2024 Range Trend Project Report

Utah Watershed Restoration Initiative Vegetation Monitoring

Utah's Big Game Range Trend Studies

Publication Number 25-10 | Federal Aid Project W-82-R-69

Prepared by the Utah Division of Wildlife Resources

Great Basin Research Center

UTAH DNR WILDLIFE RESOURCES

Utah Watershed Restoration Initiative Vegetation Monitoring 2024

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White Colorado Columbine (*Aquilegia coerulea* var. *ochroleuca*) by Jason Cox (2024)

Performance Report for Federal Aid Project W-82-R-69

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Reports for study sites, with accompanying photographs, are available online at http://wildlife.utah.gov/range-trend.html.

PROGRAM NARRATIVE

State: UTAH

Project Number: W-82-R-69

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.

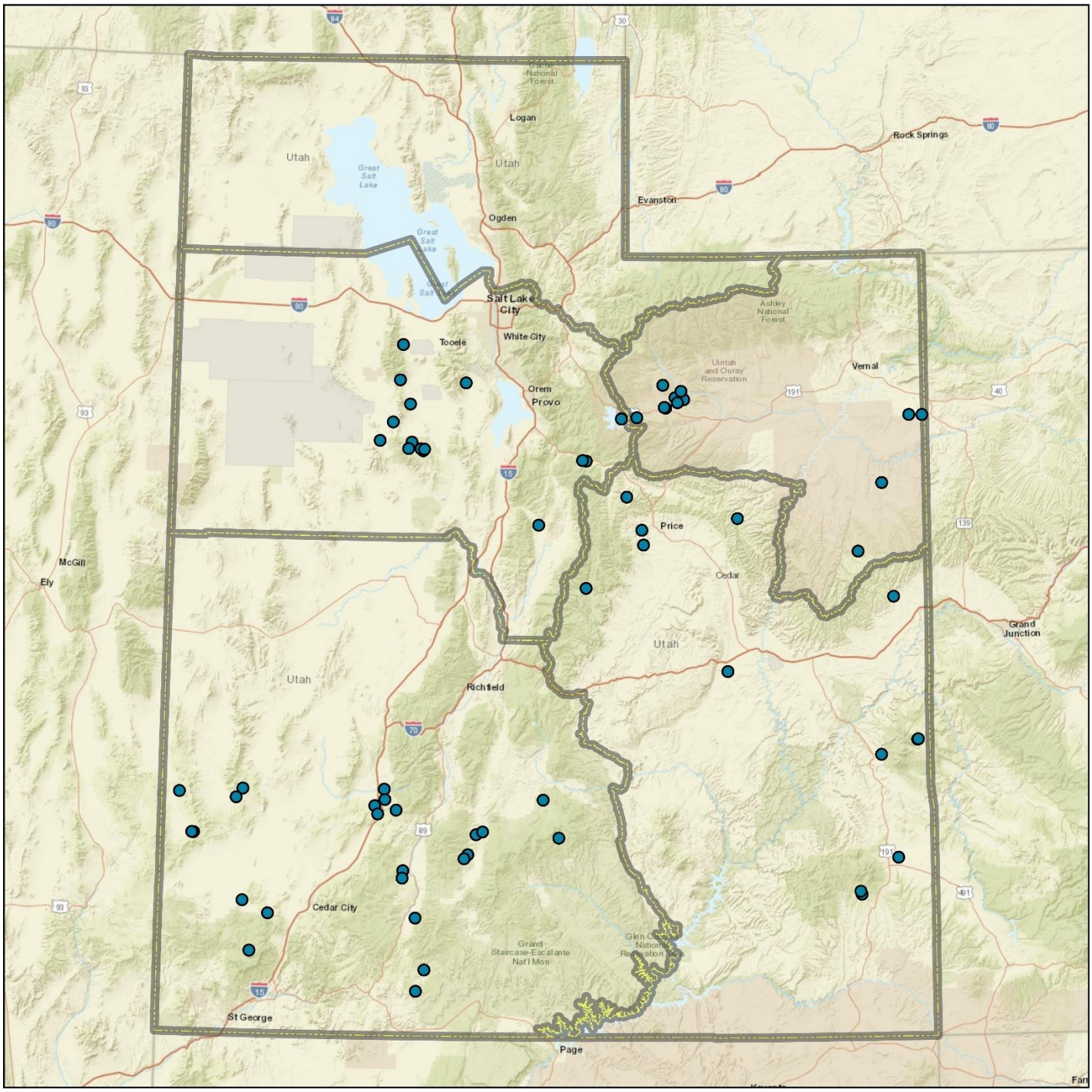
Expected Results or Benefits: Range trend studies in each region will be re-monitored every five years, and vegetation condition and trend assessments will be made for key areas. DWR biologists, land management personnel from the USFS and BLM, and private landowners will use the range trend database 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 2024 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 2024



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.

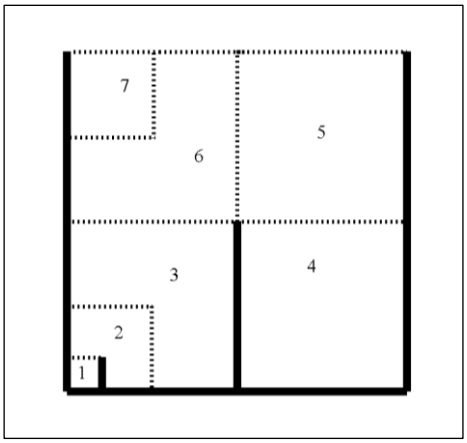


Figure 1 Cover classes of the 1/4 m^2 sampling quadrat

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.

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

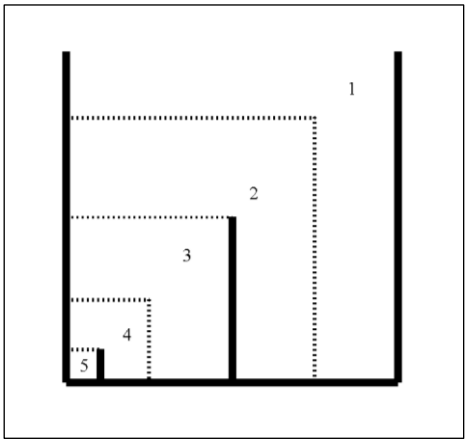


Figure 2 Nested frequency sub-quadrats of the 1/4 m^2 sampling quadrat

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

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

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 m^2 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

2024 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 2024 Wildlife Management Units 13A, 14A, 14B, 15, 16B, & 16C" which is available on the range trend website, https://wildlife.utah.gov/range-trends-archives.html.

Study #	Study Name	Type	Disturbance Name (If Available)	Date	Acres	WRI Project #
13A-8	Black Ridge	Chaining: Two-Way Ely	Black Ridge Chaining 1967	September-December 1966	3043	LTDL 1096-3014
13A-8	Black Ridge	Seeding: Aerial Before	Black Ridge Chaining 1967	September-December 1966	3043	LTDL 1096-3015
13A-8	Black Ridge	Hand Crew: Lop and Scatter	Black Ridge Fuels Reduction and Vegetation Restoration - Phase II	2011	1359	1730
13A-12	Below Polar Rim	Hand Crew: Lop and Scatter	Moab Mule Deer Winter Range Habitat Improvement-Phase 3	Nov-18	1470	4514
13A-12	Below Polar Rim	Chaining: Two-Way Unknown	North Beaver Mesa Seeding 1969	1969	1540	LTDL 8076
13A-12	Below Polar Rim	Seeding: Seed Unknown	North Beaver Mesa Seeding 1969	1969	2138	LTDL 8076
13A-14	Lower Lackey Fan	Seeding: Seed Unknown	LaSal Wray Mesa Seeding 1949	1949	4093	LTDL 6582-17923
13A-14	Lower Lackey Fan	Herbicide: Spike	Lacky Fan Sagebrush Treatment 1990	August 1989 - April 1990	3064	LTDL 6499-17926
13A-14	Lower Lackey Fan	Seeding: Seed Unknown	Lacky Reseeding 1953	1953	1578	LTDL 6497-18136
13A-18	Dolores Point	Hand Crew: Lop and Scatter	Moab Mule Deer Winter Range Habitat Improvement-Phase 3	Nov-18	1470	4514
14A-2	Brushy Basin	Mechanical: Bullhog	Brushy Basin Habitat Improvement Project Phase II	Fall 2012-Winter 2014	573	2275
14A-9	Harts Draw	Seeding: Broadcast Before	Hart Draw Sagebrush Restoration (year 1)	Dec-05	629	246
14A-9	Harts Draw	Seeding: Aerial After	Hart Draw Sagebrush Restoration (year 1)	Dec-05	629	246
14A-9	Harts Draw	Aerator: Single Drum	Hart Draw Sagebrush Restoration (year 1)	Dec-05	629	246
14A-11	Shay Mesa	Mechanical: Bullhog	Shay Mesa Phase II	May-June 2009	545	1091
14A-12	Shingle Mill	Mechanical: Bullhog	La Sal/Abajo Rx and Mx FY22	August 2021-June 2022	560	5527
14B-23	South Plain	Seeding: Transplant	Beef Basin Phase II	May-16	10	3307
14B-23	South Plain	Seeding: Aerial After	Beef Basin Phase I	Jan-15	272	2939
14B-23	South Plain	Herbicide: Plateau	Beef Basin Phase I	Late November 2014	272	2939
14B-27	Mormon Pasture Point	Mechanical: Bullhog	Mormon Pasture Mountain Wildlife Habitat Improvement Phase I	Nov-16	463	3774
14B-32	Lower Deer Flat	Herbicide: Spike	Deer Flat Brush Control 1984	1984	2700	LTDL 3197-8943
14B-32	Lower Deer Flat	Chaining: Chain Unknown	Deer Flat Revegetation	Oct-50	1900	LTDL 3199-8946
14B-32	Lower Deer Flat	Seeding: Aerial	Deer Flat Revegetation	Oct-50	1900	LTDL 3199-8945
14B-38	Arch Canyon	Chaining: Chain Unknown	Little Baullies Reseeding	August-September 1960	1983	LTDL 6711-18488
14B-38	Arch Canyon	Seeding: Aerial	Little Baullies Reseeding	August-September 1960	1983	LTDL 6711-18489
15-1	Eagle Bench	Chaining: Two-Way Unknown	Eagle Bench Seeding	August-October 1966	1627	LTDL 3713-10437
15-1	Eagle Bench	Seeding: Aerial After	Eagle Bench Seeding	August-October 1966	1627	LTDL 3713-10438
15-1	Eagle Bench	Hand Crew: Lop and Scatter	Henry Mountain Fuel Reduction	April-May 2002	1529	LTDL 3237-14505
15-4	South Creek Chaining	Hand Crew: Lop and Scatter	Color Country and Paria River District Maintenance (Proposed)	2025	5007	7315
15-4	South Creek Chaining	Chaining: Chain Unknown	South Creek Pinyon-Juniper Project	May 1968-June 1969	607	LTDL 76595-29371

Study #	Study Name	Type	Disturbance Name (If Available)	Date	Acres	WRI Project #
15-4	South Creek Chaining	Seeding: Aerial After	South Creek Pinyon-Juniper Project	May-69	607	LTDL 10841-29370
15-4	South Creek Chaining	Hand Crew: Lop and Scatter	Henry Mountains PJ Thinning	September 1999-July 2002	3363	LTDL 5238-14508
15-4	South Creek Chaining	Hand Crew: Lop and Scatter	Dugout Flat Lop and Scatter Phase II	September 2010-October 2010	1396	1335
15-5	Bates Knob	Chaining: Two-Way Unknown	South Creek Seeding 1968	Fall 1968-Spring 1969	607	LTDL 10841-29369
15-5	Bates Knob	Seeding: Aerial After	South Creek Seeding 1968	May-69	607	LTDL 10841-29370
15-5	Bates Knob	Hand Crew: Lop and Scatter	Airplane Springs Fuels Project	June-July 2008	1464	1123
15-6	Box Springs Chaining	Seeding: Dribbler	Box Springs Chain and Seed	August 1984-March 1985	294	LTDL 1398
15-6	Box Springs Chaining	Chaining: Chain Unknown	Box Springs Chain and Seed	August 1984-March 1985	294	LTDL 1398-3949
15-6	Box Springs Chaining	Seeding: Seed Unknown	Box Springs Chain and Seed	August 1984-March 1985	294	LTDL 1398-3950
15-6	Box Springs Chaining	Hand Crew: Lop and Scatter	Bullfrog Creek Chaining Maint. Phase I	June-November 2008	164	339
15-7	Airplane Spring	Hand Crew: Lop and Scatter	Color Country and Paria River District Maintenance (Proposed)	2025	5007	7315
15-7	Airplane Spring	Chaining: Two-Way Unknown	West Horn Seeding 1968	November 1968-June 1969	1632	LTDL 12601-33975
15-7	Airplane Spring	Seeding: Aerial Before	West Horn Seeding 1968	October 1968-June 1969	1632	LTDL 12601-33974
15-7	Airplane Spring	Hand Crew: Lop and Scatter	Airplane Springs Fuels Project	June-July 2008	1464	1123
15-12	Quaking Aspen Spring	Chaining: One-Way Unknown	Bulldog Fire Rehabilitation-Non WSA	October 2003-April 2004	4600	LTDL 1702-4731
15-13	Sidehill Spring	Chaining: One-Way Unknown	Bulldog Fire Rehab 2003	November 2003-April 2004	4600	LTDL 1702-4731
15-13	Sidehill Spring	Seeding: Aerial	BLM Bulldog Fire (Non-WSA)	Nov-03	8098	LTDL 1702-4735
15-16	Coyote Spring	Chaining: One-Way Unknown	Bulldog Fire Rehab 2003	October 2003-April 2004	4600	LTDL 1702-4731
15-16	Coyote Spring	Seeding: Aerial	Bulldog Fire Rehab 2003	Nov-03	8098	LTDL 1702-4735
15-20	Sage Flat	Chaining: Two-Way Ely	Nasty Flat Chaining	Aug-84	685	LTDL 7938-21769
15-20	Sage Flat	Seeding: Aerial Before	Nasty Flat Chaining	Aug-84	685	LTDL 7938-21768
15-20	Sage Flat	Hand Crew: Lop and Scatter	Color Country and Paria River District Maintenance (Proposed)	2025	5007	7315
16B-3	Rocky Hollow	Seeding: Aerial Before	Thistle Creek Watershed Restoration Phase 2	Oct-21	730	5558
16B-3	Rocky Hollow	Herbicide: Plateau	Thistle Creek Watershed and Fire Rehab Project	Sep-20	670	5177
16B-3	Rocky Hollow	Mechanical: Bullhog	Thistle Creek Watershed Restoration Phase 2	Nov-21	819	5558
16B-4	Dry Creek Chaining	Mechanical: Bullhog	Dry Canyon Wildlife Improvement and Fuels Reduction Project Phase I	Between July 2010 and June 2012	496	1701
16B-5	Jackson Unit	Mechanical: Bullhog	Birdseye WMA Bullhog Project	September 2016-December 2017	229	3605
16B-6	Mill Fork	Hand Crew: Lop and Scatter	Mill Fork Wildlife Habitat Improvement Project (Phase 2)	August-November 2015	553	3019
16B-6	Mill Fork	Seeding: Aerial Before	Mill Fork Wildlife Habitat Improvement Project	Oct-07	462	716
16B-6	Mill Fork	Chaining: Two-Way Ely/Smooth	Mill Fork Wildlife Habitat Improvement Project	October-November 2007	350	716
16B-6	Mill Fork	Seeding: Dribbler	Mill Fork Wildlife Habitat Improvement Project	Nov-07	350	716
16B-9	Starvation Mountain Brush	Seeding: Transplant	Soldier Creek Mule Deer and Watershed Restoration Project FY 25 (Proposed)	2025	3582	6909
16B-11	Hilltop	Mechanical: Bullhog	Hilltop Conservation Easement Bullhog Phase 2	July 2014-June 2015	269	3047
16B-18	Porphyry Bench	Aerator: Double Drum	Price West Benches Year 1--Porphyry Bench	November 2004, April-May 2005	1104	229
16B-18	Porphyry Bench	Seeding: Aerial After	Price West Benches Year 1--Porphyry Bench	Dec-04	1104	229

Study #	Study Name	Type	Disturbance Name (If Available)	Date	Acres	WRI Project #
16B-18	Porphyry Bench	Disc: One-Way	Porphyry Bench Sagebrush Planting	Nov-16	20	3616
16B-18	Porphyry Bench	Seeding: Broadcast After	Porphyry Bench Sagebrush Planting	Nov-16	20	3616
16B-18	Porphyry Bench	Seeding: Broadcast Before	Price West Benches Year 1--Porphyry Bench	November 2004, April-May 2005	1104	229
16B-20	Telephone Bench	Hand Crew: Lop and Scatter	North Springs PJ Removal Phase II	March-October 2018	4484	3583
16B-22	Poison Spring Bench	Seeding: Seed Unknown	Burma Rd. Pinyon/Juniper Removal	Dec-13	293	2556
16B-22	Poison Spring Bench	Hand Crew: Lop and Scatter	Burma Rd. Pinyon/Juniper Removal	October-December 2013	1312	2556
16B-23	Consumer Bench	Aerator: Double Drum	Price West Benches Year 2	October-December 2005	2658	228
16B-23	Consumer Bench	Seeding: Aerial After	Price West Benches Year 2	Mar-06	2658	228
16B-23	Consumer Bench	Seeding: Broadcast Before	Price West Benches Year 2	October-December 2005	2658	228
16B-23	Consumer Bench	Hand Crew: Lop and Scatter	Miller Creek Watershed Restoration	Nov-18	242	4207
16C-1	Manti Face Chaining	Hand Crew: Lop and Scatter	Manti Face Lop and Scatter	September-December 2012	853	1707
16C-3	North Manti Face	Hand Crew: Lop and Scatter	Manti Face Lop and Scatter	July 2010-June 2012	853	1707
16C-5	Cane Valley	Hand Crew: Lop and Scatter	Black Hills WMA Lop and Scatter	Oct-07	878	710
16C-6	Black Hill	Hand Crew: Lop and Scatter	Black Hills WMA Lop and Scatter	Oct-07	878	710
16C-6	Black Hill	Seeding: Transplant	Ephraim Mule Deer and Watershed Restoration Project FY25 (Proposed)	2025	51	6934
16C-7	Mayfield Mountain Face	Hand Crew: Lop and Scatter	Twelve Mile WMA Habitat Improvement	July-October 2007	1294	273
16C-8	Pole Canyon Chaining	Chaining: Two-Way Unknown	Pole Canyon Seeding	September-October 1967	2058	LTDL 8938-24360
16C-8	Pole Canyon Chaining	Hand Crew: Lop and Scatter	Sanpitch Mountains Collaborative Phase I	September 2019-June 2024	3733	5942
16C-8	Pole Canyon Chaining	Seeding: Aerial After	Pole Canyon Seeding	Sep-67	2058	LTDL 8938-24361
16C-8	Pole Canyon Chaining	Hand Crew: Lop and Scatter	Mayfield Fuels Reduction 2001	January 2001-June 2002	3623	LTDL 7296-19954
16C-9	Pole Canyon Oak	Herbicide: Garlon 3A/Tordon/Aquafact	12 Mile Habitat Improvement Project	September 2013-April 2015	302	2242
16C-9	Pole Canyon Oak	Chaining: Two-Way Ely/Smooth	Twelve Mile WMA Habitat Improvement - Year 2	October-November 2008	540	1059
16C-9	Pole Canyon Oak	Seeding: Aerial Before	Twelve Mile WMA Habitat Improvement - Year 2	October-November 2008	618	1059
16C-9	Pole Canyon Oak	Seeding: Dribbler	Twelve Mile WMA Habitat Improvement - Year 2	October-November 2008	540	1059
16C-11	Above South Hollow	Hand Crew: Lop and Scatter	Twelve Mile Watershed Restoration Project FY 23	July 2022-June 2023	629	5916
16C-11	Above South Hollow	Chaining: Two-Way Ely/Smooth	Twelve Mile WMA Habitat Improvement - Year 2	October-November 2008	540	1059
16C-11	Above South Hollow	Seeding: Aerial Before	Twelve Mile WMA Habitat Improvement - Year 2	October-November 2008	618	1059
16C-11	Above South Hollow	Seeding: Dribbler	Twelve Mile WMA Habitat Improvement - Year 2	October-November 2008	540	1059
16C-12	Manti Dump	Hand Crew: Lop and Scatter	6-Mile Habitat Improvement	June-August 2009	787	1051
16C-12	Manti Dump	Mechanical: Bullhog	Six Mile WMA In-House Bullhog Project - Phase 1	2019	446	4809
16C-12	Manti Dump	Seeding: Dribbler Unknown	Six Mile WMA In-House Bullhog Project - Phase 1	2019	1065	4809
16C-14	Red Point	Seeding: Aerial After	West Huntington Chain and Seed	Mar-73	1033	LTDL 12602-33977
16C-14	Red Point	Chaining: Two-Way Unknown	West Huntington Chain and Seed	September 1969-December 1969	1033	LTDL 12602-33976
16C-14	Red Point	Seeding: Aerial After	West Huntington Chain and Seed	Dec-69	1033	LTDL 12602
16C-14	Red Point	Hand Crew: Lop and Scatter	Burma Rd. Pinyon/Juniper Removal	October-December 2013	1312	2556

Study #	Study Name	Type	Disturbance Name (If Available)	Date	Acres	WRI Project #
16C-22	North Horn Rock Canyon	Mechanical: Bullhog	Swasey Wildlife Habitat Improvement and Hazardous Fuels Reduction Project Phase VII	August 2016-June 2017	620	3638
16C-24	South Horn Exclosure	Mechanical: Bullhog	South Horn Wildlife Habitat Improvement Project	June 2017-April 2018	608	4036
16C-24	South Horn Exclosure	Mechanical: Bullhog	Manti-La Sal Healthy Forest Restoration (Proposed)	2024-2025	1215	5568
16C-24	South Horn Exclosure	Mechanical: Bullhog	West Emery County Watershed Restoration	Aug-23	593	6597
16C-25	South Horn 1/4 Corner	Mechanical: Bullhog	Manti-La Sal Healthy Forest Restoration (Proposed)	2024-2025	1215	5568
16C-28	South of Dry Wash	Hand Crew: Lop and Scatter	Swasey/Dry Wash/Grimes Wildlife Habitat Improvement and Hazardous Fuels Reduction	Oct-20	610	5202
16C-31	Box Canyon Knolls	Fire: Prescribed	West Emery County Watershed Restoration (Proposed)	2024-2025	5934	6597
16C-32	Muddy Creek	Seeding: Broadcast	Muddy Creek Seeding	Feb-06	60	95
16C-36	Danish Bench	Chaining: Chain Unknown	-	November-December 1969	1319	LTDL 12835-34528
16C-36	Danish Bench	Seeding: Broadcast	-	November-December 1969	1319	LTDL 12835-34529
16C-36	Danish Bench	Hand Crew: Lop and Scatter	Danish Bench Lop and Scatter	Spring 2009	586	1390
16C-38	Pleasant Creek	Chaining: Two-Way Ely	Bear Mountain CWMU Habitat Enhancement	October-December 2013	232	2602
16C-38	Pleasant Creek	Seeding: Aerial Before	Bear Mountain CWMU Habitat Enhancement	October-December 2013	232	2602
16C-38	Pleasant Creek	Seeding: Dribbler	Bear Mountain CWMU Habitat Enhancement	October-December 2013	232	2602
16C-38	Pleasant Creek	Seeding: Aerial After	Bear Mountain CWMU Habitat Enhancement	Feb-14	232	2602
16C-40	Cedar Mountain	Harrow: One-Way Dixie	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	June-December 2005	4445	216
16C-41	Trough Hollow	Hand Crew: Lop (No Scatter)	Salina Creek Ecosystem Restoration Project Phase 3	July 2021-August 2022	2734	5446
16C-42	Box Canyon Sage-Grouse	Seeding: Aerial Before	GH Olsen Chaining	Sep-67	800	LTDL 9198-25012
16C-42	Box Canyon Sage-Grouse	Harrow: One-Way Dixie	Wildcat Knolls Habitat Improvement	September-November 2008	435	1161
16C-42	Box Canyon Sage-Grouse	Seeding: Broadcast Before	Wildcat Knolls Habitat Improvement	September-November 2008	810	1161
16C-42	Box Canyon Sage-Grouse	Seeding: Rangeland Drill	Wildcat Sagebrush Restoration Project Phase II	August-September 2009	466	1392
16C-42	Box Canyon Sage-Grouse	Chaining: Two-Way Ely	GH Olsen Chaining	Sep-67	800	LTDL 9198-25011
16C-45	Olsen Canyon	Hand Crew: Lop and Scatter	Twelve Mile Wma Habitat Improvement	July 2007-October 2008	1254	273
16R-6	North Slackpile	Mechanical: Roller Chopper	Gordon Creek Roller Chopper	Oct-06	199	513

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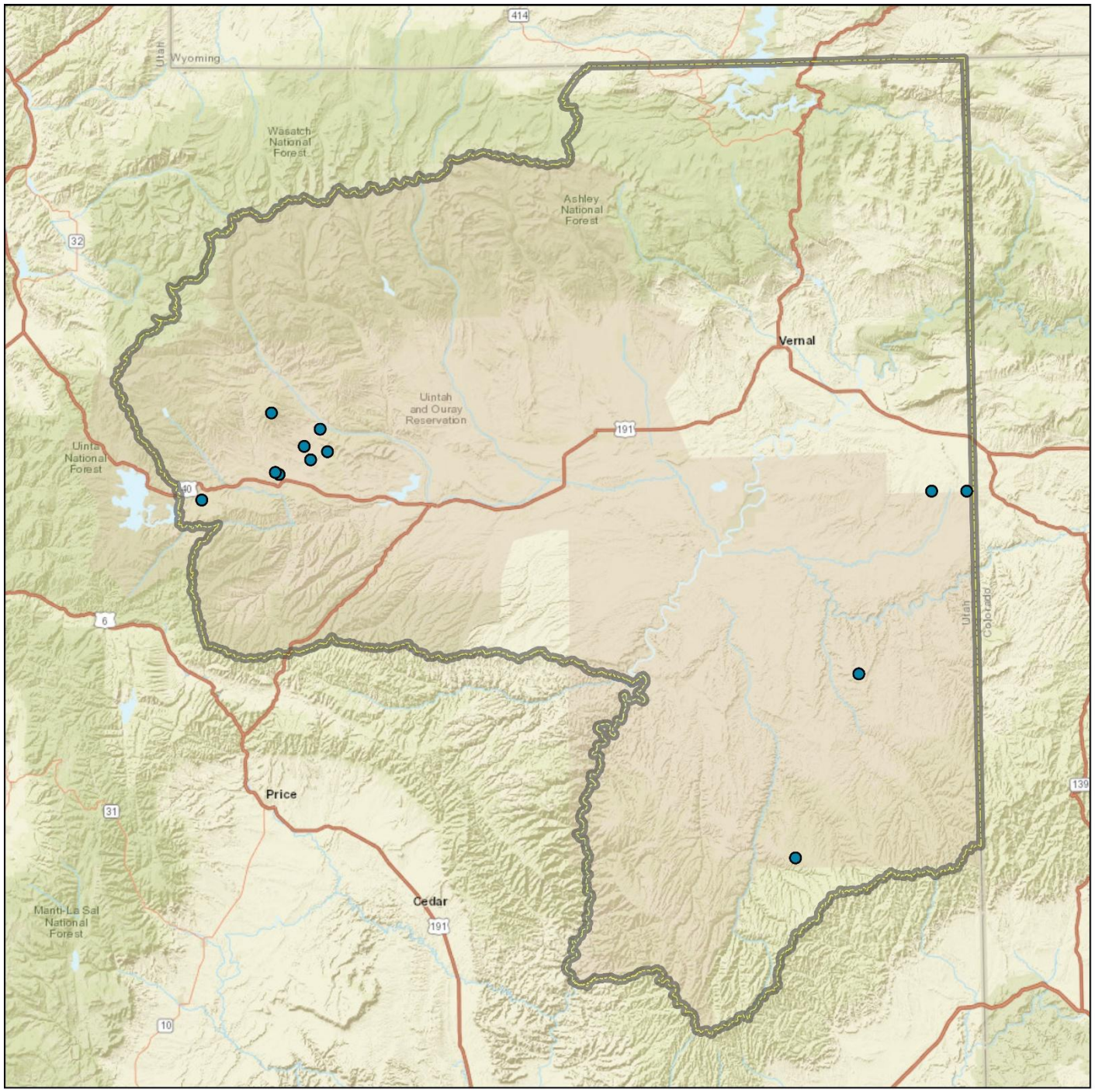
NORTHEASTERN REGION



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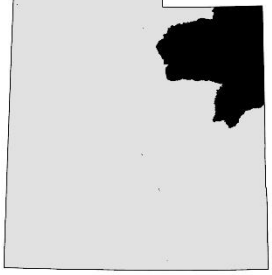
Study Locations

2024 WRI Study Sites

Administrative Boundaries

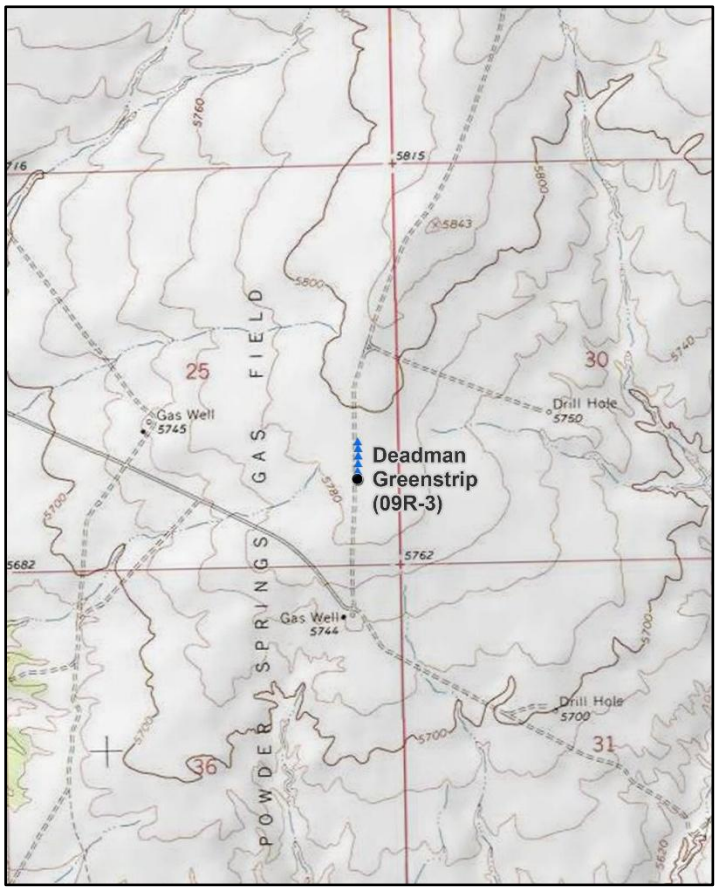
Northeastern Region

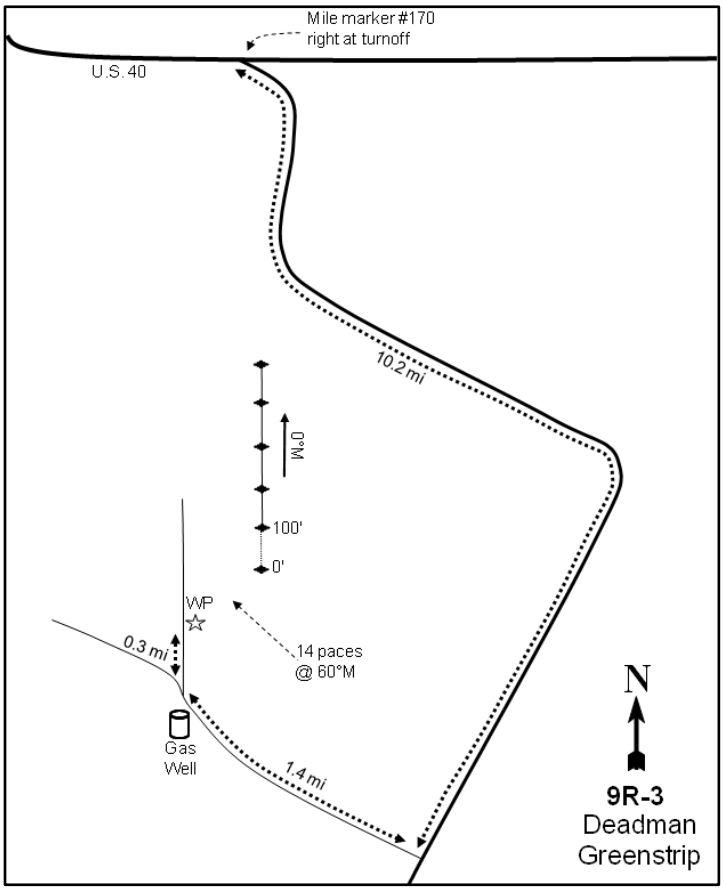
Area of Interest



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

DEADMAN GREENSTRIP - STUDY NO. 09R-3





Location Information

USGS 7.5 min Map Info	Dinosaur NW SE; Township 7S, Range 24E, Section 25
GPS (0' Stake)	NAD 83 UTM ZONE 12, 657087 East 4448956 North

Transect Information

Browse Tag # (0' Stake)	135
Transect Bearing	0° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	COYOTE WASH
Elevation	5,800ft (1,768m)
Aspect	South
Slope	1%
Sample Dates	06/28/2004, 07/30/2007, 08/10/2011, 08/25/2015, 07/21/2019, 08/28/2024

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Deadman Bench follow-up herbicide	2202	September 2012	1003
Aerator - Single Drum	Deadman Greenstrip	LTDL 3154-8825	September-November 2004	500
Herbicide - Plateau	Deadman Bench Range Improvement	1081	September 2008	523
Seeding - Rangeland Drill	Deadman Bench Range Improvement	1081	November-December 2008	523
Herbicide - Plateau	Green River District Herbicide Treatments 2019	5000	August 2019	7102
Seeding - Broadcast	Deadman Greenstrip	LTDL 3154-8825	Fall 2004	500

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

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

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

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

Wildlife Habitat and Vegetation History

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

Species	Habitat	Season
Greater Sage-Grouse		undefined & undefined
Pronghorn	crucial	year-long

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

Year	Vegetation Type	Woodland Succession
2004	Mountain Big Sagebrush	No Encroachment
2007	Annual Grass	No Encroachment
2011	Perennial Grass	No Encroachment
2015	Perennial Grass	No Encroachment
2019	Perennial Grass/Mountain Big Sagebrush	No Encroachment
2024	Perennial Grass/Mountain Big Sagebrush	No Encroachment

Site Notes

No Notes

Soils

Table 09R-03.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.5	50.3	25.5	24.2	1.0	7.1	131.2	0.6	12/01/2004

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2004 - Current Potential State: Community Phase 2.2 2007 - Current Potential State: Community Phase 2.4 2011-2024 - Seeded State: Community Phase 5.2

When the study was established in 2004, the plant community was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 09R-03.12, Table 09R-03.13) with a poor herbaceous understory (Table 09R-03.7). Following the treatment in the fall of 2004 (Table 09R-03.1), the site transitioned to an introduced annual grass (cheatgrass) (*Bromus tectorum*) community. However, an additional seeding and herbicide treatment occurred in the fall of 2008 and the community transitioned to one dominated by introduced perennial grasses, primarily crested wheatgrass (*Agropyron cristatum*) and Siberian wheatgrass (*A. fragile*), in 2011 (Table 09R-03.10). Sagebrush has remained lower than pre-treatment levels, but was considered to be a codominant site component in 2019 and 2024 (Table 09R-03.12). Without a major disturbance or significant changes in management, this site may have the potential to again transition to one dominated by sagebrush over time (Jornada, 2024).

Mule deer winter range conditions have varied between very poor and good-excellent since 2004. Winter habitat condition was considered good in 2024, and was generally limited by low preferred browse cover and recruitment, and low perennial forb cover (Table 09R-03.15). Deer and/or pronghorn presence was high in 2007, 2015, and 2019; but elk and cow presence was high in 2024. Horse presence was also high in 2024, but low for all other sample years (Table 09R-03.9). Mountain big sagebrush has provided much of the forage for wildlife, and utilization has been moderate over the course of the study; in 2024, 20% of sagebrush plants sampled in density strips were moderately hedged (Table 09R-03.13). It should be noted that this community is susceptible to severe drought, introduced species competition, and/or heavy utilization that could lead to a decrease in abundance of preferred browse and loss of utility for wildlife.

Trend Summary Tables

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

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	15.1	0.4	-	16.1	0.2	-
2007	3.8	0.0	-	4.0	0.1	-
2011	6.8	0.1	-	8.3	0.1	-
2015	4.0	0.0	-	6.9	-	-
2019	9.2	-	-	10.5	-	-
2024	6.7	0.0	-	8.0	-	-

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

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	276	242	43	35	3.1	5.3	0.1	0.2
2007	459	142	248	37	25.7	1.9	2.3	0.2
2011	253	340	139	23	4.1	19.5	0.7	0.4
2015	100	310	145	-	0.4	14.2	0.6	-
2019	277	276	464	7	7.2	15.1	19.8	0.0
2024	32	312	36	13	0.1	16.1	0.1	0.1

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

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	44.4	10.3	29.6	0.0	-	26.1
2007	38.5	1.1	38.2	0.0	-	32.9
2011	39.3	0.1	34.6	0.0	-	32.4
2015	40.8	0.1	48.8	0.0	0.0	21.8
2019	40.9	0.0	50.7	0.1	0.4	46.2
2024	46.5	0.0	48.9	0.1	-	21.7

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

Year	Cattle	Coyote	Mule Deer/Pronghorn	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency					
2004	-	-	19	-	-	71
2007	2	-	34	2	-	84
2011	-	-	28	6	-	28
2015	-	-	43	11	4	96
2019	-	-	28	18	7	23
2024	-	-	33	40	9	44
Year	Days Use Per Acre (ha)					
2004	-	-	18.7 (46.3)	-	2.3 (5.7)	-
2007	-	17.4 (43.0)*	36.2 (89.4)	-	-	-
2011	-	-	6.0 (14.9)	7.4 (18.2)	0.6 (1.4)	-
2015	-	-	50.9 (125.8)	-	4.7 (11.5)	-
2019	0.7 (1.8)	-	20.1 (49.7)	4.7 (11.6)	4.7 (11.5)	-
2024	-	-	16.1 (39.7)	65.7 (162.2)	21.5 (53.1)	-

*Pellets per acre (ha)

Table 09R-03.10 - 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)	Elymus lanceolatus (thickspike wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency								
2004	-	-	276	92	163	3	-	-	1
2007	9	-	459	70	71	2	-	-	13
2011	156	8	253	74	206	2	5	9	-
2015	184	12	96	23	135	-	25	2	4
2019	164	93	277	3	75	4	12	3	7
2024	252	8	32	-	69	-	7	-	-
year	Average Cover (%)								
2004	-	-	3.1	3.2	2.1	0.0	-	-	0.0
2007	0.0	-	25.6	1.0	0.9	0.0	-	-	0.1
2011	7.2	0.3	4.1	2.1	9.4	0.0	0.0	0.4	-
2015	8.6	0.5	0.4	0.5	3.3	-	1.2	0.1	0.0
2019	8.3	3.7	7.1	0.1	1.9	0.2	1.0	0.1	0.1
2024	14.5	0.5	0.1	-	1.0	-	0.1	-	-

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

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

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum[ai] (desert madwort)	Astragalus (milkvetch)	Ceratocephala testiculata[ai] (curveseed butterwort)	Collinsia parviflora[a] (maiden blue eyed Mary)	Descurainia pinnata[a] (western tansymustard)	Eriastrum diffusum[a] (miniature woollystar)	Erigeron pumilus (shaggy fleabane)	Gilia inconspicua[a] (shy gilia)	Lappula occidentalis[a] (flatspine stickseed)	Lupinus brevicaulis[a] (shortstem lupine)	Medicago sativa[i] (alfalfa)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Plantago patagonica[a] (woolly plantain)	Salsola tragus[ai] (prickly Russian thistle)	Schoenocrambe linifolia (flaxleaf plainsmustard)
year	Nested Frequency																
2004	-	3	-	-	-	-	-	-	-	36	10	-	-	-	-	-	-
2007	-	109	3	1	1	27	-	-	116	126	3	2	1	3	-	-	3
2011	2	122	-	-	-	13	-	-	-	4	-	3	-	1	-	-	2
2015	-	143	-	-	-	8	-	-	-	2	-	-	-	-	-	-	-
2019	-	462	-	-	2	44	7	0	2	90	79	-	-	4	7	-	-
2024	-	35	-	-	-	-	-	-	-	-	-	-	-	10	-	3	-
year	Average Cover (%)																
2004	-	0.0	-	-	-	-	-	-	-	0.1	0.0	-	-	-	-	-	-
2007	-	0.7	0.0	0.0	0.0	0.1	-	-	0.5	0.9	0.0	0.0	0.0	0.0	-	-	0.1
2011	0.0	0.6	-	-	-	0.0	-	-	-	0.0	-	0.0	-	0.0	-	-	0.0
2015	-	0.5	-	-	-	0.0	-	-	-	0.0	-	-	-	-	-	-	-
2019	-	18.6	-	-	0.0	0.2	0.0	0.0	0.0	0.5	0.4	-	-	0.0	0.0	-	-
2024	-	0.1	-	-	-	-	-	-	-	-	-	-	-	0.1	-	0.0	-

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

FORB SPECIES	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Trifolium (clover)
year	Nested Frequency		
2004	-	32	3
2007	-	25	-
2011	3	15	-
2015	15	-	-
2019	2	3	-
2024	-	3	-
year	Average Cover (%)		
2004	-	0.2	0.0
2007	-	0.1	-
2011	0.0	0.3	-
2015	0.1	-	-
2019	0.0	0.0	-
2024	-	0.0	-

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

Table 09R-03.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Bassia prostrata[pi] (forage kochia)	Chrysothamnus depressus[p] (longflower rabbitbrush)	Grayia spinosa (spiny hopsage)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
2004	16.1	-	-	-	0.2
2007	4	-	-	-	0.1
2011	7.2	1.1	-	-	0.1
2015	6.8	0.1	-	-	-
2019	8.9	1.6	-	-	-
2024	7.7	0.3	-	-	0
year	Quadrat Cover (%)				
2004	15.1	-	-	0.1	0.3
2007	3.8	0.0	0.0	-	0.0
2011	6.0	0.8	-	-	0.1
2015	3.8	0.3	-	-	0.0
2019	7.6	1.6	-	-	-
2024	6.7	0.0	-	-	0.0

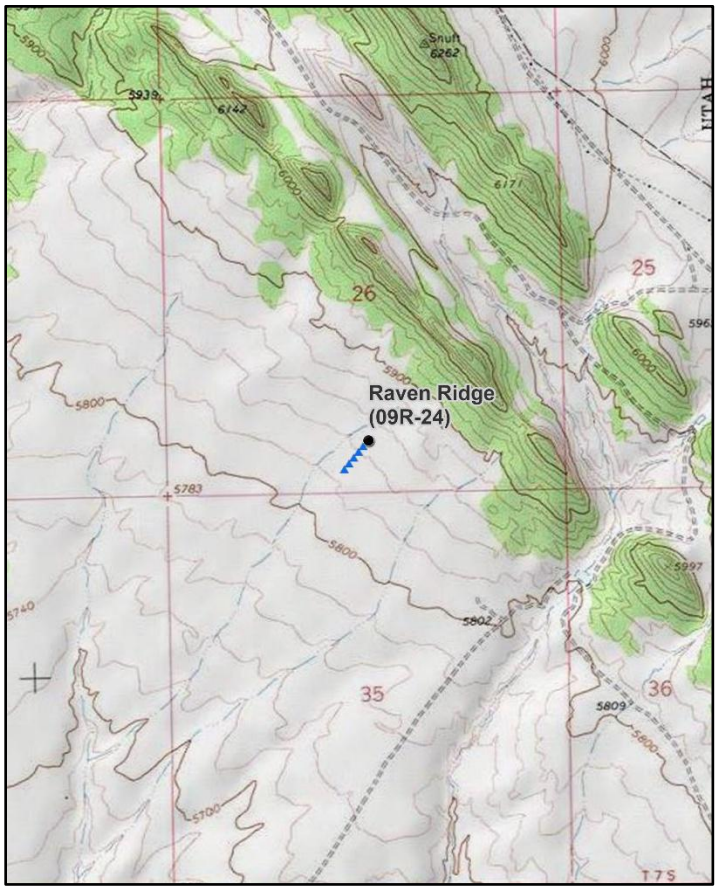
t - Tree Species; p - Preferred Browse; i - Introduced Species

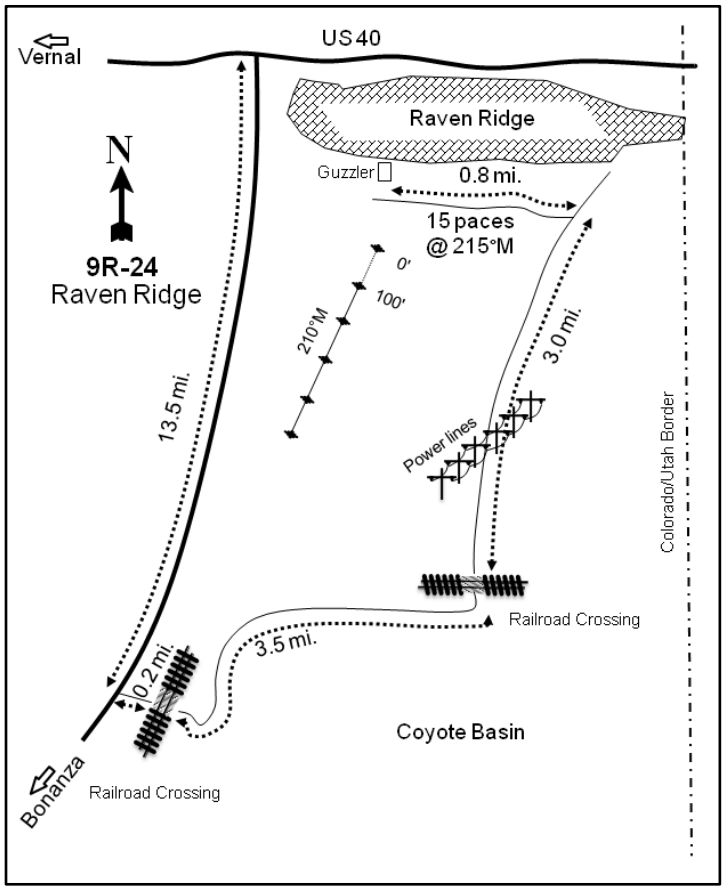
Table 09R-03.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2004	5420	-	2	40	59	31	1	30	60/75
2007	2760	20	1	27	73	25	18	72	39/49
2011	2660	52920	26	65	9	31	5	12	32/46
2015	3860	120	28	62	11	59	9	38	33/52
2019	3500	-	6	79	14	29	5	31	44/64
2024	2240	-	14	73	13	20	0	15	- / -
Bassia prostrata[pi] -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	240	140	67	33	0	0	0	0	7/8
2011	960	1200	29	71	0	25	4	0	21/34
2015	480	-	0	88	13	38	63	21	12/29
2019	440	-	0	100	0	0	14	0	47/59
2024	200	-	0	100	0	20	70	0	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2011	20	-	0	100	0	100	0	0	5/15
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2004	20	-	0	0	100	0	100	100	- / -
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	19/31
2024	-	-	-	-	-	-	-	-	-/-
Grayia spinosa -- (spiny hopsage)									
2004	20	-	0	100	0	100	0	0	40/54
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2004	740	-	0	60	41	0	0	8	10/25
2007	320	-	19	44	38	0	0	25	7/14
2011	320	-	0	100	0	0	0	0	10/25
2015	280	-	36	57	7	21	0	21	9/24
2019	60	-	0	100	0	0	0	0	9/26
2024	60	-	0	100	0	0	0	0	- / -

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

RAVEN RIDGE - STUDY NO. 09R-24





Location Information

USGS 7.5 min Map Info	Dinosaur SW; Township 7S, Range 25E, Section 26
GPS (0' Stake)	NAD 83 UTM ZONE 12, 664514 East 4448961 North

Transect Information

Browse Tag # (0' Stake)	181
Transect Bearing	210° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	RAVEN RIDGE
Elevation	5,790ft (1,765m)
Aspect	South
Slope	5%
Sample Dates	08/10/2011, 08/18/2014, 07/21/2019, 08/28/2024

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

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

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

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

Wildlife Habitat and Vegetation History

Table 09R-24.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Greater Sage-Grouse		undefined & undefined
Pronghorn	crucial	year-long

Table 09R-24.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Mountain Big Sagebrush	Phase I
2014	Mountain Big Sagebrush	No Encroachment
2019	Annual Grass/Mountain Big Sagebrush	No Encroachment
2024	Mountain Big Sagebrush/Annual Forb	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2011-2014 - Current Potential State: Community Phase 2.2 2019 - Current Potential State: Community Phase 2.4 2024 - Current Potential State: Community Phase 2.2

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been the dominant shrub on this site since study establishment in 2011, although density and cover have decreased following the harrow treatment (Table 09R-24.1). Other shrub species have remained limited in both diversity and abundance (Table 09R-24.12, Table 09R-24.13). The herbaceous understory has been mainly comprised of the introduced annual grass species cheatgrass (*Bromus tectorum*) and/or annual forbs such as tall tumblemustard (*Sisymbrium altissimum*). Cheatgrass cover increased by 30% between 2014 and 2019, and it was a codominant vegetation component in 2019; however, cheatgrass has decreased in cover and abundance as of 2024 (Table 09R-24.7, Table 09R-24.10, Table 09R-24.11). High amounts of annual grasses can increase fuel loads and may affect the ecological resilience of the plant community; additional treatments may be necessary in order to restore the herbaceous understory on this site.

Mule deer winter range conditions have varied between very poor and fair since 2011. Winter habitat condition was considered fair in

2024, and was generally limited by low preferred browse cover and recruitment, and low perennial forb cover. The presence of annual grass has also negatively impacted deer habitat quality in past sample years (Table 09R-24.15). Deer and/or pronghorn and elk presence were high in 2024 according to pellet transect data (Table 09R-24.9). Mountain big sagebrush has provided much of the forage for wildlife. Sagebrush utilization was fairly moderate between 2011 and 2019, but it received low utilization in 2024 (Table 09R-24.13). It should be noted that this community is susceptible to severe drought, introduced species competition, and/or heavy utilization that could lead to a decrease in preferred browse abundance and loss of utility for wildlife.

