	-	0.2	3.6	-	1.3	0.8	-
2007	-	0.0	-	-	-	4.2	0.2	-	0.0	9.0	0.0	-	0.9	0.1	0.0	-	-
2012	0.0	0.1	0.0	-	0.0	1.5	-	0.1	1.1	8.2	-	-	3.0	2.0	-	0.7	0.0
2016	-	0.8	-	-	-	0.1	0.1	-	0.1	-	-	1.1	3.0	2.1	-	0.6	-
2020	-	1.5	0.0	-	-	-	1.7	-	-	-	-	-	1.2	0.6	0.4	-	-
2025	-	-	-	0.0	-	-	0.1	-	-	-	-	-	16.7	0.0	-	-	-

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

Table 23R-07.12 - 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[ai] (forage kochia)	Ericameria nauseosa (rubber rabbitbrush)
year	Line Intercept Cover		
2004	-	-	-
2007	-	-	-
2012	0.2	-	-
2016	0.1	-	-
2020	-	-	-
2025	-	-	0.6
year	Quadrat Cover (%)		
2004	0.1	-	-
2007	-	0.0	-
2012	0.2	-	-
2016	0.0	-	-
2020	-	-	-
2025	-	0.5	0.8

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

Table 23R-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.

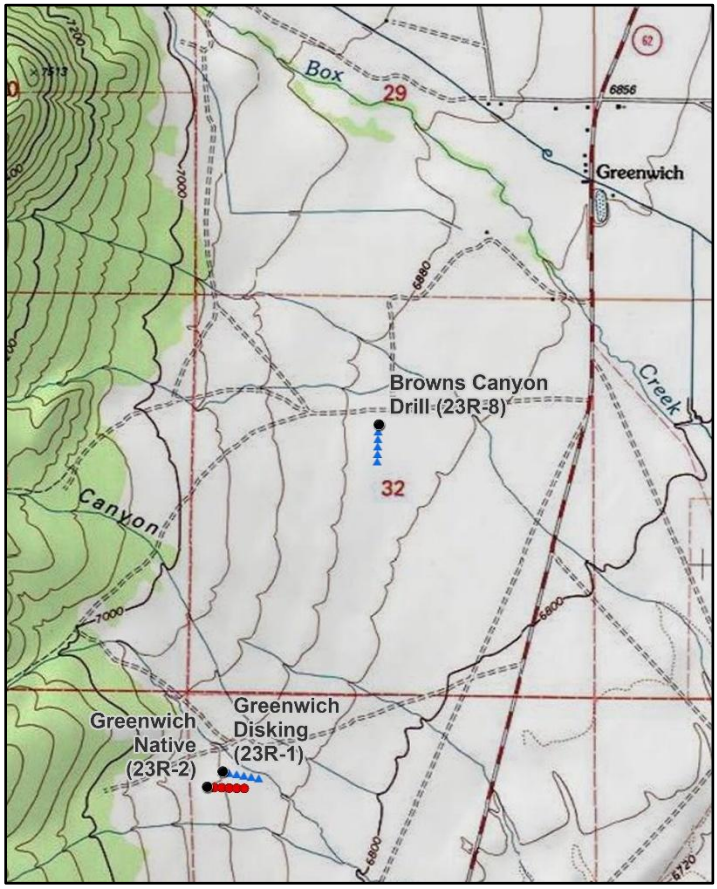
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2004	40	-	0	50	50	0	0	50	45/66
2007	20	-	0	0	100	0	0	100	- / -
2012	80	-	75	25	0	25	0	0	24/32
2016	20	-	0	100	0	0	100	0	32/49
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Bassia prostrata[pi] -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	20	200	0	100	0	0	0	0	- / -
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	600	-	13	87	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	60/76
2016	-	-	-	-	-	-	-	-	89/127
2020	20	-	0	100	0	100	0	0	56/69
2025	160	-	0	100	0	0	13	0	- / -
Opuntia -- (pricklypear)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	15/38
2016	-	-	-	-	-	-	-	-	15/50

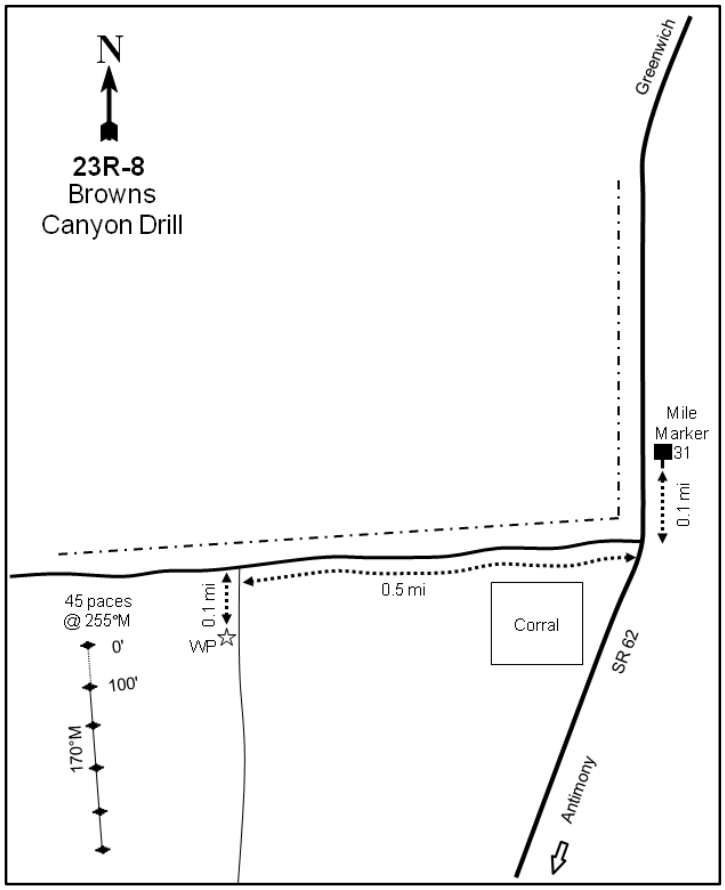
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 23R-07.15 - Deer Desirable Components Index: Semidesert Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2004	0.0	0.0	0.0	0.2	0.0	9.5	0.0	**9.7**	Very Poor-Poor
2007	0.0	0.0	0.0	0.0	0.0	0.1	0.0	**0.1**	Very Poor
2012	0.3	0.0	0.0	1.1	0.0	1.6	0.0	**3.0**	Very Poor
2016	0.1	0.0	0.0	0.1	0.0	2.9	0.0	**3.1**	Very Poor
2020	0.0	0.0	0.0	0.5	0.0	3.0	0.0	**3.5**	Very Poor
2025	0.0	0.0	0.0	1.2	0.0	0.0	0.0	**1.2**	Very Poor
2004	0.0	0.0	0.0	0.2	0.0	9.5	0.0	**9.7**	Very Poor-Poor
2007	0.0	0.0	0.0	0.0	0.0	0.1	0.0	**0.1**	Very Poor

BROWNS CANYON DRILL - STUDY NO. 23R-8





Location Information

USGS 7.5 min Map Info	Greenwich SE; Township 27S, Range 1W, Section 32
GPS (0' Stake)	NAD 83 UTM ZONE 12, 418604 East 4253004 North

Transect Information

Browse Tag # (0' Stake)	54
Transect Bearing	170° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

Travel south of Greenwich on State Route 62. From mile marker 31, travel 0.1 miles north to a road that comes in from the west. Turn onto this road and travel 0.5 miles to a road that comes in from the left (south). Turn left onto this road and drive 100 feet to a witness post on the right-hand (west) side of the road. From the witness post, walk 45 paces at 255 degrees magnetic to the 0-foot stake that is marked with browse tag #54.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,870ft (2,094m)
Aspect	East
Slope	2%
Sample Dates	08/05/2004, 06/27/2007, 08/07/2012, 08/18/2016, 08/03/2020, 08/12/2025

Table 23R-08.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	Greenwich Disking	PDB	December 2003	275
Disc - Disc Unknown	-	PDB	Fall 1996	-
Seeding - Seed Unknown	-	PDB	Fall 1996	-
Seeding - Truax Drill	Greenwich Disking	PDB	October 2003	275
Seeding - Rangeland Drill	Grass Valley/Rocky Knoll Phase II	2256	November 2013	172

Table 23R-08.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Greenwich Discing			Drill	Oct 2003	275
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	2.00	1.81
G	Dactylis glomerata	Orchardgrass	Paiute	0.55	0.47
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.09	0.92
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.09	0.94
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.45	1.28
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	2.00	1.80
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.00	1.81
F	Linum perenne	Blue Flax	Appar	0.36	0.33
F	Medicago sativa	Alfalfa	Ladak+	1.09	1.03
F	Melilotus officinalis	Yellow Sweetclover		0.36	0.32

Mix Name			Application Type	Application Date	Acres
Greenwich Discing Shrubs			Aerial	Dec 2003	275
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		1.00	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		1.16	0.12
S	Bassia prostrata	Forage Kochia		1.82	0.55

Mix Name			Application Type	Application Date	Acres
Grass Valley Rocky Knoll 2			Drill	Nov 2013	170
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.03	0.98
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.15	0.14
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.47	1.28
G	Elymus elymoides	Bottlebrush Squirreltail	Juab UT	0.50	0.46
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.76	1.60
G	Leymus cinereus	Great Basin Wildrye	Magnar	0.59	0.51
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.88	0.79
F	Linum perenne	Blue Flax	Appar	0.29	0.26
F	Medicago sativa	Alfalfa	Ranger (NC)	1.47	1.36
F	Onobrychis viciifolia	Sainfoin	Eski	2.06	1.77
F	Sanguisorba minor	Small Burnet	Delar	2.06	1.81

Wildlife Habitat and Vegetation History

Table 23R-08.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		

Table 23R-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	Forage Kochia/Annual Forb	NA
2007	Forage Kochia	NA
2012	Forage Kochia	NA
2016	Forage Kochia	NA
2020	Forage Kochia	NA
2025	Perennial Grass	NA

Site Notes

This study is located approximately one-half mile southwest of Greenwich within a treated Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat.

Soils

Table 23R-08.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.4	51.0	26.8	22.2	1.1	15.7	249.6	0.7	08/05/2004

Site Potential

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY220UT
States and Transitions	2004-2016 - Seeded State: Community Phase Undefined 2020-2025 - Seeded State: Community Phase 6.1

From establishment in 2004 through the 2020 sample year, this study site was dominated by forage kochia (*Bassia prostrata*) with few other shrub species present. However, forage kochia had a notable decrease in cover and density in 2025 (Table 23R-08.12, Table 23R-08.13). Annual forbs, mainly prickly Russian thistle (*Salsola tragus*), were a co-dominant component in 2004, but cover has since decreased. Perennial grasses and forbs have been rare in most years. However, Russian wildrye (*Psathyrostachys juncea*) has increased in cover since 2012 while maintaining similar nested frequencies, and perennial grasses were the dominant site component in 2025 (Table 23R-08.7, Table 23R-08.10, Table 23R-08.11). Without a major disturbance, this site is expected to remain in this or a similar state in future sample years.

Condition of mule deer winter range on this site has decreased from good to very poor over the course of the study. Factors negatively influencing range condition include a lack of preferred browse cover and recruitment; and a lack of perennial grasses and forbs (Table 23R-08.6, Table 23R-08.7, Table 23R-08.13, Table 23R-08.15). Pellet transect data shows that deer and elk presence has been low since 1997. During the 2024/25 winter season the area had very few occurrences of nearby collared elk (Wildlife Migration Initiative). Cattle presence has increased over time and is considered to be high as of 2025 (Table 23R-08.9). Since 2007, forage kochia has decreased in density. Utilization of forage kochia has been considered heavy in every sample year except 2004 and 2020 (Table 23R-08.13). On-site observations in 2025 noted that there was heavy utilization (>40%) on Russian wildrye, and light utilization (10-20%) on prickly Russian thistle. Russian wildrye seedheads were hedged: this may have reduced its immediate fitness. Shrubs appeared to be drought-affected with poor leader growth being the most notable (Photos).

Trend Summary Tables

Table 23R-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	21.0	0.0	-	30.9	-	-
2007	18.7	-	-	16.5	-	-
2012	22.1	0.0	-	26.2	-	-
2016	17.2	-	-	27.0	-	-
2020	11.1	-	-	16.1	-	-
2025	0.9	-	-	0.8	-	-

Table 23R-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	-	3	213	80	-	0.0	13.9	1.3
2007	-	7	283	7	-	0.0	2.0	0.2
2012	-	20	58	-	-	0.9	0.6	-
2016	-	16	116	40	-	0.9	1.7	0.6
2020	-	31	-	1	-	1.5	-	0.0
2025	-	37	15	-	-	2.6	0.0	-

Table 23R-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	44.9	0.1	21.5	3.9	4.7	38.0
2007	50.9	0.0	28.7	5.4	5.8	19.3
2012	51.5	0.1	27.2	3.3	4.8	23.4
2016	49.3	0.0	32.3	4.7	7.1	18.9
2020	40.9	0.1	34.8	14.4	6.7	12.6
2025	69.3	0.0	16.4	9.4	9.3	3.6

Table 23R-08.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2004	-	-	3	55
2007	3	-	-	98
2012	6	2	-	68
2016	5	-	-	98
2020	5	-	1	72
2025	10	4	-	88
Year	Days Use Per Acre (ha)			
2004	-	3.4 (8.3)	6.7 (16.6)	-
2007	15.3 (37.7)	-	-	-
2012	12.3 (30.5)	19.4 (48.0)	-	-
2016	7.2 (17.9)	-	0.7 (1.7)	-
2020	16.0 (39.5)	-	-	-
2025	39.9 (98.6)	-	-	-

Table 23R-08.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Psathyrostachys juncea[i] (Russian wildrye)
year	Nested Frequency			
2004	2	1	-	-
2007	-	7	-	-
2012	3	1	-	16
2016	-	-	3	13
2020	-	-	-	31
2025	-	-	-	37
year	Average Cover (%)			
2004	0.0	0.0	-	-
2007	-	0.0	-	-
2012	0.3	0.0	-	0.6
2016	-	-	0.0	0.8
2020	-	-	-	1.5
2025	-	-	-	2.6

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

Table 23R-08.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus lentiginosus (freckled milkvetch)	Cirsium (thistle)	Cleome serrulata[a] (Rocky Mountain beeplant)	Descurainia pinnata[a] (western tansymustard)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Marrubium vulgare[i] (horehound)	Nicotiana attenuata[a] (coyote tobacco)	Salsola tragus[ai] (prickly Russian thistle)	Sisymbrium altissimum[ai] (tall tumblemustard)	Solanum triflorum[a] (cutleaf nightshade)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	unknown perennial forb (unknown forb)
year	Nested Frequency												
2004	57	-	4	0	-	5	15	16	90	-	157	-	21
2007	2	1	-	74	4	270	1	-	11	21	-	3	-
2012	-	-	-	3	-	28	-	-	-	29	-	-	-
2016	40	-	-	79	-	49	-	-	-	12	-	-	-
2020	1	-	-	-	-	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-	15	-	-	-	-
year	Average Cover (%)												
2004	0.9	-	0.8	0.0	-	0.1	0.3	0.1	9.0	-	3.9	-	0.2
2007	0.0	0.0	-	0.2	0.0	1.5	0.1	-	0.0	0.2	-	0.0	-
2012	-	-	-	0.0	-	0.1	-	-	-	0.5	-	-	-
2016	0.6	-	-	1.1	-	0.2	-	-	-	0.4	-	-	-
2020	0.0	-	-	-	-	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-	0.0	-	-	-	-

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

Table 23R-08.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Bassia prostrata[pi] (forage kochia)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
2004	-	-	30.9	0
2007	-	-	16.5	-
2012	-	-	26.2	-
2016	-	-	27	-
2020	-	-	16.1	-
2025	-	-	0.8	-
year	Quadrat Cover (%)			
2004	-	0.1	20.9	0.0
2007	-	-	18.7	-
2012	-	-	22.1	0.0
2016	-	-	17.2	-
2020	0.4	-	10.7	-
2025	-	-	0.9	-

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

Table 23R-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.

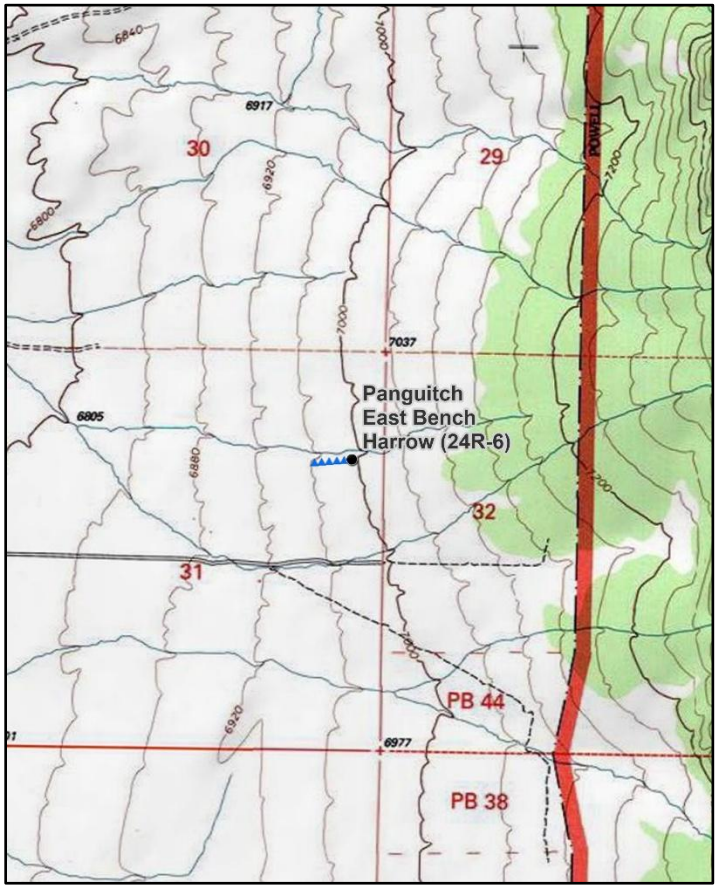
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	63/56
2016	-	-	-	-	-	-	-	-	38/37
2020	-	-	-	-	-	-	-	-	41/50
2025	20	-	100	0	0	0	0	0	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2004	20	-	100	0	0	0	0	0	- / -
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	140	-	0	100	0	0	0	0	29/51
2025	-	-	-	-	-	-	-	-	-/-
Bassia prostrata[pi] -- (forage kochia)									
2004	5360	-	1	99	0	9	0	0	34/39
2007	53720	-	31	69	0	1	98	0	10/22
2012	35700	94940	43	57	0	30	37	0	14/32
2016	18960	-	1	99	0	19	63	4	21/35
2020	12800	20	5	94	1	22	11	1	28/37
2025	6260	880	50	20	31	1	86	74	- / -
Opuntia -- (pricklypear)									
2004	80	-	0	75	25	0	0	0	11/35
2007	20	-	0	0	100	0	0	100	12/46
2012	40	-	0	100	0	0	0	0	13/47
2016	-	-	-	-	-	-	-	-	7/23
2020	-	-	-	-	-	-	-	-	11/44

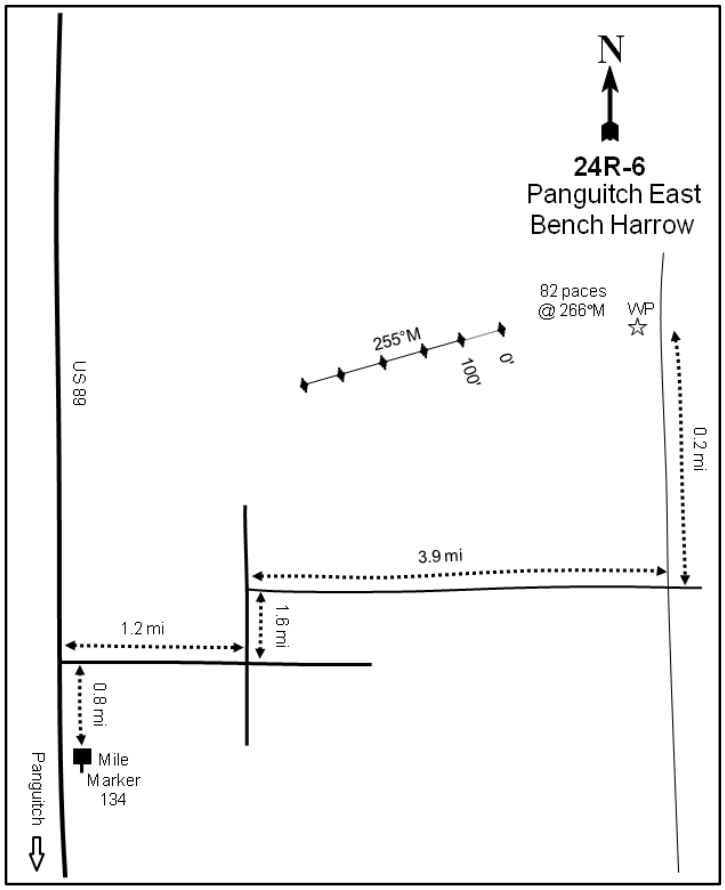
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 23R-08.15 - Deer Desirable Components Index: Semidesert Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2004	30.0	15.0	0.4	0.0	0.0	2.7	0.0	**48.1**	Good
2007	24.8	15.0	15.0	0.0	0.0	0.3	0.0	**55.1**	Good
2012	30.0	14.9	15.0	1.8	0.0	0.0	0.0	**61.7**	Good
2016	30.0	15.0	0.4	1.7	0.0	1.1	0.0	**48.2**	Good
2020	24.2	14.7	2.7	3.0	0.0	0.0	0.0	**44.6**	Fair-Good
2025	1.2	0.0	0.0	5.2	0.0	0.0	0.0	**6.4**	Very Poor

PANGUITCH EAST BENCH HARROW - STUDY NO. 24R-6





Location Information

USGS 7.5 min Map Info	Blind Spring Mountai; Township 33S, Range 4W, Section 31
GPS (0' Stake)	NAD 83 UTM ZONE 12, 382044 East 4195732 North

Transect Information

Browse Tag # (0' Stake)	41
Transect Bearing	255° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 5: No Rebar

Directions to Site

Travel north of Panguitch on US-89 to mile marker 134. Continue 0.8 miles north of the mile marker to a road that comes in from the right (east). Turn onto this road and travel 1.2 miles to an intersection. Turn left and drive 1.6 miles to a 90 degree turn. Continue 3.9 miles to a road that comes in from the left (north). Turn left here and travel 0.2 miles to two witness posts on the left (west) side of the road that are right next to each other. From the witness posts, walk 82 paces at 266 degrees magnetic to the 0-foot stake that is marked with browse tag #41.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SANFORD BENCH
Elevation	7,000ft (2,134m)
Aspect	West
Slope	3-7%
Sample Dates	07/19/2004, 06/19/2007, 08/22/2012, 08/17/2016, 08/11/2020, 08/12/2025

Table 24R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Dixie	Panguitch East Bench	PDB	October 2004	300
Seeding - Broadcast Before	Panguitch East Bench	PDB	October 2004	300
Seeding - Aerial After	Panguitch East Bench	PDB	December 2004	300

Table 24R-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Panguitch East Bench			Broadcast	Oct 2004	300
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	0.50	0.47
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.50	0.45
G	Elymus elymoides	Bottlebrush Squirreltail		0.13	0.10
G	Elymus hoffmannii	Newhy Wheatgrass		0.50	0.44
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.17	1.03
G	Festuca brevipila	Hard Fescue		0.50	0.45
G	Hesperostipa comata	Needle and Threadgrass		0.12	0.10
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.50	0.47
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.50	0.45
F	Achillea millefolium	Western Yarrow		0.07	0.06
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete UT	0.50	0.49
F	Linum perenne	Blue Flax	Appar	0.17	0.14
F	Medicago sativa	Alfalfa	Ladak+	1.00	0.95
F	Melilotus officinalis	Yellow Sweetclover		0.04	0.04
F	Onobrychis viciifolia	Sainfoin		2.67	2.55
F	Sanguisorba minor	Small Burnet	Delar	1.67	1.60

Mix Name			Application Type	Application Date	Acres
Panguitch East Bench Forage Kochia			Aerial	Dec 2004	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Bassia prostrata	Forage Kochia	Immigrant	1.00	0.67

Wildlife Habitat and Vegetation History

Table 24R-06.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	winter
Greater Sage-Grouse		undefined & undefined
Pronghorn	crucial	year-long

Table 24R-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	Wyoming Big Sagebrush	Early Phase I
2007	Wyoming Big Sagebrush	Early Phase I
2012	Wyoming Big Sagebrush/Perennial Grass	Early Phase I
2016	Wyoming Big Sagebrush/Perennial Grass	Early Phase I
2020	Wyoming Big Sagebrush	Early Phase I
2025	Wyoming Big Sagebrush	Early Phase I

Site Notes

This study is located approximately eight miles northwest of Panguitch within a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat.

Soils

Table 24R-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 Clay Loam	7.6	55.0	23.4	21.6	1.4	7.8	611.2	0.7	07/19/2004

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R047XB222UT
States and Transitions	2004 - Current Potential State: Community Phase 2.1 2007 - Current Potential State: Community Phase 2.2 2012-2025 - Current Potential State: Community Phase 2.1

The plant community on this site has existed as a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*)-dominated plant community since study establishment in 2004. Decadence was high in the 2004 sample year and the site was harrowed and seeded that fall (Table 24R-06.1). Sagebrush cover exhibited an initial decrease, but has since surpassed pre-treatment levels. In addition, decadence has generally remained low following treatment (Table 24R-06.12, Table 24R-06.13). Perennial grasses, mainly blue grama (*Bouteloua gracilis*), increased in cover and became a co-dominant component in 2012. Blue grama cover decreased substantially in 2020, but rebounded in 2025 (Table 24R-06.7, Table 24R-06.10). Although no trees have been recorded in the data, photos reveal that there is at least one on the site and a woodland to the east (Photos, Table 24R-06.12, Table 24R-06.13). Although it is likely not an immediate concern, proximity of these trees indicates that this site has the potential for future encroachment.

Condition of mule deer winter range on this site has ranged between poor and excellent since 2004. Winter range condition is considered to be excellent as of 2025, but factors negatively influencing this condition include reduced preferred browse recruitment; and a lack of perennial forbs (Table 24R-06.7, Table 24R-06.13, Table 24R-06.15). Pellet transect data shows that deer and/or pronghorn and cattle presence has been low since 2004 (Table 24R-06.9). Sagebrush density increased between 2007 and 2020, but it decreased in 2025. Utilization of sagebrush has been light but was considered to be moderate in 2020 (Table 24R-06.13). On-site observations in 2025 noted that there was light utilization (10-20%) on Russian wildrye, and little to no utilization on forb species. The community appeared to be drought-affected with poor leader growth on browse species, and little to no seed production or primary growth in the herbaceous community (Photos).