Trend Summary Tables

Table 09R-24.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	18.0	0.2	-	23.4	0.2	-
2014	9.7	0.5	-	14.6	0.2	-
2019	8.2	0.5	-	11.1	0.1	-
2024	8.8	0.9	-	13.2	0.7	-

Table 09R-24.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	375	57	51	29	8.9	0.7	1.8	0.4
2014	282	115	303	27	9.3	3.1	13.8	0.1
2019	471	106	231	17	39.4	2.0	4.4	0.9
2024	150	187	377	6	3.6	9.1	16.7	0.2

Table 09R-24.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	40.0	2.1	32.2	0.3	0.0	29.8
2014	39.5	0.1	45.8	0.8	0.1	36.1
2019	25.5	0.0	66.9	0.3	0.1	52.1
2024	31.3	0.1	54.6	1.0	0.4	34.8

Table 09R-24.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer/Pronghorn	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency			
2011	6	2	-	7
2014	3	-	-	20
2019	19	10	5	7
2024	17	11	3	15
Year	Days Use Per Acre (ha)			
2011	10.7 (26.5)	-	-	-
2014	5.3 (13.2)	0.7 (1.7)	-	-
2019	16.1 (39.7)	6.7 (16.6)	8.7 (21.5)	-
2024	33.5 (82.8)	38.2 (94.4)	4.0 (10.0)	-

Table 09R-24.10 - 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)	Elymus lanceolatus (thickspike wheatgrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency					
2011	-	375	10	47	-	-
2014	3	267	5	107	-	58
2019	24	471	11	79	-	37
2024	26	148	1	165	1	9
year	Average Cover (%)					
2011	-	8.9	0.1	0.6	-	-
2014	0.1	9.0	0.0	3.0	-	0.3
2019	0.9	39.3	0.1	0.9	-	0.1
2024	2.0	3.6	0.0	7.1	0.0	0.0

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

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

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum desertorum[ai] (desert madwort)	Cryptantha[a] (annual cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriastrum diffusum[a] (miniature woollystar)	Erysimum (wallflower)	Gilia inconspicua[a] (shy gilia)	Lappula occidentalis[a] (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Salsola tragus[ai] (prickly Russian thistle)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)
year	Nested Frequency											
2011	-	8	-	1	18	20	-	4	10	-	22	1
2014	2	-	2	208	29	-	-	126	4	62	94	21
2019	-	63	7	42	91	3	1	133	3	9	36	11
2024	-	-	-	6	-	-	-	2	3	362	29	3
year	Average Cover (%)											
2011	-	0.0	-	0.0	0.3	0.3	-	0.0	0.1	-	1.4	0.0
2014	0.0	-	0.0	6.1	0.2	-	-	1.4	0.0	0.9	5.2	0.1
2019	-	0.3	0.0	0.4	0.6	0.0	0.0	1.3	0.0	0.1	1.8	0.9
2024	-	-	-	0.3	-	-	-	0.0	0.1	15.2	1.2	0.0

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

Table 09R-24.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover		
2011	23.4	-	0.2
2014	14.6	0.2	-
2019	11.1	-	0.1
2024	13.2	0.7	-
year	Quadrat Cover (%)		
2011	18.0	0.1	0.0
2014	9.7	0.2	0.3
2019	8.2	0.0	0.5
2024	8.8	0.6	0.3

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

Table 09R-24.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

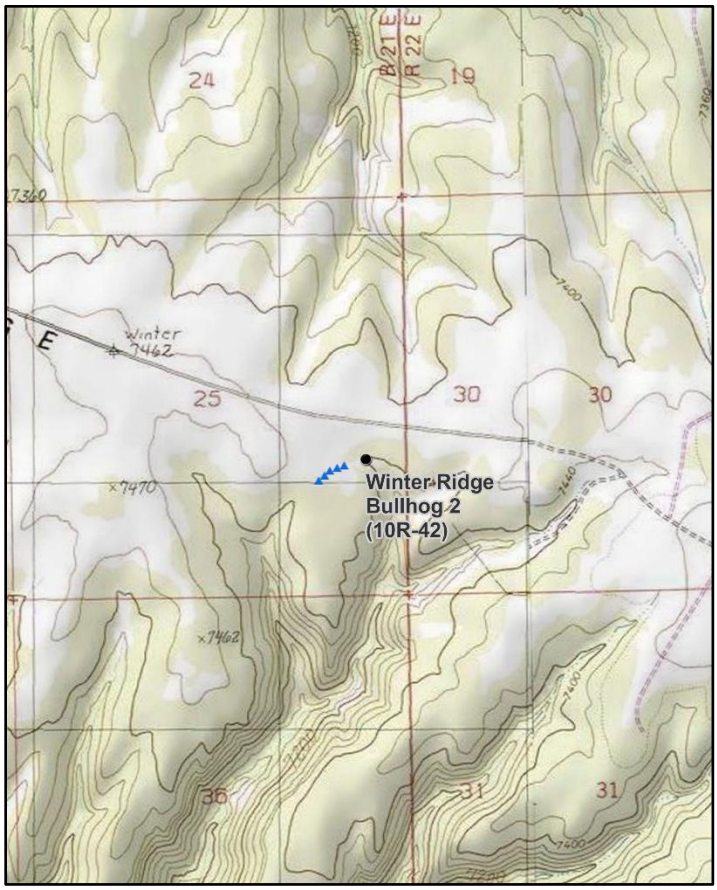
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2011	4120	2060	2	67	32	62	13	29	53/78
2014	2180	-	1	67	32	27	17	19	43/77
2019	1920	-	0	52	48	35	14	48	54/82
2024	1620	-	1	59	40	12	0	41	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2011	120	-	0	100	0	0	0	0	29/53
2014	800	-	88	13	0	0	0	0	24/38
2019	120	580	17	83	0	0	0	0	22/26
2024	600	-	0	97	3	0	0	3	- / -
Opuntia -- (pricklypear)									
2011	60	-	0	100	0	0	0	0	12/38
2014	80	-	0	100	0	0	0	0	11/39
2019	100	-	0	100	0	0	0	0	12/48
2024	120	-	0	83	17	0	0	17	- / -

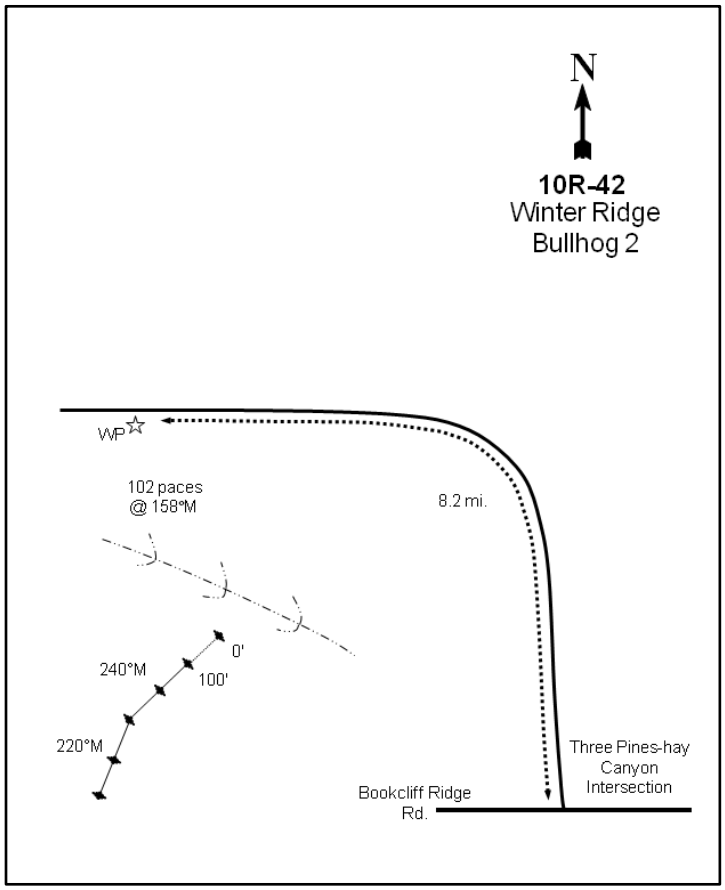
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 09R-24.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2011	2	-	100	-	-	-	7.0

WINTER RIDGE BULLHOG 2 - STUDY NO. 10R-42





Location Information

USGS 7.5 min Map Info	Tenmile Canyon North; Township 15S, Range 21E, Section 25
GPS (0' Stake)	NAD 83 UTM ZONE 12, 628293 East 4371299 North

Transect Information

Browse Tag # (0' Stake)	140
Transect Bearing	240° magnetic (Lines 4-5: 220° magnetic)
Length	500ft
Belt Placement	Line 1 (59ft), Line 2 (71ft), Line 3 (95ft), Line 4 (34ft), Line 5 (11ft)
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 8.2 miles to a witness post on the left (south) side of the road. From the witness post, the 0-foot stake is 100 paces away at 170 degrees magnetic, near the bottom of a small gully. The 0-foot stake is marked with browse tag #140.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	WINTER RIDGE AMP
Elevation	7,400ft (2,256m)
Aspect	Southeast
Slope	7%
Sample Dates	07/18/2007, 06/23/2010, 08/28/2013, 08/15/2017, 08/28/2024

Table 10R-42.1 Disturbance History. Recorded history of major disturbances.

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

Wildlife Habitat and Vegetation History

Table 10R-42.3 - 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-42.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon-Juniper	Phase II transitioning to Phase III
2010	Perennial Grass/Mountain Big Sagebrush	Phase I
2013	Perennial Grass/Mountain Big Sagebrush	Phase I
2017	Perennial Grass/Mountain Big Sagebrush	Phase I
2024	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

In 2010, lines 1 and 2 of the study transect were moved and placed at the end of line 5 because line 1 and line 2 fell outside of the treatment area.

Soils

Table 10R-42.5 - 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	30.1	42.4	27.5	1.9	10.9	83.2	0.5	07/18/2007

Site Potential

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

When the study was established in 2007, the plant community on this site was a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) stand being infilled by twoneedle pinyon (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and Rocky Mountain juniper (*J. scopulorum*). In addition, there was a mixture of mountain shrub species present that added to the total browse cover (Table 10R-42.12). The herbaceous understory was diverse and consisted primarily of native perennial grasses and forbs (Table 10R-42.10, Table 10R-42.11). Following the bullhog treatment (Table 10R-42.1), mountain big sagebrush increased in cover (Table 10R-42.12) and density with increased recruitment of young sagebrush plants to the population (Table 10R-42.13). The herbaceous understory increased in both forb and grass cover following treatment. Herbaceous cover was at its highest in 2019, but has decreased as of 2024 (Table 10R-42.10, Table 10R-42.11). This site is at high risk for infilling by conifers considering the presence of trees remaining on the site (Table 10R-42.14).

Mule deer winter range conditions have varied between very poor and good since 2007. Winter habitat condition was considered good in 2024, and was generally limited by low preferred browse cover (Table 10R-42.15). Mule deer presence has remained low for all years sampled; elk presence has been low for most sample years, but was high in 2013 (Table 10R-42.9). Mountain big sagebrush has provided much of the forage for wildlife and has steadily increased in both cover and density. Sagebrush utilization was fairly moderate in 2007 and 2010, but has remained low since 2013; in 2024, only 20% of mountain big sagebrush plants sampled in density strips were moderately to heavily hedged (Table 10R-42.13). It should be noted that this community is susceptible to severe drought, and/or heavy utilization that could lead to a decrease in preferred browse abundance and loss of utility for wildlife.

Trend Summary Tables

Table 10R-42.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	5.8	1.6	8.3	8.4	1.7	27.7
2010	3.1	1.9	1.8	4.3	2.3	2.2
2013	6.2	4.1	1.1	8.3	5.6	1.4
2017	6.9	3.6	2.3	6.9	2.5	2.1
2024	11.1	1.5	0.2	13.1	1.4	0.1

Table 10R-42.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	-	322	92	256	-	9.8	1.2	5.5
2010	-	299	21	228	-	10.2	0.1	6.0
2013	-	351	27	237	-	12.9	0.6	6.6
2017	-	401	25	251	-	21.9	0.1	11.2
2024	-	372	11	242	-	15.6	0.1	8.6

Table 10R-42.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	33.1	6.4	37.4	2.6	0.9	32.9
2010	19.5	1.3	55.2	2.2	1.8	28.7
2013	28.8	0.0	41.9	1.2	3.0	29.1
2017	29.5	0.9	46.7	4.4	0.8	41.5
2024	35.6	0.3	42.9	3.8	1.5	33.1

Table 10R-42.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle/Bison	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2007	-	4	3	-	32
2010	3	3	2	1	7
2013	5	11	32	1	2
2017	7	9	6	1	2
2024	4	5	2	5	3
Year	Days Use Per Acre (ha)				
2007	2.9 (7.2)	6.7 (16.6)	6.7 (16.6)	5.8 (14.3)	-
2010	2.9 (7.2)	17.4 (43.0)	-	4.7 (11.5)	-
2013	8.7 (21.5)	10.0 (24.8)	31.5 (77.8)	1.7 (4.3)	-
2017	20.3 (50.2)	8.1 (19.9)	14.1 (34.8)	7.5 (18.6)	-
2024	11.6 (28.7)	3.4 (8.3)	10.0 (24.8)	7.0 (17.2)	-

Table 10R-42.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency											
2007	11	92	38	-	46	76	120	-	50	133	3	30
2010	7	152	4	-	84	76	72	-	35	88	12	3
2013	13	216	10	-	164	84	45	-	2	79	-	6
2017	-	211	37	-	319	31	15	-	14	48	-	1
2024	6	142	183	2	205	2	39	29	3	59	-	1
year	Average Cover (%)											
2007	0.4	3.2	0.2	-	0.4	1.1	2.6	-	0.6	1.0	0.0	0.3
2010	0.1	5.6	0.0	-	0.9	1.2	1.1	-	0.5	0.8	0.1	0.0
2013	0.2	7.8	0.1	-	1.9	2.1	0.3	-	0.0	0.4	-	0.1
2017	-	15.1	0.4	-	4.9	0.7	0.4	-	0.1	0.3	-	0.0
2024	0.1	5.8	6.4	0.0	1.8	0.0	0.3	0.5	0.0	0.6	-	0.0

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

Table 10R-42.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria microphylla (littleleaf pussytoes)	Antennaria parvifolia (small-leaf pussytoes)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus chamaeleuce (cicada milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus spatulatus (tufted milkvetch)	Calochortus nuttallii (sego lily)	Castilleja flava (yellow Indian paintbrush)	Cirsium (thistle)	Cordylanthus kingii[a] (King's bird's-beak)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Draba[a] (draba)
year	Nested Frequency																
2007	-	-	-	146	4	-	-	8	5	-	-	-	-	8	5	-	0
2010	2	3	-	107	0	4	-	8	14	31	40	-	-	6	12	16	10
2013	-	4	-	102	23	18	8	1	1	-	-	-	-	2	11	-	-
2017	-	13	70	80	14	4	9	-	8	-	-	-	-	2	16	7	8
2024	5	4	23	83	1	-	5	-	1	1	3	5	4	-	1	-	-
year	Average Cover (%)																
2007	-	-	-	2.8	0.0	-	-	0.0	0.0	-	-	-	-	0.0	0.0	-	0.0
2010	0.0	0.0	-	2.1	0.0	0.0	-	0.1	0.2	0.1	0.2	-	-	0.1	0.1	0.0	0.0
2013	-	0.4	-	2.8	0.1	0.3	0.0	0.0	0.0	-	-	-	-	0.0	0.1	-	-
2017	-	0.0	3.1	3.0	0.1	0.0	0.1	-	0.2	-	-	-	-	0.0	0.0	0.0	0.0
2024	0.0	0.0	0.9	3.0	0.0	-	0.0	-	0.0	0.0	0.1	0.2	0.1	-	0.0	-	-

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

FORB SPECIES	Erigeron (fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Euphorbia brachycera (horned spurge)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Hymenopappus filifolius (fineleaf hymenopappus)	Hymenoxys richardsonii (pingue rubberweed)	Ipomopsis aggregata (scarlet gilia)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)	Orthocarpus[a] (owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon caespitosus (mat penstemon)	Phlox griseola (grayleaf phlox)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)
year	Nested Frequency																
2007	51	5	12	1	-	-	-	0	4	16	91	0	2	54	44	38	28
2010	14	13	2	2	4	-	2	-	-	3	7	1	4	60	12	53	34
2013	5	27	9	-	-	-	5	-	-	7	17	-	13	87	14	48	8
2017	2	13	8	-	-	14	3	-	-	12	-	-	7	87	16	6	2
2024	-	20	7	-	-	16	-	2	-	7	-	11	29	50	9	52	14
year	Average Cover (%)																
2007	0.3	0.0	0.1	0.0	-	-	-	0.0	0.0	0.1	1.2	0.0	0.1	0.5	0.9	0.2	0.2
2010	0.1	0.1	0.1	0.0	0.0	-	0.0	-	-	0.1	0.0	0.0	0.1	1.2	0.1	0.2	0.6
2013	0.1	0.2	0.1	-	-	-	0.2	-	-	0.0	0.2	-	0.2	1.7	0.5	0.2	0.0
2017	0.0	0.2	0.0	-	-	0.4	0.0	-	-	0.1	-	-	0.1	2.9	0.4	0.1	0.0
2024	-	0.3	0.0	-	-	0.4	-	0.0	-	0.1	-	0.0	0.9	1.3	0.1	0.2	0.1

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

FORB SPECIES	Polygonum douglasii[a] (Douglas' knotweed)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Stenotus acaulis (stemless mock goldenweed)	Taraxacum officinale (common dandelion)	Tetraneuris acaulis (stemless four-nerve daisy)	unknown annual forb[a] (unknown forb)
year	Nested Frequency					
2007	-	11	-	-	13	1
2010	-	6	-	-	11	-
2013	6	8	-	-	10	-
2017	4	6	3	6	31	-
2024	3	18	6	17	11	-
year	Average Cover (%)					
2007	-	0.1	-	-	0.1	0.0
2010	-	0.2	-	-	0.2	-
2013	0.0	0.0	-	-	0.1	-
2017	0.0	0.0	0.0	0.0	0.4	-
2024	0.0	0.2	0.2	0.3	0.1	-

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

Table 10R-42.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies[t] (fir)	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)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Juniperus scopulorum[t] (Rocky Mountain juniper)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis[t] (twoneedle pinyon)	Pinus ponderosa[t] (ponderosa pine)	Purshia tridentata[p] (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)												
2007	0	4	0.3	3	-	1.7	7.8	4.4	-	14.5	1	1.1	-
2010	-	2.2	-	1.8	0.1	2.2	1.1	-	-	1.1	-	0.3	-
2013	-	4.6	-	3.3	0.5	5.1	1.2	-	-	0.2	-	0.4	-
2017	-	6.1	-	0.2	0	2.5	1	-	-	1.1	-	0.6	-
2024	-	10.7	-	2.4	0.3	1.1	-	-	-	0.1	-	-	-
year	Quadrat Cover (%)												
2007	0.4	2.6	0.0	2.4	0.0	1.6	2.0	1.4	-	3.6	0.9	0.9	-
2010	-	1.0	-	2.1	0.0	1.8	0.4	-	-	1.4	-	0.0	-
2013	-	3.3	-	2.9	0.1	4.0	0.5	-	0.0	0.5	-	0.0	0.0
2017	-	6.1	-	0.7	0.5	3.0	0.8	-	-	1.5	-	0.1	-
2024	-	9.1	-	2.0	0.0	1.4	-	-	-	0.2	-	-	-

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

Table 10R-42.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Abies[t] -- (fir)									
2007	20	40	100	0	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2007	1800	20	3	27	70	36	6	39	64/67
2010	1520	200	29	32	40	28	13	17	48/46
2013	2300	960	32	51	17	18	5	7	60/76
2017	3180	1660	48	41	11	14	8	5	61/74
2024	3260	1440	39	51	10	14	6	10	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2007	60	-	67	33	0	33	33	0	71/58
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2024	240	-	42	58	0	100	0	0	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2007	9300	20	6	92	3	7	13	0	12/20
2010	4640	-	10	88	2	12	40	1	12/22
2013	3420	60	1	98	1	26	26	9	14/30
2017	800	40	5	85	10	0	57	3	11/25
2024	4120	20	5	92	3	18	61	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 (%)		
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2007	100	-	0	100	0	0	0	0	21/18
2010	200	40	10	90	0	0	0	10	21/23
2013	200	-	0	90	10	0	0	20	33/43
2017	1100	-	9	91	0	0	4	0	19/29
2024	260	-	69	15	15	0	8	15	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2007	5020	280	3	94	2	0	0	2	18/17
2010	5160	320	50	50	0	0	0	1	17/17
2013	6980	260	11	89	1	1	0	1	19/25
2017	9020	-	14	86	0	0	0	0	15/19
2024	4960	140	5	93	2	0	0	2	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2007	140	40	43	43	14	0	0	0	- / -
2010	60	-	67	0	33	0	0	33	- / -
2013	120	20	100	0	0	0	0	0	- / -
2017	60	-	33	67	0	0	0	0	- / -
2024	-	-	-	-	-	-	-	-	-/-
Juniperus scopulorum[t] -- (Rocky Mountain juniper)									
2007	100	-	60	40	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2024	40	-	100	0	0	0	0	0	- / -
Krascheninnikovia lanata[p] -- (winterfat)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2024	20	-	0	100	0	0	100	0	- / -
Opuntia fragilis -- (brittle pricklypear)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2024	20	-	100	0	0	0	0	0	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	20	20	100	0	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2007	340	580	53	41	6	0	0	0	- / -
2010	120	180	83	17	0	0	0	17	- / -
2013	140	60	100	0	0	0	29	14	- / -
2017	180	20	78	22	0	0	0	0	- / -
2024	140	-	86	0	14	0	0	14	- / -
Pinus ponderosa[t] -- (ponderosa pine)									
2007	80	-	75	25	0	0	0	50	- / -
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-

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	280	-	7	79	14	14	14	7	51/86
2010	20	20	0	100	0	0	0	0	29/56
2013	40	-	0	100	0	0	100	0	36/113
2017	60	-	33	67	0	0	67	0	37/129
2024	20	-	0	100	0	100	0	0	- / -
Tetradymia canescens -- (spineless horsebrush)									
2007	-	-	-	-	-	-	-	-	18/18
2010	40	-	100	0	0	50	0	0	16/22
2013	20	-	0	100	0	0	0	0	13/24
2017	-	-	-	-	-	-	-	-	-/-
2024	20	-	0	100	0	0	0	0	- / -

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

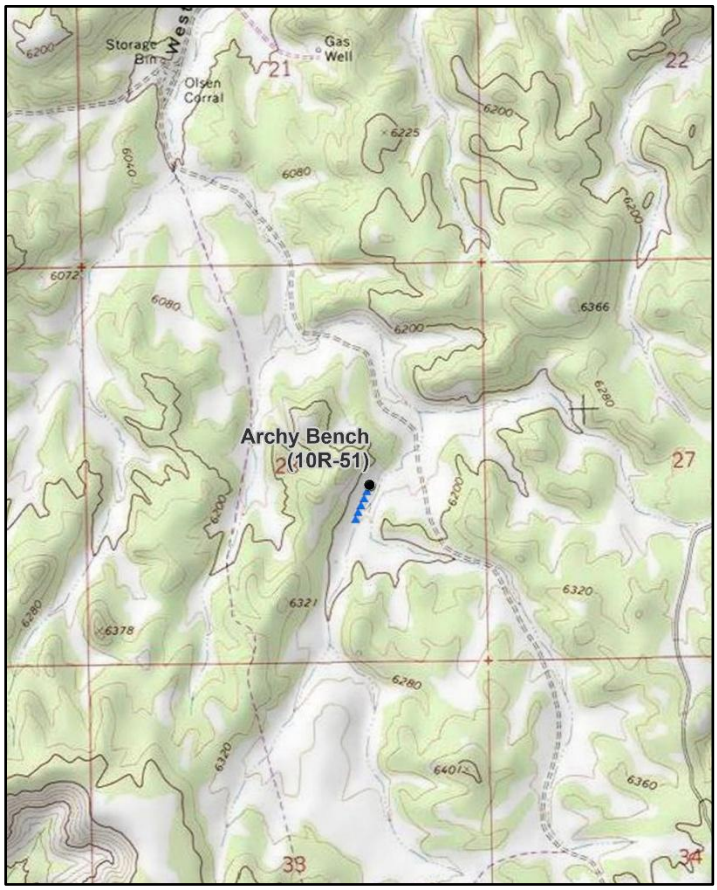
Table 10R-42.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

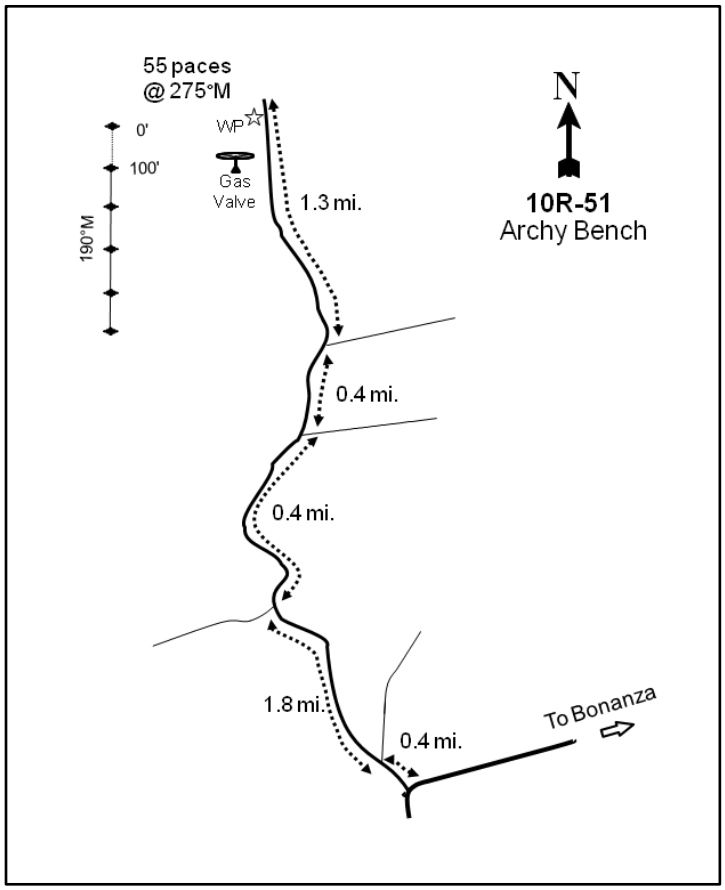
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	68	-	11	42	26	21	21.8
2010	22	33	50	17	-	-	2.5
2013	18	36	64	-	-	-	2.5
2017	26	29	64	7	-	-	4.0
Juniperus scopulorum (Rocky Mountain juniper)							
2017	1	-	100	-	-	-	5.0
2024	27	50	50	-	-	-	1.8
Pinus edulis (twoneedle pinyon)							
2007	301	15	35	25	10	15	9.2
2010	131	15	75	10	-	-	2.1
2013	184	50	45	5	-	-	2.5
2017	166	25	75	-	-	-	3.8
2024	99	59	41	-	-	-	1.8

Table 10R-42.15 - Deer Desirable Components Index: Mountain Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2007	10.9	4.1	3.4	19.5	0.0	10.0	0.0	**47.9**	Poor
2010	5.5	0.0	0.0	20.5	0.0	10.0	0.0	**36.0**	Very Poor
2013	10.5	12.2	9.2	25.9	0.0	10.0	0.0	**67.8**	Fair
2017	8.8	11.9	15.0	30.0	0.0	10.0	0.0	**75.7**	Good
2024	16.4	12.5	15.0	30.0	0.0	10.0	0.0	**83.9**	Good

ARCHY BENCH - STUDY NO. 10R-51





Location Information

USGS 7.5 min Map Info	Archy Bench SE NW; Township 11S, Range 23E, Section 28
GPS (0' Stake)	NAD 83 UTM ZONE 12, 641689 East 4410270 North

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	OLSEN AMP
Elevation	6,107ft (1,861m)
Aspect	Southeast
Slope	4%
Sample Dates	08/01/2011, 08/18/2014, 07/21/2019, 08/28/2024

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Archy Bench Slashing	LTDL 312-869	May-September 2010	1339
Seeding - Aerial Before	Archy Bench Sagebrush Restoration	2050	October 2011	607
Chaining - One-Way Ely	Archy Bench Sagebrush Restoration	2050	October 2011	607
Herbicide - Plateau	Archy Bench Sagebrush Restoration	2050	October 2011	607

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

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

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2011	Mountain Big Sagebrush/Annual Grass	Phase I
2014	Mountain Big Sagebrush/Annual Grass	No Encroachment
2019	Mountain Big Sagebrush/Annual Grass	Phase I
2024	Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	No state and transition model is available for this ecological site.

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has dominated this site since study establishment in 2011 with few other browse species present. Cover and density exhibited an initial decrease following treatment (Table 10R-51.1). Cover of sagebrush has slowly increased in subsequent years, but density has slightly decreased (Table 10R-51.12, Table 10R-51.13). The herbaceous understory has remained primarily comprised of the introduced annual grass species cheatgrass (*Bromus tectorum*). Cheatgrass increased in cover following treatment and was a codominant vegetation component in 2014 and 2019, but has since decreased and was a minor component in 2024 (Table 10R-51.7, Table 10R-51.10). High amounts of cheatgrass may increase fuel loads and threaten the ecological resilience of the plant community on this site. As such, further treatments may be necessary to control annual grasses.

Mule deer winter range conditions have varied between very poor-poor and fair since 2011. Winter habitat condition was considered

poor-fair in 2024, and was generally limited by reduced preferred browse cover and low recruitment, and low perennial grass and forb cover. The presence of annual grass has also negatively impacted deer habitat quality in past sample years (Table 10R-51.15). Deer presence was moderate in 2011 and 2024, but was low in other years. Elk presence has been increasing since study establishment and treatment and was notably high in 2024 (Table 10R-51.9). Mountain big sagebrush has provided much of the forage for wildlife. Sagebrush utilization was fairly moderate in 2011 and 2014. However, only 28% and 31% of sagebrush plants sampled in density strips were moderately to heavily utilized in 2019 and 2024 (respectively) (Table 10R-51.13). It should be noted that this community is susceptible to severe drought, introduced species competition, and/or heavy utilization that could lead to a decrease in preferred browse abundance and loss of utility for wildlife.

Trend Summary Tables

Table 10R-51.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	18.5	4.6	-	22.2	6.0	-
2014	10.6	2.2	-	13.7	4.6	-
2019	13.2	2.9	-	14.6	4.1	-
2024	13.8	1.2	-	16.1	2.4	-

Table 10R-51.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	317	75	75	62	16.8	2.9	4.6	0.7
2014	364	60	102	60	20.1	1.1	2.0	0.6
2019	373	59	92	12	20.5	1.6	2.3	0.2
2024	244	57	285	96	6.4	0.6	8.9	0.8

Table 10R-51.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	7.8	2.0	27.2	35.1	1.4	44.8
2014	16.9	0.4	37.2	24.3	4.1	36.4
2019	22.1	0.0	44.9	24.9	1.2	39.0
2024	9.2	0.0	36.5	44.1	2.2	29.8

Table 10R-51.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2011	-	6	8	2
2014	-	5	7	-
2019	1	10	20	3
2024	-	20	32	3
Year	Days Use Per Acre (ha)			
2011	-	23.4 (57.9)	7.4 (18.2)	-
2014	-	8.7 (21.5)	24.1 (59.6)	-
2019	-	8.7 (21.5)	44.9 (110.9)	-
2024	17.4 (43.0)	22.1 (54.6)	123.3 (304.6)	-

Table 10R-51.10 - 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)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency						
2011	5	-	317	28	41	3	-
2014	4	12	364	11	31	-	3
2019	3	17	373	13	28	-	-
2024	5	10	244	28	11	3	-
year	Average Cover (%)						
2011	0.2	-	16.8	1.1	1.6	0.0	-
2014	0.0	0.2	20.1	0.1	0.8	-	0.0
2019	0.1	0.4	20.5	0.2	0.8	-	-
2024	0.0	0.2	6.4	0.3	0.1	0.0	-

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

Table 10R-51.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Chamaesyce albomarginata (whitemargin sandmat)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Erigeron divergens[a] (spreading fleabane)	Eriogonum cernuum[a] (nodding buckwheat)	Halogeton glomeratus[ai] (saltlover)	Lappula occidentalis[a] (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Mentzelia albicaulis[a] (whitestem blazingstar)	Phacelia[a] (phacelia)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2011	-	8	5	24	8	-	6	6	-	7	2	1	8	-	-	5	12
2014	-	-	-	36	-	-	7	25	-	-	33	34	10	-	1	-	4
2019	10	3	-	2	3	25	-	19	5	8	1	23	3	1	7	-	4
2024	21	-	-	54	-	-	50	3	1	-	8	9	-	-	0	-	9
year	Average Cover (%)																
2011	-	0.1	0.0	0.3	0.1	-	0.0	0.1	-	0.2	0.1	0.0	0.1	-	-	0.2	0.0
2014	-	-	-	0.1	-	-	0.0	0.5	-	-	0.1	0.4	0.4	-	0.0	-	0.0
2019	1.0	0.0	-	0.1	0.0	0.1	-	0.2	0.0	0.1	0.0	0.3	0.0	0.0	0.5	-	0.0
2024	0.0	-	-	0.3	-	-	0.4	0.2	0.0	-	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)	Townsendia (Townsend daisy)
year	Nested Frequency		
2011	55	17	-
2014	27	18	3
2019	21	5	-
2024	273	21	1
year	Average Cover (%)		
2011	3.5	0.6	-
2014	0.5	0.6	0.0
2019	0.2	0.0	-
2024	8.2	0.5	0.0

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

Table 10R-51.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Grayia spinosa (spiny hopsage)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Sarcobatus vermiculatus (greasewood)
year	Line Intercept Cover (%)				
2011	22.2	0.8	1.7	-	3.5
2014	13.7	-	1.6	-	3
2019	14.6	-	1.3	-	2.8
2024	16.1	-	0.1	-	2.3
year	Quadrat Cover (%)				
2011	18.5	1.0	2.3	0.0	1.3
2014	10.6	-	1.2	0.1	0.9
2019	13.2	-	1.9	-	1.0
2024	13.8	-	0.0	-	1.1

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

Table 10R-51.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2011	3460	40	4	71	25	60	19	18	64/90
2014	2920	-	9	66	25	51	7	17	55/79
2019	2840	-	0	56	44	27	1	62	55/79
2024	2780	1140	9	49	42	20	11	45	- / -

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 -- (yellow rabbitbrush)									
2011	20	-	0	100	0	0	0	0	46/78
2014	-	-	-	-	-	-	-	-	46/80
2019	-	-	-	-	-	-	-	-	52/98
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2011	-	-	-	-	-	-	-	-	59/54
2014	-	-	-	-	-	-	-	-	81/104
2019	-	-	-	-	-	-	-	-	51/70
2024	-	-	-	-	-	-	-	-	-/-
Grayia spinosa -- (spiny hopsage)									
2011	40	-	50	50	0	100	0	0	74/112
2014	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	58/67
2024	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2011	1140	240	35	65	0	0	0	0	33/55
2014	1900	3820	44	54	2	0	0	0	24/30
2019	2160	-	1	94	6	0	0	6	22/19
2024	40	-	0	50	50	0	0	50	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2011	-	20	0	0	0	0	0	0	- / -
2014	-	-	-	-	-	-	-	-	-/-
2019	20	-	100	0	0	0	0	0	- / -
2024	20	-	100	0	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2011	20	-	0	100	0	0	0	0	11/33
2014	40	-	0	100	0	0	0	0	10/23
2019	40	-	0	100	0	0	0	0	9/30
2024	20	-	0	100	0	0	0	0	- / -
Sarcobatus vermiculatus -- (greasewood)									
2011	180	20	11	89	0	22	44	0	112/169
2014	180	-	0	100	0	33	0	0	81/144
2019	180	-	0	100	0	0	0	0	94/154
2024	120	-	0	100	0	0	17	0	- / -

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

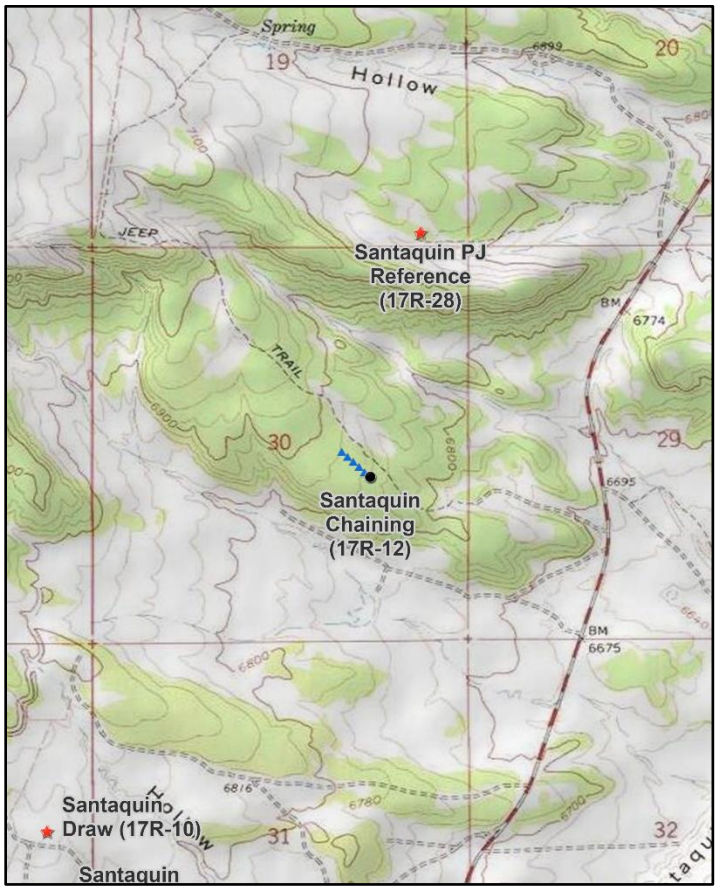
Table 10R-51.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

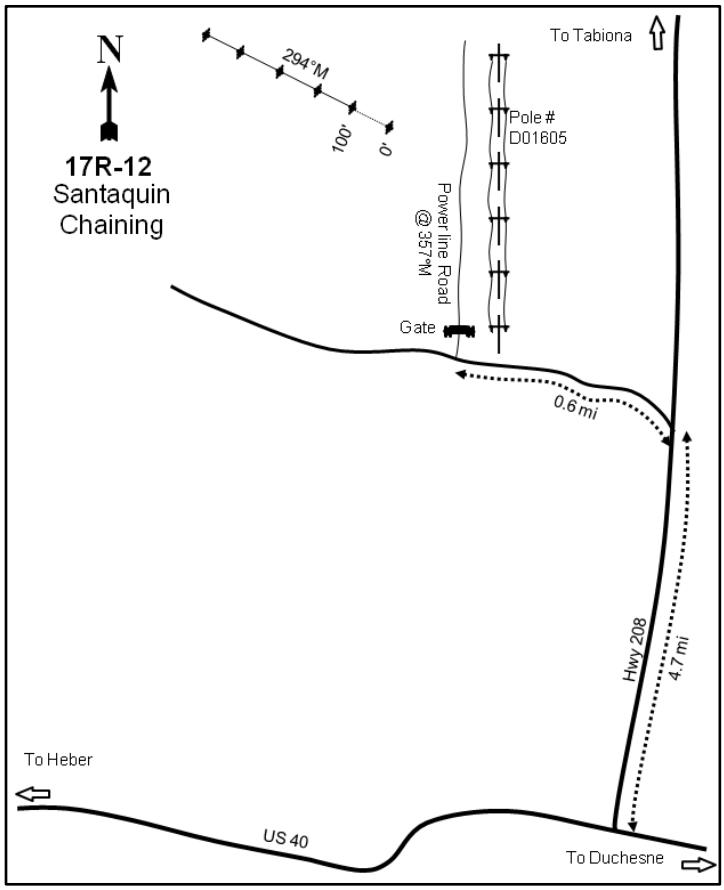
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2011	6	-	67	33	-	-	7.3
2019	6	-	100	-	-	-	4.8
2024	8	-	83	17	-	-	6.3
Pinus edulis (twoneedle pinyon)							
2011	1	100	-	-	-	-	2.0

Table 10R-51.15 - 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	27.8	7.4	1.8	5.7	-12.6	1.5	0.0	**31.6**	Fair
2014	17.1	7.6	4.5	2.3	-15.1	1.2	0.0	**17.6**	Poor
2019	18.3	1.9	0.0	3.2	-15.4	0.4	0.0	**8.4**	Very Poor-Poor
2024	20.1	2.3	4.3	1.2	-4.8	1.6	0.0	**24.7**	Poor-Fair

SANTAQUIN CHAINING - STUDY NO. 17R-12





Location Information

USGS 7.5 min Map Info	Tabiona SW; Township 2S, Range 7W, Section 30
GPS (0' Stake)	NAD 83 UTM ZONE 12, 524344 East 4458436 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	294° 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 4.7 miles north to a road that comes in from the left (west). Turn here and drive for 0.6 miles to a powerline road that comes in from the right (this road may be impassable in a vehicle and you may have to continue on foot). Turn here, pass through a gate, and travel on this road at 357 degrees magnetic to pole #D01605. The 0-foot stake is 40 paces from this pole at 330 magnetic.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,870ft (2,094m)
Aspect	East
Slope	2-5%
Sample Dates	09/07/2004, 07/27/2007, 07/13/2009, 06/29/2010, 07/09/2012, 08/02/2016, 07/28/2020, 07/01/2024

Table 17R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Cockey Hollow Vegetation Management Project	3969	October-November 2017	1400
Chaining - Two-Way Ely	Santaquin P-J	PDB	October-November 2004	300
Seeding - Aerial Before	Santaquin P-J	PDB	October 2004	300
Seeding - Aerial After	Santaquin P-J	PDB	December 2004	1755

Table 17R-12.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Santaquin Pinyon/Juniper			Aerial	Oct 2004	305
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.98	0.88
G	Dactylis glomerata	Orchardgrass	Paiute	0.98	0.92
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.15	1.10
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.98	0.92
F	Linum perenne	Blue Flax	Appar	0.49	0.45
F	Medicago sativa	Alfalfa	Nomad	0.33	0.31
F	Medicago sativa	Alfalfa	Ladak+	0.82	0.75
F	Onobrychis viciifolia	Sainfoin		0.98	0.90
F	Sanguisorba minor	Small Burnet	Delar	1.97	1.86
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.98	0.50

Mix Name			Application Type	Application Date	Acres
Santaquin PJ 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	0.50	0.14
S	Ericameria nauseosa	Whitestem Rubber Rabbitbrush		0.50	0.20

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	Sanpete UT	0.75	0.21
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.08	0.01
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-12.3 - 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-12.4 - 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	Perennial Grass	Phase I
2009	Perennial Grass/Sagebrush	Phase I
2010	Perennial Grass/Sagebrush	Phase I
2012	Perennial Grass/Sagebrush	Phase I
2016	Perennial Grass/Sagebrush	Phase I
2020	Perennial Grass/Sagebrush	Phase I
2024	Perennial Grass/Sagebrush	Phase I

Site Notes

This study is located approximately eighteen miles northwest of Duchesne within a chained twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland.

Soils

Table 17R-12.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.0	65.4	15.1	19.5	3.5	16.3	128.0	0.9	09/07/2004

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC310UT
States and Transitions	No state and transition model is available for this ecological site.

Prior to a chaining and seeding treatment in 2004 (Table 17R-12.1), this study site was a twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland that was considered to be within Phase III of woodland succession (Table 17R-12.4). Following the chaining, the community transitioned into one dominated by perennial grasses in 2007 (Table 17R-12.7, Table 17R-12.10), and a shrub overstory largely comprised of sagebrush species (*Artemisia tridentata* ssp. *vaseyana*, *A. nova*) became codominant in 2009 and has remained codominant since that time (Table 17R-12.12). A lop and scatter treatment took place in 2017 (Table 17R-12.1), and cover and density of pinyon and juniper have remained relatively low during later samplings; the site has remained in Phase I of woodland succession since 2007. However, the persistent conifer presence indicates that this site has the potential for future infilling and returning to advanced phases of woodland succession as time since treatment elapses (Table 17R-12.4, Table 17R-12.12, Table 17R-12.13, Table 17R-12.14).

Mule deer winter range conditions have varied between very poor and good since 2004. Winter range condition was considered fair in 2024 and limited by reduced preferred browse cover and recruitment, and low perennial forb cover (Table 17R-12.15). Nearby areas are known for the winter occurrence of mule deer and elk (Wildlife Tracker). Pellet group data show that deer and elk presence have been moderate to high for much of the sample period with the most notable presence coming from elk in 2010 and 2016 (Table 17R-12.9). Black and mountain big sagebrush provide the bulk of winter forage for wildlife. There were very few mountain sagebrush plants when the site was first established. However, density and cover of mountain big sagebrush have increased to the point where browsing pressure of black sagebrush is considerably dispersed between the two populations. Utilization of both black and mountain big sagebrush has increased overall; 61% of black sagebrush plants and 84% of mountain big sagebrush plants sampled in density strips were moderately to heavily hedged in 2024 (Table 17R-12.13). It should be noted that this community is susceptible to competitive introduced species and/or heavy utilization which could lead to a decrease in preferred browse abundance and loss of utility for wildlife.

Trend Summary Tables

Table 17R-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
2004	1.9	0.3	7.8	3.0	0.3	45.8
2007	2.3	0.3	0.9	3.5	0.4	0.5
2009	3.7	0.4	1.1	4.4	0.4	0.5
2010	4.4	0.3	0.7	4.8	0.2	0.4
2012	4.3	0.3	0.4	6.3	0.6	0.5
2016	4.7	0.5	1.2	8.3	0.2	0.2
2020	8.4	0.3	0.6	10.4	0.3	0.3
2024	7.4	0.2	0.8	8.7	0.6	0.4

Table 17R-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
2004	1	156	11	149	0.0	2.1	0.0	1.8
2007	63	240	58	170	0.5	9.8	0.8	5.2
2009	40	287	32	123	0.9	20.0	0.9	6.0
2010	47	300	19	116	1.1	18.6	0.1	3.4
2012	70	347	13	142	0.8	17.5	0.1	2.6
2016	13	330	9	59	0.1	21.3	0.0	1.1
2020	18	323	13	34	0.1	22.8	0.0	1.3
2024	-	317	16	53	-	20.5	0.6	0.7

Table 17R-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
2004	17.3	7.7	61.4	6.3	2.9	13.1
2007	24.7	0.4	55.5	2.6	4.5	22.2
2009	19.6	0.1	55.0	2.3	4.0	33.0
2010	19.1	0.0	50.2	1.8	3.5	31.9
2012	20.0	0.2	51.3	3.6	5.4	30.3
2016	19.7	0.1	43.1	4.2	5.7	32.0
2020	13.7	1.1	55.3	5.0	5.2	34.0
2024	23.1	0.4	54.0	2.4	5.5	29.3

Table 17R-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			
2004	-	33	11	19
2007	1	25	19	26
2009	-	31	31	18
2010	-	19	29	8
2012	-	11	28	23
2016	-	25	32	19
2020	-	28	34	13
2024	-	29	20	15
Year	Days Use Per Acre (ha)			
2004	-	26.2 (64.6)	16.8 (41.4)	-
2007	-	39.6 (97.7)	36.2 (89.4)	-
2009	-	-	-	-
2010	-	28.8 (71.2)	77.1 (190.4)	-
2012	-	6.0 (14.9)	27.5 (67.9)	-
2016	-	17.4 (43.0)	63.0 (155.6)	-
2020	-	34.2 (84.4)	40.2 (99.3)	-
2024	-	43.6 (107.6)	8.1 (19.9)	-

Table 17R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Carex geyeri (Geyer's sedge)	Carex obtusata (obtuse sedge)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia myuros[ai] (annual fescue)
year	Nested Frequency																
2004	52	-	-	7	1	9	-	-	33	-	9	-	45	19	-	-	-
2007	43	-	93	6	62	19	-	6	55	-	5	-	24	17	3	56	1
2009	60	-	110	6	40	11	-	10	66	48	8	-	40	24	9	13	-
2010	93	0	130	11	47	16	-	-	58	30	17	1	61	18	27	-	-
2012	81	5	181	8	70	10	39	10	52	129	5	-	-	27	8	3	-
2016	55	-	179	7	13	23	-	3	41	102	12	-	-	20	38	3	-
2020	92	6	231	6	18	24	-	-	2	14	6	0	-	16	11	-	-
2024	51	-	218	12	-	43	-	-	9	19	20	0	4	3	24	11	-
year	Average Cover (%)																
2004	0.7	-	-	0.0	0.0	0.1	-	-	0.2	-	0.5	-	0.2	0.4	-	-	-
2007	2.1	-	2.4	0.0	0.5	0.2	-	0.3	1.8	-	0.2	-	0.5	0.1	0.2	2.0	0.0
2009	4.1	-	6.2	0.2	0.9	0.4	-	0.3	3.0	1.8	0.2	-	2.1	0.6	0.6	0.6	-
2010	5.3	0.0	4.6	0.2	1.1	0.3	-	-	1.2	0.3	0.8	0.0	4.3	0.1	1.4	-	-
2012	4.3	0.0	7.2	0.1	0.8	0.1	0.3	0.1	0.6	3.9	0.1	-	-	0.5	0.1	0.0	-
2016	3.3	-	9.6	0.5	0.1	0.3	-	0.0	2.2	2.9	1.2	-	-	0.1	1.1	0.0	-
2020	3.9	0.5	16.2	0.5	0.1	0.6	-	-	0.0	0.4	0.2	0.0	-	0.1	0.3	-	-
2024	2.2	-	12.9	0.6	-	1.3	-	-	0.2	1.0	0.5	0.0	0.0	0.0	1.5	0.2	-

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

Table 17R-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Chenopodium[a] (goosefoot)	Chenopodium album[a] (lambsquarters)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata[a] (western tansymustard)	Erigeron eatonii (Eaton's fleabane)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Ipomopsis congesta (ballhead ipomopsis)	Lactuca serriola[ai] (prickly lettuce)
year	Nested Frequency																
2004	21	-	10	-	-	-	2	-	-	1	11	4	1	-	4	-	-
2007	6	-	-	5	3	-	1	2	-	12	7	17	-	-	4	11	10
2009	-	2	-	19	6	-	-	20	2	-	1	6	-	-	-	-	-
2010	-	-	-	27	16	-	-	10	-	-	-	-	2	4	-	10	-
2012	3	-	12	20	10	-	-	3	-	4	23	4	-	5	12	6	-
2016	11	-	-	2	-	-	-	5	-	-	1	2	3	-	2	-	3
2020	-	-	-	4	-	-	-	-	-	-	-	8	-	-	2	-	-
2024	-	-	-	18	-	1	-	4	-	-	3	2	-	-	-	-	-
year	Average Cover (%)																
2004	0.1	-	0.0	-	-	-	0.0	-	-	0.0	0.0	0.0	0.0	-	0.0	-	-
2007	0.0	-	-	0.1	0.0	-	0.0	0.0	-	0.1	0.0	0.0	-	-	0.0	0.2	0.1
2009	-	0.0	-	0.8	0.0	-	-	0.7	0.0	-	0.0	0.1	-	-	-	-	-
2010	-	-	-	1.0	0.0	-	-	0.0	-	-	-	-	0.0	0.0	-	0.1	-
2012	0.0	-	0.0	0.7	0.0	-	-	0.0	-	0.0	0.1	0.0	-	0.0	0.0	0.0	-
2016	0.1	-	-	0.0	-	-	-	0.0	-	-	0.0	0.0	0.0	-	0.0	-	0.0
2020	-	-	-	0.0	-	-	-	-	-	-	-	0.0	-	-	0.0	-	-
2024	-	-	-	0.1	-	0.0	-	0.2	-	-	0.0	0.0	-	-	-	-	-

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

FORB SPECIES	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Onobrychis viciifolia[i] (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon humilis (low beardtongue)	Phlox hoodii (spiny phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius[ai] (yellow salsify)	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency																
2004	-	-	3	-	-	87	-	20	19	5	-	-	4	-	-	11	-
2007	29	37	-	-	2	89	-	5	17	-	-	22	17	5	-	3	-
2009	5	59	3	-	-	3	5	-	11	-	-	14	13	-	1	4	-
2010	7	45	9	-	-	4	1	4	19	-	-	8	12	5	-	2	-
2012	1	29	4	-	2	56	-	-	32	-	-	20	3	-	-	-	1
2016	-	1	-	-	-	10	-	-	20	-	-	1	11	-	-	3	-
2020	-	-	-	-	-	4	-	-	25	5	-	-	1	-	-	-	-
2024	6	-	-	2	-	8	-	-	20	3	3	-	4	-	-	10	-
year	Average Cover (%)																
2004	-	-	0.0	-	-	0.5	-	0.5	0.6	0.0	-	-	0.0	-	-	0.0	-
2007	0.6	1.6	-	-	0.0	1.7	-	0.5	0.3	-	-	0.5	0.1	0.0	-	0.0	-
2009	0.2	4.0	0.0	-	-	0.0	0.3	-	0.3	-	-	0.4	0.2	-	0.0	0.0	-
2010	0.0	0.9	0.2	-	-	0.0	0.0	0.2	0.5	-	-	0.2	0.5	0.0	-	0.0	-
2012	0.0	0.2	0.0	-	0.0	0.3	-	-	1.1	-	-	0.1	0.0	-	-	-	0.0
2016	-	0.0	-	-	-	0.2	-	-	0.8	-	-	0.0	0.1	-	-	0.0	-
2020	-	-	-	-	-	0.0	-	-	1.2	0.0	-	-	0.0	-	-	-	-
2024	0.4	-	-	0.0	-	0.0	-	-	0.5	0.0	0.0	-	0.0	-	-	0.1	-

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

Table 17R-12.12 - 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)	Chrysothamnus depressus[p] (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia fragilis (brittle pricklypear)	Opuntia polyacantha (plains pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)											
2004	3	-	-	-	-	-	18.5	0.2	0.1	-	27.3	-
2007	2.7	0.8	0	-	-	0.2	0	-	0.2	-	0.5	-
2009	3.3	1.1	-	-	-	0.1	0.1	0.3	-	-	0.4	-
2010	3.5	1.3	-	-	-	-	0.1	0.1	0.1	-	0.3	-
2012	4.5	1.7	0.1	-	-	0	0.2	0.5	0	-	0.3	0.1
2016	5.3	3	-	-	-	-	0.1	0.2	-	-	0.1	-
2020	6.8	3.6	-	-	-	-	0.3	0.1	0.2	-	-	-
2024	4.2	4.5	-	0	-	-	0.4	0.2	-	0.4	-	-
year	Quadrat Cover (%)											
2004	1.9	-	-	-	-	0.0	1.1	0.3	0.1	-	6.8	-
2007	1.7	0.5	0.0	-	-	0.0	0.4	0.3	0.1	-	0.5	-
2009	2.8	0.7	0.2	-	0.0	0.0	0.5	0.4	0.1	-	0.5	-
2010	2.9	1.5	-	-	-	-	0.6	0.2	0.0	-	0.0	-
2012	3.0	1.1	0.2	-	-	0.0	0.2	0.3	0.0	-	0.2	0.0
2016	3.3	1.4	-	-	-	0.0	1.1	0.1	0.4	-	0.0	-
2020	5.4	3.0	-	-	-	-	0.6	0.1	0.2	-	-	-
2024	5.5	1.9	-	0.0	0.0	0.0	0.8	0.0	0.0	0.2	0.0	-

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

Table 17R-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 nova[p] -- (black sagebrush)									
2004	3440	80	20	33	48	4	0	25	21/38
2007	1260	380	10	91	0	30	2	5	21/37
2009	-	-	-	-	-	-	-	-	25/35
2010	2720	780	24	75	1	1	17	10	21/39
2012	3420	480	47	48	5	10	43	8	19/38
2016	3640	-	34	65	2	28	26	3	24/51
2020	3460	20	23	74	4	35	24	10	24/53
2024	3300	47200	19	63	18	21	40	18	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2004	20	-	0	100	0	0	0	0	- / -
2007	740	360	62	35	3	8	5	3	38/37
2009	-	-	-	-	-	-	-	-	32/31
2010	820	200	44	56	0	5	5	2	44/48
2012	1060	120	32	62	6	21	30	40	37/41
2016	1340	-	30	67	3	33	33	16	49/63
2020	1160	-	24	76	0	3	28	31	51/73
2024	1740	520	21	57	22	38	51	36	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	53/41
2009	-	-	-	-	-	-	-	-	46/43
2010	-	-	-	-	-	-	-	-	64/55
2012	-	-	-	-	-	-	-	-	68/58
2016	-	-	-	-	-	-	-	-	81/81
2020	-	-	-	-	-	-	-	-	74/80
2024	20	-	0	100	0	0	100	100	- / -
Atriplex confertifolia[p] -- (shadscale saltbush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	37/32
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Bassia prostrata[pi] -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	60	-	0	100	0	0	0	0	21/21
2009	-	-	-	-	-	-	-	-	21/22
2010	-	-	-	-	-	-	-	-	23/26
2012	300	-	0	100	0	47	47	0	15/15
2016	20	-	0	100	0	0	0	0	10/15
2020	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-