Trend Summary Tables

Table 24R-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	18.1	0.1	-	19.5	-	-
2007	7.7	0.2	-	4.7	-	-
2012	18.3	-	-	15.9	-	-
2016	19.8	0.3	-	22.8	0.2	-
2020	19.2	-	-	24.6	0.1	-
2025	19.8	0.0	-	25.1	-	-

Table 24R-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	-	185	16	3	-	5.3	0.1	0.0
2007	-	162	89	12	-	6.4	1.1	0.0
2012	-	211	95	22	-	10.9	0.6	0.1
2016	-	297	3	4	-	20.6	0.0	0.0
2020	-	280	24	3	-	8.1	0.1	0.0
2025	-	265	25	-	-	14.6	0.1	-

Table 24R-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	36.6	3.4	23.8	22.8	4.1	23.1
2007	49.7	0.1	28.2	9.1	5.0	15.9
2012	38.4	0.6	26.1	11.2	3.5	30.3
2016	32.7	0.6	26.4	13.1	4.2	39.1
2020	22.1	0.4	39.4	13.8	5.8	28.0
2025	28.3	0.4	32.7	12.4	6.5	33.7

Table 24R-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/Pronghorn	Rabbit
	Quadrat Frequency		
2004	-	1	26
2007	-	1	91
2012	2	-	33
2016	-	2	41
2020	-	8	60
2025	1	3	15
Year	Days Use Per Acre (ha)		
2004	-	1.3 (3.3)	-
2007	-	4.0 (9.9)	-
2012	8.0 (19.7)	2.0 (5.0)	-
2016	2.9 (7.2)	7.4 (18.2)	-
2020	5.1 (12.6)	7.4 (18.2)	-
2025	3.6 (9.0)	2.0 (5.0)	-

Table 24R-06.10 - 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)	Elymus wawawaiensis (Snake River wheatgrass)	Festuca brevipila[i] (hard fescue)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency										
2004	-	-	148	38	-	-	-	-	5	-	-
2007	3	7	148	8	-	-	2	-	3	2	1
2012	15	8	154	17	1	18	4	-	3	17	-
2016	20	-	254	62	-	-	-	1	-	4	-
2020	1	10	221	84	-	-	-	-	-	-	1
2025	9	9	220	53	-	-	-	-	-	14	-
year	Average Cover (%)										
2004	-	-	4.3	1.0	-	-	-	-	0.0	-	-
2007	0.0	0.0	6.2	0.1	-	-	0.0	-	0.0	0.0	0.0
2012	0.5	0.4	8.8	0.2	0.0	0.5	0.0	-	0.0	0.4	-
2016	0.6	-	18.4	1.1	-	-	-	0.0	-	0.4	-
2020	0.0	0.4	5.9	1.8	-	-	-	-	-	-	0.0
2025	0.2	0.5	11.7	1.3	-	-	-	-	-	0.9	-

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

Table 24R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus lentiginosus (freckled milkvetch)	Chamaesyce (sandmat)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cleome serrulata[a] (Rocky Mountain beeplant)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Gilia inconspicua[a] (shy gilia)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)
year	Nested Frequency														
2004	-	3	-	-	-	-	16	-	-	-	-	-	-	-	-
2007	4	7	-	4	9	-	60	22	1	4	2	-	1	-	-
2012	11	-	8	-	1	-	33	44	-	1	4	29	1	-	2
2016	-	-	-	-	-	3	3	-	-	-	-	-	-	1	-
2020	-	3	-	-	-	-	9	4	-	-	13	-	-	-	-
2025	-	-	-	24	-	-	-	-	-	-	2	1	-	-	-
year	Average Cover (%)														
2004	-	0.0	-	-	-	-	0.1	-	-	-	-	-	-	-	-
2007	0.0	0.0	-	0.0	0.2	-	0.9	0.0	0.0	0.0	0.0	-	0.0	-	-
2012	0.0	-	0.0	-	0.0	-	0.1	0.2	-	0.0	0.0	0.3	0.0	-	0.0
2016	-	-	-	-	-	0.0	0.0	-	-	-	-	-	-	0.0	-
2020	-	0.0	-	-	-	-	0.1	0.0	-	-	0.0	-	-	-	-
2025	-	-	-	0.1	-	-	-	-	-	-	0.0	0.0	-	-	-

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

Table 24R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)
year	Line Intercept Cover (%)			
2004	19.5	-	-	-
2007	4.7	-	-	-
2012	15.9	-	-	-
2016	22.8	-	0.1	0.1
2020	24.6	-	-	0.1
2025	25.1	-	-	-
year	Quadrat Cover (%)			
2004	18.1	-	0.1	-
2007	7.7	0.1	-	0.0
2012	18.3	-	-	-
2016	19.8	-	0.3	0.0
2020	19.2	-	-	0.0
2025	19.8	-	-	0.0

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

Table 24R-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.

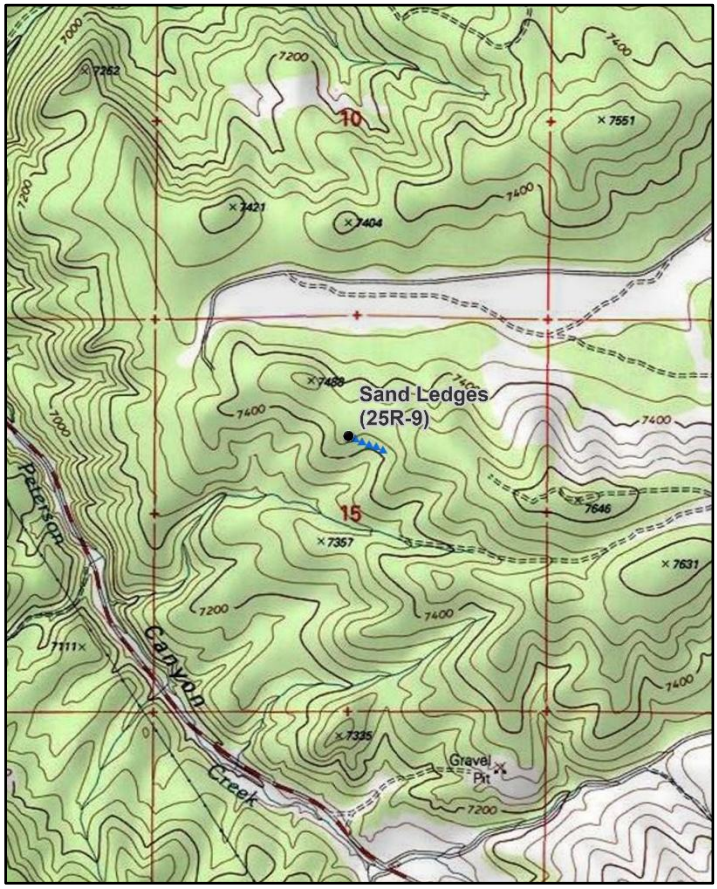
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2004	6960	60	7	48	45	3	0	26	42/65
2007	2460	80	10	68	23	22	7	59	37/55
2012	15400	9160	82	18	1	8	0	1	47/71
2016	15680	80	57	42	1	23	2	1	40/62
2020	16340	-	29	65	6	54	7	5	39/59
2025	13040	-	9	68	23	12	22	41	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2004	140	-	71	29	0	0	0	0	12/18
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	10/12
2016	180	-	11	89	0	0	0	0	18/24
2020	40	-	50	50	0	0	0	0	12/9
2025	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
2004	40	-	0	100	0	0	0	0	11/24
2007	20	-	0	100	0	0	0	0	3/4
2012	20	-	0	100	0	0	0	0	10/16
2016	20	-	0	100	0	0	0	0	10/18
2020	60	-	67	33	0	0	0	0	12/24
2025	60	-	0	100	0	0	0	33	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	20	-	100	0	0	0	0	0	2/3

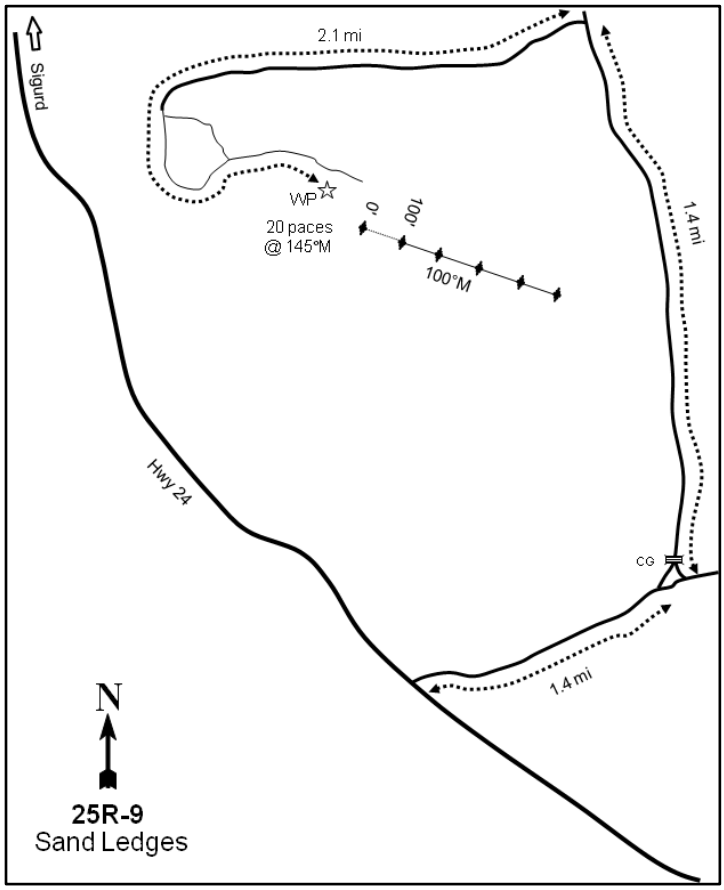
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 24R-06.15 - 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
2004	24.4	1.5	3.6	10.7	0.0	0.1	0.0	**40.3**	Fair
2007	5.9	0.0	0.0	12.8	0.0	0.1	0.0	**18.8**	Poor
2012	19.9	14.8	15.0	21.8	0.0	0.2	0.0	**71.7**	Excellent
2016	28.5	14.8	15.0	30.0	0.0	0.0	0.0	**88.3**	Excellent
2020	30.0	13.4	14.6	16.3	0.0	0.0	0.0	**74.3**	Excellent
2025	30.0	8.1	4.7	29.3	0.0	0.0	0.0	**72.1**	Excellent

SAND LEDGES - STUDY NO. 25R-9





Location Information	
USGS 7.5 min Map Info	Water Creek Canyon N; Township 24S, Range 1W, Section 15
GPS (0' Stake)	NAD 83 UTM ZONE 12, 422207 East 4286724 North

Transect Information	
Browse Tag # (0' Stake)	Not Available
Transect Bearing	100° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From Highway 24, drive 1.4 miles to a junction. Turn left, travel 1.4 miles, then turn right. Drive for 2.1 miles to a witness post on the right-hand (south) side of the road (there are two roads that climb to the top of the hill and both roads reach the site). From the witness post, walk 20 paces at 145 degrees magnetic to the 0-foot stake.

Site Information	
Land Ownership	State
Land Administrator	SITLA
Allotment	GYPSUM
Elevation	7,458ft (2,273m)
Aspect	Southeast
Slope	16%
Sample Dates	08/09/2012, 08/15/2016, 08/03/2020, 08/13/2025

Table 25R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	Sand Ledges Chaining 1983	LTDL	July-November 1983	1980
Seeding - Aerial Unknown	Sand Ledges Chaining 1983	LTDL	July-November 1983	1980
Hand Crew - Lop and Scatter	Sandledges Lop and Scatter Project Phase II	2334	June 2013	2275
Herbicide - Plateau	Willow Patch Fire Rehabilitation Project	4739	Fall 2018	1674
Chaining - One-Way Ely	Willow Patch Fire Rehabilitation Project	4739	Winter 2019-June 2021	1674
Fire - Wildfire	Willow Patch Fire	-	June-July 2018	4583
Seeding - Aerial Before	Willow Patch Fire Rehabilitation Project	4739	Winter 2019	1674

Table 25R-09.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Sand Ledges Aerial Seeding Mix			Aerial	Jul 1983	1980
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Desert Wheatgrass		1.84	0.00
G	Psathyrostachys juncea	Russian Wildrye		1.08	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.91	0.00
F	Medicago sativa	Alfalfa		1.13	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.15	0.00

Wildlife Habitat and Vegetation History

Table 25R-09.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 25R-09.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon-Juniper/Mountain Big Sagebrush-Bitterbrush	Phase II
2016	Mountain Big Sagebrush-Bitterbrush/Annual Grass	Early Phase I
2020	Perennial Grass	Early Phase I
2025	Perennial Grass	No Encroachment

Site Notes

This study is located approximately five miles east of Glenwood within an old twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) chaining.

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB462UT
States and Transitions	2012 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase Undefined 2016 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase 2.1 2020-2025 - Introduced Grassland State: Community Phase 6.1

In 2012, this study site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) in the shrub understory. A lop and scatter project later that year removed many of the trees, and cover of sagebrush and bitterbrush had increased as of 2016. However, a wildfire in 2018 removed much of the shrub and remaining tree components from the community (Table 25R-09.1, Table 25R-09.12, Table 25R-09.13). Although initially sparse, the herbaceous understory was abundant in 2016, but much of the cover was contributed by the introduced annual grass species cheatgrass (*Bromus tectorum*). Since 2020 (and following the wildfire) the introduced perennial grasses intermediate wheatgrass (*Thinopyrum intermedium*) and crested wheatgrass (*Agropyron cristatum*) have been the dominant species (Table 25R-09.7, Table 25R-09.10).

Condition of mule deer winter range on this site has ranged between poor and very poor since 2012; winter range condition is considered very poor as of 2025. Factors negatively influencing range condition include a lack of preferred browse cover andrecruitment; a lack of perennial forbs; and the presence of cheatgrass (Table 25R-09.6, Table 25R-09.7, Table 25R-09.10, Table 25R-09.13, Table 25R-09.15). Pellet transect data shows that deer and elk presence has been low most sample years, but deer presence was moderate in 2016 and that of elk was moderate in 2020. In addition, the area had occurrences of collared elk during the 2024/25

winter season (Wildlife Migration Initiative). Cattle presence was low to absent between 2012 and 2020, but it was moderate in 2025 (Table 25R-09.9). Preferred shrub densities are very low as of 2025 making it difficult to assess overall wildlife utilization (Table 25R-09.13). On-site observations in 2025 noted that there was light utilization (10-20%) on intermediate and crested wheatgrasses, and light utilization on alfalfa (*Medicago sativa*) (Photos).

Trend Summary Tables

Table 25R-09.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	6.4	0.2	20.1	10.5	0.5	20.5
2016	11.9	0.1	1.6	16.1	0.2	2.9
2020	0.5	-	-	0.4	-	-
2025	3.5	-	-	2.2	-	-

Table 25R-09.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	195	216	18	38	0.9	5.6	0.0	0.1
2016	405	250	37	19	22.2	10.6	0.3	0.1
2020	23	285	8	25	0.4	19.9	0.2	1.9
2025	205	316	44	26	2.3	20.5	0.9	0.2

Table 25R-09.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	5.2	0.6	34.6	37.9	16.1	31.3
2016	6.3	-	54.3	9.7	8.7	45.3
2020	24.1	-	16.8	25.3	31.1	24.4
2025	16.7	0.8	26.5	19.8	25.6	25.4

Table 25R-09.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2012	-	-	2	1	5
2016	-	-	8	2	51
2020	-	-	5	16	2
2025	2	-	4	8	4
Year	Days Use Per Acre (ha)				
2012	1.5 (3.6)	8.7 (21.5)*	5.3 (13.2)	7.4 (18.2)	-
2016	2.9 (7.2)	-	24.1 (59.6)	14.7 (36.4)	-
2020	-	-	5.3 (13.2)	22.8 (56.3)	-
2025	16.0 (39.5)	-	0.7 (1.7)	14.7 (36.4)	-

*Pellets per acre (ha)

Table 25R-09.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus inermis[i] (smooth brome)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency										
2012	5	28	6	195	-	-	-	40	6	92	96
2016	12	34	3	405	6	1	-	4	11	77	150
2020	12	88	4	23	-	-	0	6	-	24	203
2025	13	165	4	205	-	-	3	6	-	28	174
year	Average Cover (%)										
2012	0.0	0.5	0.0	0.9	-	-	-	0.2	0.0	2.9	1.8
2016	0.1	1.1	0.0	22.2	0.0	0.0	-	0.0	0.3	2.8	6.1
2020	0.9	3.6	0.2	0.4	-	-	0.0	0.1	-	0.9	14.3
2025	0.6	9.2	0.0	2.3	-	-	0.1	0.0	-	1.8	8.7

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

Table 25R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Arabis (rockcress)	Astragalus lentiginosus (freckled milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Descurainia pinnata[a] (western tansymustard)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Lactuca serriola[ai] (prickly lettuce)	Medicago sativa[i] (alfalfa)	Microsteris gracilis[a] (slender phlox)	Onobrychis viciifolia[i] (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2012	-	11	11	-	-	4	1	-	1	-	2	-	-	-	1	4	-
2016	10	-	3	-	7	-	1	-	-	-	1	-	25	-	1	-	3
2020	-	-	11	-	-	-	-	-	-	-	2	11	3	3	-	-	-
2025	37	-	3	5	0	4	-	3	2	3	-	11	1	-	-	-	3
year	Average Cover (%)																
2012	-	0.0	0.0	-	-	0.0	0.0	-	0.0	-	0.0	-	-	-	0.0	0.0	-
2016	0.1	-	0.0	-	0.0	-	0.0	-	-	-	0.0	-	0.1	-	0.0	-	0.0
2020	-	-	0.6	-	-	-	-	-	-	-	0.2	1.1	0.0	0.2	-	-	-
2025	0.1	-	0.1	0.0	0.0	0.0	-	0.0	0.0	0.1	-	0.2	0.0	-	-	-	0.0

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

FORB SPECIES	Polygonum douglasii[a] (Douglas' knotweed)	Salsola tragus[ai] (prickly Russian thistle)	Streptanthus cordatus (heartleaf twistflower)	Symphyotrichum (aster)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency				
2012	15	-	1	8	-
2016	5	-	6	-	1
2020	3	-	1	-	-
2025	-	4	-	-	-
year	Average Cover (%)				
2012	0.0	-	0.0	0.0	-
2016	0.0	-	0.0	-	0.1
2020	0.0	-	0.0	-	-
2025	-	0.6	-	-	-

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

Table 25R-09.12 - 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)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)					
2012	6.4	-	0.5	14.2	6.3	4.1
2016	9.6	-	0.2	2.6	0.3	6.5
2020	0.2	0.2	-	-	-	-
2025	1.4	0.8	-	-	-	-
year	Quadrat Cover (%)					
2012	4.0	-	0.2	14.4	5.7	2.4
2016	6.8	-	0.1	1.6	0.0	5.1
2020	0.2	0.1	-	-	-	0.2
2025	1.3	2.2	-	-	-	-

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

Table 25R-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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	840	40	33	57	10	26	0	5	53/84
2016	1180	-	24	76	0	17	12	0	54/89
2020	140	-	86	14	0	0	0	0	31/29
2025	380	20	42	58	0	5	0	5	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Bassia prostrata[pi] -- (forage kochia)									
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	200	-	80	20	0	0	0	0	42/54
2025	2620	720	55	45	0	8	10	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2012	40	-	0	100	0	0	0	50	96/123
2016	20	-	0	100	0	0	0	0	82/100
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	38/56
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma[t] -- (Utah juniper)									
2012	380	-	21	79	0	5	0	0	- / -
2016	220	-	55	36	9	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Krascheninnikovia lanata[p] -- (winterfat)									
2012	20	-	0	100	0	100	0	0	- / -
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	26/38
2025	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2012	-	-	-	-	-	-	-	-	17/37
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Pediocactus simpsonii -- (mountain ball cactus)									
2012	-	-	-	-	-	-	-	-	15/27
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2012	120	-	50	50	0	0	0	0	- / -
2016	80	-	100	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2012	140	-	0	71	29	0	43	14	72/165
2016	380	40	11	90	0	58	0	0	77/176
2020	20	-	100	0	0	0	0	0	14/25
2025	20	-	100	0	0	100	0	0	- / -

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

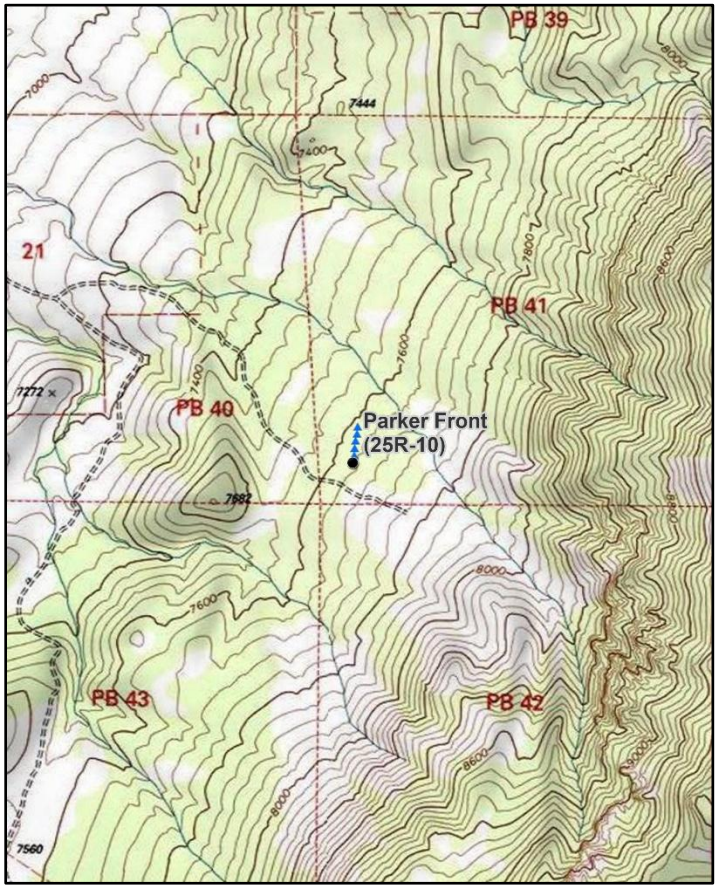
Table 25R-09.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

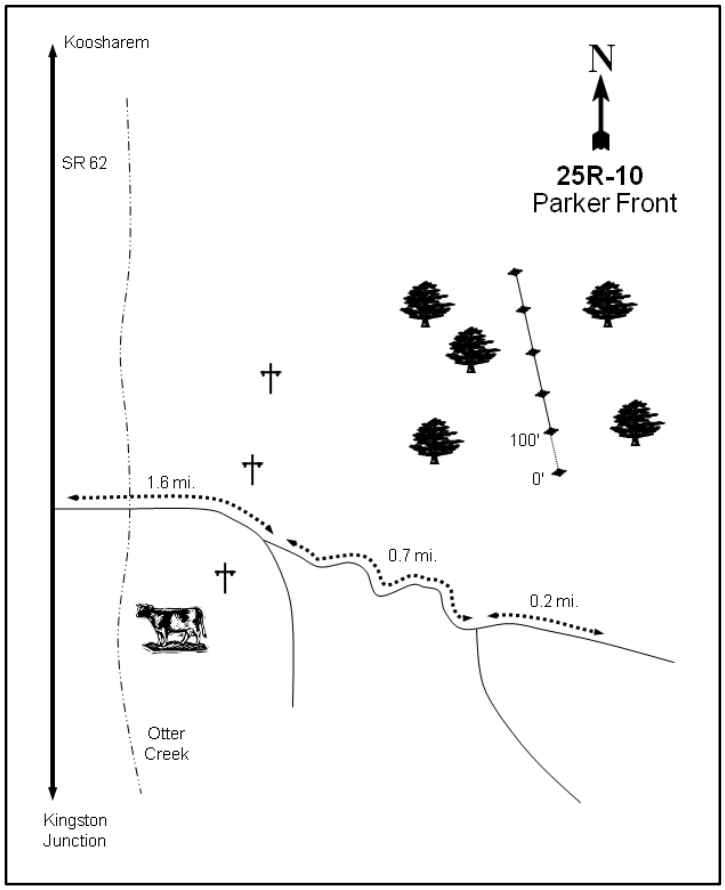
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	240	-	-	20	80	-	19.1
2016	73	-	78	22	-	-	4.1
Pinus edulis (twoneedle pinyon)							
2012	65	-	18	35	29	18	12.6
2016	29	-	100	-	-	-	2.6

Table 25R-09.15 - Deer Desirable Components Index: Mountain Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2012	14.2	9.9	10.1	11.1	-0.7	0.3	0.0	**44.9**	Poor
2016	21.8	15.0	9.2	21.2	-16.6	0.1	0.0	**50.7**	Poor
2020	0.6	0.0	0.0	30.0	-0.3	3.9	0.0	**34.2**	Very Poor
2025	3.0	0.0	0.0	30.0	-1.7	0.5	0.0	**31.8**	Very Poor

PARKER FRONT - STUDY NO. 25R-10





Location Information

USGS 7.5 min Map Info	Parker Knoll NE; Township 28S, Range 1W, Section 41
GPS (0' Stake)	NAD 83 UTM ZONE 12, 421398 East 4245609 North

Transect Information

Browse Tag # (0' Stake)	597
Transect Bearing	356° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft), Line 5 (71ft)
Belt Marker Placement	Belt 3: 5ft

Directions to Site

Travel south on State Route 62 from Greenwich for 4.2 miles. Turn east and drive for 1.6 miles, crossing Otter Creek. The road will fork: stay to the left and drive for another 0.7 miles. The road will fork again: keep left and continue for 0.2 miles. The transect will be on the north side of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	NORTH NARROWS
Elevation	7,618ft (2,322m)
Aspect	Northwest
Slope	12%
Sample Dates	08/01/2013, 08/16/2016, 08/05/2020, 08/13/2025

Table 25R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	East Grass Valley P/J Maintenance	5294	October 2020-February 2021	5299
Chaining - Two-Way Smooth	Parker Front PJ Removal	2547	October-November 2013	496
Seeding - Aerial Before	Parker Front PJ Removal	2547	November 2013	1230
Seeding - Aerial After	Parker Front PJ Removal	2547	January 2014	1230

Table 25R-10.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Parker Front PJ Removal			Aerial	Nov 2013	1230
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Festuca ovina	Sheep Fescue	Covar	0.08	0.07
G	Festuca ovina	Sheep Fescue	Covar	0.28	0.26
G	Festuca ovina	Sheep Fescue	Covar	0.16	0.15
G	Poa fendleriana	Muttongrass		0.05	0.05
G	Poa fendleriana	Muttongrass	Montezuma CO	0.12	0.09
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.50	1.36
F	Helianthus annuus	Annual Sunflower	Box Elder UT	0.57	0.54
F	Linum perenne	Blue Flax	Appar	0.73	0.64
F	Medicago sativa	Alfalfa	Big Sky Ladak	0.77	0.72
F	Melilotus officinalis	Yellow Sweetclover		0.49	0.43
F	Penstemon palmeri	Palmer Penstemon	Sevier UT	0.08	0.07
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.16	0.13
F	Sanguisorba minor	Small Burnet		2.44	2.24

Wildlife Habitat and Vegetation History

Table 25R-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		

Table 25R-10.4 - 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 II
2016	Mountain Big Sagebrush/Perennial Grass	Early Phase I
2020	Mountain Big Sagebrush/Perennial Grass	Early Phase I
2025	Mountain Big Sagebrush	Early Phase I

Site Notes

A small number of old deer shed antlers were found near the site in 2013.