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 depressus[p] -- (longflower rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	8/16
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2024	140	-	0	43	57	0	100	57	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	34/56
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	60	-	33	67	0	0	0	0	19/18
2020	-	-	-	-	-	-	-	-	-/-
2024	40	-	50	50	0	0	0	0	- / -
Echinocereus -- (hedgehog cactus)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	8/25
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	100	0	0	35/38
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	52/67
2024	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2004	200	-	0	100	0	0	0	30	16/18
2007	160	-	0	100	0	0	0	0	15/20
2009	-	-	-	-	-	-	-	-	18/23
2010	60	-	33	67	0	0	0	0	18/20
2012	100	-	0	80	20	0	0	60	14/15
2016	120	-	0	100	0	0	0	0	15/19
2020	20	-	0	100	0	0	0	0	20/21
2024	40	-	50	50	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2004	260	-	31	54	15	8	0	23	- / -
2007	60	-	67	33	0	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	-/-
2010	60	-	100	0	0	0	0	33	- / -
2012	100	-	100	0	0	0	0	0	- / -
2016	160	-	50	50	0	0	50	0	- / -
2020	120	-	100	0	0	0	0	0	- / -
2024	100	-	80	20	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)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	21/23
2009	-	-	-	-	-	-	-	-	16/20
2010	-	-	-	-	-	-	-	-	22/17
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	40/39
2020	-	-	-	-	-	-	-	-	42/37
2024	-	-	-	-	-	-	-	-	-/-
Linanthus pungens -- (granite prickly phlox)									
2004	440	-	0	68	32	0	0	14	12/17
2007	360	-	0	100	0	11	0	0	9/16
2009	-	-	-	-	-	-	-	-	10/20
2010	240	100	0	100	0	0	0	0	12/24
2012	340	-	0	100	0	0	0	65	11/20
2016	320	-	6	94	0	0	0	6	12/16
2020	420	-	5	95	0	0	0	10	15/23
2024	300	-	7	93	0	7	13	0	- / -
Opuntia fragilis -- (brittle pricklypear)									
2004	640	-	9	63	28	0	0	9	8/29
2007	360	-	11	89	0	0	0	0	8/22
2009	-	-	-	-	-	-	-	-	10/21
2010	300	40	47	53	0	7	0	0	6/14
2012	120	20	0	83	17	0	0	17	6/12
2016	520	-	0	100	0	0	0	0	9/24
2020	360	-	17	83	0	0	0	22	9/21
2024	240	-	8	92	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	9/15
2024	140	-	14	71	14	0	0	14	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2004	20	-	0	100	0	0	0	0	3/7
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	3/8
2012	-	-	-	-	-	-	-	-	5/21
2016	-	-	-	-	-	-	-	-	6/20
2020	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2004	400	80	65	35	0	0	0	0	- / -
2007	20	60	100	0	0	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	-/-
2010	20	60	100	0	0	0	0	0	- / -
2012	160	-	88	13	0	0	0	0	- / -
2016	100	-	100	0	0	0	0	0	- / -
2020	80	-	100	0	0	0	0	25	- / -
2024	60	-	67	33	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)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	67/174
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	94/287
2024	-	-	-	-	-	-	-	-	-/-
Tetradymia canescens -- (spineless horsebrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	20	-	100	0	0	0	0	0	26/16
2016	-	-	-	-	-	-	-	-	42/42

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

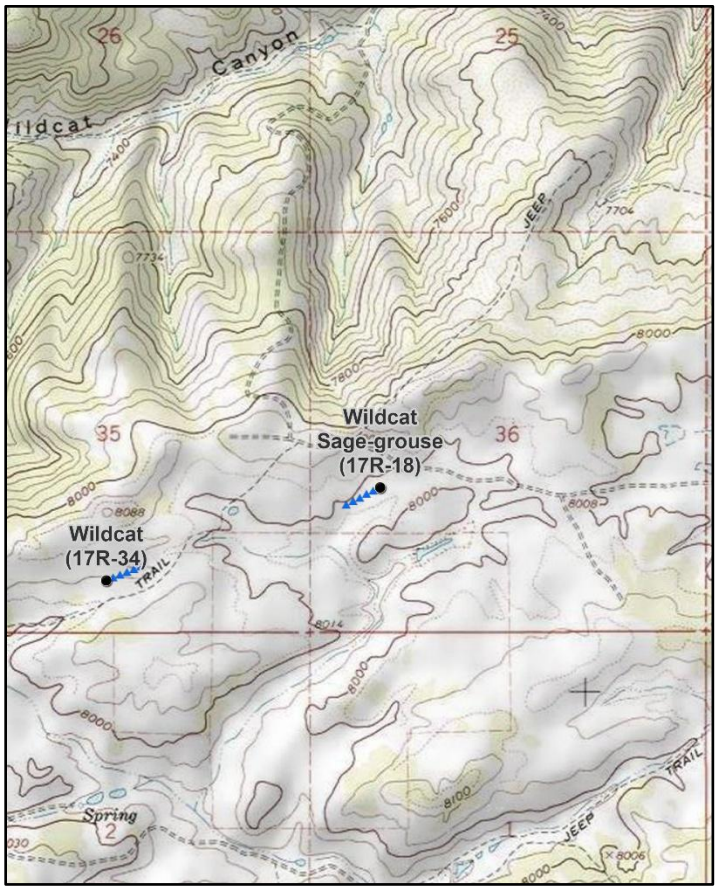
Table 17R-12.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

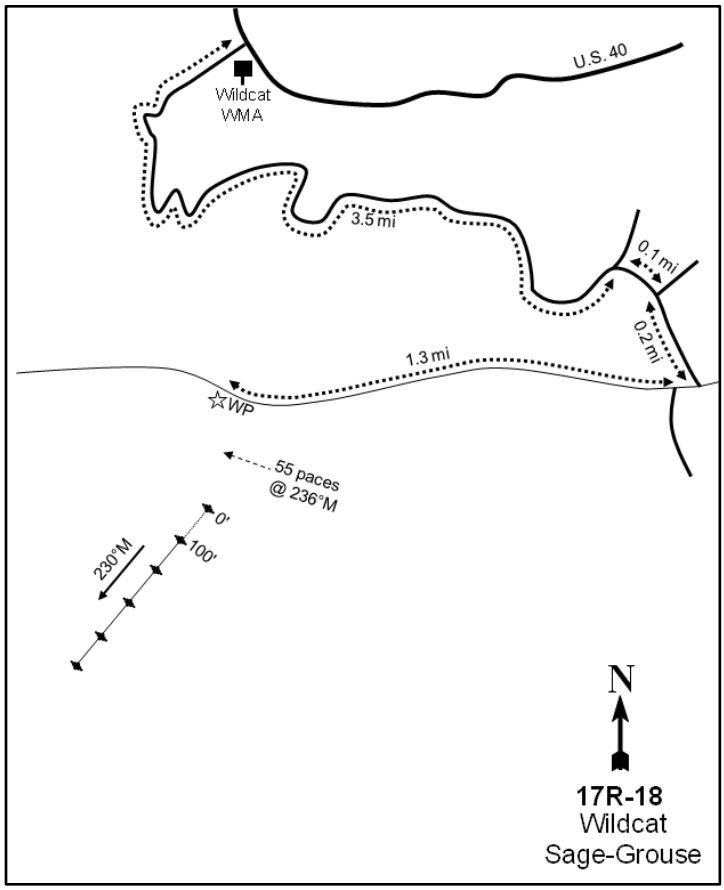
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2004	235	-	25	15	20	40	24.4
2007	30	-	90	10	-	-	9.8
2009	18	-	75	25	-	-	6.1
2010	39	29	71	-	-	-	12.4
2012	29	15	77	8	-	-	4.1
2016	42	13	40	40	-	7	6.3
2020	20	27	73	-	-	-	3.6
2024	15	9	82	9	-	-	6.8
Pinus edulis (twoneedle pinyon)							
2004	209	10	60	-	-	30	11.8
2007	54	-	100	-	-	-	2.8
2009	25	-	100	-	-	-	3.4
2010	46	20	80	-	-	-	2.9
2012	61	12	88	-	-	-	3.5
2016	46	19	31	44	6	-	5.3
2020	12	25	75	-	-	-	3.7
2024	18	33	67	-	-	-	3.3

Table 17R-12.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2004	3.8	0.0	0.0	4.2	0.0	3.6	0.0	**11.6**	Very Poor
2007	4.4	0.0	0.0	19.7	-0.4	10.0	0.0	**33.7**	Very Poor-Poor
2009	5.5	0.0	0.0	30.0	-0.7	10.0	0.0	**44.8**	Poor
2010	6.0	0.0	0.0	30.0	-0.9	6.9	0.0	**42.0**	Poor
2012	7.9	13.5	15.0	30.0	-0.6	5.2	0.0	**71.0**	Good
2016	10.4	14.4	15.0	30.0	0.0	2.3	0.0	**72.1**	Good
2020	13.0	14.3	11.5	30.0	-0.1	2.5	0.0	**71.2**	Good
2024	10.9	9.0	9.9	30.0	0.0	1.4	0.0	**61.2**	Fair

WILDCAT SAGE-GROUSE - STUDY NO. 17R-18





Location Information	
USGS 7.5 min Map Info	Deep Creek Canyon SW; Township 3S, Range 10W, Section 36
GPS (0' Stake)	NAD 83 UTM ZONE 12, 502660 East 4447065 North

Transect Information	
Browse Tag # (0' Stake)	95
Transect Bearing	230° 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. Turn right, drive 0.1 miles to a fork, and stay right. Drive 0.2 miles to another fork and stay right again. Drive 1.3 miles to the witness post on the left (south) side of the road just before a hill. From the witness post, walk 55 paces at 236 degrees magnetic to the 0-foot stake. The 0-foot stake is marked with browse tag #95.

Site Information	
Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	7,979ft (2,432m)
Aspect	Southwest
Slope	1-2%
Sample Dates	08/22/2005, 07/11/2012, 08/04/2015, 07/29/2020, 07/02/2024

Wildlife Habitat and Vegetation History

Table 17R-18.3 - 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-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	Silver Sagebrush/Perennial Grass	NA
2012	Silver Sagebrush/Perennial Grass	NA
2015	Silver Sagebrush/Perennial Grass	NA
2020	Silver Sagebrush/Perennial Grass	NA
2024	Silver Sagebrush/Perennial Grass	NA

Site Notes

The study was established in 2005 on Currant Creek Wildlife Management Area (WMA) to monitor habitat for sage-grouse. While a majority of the transect samples the silver sagebrush (*Artemisia cana*) ecological type, a smaller portion samples a mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) ecological type.

Soils

Table 17R-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
Clay Loam	6.5	32.4	39.8	27.8	4.5	18.1	275.2	0.5	08/22/2005

Site Potential

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	High Mountain Loam (Silver Sagebrush)
NRCS Ecological Site #	R047XA517UT
States and Transitions	No state and transition model is available for this ecological site.

This site has existed as a silver sagebrush (*Artemisia cana*) and perennial grass plant community since study establishment in 2005 (Table 17R-18.7, Table 17R-18.12). The perennial grass component has remained abundant and diverse over the study years with Idaho fescue (*Festuca idahoensis*) contributing a majority of the cover (Table 17R-18.10). Perennial forbs have also remained diverse and abundant (Table 17R-18.11). Deleterious community transitions influenced by overgrazing and fire suppression could lead to the decrease of native forbs with an increase in introduced species.

Mule deer winter range conditions have ranged between very good and good-excellent since study establishment, with the majority of years sampled considered to be good. Winter range condition was considered good-excellent in 2024 with range condition limited only by reduced preferred browse recruitment (Table 17R-18.15). The area is known for the winter occurrence of mule deer and elk (Wildlife Tracker). Pellet group data show that deer and elk presence has been low for much of the sample period; grouse presence has been noted each year with a generally decreasing trend (Table 17R-18.9). Silver and mountain big sagebrush provide the bulk of winter forage for wildlife; utilization for both sagebrush populations has been considered low to moderate. However, utilization of mountain big sagebrush was notably higher in 2015, with 73% of plants sampled in density strips being moderately hedged and 10% being heavily utilized (Table 17R-18.13).

Trend Summary Tables

Table 17R-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	15.5	0.2	-	22.6	0.5	-
2012	14.4	0.5	-	14.9	0.4	-
2015	13.6	0.5	-	25.2	0.4	-
2020	17.5	0.2	-	22.8	0.4	-
2024	23.2	0.5	-	25.2	1.1	-

Table 17R-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	-	434	154	323	-	29.6	2.2	18.9
2012	-	466	140	331	-	48.4	0.6	7.0
2015	-	462	48	321	-	37.8	1.2	11.9
2020	-	457	152	330	-	39.2	1.0	16.0
2024	-	461	252	425	-	41.1	3.7	32.5

Table 17R-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	21.9	0.6	27.2	0.0	0.0	62.0
2012	8.5	0.9	63.9	-	0.9	64.3
2015	12.0	0.8	32.3	-	-	65.6
2020	7.6	0.5	47.7	0.4	-	64.9
2024	12.7	2.7	34.5	0.0	-	74.3

Table 17R-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	Shiras Moose	Rabbit
	Quadrat Frequency					
2005	-	4	13	6	1	14
2012	-	4	1	2	-	-
2015	-	3	3	3	-	1
2020	-	7	8	4	-	5
2024	-	17	9	6	-	3
Year	Days Use Per Acre (ha)					
2005	0.7 (1.8)	3.4 (8.3)	30.2 (74.5)	95.8 (236.7)*	0.5 (1.2)	-
2012	-	-	2.7 (6.6)	26.2 (64.6)*	-	-
2015	-	4.0 (9.9)	11.4 (28.1)	69.7 (172.1)*	-	-
2020	-	1.3 (3.3)	9.4 (23.2)	26.2 (64.6)*	-	-
2024	-	14.7 (36.4)	4.7 (11.6)	34.9 (86.1)*	1.0 (2.4)	-

*Pellets per acre (ha)

Table 17R-18.10 - 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 elynoides (blackroot sedge)	Carex livida (livid sedge)	Carex parryana (Parry's sedge)	Danthonia spicata (poverty oatgrass)	Deschampsia cespitosa (tufted hairgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Juncus arcticus (arctic rush)	Koeleria macrantha (prairie Junegrass)	Muhlenbergia richardsonis (mat muhly)	Poa fendleriana (muttongrass)
year	Nested Frequency																
2005	39	45	3	164	-	-	-	-	15	24	5	319	13	62	41	-	58
2012	74	34	15	242	-	-	-	-	-	1	83	399	9	113	120	22	43
2015	21	24	26	166	-	-	-	6	-	71	36	356	43	24	108	7	7
2020	37	29	6	223	-	-	-	1	5	13	64	373	11	99	18	-	-
2024	32	27	20	-	227	72	67	-	-	21	63	314	-	96	68	6	-
year	Average Cover (%)																
2005	1.2	1.1	0.0	4.4	-	-	-	-	0.4	0.3	0.0	18.6	0.4	0.5	0.5	-	1.8
2012	2.9	1.0	0.2	5.7	-	-	-	-	-	0.0	0.4	33.8	0.0	0.4	2.7	0.2	0.1
2015	0.7	0.2	0.7	5.5	-	-	-	0.0	-	1.1	0.2	21.4	1.2	0.1	2.6	0.0	0.2
2020	1.0	0.6	0.3	9.8	-	-	-	0.0	0.0	0.1	0.5	25.1	0.2	0.8	0.1	-	-
2024	1.5	1.1	0.3	-	5.6	5.5	0.9	-	-	0.6	0.6	17.9	-	1.8	2.3	0.0	-

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

GRASS SPECIES	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested	
2005	49	-
2012	50	-
2015	57	7
2020	3	13
2024	98	-
year	Average Cover (%)	
2005	0.4	-
2012	0.9	-
2015	3.7	0.1
2020	0.1	0.4
2024	2.9	-

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

Table 17R-18.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria (pussytoes)	Antennaria microphylla (littleleaf pussytoes)	Antennaria rosulata (Kaibab pussytoes)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus tenellus (looseflower milkvetch)	Castilleja flava (yellow Indian paintbrush)	Cerastium beeringianum (Bering chickweed)	Cirsium scariosum[a] (meadow thistle)	Draba cuneifolia[a] (wedgeleaf draba)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gentiana calycosa (Rainier pleated gentian)	Geranium richardsonii (Richardson's geranium)
year	Nested Frequency																
2005	164	1	-	31	-	-	-	-	9	-	-	11	-	-	-	112	4
2012	163	5	123	35	-	-	-	-	-	-	4	13	7	-	2	62	4
2015	173	-	16	41	-	-	4	5	3	2	-	21	-	5	-	41	0
2020	154	3	-	27	-	-	1	-	3	-	1	17	-	-	3	24	-
2024	205	-	145	21	8	13	-	10	1	28	30	19	1	8	26	47	5
year	Average Cover (%)																
2005	4.6	0.1	-	0.4	-	-	-	-	0.1	-	-	0.9	-	-	-	3.9	0.1
2012	1.1	0.0	0.3	1.3	-	-	-	-	-	-	0.0	0.2	0.0	-	0.0	0.6	0.1
2015	1.7	-	0.1	1.5	-	-	0.0	0.0	0.0	0.0	-	1.0	-	0.0	-	0.9	0.0
2020	2.5	0.0	-	0.6	-	-	0.0	-	0.0	-	0.0	0.2	-	-	0.0	0.4	-
2024	6.9	-	1.5	0.1	0.1	0.5	-	0.0	0.0	0.3	0.6	0.4	0.0	0.0	0.3	1.4	0.2

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

FORB SPECIES	Geum triflorum (old man's whiskers)	Iris missouriensis (Rocky Mountain iris)	Lactuca serriola[ai] (prickly lettuce)	Lupinus caespitosus var. utahensis (Utah lupine)	Machaeranthera canescens (hoary tansyaster)	Mertensia oblongifolia (oblongleaf bluebells)	Microsteris gracilis[a] (slender phlox)	Orthocarpus tolmiei[a] (Tolmie's owl's-clover)	Pedicularis bracteosa (bracted lousewort)	Penstemon procerus (littleflower penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Potentilla hippiana (woolly cinquefoil)	Potentilla pensylvanica (Pennsylvania cinquefoil)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Silene drummondii (Drummond's campion)
year	Nested Frequency																
2005	-	-	-	40	-	-	2	135	80	-	20	29	48	29	-	-	-
2012	-	2	2	95	-	-	-	10	110	-	7	2	47	8	6	2	-
2015	-	3	6	1	3	-	-	14	20	-	4	-	33	24	4	5	1
2020	-	-	5	86	-	-	-	89	2	16	22	71	17	17	7	5	-
2024	7	-	-	98	-	3	6	102	3	263	17	102	19	16	-	-	-
year	Average Cover (%)																
2005	-	-	-	0.7	-	-	0.0	1.2	2.0	-	0.2	0.1	1.5	0.8	-	-	-
2012	-	0.0	0.0	0.8	-	-	-	0.0	0.8	-	0.0	0.0	0.5	0.2	0.1	0.0	-
2015	-	0.0	0.1	0.0	0.0	-	-	0.1	0.1	-	0.0	-	0.5	0.6	0.1	0.0	0.0
2020	-	-	0.0	2.1	-	-	-	0.4	0.0	0.1	0.0	0.2	0.2	0.5	0.3	0.0	-
2024	0.3	-	-	1.4	-	0.0	0.2	0.5	0.0	11.1	0.0	1.0	0.3	0.4	-	-	-

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

FORB SPECIES	Solidago multiradiata (Rocky Mountain goldenrod)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Trifolium (clover)
year	Nested Frequency			
2005	-	151	18	-
2012	-	171	12	32
2015	7	200	2	2
2020	-	270	-	-
2024	-	190	-	174
year	Average Cover (%)			
2005	-	4.3	0.1	-
2012	-	1.5	0.0	0.1
2015	0.1	6.4	0.0	0.0
2020	-	9.3	-	-
2024	-	8.3	-	0.5

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

Table 17R-18.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia cana[p] (silver sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Dasiphora fruticosa (shrubby cinquefoil)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)					
2005	16.8	5	0.5	-	-	0.8
2012	9.9	3.9	0.4	-	-	1.1
2015	17.6	5.9	0.4	-	-	1.7
2020	16.6	3.8	0.4	-	-	2.4
2024	19.1	4.3	1.1	-	-	1.8
year	Quadrat Cover (%)					
2005	11.9	2.9	0.2	-	0.0	0.8
2012	8.0	4.9	0.5	-	-	1.5
2015	8.1	4.2	0.4	0.1	-	1.3
2020	13.1	2.6	0.2	-	-	1.8
2024	16.1	5.3	0.5	-	-	1.8

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

Table 17R-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.

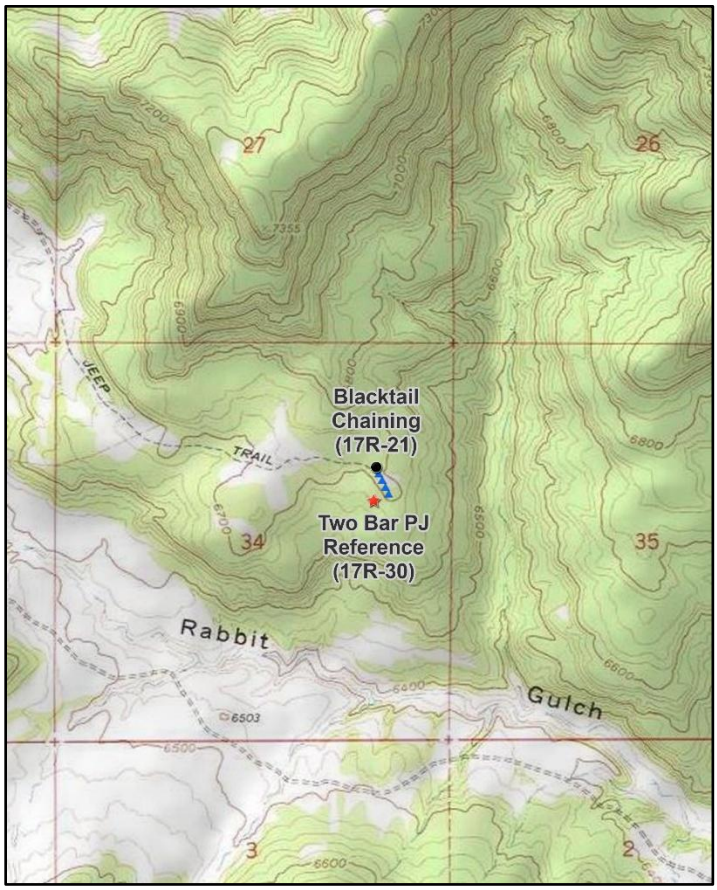
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia cana[p] -- (silver sagebrush)									
2005	6000	20	9	82	10	0	0	4	37/58
2012	5220	220	7	63	30	0	0	30	31/55
2015	5080	20	13	62	24	24	14	40	30/56
2020	5440	20	7	76	17	16	13	27	32/54
2024	5920	1880	19	75	6	2	7	6	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2005	1560	-	13	71	17	45	1	4	45/62
2012	2300	20	23	64	14	24	2	17	39/59
2015	1940	20	23	63	14	73	10	88	43/74
2020	1280	20	13	19	69	11	14	72	47/67
2024	1500	120	3	87	11	0	4	3	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2005	660	-	9	88	3	0	0	0	18/26
2012	840	-	2	98	0	0	0	0	13/12
2015	640	-	9	88	3	0	0	3	23/30
2020	520	-	15	81	4	0	0	4	21/26
2024	680	-	3	97	0	0	3	0	- / -
Dasiphora fruticosa -- (shrubby cinquefoil)									
2005	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	24/44
2015	-	-	-	-	-	-	-	-	49/87
2020	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2005	20	-	0	100	0	0	0	0	62/198
2012	240	-	0	100	0	100	0	0	44/96
2015	120	-	0	100	0	17	83	0	42/101
2020	40	-	0	100	0	0	0	0	60/190
2024	300	-	0	100	0	47	53	0	- / -
Ribes[p] -- (currant)									
2005	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	86/163
2015	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Ribes cereum[p] -- (wax currant)									
2005	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	79/143

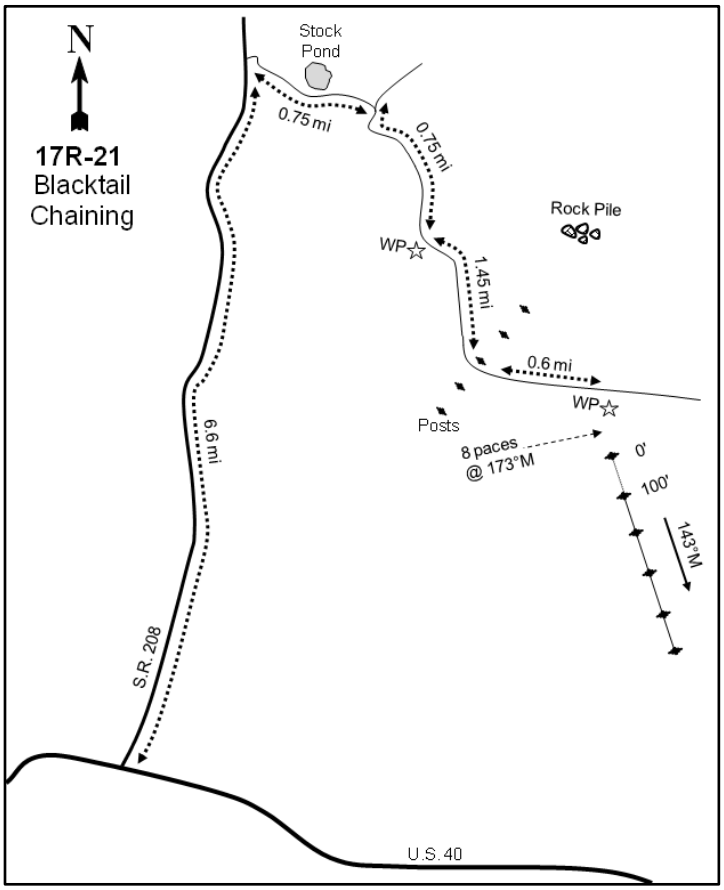
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 17R-.18 - Deer Desirable Components Index: Mountain Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2005	28.5	11.7	4.6	30.0	0.0	10.0	0.0	**84.8**	Good
2012	18.9	7.8	5.3	30.0	0.0	10.0	0.0	**72.0**	Fair-Good
2015	30.0	8.9	7.3	30.0	0.0	10.0	0.0	**86.2**	Good
2020	29.1	7.8	3.6	30.0	0.0	10.0	0.0	**80.5**	Good
2024	30.0	13.2	7.5	30.0	0.0	10.0	0.0	**90.7**	Good-Excellent

BLACKTAIL CHAINING - STUDY NO. 17R-21





Location Information

USGS 7.5 min Map Info	Tabiona SE; Township 2S, Range 7W, Section 34
GPS (0' Stake)	NAD 83 UTM ZONE 12, 529257 East 4457303 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	143° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

Directions to Site

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

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,700ft (2,042m)
Aspect	East
Slope	3-4%
Sample Dates	07/06/2006, 07/09/2009, 06/29/2010, 06/25/2013, 07/21/2019, 07/01/2024

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

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

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

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

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

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

Wildlife Habitat and Vegetation History

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

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

Table 17R-21.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Pinyon-Juniper	Phase III
2009	Perennial Grass	Phase I
2010	Perennial Grass	Phase I
2013	Perennial Grass	Phase I
2019	Perennial Grass	Phase I
2024	Perennial Grass	Phase I

Site Notes

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

Soils

Table 17R-21.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
	6.6	0.0	0.0	0.0	4.5	19.0	403.0	0.3	08/06/2015
Sandy Loam	6.9	71.3	14.4	14.3	4.5	20.7	131.2	0.9	07/05/2006

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC310UT
States and Transitions	No state and transition model is available for this ecological site.

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

Mule deer winter range conditions have ranged between very poor and good since study establishment in 2006. Winter range condition was considered to be good in 2024, but was generally limited by a reduced amount of preferred browse cover and perennial forb cover, and the presence of annual grass (Table 17R-21.15). The area is known for the winter occurrence of elk (Wildlife Tracker). Pellet group data show that deer and elk presence have been moderate to high for much of the sample period; however, deer presence has generally decreased since study establishment (Table 17R-21.9). Mountain big sagebrush provides some winter forage for wildlife, and has ranged between being moderately to heavily used (but the population is small); forage kochia (*Bassia prostrata*) provides the bulk of wildlife forage, but utilization has been relatively low since it was seeded (Table 17R-21.13). It should be noted that this community is susceptible to competitive introduced species and/or heavy utilization which could lead to a decrease in preferred browse abundance and loss of utility for wildlife.

Trend Summary Tables

Table 17R-21.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	1.1	1.7	2.9	1.2	1.8	21.2
2009	2.2	2.3	1.7	2.0	2.1	1.8
2010	1.8	2.6	1.2	2.4	1.4	1.1
2013	2.3	1.0	0.6	3.2	1.8	0.6
2019	8.6	2.2	1.0	9.0	1.1	1.6
2024	7.6	1.3	0.8	6.9	1.5	1.7

Table 17R-21.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	125	216	83	5	0.7	3.5	0.3	0.0
2009	98	249	93	66	2.2	18.9	2.4	4.0
2010	97	303	97	73	2.0	18.4	1.8	2.5
2013	151	344	49	60	0.6	13.4	0.2	0.5
2019	219	353	250	12	4.7	20.8	5.0	0.1
2024	26	361	62	20	0.1	24.0	0.7	0.4

Table 17R-21.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	40.0	5.6	50.5	-	1.1	10.1
2009	22.4	0.8	57.2	0.0	0.2	37.1
2010	20.7	0.4	51.3	-	0.2	33.4
2013	16.6	0.1	70.4	-	0.1	24.8
2019	21.3	0.9	59.3	0.0	0.2	35.8
2024	27.3	1.8	50.4	0.8	0.1	32.8

Table 17R-21.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	-	20	23	69
2009	-	31	22	63
2010	-	20	13	25
2013	-	9	24	28
2019	-	9	32	61
2024	-	45	43	28
Year	Days Use Per Acre (ha)			
2006	-	52.3 (129.1)	42.9 (105.9)	-
2009	0.7 (1.8)	39.6 (97.7)	14.7 (36.4)	-
2010	-	24.8 (61.2)	32.8 (81.1)	-
2013	2.2 (5.4)	24.1 (59.6)	81.1 (200.3)	-
2019	-	10.0 (24.8)	36.8 (91.0)	-
2024	-	19.4 (48.0)	23.4 (57.9)	-

Table 17R-21.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Carex obtusata (obtuse 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)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency																
2006	57	19	-	16	27	17	-	-	-	-	-	88	97	26	-	-	-
2009	16	2	33	7	69	-	-	21	12	62	-	101	70	15	3	7	-
2010	25	3	55	21	83	22	-	2	5	68	-	131	103	10	7	4	-
2013	32	-	79	16	128	35	-	1	14	168	16	146	10	7	10	1	3
2019	19	-	65	10	129	33	19	-	6	228	-	125	10	17	5	4	3
2024	17	-	63	13	15	15	60	-	8	156	18	182	-	-	4	-	12
year	Average Cover (%)																
2006	0.8	0.2	-	0.1	0.1	0.0	-	-	-	-	-	1.5	0.7	0.1	-	-	-
2009	0.5	0.1	1.8	0.2	1.8	-	-	0.7	0.2	2.7	-	7.9	3.7	0.4	0.2	0.5	-
2010	0.5	0.0	1.8	0.9	1.9	0.5	-	0.0	0.2	2.9	-	7.5	2.9	0.3	0.3	0.8	-
2013	0.8	-	1.7	0.8	0.5	0.2	-	0.0	0.2	3.7	0.9	4.5	0.1	0.0	0.4	0.0	0.0
2019	0.8	-	3.0	0.1	3.1	0.9	0.4	-	0.2	7.3	-	7.0	0.4	0.2	0.3	0.1	0.0
2024	0.8	-	4.2	0.6	0.0	0.7	1.8	-	0.4	4.2	1.6	9.6	-	-	0.0	-	0.1

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

GRASS SPECIES	Vulpia octoflora[a] (sixweeks fescue)
year	Nested
2006	121
2009	45
2010	20
2013	47
2019	162
2024	15
year	Average Cover (%)
2006	0.6
2009	0.4
2010	0.1
2013	0.1
2019	1.6
2024	0.1

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

Table 17R-21.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cryptantha[a] (annual cryptantha)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Eriogonum cernuum[a] (nodding buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gilia inconspicua[a] (shy gilia)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola[ai] (prickly lettuce)
year	Nested Frequency																
2006	-	-	-	-	-	-	-	-	2	-	3	3	-	-	-	2	-
2009	-	-	3	6	-	44	3	-	9	-	-	-	-	14	-	-	0
2010	-	-	-	9	-	28	7	1	10	-	-	17	-	8	-	-	7
2013	-	8	-	5	10	-	4	-	2	-	12	-	8	13	-	-	-
2019	3	-	-	-	-	85	35	21	-	4	30	1	-	93	24	-	3
2024	4	-	-	-	-	16	-	-	-	-	-	-	5	17	-	-	-
year	Average Cover (%)																
2006	-	-	-	-	-	-	-	-	0.0	-	0.0	0.0	-	-	-	0.0	-
2009	-	-	0.0	0.0	-	0.5	0.0	-	0.3	-	-	-	-	0.4	-	-	0.0
2010	-	-	-	0.1	-	0.5	0.0	0.0	0.4	-	-	0.2	-	0.0	-	-	0.0
2013	-	0.0	-	0.0	0.0	-	0.0	-	0.0	-	0.0	-	0.0	0.0	-	-	-
2019	0.0	-	-	-	-	0.4	0.6	0.1	-	0.0	0.6	0.0	-	0.7	0.1	-	0.0
2024	0.0	-	-	-	-	0.1	-	-	-	-	-	-	0.0	0.0	-	-	-

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

FORB SPECIES	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa[i] (alfalfa)	Mentzelia albicaulis[a] (whitestem blazingstar)	Microsteris gracilis[a] (slender phlox)	Onobrychis viciifolia[i] (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency															
2006	62	-	-	-	-	-	-	-	-	1	-	20	-	-	-	-
2009	24	0	-	-	5	13	-	-	6	-	-	9	1	0	38	0
2010	24	2	-	-	4	5	-	2	3	3	-	9	8	5	39	1
2013	9	3	-	-	6	-	-	2	6	-	1	-	8	-	24	4
2019	81	-	-	2	-	10	1	0	2	-	-	66	4	-	8	4
2024	4	-	3	-	3	-	-	-	-	-	-	21	1	-	14	-
year	Average Cover (%)															
2006	0.2	-	-	-	-	-	-	-	-	0.0	-	0.0	-	-	-	-
2009	0.6	0.0	-	-	0.7	0.4	-	-	0.7	-	-	0.1	0.3	0.0	2.2	0.0
2010	0.1	0.0	-	-	0.2	0.1	-	0.0	0.0	0.0	-	0.0	0.8	0.1	1.6	0.0
2013	0.0	0.0	-	-	0.0	-	-	0.1	0.0	-	0.0	-	0.1	-	0.1	0.0
2019	1.0	-	-	0.0	-	1.1	0.0	0.0	0.0	-	-	0.3	0.0	-	0.1	0.1
2024	0.0	-	0.1	-	0.0	-	-	-	-	-	-	0.5	0.0	-	0.2	-

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

Table 17R-21.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Bassia prostrata[pi] (forage kochia)	Juniperus osteosperma[t] (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)					
2006	1.2	-	7.5	-	1.8	13.7
2009	0.4	1.6	0.9	-	2.1	0.9
2010	1	1.4	0.3	-	1.4	0.8
2013	1	2.2	0.1	-	1.8	0.5
2019	1.9	7.1	0.4	-	1.1	1.2
2024	1.3	5.6	0.2	-	1.5	1.5
year	Quadrat Cover (%)					
2006	1.1	-	0.6	0.0	1.7	2.4
2009	0.3	1.8	0.8	-	2.3	1.0
2010	0.3	1.4	0.2	-	2.6	1.0
2013	0.5	1.8	0.0	-	1.0	0.6
2019	1.4	7.2	0.0	-	2.2	1.0
2024	0.7	6.9	0.8	-	1.3	0.0

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

Table 17R-21.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2006	-	-	-	-	-	-	-	-	29/76
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2006	340	2140	6	18	77	29	0	65	36/68
2009	-	-	-	-	-	-	-	-	35/44
2010	1040	-	40	54	6	25	42	2	40/53
2013	900	20	40	51	9	7	58	20	38/48
2019	600	1880	23	70	7	17	3	7	47/69
2024	840	680	14	76	10	24	62	12	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	131/230
2019	-	-	-	-	-	-	-	-	100/104
2024	-	-	-	-	-	-	-	-	-/-

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)									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	31/35
2010	2100	200	29	71	0	9	2	0	29/41
2013	6140	100	52	49	0	26	4	0	31/42
2019	3580	-	10	90	0	0	0	0	40/58
2024	9340	15900	60	40	0	4	5	25	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2006	-	-	-	-	-	-	-	-	162/140
2009	-	-	-	-	-	-	-	-	111/137
2010	-	-	-	-	-	-	-	-	70/125
2013	-	-	-	-	-	-	-	-	75/83
2019	-	-	-	-	-	-	-	-	84/98
2024	-	-	-	-	-	-	-	-	-/-
Eriogonum corymbosum -- (crispleaf buckwheat)									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	22/25
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	71/78
2010	60	-	100	0	0	0	0	0	79/89
2013	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	89/124
2024	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma[t] -- (Utah juniper)									
2006	40	-	0	50	50	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	80	-	75	25	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	-/-
2024	20	-	0	0	100	0	0	100	- / -
Linanthus pungens -- (granite prickly phlox)									
2006	-	-	-	-	-	-	-	-	5/14
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	15/17
2024	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2006	1800	-	0	83	17	0	0	9	14/50
2009	-	-	-	-	-	-	-	-	14/40
2010	1900	-	8	91	1	0	0	1	13/48
2013	2320	20	1	99	0	0	0	1	11/26
2019	2260	-	9	91	0	0	0	0	13/34
2024	2780	-	10	89	1	0	0	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 (%)		
Pinus edulis[t] -- (twoneedle pinyon)									
2006	120	20	33	67	0	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	100	- / -
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2006	-	-	-	-	-	-	-	-	30/136
2009	-	-	-	-	-	-	-	-	62/180
2010	-	-	-	-	-	-	-	-	50/137
2013	-	-	-	-	-	-	-	-	35/43
2019	-	-	-	-	-	-	-	-	77/174

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

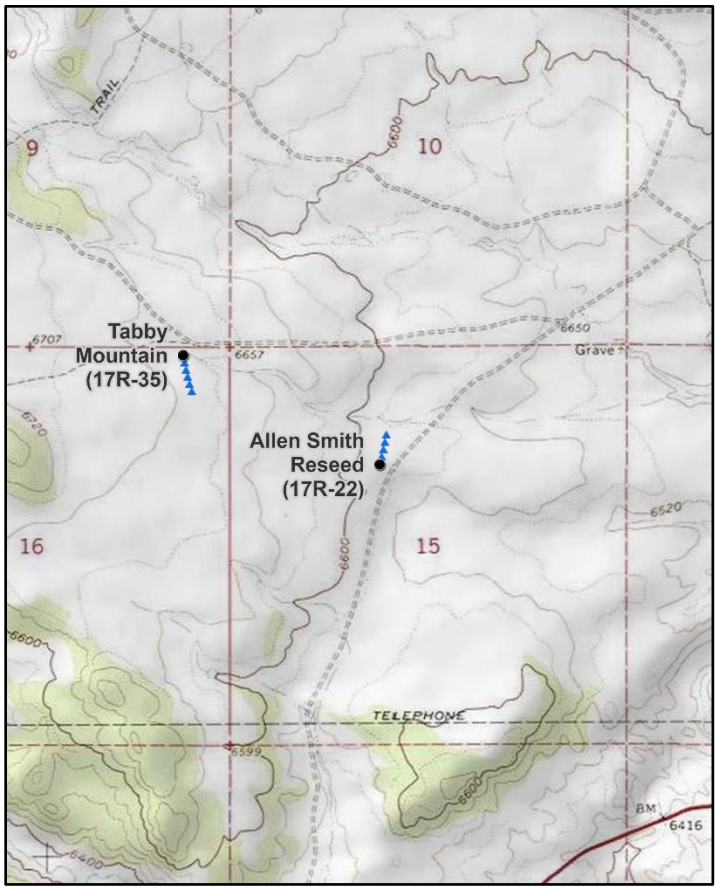
Table 17R-21.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

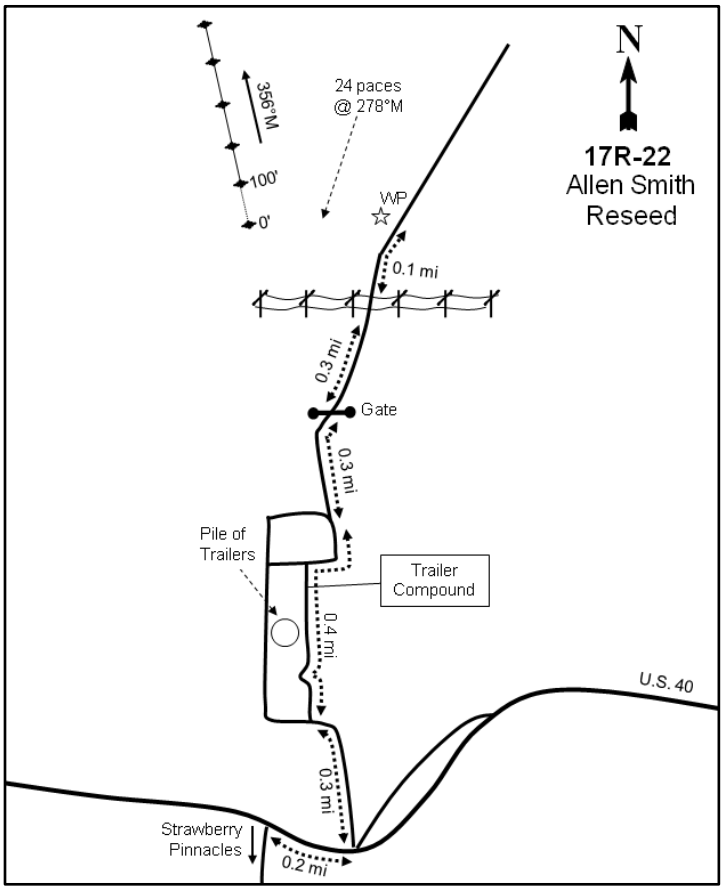
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2006	30	-	-	13	50	38	47.6
2009	8	-	25	25	-	50	21.3
2010	20	-	91	9	-	-	14.7
2013	7	-	20	80	-	-	13.2
2019	10	14	57	29	-	-	21.1
2024	19	9	45	36	9	-	10.7
Pinus edulis (twoneedle pinyon)							
2006	50	33	17	17	6	28	16.7
2009	27	-	89	11	-	-	4.3
2010	23	17	75	8	-	-	3.0
2013	20	-	80	20	-	-	4.9
2019	20	-	63	38	-	-	5.9
2024	24	-	75	13	13	-	5.5

Table 17R-21.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2006	1.5	0.0	0.0	6.9	-0.5	0.0	0.0	**7.9**	Very Poor
2009	2.9	0.0	0.0	30.0	-1.6	7.9	0.0	**39.2**	Poor
2010	3.4	0.0	0.0	30.0	-1.5	5.0	0.0	**36.9**	Very Poor-Poor
2013	4.6	0.0	0.0	26.7	-0.5	0.9	0.0	**31.7**	Very Poor
2019	13.0	14.5	6.4	30.0	-3.6	0.2	0.0	**60.5**	Fair
2024	10.0	14.4	15.0	30.0	-0.1	0.7	0.0	**70.0**	Good

ALLEN SMITH RESEED - STUDY NO. 17R-22





Location Information

USGS 7.5 min Map Info	Fruitland NE; Township 3S, Range 8W, Section 15
GPS (0' Stake)	NAD 83 UTM ZONE 12, 519024 East 4452480 North

Transect Information

Browse Tag # (0' Stake)	147
Transect Bearing	356° 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

While driving east on US-40, go to the farthest west turnoff leading to the Strawberry Pinnacles. From there, drive east for 0.2 miles to a road on the left (north) side of the road. Turn here and drive north for 0.3 miles to a fork that leads to a compound of trailers. Stay to the right and drive 0.4 miles, passing the trailer compound and coming to another fork. Stay to the right and drive 0.3 miles to a gate. Go through the gate and drive 0.5 miles to power lines crossing the road. From there, drive 0.1 miles to a witness post on the left (west) side of the road. From the witness post, walk 24 paces at 278 degrees magnetic to the 0-foot stake that is marked with browse tag #147.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,600ft (2,012m)
Aspect	Southeast
Slope	2-3%
Sample Dates	07/05/2006, 06/30/2010, 06/16/2015, 07/27/2020, 07/01/2024

Table 17R-22.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Disc - Disc Unknown	-	-	Early 1990s	-
Seeding - Seed Unknown	-	-	Early 1990s	-
Herbicide - Tebuthiuron	-	-	Early 2000s	-
Seeding - Aerial Before	Sink Draw Interseeding	417	November 2006	546
Grazing - Intensive Grazing	Sink Draw Interseeding	417	November 2006	546
Mechanical - Scalper	Tabby Browse Plots	2681	November 2013	78
Seeding - Dribbler	Tabby Browse Plots	2681	November 2013	78

Table 17R-22.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Sink Draw Interseeding			Aerial	Nov 2006	600
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Bouteloua gracilis	Blue Grama		0.00	0.00
G	Dactylis glomerata	Orchardgrass	Paiute	0.00	0.00
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.00	0.00
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.00	0.00
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.00	0.00
F	Linum perenne	Blue Flax	Appar	0.00	0.00
F	Medicago sativa	Alfalfa	Ladak	0.42	0.39
F	Medicago sativa	Alfalfa	Ranger	0.42	0.37
F	Medicago sativa	Alfalfa	Spredor 4	0.42	0.39
F	Onobrychis viciifolia	Sainfoin	Eski	0.00	0.00
F	Sanguisorba minor	Small Burnet	Delar	0.00	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.00	0.00
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.00	0.00
S	Bassia prostrata	Forage Kochia	Beaver UT	0.00	0.00
S	Krascheninnikovia lanata	Winterfat	Iron UT	0.08	0.03
S	Krascheninnikovia lanata	Winterfat	Beaver UT	0.17	0.06

Mix Name			Application Type	Application Date	Acres
Tabby Browse Plots			Scalper	Nov 2013	40
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Duchesne UT	2.50	0.88
S	Purshia tridentata	Bitterbrush	Elko/White Pine NV	2.00	1.72

Mix Name			Application Type	Application Date	Acres
Tabby Browse Plots- Sagebrush			Scalper	Nov 2013	40
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 17R-22.3 - 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-22.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Perennial Grass	No Encroachment
2010	Perennial Grass	No Encroachment
2015	Perennial Grass	No Encroachment
2020	Perennial Grass	No Encroachment
2024	Perennial Grass	No Encroachment

Site Notes

In 2015, it was noted that scarlet globemallow (*Sphaeralcea coccinea*) and forage kochia (*Bassia prostrata*) were the main species establishing along the scalp lines.

Soils

Table 17R-22.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.5	49.6	27.2	23.3	1.9	12.1	160.0	0.7	07/05/2006

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC310UT
States and Transitions	No state and transition model is available for this ecological site.

This site has been dominated by perennial grasses since study establishment in 2006 (Table 17R-22.7) with the introduced species crested wheatgrass (*Agropyron cristatum*) as the most dominant species. There was a significant increase in both cover and abundance of Russian wildrye (*Psathyrostachys juncea*) in 2020, but it decreased in 2024. The introduced annual grass species cheatgrass (*Bromus tectorum*) was present in 2006, but has not been observed in subsequent sample years (Table 17R-22.10). Forbs have remained moderately diverse, but have not been particularly abundant (Table 17R-22.11). Despite shrubs remaining rare overall, density of forage kochia (*Bassia prostrata*) has had substantial increases each sample year since 2010 (Table 17R-22.6, Table 17R-22.12, Table 17R-22.13).

Mule deer winter range conditions have ranged between very poor and good since study establishment in 2006. Winter range condition was considered good in 2024 and was generally limited by a reduced amount of preferred browse cover and perennial forb cover, and the presence of annual grass (Table 17R-22.15). The area is known for the winter occurrence of elk (Wildlife Tracker). Pellet group data show that elk presence has been moderate to high for much of the sample period. Deer presence was low between 2006 and 2020, but was considered to be high in 2024 (Table 17R-22.9). Mountain big sagebrush provides some winter forage for wildlife, and utilization has ranged between moderate and heavy (but the population is small); forage kochia (*Bassia prostrata*) provides the bulk of wildlife forage, but use has been relatively low since it was seeded (Table 17R-22.13). It should be noted that this community is susceptible to competitive introduced species and/or heavy utilization which could lead to a decrease in preferred browse abundance and loss of utility for wildlife.

Trend Summary Tables

Table 17R-22.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	-	0.2	-	-	0.1	-
2010	0.0	0.2	-	0.1	0.7	-
2015	0.5	0.3	-	1.2	0.3	-
2020	1.1	0.7	-	1.4	0.1	-
2024	1.3	0.1	-	0.9	0.3	-

Table 17R-22.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	3	415	156	109	0.0	22.3	0.6	2.2
2010	-	384	5	67	-	23.7	0.0	1.3
2015	-	407	12	76	-	23.2	0.0	1.5
2020	-	392	-	56	-	41.0	-	1.4
2024	-	387	-	90	-	24.8	-	3.0

Table 17R-22.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	39.5	0.1	51.6	1.7	0.8	25.5
2010	32.0	0.1	48.7	1.7	0.3	25.7
2015	43.2	0.1	39.2	3.3	1.0	25.7
2020	22.3	0.4	47.7	5.9	2.4	43.5
2024	25.2	0.1	54.1	4.4	1.3	29.9

Table 17R-22.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2006	9	13	42	1	25
2010	14	15	33	-	1
2015	10	7	21	-	13
2020	7	18	35	-	7
2024	3	23	34	-	1
Year	Days Use Per Acre (ha)				
2006	21.1 (52.0)	6.7 (16.6)	61.7 (152.3)	-	-
2010	10.2 (25.1)	2.7 (6.6)	48.3 (119.2)	-	-
2015	10.9 (26.9)	8.7 (21.5)	30.2 (74.5)	-	-
2020	15.3 (37.7)	4.7 (11.6)	42.2 (104.3)	-	-
2024	1.5 (3.6)	48.9 (120.8)	33.5 (82.8)	-	-

Table 17R-22.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Elymus lanceolatus (thickspike 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										
2006	37	403	3	14	-	-	-	1	34	4	21
2010	5	376	-	27	-	3	13	9	19	-	16
2015	-	388	-	12	11	-	18	4	32	-	10
2020	-	383	-	10	-	-	29	23	79	-	-
2024	-	380	-	21	-	3	-	-	16	-	1
year	Average Cover (%)										
2006	0.2	20.5	0.0	0.1	-	-	-	0.0	1.3	0.0	0.1
2010	0.1	20.8	-	0.5	-	0.0	0.5	0.3	1.1	-	0.3
2015	-	21.4	-	0.1	0.2	-	0.2	0.0	1.2	-	0.1
2020	-	34.8	-	0.0	-	-	0.3	0.6	5.2	-	-
2024	-	24.1	-	0.1	-	0.0	-	-	0.5	-	0.0

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

Table 17R-22.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Chaetopappa ericoides (rose heath)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Eriogonum cernuum[a] (nodding buckwheat)	Lappula occidentalis[a] (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa[i] (alfalfa)	Melilotus officinalis[i] (sweetclover)	Packera multilobata (lobeleaf groundsel)	Phlox austromontana (mountain phlox)	Salsola tragus[ai] (prickly Russian thistle)	Schoenocrambe linifolia (flaxleaf plainsmustard)
year	Nested Frequency																
2006	1	-	3	-	2	-	24	2	5	1	35	42	2	3	3	141	4
2010	-	4	3	4	-	-	-	1	-	-	-	26	-	-	2	-	1
2015	-	4	3	-	-	2	7	-	-	-	-	28	4	-	2	1	11
2020	-	3	3	-	-	-	-	-	-	-	-	14	-	1	3	-	3
2024	-	3	2	-	-	-	-	-	-	-	-	31	-	-	2	-	1
year	Average Cover (%)																
2006	0.0	-	0.0	-	0.0	-	0.1	0.0	0.0	0.0	0.4	1.4	0.0	0.0	0.0	0.5	0.0
2010	-	0.3	0.0	0.0	-	-	-	0.0	-	-	-	0.5	-	-	0.0	-	0.0
2015	-	0.0	0.0	-	-	0.0	0.0	-	-	-	-	0.9	0.0	-	0.0	0.0	0.1
2020	-	0.0	0.0	-	-	-	-	-	-	-	-	0.7	-	0.0	0.0	-	0.2
2024	-	0.1	0.0	-	-	-	-	-	-	-	-	1.9	-	-	0.0	-	0.0

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

FORB SPECIES	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius[ai] (yellow salsify)	Trifolium (clover)
year	Nested Frequency		
2006	24	-	6
2010	21	-	15
2015	29	4	8
2020	29	-	-
2024	52	-	6
year	Average Cover (%)		
2006	0.3	-	0.0
2010	0.3	-	0.1
2015	0.3	0.0	0.0
2020	0.5	-	-
2024	0.9	-	0.0

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

Table 17R-22.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Bassia prostrata[pi] (forage kochia)	Gutierrezia sarothrae (broom snakeweed)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
2006	-	-	-	-	0.1
2010	-	0.1	0.5	-	0.2
2015	-	1.2	0.3	-	-
2020	-	1.4	0	0.1	-
2024	-	0.9	0	-	0.3
year	Quadrat Cover (%)				
2006	-	-	0.0	-	0.1
2010	0.0	0.0	0.2	-	0.0
2015	-	0.5	0.3	-	-
2020	-	1.1	0.7	0.0	-
2024	0.4	0.9	0.1	-	0.0

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

Table 17R-22.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2006	-	-	-	-	-	-	-	-	18/20
2010	40	-	0	100	0	0	0	0	34/37
2015	60	-	33	67	0	33	0	0	33/42
2020	-	-	-	-	-	-	-	-	47/65
2024	100	20	80	20	0	0	20	0	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	15/33
2020	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Bassia prostrata[pi] -- (forage kochia)									
2006	-	-	-	-	-	-	-	-	-/-
2010	140	-	14	86	0	14	0	0	17/22
2015	700	160	29	71	0	17	23	0	17/31
2020	1260	40	35	65	0	32	0	8	29/45
2024	2620	29040	26	74	0	9	11	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	- / -
2015	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	19/38
2024	-	-	-	-	-	-	-	-	-/-
Eriogonum corymbosum -- (crispleaf buckwheat)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	26/35
2015	20	-	0	100	0	0	0	0	22/24
2020	-	-	-	-	-	-	-	-	40/53
2024	-	-	-	-	-	-	-	-	-/-
Eriogonum microthecum[p] -- (slender buckwheat)									
2006	-	-	-	-	-	-	-	-	30/40
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	42/60
2015	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	35/55
2024	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2006	140	-	0	100	0	0	0	0	14/26
2010	400	-	0	100	0	0	0	0	17/29
2015	540	20	11	89	0	0	0	0	14/22
2020	400	-	30	70	0	0	0	5	16/27
2024	580	20	38	62	0	0	0	0	- / -

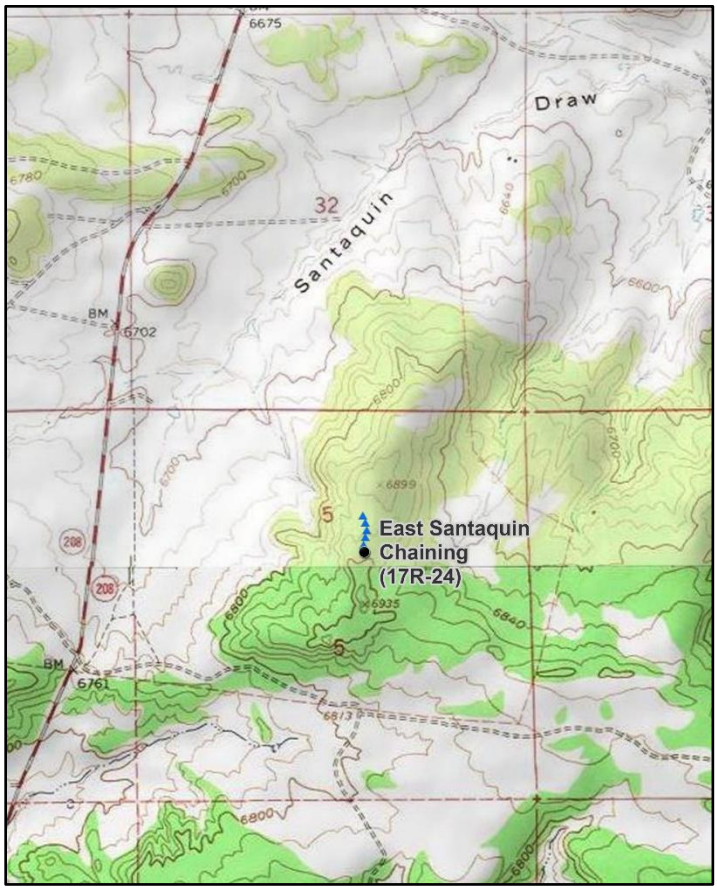
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Krascheninnikovia lanata[p] -- (winterfat)									
2006	-	-	-	-	-	-	-	-	36/60
2010	-	-	-	-	-	-	-	-	34/37
2015	-	-	-	-	-	-	-	-	19/29
2020	-	-	-	-	-	-	-	-	23/24
2024	-	-	-	-	-	-	-	-	-/-
Linanthus pungens -- (granite prickly phlox)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2020	20	-	0	100	0	0	0	0	15/30
2024	40	-	0	100	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2006	180	-	11	56	33	0	0	22	10/39
2010	100	-	0	100	0	0	0	0	10/40
2015	280	-	7	93	0	7	0	0	11/30
2020	140	-	0	100	0	0	0	0	9/28
2024	260	-	0	100	0	0	0	0	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	6/19

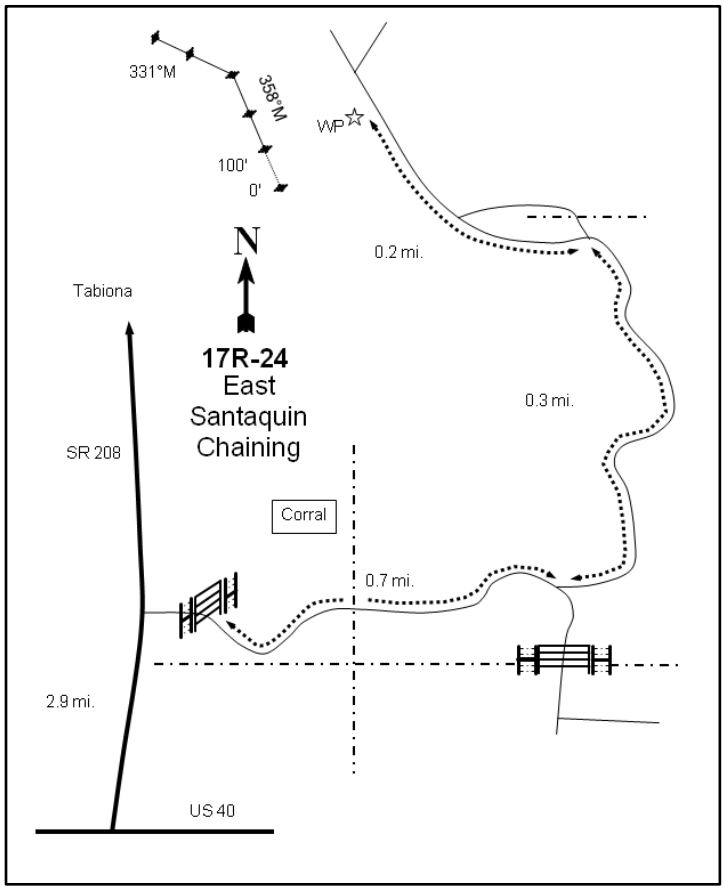
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 17R-22.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2006	0.0	0.0	0.0	30.0	0.0	4.3	0.0	**34.3**	Very Poor-Poor
2010	0.2	0.0	0.0	30.0	0.0	2.6	0.0	**32.8**	Very Poor
2015	1.8	0.0	0.0	30.0	0.0	2.9	0.0	**34.7**	Very Poor-Poor
2020	2.1	0.0	0.0	30.0	0.0	2.8	0.0	**34.9**	Very Poor-Poor
2024	1.4	0.0	0.0	30.0	0.0	6.0	0.0	**37.4**	Poor

EAST SANTAQUIN CHAINING - STUDY NO. 17R-24





Location Information

USGS 7.5 min Map Info	Tabiona SW; Township 3S, Range 7W, Section 05
GPS (0' Stake)	NAD 83 UTM ZONE 12, 525694 East 4455581 North

Transect Information

Browse Tag # (0' Stake)	146
Transect Bearing	355° magnetic (Lines 4-5: 331° 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 US-40, drive north on SR-208 for 2.9 miles to a gated road on the right (east) side of the road. Turn here, pass through the gate, and proceed for 0.7 miles to a fork: turn left and follow the road for 0.3 miles to a fence. Veer left and drive for 0.2 miles to a witness post on the left (west) side of the road. From the witness post, walk 15 paces at 265 degrees magnetic to the 0-foot stake which is marked with browse tag #146.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,900ft (2,103m)
Aspect	Northwest
Slope	3-5%
Sample Dates	07/07/2006, 06/30/2010, 06/25/2013, 07/31/2017, 07/28/2020, 07/01/2024

Table 17R-24.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely/Smooth	East Santaquin Draw P/J Chaining	367	September-October 2006	449
Seeding - Aerial Before	East Santaquin Draw P/J Chaining	367	September 2006	449
Seeding - Dribbler	East Santaquin Draw P/J Chaining	367	September-October 2006	449
Seeding - Aerial After	East Santaquin Draw P/J Chaining	367	January 2007	449
Hand Crew - Lop and Scatter	Tabby Mountain chaining maintenance	2570	October 2013	1915

Table 17R-24.2 Seed Mix. List of known seeded plant species and rates (if available).

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

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

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

Wildlife Habitat and Vegetation History

Table 17R-24.3 - 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-24.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Pinyon-Juniper	Phase III
2010	Perennial Grass/Mixed Browse	Phase I
2013	Perennial Grass/Mixed Browse	Phase I
2017	Perennial Grass/Mixed Browse	Phase I
2020	Perennial Grass/Mixed Browse	Phase I
2024	Perennial Grass/Mixed Browse	Phase I

Site Notes

Over 217,000 acres of the Uintah Basin/Northeastern Region suffered sagebrush (*Artemisia* spp.) die-off following a six-year drought. Deer carcasses and limbs were found on site in 2017. There are two 0-foot stakes; the transect should be set up using the 0-foot stake marked by a browse tag.

Soils

Table 17R-24.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.0	72.7	14.4	12.8	1.3	9.4	83.2	0.4	07/07/2006

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC310UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2006, this study site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase III of woodland succession (Photos, Table 17R-24.4, Table 17R-24.14). The browse component diversified and became a codominant site component following treatment (Table 17R-24.1), with forage kochia (*Bassia prostrata*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and antelope bitterbrush (*Purshia tridentata*) contributing the most preferred browse cover (Table 17R-24.12, Table 17R-24.13). The herbaceous understory also increased in cover and diversity following treatment. Perennial grasses have provided the most herbaceous cover and have been considered to be codominant with mixed browse in each post-treatment sample year. Much of the perennial grass cover was provided by thickspike wheatgrass (*Elymus lanceolatus*), Indian ricegrass (*Achnatherum hymenoides*), crested wheatgrass (*Agropyron cristatum*), and needle and thread (*Hesperostipa comata*) through 2020, but sedge (*Carex* sp.) and western wheatgrass (*Pascopyrum smithii*) contributed most of the perennial grass cover in 2024. The introduced annual grass species cheatgrass (*Bromus tectorum*) was observed in all sample years, but with low abundance. Annual and perennial forbs have remained rare (Table 17R-24.7, Table 17R-24.10, Table 17R-24.11). Despite multiple targeted pinyon and juniper reduction treatments, conifer densities appear to have the potential to rebound quickly and woodland succession remains dynamic (Table 17R-24.13, Table 17R-24.14).

Mule deer winter range conditions have ranged between very poor and good-excellent since study establishment in 2006. Winter range condition was considered good-excellent in 2024 and was generally limited by low perennial forb cover (Table 17R-24.15). The area is known for the winter occurrence of elk (Wildlife Tracker). Pellet group data show that cattle and elk presence have been high for much of the sample period; cattle presence has generally increased since study establishment while elk presence has varied. Deer presence has been low in most sample years, but has increased over time with presence being considered high in 2020 and 2024 (Table 17R-24.9). Mountain big sagebrush provided very little forage for wildlife when the study was established, but has since increased in abundance and now provides a sizable amount of forage as of 2024. As the population of sagebrush has grown, utilization has been low to moderate. Forage kochia has provided consistent wildlife forage, but use has been relatively low since it was seeded (Table 17R-24.13). It should be noted that this community is susceptible to competitive introduced species and/or heavy utilization which could lead to a decrease in preferred browse abundance and loss of utility for wildlife.

Trend Summary Tables

Table 17R-24.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	1.0	2.6	2.0	1.3	2.8	30.0
2010	6.0	0.4	0.3	7.5	1.0	0.6
2013	9.1	0.3	0.1	11.7	0.4	0.6
2017	11.7	0.3	0.4	15.1	0.4	-
2020	13.3	0.4	0.1	16.1	1.2	0.1
2024	14.8	0.6	0.0	18.4	1.1	-

Table 17R-24.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	76	245	61	65	0.6	3.8	0.2	0.6
2010	129	288	40	68	2.1	13.3	0.2	1.4
2013	61	368	22	59	0.1	11.4	0.1	0.7
2017	38	404	20	82	0.2	22.0	0.2	0.9
2020	44	362	13	24	0.3	25.2	0.0	0.5
2024	4	340	12	14	0.0	13.6	0.0	0.2

Table 17R-24.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	34.5	2.2	58.1	0.0	2.4	10.1
2010	20.3	0.2	60.0	0.0	0.5	25.3
2013	21.3	0.1	59.1	0.0	0.9	28.3
2017	17.6	0.3	58.2	0.1	1.1	35.7
2020	26.8	0.2	55.5	0.0	0.8	38.9
2024	35.1	1.0	47.7	0.2	0.4	29.8

Table 17R-24.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	-	27	22	70
2010	3	19	7	9
2013	2	8	22	31
2017	3	15	22	57
2020	2	40	26	27
2024	3	40	22	6
Year	Days Use Per Acre (ha)			
2006	-	42.2 (104.3)	48.3 (119.2)	-
2010	8.7 (21.5)	12.8 (31.5)	18.7 (46.3)	-
2013	14.5 (35.9)	7.4 (18.2)	75.1 (185.4)	-
2017	2.2 (5.4)	10.7 (26.5)	30.8 (76.1)	-
2020	12.3 (30.5)	40.9 (101.0)	38.9 (96.0)	-
2024	32.7 (80.7)	72.4 (178.8)	54.9 (135.7)	-

Table 17R-24.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	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										
2006	95	-	76	91	1	-	29	94	37	-	-
2010	75	76	129	34	3	61	64	97	41	-	11
2013	44	77	61	69	3	199	88	45	6	5	10
2017	40	36	38	65	53	255	66	25	17	2	24
2020	38	153	44	32	8	100	68	-	22	1	44
2024	7	49	4	169	-	34	16	186	1	3	-
year	Average Cover (%)										
2006	2.1	-	0.6	0.4	0.0	-	0.5	0.3	0.4	-	-
2010	2.9	2.5	2.1	0.5	0.0	1.7	2.4	2.6	0.4	-	0.3
2013	2.2	1.5	0.1	0.5	0.0	4.3	2.2	0.4	0.0	0.0	0.2
2017	3.3	1.7	0.2	0.5	3.5	8.4	2.3	0.6	0.1	0.0	1.6
2020	1.3	9.4	0.3	0.8	0.3	4.7	4.9	-	0.3	0.0	3.5
2024	0.1	0.8	0.0	6.5	-	0.7	0.3	5.1	0.0	0.1	-

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

Table 17R-24.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Arabis lignifera (desert rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Carduus nutans[ani] (nodding plumeless thistle)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Eriogonum (buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gilia inconspicua[a] (shy gilia)	Hedysarum boreale (Utah sweetvetch)	Ipomopsis aggregata (scarlet gilia)	Ipomopsis congesta (ballhead ipomopsis)
year	Nested Frequency																
2006	-	-	0	-	-	-	-	-	2	1	1	-	2	2	-	42	-
2010	-	-	-	-	2	-	12	18	9	3	-	3	-	-	-	1	6
2013	-	1	4	-	-	-	7	6	5	1	-	-	-	-	-	16	3
2017	-	-	9	2	2	3	-	2	-	4	-	-	-	-	-	13	2
2020	4	1	-	-	-	-	-	-	3	-	-	-	1	-	1	13	-
2024	-	0	-	-	-	-	-	4	-	1	-	-	-	-	-	-	1
year	Average Cover (%)																
2006	-	-	0.0	-	-	-	-	-	0.0	0.0	0.0	-	0.0	0.0	-	0.1	-
2010	-	-	-	-	0.0	-	0.0	0.1	0.1	0.0	-	0.0	-	-	-	0.0	0.1
2013	-	0.0	0.0	-	-	-	0.0	0.0	0.0	0.0	-	-	-	-	-	0.1	0.0
2017	-	-	0.0	0.0	0.0	0.1	-	0.0	-	0.0	-	-	-	-	-	0.1	0.0
2020	0.0	0.0	-	-	-	-	-	-	0.0	-	-	-	0.0	-	0.1	0.1	-
2024	-	0.0	-	-	-	-	-	0.0	-	0.0	-	-	-	-	-	-	0.0

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

FORB SPECIES	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Medicago sativa[i] (alfalfa)	Onobrychis viciifolia[i] (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon cyananthus (Wasatch beardtongue)	Phlox austromontana (mountain phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Taraxacum officinale (common dandelion)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency											
2006	28	-	-	-	24	1	-	32	-	-	-	-
2010	3	12	7	3	33	2	-	4	2	-	-	-
2013	9	12	-	-	20	9	-	-	-	-	2	1
2017	6	1	-	-	48	6	6	3	-	2	-	-
2020	-	-	-	-	1	4	3	5	-	3	-	-
2024	-	-	-	4	6	4	-	9	-	-	-	-
year	Average Cover (%)											
2006	0.1	-	-	-	0.5	0.0	-	0.1	-	-	-	-
2010	0.0	0.2	0.1	0.2	0.4	0.2	-	0.0	0.1	-	-	-
2013	0.0	0.1	-	-	0.1	0.4	-	-	-	-	0.0	0.0
2017	0.0	0.0	-	-	0.5	0.1	0.2	0.0	-	0.0	-	-
2020	-	-	-	-	0.0	0.0	0.1	0.0	-	0.0	-	-
2024	-	-	-	0.1	0.0	0.0	-	0.0	-	-	-	-

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

Table 17R-24.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Bassia prostrata[pi] (forage kochia)	Cercocarpus montanus[p] (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma[t] (Utah juniper)	Krascheninnikovia lanata[p] (winterfat)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Opuntia fragilis (brittle pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)											
2006	-	-	-	0.1	-	8.5	-	-	0.6	2.1	21.5	1.3
2010	1.3	4.6	-	-	-	-	-	0.3	0.1	0.6	0.6	1.6
2013	3.2	5	0.8	0.2	-	0	-	0.2	0	0	0.6	2.7
2017	6	4.8	0.7	0.2	-	-	-	0.1	0	0.1	-	3.6
2020	7.1	4.2	0.8	0.3	-	0.1	-	-	0.6	0.3	-	4
2024	9.5	3.5	0.9	0.6	0.4	0	-	0	-	0.1	-	4.5
year	Quadrat Cover (%)											
2006	-	-	-	0.0	-	1.3	-	-	0.6	2.0	0.7	1.0
2010	1.1	3.2	-	-	-	-	-	0.2	0.0	0.2	0.3	1.6
2013	2.9	4.5	0.6	0.0	-	0.0	-	0.2	0.0	0.1	0.1	1.2
2017	5.0	5.2	0.4	0.0	-	0.0	-	0.1	0.0	0.1	0.4	1.2
2020	7.0	3.0	0.8	0.0	-	0.1	-	0.2	0.0	0.1	-	2.5
2024	6.7	4.0	1.0	0.1	0.0	0.0	0.0	0.1	-	0.4	-	3.0

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

Table 17R-24.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2006	-	-	-	-	-	-	-	-	49/101
2010	-	-	-	-	-	-	-	-	77/140
2013	-	-	-	-	-	-	-	-	113/190
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	150/211
2024	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2006	-	-	-	-	-	-	-	-	36/55
2010	800	-	18	83	0	10	0	5	41/40
2013	940	40	19	81	0	43	15	0	51/53
2017	1020	40	10	88	2	45	14	2	66/91
2020	1120	380	25	75	0	2	0	7	74/91
2024	1420	80	28	68	4	48	3	20	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	79/114
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	128/195
2020	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Bassia prostrata[pi] -- (forage kochia)									
2006	-	-	-	-	-	-	-	-	-/-
2010	2900	9580	37	63	0	5	8	4	25/46
2013	6700	1480	75	25	0	7	0	0	25/35
2017	8040	40	14	86	0	3	0	0	15/29
2020	2320	40	10	86	4	1	0	21	20/30
2024	5640	52660	58	40	2	11	14	13	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2006	-	-	-	-	-	-	-	-	60/103
2010	-	20	0	0	0	0	0	0	70/73
2013	20	-	0	100	0	0	100	0	73/82
2017	20	-	0	100	0	100	0	0	115/133
2020	40	-	0	100	0	50	0	50	123/111
2024	20	-	0	100	0	100	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	20	40	0	100	0	0	0	0	29/50
2010	120	-	33	67	0	0	33	17	26/59
2013	160	-	50	50	0	0	0	25	34/65
2017	180	-	44	56	0	0	0	0	44/93
2020	180	-	22	67	11	11	0	22	38/78
2024	140	-	0	100	0	43	43	0	- / -
Ephedra viridis[p] -- (mormon tea)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	29/8
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	32/66
2024	-	-	-	-	-	-	-	-	-/-

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)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	63/63
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	102/143
2024	40	-	0	100	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2006	60	-	0	100	0	0	0	0	- / -
2010	-	20	0	0	0	0	0	0	- / -
2013	20	80	100	0	0	0	0	0	- / -
2017	40	-	100	0	0	0	0	0	- / -
2020	60	20	100	0	0	0	0	0	- / -
2024	60	-	100	0	0	0	0	0	- / -
Krascheninnikovia lanata[p] -- (winterfat)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2024	100	80	100	0	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2006	40	-	0	100	0	100	0	0	10/18
2010	300	-	7	93	0	0	0	0	11/33
2013	180	-	44	56	0	0	22	0	9/16
2017	100	-	0	100	0	0	0	0	10/18
2020	160	-	0	100	0	63	0	0	14/21
2024	180	-	0	100	0	0	0	0	- / -
Opuntia fragilis -- (brittle pricklypear)									
2006	6260	20	27	69	4	0	0	2	6/26
2010	3640	340	18	82	0	0	0	3	5/15
2013	840	-	19	81	0	0	0	19	5/13
2017	2000	-	2	95	3	0	0	1	4/9
2020	500	20	16	84	0	0	0	8	4/18
2024	680	-	47	50	3	3	0	3	- / -
Opuntia -- (pricklypear)									
2006	440	-	0	77	23	0	0	23	10/45
2010	140	-	71	29	0	0	0	0	12/36
2013	360	-	11	83	6	0	0	6	8/17
2017	280	-	14	86	0	0	0	0	9/24
2020	220	-	0	82	18	0	0	18	9/21
2024	160	-	0	88	13	0	0	13	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2006	40	20	0	100	0	0	0	0	- / -
2010	40	20	50	50	0	0	0	0	- / -
2013	40	-	50	50	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-

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)									
2006	80	-	0	100	0	25	50	0	42/183
2010	180	-	22	78	0	0	0	0	45/90
2013	200	-	0	100	0	0	100	0	54/106
2017	160	-	13	88	0	0	75	0	73/138
2020	200	-	0	100	0	20	10	0	82/170
2024	180	-	0	100	0	56	11	0	- / -

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

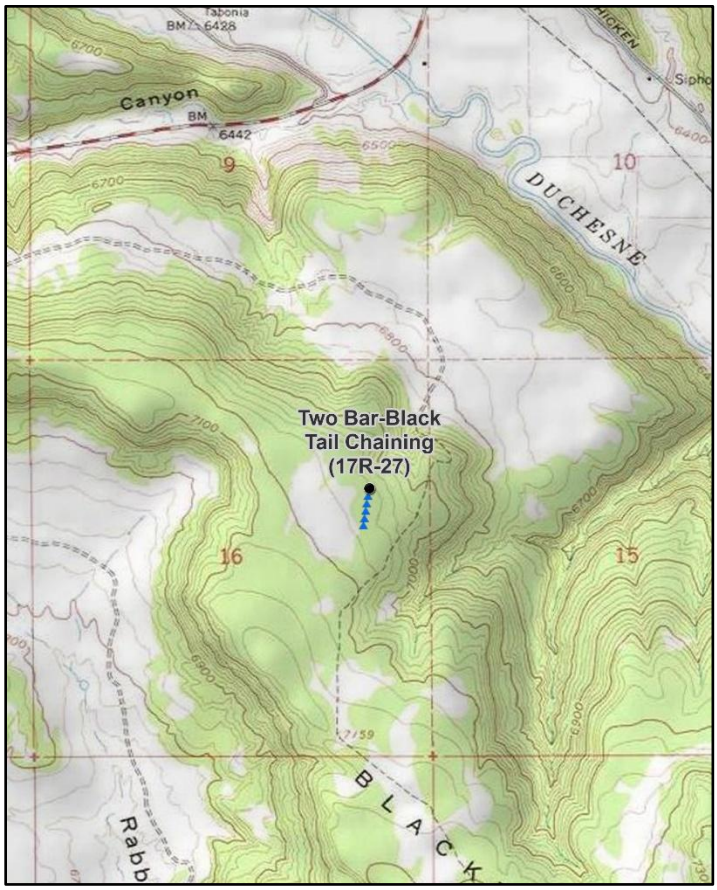
Table 17R-24.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

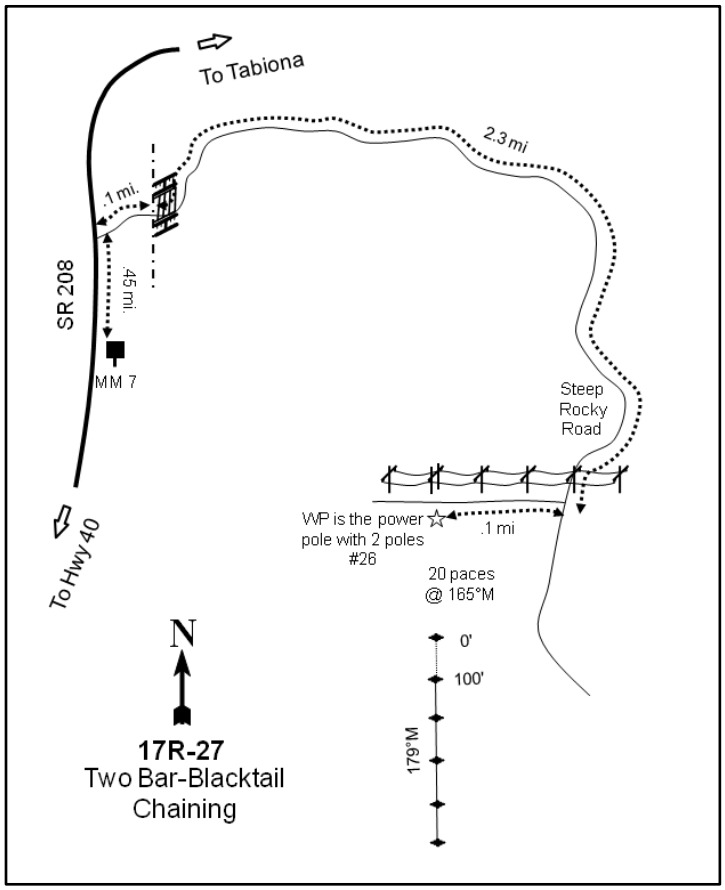
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2006	41	-	5	5	5	84	53.7
2010	2	-	100	-	-	-	1.0
2013	10	67	-	-	-	33	17.3
2017	14	29	43	14	-	14	13.3
2020	36	27	73	-	-	-	2.5
2024	22	18	45	18	-	18	11.7
Pinus edulis (twoneedle pinyon)							
2006	45	7	7	-	-	87	43.3
2010	19	50	33	17	-	-	2.8
2013	18	17	67	-	-	17	8.8
2017	4	50	-	-	-	50	30.5
2020	3	100	-	-	-	-	2.0
2024	2	50	-	-	-	50	22.0

Table 17R-24.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2006	2.0	0.0	0.0	7.6	-0.4	1.3	0.0	**10.5**	Very Poor
2010	10.9	15.0	15.0	26.7	-1.6	2.8	0.0	**68.8**	Good
2013	16.8	15.0	15.0	22.9	-0.1	1.4	0.0	**71.0**	Good
2017	21.2	14.8	5.7	30.0	-0.1	1.9	-2.0	**71.5**	Good
2020	22.4	14.6	6.8	30.0	-0.3	1.0	0.0	**74.5**	Good
2024	25.2	14.3	12.8	27.2	0.0	0.4	0.0	**79.9**	Good-Excellent

TWO BAR-BLACK TAIL CHAINING - STUDY NO. 17R-27





Location Information

USGS 7.5 min Map Info	Tabiona SE; Township 2S, Range 7W, Section 16
GPS (0' Stake)	NAD 83 UTM ZONE 12, 527707 East 4462075 North

Transect Information

Browse Tag # (0' Stake)	255
Transect Bearing	179° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From Highway 40 drive north on SR-208 and travel to mile marker 7. Travel north from mile marker 7 for 0.65 miles to a road coming in from the right (east). Turn right, travel 0.1 miles to a gate, and proceed for another 2.3 miles to a powerline. Park at the powerline service road (in past readings of the study, the road up the steep rocky hill was impassable. Be cautious: you may have to park at the bottom or have a spotter get out of the truck). From the service road walk 0.1 miles to the double powerpole marked with pole #26. The 0-foot stake is 20 paces away at 165 degrees magnetic and is marked with browse tag #255.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	7,050ft (2,149m)
Aspect	Northeast
Slope	4-5%
Sample Dates	07/26/2007, 07/06/2009, 08/08/2011, 08/06/2014, 07/31/2018, 07/01/2024

Table 17R-27.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	2-Bar Pinyon and Juniper Thinning	368	September 2007	978
Seeding - Aerial Before	2-Bar Pinyon and Juniper Thinning	368	September 2007	978
Seeding - Dribbler	2-Bar Pinyon and Juniper Thinning	368	September 2007	978
Seeding - Aerial After	2-Bar Pinyon and Juniper Thinning	368	January 2008	978
Hand Crew - Lop and Scatter	Tabby Mountain chaining maintenance	2570	October 2013	1915

Table 17R-27.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
2-Bar PJ thining- Black Tail			Aerial	Sep 2007	600
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.50	0.42
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.50	0.45
G	Bouteloua gracilis	Blue Grama		0.50	0.33
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.39
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.00	0.92
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.50	0.40
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.50	0.48
G	Poa secunda	Canby Bluegrass	Canbar	0.25	0.22
G	Poa secunda	Sandberg Bluegrass	Mountain Home ID	0.25	0.23
G	Psathyrostachys juncea	Russian Wildrye		0.75	0.63
F	Linum perenne	Blue Flax	Appar	0.25	0.23
F	Onobrychis viciifolia	Sainfoin	Eski	2.50	2.30
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.86

Mix Name			Application Type	Application Date	Acres
2-Bar PJ thining- Dribbler			Dribbler	Sep 2007	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	0.01	0.01
S	Atriplex canescens	Fourwing Saltbush	Lincoln NV	0.19	0.07
S	Cercocarpus montanus	True Mountain Mahogany	Sevier UT	0.05	0.04
S	Purshia tridentata	Bitterbrush	Elko NV	0.15	0.14

Mix Name			Application Type	Application Date	Acres
Two Bar PJ Thinning Sagebrush			Aerial	Jan 2008	925
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Iron UT	1.04	0.22

Wildlife Habitat and Vegetation History

Table 17R-27.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 17R-27.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon-Juniper	Phase II transitioning to Phase III
2009	Perennial Grass	Phase I
2011	Perennial Grass	Phase I
2014	Perennial Grass	Phase I
2018	Perennial Grass	Phase I
2024	Perennial Grass/Sagebrush	Phase I

Site Notes

No Notes

Soils

Table 17R-27.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.0	41.4	44.0	14.6	1.6	9.1	67.2	0.6	07/26/2007

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC310UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2007, this study site was in Phase II of woodland succession and being infilled by twoneedle pinyon (*Pinus edulis*) with some Utah juniper (*Juniperus osteosperma*) present. A small number of other browse species were also observed, but they offered little cover. Tree cover decreased significantly following a chaining and seeding project in 2008 and a lop and scatter project in 2013 (Table 17R-27.1); browse species have exhibited overall increases in cover and density following tree removal. Although most of the trees were removed by treatments, they have been observed in all sample years. This continued presence of trees indicates that infilling will likely take place over time (Table 17R-27.12, Table 17R-27.13, Table 17R-27.14). The herbaceous understory was sparse prior to treatment, but has increased in subsequent sample years. Perennial grasses such as crested wheatgrass (*Agropyron cristatum*) and thickspike wheatgrass (*Elymus lanceolatus*) have contributed a majority of the herbaceous cover and have been a dominant vegetation component throughout the post-treatment study period (Table 17R-27.7, Table 17R-27.10, Table 17R-27.11). Over time the shrubs will likely increase in cover and become dominant; black sagebrush (*Artemisia nova*) and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) were codominant with perennial grasses in 2024 (Photos, Table 17R-27.12, Table 17R-27.13).

Condition of this site as mule deer winter range has fluctuated between very poor and good since 2007. Although winter habitat condition is considered to be good as of 2024, it is primarily limited by reduced preferred browse cover, limited cover of perennial forbs, and reduced recruitment of young plants into the preferred browse community (Table 17R-27.15). Pellet transect data indicates that mule deer presence fluctuated between low and moderate from 2007 through the 2018 year, but was high in 2024. Black and mountain big sagebrush have received little to moderate utilization in most sample years. However, in 2024, 66% of black sagebrush plants sampled in density strips and 72% of mountain big sagebrush plants were moderately to heavily hedged. This increased sagebrush utilization correlates with the high deer presence during the most recent sample year. Elk presence has also fluctuated over time, but was high in both 2007 and 2024 (Table 17R-27.9, Table 17R-27.13). Furthermore, on-site observations for 2024 mention moderate utilization of crested wheatgrass and thickspike wheatgrass.

Trend Summary Tables

Table 17R-27.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	2.1	0.1	4.9	2.6	-	24.7
2009	2.6	0.1	3.5	1.6	0.5	3.7
2011	4.8	0.1	2.0	6.4	0.1	2.6
2014	3.5	0.1	0.2	3.6	-	-
2018	4.7	1.4	1.0	7.4	1.0	0.6
2024	9.0	0.5	1.4	12.8	0.7	0.8

Table 17R-27.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	-	206	35	62	-	5.1	0.1	0.8
2009	19	188	120	98	0.2	11.5	6.0	3.9
2011	128	302	139	159	1.4	17.3	1.6	6.6
2014	30	298	10	63	0.1	20.2	0.1	1.3
2018	28	340	9	17	0.1	22.5	0.0	0.4
2024	2	302	1	11	0.0	25.7	0.0	0.1

Table 17R-27.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	23.8	10.4	57.8	1.2	3.2	12.6
2009	19.5	0.6	64.8	0.1	3.0	28.0
2011	16.6	0.2	55.5	0.3	3.3	31.5
2014	13.6	0.3	73.7	0.5	3.2	27.7
2018	14.5	0.5	72.0	1.5	5.3	31.8
2024	15.3	0.3	59.6	0.7	5.0	34.0

Table 17R-27.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2007	35	31	38
2009	14	6	4
2011	9	9	8
2014	3	11	9
2018	4	16	4
2024	17	16	5
Year	Days Use Per Acre (ha)		
2007	25.5 (62.9)	42.2 (104.3)	-
2009	-	-	-
2011	17.4 (43.0)	13.4 (33.1)	-
2014	4.0 (9.9)	30.2 (74.5)	-
2018	4.7 (11.6)	13.4 (33.1)	-
2024	46.9 (115.9)	46.9 (115.9)	-

Table 17R-27.10 - 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)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency														
2007	23	-	-	5	-	4	-	5	-	19	4	115	-	101	-
2009	2	30	19	-	28	2	8	2	10	2	30	56	1	96	-
2011	12	55	128	1	17	16	105	32	11	23	10	49	0	105	1
2014	22	56	30	5	-	25	31	2	16	61	1	50	17	127	-
2018	49	102	28	21	10	19	142	20	11	27	13	26	9	70	-
2024	12	116	2	8	-	16	123	12	15	6	9	-	49	41	-
year	Average Cover (%)														
2007	0.4	-	-	0.0	-	0.0	-	0.0	-	0.1	0.4	1.2	-	3.0	-
2009	0.0	1.7	0.2	-	0.8	0.1	0.1	0.9	0.1	0.0	0.7	0.6	0.0	6.5	-
2011	0.4	2.0	1.4	0.0	1.0	0.6	4.6	1.0	0.8	1.1	0.3	0.5	0.0	4.8	0.0
2014	1.0	2.9	0.1	0.0	-	0.4	1.2	0.1	2.6	1.8	0.0	0.4	0.9	9.0	-
2018	2.0	5.4	0.1	0.5	0.1	0.6	5.4	0.3	1.6	1.0	0.1	0.1	0.6	4.7	-
2024	0.9	9.1	0.0	0.2	-	0.5	5.5	0.3	2.2	0.0	0.1	-	3.3	3.6	-

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

Table 17R-27.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album[a] (lambsquarters)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata[a] (western tansymustard)	Eriogonum (buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)
year	Nested Frequency																
2007	-	9	-	-	3	-	3	-	-	-	15	1	-	-	-	-	31
2009	-	-	1	3	-	1	77	2	3	1	10	5	10	29	3	-	42
2011	4	2	4	-	20	2	32	11	-	10	-	11	3	17	8	12	37
2014	-	-	-	-	3	-	1	-	-	-	-	9	-	-	1	-	-
2018	-	-	-	-	-	-	1	-	-	-	-	1	3	-	-	-	1
2024	-	-	-	1	-	-	-	-	-	2	-	-	-	1	-	-	-
year	Average Cover (%)																
2007	-	0.0	-	-	0.0	-	0.0	-	-	-	0.0	0.0	-	-	-	-	0.1
2009	-	-	0.0	0.2	-	0.0	2.0	0.0	0.0	0.0	0.1	0.2	0.3	0.7	0.1	-	2.9
2011	0.0	0.0	0.0	-	0.4	0.1	0.7	0.1	-	0.1	-	0.1	0.0	0.1	0.1	0.2	0.1
2014	-	-	-	-	0.0	-	0.0	-	-	-	-	0.1	-	-	0.0	-	-
2018	-	-	-	-	-	-	0.0	-	-	-	-	0.0	0.0	-	-	-	0.0
2024	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	0.0	-	-	-

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

FORB SPECIES	Linum perenne[i] (blue flax)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa[i] (alfalfa)	Onobrychis viciifolia[i] (sainfoin)	Penstemon humilis (low beardtongue)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Sanguisorba minor[i] (small burnet)	Silene antirrhina[a] (sleepy silene)	Sisymbrium altissimum[ai] (tall tumblemustard)	Tetraneuris acaulis (stemless four-nerve daisy)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency												
2007	-	-	-	-	23	24	-	-	-	-	-	-	-
2009	18	5	-	9	19	20	4	2	9	-	-	3	-
2011	56	47	4	12	26	25	1	48	10	2	-	-	1
2014	22	34	-	-	6	11	-	-	-	-	-	-	-
2018	4	1	-	-	1	5	-	-	-	-	6	3	-
2024	3	-	-	-	2	3	-	-	-	-	-	-	-
year	Average Cover (%)												
2007	-	-	-	-	0.2	0.6	-	-	-	-	-	-	-
2009	1.1	0.2	-	0.7	0.2	0.3	0.0	0.1	0.5	-	-	0.0	-
2011	2.7	0.5	0.0	0.5	0.2	1.4	0.0	0.3	0.5	0.0	-	-	0.0
2014	0.2	0.8	-	-	0.0	0.2	-	-	-	-	-	-	-
2018	0.2	0.0	-	-	0.0	0.2	-	-	-	-	0.0	0.0	-
2024	0.0	-	-	-	0.0	0.0	-	-	-	-	-	-	-

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

Table 17R-27.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[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 nauseosa (rubber rabbitbrush)	Juniperus osteosperma[t] (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Opuntia fragilis (brittle pricklypear)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)										
2007	2.3	0.1	-	0.2	-	-	3.3	-	0	-	21.4
2009	1.4	0.2	-	-	-	-	2.4	0.5	0	-	1.3
2011	4.8	0.6	0.8	0.2	-	-	1.3	-	0.1	-	1.3
2014	2.9	0.7	-	-	-	-	-	-	-	-	-
2018	5.1	1.9	0.4	-	-	0.9	0.2	-	-	0.1	0.4
2024	7	5.3	0.2	0.3	0.5	-	0.2	-	0.1	0.1	0.6
year	Quadrat Cover (%)										
2007	1.5	0.2	-	0.4	-	-	0.0	-	0.0	0.0	4.9
2009	1.4	0.2	-	1.0	-	-	1.1	0.0	0.1	0.0	2.4
2011	3.1	0.4	0.0	1.4	-	-	1.0	0.0	0.1	-	1.0
2014	1.8	1.7	-	-	0.0	-	-	-	0.1	0.1	0.2
2018	3.1	1.6	0.0	0.1	0.0	0.4	0.6	1.0	-	0.1	0.4
2024	3.8	5.0	0.0	0.1	0.2	0.1	0.5	0.0	0.0	0.1	1.0

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

Table 17R-27.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2007	1400	220	21	39	40	9	39	21	24/49
2009	-	-	-	-	-	-	-	-	34/55
2011	1720	4020	42	55	4	8	0	5	20/43
2014	1720	120	61	36	4	17	14	4	23/52
2018	2920	20	58	42	0	0	0	0	29/56
2024	2680	-	19	81	0	42	24	0	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2007	180	-	0	33	67	0	56	56	42/66
2009	-	-	-	-	-	-	-	-	44/62
2011	280	420	29	71	0	0	0	0	37/53
2014	680	160	77	24	0	6	9	0	48/70
2018	720	-	44	56	0	0	0	0	57/83
2024	920	220	15	83	2	24	48	7	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2007	20	-	0	0	100	0	100	100	48/56
2009	-	-	-	-	-	-	-	-	57/68
2011	40	-	0	100	0	50	0	0	72/86
2014	20	-	0	100	0	100	0	0	64/72
2018	40	-	50	50	0	0	0	0	70/73
2024	40	-	50	50	0	0	50	0	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2007	900	440	0	84	16	40	49	7	8/24
2009	-	-	-	-	-	-	-	-	18/38
2011	680	80	9	91	0	3	0	0	14/33
2014	140	-	43	43	14	43	0	14	10/26
2018	660	20	6	94	0	3	42	0	14/28
2024	120	-	0	100	0	0	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2007	-	-	-	-	-	-	-	-	19/25
2009	-	-	-	-	-	-	-	-	37/43
2011	40	-	0	100	0	0	0	0	18/33
2014	100	-	20	60	20	0	20	60	30/45
2018	240	-	8	83	8	0	0	8	29/42
2024	60	-	0	100	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	48/48
2014	-	-	-	-	-	-	-	-	32/144
2018	40	-	0	100	0	50	0	0	63/77
2024	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma[t] -- (Utah juniper)									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2011	20	20	100	0	0	0	0	0	- / -
2014	40	20	100	0	0	0	0	0	- / -
2018	220	-	82	18	0	0	0	0	- / -
2024	100	-	60	40	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)									
2007	100	-	0	0	100	0	0	100	- / -
2009	-	-	-	-	-	-	-	-	14/20
2011	180	-	0	100	0	0	0	0	9/18
2014	20	-	0	100	0	0	0	0	- / -
2018	500	-	0	96	4	0	0	92	8/18
2024	-	-	-	-	-	-	-	-	-/-
Opuntia fragilis -- (brittle pricklypear)									
2007	320	-	19	81	0	0	0	0	6/15
2009	-	-	-	-	-	-	-	-	5/23
2011	-	-	-	-	-	-	-	-	-/-
2014	300	-	67	33	0	0	0	0	5/14
2018	80	-	0	100	0	0	0	0	6/11
2024	220	-	100	0	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2007	260	-	8	62	31	0	0	8	12/36
2009	-	-	-	-	-	-	-	-	12/38
2011	220	20	0	91	9	0	0	9	8/21
2014	60	20	0	100	0	0	0	0	11/24
2018	80	-	0	100	0	0	0	0	11/24
2024	80	-	0	100	0	0	0	0	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2007	20	-	0	100	0	0	0	0	2/4
2009	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	5/8
2018	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2007	140	20	43	57	0	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	-/-
2011	40	20	100	0	0	0	0	0	- / -
2014	40	20	100	0	0	0	0	0	- / -
2018	40	-	50	50	0	0	0	0	- / -
2024	100	-	60	40	0	0	0	20	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	61/205
2018	-	-	-	-	-	-	-	-	82/318

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

Table 17R-27.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

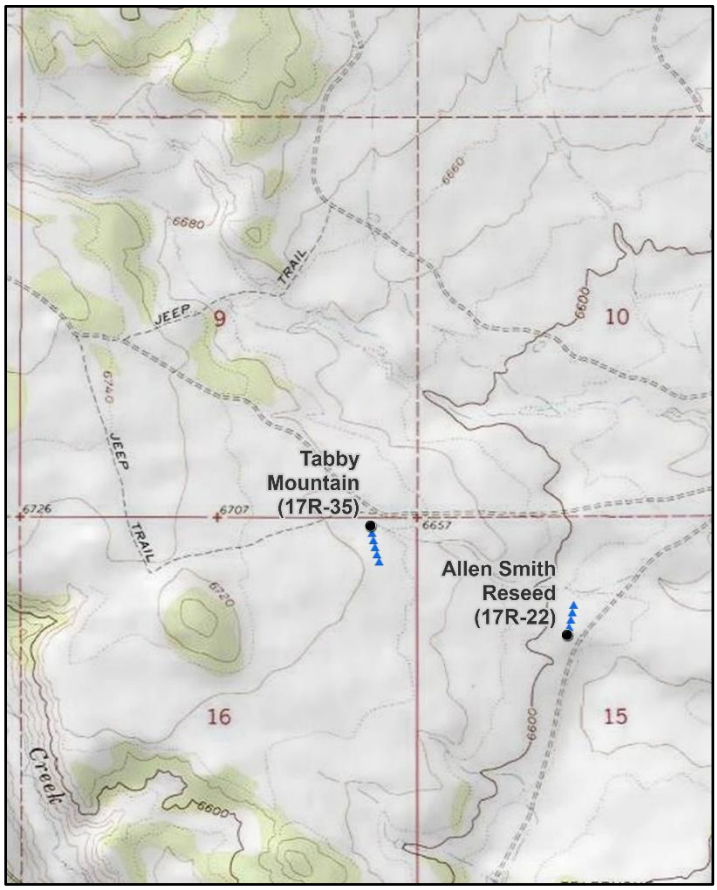
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	25	-	17	25	8	50	21.3
2009	9	-	67	17	-	17	15.5
2011	23	27	55	9	-	9	10.3
2014	8	17	83	-	-	-	3.0
2018	23	-	90	10	-	-	9.3
2024	45	36	50	14	-	-	5.9

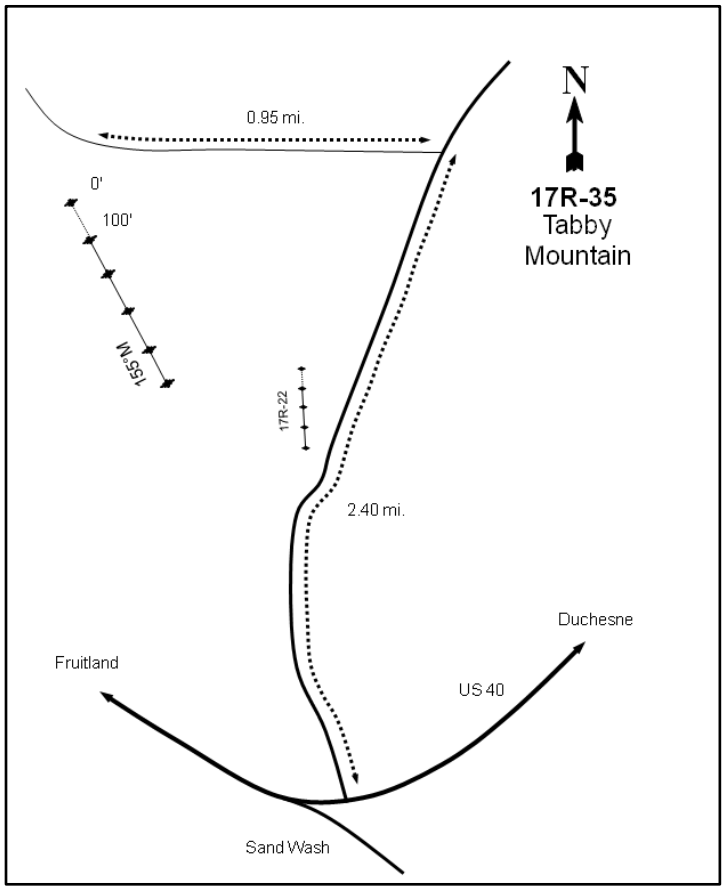
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Pinus edulis (twoneedle pinyon)							
2007	185	-	-	-	-	-	13.4
2009	22	-	50	33	17	-	7.8
2011	38	47	20	33	-	-	5.5
2014	26	36	64	-	-	-	3.0
2018	43	15	85	-	-	-	2.6
2024	44	-	100	-	-	-	3.1

Table 17R-27.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2007	3.3	0.0	0.0	10.2	0.0	1.7	0.0	**15.2**	Very Poor
2009	2.0	0.0	0.0	23.0	-0.2	7.8	0.0	**32.6**	Very Poor
2011	8.2	14.3	15.0	30.0	-1.1	10.0	0.0	**76.4**	Good
2014	4.5	0.0	0.0	30.0	-0.1	2.7	0.0	**37.1**	Poor
2018	9.4	15.0	15.0	30.0	-0.1	0.8	0.0	**70.1**	Good
2024	16.1	14.7	8.7	30.0	0.0	0.3	0.0	**69.8**	Good

TABBY MOUNTAIN - STUDY NO. 17R-35





Location Information

USGS 7.5 min Map Info	Fruitland NE; Township 3S, Range 8W, Section 16
GPS (0' Stake)	NAD 83 UTM ZONE 12, 518227 East 4452922 North

Transect Information

Browse Tag # (0' Stake)	160
Transect Bearing	155° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Traveling east on US-40, drive to the farthest west turnoff leading to the Strawberry Pinnacles. From there, drive east for 0.2 miles to a road on the left (north) side of US-40. Turn here and drive north for 2.4 miles (0.3 miles to a fork that leads to a group of trailers. Stay to the right and drive 0.4 miles, passing a trailer compound and coming to another fork. Stay to the right and drive for 0.3 miles to a gate. Go through the gate and continue for 0.5 miles to power lines crossing the road. Proceed for another 0.9 miles). Turn left and continue for another 1 mile. The study is on the left (south) side of the road.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,667ft (2,032m)
Aspect	Southeast
Slope	2%
Sample Dates	07/08/2013, 08/02/2016, 07/29/2020, 07/01/2024

Table 17R-35.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Scalper	Tabby Browse Plots	2681	October-November 2013	79

Table 17R-35.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Tabby Browse Plots			Scalper	Nov 2013	40
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Duchesne UT	2.50	0.88
S	Purshia tridentata	Bitterbrush	Elko/White Pine NV	2.00	1.72

Mix Name			Application Type	Application Date	Acres
Tabby Browse Plots- Sagebrush			Scalper	Nov 2013	40
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 17R-35.3 - 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-35.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Perennial Grass	No Encroachment
2016	Perennial Grass	No Encroachment
2020	Perennial Grass	No Encroachment
2024	Perennial Grass	No Encroachment

Site Notes

No notes

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XC310UT
States and Transitions	No state and transition model is available for this ecological site.

Since the study was established in 2013, this community has remained dominated by the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) (Table 17R-35.10). Forbs have remained limited in both composition and abundance (Table 17R-35.11). Forage kochia (*Bassia prostrata*) has contributed the majority of the shrub cover in each sample year. Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) cover increased in 2022 and 2024, but this increase can only be attributed to a small number of individual plants (Table 17R-35.12, Table 17R-35.13).

Condition of this site as mule deer winter range has varied between very poor-poor and good since 2013. Although winter habitat condition is considered to be good as of 2024, it is limited by reduced cover of the perennial forb and preferred browse components (Table 17R-35.15). Pellet transect data indicates that mule deer presence has decreased over time and has remained low throughout the post-treatment sample period. Elk presence has remained moderate to high, and was considered to be very high in 2024 (Table 17R-35.9). Few sagebrush plants have been sampled in density strips over the study period, but more than 50% of plants have been moderately to heavily hedged in most years. Forage kochia has been abundant, but utilization of this browse species has remained light (Table 17R-35.13). However, on-site observations for 2024 note that crested wheatgrass received moderate utilization.