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB462UT
States and Transitions	2012 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase Undefined 2016-2025 - Mountain Big Sagebrush-Steppe/Introduced Non-Natives State: Community Phase 2.1

When the study was established in 2013, this site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with moderately robust populations of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) in the understory. Tree and bitterbrush cover decreased following a chaining and seeding treatment (Table 25R-10.1), and the dominant browse species was mountain big sagebrush between 2016 and 2025 (Table 25R-10.12). Herbaceous cover increased following the treatment; perennial grasses were a co-dominant site component in 2016 and 2020, with squirreltail (*Elymus elymoides*), Indian ricegrass (*Achnatherum hymenoides*), and needle and thread (*Hesperostipa comata*) providing much of the cover (Table 25R-10.7, Table 25R-10.10). Although juniper trees were not initially a major component of the tree community, juniper have re-established with density increasing to pre-treatment levels while that of pinyon trees continues to

decrease. This likely indicates that woodland succession remains dynamic on the site, and future infilling could pose a threat to understory diversity and abundance (Table 25R-10.12, Table 25R-10.14).

Condition of mule deer winter range on this site has ranged from poor to good since 2013; winter habitat condition is considered to be fair as of 2025. Current factors that limit winter range condition include a lack of recruitment of young preferred browse, reduced perennial grass cover, a lack of perennial forb cover, and the presence of cheatgrass (*Bromus tectorum*) (Table 25R-10.6, Table 25R-10.7, Table 25R-10.10, Table 25R-10.13, Table 25R-10.15). According to pellet transect data, mule deer presence has been low since 2013. Elk presence has increased from low in 2013 and 2016 to moderate in 2020 and 2025. During the 2024/25 winter season the area had occurrences of collared mule deer and elk (Wildlife Migration Initiative). In addition, the majority of mountain big sagebrush plants are considered to have been lightly hedged in all sample years. The small population of bitterbrush on site receives more utilization pressure than sagebrush; combined moderate and heavy utilization of bitterbrush plants sampled in density strips was 60% in 2025 (Table 25R-10.9, Table 25R-10.13). On-site observations in 2025 noted that there was little to no utilization on grass and forb species.

Trend Summary Tables

Table 25R-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
2013	5.4	0.0	6.3	11.1	-	33.9
2016	13.4	0.6	1.9	18.3	0.2	2.1
2020	15.1	0.8	3.6	21.9	-	3.6
2025	22.8	0.6	1.8	30.8	0.1	1.7

Table 25R-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
2013	-	151	-	40	-	5.0	-	0.3
2016	7	238	38	52	0.1	11.6	1.4	0.8
2020	13	230	-	20	0.1	10.6	-	0.2
2025	-	210	-	15	-	10.4	-	0.1

Table 25R-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
2013	5.7	0.8	48.2	3.0	33.0	17.1
2016	2.5	0.0	56.4	1.6	26.3	29.8
2020	1.0	-	62.9	2.6	25.3	31.7
2025	2.2	0.0	54.8	3.2	27.8	33.7

Table 25R-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			
2013	-	7	2	9
2016	-	6	2	27
2020	-	6	7	7
2025	-	13	11	23
Year	Days Use Per Acre (ha)			
2013	-	3.4 (8.3)	2.7 (6.6)	-
2016	-	19.4 (48.0)	2.0 (5.0)	-
2020	0.7 (1.8)	14.7 (36.4)	31.5 (77.8)	-
2025	2.2 (5.4)	10.7 (26.5)	37.5 (92.7)	-

Table 25R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2013	21	-	49	-	33	12	29	45	-	-
2016	27	0	14	7	86	88	59	49	4	2
2020	68	23	6	13	42	99	24	34	8	-
2025	53	4	7	-	38	76	75	13	2	17
year	Average Cover (%)									
2013	0.3	-	1.4	-	1.1	0.1	0.8	1.2	-	-
2016	1.5	0.0	0.7	0.1	2.6	2.6	2.5	1.7	0.0	0.0
2020	2.8	0.6	0.1	0.1	0.7	3.8	1.0	1.7	0.0	-
2025	3.4	0.0	0.3	-	0.5	1.9	3.5	0.2	0.0	0.6

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

Table 25R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus utahensis (Utah milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Corydalis aurea[a] (scrambled eggs)	Cryptantha (cryptantha)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum[a] (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa[i] (alfalfa)	Melilotus officinalis[i] (sweetclover)	Packera multilobata (lobeleaf groundsel)	Salsola tragus[ai] (prickly Russian thistle)
year	Nested Frequency																
2013	3	1	2	-	3	2	8	-	-	-	-	-	2	-	-	27	-
2016	7	-	3	4	8	6	9	3	17	11	16	9	2	1	2	12	1
2020	-	-	-	-	3	-	4	-	7	-	-	-	0	-	-	3	-
2025	-	-	-	-	5	-	6	-	4	-	-	-	0	-	-	-	-
year	Average Cover (%)																
2013	0.0	0.0	0.0	-	0.0	0.0	0.1	-	-	-	-	-	0.0	-	-	0.2	-
2016	0.1	-	0.0	0.1	0.1	0.0	0.2	0.0	0.2	0.1	0.5	0.8	0.0	0.0	0.0	0.1	0.0
2020	-	-	-	-	0.0	-	0.0	-	0.1	-	-	-	0.0	-	-	0.0	-
2025	-	-	-	-	0.0	-	0.0	-	0.0	-	-	-	0.0	-	-	-	-

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

FORB SPECIES	Streptanthus cordatus (heartleaf twistflower)
year	Nested
2013	-
2016	2
2020	3
2025	-
year	Average Cover (%)
2013	-
2016	0.0
2020	0.0
2025	-

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

Table 25R-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)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia polyacantha (plains pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Purshia tridentata[p] (antelope bitterbrush)	Sambucus racemosa[p] (red elderberry)
year	Line Intercept Cover (%)								
2013	7.6	-	0	7	-	-	26.9	3.5	-
2016	16.5	0.2	-	0.4	-	-	1.7	1.8	-
2020	19.6	-	-	0.8	-	-	2.8	2.3	-
2025	29.3	0.1	-	1.3	-	-	0.4	1.5	-
year	Quadrat Cover (%)								
2013	4.3	0.0	0.0	1.1	-	-	5.3	1.1	-
2016	11.8	0.3	-	1.0	-	0.3	1.0	1.6	-
2020	13.4	0.8	-	1.3	0.0	0.0	2.3	1.5	0.1
2025	21.3	0.5	-	1.4	0.0	0.0	0.5	1.5	-

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

Table 25R-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)									
2013	2540	40	30	37	33	21	13	36	49/74
2016	2860	60	26	73	1	1	0	1	48/78
2020	3400	40	26	72	2	7	0	7	61/83
2025	4200	-	3	89	8	14	11	8	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2013	60	-	0	100	0	0	100	0	5/28
2016	300	-	13	87	0	0	13	13	35/44
2020	100	-	0	100	0	0	0	0	43/65
2025	100	-	0	40	60	0	0	60	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2013	40	-	0	100	0	0	0	0	24/33
2016	-	-	-	-	-	-	-	-	40/71
2020	-	-	-	-	-	-	-	-	26/26
2025	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma[t] -- (Utah juniper)									
2013	120	40	17	83	0	0	0	0	- / -
2016	120	20	83	0	17	0	0	0	- / -
2020	220	-	91	9	0	0	0	0	- / -
2025	200	-	90	10	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2013	40	-	0	100	0	0	0	0	10/15
2016	20	-	0	100	0	0	0	0	22/32
2020	20	-	0	100	0	0	0	0	26/42
2025	40	-	0	100	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2013	60	-	0	100	0	0	0	0	14/27
2016	60	-	0	100	0	0	0	0	15/35
2020	40	-	0	100	0	0	0	0	11/27
2025	40	-	0	100	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2013	320	20	38	63	0	0	0	0	- / -
2016	140	-	71	14	14	0	0	29	- / -
2020	380	40	95	0	5	0	0	5	- / -
2025	220	-	100	0	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2013	380	-	5	79	16	42	42	32	67/106
2016	300	-	0	100	0	33	13	0	51/80
2020	340	-	12	82	6	35	35	6	61/97
2025	300	-	7	60	33	33	27	80	- / -
Rubus idaeus -- (American red raspberry)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	71/53
2020	20	-	0	100	0	0	100	0	34/49
2025	60	-	0	100	0	0	0	0	- / -
Sambucus racemosa[p] -- (red elderberry)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	94/104
2020	-	-	-	-	-	-	-	-	134/179
2025	-	-	-	-	-	-	-	-	- / -

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

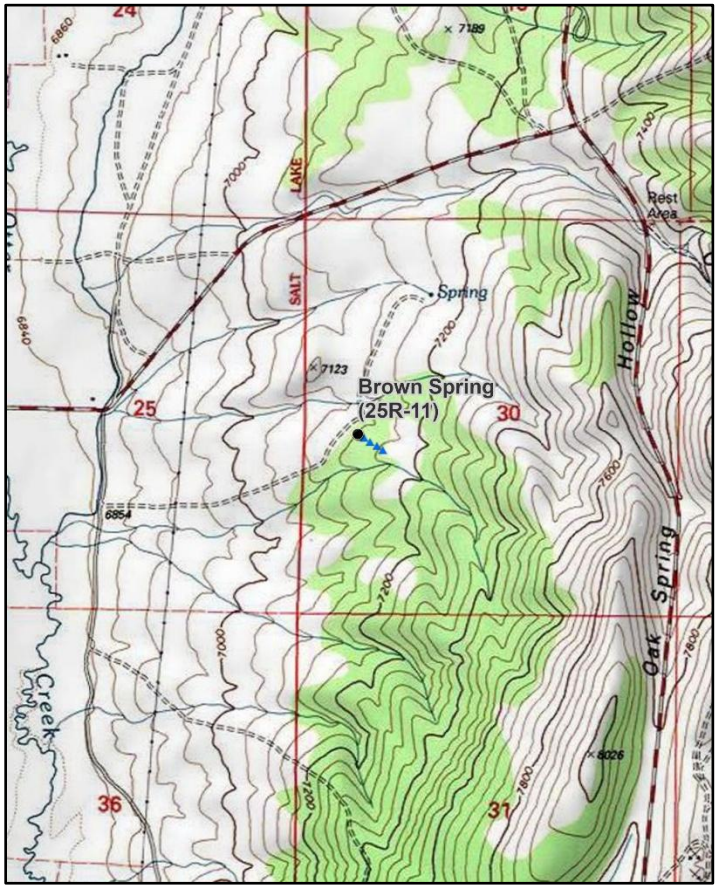
Table 25R-10.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

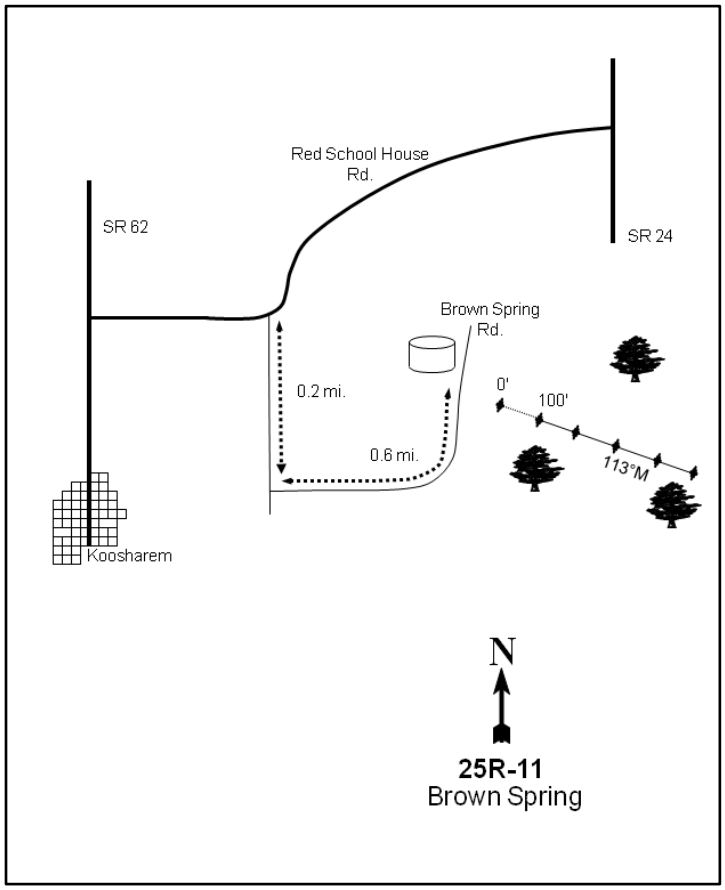
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	85	5	26	11	26	32	17.1
2016	45	17	50	33	-	-	6.2
2020	84	39	50	11	-	-	3.1
2025	81	29	65	6	-	-	2.7
Pinus edulis (twoneedle pinyon)							
2013	261	5	15	30	30	20	15.1
2016	74	21	68	5	5	-	4.5
2020	71	17	72	11	-	-	3.7
2025	58	28	72	-	-	-	2.5