Trend Summary Tables

Table 17R-35.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and 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	0.7	0.4	-	1.6	0.2	-
2016	2.6	0.0	-	3.8	0.2	-
2020	4.3	0.1	-	5.5	0.2	-
2024	7.9	0.2	-	6.4	-	-

Table 17R-35.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional 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	-	388	-	72	-	22.9	-	1.1
2016	-	383	-	81	-	31.1	-	0.8
2020	-	380	-	61	-	36.4	-	1.3
2024	-	382	-	88	-	27.9	-	2.4

Table 17R-35.8 - Basic 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	36.5	0.1	42.2	2.2	0.2	25.5
2016	35.9	-	28.4	7.4	0.9	35.1
2020	23.1	0.0	51.2	3.8	2.3	40.7
2024	24.1	0.1	51.3	2.6	2.8	35.5

Table 17R-35.9 - Pellet Group Data. Quadrat 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	5	18	59	5
2016	3	15	37	45
2020	4	16	27	6
2024	-	9	49	1
Year	Days Use Per Acre (ha)			
2013	10.2 (25.1)	20.8 (51.3)	48.9 (120.8)	-
2016	14.5 (35.9)	8.7 (21.5)	39.6 (97.7)	-
2020	11.6 (28.7)	8.1 (19.9)	34.2 (84.4)	-
2024	4.4 (10.8)	0.7 (1.7)	91.8 (226.8)	-

Table 17R-35.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency					
2013	-	388	4	-	1	14
2016	2	368	4	-	8	17
2020	5	374	-	-	-	4
2024	-	377	-	13	-	-
year	Average Cover (%)					
2013	-	22.6	0.0	-	0.0	0.2
2016	0.0	30.3	0.1	-	0.2	0.5
2020	0.1	36.2	-	-	-	0.0
2024	-	27.5	-	0.3	-	-

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

Table 17R-35.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus convallarius (lesser rushy milkvetch)	Chaetopappa ericoides (rose heath)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa[i] (alfalfa)	Melilotus officinalis[i] (sweetclover)	Phlox hoodii (spiny phlox)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Trifolium gymnocarpon (hollyleaf clover)
year	Nested Frequency									
2013	9	1	2	9	6	7	0	-	36	13
2016	5	-	-	4	-	12	9	-	59	5
2020	2	1	-	-	-	4	-	12	44	-
2024	5	1	-	0	-	1	8	71	4	6
year	Average Cover (%)									
2013	0.1	0.0	0.0	0.3	0.2	0.1	0.0	-	0.4	0.1
2016	0.0	-	-	0.0	-	0.2	0.0	-	0.5	0.0
2020	0.1	0.0	-	-	-	0.1	-	0.2	0.9	-
2024	0.3	0.0	-	0.0	-	0.0	0.3	1.4	0.1	0.0

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

Table 17R-35.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Bassia prostrata[pi] (forage kochia)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ephedra viridis[p] (mormon tea)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover (%)						
2013	0.3	1.3	-	-	0.1	-	0.1
2016	0.2	3.6	-	-	-	-	0.2
2020	1.1	4.4	0.1	-	-	-	0.1
2024	2.5	3.9	-	-	-	-	0
year	Quadrat Cover (%)						
2013	0.0	0.7	0.0	0.0	0.4	-	0.0
2016	0.0	2.6	-	-	-	-	0.0
2020	1.3	3.0	0.1	-	-	-	0.0
2024	1.8	6.2	-	-	-	0.1	0.0

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

Table 17R-35.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor 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	140	-	14	86	0	14	71	0	31/37
2016	180	-	11	78	11	11	78	11	35/47
2020	160	-	0	100	0	13	0	0	55/67
2024	280	220	36	64	0	43	14	0	- / -
Bassia prostrata[pi] -- (forage kochia)									
2013	880	2360	61	39	0	2	2	0	29/38
2016	6080	960	48	52	0	0	1	0	25/37
2020	6640	20	41	58	1	19	0	1	27/44
2024	6360	16600	25	76	0	3	7	0	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2013	60	-	0	100	0	0	0	0	18/25
2016	-	-	-	-	-	-	-	-	21/36
2020	160	-	13	88	0	0	100	100	25/38
2024	-	-	-	-	-	-	-	-	-/-
Ephedra viridis[p] -- (mormon tea)									
2013	20	-	0	100	0	0	100	0	17/16
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	20	-	0	100	0	0	0	0	47/46
2016	-	-	-	-	-	-	-	-	64/72
2020	-	-	-	-	-	-	-	-	77/80
2024	-	-	-	-	-	-	-	-	-/-

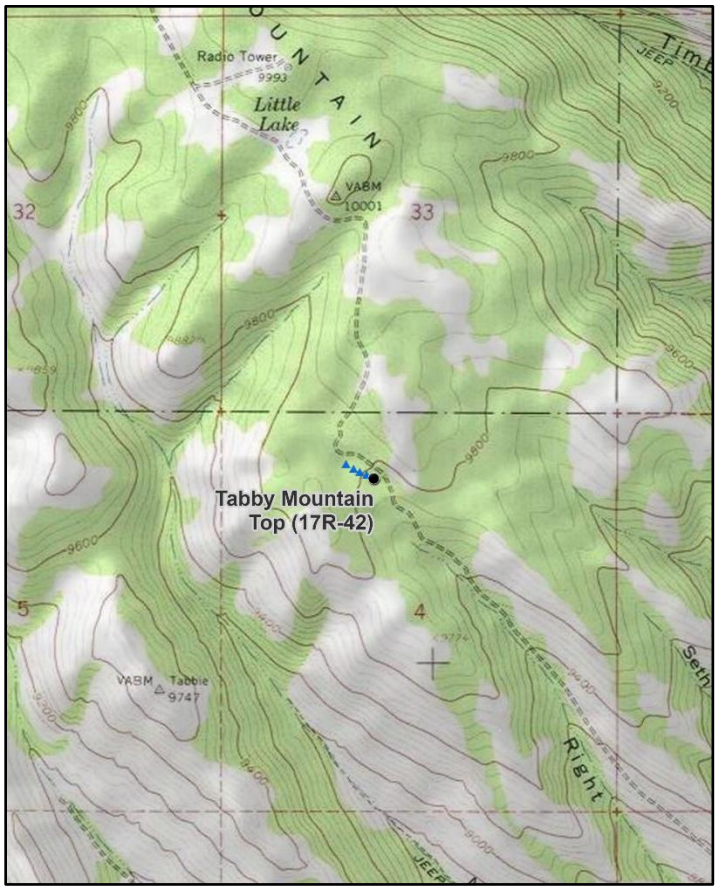
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Ericameria nauseosa ssp. nauseosa var. speciosa[p] -- (rubber rabbitbrush)									
2013	-	-	-	-	-	-	-	-	54/86
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	77/66
2024	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2013	-	-	-	-	-	-	-	-	-/-
2016	20	40	0	100	0	0	0	0	33/36
2020	20	-	0	100	0	0	0	0	16/24
2024	100	-	0	100	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2013	20	-	0	100	0	0	0	0	20/16
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2013	120	-	0	50	50	0	0	50	11/24
2016	280	-	0	100	0	0	0	0	13/26
2020	140	-	14	86	0	0	0	0	14/43
2024	260	-	15	62	23	0	0	23	- / -

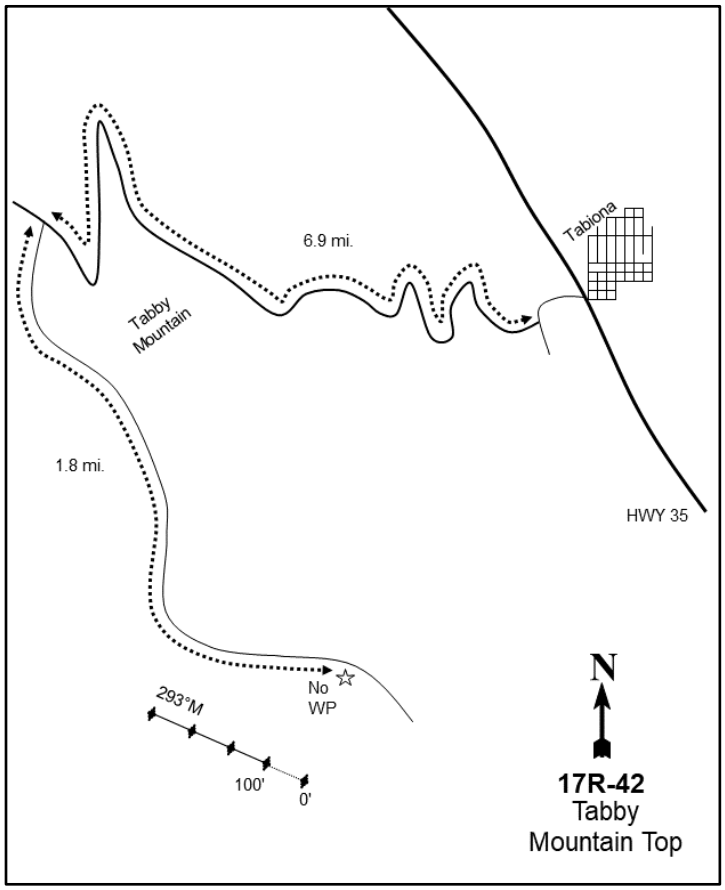
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 17R-35.15 - 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	2.3	0.0	0.0	30.0	0.0	2.2	0.0	**34.5**	Very Poor-Poor
2016	5.7	0.0	0.0	30.0	0.0	1.6	0.0	**37.3**	Poor
2020	8.0	14.9	15.0	30.0	0.0	2.7	0.0	**70.6**	Good
2024	9.0	15.0	14.4	30.0	0.0	4.7	0.0	**73.1**	Good

TABBY MOUNTAIN TOP - STUDY NO. 17R-42





Location Information

USGS 7.5 min Map Info	Tabby Mountain NE; Township 2S, Range 8W, Section 04
GPS (0' Stake)	NAD 83 UTM ZONE 12, 517407 East 4465513 North

Transect Information

Browse Tag # (0' Stake)	39
Transect Bearing	293° 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

While traveling north from the town of Tabiona on State Route 35, turn left (west) on Tabby Access Road. Continue on this road for 0.43 miles until the road intersects with 3600 North; turn right (west) and travel for 0.64 miles to Juniper Drive. Turn left onto Juniper Drive and drive to a left turn on Lewis Drive in 0.57 miles. Drive for 0.45 to East Tabby Access Road (County Road 6), and turn left (south). Travel along this access road until the summit (or near summit) of Tabby Mountain is gained, and turn left (south) just before reaching a stock pond. Travel another 1.17 miles, while passing 3800 North and another stock pond, to a right turn. Turn here (south) and travel 0.63 miles to a mixed aspen-conifer stand and a sharp left turn (east): park here. Use a GPS to navigate to stake locations.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	9,800ft (2,987m)
Aspect	Northeast
Slope	4%
Sample Dates	08/10/2021, 07/02/2024

Table 17R-42.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Coppice Cutting	Mill Hollow Aspen Restoration Phase II	5621	Fall 2021	347

Wildlife Habitat and Vegetation History

Table 17R-42.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 17R-42.4 - 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
2024	Quaking Aspen	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	28 inches
NRCS Ecological Site	High Mountain Stony Loam (Aspen)
NRCS Ecological Site #	F047XA531UT
States and Transitions	2021 - Reference State: Community Phase 1.4 2024 - Current Potential State: Community Phase 1.2

When the study was established in 2021, the plant community on this site was comprised of a population of decadent quaking aspen (*Populus tremuloides*) being infilled by young subalpine fir (*Abies lasiocrpa*) and mature Engelmann spruce (*Picea engelmannii*). Browse species have remained limited following treatment (17R-42.1), with gooseberry currant (*Ribes montigenum*) as the dominant species (Photos, Table 17R-42.12, Table 17R-42.13, Table 17R-42.13a). The herbaceous understory has been fairly diverse since treatment with most species contributing little cover. Nevada pea (*Lathyrus lanszwertii*) has remained the most abundant forb and provided much of what understory cover has been present (Table 17R-42.11). Of the perennial grasses, Porter brome (*Bromus porteri*) and Sandberg bluegrass (*Poa secunda*) were the dominant species in 2021; however, mountain brome (*Bromus marginatus*) experienced a notable increase in cover following treatment (Table 17R-42.10). Also notable since treatment is the increase in density of seedlings and young aspen trees in the community (Table 17R-42.13a, Table 17R-42.14). Cover of aspen will likely rebound as trees mature and density increases.

The abundant herbaceous understory on this site could provide valuable forage for summering mule deer, but pellet transect data indicates that deer presence has been low in both sample years (Table 17R-42.9, Table 17R-42.10, Table 17R-42.11). In addition, aspen has received little use over the study period (Table 17R-42.13a), and on-site observations for 2024 noted little to no use of the herbaceous understory.

Trend Summary Tables

Table 17R-42.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2021	2.8	0.6	27.5	5.3	1.2	74.3
2024	2.9	0.7	8.0	3.8	0.5	19.2

Table 17R-42.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2021	-	136	21	244	-	4.8	0.1	15.3
2024	-	157	77	268	-	6.4	1.9	15.4

Table 17R-42.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2021	1.4	0.4	74.5	0.9	0.5	46.7
2024	10.3	0.0	72.0	0.3	1.4	30.9

Table 17R-42.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Black Bear	Cattle	Mule Deer	Rocky Mountain Elk	Shiras Moose	Rabbit
	Quadrat Frequency					
2021	-	1	10	3	-	3
2024	-	-	3	1	-	-
Year	Days Use Per Acre (ha)					
2021	8.7 (21.5)*	5.8 (14.3)	12.1 (29.8)	7.4 (18.2)	3.4 (8.4)	-
2024	-	-	9.4 (23.2)	4.7 (11.6)	-	-

*Pellets per acre (ha)

Table 17R-42.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex (sedge)	Carex eggleston ii (Eggleston's sedge)	Carex rossii (Ross' sedge)	Elymus trachycaulus (slender wheatgrass)	Koeleria macrantha (prairie Junegrass)	Melica bulbosa (oniongrass)	Poa palustris (fowl bluegrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Trisetum spicatum (spike trisetum)
year	Nested Frequency											
2021	2	62	1	-	24	4	-	3	13	30	38	9
2024	59	21	1	1	44	8	4	5	3	30	37	12
year	Average Cover (%)											
2021	0.0	1.5	0.0	-	0.7	0.0	-	0.1	0.2	0.7	1.2	0.4
2024	1.3	1.1	0.0	0.0	0.9	0.3	0.0	0.2	0.0	0.8	1.3	0.5

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

Table 17R-42.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis drummondii (Drummond's rockcress)	Arnica cordifolia (heartleaf arnica)	Astragalus miser (timber milkvetch)	Castilleja miniata (giant red Indian paintbrush)	Chamerion angustifolium (fireweed)	Clematis hirsutissima (hairy clematis)	Collinsia parviflora[a] (maiden blue eyed Mary)	Collomia linearis[a] (tiny trumpet)	Descurainia californica[a] (Sierra tansymustard)	Draba[a] (draba)	Erigeron speciosus (aspen fleabane)	Erigeron ursinus (Bear River fleabane)	Erysimum capitatum[a] (sanddune wallflower)	Fragaria virginiana (Virginia strawberry)
year	Nested Frequency																
2021	54	-	-	1	51	-	-	17	5	5	5	6	5	-	47	-	67
2024	54	13	5	-	56	10	4	26	-	8	39	12	5	4	3	3	52
year	Average Cover (%)																
2021	1.0	-	-	0.0	1.2	-	-	0.1	0.2	0.0	0.0	0.0	0.0	-	1.9	-	1.7
2024	1.8	0.0	0.1	-	1.7	0.2	0.2	0.8	-	0.1	0.9	0.5	0.0	0.0	0.0	0.2	1.1

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

FORB SPECIES	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Geranium richardsonii (Richardson's geranium)	Hydrophyllum capitatum (ballhead waterleaf)	Lathyrus lanszwertii (Nevada pea)	Lupinus argenteus (silvery lupine)	Mertensia oblongifolia (oblongleaf bluebells)	Noccaea fendleri (Fendler's pennycress)	Osmorhiza depauperata (bluntseed sweetroot)	Packera multilobata (lobeleaf groundsel)	Penstemon whippleanus (Whipple's penstemon)	Phacelia hastata (silverleaf phacelia)	Polygonum douglasii[a] (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Pseudocymopterus montanus (alpine false springparsley)	Pseudostellaria jamesiana (tuber starwort)	Ranunculus inamoenus (graceful buttercup)	Silene drummondii (Drummond's campion)
year	Nested Frequency																
2021	-	5	-	93	6	4	-	57	9	19	-	4	11	0	58	1	-
2024	3	-	6	91	22	-	5	26	3	31	11	21	13	3	97	8	3
year	Average Cover (%)																
2021	-	0.0	-	5.7	0.1	0.0	-	0.7	0.2	0.3	-	0.0	0.4	0.0	1.3	0.0	-
2024	0.0	-	0.1	3.9	0.1	-	0.1	0.2	0.0	0.8	0.3	0.2	0.4	0.0	1.9	0.1	0.0

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

FORB SPECIES	Spergularia rubra[i] (red sandspurry)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius[ai] (yellow salsify)	Viola (violet)	Zigadenus elegans (mountain deathcamas)
year	Nested Frequency					
2021	-	-	10	-	29	-
2024	2	44	6	0	11	1
year	Average Cover (%)					
2021	-	-	0.1	-	0.4	-
2024	0.0	1.1	0.2	0.0	0.1	0.0

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

Table 17R-42.12 - 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)	Pinus monticola[t] (western white pine)	Populus tremuloides[tp] (quaking aspen)	Ribes montigenum[p] (gooseberry currant)	Rubus idaeus (American red raspberry)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)						
2021	31.5	12.9	0.4	29.5	5	1.2	0.3
2024	4	-	-	15.2	3.7	0.5	0.1
year	Quadrat Cover (%)						
2021	20.8	3.6	0.8	2.3	2.6	0.6	0.1
2024	4.1	-	-	3.9	2.7	0.7	0.2

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

Table 17R-42.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Abies lasiocarpa[t] -- (subalpine fir)									
2021	5920	200	77	21	1	0	0	1	- / -
2024	1800	20	69	29	2	0	0	3	- / -
Pinus contorta[t] -- (lodgepole pine)									
2021	-	-	-	-	-	-	-	-	- / -
2024	-	-	-	-	-	-	-	-	-/-
Picea engelmannii[t] -- (Engelmann spruce)									
2021	360	-	17	44	39	0	0	67	- / -
2024	20	-	100	0	0	0	0	0	- / -
Ribes montigenum[p] -- (gooseberry currant)									
2021	1160	20	14	86	0	0	0	0	- / -
2024	1200	-	27	72	2	0	0	2	- / -
Rubus idaeus -- (American red raspberry)									
2021	700	-	9	91	0	0	6	0	- / -
2024	1020	460	94	6	0	0	0	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2021	-	-	-	-	-	-	-	-	-/-
2024	60	-	100	0	0	0	0	0	- / -

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

Table 17R-42.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

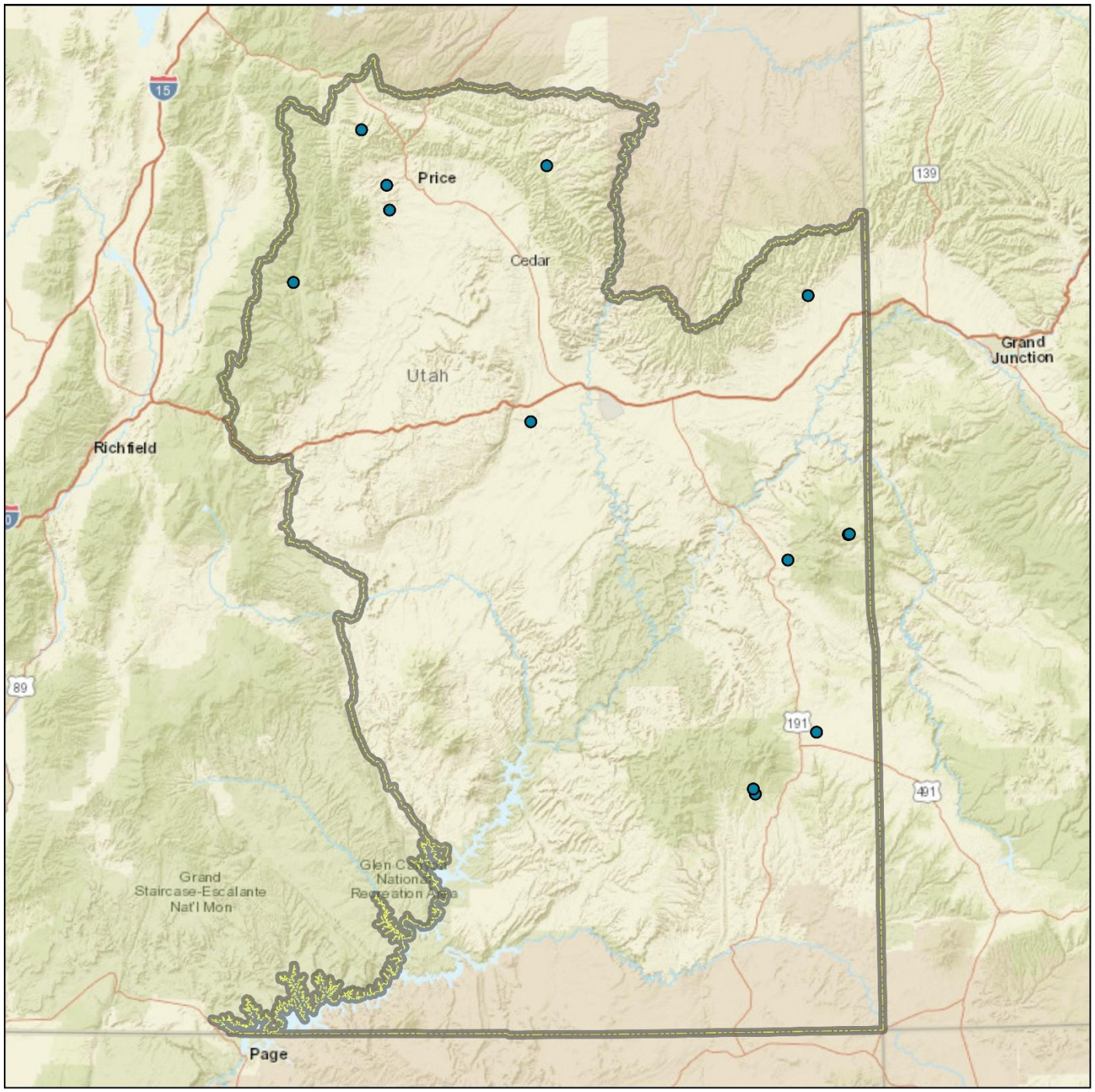
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2021	1540	19	53	12	16	5	8	5
2024	2840	46	42	5	8	10	7	4

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-42.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

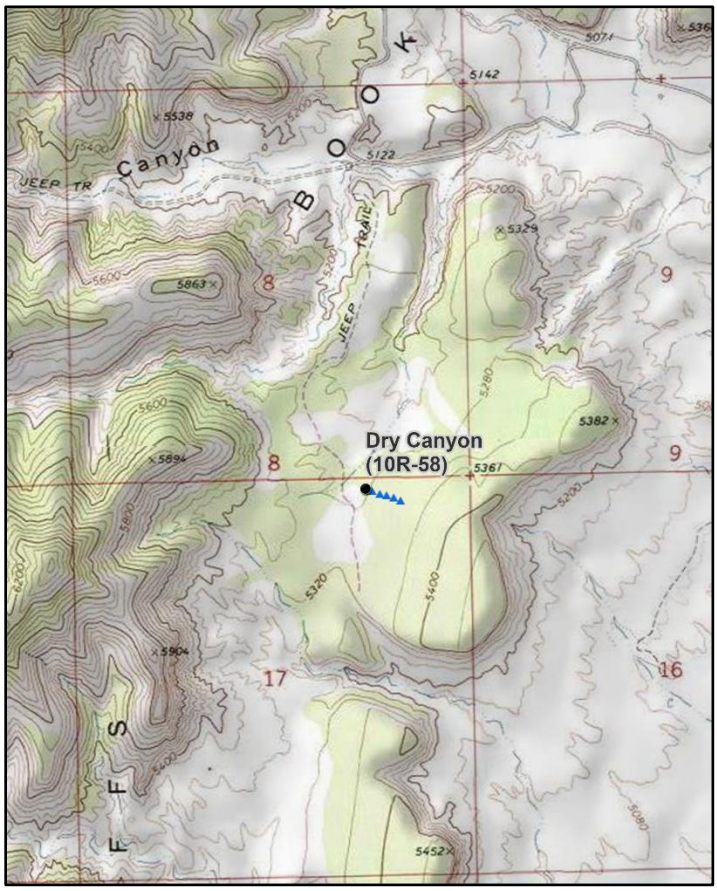
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Abies lasiocarpa (subalpine fir)							
2021	574	5	65	20	-	10	5.3
2024	321	95	5	-	-	-	1.2
Pinus contorta (lodgepole pine)							
2021	9	-	-	-	-	100	30.3
Picea engelmannii (Engelmann spruce)							
2021	92	-	33	20	-	47	19.0
Populus tremuloides (quaking aspen)							
2021	268	6	39	22	-	33	6.4
2024	744	70	25	-	-	5	2.9

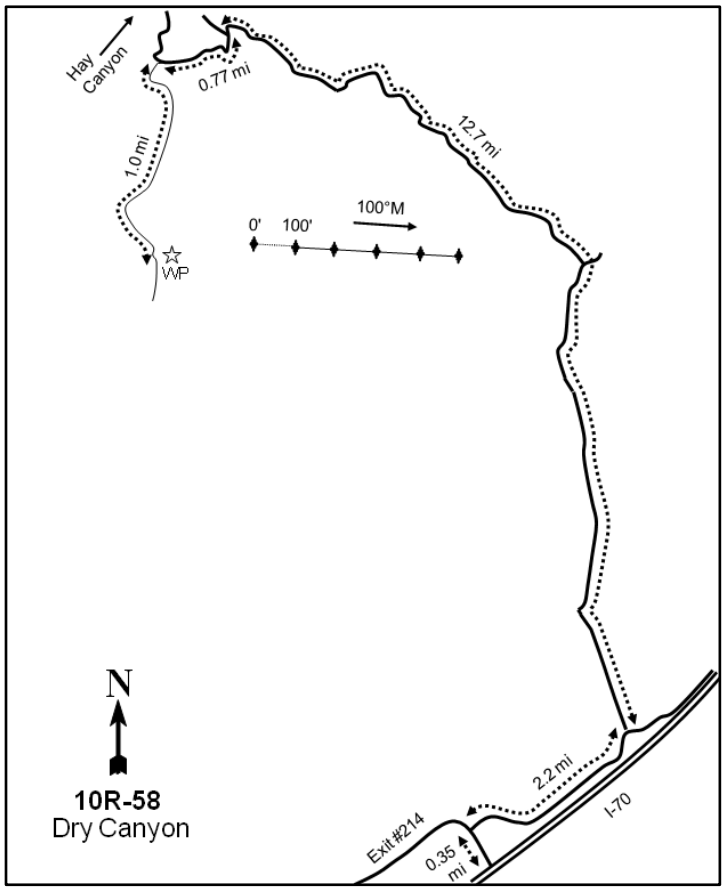
SOUTHEASTERN REGION



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

DRY CANYON - STUDY NO. 10R-58





Location Information

USGS 7.5 min Map Info	Antone Canyon NE; Township 18S, Range 24E, Section 17
GPS (0' Stake)	NAD 83 UTM ZONE 12, 648488 East 4345710 North

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	CORRAL WASH CANYON
Elevation	5,300ft (1,615m)
Aspect	West
Slope	5%
Sample Dates	09/02/2015, 07/29/2019, 08/13/2024

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

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

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

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

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

Wildlife Habitat and Vegetation History

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

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

Table 10R-58.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Pinyon-Juniper	Phase III
2019	Broom Snakeweed	Phase I
2024	Mountain Big Sagebrush/Broom Snakeweed/Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Shallow Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY225UT
States and Transitions	2015 - Juniper Invasion State: Community Phase 3.2 2019 - Invasive Annual State: Community Phase 4.1 2024 - Seeded State: Community Phase 5.2

Upon study establishment in 2015, this site was dominated by Utah Juniper (*Juniperus osteosperma*) with a lesser component of twoneedle pinyon (*Pinus edulis*) and was considered to be in Phase III of woodland succession (Table 10R-58.4). The shrub component was fairly limited, but broom snakeweed (*Gutierrezia sarothrae*) provided moderate amounts of cover. The herbaceous understory was depauperate in both diversity and abundance. A bullhog and seeding treatment in the winter of 2015-2016 (Table 10R-58.1) removed most of the trees, causing the site to transition to one dominated by broom snakeweed in 2019. Mountain big sagebrush

(*Artemisia tridentata* ssp. *vaseyana*) increased in density and cover between the two most recent sample years, becoming a codominant vegetation component in 2024. Furthermore, sagebrush decadence has decreased each sample year while recruitment of young has increased (Table 10R-58.12, Table 10R-58.13, Table 10R-58.14). The herbaceous component has diversified and increased following treatment. The introduced annual grass cheatgrass (*Bromus tectorum*) and a variety of annual forbs contributed a majority of the cover in 2019, but annual forb cover had decreased as of the most recent sample year. Cover of native perennial grasses -- namely squirreltail (*Elymus elymoides*) -- increased in 2024, and it was considered to be codominant with sagebrush and broom snakeweed in that year (Table 10R-58.7, Table 10R-58.10, Table 10R-58.11). Although the site is considered to be within Phase I of woodland succession as of 2024 (Table 10R-58.4), continued tree presence indicates that there may be potential for infilling in future sample years.

Condition of deer winter range on this site has varied between very poor and poor since 2015; deer winter habitat condition is considered to be poor as of 2024. The main factors negatively affecting winter range condition include the limited preferred browse component, reduced perennial grass and forb cover, and the amount of cheatgrass cover (Table 10R-58.15). Pellet transect data indicates that deer presence was low prior to treatment, high in 2019, and is moderate as of 2024 (Table 10R-58.9). Fifty five percent or more of sagebrush plants sampled in density strips were moderately or heavily hedged in 2015 and 2019; in 2024, 14% of sagebrush plants were moderately browsed and 35% were heavily hedged. In addition, only 2% of sagebrush plants were decadent in 2024 compared to 18% in 2019 and 55% in 2015 (Table 10R-58.13).

Trend Summary Tables

Table 10R-58.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2015	1.9	6.6	6.4	3.9	11.8	26.4
2019	2.3	14.9	0.0	2.3	27.5	-
2024	2.8	8.2	0.1	3.1	7.8	-

Table 10R-58.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2015	69	2	23	27	0.2	0.0	0.1	0.1
2019	141	28	198	98	5.6	0.8	5.0	2.9
2024	216	162	29	6	5.7	7.3	0.2	0.2

Table 10R-58.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2015	42.2	3.1	34.8	7.7	11.0	14.8
2019	17.4	0.5	64.3	3.0	5.0	27.1
2024	17.8	0.8	60.4	5.1	6.3	23.6

Table 10R-58.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2015	-	12	1	23
2019	-	23	-	13
2024	-	47	6	15
Year	Days Use Per Acre (ha)			
2015	-	9.4 (23.2)	0.7 (1.7)	-
2019	0.7 (1.8)	51.6 (127.5)	-	-
2024	0.7 (1.8)	36.8 (91.0)	-	-

Table 10R-58.10 - 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)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency					
2015	-	69	2	-	-	3
2019	1	141	27	-	0	-
2024	32	216	122	1	13	-
year	Average Cover (%)					
2015	-	0.2	0.0	-	-	0.0
2019	0.0	5.6	0.8	-	0.0	-
2024	0.9	5.7	5.9	0.1	0.3	-

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

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

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum desertorum[ai] (desert madwort)	Astragalus chamaeleuce (cicada milkvetch)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Eriogonum cernuum[a] (nodding buckwheat)	Gilia inconspicua[a] (shy gilia)	Lappula occidentalis[a] (flatspine stickseed)	Lepidium montanum[a] (mountain pepperweed)	Linum perenne[i] (blue flax)	Lithospermum incisum (narrowleaf stoneseed)	Mentzelia albicaulis[a] (whitestem blazingstar)	Microsteris gracilis[a] (slender phlox)	Mirabilis (four o'clock)	Orobanche fasciculata (clustered broomrape)
year	Nested Frequency																
2015	-	5	-	-	3	17	-	3	-	9	-	-	-	-	-	-	-
2019	1	8	2	21	12	52	74	16	103	22	3	3	4	14	3	0	45
2024	2	7	-	4	-	4	-	-	1	10	-	-	-	-	3	-	-
year	Average Cover (%)																
2015	-	0.0	-	-	0.0	0.1	-	0.0	-	0.0	-	-	-	-	-	-	-
2019	0.0	0.3	0.0	0.1	0.1	1.4	0.5	0.0	2.3	0.1	0.1	0.0	0.1	0.1	0.1	0.2	1.5
2024	0.1	0.0	-	0.0	-	0.0	-	-	0.0	0.1	-	-	-	-	0.0	-	-

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Townsendia (Townsend daisy)
year	Nested Frequency					
2015	2	-	-	-	5	17
2019	-	-	0	19	-	24
2024	-	2	-	3	-	1
year	Average Cover (%)					
2015	0.0	-	-	-	0.0	0.1
2019	-	-	0.0	0.7	-	0.4
2024	-	0.0	-	0.0	-	0.0

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

Table 10R-58.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Bassia prostrata[pi] (forage kochia)	Ephedra viridis[p] (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Yucca (yucca)
year	Line Intercept Cover (%)							
2015	3.7	-	0.2	10.1	21.1	1	5.3	0.7
2019	2	-	0.3	26.1	-	1.4	-	-
2024	2.8	-	0.3	7.1	-	0.7	-	-
year	Quadrat Cover (%)							
2015	1.7	0.0	0.1	5.6	5.0	0.8	1.4	0.2
2019	1.9	-	0.4	13.9	0.0	1.0	0.0	-
2024	2.7	-	0.1	7.5	0.0	0.6	0.0	-

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

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

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2015	620	-	13	32	55	42	13	58	51/92
2019	560	560	11	71	18	32	29	43	51/71
2024	1040	-	21	77	2	14	35	2	- / -
Echinocereus -- (hedgehog cactus)									
2015	-	-	-	-	-	-	-	-	6/14
2019	-	-	-	-	-	-	-	-	-/-
2024	20	-	0	100	0	0	0	0	- / -
Ephedra viridis[p] -- (mormon tea)									
2015	40	-	0	50	50	0	50	50	43/45
2019	100	-	0	100	0	0	0	0	44/38
2024	60	-	0	100	0	0	0	0	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	12/7
2024	20	-	100	0	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2015	15120	40	31	68	1	0	0	1	24/29
2019	9400	2640	12	82	6	0	0	7	35/53
2024	6440	20	15	77	8	0	0	8	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2015	120	-	33	50	17	0	0	17	- / -
2019	-	60	0	0	0	0	0	0	- / -
2024	260	-	100	0	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2015	600	20	3	80	17	3	0	17	11/43
2019	680	-	0	100	0	0	0	3	11/27
2024	680	-	3	74	24	0	0	24	- / -

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 edulis[t] -- (twoneedle pinyon)									
2015	20	40	0	100	0	0	0	0	- / -
2019	-	340	0	0	0	0	0	0	- / -
2024	40	-	100	0	0	0	0	0	- / -
Yucca -- (yucca)									
2015	280	-	7	71	21	0	0	14	27/52
2019	40	-	0	100	0	0	0	0	29/33
2024	20	-	0	100	0	0	0	0	- / -

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

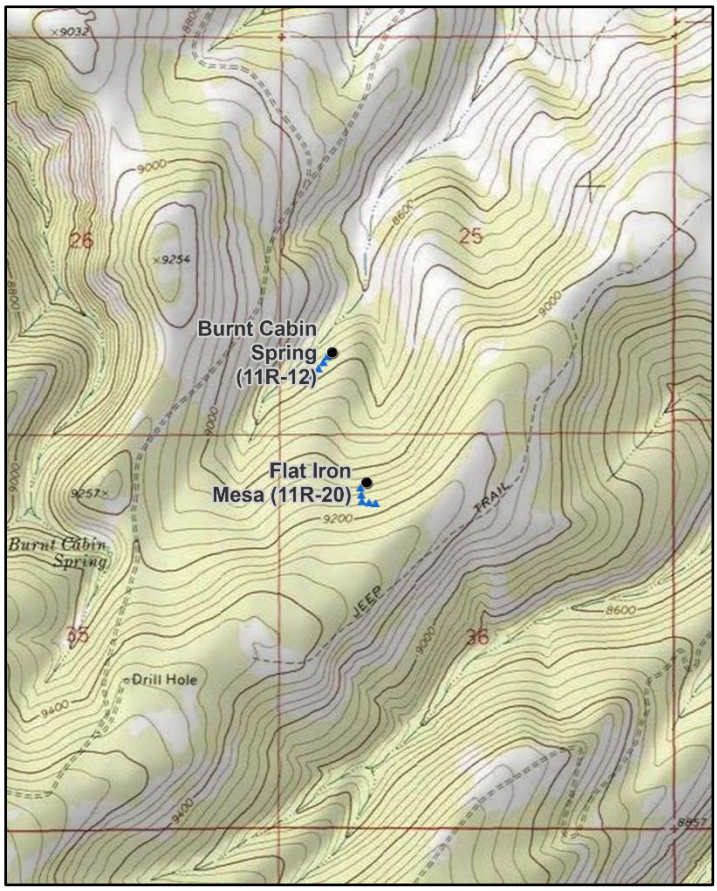
Table 10R-58.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

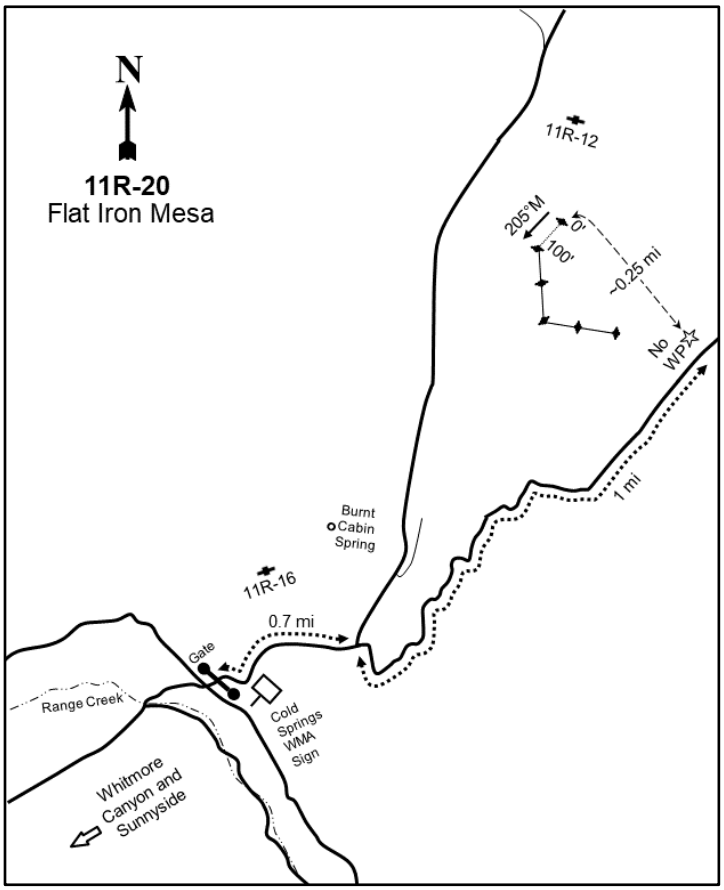
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2015	186	-	10	-	50	40	23.4
2019	14	-	100	-	-	-	4.0
2024	51	31	69	-	-	-	5.4
Pinus edulis (twoneedle pinyon)							
2015	32	-	17	17	8	58	15.4
2019	4	25	75	-	-	-	2.3
2024	6	20	80	-	-	-	2.6

Table 10R-58.15 - Deer Desirable Components Index: Semidesert Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2015	4.9	0.0	0.0	0.0	-0.2	0.2	0.0	**4.9**	Very Poor
2019	2.9	0.0	0.0	1.6	-4.2	5.9	0.0	**6.2**	Very Poor
2024	3.9	0.0	0.0	14.6	-4.3	0.3	0.0	**14.5**	Poor

FLAT IRON MESA - STUDY NO. 11R-20





Location Information

USGS 7.5 min Map Info	Bruin Point SE; Township 13S, Range 14E, Section 36
GPS (0' Stake)	NAD 83 UTM ZONE 12, 559798 East 4389786 North

Transect Information

Browse Tag # (0' Stake)	69
Transect Bearing	205° magnetic (Lines 2-3: 175° magnetic, Lines 4-5: 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 the fence and the Cold Springs WMA sign, travel east for 0.7 miles to a fork. Proceed left at the fork, continue for 1.0 miles, and park: there is no witness post. The study site is located approximately 0.25 miles downhill and northwest of the road. All stake markers are rebar and will likely be hard to find.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	GREEN RIVER
Elevation	9,150ft (2,789m)
Aspect	Northwest
Slope	20%
Sample Dates	08/20/2019, 07/20/2022, 07/23/2024

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Push	Cold Springs WMA Conifer Removal Aspen Regeneration Phase VI	4840	October 2019-July 2020	129
Fire - Slash Pile	Upper Price River Watershed	6043	November 2022	304

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2019	Quaking Aspen-Conifer Encroached	NA
2022	Quaking Aspen/Annual-Perennial Forb	NA
2024	Quaking Aspen	NA

Site Notes

In 2022, the 200, 300, 400, and 500-foot stakes were shifted to fit within the treatment area and the lines were taken down before a bearing could be taken for lines 2-5. As such, a bearing should be taken for these lines during the next sampling.

Site Potential

1981 - 2010 Average Annual Precipitation	22 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	2019 - Reference State: Community Phase 1.4 2022-2024 - Logged/Disturbed State: Community Phase 3.1

This study site was established in 2019 and was dominated by mixed conifers, mainly subalpine fir (*Abies lasiocarpa*), and quaking aspen (*Populus tremuloides*). The browse component was diverse and abundant, with Woods' rose (*Rosa woodsii*) and mountain snowberry (*Symphoricarpos oreophilus*) contributing most of the cover (Photos, Table 11R-20.12, Table 11R-20.13, Table 11R-20.14). Perennial forbs provided a majority of the cover in the herbaceous understory, while annual forbs and perennial grasses were rare (Table 11R-20.7, Table 11R-20.10, Table 11R-20.11). Following the treatment that removed all of the mature trees from the site (Table 11R-20.1), young aspen became the dominant plant species. Furthermore, conifer trees were almost completely removed by the treatment, with only a few young trees remaining (Table 11R-20.12, Table 11R-20.13, Table 11R-20.14). Annual and perennial forbs increased and provided the majority of the herbaceous cover. Also notable are the noxious weeds gypsyflower (*Cynoglossum officinale*) and nodding plumeless thistle (*Carduus nutans*) that appeared in the community following treatment (Table 11R-20.7).

This site likely serves as adequate summer range for mule deer due to the diverse and abundant herbaceous and shrub communities (Table 11R-20.3, Table 11R-20.10, Table 11R-20.11, Table 11R-20.12). However, the area is also known for the fall and winter occurrence of deer (Wildlife Tracker). Pellet group data indicates that both deer and elk presence have remained low to moderate since 2019 (Table 11R-20.9). Mountain snowberry and quaking aspen provide the bulk of the summer forage for wildlife. However, utilization of snowberry and aspen has been low since study establishment. Use of trees by wildlife appears to be low to absent (Table 11R-20.13, Table 11R-20.13a).

Trend Summary Tables

Table 11R-20.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2019	14.5	2.6	21.8	17.9	3.1	69.2
2022	11.0	0.6	20.9	12.3	0.3	35.3
2024	19.1	0.6	21.9	22.6	0.5	42.7

Table 11R-20.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2019	-	87	17	299	-	1.7	0.5	25.1
2022	-	87	246	210	-	2.6	18.7	12.7
2024	-	230	222	235	-	8.8	6.7	12.5

Table 11R-20.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2019	3.9	4.8	74.1	1.2	0.6	49.6
2022	37.1	0.4	39.0	0.4	0.9	50.8
2024	27.1	-	36.5	0.9	0.9	53.9

Table 11R-20.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency			
2019	2	1	-	1
2022	9	6	-	-
2024	5	9	-	1
Year	Days Use Per Acre (ha)			
2019	5.3 (13.2)	2.7 (6.6)	-	-
2022	7.4 (18.2)	8.1 (19.9)	-	-
2024	5.3 (13.2)	12.8 (31.5)	1.2 (2.9)	-

Table 11R-20.10 - 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 rossii (Ross' sedge)	Elymus trachycaulus (slender wheatgrass)	Poa palustris (fowl bluegrass)	Poa pratensis[i] (Kentucky bluegrass)	Trisetum canescens (tall trisetum)
year	Nested Frequency							
2019	-	-	60	30	-	-	-	-
2022	-	0	25	63	-	-	1	1
2024	11	-	149	113	0	1	4	1
year	Average Cover (%)							
2019	-	-	0.9	0.8	-	-	-	-
2022	-	0.0	0.9	1.5	-	-	0.0	0.1
2024	0.4	-	3.6	4.7	0.0	0.0	0.0	0.0

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

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

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	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)	Chaenactis fremontii[a] (pincushion flower)	Chamerion angustifolium (fireweed)	Chenopodium atrovirens[a] (pinyon goosefoot)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cirsium wheeleri (Wheeler's thistle)	Collomia linearis[a] (tiny trumpet)	Corydalis aurea[a] (scrambled eggs)	Cynoglossum officinale[ani] (gypsyflower)	Descurainia californica[a] (Sierra tansymustard)	Dracocephalum parviflorum (American dragonhead)
year	Nested Frequency																
2019	40	-	3	7	199	96	-	-	-	-	-	-	-	-	-	-	-
2022	16	4	-	6	39	45	-	-	11	17	110	-	-	43	8	122	22
2024	70	-	-	12	34	33	1	5	14	7	18	3	4	-	7	152	15
year	Average Cover (%)																
2019	1.1	-	0.2	0.0	6.7	6.0	-	-	-	-	-	-	-	-	-	-	-
2022	0.4	0.0	-	0.2	0.8	1.6	-	-	0.1	0.3	3.0	-	-	2.0	0.0	11.9	1.7
2024	1.3	-	-	0.3	0.9	0.8	0.1	0.0	0.3	0.0	0.3	0.0	0.0	-	0.1	3.4	0.2

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

FORB SPECIES	Epilobium (willowherb)	Epilobium brachycarpum[a] (tall annual willowherb)	Erigeron eximius (sprucefir fleabane)	Erigeron speciosus (aspen fleabane)	Fragaria virginiana (Virginia strawberry)	Gentianella amarella ssp. heterosepala[a] (autumn dwarf gentian)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Lupinus argenteus (silvery lupine)	Maianthemum stellatum (starry false lily of the valley)	Orthilia secunda (sidebells wintergreen)	Osmorhiza depauperata (bluntseed sweetroot)	Phacelia sericea[a] (silky phacelia)	Polygonum douglasii[a] (Douglas' knotweed)	Saxifraga (saxifrage)	Senecio atratus (tall blacktip ragwort)	Senecio integerrimus[a] (lambstongue ragwort)
year	Nested Frequency																
2019	-	1	116	-	2	-	-	-	33	1	1	21	-	-	43	-	16
2022	2	-	44	-	16	1	0	-	10	-	-	9	23	24	-	-	-
2024	-	-	5	26	-	11	17	4	21	-	4	3	43	65	-	52	-
year	Average Cover (%)																
2019	-	0.0	5.7	-	0.2	-	-	-	2.1	0.0	0.0	0.3	-	-	1.3	-	0.5
2022	0.0	-	2.0	-	0.2	0.0	0.0	-	0.6	-	-	0.3	1.1	0.3	-	-	-
2024	-	-	0.1	0.8	-	0.2	0.1	0.0	0.7	-	0.2	0.2	2.1	0.4	-	2.8	-

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

FORB SPECIES	Silene menziesii (Menzies' campion)	Stenotus acaulis (stemless mock goldenweed)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Urtica dioica (stinging nettle)	Viola adunca (hookedspur violet)
year	Nested Frequency						
2019	27	-	-	12	4	-	61
2022	25	5	16	38	13	-	67
2024	16	-	1	74	-	0	76
year	Average Cover (%)						
2019	0.1	-	-	0.2	0.2	-	1.1
2022	0.3	0.3	0.3	1.4	0.8	-	1.6
2024	0.2	-	0.0	1.9	-	0.0	1.8

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

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

SHRUB SPECIES	Abies lasiocarpa[t] (subalpine fir)	Juniperus communis (common juniper)	Mahonia repens (creeping barberry)	Paxistima myrsinites (Oregon boxleaf)	Populus tremuloides[tp] (quaking aspen)	Pseudotsuga menziesii[t] (Douglas-fir)	Ribes wolfii[p] (Wolf's currant)	Rosa woodsii[p] (Woods' rose)	Shepherdia canadensis (russet buffaloberry)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)									
2019	43.1	-	0.2	0.4	22.7	3.4	0.5	11.1	2.5	6.3
2022	0.1	-	0.1	-	35.2	-	0.7	8.4	0.2	3.2
2024	0.2	0.4	0.1	0	42.5	-	1.3	13	-	8.3
year	Quadrat Cover (%)									
2019	20.9	-	0.3	1.2	0.9	0.0	1.2	9.1	1.0	4.2
2022	0.0	0.4	0.0	0.2	20.9	-	0.7	8.3	0.0	2.1
2024	0.1	0.4	0.0	0.2	21.8	-	1.1	12.5	0.0	5.6

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

Table 11R-20.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Abies lasiocarpa[t] -- (subalpine fir)									
2019	1260	660	67	32	2	0	0	2	- / -
2022	60	-	67	0	33	0	0	33	- / -
2024	60	-	100	0	0	0	0	0	- / -
Acer glabrum -- (Rocky Mountain maple)									
2019	-	-	-	-	-	-	-	-	78/55
2022	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-

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 (%)		
Acer negundo[t] -- (boxelder)									
2019	20	-	100	0	0	100	0	0	- / -
2022	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2019	-	-	-	-	-	-	-	-	-/-
2022	-	-	-	-	-	-	-	-	-/-
2024	20	-	0	100	0	0	0	0	- / -
Juniperus communis -- (common juniper)									
2019	-	-	-	-	-	-	-	-	-/-
2022	20	-	0	100	0	0	0	0	- / -
2024	20	-	0	100	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
2019	900	-	0	100	0	0	0	0	18/14
2022	60	-	0	100	0	0	0	0	- / -
2024	120	-	0	100	0	0	0	0	- / -
Paxistima myrsinites -- (Oregon boxleaf)									
2019	2580	20	6	94	0	0	0	0	11/16
2022	80	-	100	0	0	0	0	0	- / -
2024	180	-	11	89	0	0	0	0	- / -
Pseudotsuga menziesii[t] -- (Douglas-fir)									
2019	240	20	8	92	0	0	0	0	- / -
2022	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Ribes wolfii[p] -- (Wolf's currant)									
2019	240	-	0	100	0	0	0	0	48/36
2022	800	-	73	28	0	38	25	0	- / -
2024	480	-	21	79	0	8	83	0	- / -
Rosa woodsii[p] -- (Woods' rose)									
2019	13280	120	9	91	0	1	0	1	23/25
2022	5680	40	35	65	0	0	0	2	- / -
2024	6920	-	16	84	0	8	7	6	- / -
Shepherdia canadensis -- (russet buffaloberry)									
2019	420	-	19	76	5	0	0	5	45/48
2022	20	-	0	100	0	0	0	0	- / -
2024	20	-	0	100	0	0	100	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2019	3280	60	4	95	1	1	0	1	44/45
2022	680	-	6	94	0	0	0	0	- / -
2024	2240	-	8	92	0	12	7	0	- / -

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

Table 11R-20.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

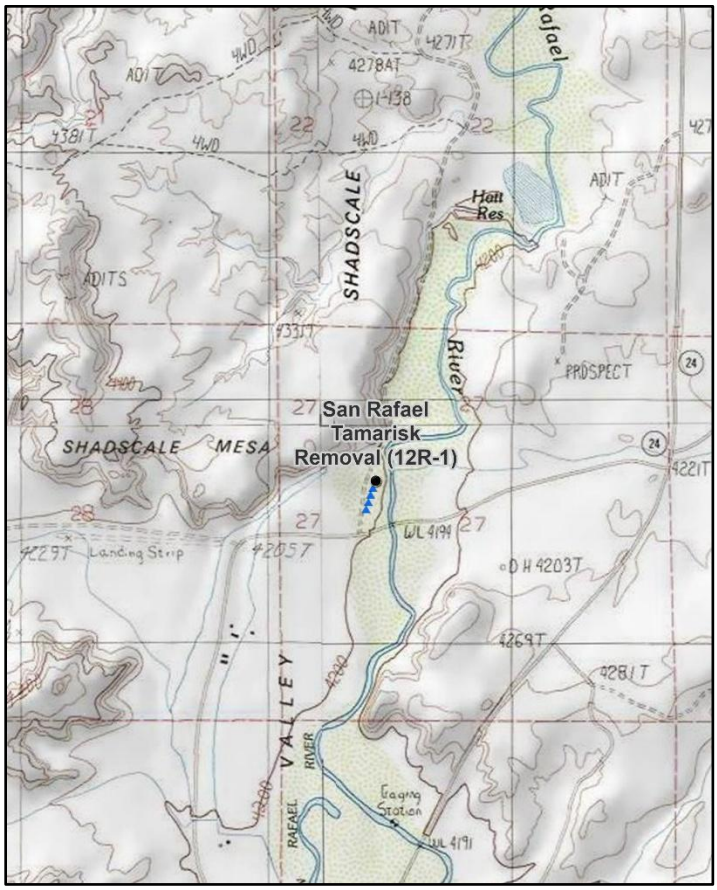
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2019	520	27	42	4	27	5	0	5
2022	8540	9	91	0	-	1	0	1
2024	7260	7	48	42	3	1	0	0

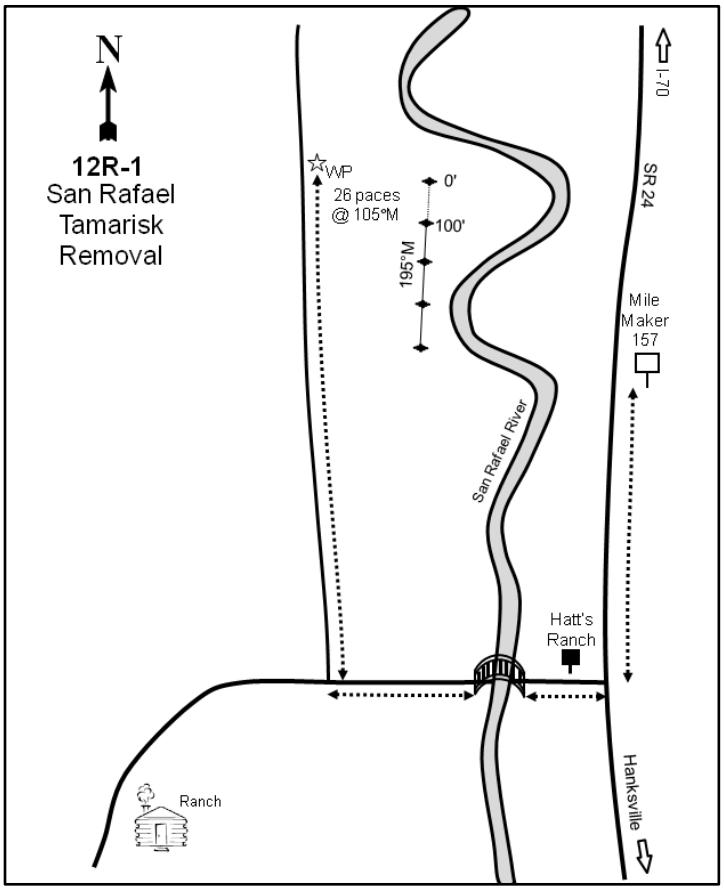
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

Table 11R-20.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Abies lasiocarpa (subalpine fir)							
2022	9	-	60	40	-	-	4.2
2024	6	-	33	67	-	-	5.3
Populus tremuloides (quaking aspen)							
2019	196	-	13	-	-	88	16.4
2022	2021	-	90	10	-	-	1.9
2024	2395	5	25	60	10	-	2.1

SAN RAFAEL TAMARISK REMOVAL - STUDY NO. 12R-1





Location Information

USGS 7.5 min Map Info	Horse Bench West NW; Township 22S, Range 14E, Section 27
GPS (0' Stake)	NAD 83 UTM ZONE 12, 554387 East 4302860 North

Transect Information

Browse Tag # (0' Stake)	246
Transect Bearing	190° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

Directions to Site

From I-70, take SR-24 south towards Hanksville. Proceed 0.4 miles past mile marker 157 and then turn right, near the Hatt's Ranch sign. Continue 0.6 miles past a gate to a bridge and then continue for 0.1 miles to a right turn. Drive 0.1 miles to the witness post on the right-hand (east) side of the road. The 0-foot stake is 26 paces from the witness post at 105 degrees magnetic and is marked with browse tag #246.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	IRON WASH
Elevation	4,137ft (1,261m)
Aspect	Southeast
Slope	1-3%
Sample Dates	08/18/2008, 08/21/2012, 07/27/2017, 08/13/2024

Table 12R-01.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Vista	San Rafael River Restoration Phase III	2260	May 2013	310
Fire - Wildfire	Hatts	-	2006	132
Mechanical - Grapple	San Rafael River Restoration Phase I	867	September 2008-May 2010	740

Wildlife Habitat and Vegetation History

Table 12R-01.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 12R-01.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Tamarisk	NA
2012	Greasewood	NA
2017	Greasewood	NA
2024	Greasewood	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	6 inches
NRCS Ecological Site	Semidesert - River Floodplain (Fremont Cottonwood)
NRCS Ecological Site #	R034BY011UT
States and Transitions	2008 - State Undefined: Community Phase Undefined 2012-2024 - State Undefined: Community Phase Undefined

This study site was dominated by five-stamen tamarisk (*Tamarix chinensis*) when it was established in 2008. Cover of tamarisk significantly decreased following a mechanical treatment sometime between 2008 and 2010 and greasewood (*Sarcobatus vermiculatus*) became the dominant site component in the 2012, 2017, and 2024 sample years. Tamarisk cover and density increased between 2012 and 2017, but density decreased again in 2024. However, tamarisk may still have the potential to again dominate this area in the future (Table 12R-01.12, Table 12R-01.13). The herbaceous understory has remained relatively homogenous, with a majority of the cover being contributed by the introduced annual forb burningbush (*Bassia scoparia*) (Table 12R-01.7, Table 12R-01.10, Table 12R-01.11). One should note the presence of the perennial grass common reed (*Phragmites australis*) on this study site: although it is present in very low amounts, it is a noxious weed and may have the potential to increase over time (Table 12R-01.10).

Mule deer winter range condition has remained very poor over the course of the study, and is limited by a lack of preferred browse, perennial grass and forb cover, and the presence of noxious weeds (Table 12R-01.15). Pellet group data indicate that deer presence has been low since study establishment (Table 12R-01.9). Preferred browse species are lacking on the site; however, fourwing saltbush (*Atriplex canescens*) is present, but has received very little utilization (Table 12R-01.13).

Trend Summary Tables

Table 12R-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
2008	-	35.1	-	-	52.1	-
2012	2.3	8.8	-	2.3	16.4	-
2017	-	29.3	-	-	39.2	-
2024	0.9	24.3	-	1.6	37.9	-

Table 12R-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
2008	-	23	263	-	-	1.0	10.3	-
2012	-	46	99	18	-	3.0	17.3	0.7
2017	-	45	233	60	-	1.1	15.0	2.2
2024	-	21	153	21	-	1.5	5.1	1.6

Table 12R-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
2008	31.3	-	55.1	0.5	-	47.7
2012	57.2	-	28.1	0.0	-	33.1
2017	44.5	-	35.1	0.5	0.0	44.1
2024	47.9	0.4	39.1	0.2	0.2	31.4

Table 12R-01.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2008	-	3	30
2012	1	3	10
2017	-	3	9
2024	-	2	19
Year	Days Use Per Acre (ha)		
2008	1.5 (3.6)	20.8 (51.3)	-
2012	-	4.0 (9.9)	-
2017	-	13.4 (33.1)	-
2024	-	4.0 (9.9)	-

Table 12R-01.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Distichlis spicata (saltgrass)	Phragmites australis[n] (common reed)	Sporobolus airoides (alkali sacaton)
year	Nested Frequency		
2008	14	6	3
2012	31	5	13
2017	36	2	9
2024	5	6	10
year	Average Cover (%)		
2008	0.2	0.2	0.7
2012	0.8	0.1	2.1
2017	0.4	0.1	0.7
2024	0.0	0.2	1.3

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

Table 12R-01.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Bassia scoparia[ai] (burningbush)	Chenopodium fremontii[a] (Fremont's goosefoot)	Descurainia pinnata[a] (western tansymustard)	Halogeton glomeratus[ai] (saltlover)	Iva axillaris (povertyweed)	Salsola tragus[ai] (prickly Russian thistle)
year	Nested Frequency					
2008	251	55	-	2	-	9
2012	85	-	-	13	18	6
2017	158	-	3	90	60	7
2024	122	-	20	27	21	16
year	Average Cover (%)					
2008	9.0	1.0	-	0.0	-	0.3
2012	13.7	-	-	2.8	0.7	0.8
2017	10.6	-	0.5	3.8	2.2	0.0
2024	3.4	-	0.5	0.9	1.6	0.2

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

Table 12R-01.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Atriplex canescens[p] (fourwing saltbush)	Ericameria nauseosa (rubber rabbitbrush)	Sarcobatus vermiculatus (greasewood)	Suaeda moquinii (Mojave seablite)	Tamarix chinensis[i] (five-stamen tamarisk)
year	Line Intercept Cover (%)				
2008	-	1.1	12.7	-	38.3
2012	2.3	4.8	11.6	-	-
2017	-	9.1	29.2	-	0.9
2024	1.6	5.6	27.1	3.2	2
year	Quadrat Cover (%)				
2008	-	0.1	10.5	-	24.6
2012	2.3	1.1	7.6	-	0.1
2017	-	2.3	24.4	1.4	1.2
2024	0.9	2.6	18.5	2.2	1.0

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

Table 12R-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.

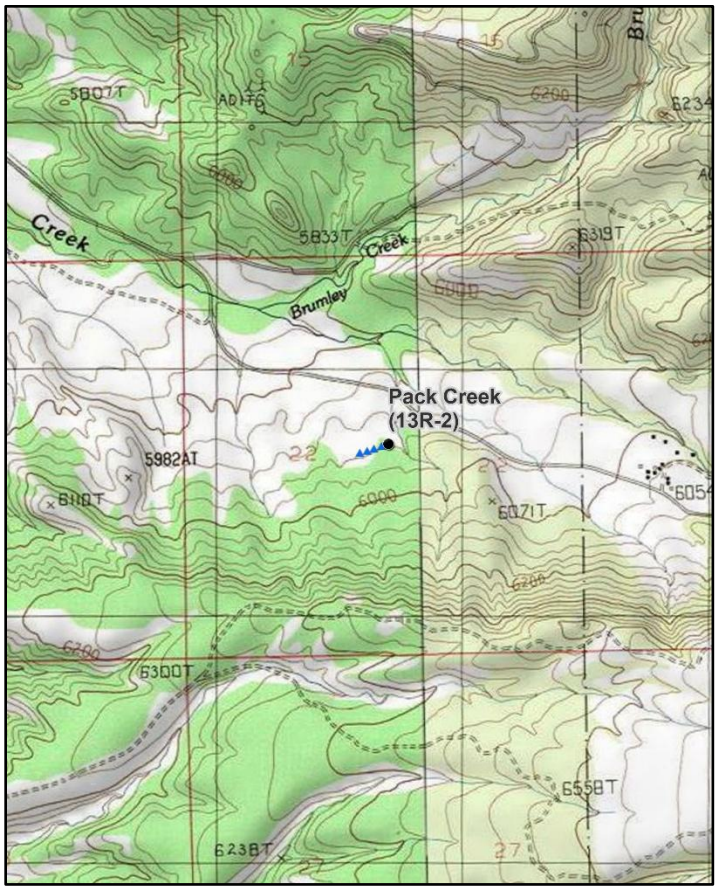
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Atriplex canescens[p] -- (fourwing saltbush)									
2008	-	-	-	-	-	-	-	-	-/-
2012	80	-	0	100	0	0	0	25	107/146
2017	-	-	-	-	-	-	-	-	121/231
2024	120	-	0	100	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	320	-	0	100	0	0	0	0	117/142
2012	520	-	23	77	0	0	0	0	87/131
2017	360	-	0	100	0	0	0	0	146/222
2024	300	-	0	60	40	7	7	40	- / -
Sarcobatus vermiculatus -- (greasewood)									
2008	1520	-	37	62	1	0	0	4	95/118
2012	1360	-	22	78	0	0	0	2	103/136
2017	1180	-	3	97	0	0	0	0	120/173
2024	1280	-	3	77	20	5	6	20	- / -
Suaeda moquinii -- (Mojave seablite)									
2008	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2024	1180	-	12	80	9	0	0	10	- / -
Tamarix chinensis[i] -- (five-stamen tamarisk)									
2008	3400	-	9	91	0	10	0	90	208/162
2012	60	-	100	0	0	0	0	0	86/95
2017	260	-	8	92	0	0	0	0	181/161
2024	140	-	0	100	0	0	0	29	- / -

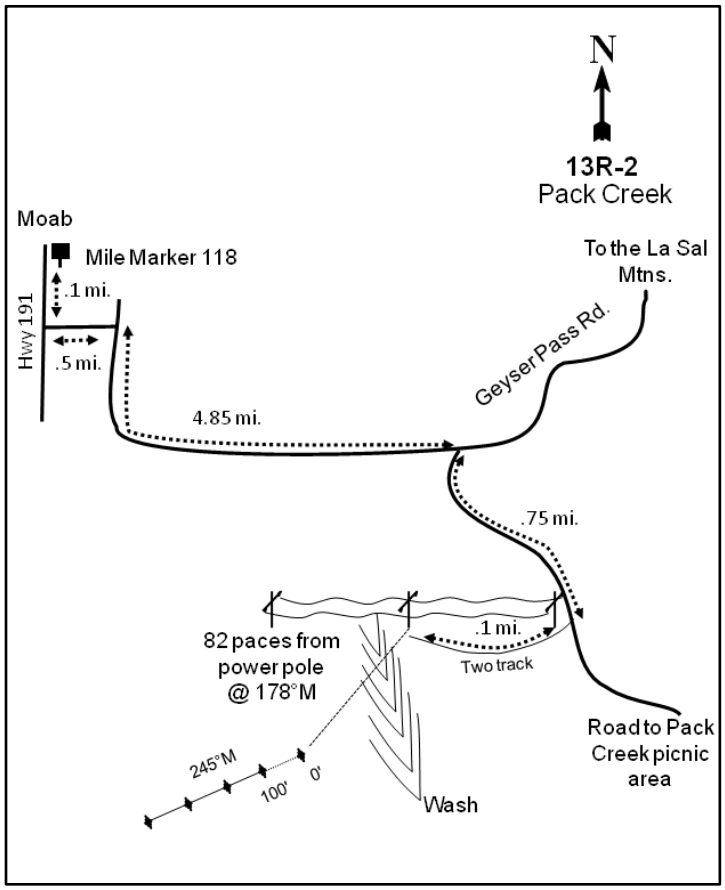
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 12R-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
2008	0.0	0.0	0.0	1.7	0.0	0.0	-4.0	**-2.3**	Very Poor
2012	2.9	0.0	0.0	5.7	0.0	1.5	-4.0	**6.1**	Very Poor
2017	0.0	0.0	0.0	2.1	0.0	4.5	-4.0	**2.6**	Very Poor
2024	2.0	0.0	0.0	2.6	0.0	3.3	-4.0	**3.9**	Very Poor

PACK CREEK - STUDY NO. 13R-2





Location Information

USGS 7.5 min Map Info	Kane Springs NE; Township 27S, Range 23E, Section 22
GPS (0' Stake)	NAD 83 UTM ZONE 12, 641639 East 4255899 North

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	BLACK RIDGE
Elevation	5,900ft (1,798m)
Aspect	North
Slope	7%
Sample Dates	06/14/2007, 06/16/2010, 08/04/2014, 06/20/2019, 07/23/2024

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
	Mill Creek (Moab) Restoration 5 (Proposed)	6969	2024-2025	-
Hand Crew - Lop and Scatter	Pack Creek	LTDL 8471-23174	2003	176
Mechanical - Bullhog	Pack Creek	907	April 2007	127
Fire - Slash Pile	Pack Creek	907	October 2007	127
Seeding - Broadcast/Harrow	Pack Creek	907	October 2007	127

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

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

Wildlife Habitat and Vegetation History

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

Species	Habitat	Season
Mule Deer	crucial	winter

Table 13R-02.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Annual Grass	Phase I
2010	Blackbrush	Phase I
2014	Blackbrush	Phase I
2019	Blackbrush	Phase I
2024	Blackbrush	Phase I

Site Notes

The study was established to monitor a project implemented by the BLM 13 miles southeast of Moab. As part of the project, twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees were thinned and the slash was piled and burned. However, many of the remaining trees continued to die as a result of bark beetle (*Ips* sp.) infestation and fire damage.

Soils

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

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

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Semidesert Stony Loam (Blackbrush)
NRCS Ecological Site #	R035XY243UT
States and Transitions	2011-2024 - Current Potential State: Community Phase 2.2

Upon study establishment in 2007, this site was dominated by the introduced annual grass species cheatgrass (*Bromus tectorum*) with limited cover from other grasses and forbs (Table 13R-02.7). However, perennial grass cover has generally increased with Indian ricegrass (*Achnatherum hymenoides*) being the dominant species. Cheatgrass has decreased in general, although a flush was observed in the 2019 sample year (Table 13R-02.10). Forb cover has fluctuated from year to year, but has decreased overall with gooseberryleaf globemallow (*Sphaeralcea grossulariifolia*) and rock goldenrod (*Petradoria pumila*) as the dominant species in 2024 (Table 13R-02.11). The browse component of this site has remained dominated by blackbrush (*Coleogyne ramosissima*) with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) as a subordinate species; line intercept cover of both species has slightly increased overall (Table 13R-02.12, Table 13R-02.13). The study was established following the 2007 bullhog treatment (Table 13R-02.1) which only removed a small number of trees (Photos); twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been

observed throughout the study period with density and cover remaining fairly stable (Table 13R-02.12, Table 13R-02.14).

Mule deer winter range condition on this site has ranged between very poor-poor and fair over the course of the study, but has been considered fair in most sample years including 2024. The lack of cover and recruitment of young within the preferred browse population are the main factors negatively influencing winter range condition as of the most recent sample year (Table 13R-02.15). According to pellet transect data, mule deer presence has remained moderate to high throughout the study period. Elk presence was high in 2007, but has remained low since 2010 (Table 13R-02.9). Blackbrush and Wyoming big sagebrush provide much of the available forage for wildlife, and both species have experienced an increase in utilization since study establishment. Utilization of blackbrush and Wyoming big sagebrush has been considered heavy since 2014, and utilization on both species was very heavy in 2024. More specifically, 76% of sagebrush plants sampled in density strips were heavily hedged and 17% were moderately used in 2024; while 92% and 7% of blackbrush plants exhibited heavy and moderate levels of utilization, respectively (Table 13R-02.13). Continued heavy utilization could lead to a decrease in preferred browse abundance and loss of utility for wildlife.

Trend Summary Tables

Table 13R-02.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	7.0	5.0	1.0	6.2	4.5	3.2
2010	7.6	3.3	0.0	9.1	2.3	3.1
2014	8.0	1.5	0.0	8.1	3.3	2.0
2019	8.7	2.4	0.6	10.7	1.8	1.9
2024	8.6	7.4	0.0	12.1	8.3	3.4

Table 13R-02.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	457	96	230	170	26.1	3.5	1.7	3.8
2010	268	109	182	158	3.4	5.3	3.7	4.7
2014	164	149	271	178	1.9	5.4	3.4	3.4
2019	317	142	297	268	15.6	6.1	6.6	6.6
2024	310	92	43	88	6.3	4.5	0.2	1.3

Table 13R-02.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	13.8	1.7	22.4	13.0	13.7	48.7
2010	18.7	0.3	38.6	13.5	13.3	28.7
2014	26.0	1.5	25.5	14.9	14.4	23.7
2019	22.5	1.0	30.9	22.5	18.5	36.9
2024	36.8	0.4	30.7	11.7	11.8	25.1

Table 13R-02.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	-	36	3	16
2010	-	30	1	9
2014	-	33	2	12
2019	1	26	2	15
2024	-	38	1	9
Year	Days Use Per Acre (ha)			
2007	-	32.2 (79.5)	84.5 (208.6)	-
2010	1.5 (3.6)	59.6 (147.3)	1.3 (3.3)	-
2014	-	22.1 (54.6)	-	-
2019	2.9 (7.2)	42.9 (105.9)	1.3 (3.3)	-
2024	0.7 (1.8)	53.6 (132.4)	0.7 (1.7)	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron fragile[i] (Siberian wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandnus (sand dropseed)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency											
2007	3	-	-	-	457	68	-	-	5	23	-	35
2010	1	5	1	3	262	83	-	-	4	16	-	10
2014	11	13	17	7	163	85	3	2	4	28	19	3
2019	15	17	12	6	314	27	12	25	33	13	12	14
2024	24	15	-	2	310	7	-	5	9	40	1	1
year	Average Cover (%)											
2007	0.2	-	-	-	26.1	2.6	-	-	0.0	0.7	-	0.1
2010	0.8	0.0	0.2	0.2	3.2	2.8	-	-	0.7	0.7	-	0.2
2014	1.0	0.8	0.4	0.3	1.9	1.3	0.2	0.1	0.1	0.3	1.0	0.0
2019	2.2	1.0	0.6	0.1	15.5	0.1	0.0	0.5	1.0	0.4	0.1	0.0
2024	2.7	0.8	-	0.0	6.2	0.0	-	0.2	0.2	0.4	0.2	0.0

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

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

FORB SPECIES	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus flexuosus (flexile milkvetch)	Astragalus miser (timber milkvetch)	Astragalus zionis (Zion milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaetopappa ericoides (rose heath)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Delphinium nuttallianum (twolobe larkspur)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Eriogonum cernuum[a] (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)
year	Nested Frequency																
2007	4	-	3	-	52	2	66	-	-	-	42	3	1	-	58	4	3
2010	17	-	-	-	21	6	10	-	1	11	22	1	-	-	3	40	14
2014	-	-	20	-	21	-	1	-	10	-	48	-	-	5	16	4	4
2019	-	0	3	27	75	16	61	4	6	-	9	14	3	16	106	94	-
2024	1	-	-	-	6	-	26	9	-	-	5	-	-	-	2	-	-
year	Average Cover (%)																
2007	0.0	-	0.2	-	0.2	0.0	0.3	-	-	-	0.6	0.0	0.0	-	0.1	0.0	0.0
2010	0.9	-	-	-	0.1	0.0	0.1	-	0.0	0.1	0.7	0.0	-	-	0.0	0.1	0.0
2014	-	-	0.1	-	0.3	-	0.0	-	0.0	-	0.4	-	-	0.0	0.1	0.0	0.0
2019	-	0.4	0.0	0.3	1.2	0.0	0.3	0.1	0.0	-	0.1	0.1	0.0	0.3	0.4	1.3	-
2024	0.0	-	-	-	0.0	-	0.1	0.0	-	-	0.0	-	-	-	0.0	-	-

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

FORB SPECIES	Gilia inconspicua[a] (shy gilia)	Helianthus annuus[a] (common sunflower)	Lactuca serriola[ai] (prickly lettuce)	Linum lewisii (Lewis flax)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Microsteris gracilis[a] (slender phlox)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon cyanocaulis (bluestem beardtongue)	Petradoria pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Pleiacanthus spinosus (thorn skeletonweed)	Salsola tragus[ai] (prickly Russian thistle)	Silene antirrhina[a] (sleepy silene)	Sisymbrium altissimum[ai] (tall tumblemustard)
year	Nested Frequency																
2007	106	1	6	1	3	-	-	-	-	27	4	51	4	5	100	1	-
2010	32	14	7	-	1	-	1	-	22	17	4	20	17	-	154	-	-
2014	11	3	-	-	11	-	-	-	-	17	17	-	46	-	250	12	3
2019	143	21	-	-	3	1	4	1	16	3	9	60	150	-	12	-	-
2024	-	-	-	-	-	-	-	-	-	4	11	27	3	-	17	-	-
year	Average Cover (%)																
2007	0.7	0.0	0.0	0.0	0.0	-	-	-	-	1.3	0.7	0.2	0.0	0.0	0.4	0.0	-
2010	0.1	0.1	0.0	-	0.0	-	0.0	-	0.8	0.0	0.6	0.1	0.2	-	3.0	-	-
2014	0.0	0.0	-	-	0.1	-	-	-	-	0.4	0.5	-	0.1	-	3.2	0.0	0.0
2019	4.0	0.1	-	-	0.0	0.0	0.0	0.0	0.1	0.0	0.4	0.7	1.8	-	0.1	-	-
2024	-	-	-	-	-	-	-	-	-	0.0	0.3	0.1	0.0	-	0.2	-	-

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

FORB SPECIES	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Tetraneuris acaulis (stemless four-nerve daisy)	Townsendia (Townsend daisy)	Tragopogon dubius[ai] (yellow salsify)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency				
2007	12	1	31	-	-
2010	25	4	19	1	1
2014	24	4	25	4	1
2019	30	28	-	32	-
2024	28	-	1	-	-
year	Average Cover (%)				
2007	0.3	0.0	0.1	-	-
2010	0.9	0.2	0.2	0.1	0.0
2014	0.3	0.4	0.6	0.0	0.0
2019	0.8	0.6	-	0.1	-
2024	0.7	-	0.0	-	-

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

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

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Coleogyne ramosissima[p] (blackbrush)	Echinocereus coccineus var. coccineus (scarlet hedgehog cactus)	Ephedra torreyana (Torrey's jointfir)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum[p] (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Sclerocactus (fishhook cactus)
year	Line Intercept Cover (%)											
2007	1.7	-	4.5	-	-	-	0	4.5	3.2	-	-	-
2010	2	-	7	-	0.4	-	0.1	1.9	3	-	0.1	-
2014	1.6	-	6.4	-	0.3	0.8	0.1	2.2	2	-	-	-
2019	3.2	-	7	-	0.1	1.4	0.5	0.3	1.9	-	-	-
2024	3.9	-	7.8	-	1.6	0.4	0.4	6.3	3.4	-	-	-
year	Quadrat Cover (%)											
2007	1.9	-	4.8	0.0	-	0.6	0.3	4.4	0.8	-	0.1	-
2010	2.4	0.0	4.8	0.0	0.0	-	0.3	3.2	0.0	0.0	0.0	0.0
2014	2.0	-	5.7	-	0.0	0.1	0.3	1.4	0.0	0.0	0.0	0.0
2019	2.7	-	5.5	-	0.2	0.6	0.5	1.3	0.6	0.2	-	0.0
2024	3.7	-	4.6	-	0.8	0.2	0.3	6.3	0.0	0.2	-	0.0

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

Table 13R-02.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2007	1100	40	6	38	56	29	2	44	38/65
2010	960	-	0	81	19	17	4	13	41/69
2014	1300	-	3	74	23	32	62	17	37/67
2019	980	-	0	82	18	41	53	18	40/65
2024	1160	-	2	86	12	17	76	17	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2007	-	-	-	-	-	-	-	-	91/137
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	80	-	0	0	100	100	0	100	- / -
Coleogyne ramosissima[p] -- (blackbrush)									
2007	1680	-	6	71	23	39	0	4	27/59
2010	1880	-	3	96	1	13	3	2	24/54
2014	2120	-	0	99	1	22	69	5	27/54
2019	2240	-	4	94	3	40	52	9	29/63
2024	2200	-	14	53	33	7	92	33	- / -
Echinocereus coccineus var. coccineus -- (scarlet hedgehog cactus)									
2007	80	-	0	100	0	0	0	0	13/10
2010	40	-	0	100	0	0	0	0	14/12
2014	-	-	-	-	-	-	-	-	-/-
2019	200	-	0	100	0	30	0	0	17/24
2024	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 (%)		
Ephedra torreyana -- (Torrey's jointfir)									
2007	40	-	0	100	0	0	0	0	45/57
2010	60	-	0	100	0	0	33	0	53/78
2014	80	-	0	100	0	25	50	50	49/83
2019	140	-	0	86	14	43	0	14	61/94
2024	200	-	10	90	0	40	0	0	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2007	160	20	50	50	0	0	0	0	29/33
2010	80	-	0	100	0	0	0	0	19/31
2014	420	40	14	86	0	24	43	0	17/21
2019	180	200	0	100	0	0	0	0	17/24
2024	580	-	28	72	0	45	7	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2007	740	-	0	97	3	3	0	8	45/62
2010	180	-	89	11	0	0	0	0	92/119
2014	140	-	14	86	0	0	0	0	75/101
2019	180	1040	0	100	0	0	0	0	63/73
2024	200	-	0	70	30	30	0	40	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2007	4340	3180	12	84	3	0	0	3	25/39
2010	3140	20	14	86	0	0	0	0	21/30
2014	2260	1280	10	89	2	0	0	2	24/29
2019	4160	24040	71	27	1	0	0	1	15/16
2024	8240	-	2	91	8	0	0	8	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2007	20	-	0	100	0	0	0	0	- / -
2010	40	-	50	50	0	0	0	0	- / -
2014	60	-	67	33	0	0	0	0	- / -
2019	40	40	50	50	0	0	0	0	- / -
2024	40	-	50	50	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2007	-	-	-	-	-	-	-	-	13/22
2010	60	-	100	0	0	0	0	0	13/41
2014	60	-	33	67	0	0	0	0	13/41
2019	60	160	0	100	0	0	0	0	14/52
2024	100	-	0	100	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2007	20	-	100	0	0	0	0	0	- / -
2010	-	20	0	0	0	0	0	0	- / -
2014	-	40	0	0	0	0	0	0	- / -
2019	20	-	100	0	0	0	0	0	- / -
2024	20	-	100	0	0	0	0	0	- / -
Rhus -- (sumac)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	68/131
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	56/137
2024	-	-	-	-	-	-	-	-	-/-
Sclerocactus -- (fishhook cactus)									
2007	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	10/10
2014	80	-	0	100	0	0	0	0	9/10
2019	20	-	0	100	0	0	0	0	11/12
2024	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 (%)		
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2007	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Yucca -- (yucca)									
2007	-	-	-	-	-	-	-	-	69/134
2010	-	-	-	-	-	-	-	-	9/33
2014	-	-	-	-	-	-	-	-	19/46
2019	-	-	-	-	-	-	-	-	22/44

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

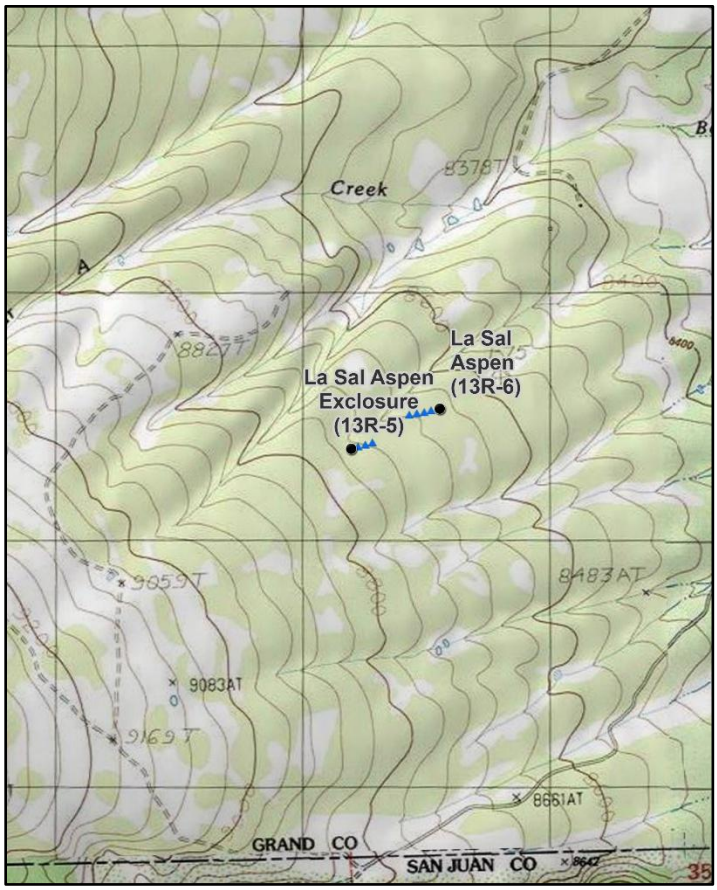
Table 13R-02.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

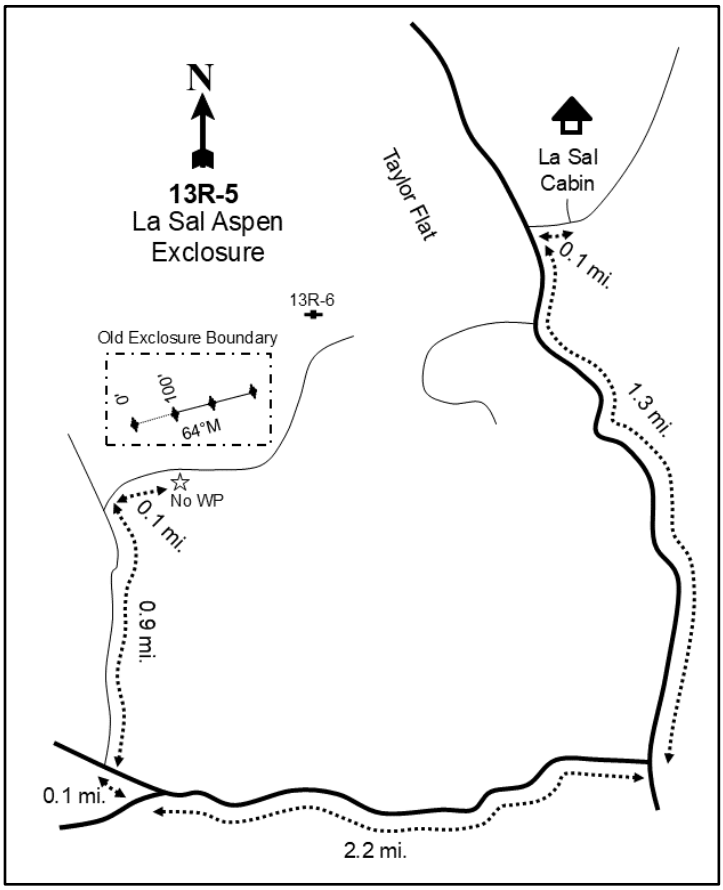
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	22	17	17	-	50	17	34.9
2010	16	10	60	-	10	20	15.5
2014	59	12	65	-	12	12	10.1
2019	61	11	78	-	6	6	7.9
2024	55	6	78	-	6	11	11.5
Pinus edulis (twoneedle pinyon)							
2007	4	75	25	-	-	-	1.8
2010	4	33	33	-	-	33	9.7
2014	7	-	100	-	-	-	4.7
2019	8	20	80	-	-	-	2.6
2024	7	-	100	-	-	-	5.0

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

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2007	6.6	5.5	2.9	6.9	-19.6	7.6	0.0	**9.9**	Very Poor-Poor
2010	9.6	13.6	1.2	10.7	-2.6	9.5	0.0	**42.0**	Fair
2014	8.5	13.4	0.4	10.8	-1.4	6.7	0.0	**38.4**	Fair
2019	11.6	12.8	1.2	12.2	-11.7	10.0	0.0	**36.1**	Fair
2024	13.2	7.5	5.4	9.0	-4.7	2.6	0.0	**33.0**	Fair

LA SAL ASPEN EXCLOSURE - STUDY NO. 13R-5





Location Information

USGS 7.5 min Map Info	Mount Waas SE; Township 26S, Range 25E, Section 26
GPS (0' Stake)	NAD 83 UTM ZONE 12, 662148 East 4264560 North

Transect Information

Browse Tag # (0' Stake)	40
Transect Bearing	64° magnetic
Length	300ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft & 71ft), Line 3 (59ft)
Belt Marker Placement	Standard

Directions to Site

Drive down the canyon from the La Sal cabin to the southwest for 0.7 miles, then turn left, traveling south on Taylors Flat. Drive for 1.3 miles, turn right, and continue for another 2.2 miles. At the intersection, drive a short 0.1 miles and turn right. Proceed for another 0.9 miles and turn right again, then drive for 0.1 miles to the exclosure: the study is on the north side of the road inside the exclosure. The 0-foot stake is approximately 12 paces north of the road and is marked with browse tag #40.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	8,682ft (2,646m)
Aspect	Northeast
Slope	9%
Sample Dates	07/18/2011, 08/06/2014, 06/24/2019, 06/25/2024

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

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

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2011	Aspen/Snowberry	NA
2014	Aspen/Snowberry	NA
2019	Aspen/Snowberry	NA
2024	Aspen/Snowberry	NA

Site Notes

The study was established in 2011 to monitor an aspen regeneration project. Livestock grazing occurs from June 15th to October 20th. Density of snowberry was not taken in 2011 due to high density and difficulty distinguishing individual plants. It was noted that pellet groups were hard to see due to thick vegetation on the site. Cattle were on the site at the time of sampling, but no cattle pellet groups were sampled in hoop data in 2011. For point-quarter density measurements, measure from the tall lone oak tree for the fifth stake. The 0-foot baseline stake could not be found in 2024 and was replaced by a full-high stake.

Site Potential

1981 - 2010 Average Annual Precipitation	26 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	F048AY506UT
States and Transitions	2011 - Current Potential State: Community Phase 2.4 2014-2019 - Current Potential State: Community Phase 2.2 2024 - Current Potential State: Community Phase 2.3

This site has existed as a stable aspen/mountain snowberry plant community since study establishment in 2011. Although browse cover has remained similar, the age structure of the aspen (*Populus tremuloides*) community has changed following the clear-cut logging treatment. The mature quaking aspen trees were removed from the site, which stimulated suckering of a dense stand of young aspen in the years after treatment (Table 13R-05.1, Table 13R-05.12, Table 13R-05.13a; WRI Database, 2024). Perennial grass and forb cover have displayed a generally decreasing trend after treatment (Table 13R-05.7). Kentucky bluegrass (*Poa pratensis*) has been the dominant grass species in the understory with sedge (*Carex* sp.) providing significant but lesser cover (Table 13R-05.10). Perennial forbs contribute significant cover as of 2024 with Nevada pea (*Lathyrus lanszwertii*) and Fendler's meadow-rue (*Thalictrum fendleri*) as the dominant species (Table 13R-05.11). Mountain snowberry (*Symphoricarpos oreophilus*) has consistently provided a high amount of browse cover (Table 13R-05.12, Table 13R-05.13). Aspen has shown an increase in intercept cover and a slight decrease in density following an initial post-treatment increase (Table 13R-05.12, Table 13R-05.13a, Table 13R-05.14). It is probable that this trend of increasing cover and decreasing density of quaking aspen will continue as the stand continues to mature.

This site likely serves as adequate summer range for mule deer due to the diverse and abundant herbaceous and shrub communities (Table 13R-05.3, Table 13R-05.10, Table 13R-05.11, Table 13R-05.12). However, the area is also known for the fall and winter occurrence of deer (Wildlife Tracker). Pellet group data indicates that both deer and elk presence have remained low since 2011 (Table 13R-05.9). Mountain snowberry and quaking aspen provide the bulk of the summer forage for wildlife; utilization of snowberry, however, has been low since study establishment. Aspen utilization was identified as being moderate when trees were young in 2011, but as trees have aged and increased in height, use of trees by wildlife has been low to absent (Table 13R-05.13, Table 13R-5.13a).

Trend Summary Tables

Table 13R-05.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	25.3	-	3.3	39.1	-	29.2
2014	22.5	-	16.0	28.3	-	35.2
2019	33.5	0.0	8.4	57.0	-	68.7
2024	37.7	0.1	3.9	56.6	-	76.3

Table 13R-05.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	-	421	61	391	-	34.0	1.5	48.1
2014	-	358	0	397	-	27.7	0.0	46.0
2019	-	291	12	353	-	15.8	0.1	38.9
2024	-	249	39	302	-	11.3	1.9	29.3

Table 13R-05.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	0.0	0.1	55.9	-	-	86.6
2014	-	0.1	62.1	-	-	85.9
2019	-	-	84.5	-	-	78.4
2024	1.3	0.1	54.2	-	-	68.0

Table 13R-05.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Black Bear	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2011	-	1	-	-	-
2019	-	-	-	1	1
2024	-	-	2	-	-
Year	Days Use Per Acre (ha)				
2011	-	-	0.7 (1.7)	1.3 (3.3)	-
2019	26.2 (64.6)*	0.7 (1.8)	-	0.7 (1.7)	-
2024	78.4 (193.7)*	-	1.3 (3.3)	2.7 (6.6)	-

*Pellets per acre (ha)

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

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Bromus inermis[i] (smooth brome)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex (sedge)	Elymus trachycaulus (slender wheatgrass)	Festuca thurberi (Thurber's fescue)	Poa pratensis[i] (Kentucky bluegrass)
year	Nested Frequency							
2011	45	-	18	23	84	126	8	391
2014	15	8	58	37	68	88	6	278
2019	7	9	42	48	121	12	9	194
2024	4	2	26	21	170	0	-	79
year	Average Cover (%)							
2011	1.4	-	0.7	0.2	4.3	3.7	0.4	23.5
2014	0.3	0.6	1.8	0.8	4.0	4.8	0.4	15.1
2019	0.3	0.4	1.2	1.6	3.3	0.3	0.9	7.8
2024	0.2	0.1	1.1	0.6	6.6	0.0	-	2.7

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

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

FORB SPECIES	Achillea millefolium (Common yarrow)	Artemisia ludoviciana (white sagebrush)	Calochortus gunnisonii (Gunnison's mariposa lily)	Chenopodium fremontii[a] (Fremont's goosefoot)	Crepis acuminata (tapertip hawksbeard)	Galium[a] (bedstraw)	Gilia inconspicua[a] (shy gilia)	Grindelia squarrosa (curlycup gumweed)	Heracleum maximum (common cowparsnip)	Hymenoxys hoopesii (owl's-claws)	Lathyrus lanszwertii (Nevada pea)	Ligusticum porteri (Porter's licorice-root)	Lupinus sericeus (silky lupine)	Phacelia heterophylla[a] (varileaf phacelia)	Potentilla gracilis (slender cinquefoil)	Pseudocymopterus montanus (alpine false springparsley)	Pseudostellaria jamesiana (tuber starwort)
year	Nested Frequency																
2011	71	3	2	-	-	58	3	-	24	-	206	-	6	-	1	14	10
2014	48	3	1	-	2	-	-	4	20	0	256	-	2	0	-	1	16
2019	14	-	10	1	2	7	-	-	22	-	166	-	3	4	1	18	3
2024	6	-	-	-	-	39	-	-	-	-	109	12	-	-	-	3	2
year	Average Cover (%)																
2011	2.0	0.0	0.0	-	-	1.5	0.0	-	1.7	-	6.9	-	0.2	-	0.0	0.3	0.1
2014	1.0	0.0	0.0	-	0.0	-	-	0.0	0.8	0.0	11.1	-	0.1	0.0	-	0.0	0.4
2019	0.3	-	0.1	0.0	0.0	0.1	-	-	1.4	-	8.8	-	0.2	0.0	0.0	0.5	0.0
2024	0.1	-	-	-	-	1.9	-	-	-	-	4.1	2.1	-	-	-	0.0	0.1

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

FORB SPECIES	Symphyotrichum (aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Vicia americana (American vetch)
year	Nested Frequency			
2011	17	33	301	204
2014	1	2	307	55
2019	-	11	272	92
2024	2	7	255	11
year	Average Cover (%)			
2011	0.3	0.5	26.4	9.5
2014	0.1	0.0	31.4	1.0
2019	-	0.3	24.5	3.0
2024	0.2	0.2	22.3	0.3

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

Table 13R-05.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Mahonia repens (creeping barberry)	Populus tremuloides[tp] (quaking aspen)	Quercus gambelii[p] (Gambel oak)	Rosa woodsii[p] (Woods' rose)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)				
2011	-	29.2	-	0.4	38.7
2014	-	35.2	-	0.5	27.8
2019	-	68.7	1	0.4	55.6
2024	-	76.3	1.9	2.2	52.5
year	Quadrat Cover (%)				
2011	-	3.3	-	0.2	25.1
2014	-	16.0	-	0.4	22.1
2019	0.0	8.4	0.0	0.9	32.5
2024	0.1	3.9	0.1	1.9	35.6

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

Table 13R-05.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2011	-	60	0	0	0	0	0	0	- / -
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-

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)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	94/64
2024	-	-	-	-	-	-	-	-	-/-
Quercus gambelii[p] -- (Gambel oak)									
2011	40	-	0	100	0	0	0	0	- / -
2014	40	-	0	100	0	0	0	0	- / -
2019	60	-	33	67	0	0	0	0	530/286
2024	40	-	50	50	0	0	0	0	- / -
Rosa woodsii[p] -- (Woods' rose)									
2011	180	-	33	67	0	0	0	0	54/37
2014	260	-	0	100	0	0	0	0	52/28
2019	460	-	9	91	0	0	0	0	69/43
2024	860	-	44	56	0	5	14	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2011	-	-	-	-	-	-	-	-	-/-
2014	8580	-	0	100	0	0	0	0	82/65
2019	9080	20	8	92	0	11	0	0	91/85
2024	10480	-	12	88	0	6	5	0	- / -

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

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

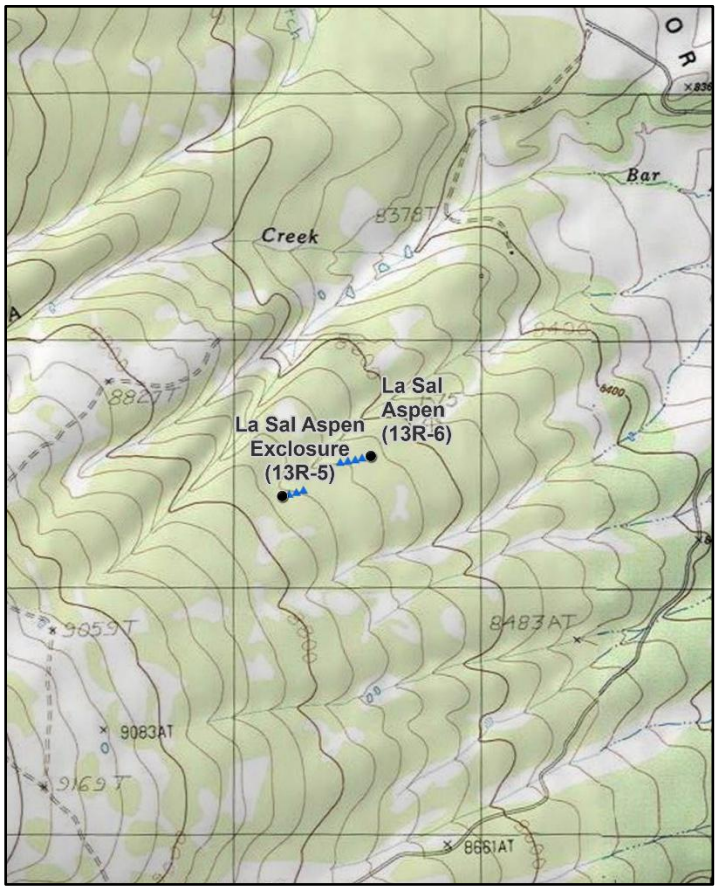
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2011	4740	21	77	-	2	24	11	1
2014	10080	0	35	64	-	0	0	0
2019	8080	1	3	67	30	14	1	0
2024	5600	0	3	14	83	0	0	0

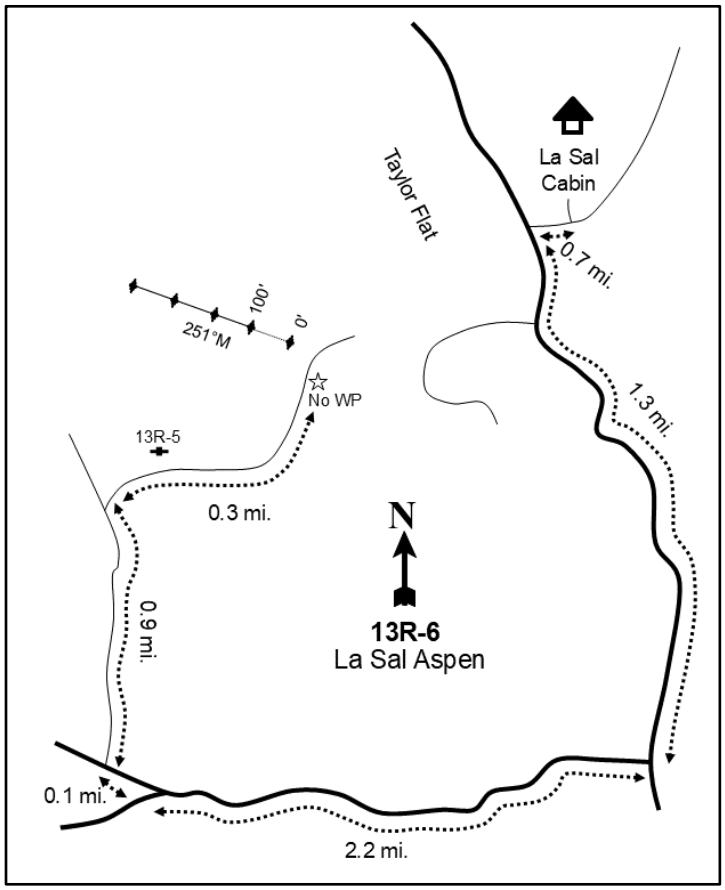
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

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

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Populus tremuloides (quaking aspen)							
2011	44	-	-	-	-	100	39.1
2014	2156	-	40	55	5	-	2.0
2019	1231	-	5	21	53	21	3.5
2024	1015	-	-	-	38	63	5.8

LA SAL ASPEN - STUDY NO. 13R-6





Location Information

USGS 7.5 min Map Info	Mount Waas SE; Township 26S, Range 25E, Section 26
GPS (0' Stake)	NAD 83 UTM ZONE 12, 662507 East 4264723 North

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	8,593ft (2,619m)
Aspect	North
Slope	10%
Sample Dates	07/19/2011, 08/06/2014, 06/25/2019, 06/26/2024

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

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

Wildlife Habitat and Vegetation History

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

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

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

Year	Vegetation Type	Woodland Succession
2011	Aspen/Snowberry	NA
2014	Aspen/Snowberry	NA
2019	Aspen/Snowberry	NA
2024	Aspen/Snowberry	NA

Site Notes

The study was established in 2011 to monitor an aspen regeneration project. Following the logging treatment, mountain snowberry (*Symphoricarpos oreophilus*) was planned to be thinned by a dozer or a skidsteer equipped with a brush rake. However, due to timing and limited access from winter storms, the snowberry was not thinned (WRI Database, 2024). Three temporary fences were constructed in areas known to experience heavy browsing within the project, and exclosure size ranged from three to eight acres. The study is located outside of the exclosure portion of the project. Livestock grazing occurs from June 15th to October 20th. Cattle, deer, and elk pellet groups were sampled in low abundance in 2011 and 2014. Cattle were present on the site at the time of sampling in 2011. It was noted that pellet groups were hard to see due to thick vegetation on the site. Density was not taken on snowberry in 2011 due to the large number of plants and the difficulty in distinguishing individual plants.

Site Potential

1981 - 2010 Average Annual Precipitation	25 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	F048AY506UT
States and Transitions	2011 - Current Potential State: Community Phase 2.4 2014-2024 - Current Potential State: Community Phase 2.2

Upon study establishment in 2011, the plant community on this site existed as a mixed stand of quaking aspen (*Populus tremuloides*) and snowberry (*Symphoricarpos oreophilus*) with some Gambel oak (*Quercus gambelii*) present; there was also a small amount of Wood's rose (*Rosa woodsii*) observed (Table 13R-06.12). The herbaceous understory was abundant with the dominant grass being Kentucky bluegrass (*Poa pratensis*) (Table 13R-06.10). Forbs were abundant and diverse with Fendler's meadow-rue (*Thalictrum fendleri*), Nevada pea (*Lathyrus lanszwertii*), and Common yarrow (*Achillea millefolium*) as the dominant species (Table 13R-06.11). After the treatment (13R-06.1), aspen cover initially decreased with large, persistent increases occurring in the 2019 and 2024 sample years (Table 13R-06.12). In addition, the age class of the quaking aspen population has shifted, with the majority of the age class moving from Class I following treatment to most of the aspen trees being considered as Class III in 2019. The age class shifted again in 2024 to Class IV, and the aging and growth of the stand is further suggested by increases in height distribution and tree diameter (Table 13R-06.13a, Table 13R-06.14).

This site likely serves as adequate summer range for mule deer due to the diverse and abundant herbaceous and shrub communities (Table 13R-06.3, Table 13R-06.10, Table 13R-06.11, Table 13R-06.12). The area is also known for the fall and winter occurrence of deer (Wildlife Tracker). However, pellet group data indicates that deer presence has remained low since 2011, while elk presence has steadily increased since study establishment and was considered moderate in 2024 (Table 13R-06.9). Mountain snowberry and quaking aspen 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; utilization of snowberry has been moderate since study establishment. Oak utilization was moderate when the study was established, but was considered heavy in 2014 and 2024 (most notably in 2014). Aspen utilization was identified as being moderate to heavy when trees were young in 2011, but as trees have aged and increased in height, use of trees by wildlife has been mostly low to absent (Table 13R-06.13, Table 13R-06.13a).