Table 25R-10.15 - Deer Desirable Components Index: Mountain Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2013	14.8	6.7	11.1	10.0	0.0	0.7	0.0	**43.3**	Poor
2016	23.3	14.6	11.7	23.2	-0.1	1.6	0.0	**74.3**	Good
2020	28.0	14.2	12.2	21.3	-0.1	0.5	0.0	**76.1**	Good
2025	30.0	12.2	1.7	20.8	0.0	0.2	0.0	**64.9**	Fair

BROWN SPRING - STUDY NO. 25R-11





Location Information

USGS 7.5 min Map Info	Burrville SW; Township 26S, Range 1E, Section 30
GPS (0' Stake)	NAD 83 UTM ZONE 12, 426233 East 4263793 North

Transect Information

Browse Tag # (0' Stake)	118
Transect Bearing	113° magnetic
Length	400ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95)
Belt Marker Placement	Standard

Directions to Site

Drive north out of Koosharem on State Route 62 for 0.7 miles and turn right (east) onto Red School House Road. Drive about 1.3 miles, turn right (south), and proceed for 0.2 miles. Turn left (east) and continue for 0.6 miles; the study will be on the right (east) side of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	OAK SPRINGS
Elevation	7,139ft (2,176m)
Aspect	West
Slope	9%
Sample Dates	08/01/2013, 08/16/2016, 08/04/2020, 08/12/2025

Table 25R-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	East Grass Valley P/J Maintenance	5294	October 2020-February 2021	5299
Mechanical - Bullhog	Parker Front PJ Removal	2547	November 2013-January 2014	404
Seeding - Aerial Before	Parker Front PJ Removal	2547	November 2013	1230

Table 25R-11.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Parker Front PJ Removal			Aerial	Nov 2013	1230
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Festuca ovina	Sheep Fescue	Covar	0.08	0.07
G	Festuca ovina	Sheep Fescue	Covar	0.28	0.26
G	Festuca ovina	Sheep Fescue	Covar	0.16	0.15
G	Poa fendleriana	Muttongrass		0.05	0.05
G	Poa fendleriana	Muttongrass	Montezuma CO	0.12	0.09
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.50	1.36
F	Helianthus annuus	Annual Sunflower	Box Elder UT	0.57	0.54
F	Linum perenne	Blue Flax	Appar	0.73	0.64
F	Medicago sativa	Alfalfa	Big Sky Ladak	0.77	0.72
F	Melilotus officinalis	Yellow Sweetclover		0.49	0.43
F	Penstemon palmeri	Palmer Penstemon	Sevier UT	0.08	0.07
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.16	0.13
F	Sanguisorba minor	Small Burnet		2.44	2.24

Wildlife Habitat and Vegetation History

Table 25R-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 25R-11.4 - 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	Wyoming Big Sagebrush/Annual-Perennial Forb	Early Phase I
2020	Wyoming Big Sagebrush	Early Phase I
2025	Wyoming Big Sagebrush	Early Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R047XA312UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2013, this site was a Phase III twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland with a mostly depauperate understory (Table 25R-11.4). Most of the tree cover was removed by a bullhog treatment the following winter (Table 25R-11.1), and since 2016 the main browse component has been Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). Sagebrush density increased nearly three-fold between 2016 and 2020, but the rate of change has since slowed with only a 20% increase between 2020 and 2025. In addition, sagebrush cover has had a marked increase each sample year (Table 25R-11.12, Table 25R-11.13). Perennial grass cover has remained low throughout the duration of the study, although it has been steadily increasing. In 2016 annual and perennial forbs filled the interspaces and were co-dominant site components, but they have remained minor components since 2020 (Table 25R-11.7, Table 25R-11.11). Pinyon and juniper were observed in 2016 in low amounts, but juniper density increased in 2020, surpassing pre-treatment measurements. However, juniper cover has remained low and point-quarter data indicates that trees have remained small: this may have led to difficulty in finding treesand could explain why there are large discrepancies between sample years (Table 25R-11.12, Table 25R-11.14). Woodland succession has remained dynamic, and it is probable that future infilling will need continued inputs for this sagebrush community to be maintained.

Condition of mule deer winter range on this site has improved from very poor in 2013 to fair in 2025. Current factors that limit winter range condition include reduced preferred browse cover, reduced perennial grass cover, and a lack of perennial forb cover (Table 25R-11.6, Table 25R-11.7, Table 25R-11.15). According to pellet transect data, mule deer presence has decreased from high to low since the lop and scatter treatment. Elk presence has been low to absent (Table 25R-11.9). During the 2024/25 winter season the area had occurrences of collared mule deer while collared elk occurrences were occasional (Wildlife Migration Initiative). In addition, Wyoming big sagebrush density has increased over time. Prior to treatment, combined moderate and heavy utilization of sagebrush plants sampled in density strips was estimated at 77%; combined utilization in 2025 was estimated at 49%. This decrease may be a function of increased plant density that has redistributed utilization pressures across the now larger population (Table 25R-11.13). On-site observations in 2025 noted that there was light utilization (10-20%) on Indian ricegrass (*Achnatherum hymenoides*), but little to no utilization on forb species. It was also noted that the plant community was experiencing low primary production with restricted flowering and seed production, which may be an indicator of drought effects.

Trend Summary Tables

Table 25R-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
2013	1.1	-	6.2	2.4	-	41.7
2016	4.7	-	0.1	3.0	-	-
2020	6.5	0.0	0.1	8.5	-	0.4
2025	12.2	0.4	0.1	14.1	0.9	0.1

Table 25R-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
2013	-	4	-	1	-	0.0	-	0.0
2016	-	51	148	177	-	0.4	6.4	5.7
2020	-	83	76	20	-	3.8	1.8	0.3
2025	10	117	7	1	0.1	7.1	0.0	0.0

Table 25R-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
2013	11.7	1.7	39.0	31.7	11.2	7.6
2016	11.4	0.0	63.6	13.0	3.8	17.0
2020	7.6	0.0	67.7	17.4	3.4	12.3
2025	15.2	0.0	51.6	19.4	5.1	18.1

Table 25R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2013	17	-	29
2016	21	-	44
2020	31	5	43
2025	12	-	24
Year	Days Use Per Acre (ha)		
2013	45.6 (112.6)	-	-
2016	36.2 (89.4)	-	-
2020	7.4 (18.2)	0.7 (1.7)	-
2025	3.4 (8.3)	-	-

Table 25R-11.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2013	-	-	-	4	-	-	-	-
2016	0	1	-	28	14	3	3	4
2020	6	0	-	30	17	19	14	7
2025	6	-	10	61	56	2	-	3
year	Average Cover (%)							
2013	-	-	-	0.0	-	-	-	-
2016	0.0	0.0	-	0.1	0.1	0.1	0.0	0.0
2020	0.2	0.0	-	0.6	1.4	1.1	0.1	0.3
2025	0.2	-	0.1	2.5	3.7	0.0	-	0.7

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

Table 25R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Arabis (rockcress)	Astragalus lentiginosus (freckled milkvetch)	Astragalus tenellus (loosefl ower milkvetch)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cirsium (thistle)	Cryptantha[a] (annual cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Medicago sativa[i] (alfalfa)	Melilotus officinalis[i] (sweetclover)	Nicotiana attenuata[a] (coyote tobacco)
year	Nested Frequency																
2013	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2016	-	-	5	-	-	7	-	8	3	8	1	2	2	174	2	1	73
2020	4	-	13	-	-	-	-	1	-	8	-	29	2	6	1	-	1
2025	-	-	-	1	2	-	1	-	-	-	-	-	4	-	-	-	-
year	Average Cover (%)																
2013	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2016	-	-	0.0	-	-	0.2	-	0.1	0.0	0.1	0.0	0.0	0.0	5.5	0.0	0.0	1.5
2020	0.0	-	0.2	-	-	-	-	0.0	-	0.0	-	0.3	0.0	0.0	0.0	-	0.0
2025	-	-	-	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)	Solanum triflorum[a] (cutleaf nightshade)
year	Nested Frequency		
2013	-	-	-
2016	77	6	14
2020	12	42	-
2025	-	-	-
year	Average Cover (%)		
2013	-	-	-
2016	3.8	0.3	0.5
2020	0.1	1.4	-
2025	-	-	-

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

Table 25R-11.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma[t] (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Sambucus racemosa[p] (red elderberry)
year	Line Intercept Cover (%)					
2013	2.4	-	4.7	-	37	-
2016	3	-	-	-	0	0
2020	8.2	-	0.2	-	0.2	0.3
2025	14.1	0.7	0.1	0.2	-	-
year	Quadrat Cover (%)					
2013	1.1	-	0.5	-	5.7	-
2016	4.7	-	0.1	-	0.0	0.0
2020	6.5	0.0	0.1	-	0.0	0.0
2025	12.2	0.4	0.1	0.0	-	-

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

Table 25R-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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2013	1140	500	5	30	65	49	28	61	49/58
2016	1180	200	20	75	5	2	3	0	48/71
2020	4480	1940	69	31	0	1	0	1	54/77
2025	5400	840	30	68	2	29	20	27	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	14/12
2025	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	27/10
2020	140	140	71	29	0	29	14	0	58/62
2025	320	-	6	38	56	56	6	56	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	20	-	100	0	0	0	0	0	20/24
2025	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma[t] -- (Utah juniper)									
2013	100	20	20	80	0	0	0	20	- / -
2016	-	120	0	0	0	0	0	0	- / -
2020	280	-	93	7	0	0	0	0	- / -
2025	200	-	100	0	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	20	-	0	100	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2013	-	-	-	-	-	-	-	-	-/-
2016	80	-	25	75	0	0	0	0	12/29
2020	40	-	0	100	0	0	0	0	9/23
2025	-	20	0	0	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2013	300	100	47	53	0	0	0	0	- / -
2016	80	60	100	0	0	0	0	0	- / -
2020	100	-	100	0	0	0	0	0	- / -
2025	20	-	100	0	0	0	0	0	- / -
Sambucus racemosa[p] -- (red elderberry)									
2013	-	-	-	-	-	-	-	-	-/-
2016	20	-	0	100	0	0	0	0	56/80
2020	20	-	0	100	0	0	100	0	106/107

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

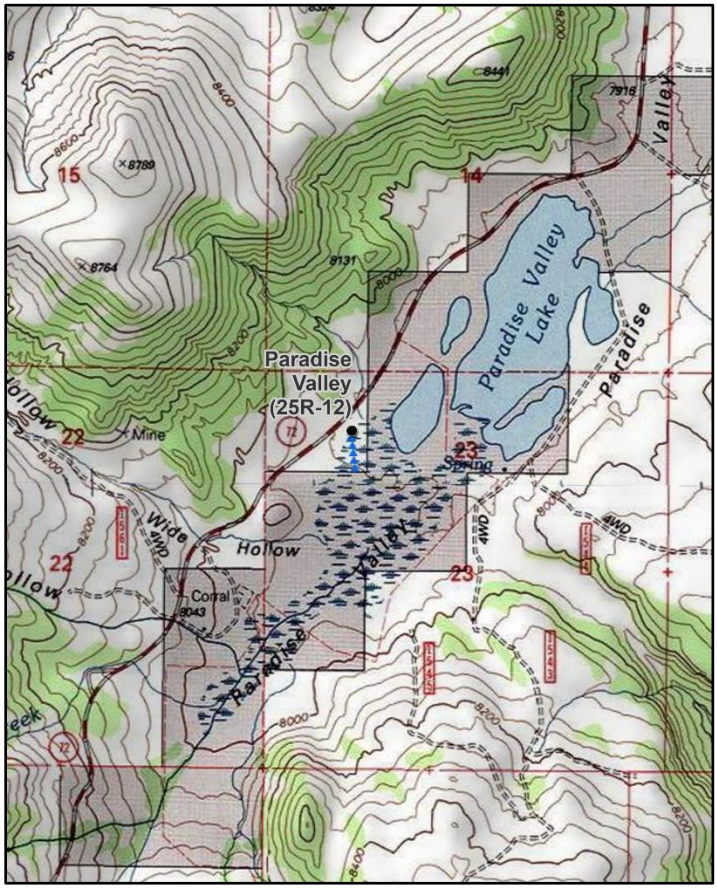
Table 25R-11.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

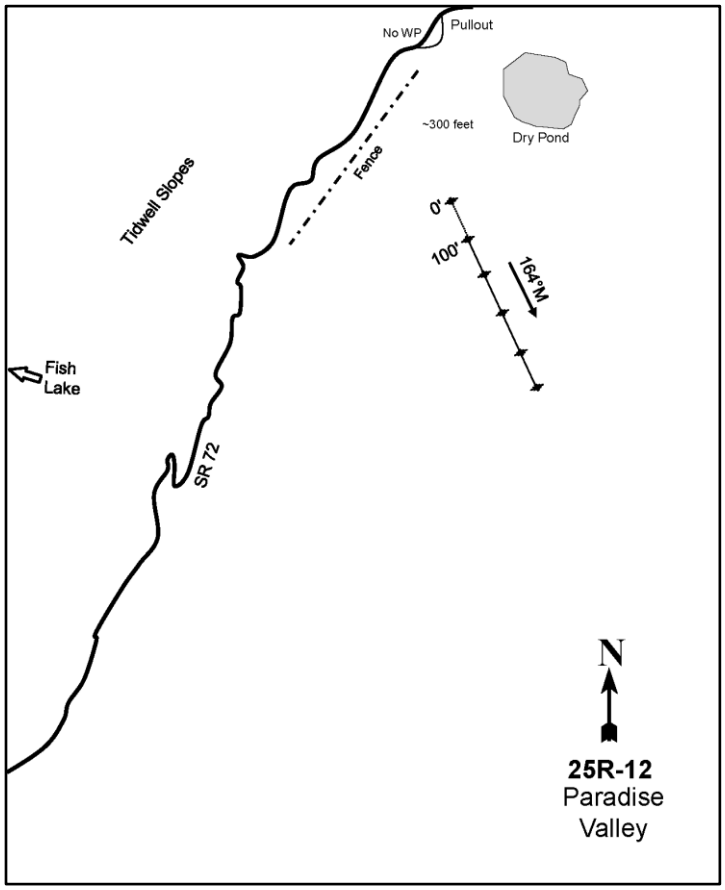
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	56	5	-	5	32	58	17.4
2016	142	100	-	-	-	-	1.0
2020	52	33	58	-	8	-	1.8
2025	153	20	80	-	-	-	1.5
Pinus edulis (twoneedle pinyon)							
2013	358	20	15	10	15	40	11.1
2016	37	50	50	-	-	-	2.1
2020	45	38	63	-	-	-	3.4
2025	28	44	56	-	-	-	1.3

Table 25R-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
2013	3.0	0.0	0.0	0.0	0.0	0.0	0.0	**3.0**	Very Poor
2016	3.8	0.0	0.0	0.8	0.0	10.0	0.0	**14.6**	Very Poor
2020	10.7	14.9	15.0	7.6	0.0	0.6	0.0	**48.8**	Poor-Fair
2025	17.6	14.4	15.0	14.2	0.0	0.0	0.0	**61.2**	Fair

PARADISE VALLEY - STUDY NO. 25R-12





Location Information

USGS 7.5 min Map Info	Johns Peak SW; Township 25S, Range 4E, Section 23
GPS (0' Stake)	NAD 83 UTM ZONE 12, 461092 East 4275472 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	164° 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

Go east from Salina on I-70 for approximately 37.5 miles to the rest area (exit 86). From the exit, go 2.4 miles east on the frontage road to the junction with State Route (SR) 72. Travel south on SR-72 for approximately 12.8 miles to a pullout on the east side of the highway; there is no witness post. The study site is approximately 300 feet east of the highway.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Last Chance Allotment
Elevation	7,927ft (2,416m)
Aspect	Northeast
Slope	3%
Sample Dates	08/31/2016, 08/04/2020, 06/02/2025

Table 25R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Tordon	Paradise Valley Restoration Project	3794	October-December 2017	112
Mechanical - Mower	Paradise Valley Restoration Project	3794	October-December 2017	112
Mechanical - Mower	Last Chance Habitat Improvement (Proposed)	6554	Fall 2025	114
Herbicide - Picloram and 2,4-D	Last Chance Habitat Improvement (Proposed)	6554	Spring 2026	114

Wildlife Habitat and Vegetation History

Table 25R-12.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 25R-12.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Rubber Rabbitbrush	No Encroachment
2020	Perennial Grass	No Encroachment
2025	Rubber Rabbitbrush/Perennial Grass	No Encroachment

Site Notes

The herbaceous understory was observed to have been heavily grazed in 2016 and moderately grazed in 2024.

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Semiwet (Fresh Meadow)
NRCS Ecological Site #	R047XB004UT
States and Transitions	2016 - State Undefined: Community Phase Undefined 2020 - Sedge State: Community Phase 4.1 2025 - State Undefined: Community Phase Undefined

When established in 2016, this study site was dominated by rubber rabbitbrush (*Ericameria nauseosa*) with no other browse species present (Table 25R-12.12, Table 25R-12.13). The understory was plentiful, but not diverse; a majority of the cover was contributed by the perennial grass Kentucky bluegrass (*Poa pratensis*), sedges (*Carex* sp.), and arctic rush (*Juncus arcticus*) (Table 25R-12.7, Table 25R-12.10). Following the mower and herbicide treatment (Table 25R-12.1), cover and density of rubber rabbitbrush decreased substantially. Despite the removal of rabbitbrush, however, more desirable browse and herbaceous species have remained depreciated since 2020. As of 2025, rubber rabbitbrush has increased in density to levels that are above those exhibited pre-treatment (Table 25R-12.10, Table 25R-11.12, Table 25R-12.13).

The Desirable Components Index (DCI) is not assessed for mule deer winter range found in semiwet ecological potentials. However, current factors that limit winter range condition include a lack of preferred browse cover and recruitment, a lack of perennial forb cover, and the presence of cheatgrass (*Bromus tectorum*) (Table 25R-12.6, Table 25R-12.7, Table 25R-12.13, Table 25R-12.15). According to pellet transect data, mule deer presence has been low since study establishment. In addition, the area had few occurrences of collared elk during the 2024/25 winter season (Wildlife Migration Initiative). However, cattle presence has been high in each sample year. Preferred browse utilization cannot be assessed due to too few plants in the population (Table 25R-12.9, Table 25R-12.13). On-site observations in 2025 noted that there was moderate utilization (20-40%) on squirreltail (*Elymus elymoides*), prairie Junegrass (*Koeleria macrantha*), and arctic rush (*Juncus arcticus*), but little to no utilization on forb species.

Trend Summary Tables

Table 25R-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
2016	-	39.3	-	-	63.0	-
2020	-	5.5	-	-	7.8	-
2025	-	24.6	-	0.2	30.4	-

Table 25R-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
2016	-	395	27	200	-	26.5	0.2	2.2
2020	-	309	-	1	-	17.2	-	0.0
2025	8	420	72	34	0.4	31.3	1.7	0.1

Table 25R-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
2016	10.5	0.1	41.6	-	0.0	67.0
2020	15.5	0.0	70.8	-	0.0	23.3
2025	17.0	0.0	49.6	0.0	-	55.5

Table 25R-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			
2016	12	-	2	60
2020	13	2	1	25
2025	9	1	1	34
Year	Days Use Per Acre (ha)			
2016	26.2 (64.6)	-	-	-
2020	28.3 (69.9)	0.7 (1.7)	-	-
2025	21.8 (53.8)	0.7 (1.7)	-	-

Table 25R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Distichlis spicata (saltgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Juncus arcticus (arctic rush)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency									
2016	-	277	9	9	-	189	3	4	202	-
2020	-	196	94	5	1	143	3	10	151	-
2025	8	177	134	180	7	164	63	17	113	99
year	Average Cover (%)									
2016	-	13.8	0.0	0.2	-	4.5	0.0	0.0	7.9	-
2020	-	6.8	1.2	0.2	0.0	3.4	0.0	0.1	5.5	-
2025	0.4	7.7	2.4	5.9	0.0	4.7	2.1	0.2	4.2	4.0

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

Table 25R-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Ambrosia[a] (ragweed)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cleome[a] (spiderflower)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Cryptantha[a] (annual cryptantha)	Descurainia pinnata[a] (western tansymustard)	Equisetum laevigatum (smooth horsetail)	Erigeron aphanactis[a] (rayless shaggy fleabane)	Packera multilobata (lobeleaf groundsel)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)
year	Nested Frequency												
2016	3	-	5	-	3	19	-	23	-	-	-	70	136
2020	-	-	-	-	-	-	-	-	1	-	-	-	-
2025	-	49	-	5	-	-	1	21	8	2	3	-	23
year	Average Cover (%)												
2016	0.0	-	0.1	-	0.0	0.1	-	0.1	-	-	-	0.9	1.2
2020	-	-	-	-	-	-	-	-	0.0	-	-	-	-
2025	-	1.3	-	0.0	-	-	0.0	0.4	0.0	0.0	0.0	-	0.1

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

Table 25R-12.12 - 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)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover		
2016	-	63	-
2020	-	7.8	-
2025	0.2	30.4	0
year	Quadrat Cover (%)		
2016	-	39.3	-
2020	-	5.5	-
2025	0.0	24.6	0.0

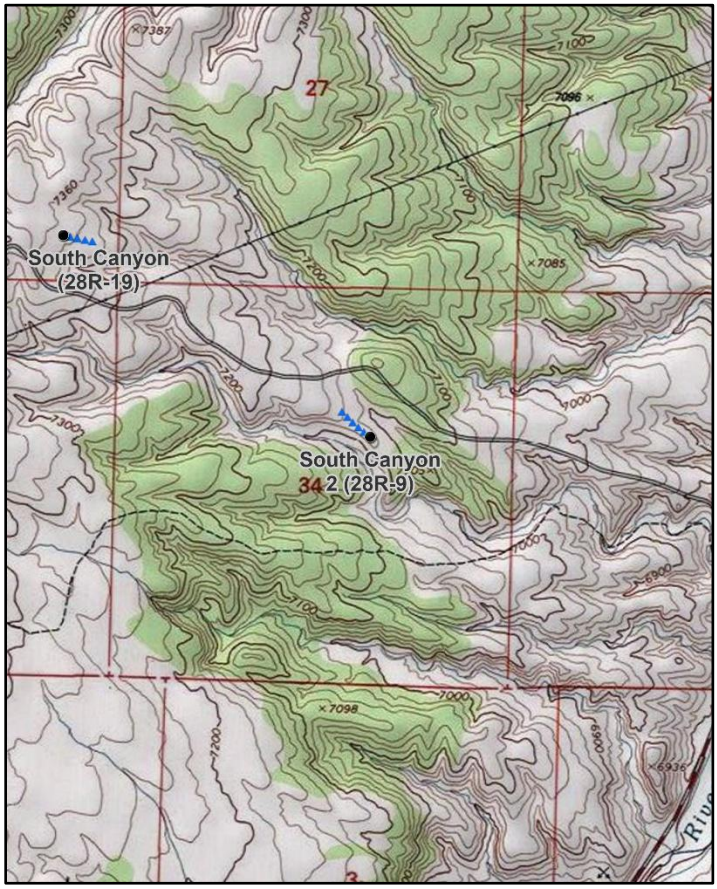
t - Tree Species; p - Preferred Browse; i - Introduced Species

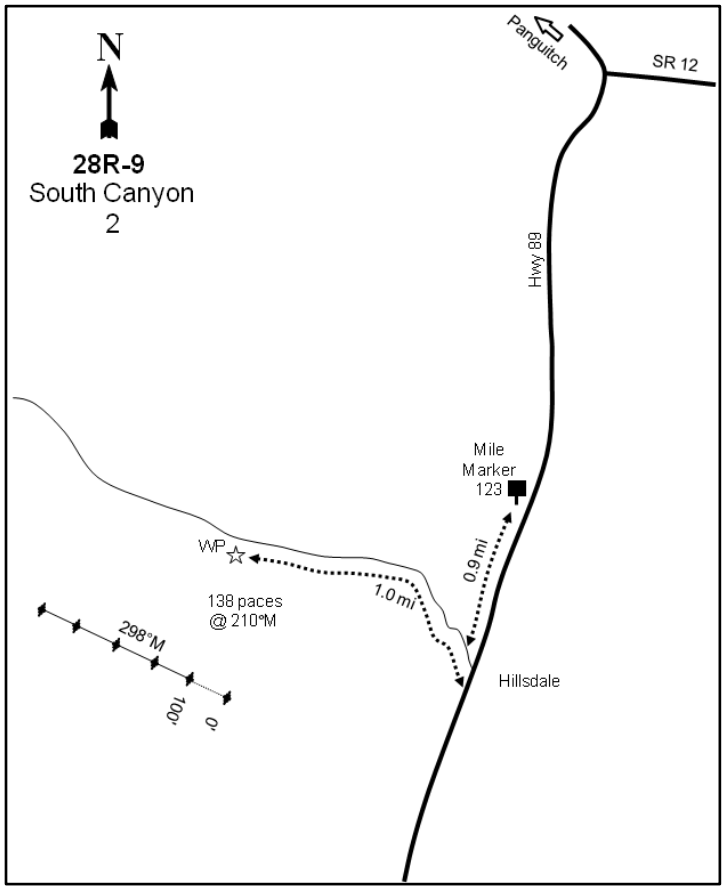
Table 25R-12.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	20	-	0	100	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2016	6680	60	6	90	4	0	1	3	102/115
2020	1160	-	3	74	22	0	0	33	60/74
2025	7700	80	55	43	1	7	2	1	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	200	-	0	100	0	0	0	0	- / -

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

SOUTH CANYON 2 - STUDY NO. 28R-9





Location Information

USGS 7.5 min Map Info	Hatch NE; Township 35S, Range 5W, Section 34
GPS (0' Stake)	NAD 83 UTM ZONE 12, 376288 East 4176250 North

Transect Information

Browse Tag # (0' Stake)	70
Transect Bearing	298° 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 Panguitch, drive west on US-89 to mile marker 123. Continue 0.9 miles to a dirt road on the left (west) with a cattle guard. Turn left and drive 1 mile to the witness post on the left (south) side of the road. From the witness post, walk 138 paces at 210 degrees magnetic to the 0-foot stake which is marked with browse tag #70; the site is across a drainage and on top of a ridge located south of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SOUTH CANYON
Elevation	7,143ft (2,177m)
Aspect	Northeast
Slope	3%
Sample Dates	07/07/2005, 08/13/2012, 08/23/2016, 08/12/2020, 08/11/2025

Table 28R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Canyon (Hillsdale)	2311	October 2012-February 2013	2279
Seeding - Aerial Before	South Canyon (Hillsdale)	2311	September 2012	2279

Table 28R-09.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Canyon - Hillsdale			Aerial	Sep 2012	2000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.35	0.33
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.55	1.47
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.10	0.09
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.50	0.44
G	Agropyron cristatum	Crested Wheatgrass	CDII	1.00	0.95
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.50	1.38
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.50	0.37
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.75
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	1.50	1.22
F	Linum perenne	Blue Flax	Appar	1.00	0.89
F	Medicago sativa	Alfalfa	Nomad	0.50	0.45
F	Medicago sativa	Alfalfa	Ladak DL	0.50	0.46
F	Onobrychis viciifolia	Sainfoin	Eski	0.56	0.49
F	Onobrychis viciifolia	Sainfoin	Eski	0.45	0.35
F	Penstemon palmeri	Palmer Penstemon	Lincoln NV	0.05	0.05
F	Penstemon palmeri	Palmer Penstemon	Iron UT	0.00	0.00
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.23	0.18
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.89

Wildlife Habitat and Vegetation History

Table 28R-09.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	winter
Greater Sage-Grouse		

Table 28R-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	Pinyon	Phase III
2012	Pinyon	Phase III
2016	Perennial Grass	Early Phase I
2020	Perennial Grass	Early Phase I
2025	Perennial Grass	Early Phase I

Site Notes

This study is located approximately one mile west of Hillsdale within a treated twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland.