Trend Summary Tables

Table 13R-06.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	24.8	0.0	2.4	38.4	-	17.5
2014	20.1	-	2.2	33.4	-	3.0
2019	28.8	-	4.6	39.5	-	9.9
2024	36.3	-	4.6	56.0	-	16.7

Table 13R-06.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	-	409	21	383	-	35.5	0.3	46.9
2014	-	416	11	358	-	38.8	0.1	30.6
2019	-	382	51	342	-	23.6	0.8	29.6
2024	-	305	82	319	-	19.8	2.3	23.4

Table 13R-06.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	0.8	0.1	49.8	-	-	82.4
2014	0.1	0.0	63.6	0.0	-	79.2
2019	2.3	-	70.3	0.1	0.1	72.4
2024	3.1	0.1	36.3	0.0	0.4	71.6

Table 13R-06.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Black Bear	Cattle	Mule Deer	Rocky Mountain Elk
	Quadrat Frequency			
2011	-	1	-	-
2014	-	2	-	4
2019	-	5	2	16
2024	-	2	1	7
Year	Days Use Per Acre (ha)			
2011	-	8.7 (21.5)	0.7 (1.7)	2.0 (5.0)
2014	-	0.7 (1.8)	1.3 (3.3)	13.4 (33.1)
2019	-	13.8 (34.1)	4.7 (11.6)	27.5 (67.9)
2024	61.0 (150.6)*	-	1.3 (3.3)	32.8 (81.1)

*Pellets per acre (ha)

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

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Bromus inermis[i] (smooth brome)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex (sedge)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Festuca thurberi (Thurber's fescue)	Poa glauca (glaucous bluegrass)	Poa pratensis[i] (Kentucky bluegrass)
year	Nested Frequency									
2011	82	6	24	35	11	91	7	28	-	374
2014	35	17	95	4	-	55	10	64	-	368
2019	17	20	48	22	39	44	1	20	-	347
2024	19	20	32	35	44	6	9	27	6	211
year	Average Cover (%)									
2011	3.0	0.1	1.2	0.5	0.2	3.5	0.2	1.9	-	24.9
2014	1.3	0.3	3.6	0.1	-	2.0	0.1	5.0	-	26.3
2019	1.2	0.5	1.2	0.8	0.5	0.7	0.0	3.3	-	15.5
2024	0.7	1.3	1.2	1.1	1.7	0.0	0.7	3.4	0.2	9.6

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

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

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Artemisia ludoviciana (white sagebrush)	Calochortus gunnisonii (Gunnison's mariposa lily)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cirsium (thistle)	Descurainia incana[a] (mountain tansymustard)	Dracocephalum parviflorum (American dragonhead)	Erigeron flagellaris (trailing fleabane)	Erigeron speciosus (aspen fleabane)	Galium[a] (bedstraw)	Grindelia squarrosa (curlycup gumweed)	Heracleum maximum (common cowparsnip)	Hymenoxys hoopesii (owl's-claws)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Lathyrus lanszwertii (Nevada pea)
year	Nested Frequency																
2011	204	3	-	-	8	1	-	-	2	-	12	-	10	-	-	-	232
2014	205	-	3	-	6	-	-	2	-	7	6	1	6	0	-	-	207
2019	131	-	-	2	44	5	-	3	-	-	4	-	15	21	1	2	190
2024	115	2	-	-	41	6	3	-	24	6	23	-	3	4	12	3	99
year	Average Cover (%)																
2011	9.6	0.0	-	-	0.1	0.0	-	-	0.0	-	0.2	-	0.3	-	-	-	9.8
2014	11.1	-	0.0	-	0.0	-	-	0.0	-	0.3	0.1	0.0	0.1	0.0	-	-	6.5
2019	6.0	-	-	0.0	0.7	0.1	-	0.0	-	-	0.0	-	0.5	0.4	0.0	0.0	6.6
2024	4.6	0.1	-	-	1.3	0.2	0.0	-	1.0	0.3	0.2	-	0.4	0.1	0.1	0.0	2.8

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

FORB SPECIES	Ligusticum porteri (Porter's licorice-root)	Lupinus sericeus (silky lupine)	Machaeranthera canescens (hoary tansyaster)	Potentilla gracilis (slender cinquefoil)	Pseudocymopterus montanus (alpine false springparsley)	Symphyotrichum (aster)	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Tragopogon dubius[ai] (yellow salsify)	Vicia americana (American vetch)
year	Nested Frequency									
2011	-	14	-	-	3	12	34	257	-	138
2014	-	12	4	2	-	14	24	191	1	86
2019	-	13	-	2	21	59	89	120	2	63
2024	9	16	2	5	1	70	67	145	13	64
year	Average Cover (%)									
2011	-	0.9	-	-	0.0	0.1	0.7	20.7	-	4.8
2014	-	0.9	0.0	0.0	-	0.4	0.2	9.6	0.0	1.5
2019	-	0.9	-	0.0	0.7	2.9	3.8	6.0	0.0	1.5
2024	0.6	1.0	0.0	0.1	0.1	1.7	1.4	8.0	0.6	1.1

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

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

SHRUB SPECIES	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 (%)				
2011	-	17.5	7.6	0.1	30.7
2014	-	3	3.1	-	30.3
2019	-	9.9	3.1	0.1	36.3
2024	-	16.7	5.5	0.8	49.7
year	Quadrat Cover (%)				
2011	0.0	2.4	0.3	0.0	24.5
2014	-	2.2	0.9	0.1	19.1
2019	-	4.6	0.1	0.2	28.4
2024	-	4.6	0.5	1.3	34.4

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

Table 13R-06.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Quercus gambelii[p] -- (Gambel oak)									
2011	620	-	90	10	0	52	0	0	- / -
2014	760	-	100	0	0	0	92	0	- / -
2019	180	-	0	100	0	0	0	0	45/29
2024	260	-	46	54	0	0	69	0	- / -
Rosa woodsii[p] -- (Woods' rose)									
2011	60	-	0	100	0	0	0	0	56/47
2014	120	-	0	100	0	33	0	0	72/42
2019	120	-	0	100	0	0	0	0	67/42
2024	700	20	51	49	0	6	11	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2011	-	-	-	-	-	-	-	-	-/-
2014	6680	-	0	100	0	65	0	0	74/82
2019	4840	-	8	92	0	17	0	0	82/101
2024	4680	-	4	96	0	2	18	0	- / -

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

Table 13R-06.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

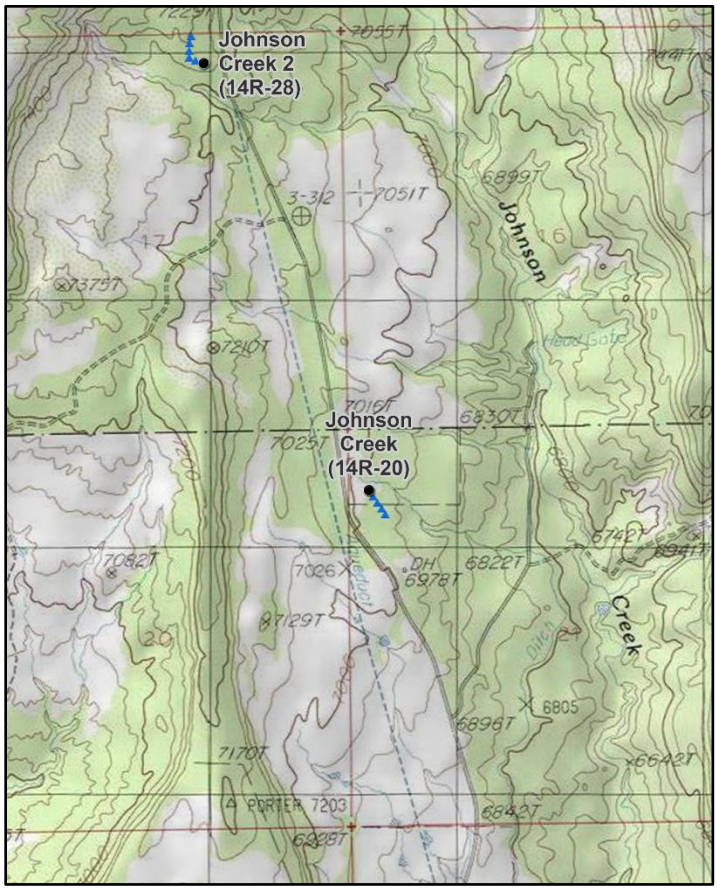
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2011	1920	33	64	2	1	31	38	0
2014	2400	4	95	1	-	37	0	0
2019	1020	-	16	63	22	26	0	0
2024	1000	-	-	34	66	24	4	0

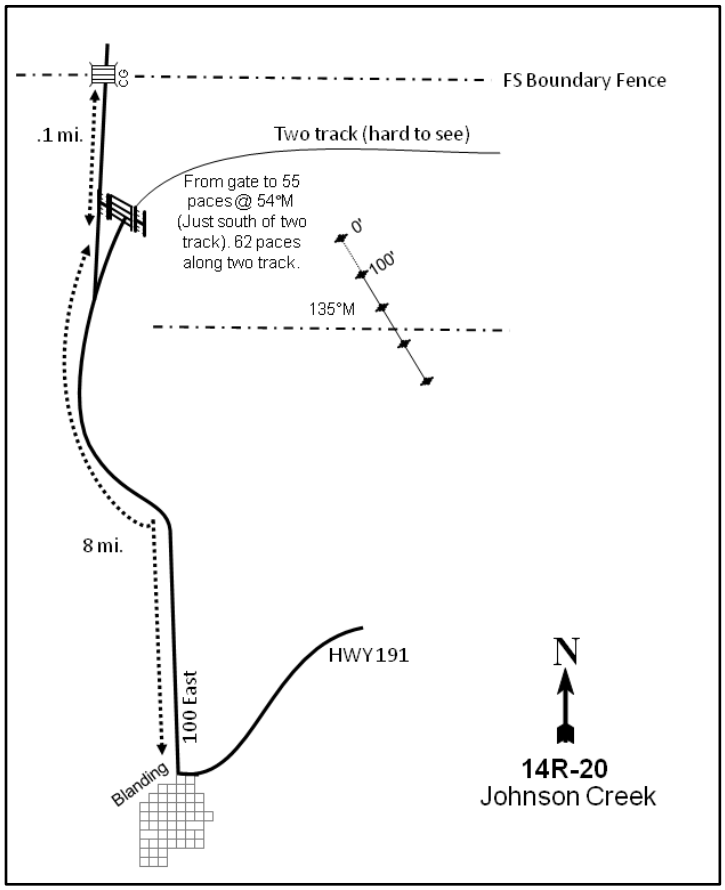
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

Table 13R-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Populus tremuloides (quaking aspen)							
2011	33	-	-	-	-	100	39.2
2014	277	6	72	22	-	-	2.2
2019	175	-	17	72	11	-	4.3
2024	205	-	-	41	53	6	5.1

JOHNSON CREEK - STUDY NO. 14R-20





Location Information

USGS 7.5 min Map Info	Mancos Jim Butte NE; Township 35S, Range 22E, Section 21
GPS (0' Stake)	NAD 83 UTM ZONE 12, 630588 East 4176434 North

Transect Information

Browse Tag # (0' Stake)	181
Transect Bearing	135° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Belts 1-3, 5: No Rebar; Line 4: 80ft Long

Directions to Site

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

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	TANK BENCH BRUSHY BASIN
Elevation	7,000ft (2,134m)
Aspect	Southeast
Slope	7%
Sample Dates	06/12/2007, 06/15/2010, 06/25/2014, 06/17/2019, 07/22/2024

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

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

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

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

Wildlife Habitat and Vegetation History

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

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

Table 14R-20.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon-Juniper	Phase III
2010	Annual Grass/Perennial Forb	Phase I
2014	Wyoming Big Sagebrush	Phase I
2019	Wyoming Big Sagebrush/Annual Grass/Perennial Forb	Phase I
2024	Wyoming Big Sagebrush	Phase I

Site Notes

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

Soils

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

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

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	2007 - Pinyon-Juniper State: Community Phase 4.1 2010-2024 - Current Potential State: Community Phase 2.3

When this study was established in 2007, it was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was classified as being within Phase III of woodland succession. Other browse species were also present, but they contributed little cover. Tree cover decreased following the lop and scatter treatment (Table 14R-20.1), but the site has remained in Phase I since 2010 (Table 14R-20.4, Table 14R-20.12, Table 14R-20.14). Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) cover has increased since treatment and it became the dominant vegetation component in 2014 (Table 14R-20.12, Table 14R-20.13). Prior to treatment, the herbaceous understory was diverse and moderately abundant. The introduced annual grass species cheatgrass (*Bromus tectorum*) has fluctuated following treatment and contributed the most herbaceous cover of any species in 2019, but has since decreased. Increased amounts of cheatgrass may pose a threat to the resilience of the plant community. Perennial grasses have increased in cover following treatment, while forbs have exhibited an overall decrease (Table 14R-20.7, Table 14R-20.10, Table 14R-20.11). Infilling by remaining pinyon and juniper could cause the site to again transition to a tree-

dominated state in future sample years.

Mule deer habitat conditions have varied between poor and good since 2007. Habitat condition is considered good as of 2024, and is generally limited by a reduced amount of perennial grass and forb cover, and the presence of annual grass, which has been high in cover at times. Deer and elk presence have remained low over the course of the study, except in 2024 where deer presence was moderate (Table 14R-20.9). Mountain big sagebrush provides much of the winter forage for wildlife. Utilization of sagebrush was high when the population was much smaller; however, as the density and cover of sagebrush has grown, utilization pressure has decreased. More specifically, 42% of mountain big sagebrush plants sampled in density strips were moderately to heavily hedged in 2024 (Table 14R-20.13).

Trend Summary Tables

Table 14R-20.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	4.3	0.0	8.9	6.5	-	41.9
2010	5.1	-	0.7	5.4	0.1	9.1
2014	7.9	0.1	0.7	8.1	0.4	4.3
2019	14.4	0.0	0.8	23.7	-	2.8
2024	14.8	0.2	3.0	26.3	-	6.4

Table 14R-20.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	310	82	329	118	4.0	1.2	3.8	4.5
2010	378	109	129	122	18.1	3.5	1.8	14.1
2014	298	161	176	248	7.0	4.0	4.5	6.4
2019	347	112	310	286	18.3	3.3	12.6	18.6
2024	112	129	153	90	2.0	4.3	2.4	1.6

Table 14R-20.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	28.6	3.8	55.7	0.1	0.0	24.2
2010	15.4	-	60.6	-	-	41.2
2014	27.2	0.0	52.6	0.0	-	32.8
2019	27.9	-	36.5	0.1	0.0	55.8
2024	35.8	0.9	51.5	0.1	0.0	25.9

Table 14R-20.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	9	1	1	82
2010	5	5	1	2
2014	6	6	6	46
2019	10	1	-	5
2024	12	20	4	26
Year	Days Use Per Acre (ha)			
2007	27.6 (68.1)	11.4 (28.1)	0.7 (1.7)	-
2010	10.9 (26.9)	8.7 (21.5)	2.0 (5.0)	-
2014	1.5 (3.6)	0.7 (1.7)	-	-
2019	25.4 (62.8)	4.7 (11.6)	2.7 (6.6)	-
2024	80.6 (199.0)	32.8 (81.1)	4.0 (9.9)	-

Table 14R-20.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron fragile[i] (Siberian wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa[i] (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency														
2007	9	-	10	257	0	23	-	-	-	-	-	3	44	-	154
2010	4	21	6	378	-	48	19	-	5	-	-	3	21	-	-
2014	1	11	25	294	-	42	53	7	26	-	-	14	22	3	44
2019	3	7	11	329	-	24	26	4	27	0	7	2	0	12	59
2024	1	-	2	109	-	37	9	-	30	-	6	-	1	48	5
year	Average Cover (%)														
2007	0.2	-	0.0	3.1	0.0	0.1	-	-	-	-	-	0.0	0.8	-	0.9
2010	0.2	0.6	0.2	18.1	-	1.0	0.5	-	0.0	-	-	0.1	1.0	-	-
2014	0.0	0.0	0.7	6.9	-	0.8	1.6	0.1	0.1	-	-	0.3	0.3	0.0	0.1
2019	0.0	0.4	0.4	17.9	-	0.6	0.6	0.2	0.7	0.0	0.1	0.0	0.0	0.3	0.4
2024	0.1	-	0.0	2.0	-	1.5	0.2	-	0.8	-	0.1	-	0.0	1.6	0.0

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

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

FORB SPECIES	Allium (onion)	Alyssum desertorum[ai] (desert madwort)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chamaesyce (sandmat)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cirsium (thistle)	Collinsia parviflora[a] (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Cryptantha bakeri (Baker's cryptantha)	Descurainia pinnata[a] (western tansymustard)
year	Nested Frequency																
2007	-	-	16	3	-	20	2	240	-	-	-	-	131	-	14	-	14
2010	3	-	-	13	-	9	-	43	-	6	-	3	5	2	7	-	6
2014	-	5	-	3	12	6	-	9	-	3	-	-	1	-	20	1	14
2019	5	0	12	-	10	17	-	66	-	44	11	3	43	4	-	2	48
2024	-	-	-	-	1	3	-	-	11	21	-	-	3	-	3	-	3
year	Average Cover (%)																
2007	-	-	0.0	0.0	-	0.2	0.0	2.6	-	-	-	-	0.6	-	0.0	-	0.1
2010	0.0	-	-	0.3	-	0.4	-	0.4	-	0.0	-	0.1	0.1	0.0	0.3	-	0.0
2014	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.0	-	-	0.0	-	0.1	0.1	0.2
2019	0.0	0.0	0.1	-	0.0	0.1	-	0.2	-	0.3	0.0	0.0	0.7	0.0	-	0.0	0.7
2024	-	-	-	-	0.0	0.0	-	-	0.0	1.0	-	-	0.0	-	0.0	-	0.0

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

FORB SPECIES	Draba[a] (draba)	Erigeron (fleabane)	Eriogonum (buckwheat)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Erodium cicutarium[ai] (redstem stork's bill)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gilia inconspicua[a] (shy gilia)	Heterotheca villosa (hairy false goldenaster)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Lepidium[a] (pepperweed)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa[i] (alfalfa)	Mentzelia albicaulis[a] (whitestem blazingstar)	Microsteris gracilis[a] (slender phlox)
year	Nested Frequency																
2007	151	-	-	-	1	3	-	2	-	-	14	-	68	-	-	-	-
2010	-	3	4	-	6	3	7	13	-	9	29	-	81	5	-	-	13
2014	13	150	10	-	-	33	-	3	-	1	104	-	94	17	-	4	24
2019	88	221	7	-	-	76	21	59	-	6	147	8	79	47	1	-	111
2024	2	6	0	1	-	-	5	-	1	-	2	2	38	16	13	-	55
year	Average Cover (%)																
2007	0.4	-	-	-	0.0	0.0	-	0.0	-	-	0.0	-	3.6	-	-	-	-
2010	-	0.0	0.0	-	0.0	0.0	0.0	0.1	-	0.0	0.3	-	12.6	0.0	-	-	0.0
2014	0.1	0.8	0.0	-	-	0.4	-	0.0	-	0.0	0.6	-	5.0	0.0	-	0.0	0.1
2019	0.6	2.6	0.1	-	-	1.7	0.2	0.8	-	0.1	4.9	0.0	15.2	0.3	0.0	-	1.8
2024	0.0	0.1	0.0	0.0	-	-	0.0	-	0.0	-	0.1	0.0	1.0	0.1	0.2	-	0.3

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

FORB SPECIES	Oenothera (evening primrose)	Packera multilobata (lobeleaf groundsel)	Pedicularis centranthera (dwarf lousewort)	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Plantago patagonica[a] (woolly plantain)	Polygonum douglasii[a] (Douglas' knotweed)	Portulaca oleracea[ai] (little hogweed)	Salsola tragus[ai] (prickly Russian thistle)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Silene antirrhina[a] (sleepy silene)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius[ai] (yellow salsify)	Verbascum thapsus[ai] (common mullein)
year	Nested Frequency													
2007	-	-	14	5	10	-	9	-	2	-	1	-	1	-
2010	-	-	-	3	5	-	28	-	-	0	7	-	-	22
2014	4	1	7	10	9	-	5	-	-	-	2	-	-	38
2019	5	14	2	4	6	5	44	-	-	-	2	2	-	15
2024	1	2	-	-	4	1	8	84	-	-	-	5	-	-
year	Average Cover (%)													
2007	-	-	0.5	0.0	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-
2010	-	-	-	0.0	0.0	-	0.1	-	-	0.0	0.1	-	-	0.5
2014	0.1	0.0	0.1	0.0	0.0	-	0.0	-	-	-	0.0	-	-	3.1
2019	0.0	0.1	0.0	0.1	0.0	0.0	0.4	-	-	-	0.0	0.0	-	0.0
2024	0.0	0.0	-	-	0.0	0.0	0.0	0.9	-	-	-	0.1	-	-

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

Table 14R-20.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia fragilis (brittle pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Quercus gambelii[p] (Gambel oak)
year	Line Intercept Cover (%)						
2007	3.9	0.6	-	15.9	0	26	2
2010	1.8	1.8	-	3	0.1	6.1	1.8
2014	1.1	6.7	-	0.9	0.4	3.4	0.3
2019	5.2	11	-	0.7	-	2.1	7.5
2024	6.9	13.3	-	1.5	-	4.9	6.1
year	Quadrat Cover (%)						
2007	2.6	1.1	-	3.9	0.0	5.0	0.6
2010	1.0	3.2	-	0.0	0.0	0.7	0.9
2014	0.3	7.6	-	0.2	0.1	0.5	0.0
2019	3.1	10.4	0.0	0.4	0.0	0.4	0.8
2024	3.0	10.9	0.1	2.0	0.0	1.0	0.8

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

Table 14R-20.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2007	320	60	25	69	6	0	38	13	160/158
2010	280	-	36	64	0	29	36	0	113/125
2014	200	-	20	80	0	30	30	0	71/81
2019	160	-	13	88	0	50	13	0	106/123
2024	560	20	50	50	0	79	18	0	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2007	700	200	6	17	77	54	23	69	49/65
2010	700	3020	20	80	0	29	11	0	48/66
2014	4160	80	33	67	0	47	0	1	42/57
2019	3120	-	39	58	4	5	0	4	58/80
2024	3760	14120	9	88	4	10	32	4	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	20	100	0	100	0	0	0	0	28/25
2024	120	-	0	100	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2007	320	-	25	75	0	0	0	6	- / -
2010	120	-	83	17	0	0	0	0	- / -
2014	100	-	80	20	0	0	0	0	- / -
2019	40	-	50	50	0	0	0	0	- / -
2024	40	-	0	100	0	0	0	0	- / -

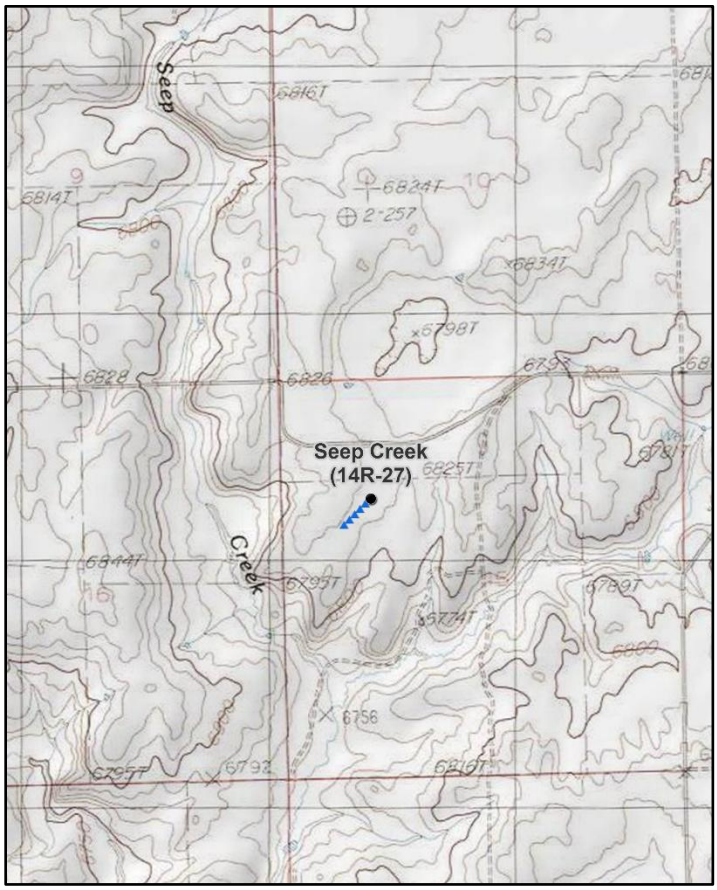
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Opuntia fragilis -- (brittle pricklypear)									
2007	160	-	50	25	25	0	0	38	7/27
2010	60	-	0	100	0	0	0	33	6/17
2014	240	-	17	83	0	0	0	0	8/17
2019	40	-	50	50	0	0	0	0	8/16
2024	80	-	0	100	0	0	0	0	- / -
Peraphyllum ramosissimum[p] -- (wild crab apple)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	52/138
2019	-	-	-	-	-	-	-	-	112/155
2024	-	-	-	-	-	-	-	-	-/-
Pediocactus simpsonii -- (mountain ball cactus)									
2007	-	-	-	-	-	-	-	-	6/11
2010	40	-	100	0	0	0	0	0	4/9
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2007	460	180	56	39	4	0	0	4	- / -
2010	60	40	67	33	0	0	0	0	- / -
2014	140	20	86	14	0	0	0	0	- / -
2019	120	-	100	0	0	0	0	0	- / -
2024	200	-	60	40	0	0	0	0	- / -
Quercus gambelii[p] -- (Gambel oak)									
2007	660	20	39	55	6	0	0	6	294/201
2010	340	-	53	47	0	0	0	0	51/120
2014	60	-	100	0	0	0	0	0	205/235
2019	1300	20	92	8	0	6	0	0	157/90
2024	2880	-	97	0	3	23	53	3	- / -
Tetradymia canescens -- (spineless horsebrush)									
2007	-	-	-	-	-	-	-	-	29/48
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	34/39
2019	-	-	-	-	-	-	-	-	65/118

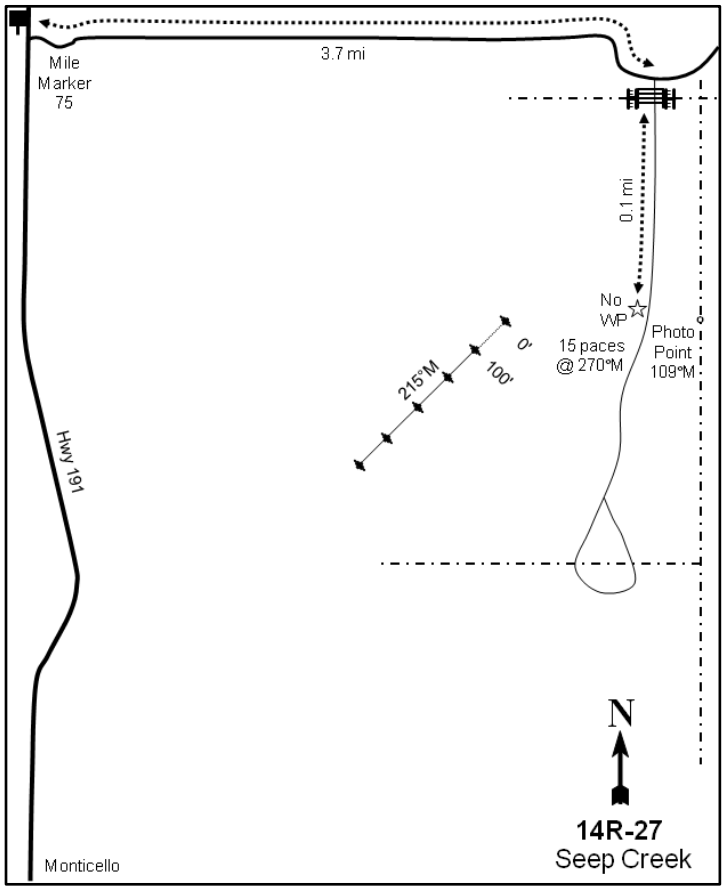
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 14R-20.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	112	-	11	6	44	39	17.6
2010	25	27	64	-	-	9	6.5
2014	57	20	80	-	-	-	3.2
2019	51	13	44	31	6	6	6.6
2024	61	6	24	59	6	6	11.2
Pinus edulis (twoneedle pinyon)							
2007	431	35	20	15	20	10	5.5
2010	57	27	40	7	7	20	8.0
2014	53	19	63	6	-	13	6.4
2019	57	5	70	10	-	15	8.0
2024	65	11	39	33	6	11	8.7

SEEP CREEK - STUDY NO. 14R-27





Location Information

USGS 7.5 min Map Info	Monticello North SE; Township 33S, Range 24E, Section 15
GPS (0' Stake)	NAD 83 UTM ZONE 12, 651361 East 4197447 North

Transect Information

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

Directions to Site

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

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,824ft (2,080m)
Aspect	South
Slope	3%
Sample Dates	06/21/2012, 08/31/2015, 06/18/2019, 07/22/2024

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

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

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

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

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

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

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

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

Wildlife Habitat and Vegetation History

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

Species	Habitat	Season
Mule Deer	crucial	spring/fall

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

Year	Vegetation Type	Woodland Succession
2012	Annual Grass-Forb	No Encroachment
2015	Annual Grass-Forb	No Encroachment
2019	Annual Grass-Forb	No Encroachment
2024	Mountain Big Sagebrush/Annual Grass	No Encroachment

Site Notes

In the fall of 2012, approximately 130 acres were sprayed with Plateau (Imazapic) herbicide, disked, and drill seeded with grass and forb species and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Table 14R-27.2). In the spring of 2013, approximately 5,240 bareroot plugs of sagebrush stock were planted on 40 acres. In the fall of 2013, the site was reseeded with a seed mix recommended by the NRCS because the first seeding appeared to not have been successful: this seed mix is not available, but is said to be similar to the first. In addition, in April of 2014, approximately 10,000 bareroot sagebrush plugs were planted to improve the bareroot plantings from 2013. Two does were seen on site in 2024.

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	2012-2024 - State Undefined: Community Phase Undefined

Between 2012 and 2019 the plant community on this site was in an annual grass-forb community type. The annual grass species cheatgrass (*Bromus tectorum*) and cereal rye (*Secale cereale*) and the annual forb redstem stork's bill (*Erodium cicutarium*) were the dominant species in 2019 (Table 14R-27.10, Table 14R-27.11), although restoration seedings have tried to increase desired rangeland species (Table 14R-27.1). Shrubs were rare immediately following treatment, but mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) had a substantial increase in both cover and density in 2024. These increases in sagebrush cover and density (Table 14R-27.12, Table 14R-27.13) indicate that this site may have the potential to transition to a sagebrush-dominated state in the future.

Deer habitat conditions have varied between very poor and poor-fair since 2012. Habitat condition is considered to be poor-fair as of 2024, and is generally limited by a reduced amount of preferred browse cover, perennial grass and forb cover, and the presence of annual grass (Table 14R-27.15). Pellet group data shows that deer/sheep presence has remained low over the course of the study, except in 2024 when deer and/or sheep presence was moderate (Table 14R-27.9). Mountain big sagebrush provides much of the current winter forage for wildlife. Utilization of sagebrush has been low over the sample years, and only 8% of plants sampled in density strips were heavily browsed in 2024 (Table 14R-27.13).

Trend Summary Tables

Table 14R-27.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	-	-	-	-	-	-
2015	0.4	0.0	-	0.2	-	-
2019	3.0	-	-	1.7	-	-
2024	11.2	0.4	-	13.3	0.1	-

Table 14R-27.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	389	2	266	88	23.5	0.0	15.3	2.0
2015	434	14	389	121	31.3	1.0	27.7	2.9
2019	412	64	445	194	17.9	1.6	35.9	10.1
2024	332	149	189	201	15.6	6.5	2.1	8.6

Table 14R-27.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	47.7	-	14.0	-	2.7	45.8
2015	26.0	0.0	36.9	0.0	0.4	58.1
2019	29.0	0.2	36.4	0.3	0.7	56.2
2024	38.4	-	37.1	0.2	0.9	41.1

Table 14R-27.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer/Domestic Sheep	Rabbit
	Quadrat Frequency			
2012	-	-	-	2
2015	2	-	2	24
2019	7	-	25	74
2024	5	-	14	42
Year	Days Use Per Acre (ha)			
2012	-	8.7 (21.5)*	0.7 (1.7)	-
2015	2.2 (5.4)	-	10.0 (24.8)	-
2019	13.8 (34.1)	-	12.1 (29.8)	-
2024	1.5 (3.6)	-	33.5 (82.8)	-

*Pellets per acre (ha)

Table 14R-27.10 - 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)	Muhlenbergia richardsonis (mat muhly)	Pascopyrum smithii (western wheatgrass)	Psathyrostachys juncea[i] (Russian wildrye)	Secale cereale[ai] (cereal rye)	Sporobolus cryptandrus (sand dropseed)	Triticum aestivum[ai] (common wheat)
year	Nested Frequency										
2012	2	344	-	-	-	-	-	-	111	-	65
2015	7	417	1	1	-	-	5	-	190	4	-
2019	6	410	7	3	-	9	29	9	174	7	1
2024	33	332	-	-	5	3	78	26	3	10	-
year	Average Cover (%)										
2012	0.0	15.0	-	-	-	-	-	-	7.9	-	0.6
2015	0.3	25.1	0.1	0.1	-	-	0.2	-	6.2	0.2	-
2019	0.3	14.0	0.0	0.0	-	0.5	0.6	0.2	3.9	0.0	0.0
2024	1.6	15.4	-	-	0.4	0.1	3.3	1.0	0.2	0.1	-

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

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

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Camelina microcarpa[ai] (littlepod false flax)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cirsium (thistle)	Cirsium undulatum[a] (wavyleaf thistle)	Convolvulus arvensis[ni] (field bindweed)	Descurainia pinnata[a] (western tansymustard)	Descurainia sophia[ai] (herb sophia)	Erodium cicutarium[ai] (redstem stork's bill)	Helianthus annuus[a] (common sunflower)	Heterotheca villosa (hairy false goldenaster)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa[i] (alfalfa)
year	Nested Frequency																
2012	-	-	24	26	2	-	-	87	33	31	36	1	-	26	-	-	-
2015	2	-	-	-	28	-	-	103	3	-	37	4	-	1	-	5	0
2019	6	1	-	30	4	3	2	147	60	-	417	-	2	35	45	8	3
2024	3	-	-	49	-	-	3	151	-	-	33	-	-	3	-	0	-
year	Average Cover (%)																
2012	-	-	0.6	0.2	0.0	-	-	2.0	0.8	1.1	2.0	0.0	-	0.2	-	-	-
2015	0.3	-	-	-	0.3	-	-	2.3	0.0	-	0.1	0.0	-	0.0	-	0.1	0.0
2019	0.5	0.0	-	0.1	0.0	0.0	0.0	8.8	0.7	-	27.5	-	0.1	0.1	0.6	0.0	0.0
2024	0.5	-	-	0.2	-	-	0.0	5.9	-	-	0.2	-	-	0.0	-	0.0	-

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

FORB SPECIES	Microsteris gracilis[a] (slender phlox)	Oenothera pallida[a] (pale evening primrose)	Onobrychis viciifolia[i] (sainfoin)	Orobanche fasciculata (clustered broomrape)	Polygonum aviculare[i] (prostrate knotweed)	Polygonum douglasii[a] (Douglas' knotweed)	Portulaca oleracea[ai] (little hogweed)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)	Trifolium (clover)	Verbesina encelioides[a] (golden crownbeard)
year	Nested Frequency													
2012	2	29	-	-	6	-	-	61	-	167	4	-	-	-
2015	-	20	4	-	7	-	4	378	5	22	5	-	4	20
2019	4	49	-	1	35	8	-	71	3	266	22	2	2	-
2024	-	9	-	4	16	22	58	91	-	24	60	-	-	-
year	Average Cover (%)													
2012	0.1	0.2	-	-	0.0	-	-	0.9	-	9.3	0.0	-	-	-
2015	-	0.3	0.1	-	0.0	-	0.0	25.8	0.1	0.8	0.0	-	0.0	0.4
2019	0.0	0.8	-	0.0	0.1	0.0	-	0.2	0.0	5.9	0.3	0.1	0.0	-
2024	-	0.3	-	0.4	0.1	0.0	0.4	0.6	-	0.3	1.8	-	-	-

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

Table 14R-27.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept	
2012	-	-
2015	0.2	-
2019	1.7	-
2024	13.3	0.1
year	Quadrat Cover (%)	
2012	-	-
2015	0.4	0.0
2019	3.0	-
2024	11.2	0.4

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

Table 14R-27.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

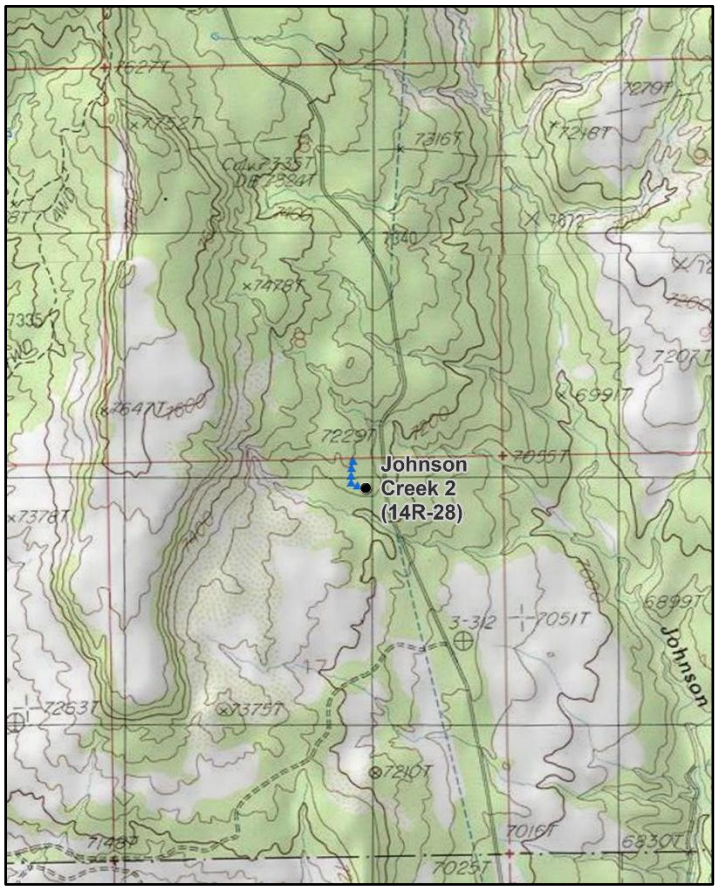
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	-	-	-	-	-	-	-	-	90/172
2015	320	-	56	44	0	0	0	0	36/34
2019	380	13820	21	79	0	11	0	0	51/62
2024	20480	4640	78	22	0	0	8	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2012	-	-	-	-	-	-	-	-	32/60
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	27/24
2024	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	100	0	0	0	0	0	21/19
2019	-	-	-	-	-	-	-	-	-/-
2024	560	-	79	21	0	0	0	0	- / -

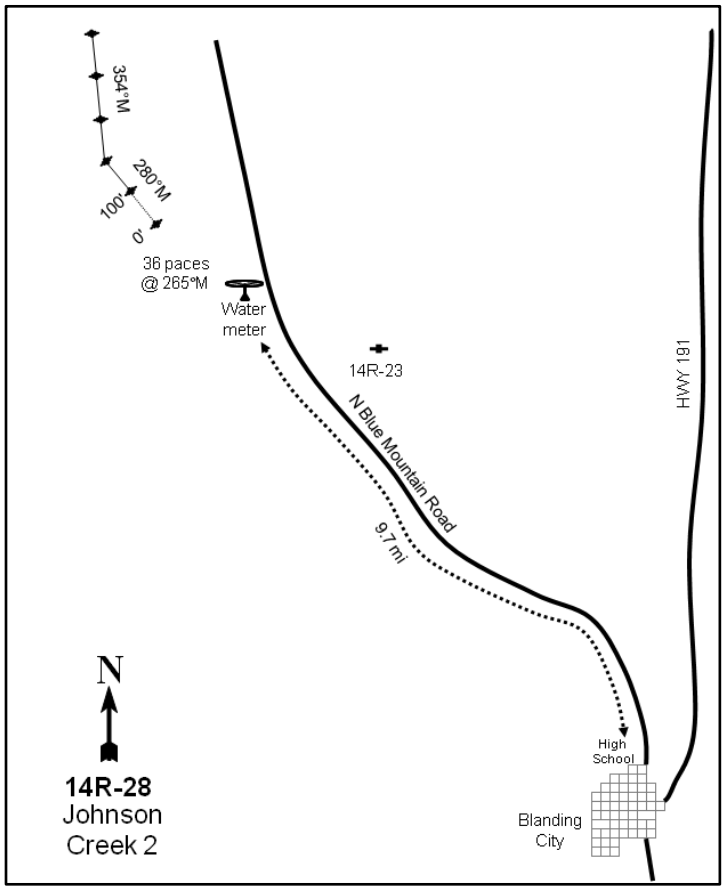
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 14R-27.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2012	0.0	0.0	0.0	0.0	-17.6	0.1	-2.0	**-19.5**	Very Poor
2015	0.3	0.0	0.0	2.0	-20.0	1.2	-2.0	**-18.5**	Very Poor
2019	2.1	0.0	0.0	3.3	-13.4	2.5	-2.0	**-7.5**	Very Poor
2024	16.6	14.9	15.0	12.9	-11.7	5.5	-2.0	**51.2**	Poor-Fair

JOHNSON CREEK 2 - STUDY NO. 14R-28





Location Information

USGS 7.5 min Map Info	Mancos Jim Butte NE; Township 35S, Range 22E, Section 17
GPS (0' Stake)	NAD 83 UTM ZONE 12, 629919 East 4178163 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	280° magnetic (Lines 3-5: 354° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Drive from Blanding High School and travel north on North Blue Mountain Road for 9.7 miles. At this point, a water meter will be on the left (west) side of the road. Walk 36 paces from the water meter at 265 degrees magnetic to the site; the 0-foot stake is not marked by a browse tag.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	CAMP JACKSON
Elevation	7,243ft (2,208m)
Aspect	South
Slope	10%
Sample Dates	06/19/2012, 09/01/2015, 07/31/2019, 07/23/2024

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Johnson Creek Hazard Fuel Project	2265	October 2013-June 2014	266

Wildlife Habitat and Vegetation History

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

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

Table 14R-28.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon-Juniper	Phase III
2015	Gambel Oak	Phase I
2019	Gambel Oak	Phase I
2024	Gambel Oak	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Mountain Loam (Oak)
NRCS Ecological Site #	R048AY415UT
States and Transitions	2012 - Current Potential State: Community Phase 2.3 2015-2024 - Current Potential State: Community Phase 2.1

When the study was established in 2012, this site existed in a conifer-dominated state with twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) as the primary conifer species; the shrub understory was dominated by Gambel oak (*Quercus gambelii*) (Table 14R-28.12). Tree cover decreased following the bullhog treatment (Table 14R-28.1), and Gambel oak became the dominant vegetation component in 2015 (Table 14R-28.12, Table 14R-28.13, Table 14R-28.14). The herbaceous understory was sparse with low diversity and cover prior to treatment, but has since increased: the introduced annual grass species cheatgrass (*Bromus tectorum*), a mixture of native perennial grasses, and perennial forbs contributed the most herbaceous cover in 2024 (Table 14R-28.7, Table 14R-28.10, Table 14R-28.11). Although cover and density have been low (Table 14R-28.12, Table 14R-28.14), the post-treatment presence of pinyon and juniper indicates that this site may have the potential to be infilled in future sample years.

Mule deer habitat conditions have varied between poor-fair and fair since 2012. Habitat condition is considered fair as of 2024, and is generally limited by low perennial grass and forb cover. Deer presence was moderate in 2024, but all previous sample years have had low presence; elk presence has been absent to low since study establishment (Table 14R-28.9). Gambel oak provides much of the forage for wildlife, and utilization has ranged from low to heavy. However, utilization of oak was notably higher in 2019, when 43% of plants sampled in density strips were moderately browsed and 47% were heavily hedged (Table 14R-28.13). It should be noted that this community is susceptible to severe drought and/or heavy utilization which could lead to a decrease in preferred browse abundance and loss of utility for wildlife. Utah serviceberry (*Amelanchier utahensis*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) provide additional forage, but the populations are limited. Utilization of serviceberry has been heavy since 2015, however, and overall density and cover have decreased over the course of the study. Again, prolonged browsing pressures on serviceberry or sagebrush could lead to a decrease in their abundance and loss of their utility for wildlife.

Trend Summary Tables

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

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	23.8	0.4	11.8	32.7	0.4	43.8
2015	12.8	0.5	0.0	16.4	-	4.3
2019	20.6	0.6	0.0	26.8	1.0	3.9
2024	26.4	1.2	0.3	33.3	2.2	4.9

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

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	-	41	22	72	-	0.6	0.0	1.3
2015	-	60	58	48	-	1.9	0.9	1.9
2019	130	83	183	105	4.7	5.0	3.5	3.0
2024	123	106	38	78	3.4	3.4	1.4	3.7

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

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	12.3	1.4	73.5	1.9	6.2	36.2
2015	16.1	0.0	71.8	1.6	4.7	15.6
2019	17.0	-	65.5	2.1	7.2	32.0
2024	14.7	0.1	60.7	0.9	7.6	38.2

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

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2012	-	-	1	3
2015	-	9	2	1
2019	4	19	4	4
2024	2	22	3	7
Year	Days Use Per Acre (ha)			
2012	-	1.3 (3.3)	2.7 (6.6)	-
2015	-	8.7 (21.5)	-	-
2019	0.7 (1.8)	18.7 (46.3)	3.4 (8.3)	-
2024	2.9 (7.2)	28.8 (71.2)	8.7 (21.5)	-

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

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum[ai] (cheatgrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)
year	Nested Frequency						
2012	-	-	40	-	-	3	-
2015	-	-	30	1	5	25	6
2019	2	130	30	12	13	16	11
2024	13	123	25	35	19	22	-
year	Average Cover (%)						
2012	-	-	0.5	-	-	0.0	-
2015	-	-	0.8	0.0	0.0	0.6	0.5
2019	0.2	4.7	1.7	0.9	1.1	0.4	0.7
2024	0.9	3.4	1.0	0.6	0.6	0.3	-

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

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

FORB SPECIES	Arabis holboellii[a] (Holboell's rockcress)	Arabis pulchra (beautiful rockcress)	Astragalus (milkvetch)	Cirsium (thistle)	Cirsium vulgare[ai] (bull thistle)	Collinsia parviflora[a] (maiden blue eyed Mary)	Conyza canadensis[a] (Canadian horseweed)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Erigeron divergens[a] (spreading fleabane)	Erigeron flagellaris (trailing fleabane)	Eriogonum alatum (winged buckwheat)	Erodium cicutarium[ai] (redstem stork's bill)	Gayophytum ramosissimum[a] (pinyon groundsmoke)
year	Nested Frequency																
2012	22	-	2	-	-	-	-	-	9	-	0	-	-	-	5	-	-
2015	25	12	-	0	-	-	-	1	4	-	20	4	-	0	-	0	1
2019	8	-	-	12	9	50	26	4	-	1	52	2	-	16	-	-	19
2024	4	-	1	-	-	-	-	6	2	4	3	-	1	3	-	9	-
year	Average Cover (%)																
2012	0.0	-	0.0	-	-	-	-	-	0.0	-	0.0	-	-	-	0.1	-	-
2015	0.4	0.3	-	0.3	-	-	-	0.0	0.0	-	0.2	0.0	-	0.0	-	0.0	0.0
2019	0.1	-	-	0.0	0.3	0.4	0.2	0.0	-	0.0	0.7	0.0	-	0.2	-	-	0.1
2024	0.0	-	0.0	-	-	-	-	0.2	0.0	0.2	0.0	-	0.0	0.1	-	0.3	-

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

FORB SPECIES	Gilia inconspicua[a] (shy gilia)	Helianthella microcephala (purpledisk helianthella)	Heterotheca villosa (hairy false goldenaster)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola[ai] (prickly lettuce)	Machaeranthera grindelioides (rayless tansyaster)	Microsteris gracilis[a] (slender phlox)	Oenothera (evening primrose)	Packera streptanthifolia (Rocky Mountain groundsel)	Pedicularis centranthera (dwarf lousewort)	Phlox hoodii (spiny phlox)	Physaria (twinpod)	Polygonum douglasii[a] (Douglas' knotweed)	Tetraneuris acaulis (stemless four-nerve daisy)	Trifolium (clover)	Verbascum thapsus[ai] (common mullein)
year	Nested Frequency															
2012	-	21	-	4	-	-	-	-	-	27	7	1	-	-	-	-
2015	8	22	3	-	7	-	-	-	2	-	3	3	6	-	5	-
2019	17	45	5	-	75	2	25	-	34	-	4	15	39	0	-	4
2024	-	31	6	2	4	8	1	1	8	-	7	1	8	-	6	14
year	Average Cover (%)															
2012	-	0.5	-	0.0	-	-	-	-	-	0.6	0.1	0.0	-	-	-	-
2015	0.0	1.2	0.0	-	0.1	-	-	-	0.0	-	0.0	0.0	0.2	-	0.0	-
2019	0.4	1.7	0.6	-	0.5	0.2	0.1	-	0.1	-	0.0	0.0	0.4	0.0	-	0.2
2024	-	1.9	0.6	0.0	0.0	0.1	0.0	0.0	0.2	-	0.2	0.0	0.0	-	0.1	0.9

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

Table 14R-28.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Cercocarpus montanus[p] (alderleaf mountain mahogany)	Chrysothamnus depressus[p] (longflower rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia fragilis (brittle pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis[t] (twoneedle pinyon)	Pinus ponderosa[t] (ponderosa pine)	Purshia tridentata[p] (antelope bitterbrush)	Quercus gambelii[p] (Gambel oak)
year	Line Intercept Cover (%)											
2012	5.6	0.5	0.2	-	0.3	13.8	0.1	-	30	-	-	26.4
2015	0.5	-	-	-	-	-	-	-	4.3	-	-	15.9
2019	0.2	0.7	-	-	1	-	0	-	3.9	-	-	25.9
2024	0.5	1	-	0.4	2.2	0.3	-	-	4	0.6	-	31.4
year	Quadrat Cover (%)											
2012	3.8	1.5	0.4	-	0.2	3.2	0.2	-	8.6	-	-	18.1
2015	0.4	-	-	-	0.2	-	0.3	-	0.0	-	-	12.4
2019	0.6	0.0	-	0.0	0.5	-	0.2	-	0.0	-	-	20.1
2024	0.1	0.3	-	0.3	1.2	0.0	-	0.0	0.1	0.1	1.0	24.6

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

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

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2012	440	60	32	68	0	0	0	0	238/272
2015	540	-	70	30	0	37	56	33	36/73
2019	400	-	35	65	0	5	75	0	43/60
2024	180	-	22	78	0	0	67	0	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	120	-	33	67	0	33	0	17	39/54
2015	20	20	0	100	0	0	0	0	36/72
2019	300	40	33	67	0	13	7	0	39/60
2024	400	-	0	100	0	85	0	0	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2012	20	-	0	100	0	0	0	0	142/132
2015	-	-	-	-	-	-	-	-	58/122
2019	-	-	-	-	-	-	-	-	64/65
2024	20	-	0	100	0	0	100	0	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	60	-	0	100	0	0	0	0	4/12
2024	400	-	0	100	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	109/108
2024	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2012	660	400	6	94	0	0	0	0	17/17
2015	140	-	0	100	0	0	0	0	20/31
2019	480	60	0	96	4	0	0	4	22/33
2024	1780	-	2	98	0	0	6	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2012	200	-	10	50	40	0	0	40	- / -
2015	-	20	0	0	0	0	0	0	- / -
2019	20	-	0	0	100	0	0	100	- / -
2024	20	-	100	0	0	0	0	0	- / -
Opuntia fragilis -- (brittle pricklypear)									
2012	240	-	17	83	0	0	0	17	6/30
2015	200	-	10	80	10	0	0	0	9/17
2019	180	-	0	100	0	0	0	0	4/14
2024	-	-	-	-	-	-	-	-	-/-
Pediocactus simpsonii -- (mountain ball cactus)									
2012	20	-	0	100	0	0	0	0	5/9
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	60	-	33	67	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2012	360	40	28	72	0	0	0	0	- / -
2015	60	-	67	33	0	0	0	0	- / -
2019	60	-	33	33	33	0	0	33	- / -
2024	40	-	0	100	0	0	0	0	- / -

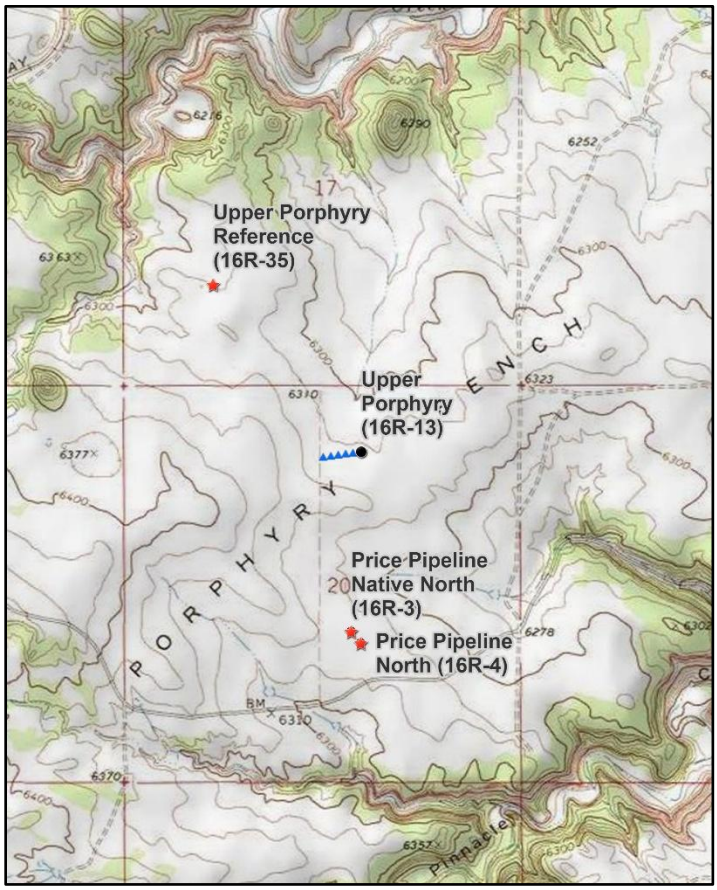
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Pinus ponderosa[t] -- (ponderosa pine)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	40	-	100	0	0	0	0	50	- / -
2024	20	-	100	0	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2012	-	-	-	-	-	-	-	-	18/61
2015	-	-	-	-	-	-	-	-	30/89
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Quercus gambelii[p] -- (Gambel oak)									
2012	7460	-	60	41	0	3	0	0	102/120
2015	9800	200	54	46	0	71	19	38	50/51
2019	6940	40	6	80	14	43	47	14	52/57
2024	9320	-	14	85	1	6	24	1	- / -
Yucca -- (yucca)									
2012	-	-	-	-	-	-	-	-	37/73
2015	-	-	-	-	-	-	-	-	29/64
2019	-	-	-	-	-	-	-	-	71/114

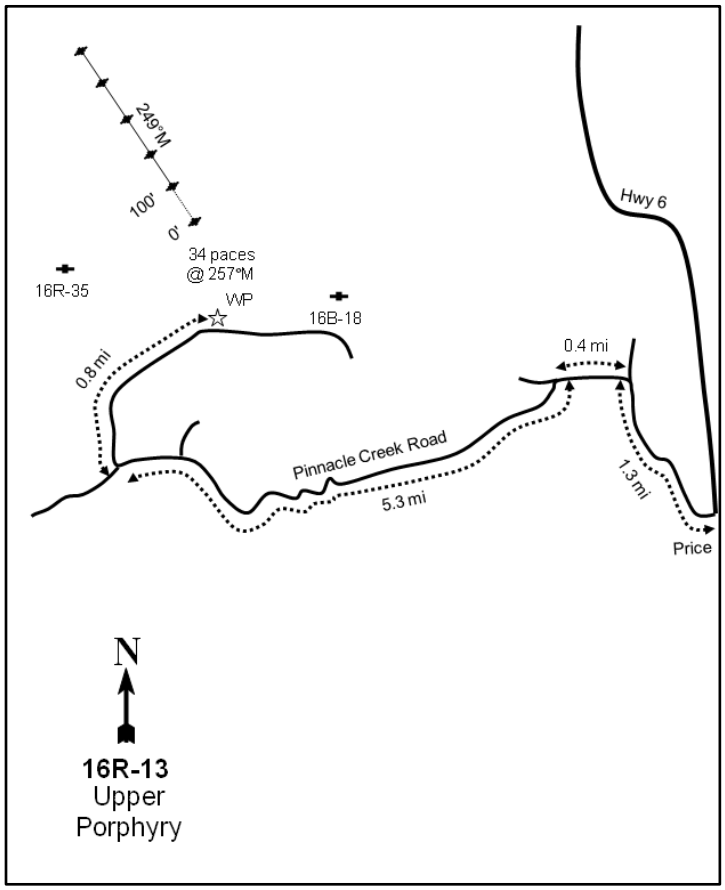
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 14R-28.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	173	-	10	-	10	80	40.5
2015	21	20	70	10	-	-	5.6
2019	25	29	57	14	-	-	5.6
2024	19	18	45	36	-	-	6.4
Pinus edulis (twoneedle pinyon)							
2012	152	-	11	26	5	58	19.0
2015	11	-	50	13	-	38	18.8
2019	11	17	-	17	17	50	19.2
2024	4	-	-	50	-	50	23.5
Pinus ponderosa (ponderosa pine)							
2015	4	33	-	33	33	-	5.5
2024	3	-	67	-	-	33	7.3

UPPER PORPHYRY - STUDY NO. 16R-13





Location Information

USGS 7.5 min Map Info	Pinnacle Peak NE; Township 14S, Range 9E, Section 20
GPS (0' Stake)	NAD 83 UTM ZONE 12, 505484 East 4383157 North

Transect Information

Browse Tag # (0' Stake)	51
Transect Bearing	249° 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 on Westwood Boulevard (1550 W) northwest out of Price for 2.35 miles to a major intersection. Turn left onto Gordon Creek Road and proceed for 0.45 miles to a fork. Bear left away from Gordon Creek Road, going 0.1 miles to a gravel pit. Continue for 5.5 miles on Pinnacle Peak Road to a three-way fork at the top of the bench; an oil rig is near this intersection. Take the right fork and drive for 0.6 miles to the north, passing another oil rig, to a witness post on the left (northwest) side of the road. The 0-foot post is 34 paces from the witness post at 257 degrees magnetic and is marked with browse tag #51.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	PORPHYRY BENCH
Elevation	6,330ft (1,929m)
Aspect	Northwest
Slope	2%
Sample Dates	08/02/2004, 06/14/2007, 06/29/2009, 08/25/2010, 07/31/2012, 08/15/2017, 07/17/2024

Table 16R-13.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Aerator - Double Drum	Price West Benches (Year1) Porphyry Bench	229	November 2004, April-May 2005	1104
Seeding - Aerial After	Price West Benches (Year1) Porphyry Bench	229	December 2004	1104
Seeding - Broadcast Before	Price West Benches (Year1) Porphyry Bench	229	November 2004, April-May 2005	1104

Table 16R-13.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Porphyry Bench A			Aerial	Dec 2004	1160
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.69	0.00
S	Bassia prostrata	Forage Kochia	Immigrant	0.75	0.50
S	Krascheninnikovia lanata	Winterfat	Duchesne/Uintah UT	0.06	0.03

Mix Name			Application Type	Application Date	Acres
Porphyry Bench B1			Broadcast	Nov 2004	85
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.88	0.25

Mix Name			Application Type	Application Date	Acres
Porphyry Bench B2			Broadcast	Nov 2004	495
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.89	0.25
S	Atriplex canescens	Fourwing Saltbush	Emery UT	0.26	0.12

Mix Name			Application Type	Application Date	Acres
Porphyry Bench C1			Broadcast	Nov 2004	410
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.22	1.01
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.10	1.00
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	2.15	2.00
F	Melilotus officinalis	Yellow Sweetclover		0.55	0.50
F	Sanguisorba minor	Small Burnet	Delar	0.52	0.50
S	Atriplex canescens	Fourwing Saltbush	Emery UT	1.50	0.68

Mix Name			Application Type	Application Date	Acres
Porphyry Bench C2			Broadcast	Nov 2004	85
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.00	0.97
G	Festuca ovina	Sheep Fescue		1.12	0.98
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.06	0.99
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.18	0.98
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete UT	0.20	0.20
F	Linum perenne	Blue Flax	Appar	0.11	0.10
S	Atriplex canescens	Fourwing Saltbush	Emery UT	1.48	0.67

Wildlife Habitat and Vegetation History

Table 16R-13.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		

Table 16R-13.4 - 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	NA
2007	Wyoming Big Sagebrush/Perennial Grass	NA
2009	Wyoming Big Sagebrush/Perennial Grass	NA
2010	Wyoming Big Sagebrush/Perennial Grass	NA
2012	Wyoming Big Sagebrush/Perennial Grass	NA
2017	Perennial Grass/Wyoming Big Sagebrush	NA
2024	Perennial Grass	NA

Site Notes

Oil and gas activity is in the general vicinity.