Soils

Table 28R-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
Loam	6.5	45.1	33.1	21.8	2.4	15.2	150.4	0.5	07/07/2005

Site Potential

981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Gravelly Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB306UT
States and Transitions	2005-2012 - Current Potential State: Community Phase Undefined 2016-2025 - Current Potential State: Community Phase 2.1

When the study was established in 2005, the plant community was dominated by two-needle pinyon (*Pinus edulis*) and was considered to be in Phase III of woodland succession (Table 28R-09.4, Table 28R-09.12); shrubs were rare (Table 28R-09.6). After a bullhog and seeding treatment in the fall of 2012 (Table 28R-09.1), pinyon decreased and became a minor vegetation component (Table 28R-09.14). Shrubs have remained scarce in the post-treatment sample period, with black sagebrush (*Artemisia nova*) as the dominant species (Table 28R-09.12). The herbaceous understory was sparse prior to the bullhog and seeding treatment. Following treatment, however, perennial grasses such as blue grama (*Bouteloua gracilis*) and squirreltail (*Elymus elymoides*) became the dominant vegetation component (Table 28R-09.7, Table 28R-09.10). Shrubs will likely increase as the treatment matures.

Since 2005, condition of mule deer winter range on this site has improved from very poor to fair; winter habitat condition is considered to be fair as of 2025. Current factors that limit winter range condition include reduced preferred browse cover and recruitment, and a lack of perennial forb cover (Table 28R-09.6, Table 28R-09.7, Table 28R-09.13, Table 28R-09.15). According to pellet transect data, mule deer presence has remained low since the mastication treatment; elk presence has been low to absent. Cattle presence has ranged between low and moderate and has increased since treatment (Table 28R-09.9). Black sagebrush density has generally decreased over time. Prior to treatment, combined moderate and heavy utilization of sagebrush plants sampled in density strips was estimated at 2%. However, moderate utilization of black sagebrush has increased and was estimated at 19% in 2025 (Table 28R-09.13). On-site observations in 2025 noted that there was little to no utilization on grass and forb species (Photos).

Trend Summary Tables

Table 28R-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	3.3	0.2	27.7	2.5	-	49.0
2012	2.6	0.2	25.5	2.2	-	42.0
2016	3.4	1.0	-	3.1	0.3	-
2020	3.0	0.0	-	3.6	0.1	-
2025	7.0	2.1	-	6.6	2.2	-

Table 28R-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	-	147	66	12	-	2.7	0.3	0.1
2012	-	136	11	44	-	3.4	0.0	0.2
2016	-	351	30	143	-	22.1	0.2	1.7
2020	-	369	43	38	-	22.4	0.5	0.5
2025	-	367	21	15	-	23.9	0.1	0.1

Table 28R-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	15.1	1.6	54.5	17.0	9.0	35.2
2012	14.1	3.6	53.1	22.0	5.7	33.3
2016	10.7	0.0	57.4	6.0	4.9	27.5
2020	5.1	0.0	60.8	11.1	6.9	30.1
2025	11.3	0.1	49.6	5.8	9.7	31.4

Table 28R-09.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	1	2	-	36
2012	-	-	-	4
2016	-	7	-	43
2020	9	11	-	63
2025	2	2	-	14
Year	Days Use Per Acre (ha)			
2005	1.5 (3.6)	3.4 (8.3)	0.7 (1.7)	-
2012	0.7 (1.8)	2.7 (6.6)	0.7 (1.7)	-
2016	13.1 (32.3)	3.4 (8.3)	0.7 (1.7)	-
2020	12.3 (30.5)	14.1 (34.8)	-	-
2025	5.1 (12.6)	-	-	-

Table 28R-09.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency										
2005	20	-	-	104	3	32	1	3	-	-	-
2012	3	-	-	122	-	21	-	-	-	-	-
2016	13	43	-	163	2	203	8	13	14	-	56
2020	4	26	2	157	9	220	17	2	24	0	123
2025	13	85	4	193	43	59	47	2	5	-	103
year	Average Cover (%)										
2005	0.2	-	-	2.2	0.0	0.2	0.0	0.0	-	-	-
2012	0.0	-	-	3.2	-	0.2	-	-	-	-	-
2016	0.8	1.7	-	8.9	0.0	8.9	0.2	0.1	0.1	-	1.3
2020	0.5	1.4	0.0	5.5	0.0	8.7	0.5	0.0	1.1	0.0	4.5
2025	0.2	2.9	0.1	11.6	0.6	2.5	2.8	0.1	0.1	-	3.1

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

Table 28R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Arabis holboellii[a] (Holboell's rockcress)	Astragalus (milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Chamaesyce albomarginata (whitemargin sandmat)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cryptantha (cryptantha)	Cryptantha[a] (annual cryptantha)	Descurainia pinnata[a] (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Lithospermum incisum (narrowleaf stoneseed)	Lotus utahensis (Utah bird's-foot trefoil)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2005	-	2	-	-	-	-	1	9	-	7	-	61	-	-	-	1	2
2012	-	5	3	-	-	37	-	3	-	6	-	-	-	-	-	-	3
2016	8	-	1	4	-	24	-	6	5	11	1	-	14	114	1	0	-
2020	3	2	-	1	3	-	-	8	38	-	-	6	-	4	2	14	1
2025	1	3	-	-	-	-	-	6	18	-	-	-	-	-	-	-	2
year	Average Cover (%)																
2005	-	0.0	-	-	-	-	0.0	0.1	-	0.0	-	0.3	-	-	-	0.0	0.0
2012	-	0.0	0.0	-	-	0.1	-	0.1	-	0.0	-	-	-	-	-	-	0.0
2016	0.2	-	0.0	0.0	-	0.0	-	0.2	0.1	0.1	0.0	-	0.1	1.1	0.0	0.0	-
2020	0.0	0.0	-	0.0	0.0	-	-	0.1	0.5	-	-	0.0	-	0.0	0.2	0.2	0.0
2025	0.0	0.0	-	-	-	-	-	0.1	0.1	-	-	-	-	-	-	-	0.0

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

FORB SPECIES	Pleiacanthus spinosus (thorn skeletonweed)	Sanguisorba minor[i] (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Trifolium gymnocarpon (hollyleaf clover)
year	Nested Frequency				
2005	-	-	-	-	-
2012	-	-	-	-	2
2016	-	1	-	2	-
2020	0	-	-	4	-
2025	-	-	5	1	-
year	Average Cover (%)				
2005	-	-	-	-	-
2012	-	-	-	-	0.0
2016	-	0.0	-	0.0	-
2020	0.0	-	-	0.0	-
2025	-	-	0.0	0.0	-

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

Table 28R-09.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)						
2005	2.5	-	-	-	-	-	49
2012	2.2	-	-	-	-	-	42
2016	3.1	-	-	0.3	-	-	-
2020	3.6	-	0.1	-	-	-	-
2025	6.6	-	0.3	1.9	-	-	-
year	Quadrat Cover (%)						
2005	3.3	-	-	0.0	0.2	-	27.7
2012	2.6	0.1	-	0.0	-	0.0	25.5
2016	3.4	-	-	1.0	-	-	-
2020	3.0	-	0.0	0.0	-	-	-
2025	7.0	-	0.0	2.1	0.0	-	-

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

Table 28R-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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2005	1940	40	4	54	42	2	0	29	34/52
2012	1860	120	17	65	18	14	0	34	28/44
2016	1340	-	21	79	0	12	5	5	25/50
2020	1220	80	15	74	12	13	0	12	31/54
2025	1780	40	7	92	1	19	0	1	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2012	60	-	0	100	0	0	0	0	26/25
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	44/53
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	59/107
2020	20	-	100	0	0	0	0	0	78/111
2025	20	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2005	60	60	67	33	0	0	0	0	27/23
2012	60	-	33	67	0	0	0	0	30/16
2016	620	-	10	90	0	0	0	0	30/41
2020	360	-	11	28	61	50	0	61	13/9
2025	2240	40	3	97	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Juniperus scopulorum[t] -- (Rocky Mountain juniper)									
2005	-	20	0	0	0	0	0	0	- / -
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Krascheninnikovia lanata[p] -- (winterfat)									
2005	-	-	-	-	-	-	-	-	18/25
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2005	80	-	0	100	0	25	0	0	15/32
2012	40	-	0	100	0	0	0	0	14/28
2016	20	-	0	100	0	0	0	0	13/34
2020	40	-	50	50	0	0	0	50	8/14
2025	20	-	100	0	0	0	0	0	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2005	20	-	0	100	0	0	0	0	3/5
2012	40	-	0	100	0	0	0	0	5/7
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2025	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2005	960	40	21	77	2	0	2	0	- / -
2012	580	40	31	69	0	0	0	0	- / -
2016	-	20	0	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	- / -
2025	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2005	-	-	-	-	-	-	-	-	130/274
2012	-	-	-	-	-	-	-	-	139/193

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

Table 28R-09.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2012	8	33	-	33	33	-	7.0
2020	12	-	100	-	-	-	2.0
2025	15	-	100	-	-	-	3.0
Pinus edulis (twoneedle pinyon)							
2012	315	-	10	20	35	35	14.9
2016	6	25	75	-	-	-	3.0
2020	2	33	67	-	-	-	3.0
2025	4	33	67	-	-	-	3.3

Table 28R-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	3.1	0.0	0.0	5.3	0.0	0.2	0.0	**8.6**	Very Poor
2012	2.8	0.0	0.0	6.7	0.0	0.4	0.0	**9.9**	Very Poor
2016	3.9	0.0	0.0	30.0	0.0	3.4	0.0	**37.3**	Poor
2020	4.5	0.0	0.0	30.0	0.0	1.1	0.0	**35.6**	Very Poor-Poor
2025	8.3	14.7	3.4	30.0	0.0	0.3	0.0	**56.7**	Fair

REFERENCES

Beck, J. L., & Peek, J. M. (2005). Great Basin Summer Range Forage Quality: Do Plant Nutrients Meet Elk Requirements? Western North American Naturalist, 516-527.

Evans, G., Westphal, V., Welch, M. K., Grandison, J., Cornicelli, L., & Cranney, S. J. (1997). Utah Big Game Annual Report. Utah Dept. of Natural Resources, Division of Wildlife Resources, Salt Lake City, Utah.

Jense, G. K., Fitzgerald, J. W., Bates, J. W., Bowden, N. I., Coles, F., Kimball, J. F., & Nielson, B. J. (1982). Utah Big Game Investigations and Management Recommendations. Utah Dept. of Natural Resources and Energy, Utah State Division of Wildlife Resources, Salt Lake City, Utah.

Jense, G. K., Fitzgerald, J. W., Bates, J. W., Bowden, N. I., Coles, F., Kimball, J. F., & Nielson, B. J. (1985). Utah Big Game Annual Report. Utah Dept. of Natural Resources, Division of Wildlife Resources, Salt Lake City, Utah.

Jense, G. K., Shields, W., Leatham, J. P., K. J., Bowden, N. I., Coles, F. F., & Erickson, L. L. (1991). Utah Big Game Annual Report. Utah Dept. of Natural Resources, Division of Wildlife Resources, Salt Lake City, Utah.

Jense, G. K., Shields, W., Leatham, J. P., Karpoowitz, J., Bowden, N. I., Coles, F. F., & Takeda, R. A. (1992). Utah Big Game Annual Report. Utah Dept. of Natural Resources, Division of Wildlife Resources, Salt Lake City.

Jornada, U.-A., & NRCS, U. (2022). *Ecological Site Discription Catalog*. (New Mexico State University) Retrieved from EDIT: Ecosystem Dynamic Interpretive Tool: https://edit.jornada.nmsu.edu/

PRISM Climate Group, Oregon State University. (n.d.). *1981-2010 Climatology Normals , Created 2013*.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. (n.d.). Soil Survey Geographic (SSURGO) Database for all Survey Areas in UT.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. (n.d.). U.S. General Soil Map (STATSGO2).

Tausch, R. J., Miller, R. F., Roundy, B. A., & Chambers, J. C. (2009). Piñon and Juniper Field Guide: Asking the Right Questions to Select Appropriate Management Actions. *Circular 1335* , 96. U.S. Geological Survey.

Tiedemann, A. R., & Lopez, C. F. (2004). Assessing soil factors in wildland improvement programs. In S. B. Monsen, R. Stevens, & N. L. Shaw, *Restoring western ranges and wildlands* (Gen. Tech. Rep. RMRS-GTR-136-vol-1 ed., Vol. 1, pp. 39-56). Fort Collins, Colorado: U.S. Department of Agiculture, Forest Dervice, Rocky Mountain Research Station.

Wambolt, C. L. (1996). Mule deer and elk foraging preference for 4 sagebrush taxa. Journal of Range Management, 499-503.

WRI Projects Database. (2025). Retrieved from Utah's Watershed Restoration Initiative: http://wri.utah.gov

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.
[1]Phase of woodland succession