Soils

Table 16R-13.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.1	43.6	28.9	27.5	1.7	8.8	80.0	0.5	08/02/2004

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2011-2024 - Seeded State: Community Phase 5.2

At the time of study establishment in 2004, this was a decadent Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*)-dominated site with a sparse understory. The site was treated with an aerator and seeded in 2005 to reduce sagebrush decadence (Table 16R-13.1). Cover of sagebrush decreased slightly following the treatment, although the population did exhibit a shift towards more young and mature plants (Table 16R-13.12, Table 16R-13.13). Prior to treatment, the understory was dominated by native annual forbs (Table 16R-13.7), particularly narrowleaf goosefoot (*Chenopodium leptophyllum*). Perennial grasses became the dominant herbaceous component following treatment with Indian ricegrass (*Achnatherum hymenoides*), crested wheatgrass (*Agropyron cristatum*), needle and thread (*Hesperostipa comata*), and/or Russian wildrye (*Psathyrostachys juncea*) displaying codominance in all post-treatment sample years (Table 16R-13.10). Forb cover has fluctuated post-treatment with scarlet globemallow (*Sphaeralcea coccinea*) being the dominant species (Table 16R-13.11). Overall, the site has transitioned from a sagebrush-dominated state into a perennial grass and sagebrush codominant state, and it is likely that it will remain in this state without a future disturbance.

Mule deer winter range conditions have varied between very poor and good-excellent since 2004. Winter habitat condition is considered fair as of 2024, and is limited by a low amount of preferred browse cover and recruitment, and low perennial forb cover (Table 16R-13.15). The area is known for the winter occurrence of mule deer (Wildlife Tracker). Pellet group data show that deer presence has generally been high over the course of the study while elk presence was absent to low over the same time period (Table 16R-13.9). Wyoming big sagebrush has provided much of the winter forage for wildlife. Utilization of sagebrush has been low to moderate in most sample years, with the exception of the 2012 sample year in which sagebrush utilization was heavy (Table 16R-13.13). It should be noted that this community is susceptible to severe drought, competitive introduced species, and/or heavy utilization which could lead to a decrease in preferred browse abundance and loss of its utility for wildlife.

Trend Summary Tables

Table 16R-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
2004	4.6	1.6	-	6.4	1.6	-
2007	6.2	3.4	-	4.7	3.9	-
2009	8.0	5.1	-	6.4	3.2	-
2010	8.5	4.6	-	5.8	3.6	-
2012	6.2	1.8	-	6.2	2.3	-
2017	6.2	3.4	-	6.2	3.7	-
2024	4.1	1.4	-	3.4	1.4	-

Table 16R-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
2004	-	139	274	78	-	1.2	9.0	2.0
2007	43	313	302	190	0.3	10.7	5.2	3.0
2009	7	294	77	129	0.0	17.1	1.0	1.8
2010	13	268	63	119	0.0	15.9	0.6	2.1
2012	7	302	16	118	0.1	10.0	0.1	0.9
2017	35	324	150	158	0.6	25.9	4.4	3.5
2024	-	351	14	179	-	23.0	0.1	2.8

Table 16R-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
2004	60.1	4.8	26.7	-	-	19.7
2007	52.1	2.0	29.3	0.0	-	30.5
2009	47.1	2.7	37.6	-	-	33.4
2010	51.2	0.6	30.9	0.0	0.1	29.9
2012	51.4	1.1	41.7	-	0.0	19.1
2017	36.0	0.3	33.9	-	-	44.1
2024	45.2	0.3	40.5	0.1	0.4	27.6

Table 16R-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	Greater Sage-Grouse	Horse	Rabbit
	Quadrat Frequency					
2004	3	47	1	-	-	56
2007	2	52	6	-	-	89
2009	2	56	6	-	-	63
2010	4	50	4	-	-	44
2012	2	36	2	1	-	24
2017	1	17	1	-	-	69
2024	3	47	-	1	-	10
Year	Days Use Per Acre (ha)					
2004	0.7 (1.8)	95.8 (236.7)	-	-	0.6 (1.4)	-
2007	5.1 (12.6)	171.6 (423.8)	1.3 (3.3)	-	-	-
2009	13.1 (32.3)	153.5 (379.1)	14.1 (34.8)	-	-	-
2010	5.1 (12.6)	71.1 (175.5)	-	-	-	-
2012	0.7 (1.8)	81.1 (200.3)	8.1 (19.9)	8.7 (21.5)*	-	-
2017	19.6 (48.4)	72.4 (178.8)	-	-	-	-
2024	18.1 (44.8)	34.9 (86.1)	-	-	-	-

*Pellets per acre (ha)

Table 16R-13.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Agropyron fragile[i] (Siberian wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency											
2004	45	1	-	1	-	59	32	9	-	-	-	-
2007	51	34	51	8	38	217	55	17	-	-	15	5
2009	85	86	3	9	7	175	80	15	-	-	24	-
2010	78	114	-	-	13	47	52	51	1	-	25	-
2012	154	78	-	12	7	52	31	78	-	1	25	-
2017	108	96	-	8	17	55	109	116	2	1	51	30
2024	46	150	4	12	-	9	155	50	-	-	79	-
year	Average Cover (%)											
2004	0.1	0.0	-	0.0	-	0.7	0.2	0.2	-	-	-	-
2007	0.8	0.7	1.4	0.5	0.2	5.2	1.4	0.6	-	-	0.1	0.0
2009	2.2	4.2	0.0	0.3	0.0	7.0	2.3	0.5	-	-	0.8	-
2010	2.5	7.2	-	-	0.0	1.0	1.5	2.4	0.0	-	1.3	-
2012	3.0	3.6	-	0.0	0.1	0.8	0.3	1.5	-	0.0	0.7	-
2017	3.6	7.2	-	0.0	0.3	1.8	6.6	3.5	0.0	0.0	3.2	0.2
2024	1.9	8.3	0.1	0.6	-	0.1	6.7	1.1	-	-	4.2	-

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

Table 16R-13.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Castilleja (Indian paintbrush)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cordylanthus[a] (bird's-beak)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Eriogonum (buckwheat)	Eriogonum cernuum[a] (nodding buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gilia inconspicua[a] (shy gilia)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Penstemon (beardtongue)	Phlox hoodii (spiny phlox)
year	Nested Frequency																
2004	2	5	-	4	3	184	44	53	-	-	15	50	2	42	-	7	-
2007	4	9	-	-	-	-	13	43	2	-	30	-	-	273	-	15	3
2009	-	3	-	-	-	1	-	-	-	1	31	-	-	-	-	9	-
2010	-	-	-	-	2	24	14	-	3	-	25	-	-	7	-	5	3
2012	-	-	-	-	-	1	-	12	-	-	3	1	-	-	-	8	-
2017	5	15	2	-	-	13	-	112	3	-	-	-	-	74	1	-	-
2024	-	3	-	-	-	9	-	-	-	-	-	-	-	-	-	7	-
year	Average Cover (%)																
2004	0.0	0.1	-	0.0	0.2	4.5	0.6	0.5	-	-	0.2	1.3	0.0	1.0	-	0.1	-
2007	0.0	0.2	-	-	-	-	0.0	0.1	0.0	-	0.1	-	-	4.2	-	0.1	0.0
2009	-	0.0	-	-	-	0.0	-	-	-	0.0	0.3	-	-	-	-	0.0	-
2010	-	-	-	-	0.0	0.1	0.4	-	0.0	-	0.1	-	-	0.0	-	0.0	0.0
2012	-	-	-	-	-	0.0	-	0.0	-	-	0.0	0.0	-	-	-	0.0	-
2017	0.0	0.3	0.0	-	-	0.0	-	3.1	0.0	-	-	-	-	1.2	0.0	-	-
2024	-	0.1	-	-	-	0.0	-	-	-	-	-	-	-	-	-	0.0	-

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Plantago patagonica[a] (woolly plantain)	Salsola tragus[ai] (prickly Russian thistle)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	unknown annual forb[a] (unknown forb)
year	Nested Frequency						
2004	20	-	26	8	-	49	-
2007	64	7	75	27	4	124	-
2009	16	1	-	5	3	104	44
2010	29	-	3	2	3	95	-
2012	12	4	-	-	-	104	-
2017	6	-	29	-	-	141	-
2024	3	-	-	5	-	173	-
year	Average Cover (%)						
2004	0.1	-	0.5	0.3	-	1.7	-
2007	0.2	0.1	0.6	0.1	0.0	2.3	-
2009	0.1	0.0	-	0.0	0.0	1.6	0.7
2010	0.3	-	0.0	0.0	0.0	1.7	-
2012	0.1	0.0	-	-	-	0.9	-
2017	0.0	-	0.2	-	-	3.1	-
2024	0.0	-	-	0.0	-	2.6	-

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

Table 16R-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)	Bassia prostrata[pi] (forage kochia)	Chrysothamnus depressus[p] (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Eriogonum microthecum[p] (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover (%)						
2004	5.8	-	-	1.6	0.6	-	-
2007	4.1	0	-	3.7	0.6	0.2	-
2009	6.4	0	-	2.8	-	0.3	0.1
2010	5.1	-	-	3.5	0.7	-	0.1
2012	6	-	-	2.2	0.2	0	0.1
2017	5	0.2	0.2	2.5	0.8	1.2	-
2024	2.7	0.2	-	0.9	0.5	0.5	-
year	Quadrat Cover (%)						
2004	4.2	-	-	1.6	0.4	-	0.0
2007	5.7	0.0	-	3.3	0.5	0.1	0.0
2009	8.0	0.0	-	4.9	-	0.2	0.0
2010	7.1	0.2	-	4.5	1.2	0.1	0.0
2012	5.7	0.1	-	1.6	0.4	0.1	0.0
2017	4.6	0.3	0.0	2.0	1.3	1.3	0.1
2024	2.5	0.2	-	1.2	1.4	0.2	-

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

Table 16R-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)									
2004	2380	-	0	4	96	13	29	69	52/75
2007	3420	22960	37	16	47	19	6	30	51/77
2009	-	-	-	-	-	-	-	-	39/57
2010	3620	260	43	28	30	14	9	27	47/74
2012	4140	260	44	30	26	13	77	17	36/57
2017	2680	-	8	50	42	18	24	36	37/52
2024	1540	-	1	70	29	9	26	26	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	26/53
2024	-	-	-	-	-	-	-	-	-/-
Bassia prostrata[pi] -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	60	40	67	33	0	0	0	0	6/7
2009	-	-	-	-	-	-	-	-	14/16
2010	120	20	83	17	0	0	0	0	13/14
2012	240	-	8	92	0	17	33	0	10/16
2017	40	-	0	100	0	0	0	0	20/35
2024	240	480	33	67	0	0	17	0	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	17/30
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	80	-	0	100	0	0	0	0	14/22
2024	60	-	0	33	67	0	0	67	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2004	2080	1580	0	100	0	0	0	0	22/33
2007	12100	4540	49	51	0	3	6	0	16/24
2009	-	-	-	-	-	-	-	-	14/21
2010	6000	-	15	85	0	1	0	10	16/27
2012	6160	140	27	68	5	10	75	9	8/20
2017	3400	20	10	90	0	0	0	0	18/27
2024	1900	-	2	98	0	16	20	0	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2004	2020	-	19	81	0	0	0	0	16/17
2007	4760	6200	42	58	0	3	12	0	9/11
2009	-	-	-	-	-	-	-	-	7/18
2010	3760	20	11	89	0	0	0	0	12/14
2012	3120	40	15	85	0	2	22	0	7/8
2017	4080	-	1	100	0	0	0	0	14/16
2024	1680	-	5	95	0	11	2	0	- / -

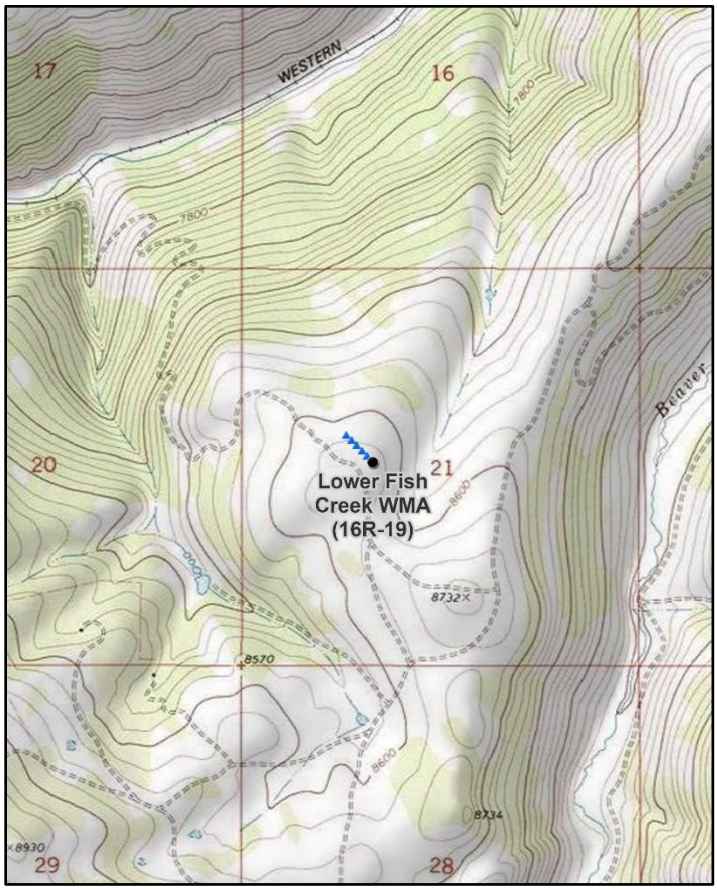
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Gutierrezia sarothrae -- (broom snakeweed)									
2004	-	-	-	-	-	-	-	-	-/-
2007	1260	940	35	65	0	0	0	0	17/16
2009	-	-	-	-	-	-	-	-	23/24
2010	100	-	0	100	0	0	0	0	19/28
2012	660	140	85	15	0	0	0	0	10/8
2017	1660	20	14	84	1	0	0	1	27/35
2024	600	-	10	90	0	7	0	0	- / -
Krascheninnikovia lanata[p] -- (winterfat)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	37/34
2024	-	-	-	-	-	-	-	-	-/-
Linanthus pungens -- (granite prickly phlox)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	7/13
2012	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2004	140	-	0	100	0	0	0	0	5/23
2007	260	-	39	39	23	0	0	0	6/18
2009	-	-	-	-	-	-	-	-	10/18
2010	40	-	0	100	0	0	0	50	7/18
2012	40	-	50	50	0	0	0	50	7/23
2017	60	-	0	100	0	0	0	0	7/23

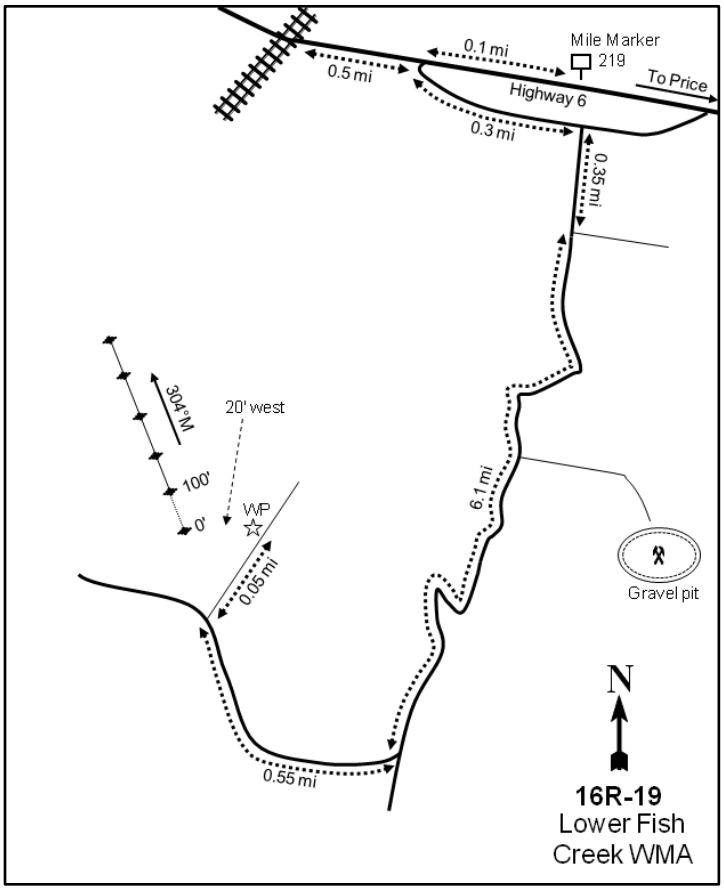
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 16R-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
2004	8.0	-5.6	0.9	2.5	0.0	4.0	0.0	**9.8**	Very Poor-Poor
2007	5.9	0.0	0.0	21.5	-0.2	5.9	0.0	**33.1**	Fair
2009	8.0	0.0	0.0	30.0	0.0	3.7	0.0	**41.7**	Fair
2010	7.3	7.1	15.0	30.0	0.0	4.2	0.0	**63.6**	Good-Excellent
2012	7.8	7.4	15.0	20.1	-0.1	1.9	0.0	**52.1**	Good
2017	7.8	4.9	3.3	30.0	-0.4	7.0	0.0	**52.6**	Good
2024	4.3	0.0	0.0	30.0	0.0	5.6	0.0	**39.9**	Fair

LOWER FISH CREEK WMA - STUDY NO. 16R-19





Location Information

USGS 7.5 min Map Info	Colton SE; Township 12S, Range 8E, Section 21
GPS (0' Stake)	NAD 83 UTM ZONE 12, 496950 East 4401981 North

Transect Information

Browse Tag # (0' Stake)	92
Transect Bearing	304° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Traveling north on US-6 from Price, drive to mile marker 219 and continue 0.1 miles to a road on the left (southwest) side of the road. Turn left and drive 0.3 miles to a road on the right (south). Turn right and drive 6.1 miles to a fork. Take the right fork and drive 0.5 miles to a two-track on the right (east) side of the road. Turn right on the two-track and drive 0.05 miles to the witness post. From the witness post, walk 20 feet in a westward direction to the 0-foot stake. The 0-foot stake is marked with browse tag #92.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	BEAVER CREEK
Elevation	8,640ft (2,633m)
Aspect	North
Slope	5%
Sample Dates	08/10/2005, 06/24/2010, 08/19/2015, 07/16/2019, 07/16/2024

Table 16R-19.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - 2,4-D/Tordon	Lower Fish Creek Sage-Grouse Habitat Improvement	17	June 2006	418

Wildlife Habitat and Vegetation History

Table 16R-19.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 16R-19.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Mountain Big Sagebrush/Yellow Rabbitbrush/Mountain Snowberry	NA
2010	Mountain Big Sagebrush/Yellow Rabbitbrush/Mountain Snowberry	NA
2015	Mountain Big Sagebrush/Yellow Rabbitbrush/Mountain Snowberry	NA
2019	Mountain Big Sagebrush/Yellow Rabbitbrush/Mountain Snowberry	NA
2024	Mountain Big Sagebrush/Yellow Rabbitbrush/Mountain Snowberry	NA

Site Notes

No Notes

Soils

Table 16R-19.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Silt Loam	6.8	16.0	41.4	42.6	5.9	18.5	268.8	0.8	08/10/2005

Site Potential

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	No state and transition model is available for this ecological site.

This community has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp.*vaseyana*), yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*), and mountain snowberry (*Symphoricarpos oreophilus*) since study establishment in 2005 (Table 16R-19.12, Table 16R-19.13). The herbaceous understory has remained abundant and diverse, with perennial forbs and grasses, particularly Kentucky bluegrass (*Poa pratensis*), providing a majority of the cover (Table 16R-19.7, Table 16R-19.10, Table 16R-19.11). Without a major shrub-removing disturbance or changes in management and/or grazing, this site will likely continue to remain in this state in future sample years.

Mule deer winter range conditions have been good since study establishment. Winter range condition is generally limited by low recruitment of preferred browse (Table 16R-19.15). Pellet group data show that deer presence has been low to moderate in most sample years, but was high in 2024. Elk presence was moderate in 2005, but has been absent to low since 2010 (Table 16R-19.9). Mountain big sagebrush provides much of the winter forage for wildlife. Utilization of sagebrush has been moderate in most sample years; in 2024, 10% of sagebrush plants sampled in density strips were moderately hedged and 21% were heavily browsed (Table 16R-19.13).

Trend Summary Tables

Table 16R-19.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	18.8	17.1	-	28.7	24.8	-
2010	23.8	18.6	-	33.2	25.7	-
2015	28.4	15.1	-	38.1	23.2	-
2019	26.8	20.5	-	44.6	22.8	-
2024	25.6	21.3	-	39.1	24.1	-

Table 16R-19.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	-	391	43	316	-	15.1	1.1	22.9
2010	-	392	30	315	-	20.9	1.1	20.9
2015	-	459	20	260	-	34.8	0.1	17.3
2019	-	425	48	346	-	21.9	0.8	21.7
2024	-	373	33	286	-	13.7	0.6	15.6

Table 16R-19.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	3.9	0.0	58.5	0.0	0.2	65.5
2010	3.8	0.0	59.0	-	-	68.8
2015	0.7	0.0	38.8	0.0	0.1	83.2
2019	3.5	-	63.4	0.0	0.2	70.8
2024	6.8	0.1	46.0	0.0	0.5	61.6

Table 16R-19.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2005	4	9	9	-	1
2010	7	15	1	-	2
2015	2	6	2	-	-
2019	5	11	5	-	1
2024	4	21	-	-	3
Year	Days Use Per Acre (ha)				
2005	21.1 (52.0)	22.8 (56.3)	30.8 (76.1)	8.7 (21.5)*	-
2010	11.6 (28.7)	14.7 (36.4)	2.0 (5.0)	-	-
2015	14.5 (35.9)	13.4 (33.1)	-	-	-
2019	5.8 (14.3)	32.2 (79.5)	-	-	-
2024	54.5 (134.5)	60.3 (149.0)	-	-	-

*Pellets per acre (ha)

Table 16R-19.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus porteri (Porter brome)	Carex (sedge)	Carex geyeri (Geyer's sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency													
2005	-	96	40	8	-	2	178	32	4	8	-	233	18	-
2010	-	15	13	-	-	-	92	19	12	1	1	325	19	-
2015	26	7	62	3	-	-	26	15	9	3	3	434	19	0
2019	33	10	63	-	1	10	85	4	9	10	15	360	-	-
2024	75	5	32	2	5	4	68	12	51	21	10	203	44	-
year	Average Cover (%)													
2005	-	2.3	0.6	0.2	-	0.1	2.8	0.7	0.0	0.1	-	7.9	0.5	-
2010	-	0.4	0.2	-	-	-	2.6	0.4	0.2	0.0	0.0	16.8	0.2	-
2015	0.8	0.1	1.7	0.4	-	-	0.3	0.2	0.3	0.0	0.1	30.5	0.4	0.0
2019	1.2	0.7	0.7	-	0.0	0.2	1.8	0.0	0.1	0.1	0.4	16.6	-	-
2024	1.8	0.2	1.0	0.1	0.0	0.1	1.3	0.1	0.9	0.3	0.0	6.9	1.0	-

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

Table 16R-19.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria (pussytoes)	Aquilegia (columbine)	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus miser (timber milkvetch)	Astragalus purshii (woollypod milkvetch)	Astragalus tenellus (looseflower milkvetch)	Calochortus nuttallii (sego lily)	Castilleja flava (yellow Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Erigeron (fleabane)	Erigeron eatonii (Eaton's fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Frasera speciosa (elkweed)	Geranium richardsonii (Richardson's geranium)
year	Nested Frequency																
2005	2	5	1	0	3	41	-	11	88	-	13	6	-	11	30	89	54
2010	4	1	2	-	-	12	-	6	85	-	-	-	1	4	63	89	40
2015	16	18	1	-	7	2	-	8	-	-	3	-	-	14	18	92	28
2019	8	-	4	-	16	10	40	9	58	5	7	-	3	4	45	97	45
2024	9	2	4	-	6	17	91	20	13	-	12	3	-	-	51	62	38
year	Average Cover (%)																
2005	0.0	0.0	0.0	0.0	0.0	0.2	-	0.1	3.7	-	0.4	0.1	-	0.1	1.1	3.8	0.5
2010	0.2	0.0	0.0	-	-	0.1	-	0.2	2.8	-	-	-	0.0	0.0	2.0	5.5	1.7
2015	0.6	0.1	0.0	-	0.1	0.0	-	0.1	-	-	0.0	-	-	0.1	0.7	7.1	0.6
2019	0.6	-	0.0	-	0.1	0.1	0.7	0.1	1.0	0.0	0.2	-	0.0	0.0	1.8	4.9	2.7
2024	0.2	0.0	0.0	-	0.1	0.4	2.1	0.3	0.2	-	0.1	0.0	-	-	1.5	4.0	0.6

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

FORB SPECIES	Gilia inconspicua[a] (shy gilia)	Hymenoxys hoopesii (owl's-claws)	Ipomopsis aggregata (scarlet gilia)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)	Mertensia (bluebells)	Orthocarpus luteus[a] (yellow owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon watsonii (Watson's penstemon)	Phacelia[a] (phacelia)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Senecio integerrimus[a] (lambstongue ragwort)	Silene drummondii (Drummond's campion)	Symphyotrichum ascendens (western aster)
year	Nested Frequency																
2005	3	14	3	118	-	-	32	3	1	122	-	60	7	3	-	-	5
2010	-	-	2	65	0	49	-	5	-	114	1	26	-	4	5	-	66
2015	-	2	3	39	-	9	5	-	-	86	-	2	-	5	-	-	6
2019	-	3	-	45	1	73	42	3	-	150	-	42	7	8	-	3	7
2024	2	-	3	46	-	11	26	-	4	88	-	12	2	8	1	-	17
year	Average Cover (%)																
2005	0.0	0.2	0.0	7.9	-	-	1.0	0.1	0.0	2.9	-	0.2	0.0	0.1	-	-	0.1
2010	-	-	0.0	1.5	0.0	0.9	-	0.2	-	3.5	0.1	0.3	-	0.1	0.1	-	1.4
2015	-	0.0	0.0	2.8	-	0.6	0.0	-	-	1.5	-	0.0	-	0.2	-	-	0.1
2019	-	0.0	-	2.6	0.0	0.8	0.7	0.0	-	3.6	-	0.2	0.0	0.4	-	0.0	0.2
2024	0.0	-	0.0	2.5	-	0.1	0.5	-	0.1	2.5	-	0.1	0.0	0.2	0.0	-	0.1

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

FORB SPECIES	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Tragopogon dubius[ai] (yellow salsify)	Trifolium (clover)	Veronica biloba[ai] (twolobe speedwell)	Vicia americana (American vetch)
year	Nested Frequency					
2005	31	-	3	1	1	48
2010	23	-	-	-	23	25
2015	16	-	-	-	-	102
2019	69	-	-	-	3	35
2024	23	5	-	-	-	20
year	Average Cover (%)					
2005	0.7	-	0.0	0.0	0.0	0.6
2010	0.2	-	-	-	0.8	0.2
2015	0.1	-	-	-	-	2.9
2019	0.8	-	-	-	0.0	1.0
2024	0.2	0.1	-	-	-	0.2

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

Table 16R-19.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ribes cereum[p] (wax currant)	Rosa woodsii[p] (Woods' rose)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)					
2005	-	18.6	24.8	0.2	0.1	9.8
2010	-	22.8	25.7	0.1	0.4	9.9
2015	-	25.8	23.2	0.2	0.1	12
2019	-	30	22.8	0.1	-	14.5
2024	0.8	20.9	24.1	-	0.1	17.3
year	Quadrat Cover (%)					
2005	-	13.7	17.1	0.2	0.2	4.8
2010	-	18.4	18.6	0.1	0.1	5.2
2015	0.0	19.4	15.1	0.7	0.2	8.0
2019	-	16.6	20.5	0.1	0.2	9.8
2024	0.6	14.1	21.3	0.4	0.2	10.3

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

Table 16R-19.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2005	40	20	0	100	0	50	50	0	60/51
2010	40	-	50	50	0	0	0	0	70/62
2015	40	-	50	0	50	0	50	50	55/41
2019	40	-	50	50	0	0	50	50	49/37
2024	100	-	20	80	0	0	0	0	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2005	4400	220	4	30	66	20	4	41	71/73
2010	3600	100	11	78	11	28	5	11	74/91
2015	4240	20	8	70	22	25	1	25	70/84
2019	3700	-	6	57	37	20	16	36	77/83
2024	3940	-	12	65	23	10	21	22	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2005	11540	60	1	99	0	0	0	0	34/46
2010	11380	460	16	84	0	0	0	0	32/46
2015	11240	-	8	92	0	2	0	4	38/50
2019	11280	-	2	98	1	0	1	1	34/43
2024	11100	-	8	92	0	2	15	0	- / -
Juniperus communis -- (common juniper)									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	27/45
2024	-	-	-	-	-	-	-	-	-/-

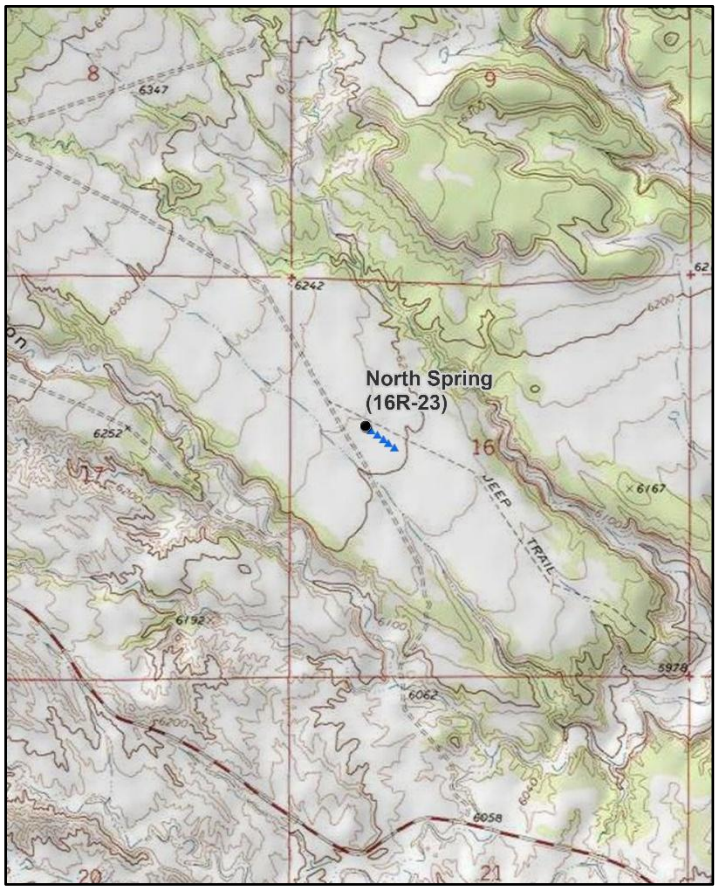
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Ribes cereum[p] -- (wax currant)									
2005	40	-	0	100	0	0	0	0	55/50
2010	60	-	33	67	0	0	0	0	45/47
2015	140	-	57	43	0	14	0	14	57/66
2019	60	-	0	100	0	0	0	0	70/69
2024	40	-	0	100	0	100	0	0	- / -
Rosa woodsii[p] -- (Woods' rose)									
2005	480	-	25	75	0	0	0	0	23/17
2010	360	20	22	78	0	0	0	0	36/23
2015	260	-	54	46	0	0	0	23	47/31
2019	160	-	0	100	0	0	0	0	- / -
2024	240	20	50	50	0	0	0	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2005	1480	-	7	92	1	0	0	0	60/84
2010	1080	-	2	98	0	2	0	0	73/107
2015	2620	-	8	92	0	9	0	0	69/82
2019	2060	20	2	89	9	14	8	9	68/89
2024	4180	-	24	75	1	1	19	0	- / -
Tetradymia canescens -- (spineless horsebrush)									
2005	-	-	-	-	-	-	-	-	26/32
2010	20	-	100	0	0	0	0	0	27/29
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	0	100	0	0	100	48/11

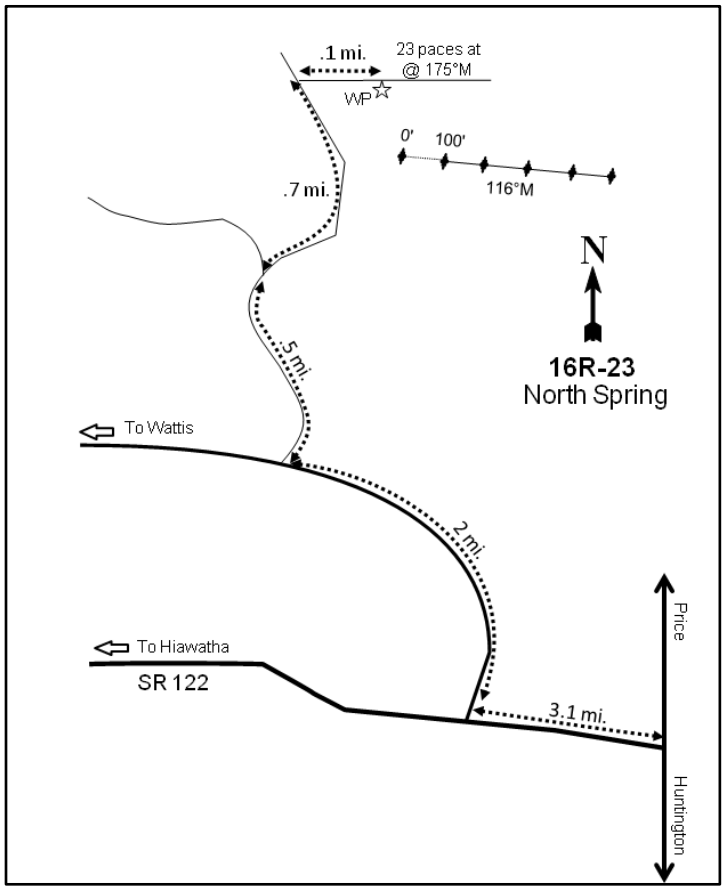
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 16R-19.15 - Deer Desirable Components Index: Mountain Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2005	30.0	2.1	2.5	30.0	0.0	10.0	0.0	**74.6**	Good
2010	30.0	12.8	4.3	30.0	0.0	10.0	0.0	**87.1**	Good
2015	30.0	10.4	4.3	30.0	0.0	10.0	0.0	**84.7**	Good
2019	30.0	6.6	2.3	30.0	0.0	10.0	0.0	**78.9**	Good
2024	30.0	11.2	8.8	27.4	0.0	10.0	0.0	**87.4**	Good

NORTH SPRING - STUDY NO. 16R-23





Location Information

USGS 7.5 min Map Info	Pinnacle Peak SE; Township 15S, Range 9E, Section 16
GPS (0' Stake)	NAD 83 UTM ZONE 12, 506474 East 4374741 North

Transect Information

Browse Tag # (0' Stake)	175
Transect Bearing	116° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 3: 7ft, Belt 5: 3ft; Line 4: 83ft Long to avoid a gully

Directions to Site

Turn from SR-10 onto SR-122 from Price or Huntington and drive 3.1 miles to a road on the right. Turn onto this road and drive 2.0 miles to another road on the right. Turn right again and drive 0.5 miles to a fork. Proceed right and travel for another 0.7 miles to a road on the right heading southeast. Turn right and travel 0.1 miles to a witness post on the right (south) side of the road. From the witness post walk 23 paces at 175 degrees magnetic to the 0-foot stake that is marked with browse tag #175.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,200ft (1,890m)
Aspect	S
Slope	1%
Sample Dates	08/16/2006, 08/24/2010, 07/29/2014, 08/13/2018, 07/17/2024

Table 16R-23.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Dixie	Price West Benches Phase 3 - North Springs	430	October 2006	680
Seeding - Broadcast Before	Price West Benches Phase 3 - North Springs	430	October 2006	340

Table 16R-23.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Price West Benches--Phase 3			Broadcast	Oct 2006	340
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.03	1.02
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.03	0.92
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.99	1.82
G	Festuca ovina	Sheep Fescue		0.51	0.49
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.03	0.78
G	Psathyrostachys juncea	Russian Wildrye		0.76	0.67
G	Psathyrostachys juncea	Russian Wildrye		0.01	0.01
G	Psathyrostachys juncea	Russian Wildrye		3.09	2.51
F	Medicago sativa	Alfalfa	Ranger	0.51	0.45
F	Medicago sativa	Alfalfa	Spreador 4	0.51	0.49
F	Onobrychis viciifolia	Sainfoin	Eski	1.03	0.93
F	Sanguisorba minor	Small Burnet	Delar	0.51	0.48
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	0.51	0.10
S	Atriplex canescens	Fourwing Saltbush	Juab/Tooele UT	1.47	0.74

Wildlife Habitat and Vegetation History

Table 16R-23.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 16R-23.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Mountain Big Sagebrush	No Encroachment
2010	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2014	Mountain Big Sagebrush	No Encroachment
2018	Mountain Big Sagebrush/Perennial Grass	Phase I
2024	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

This area is heavily used by the oil and gas industry.

Soils

Table 16R-23.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.5	41.2	33.0	25.8	3.3	12.1	118.4	0.5	08/15/2006

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY212UT
States and Transitions	2006-2024 - Current Potential State: Community Phase 2.1

Since study establishment in 2006, the plant community on this site has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with other browse species contributing less cover. Sagebrush cover exhibited an initial decrease in the first sample year following a harrow and seeding treatment (Table 16R-23.1), but has since recovered to nearly pre-treatment levels. Sagebrush density increased following treatment and the age class diversified. However, a large portion of the sagebrush population was considered mature and there was little recruitment of young in 2024 (Table 16R-23.12, Table 16R-23.13). Perennial grasses such as blue grama (*Bouteloua gracilis*), squirreltail (*Elymus elymoides*), and Indian ricegrass (*Achnatherum hymenoides*) have contributed most of the herbaceous cover in all study years. However, the understory has exhibited an overall slight decrease following treatment

(Table 16R-23.7, Table 16R-23.10, Table 16R-23.11). Twoneedle pinyon (*Pinus edulis*) trees were observed in low amounts in point-quarter measurements in 2018 and 2024 (Table 16R-23.14). The community has been considered to be within Phase I of woodland succession since 2018 (Table 16R-23.4), and the presence of trees indicates that further infilling may be possible over time.

Mule deer winter range conditions have varied between fair and good since 2006. Winter habitat condition is considered fair-good as of 2024, and is generally limited by a low amount of preferred browse cover and recruitment, and low perennial forb cover (Table 16R-23.15). Nearby areas are known for the winter occurrence of mule deer (Wildlife Tracker). Pellet group data show that deer presence has mostly been high over the course of the study while elk presence has remained low over the same time period (Table 16R-23.9). Mountain big sagebrush provides much of the winter forage for wildlife. Utilization of sagebrush has been fairly moderate in most sample years, with the exception of the 2014 sample year in which sagebrush utilization was heavy (Table 16R-23.13). It should be noted that this community is susceptible to severe drought, competitive introduced species, and/or heavy utilization which could lead to a decrease in preferred browse abundance and a loss of utility for wildlife.

Trend Summary Tables

Table 16R-23.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	9.7	7.6	-	11.7	6.3	-
2010	9.4	5.6	-	8.4	5.4	-
2014	8.3	4.0	-	8.0	3.9	-
2018	9.4	7.7	-	10.7	7.0	-
2024	9.3	10.2	-	9.9	11.9	-

Table 16R-23.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	26	263	126	51	0.2	9.7	1.0	1.0
2010	9	245	39	21	0.0	10.0	0.5	1.1
2014	8	187	85	5	0.1	3.9	0.6	0.0
2018	7	198	39	11	0.4	7.2	0.5	0.0
2024	5	213	19	40	0.0	10.0	0.4	0.3

Table 16R-23.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	57.7	4.1	29.2	0.1	0.0	24.3
2010	57.4	0.2	29.3	0.2	1.0	25.5
2014	60.0	0.3	26.6	0.2	0.4	18.6
2018	62.4	0.5	28.8	0.9	0.4	23.4
2024	60.4	0.2	24.2	0.2	0.4	27.6

Table 16R-23.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	-	32	22	33
2010	-	65	-	12
2014	-	36	5	38
2018	-	42	4	53
2024	-	55	-	6
Year	Days Use Per Acre (ha)			
2006	-	121.3 (299.6)	5.3 (13.2)	-
2010	8.7 (21.5)*	113.2 (279.7)	1.3 (3.3)	-
2014	-	39.6 (97.7)	-	-
2018	-	30.2 (74.5)	10.7 (26.5)	-
2024	-	65.0 (160.6)	1.3 (3.3)	-

*Pellets per acre (ha)

Table 16R-23.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum thurberianum (Thurber's needlegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium[i] (intermediate wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency												
2006	84	1	-	66	13	180	-	5	2	-	-	-	13
2010	38	-	47	53	9	170	-	1	2	-	-	1	-
2014	43	-	52	59	2	52	6	-	-	-	-	-	6
2018	41	-	23	93	7	50	-	-	1	4	33	-	-
2024	48	6	24	68	3	41	-	4	-	34	31	-	4
year	Average Cover (%)												
2006	1.1	0.0	-	3.9	0.1	4.6	-	0.0	0.0	-	-	-	0.1
2010	1.6	-	1.4	3.4	0.0	3.6	-	0.0	0.0	-	-	0.0	-
2014	0.7	-	0.7	2.2	0.0	0.3	0.0	-	-	-	-	-	0.0
2018	0.5	-	0.2	4.8	0.4	0.8	-	-	0.1	0.3	0.4	-	-
2024	1.1	0.5	1.0	4.5	0.0	0.5	-	0.5	-	0.7	1.3	-	0.0

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

Table 16R-23.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Halogeton glomeratus[ai] (saltlover)	Lappula occidentalis[a] (flatspine stickseed)	Lepidium montanum[a] (mountain pepperweed)	Lupinus (lupine)	Machaeranthera grindelioides (rayless tansyaster)	Plantago patagonica[a] (woolly plantain)	Salsola tragus[ai] (prickly Russian thistle)
year	Nested Frequency																
2006	2	-	3	1	10	-	1	10	24	44	10	4	23	1	21	6	23
2010	1	3	-	-	7	5	-	-	2	28	-	1	1	-	7	7	-
2014	-	-	-	-	-	-	-	3	32	12	22	12	-	-	-	2	3
2018	-	-	-	-	1	5	-	-	26	3	1	-	-	-	4	2	3
2024	-	-	-	-	8	2	-	2	3	-	-	14	-	-	7	-	-
year	Average Cover (%)																
2006	0.0	-	0.0	0.0	0.2	-	0.0	0.1	0.1	0.2	0.1	0.0	0.4	0.0	0.6	0.0	0.1
2010	0.0	0.0	-	-	0.2	0.0	-	-	0.0	0.3	-	0.0	0.2	-	0.7	0.0	-
2014	-	-	-	-	-	-	-	0.0	0.1	0.0	0.0	0.1	-	-	-	0.0	0.0
2018	-	-	-	-	0.0	0.0	-	-	0.2	0.0	0.0	-	-	-	0.0	0.0	0.1
2024	-	-	-	-	0.0	0.0	-	0.0	0.0	-	-	0.3	-	-	0.1	-	-

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

FORB SPECIES	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency		
2006	15	7	3
2010	3	-	2
2014	-	25	2
2018	1	4	5
2024	3	-	20
year	Average Cover (%)		
2006	0.0	0.0	0.0
2010	0.2	-	0.0
2014	-	0.2	0.0
2018	0.0	0.0	0.0
2024	0.0	-	0.1

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

Table 16R-23.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Atriplex confertifolia[p] (shadscale saltbush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata[p] (winterfat)	Opuntia (pricklypear)
year	Line Intercept Cover (%)					
2006	10.9	0.8	0.6	0.7	-	5
2010	8.3	0.1	1.2	1.4	-	2.8
2014	7.6	0.4	1	0.3	-	2.6
2018	10.7	-	0.2	1.1	-	5.7
2024	9.9	-	1.5	0.7	-	9.7
year	Quadrat Cover (%)					
2006	9.3	0.4	1.0	0.6	0.0	6.0
2010	9.0	0.3	1.4	1.4	0.1	2.8
2014	7.7	0.5	0.6	0.2	0.0	3.2
2018	9.4	0.0	0.3	1.4	-	6.0
2024	9.1	0.1	0.9	0.6	-	8.7

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

Table 16R-23.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia frigida[P] -- (prairie sagewort)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2024	20	-	0	100	0	0	100	0	- / -
Artemisia tridentata ssp. vaseyana[P] -- (mountain big sagebrush)									
2006	3700	41260	6	24	70	29	46	60	46/68
2010	7700	1600	51	37	12	25	11	13	38/65
2014	8500	300	25	66	10	36	49	11	29/51
2018	8200	20	34	52	14	42	1	12	31/48
2024	6560	-	2	83	15	35	34	15	- / -
Atriplex confertifolia[P] -- (shadscale saltbush)									
2006	140	20	57	43	0	14	0	0	39/70
2010	140	-	29	71	0	0	0	0	37/86
2014	180	20	33	67	0	22	0	0	27/58
2018	100	-	0	100	0	0	80	0	9/24
2024	80	-	0	100	0	0	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2006	640	100	25	69	6	0	25	6	20/40
2010	1540	-	7	94	0	3	0	0	20/31
2014	1960	540	8	87	5	1	1	11	16/24
2018	1280	20	8	66	27	16	52	30	10/16
2024	2640	-	42	57	2	1	2	3	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2006	980	520	43	57	0	0	0	0	27/34
2010	1780	-	2	91	7	0	0	9	22/24
2014	580	40	10	83	7	3	0	10	13/15
2018	10960	60	72	26	2	0	0	1	11/15
2024	4060	-	26	73	1	0	0	1	- / -
Krascheninnikovia lanata[P] -- (winterfat)									
2006	20	-	0	100	0	0	100	0	37/30
2010	40	-	0	100	0	50	0	0	37/30
2014	40	60	50	50	0	0	100	0	22/19
2018	140	-	0	100	0	0	14	0	24/15
2024	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2006	4840	20	1	98	1	0	0	1	9/30
2010	2300	40	1	92	7	0	0	10	7/36
2014	4640	-	0	97	3	0	0	5	9/31
2018	5760	-	0	98	2	0	0	1	10/37
2024	7500	20	0	81	19	6	0	20	- / -
Sarcobatus vermiculatus -- (greasewood)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	60/101
2024	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 (%)		
Yucca -- (yucca)									
2006	-	-	-	-	-	-	-	-	42/68
2010	-	-	-	-	-	-	-	-	34/70
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	48/87

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

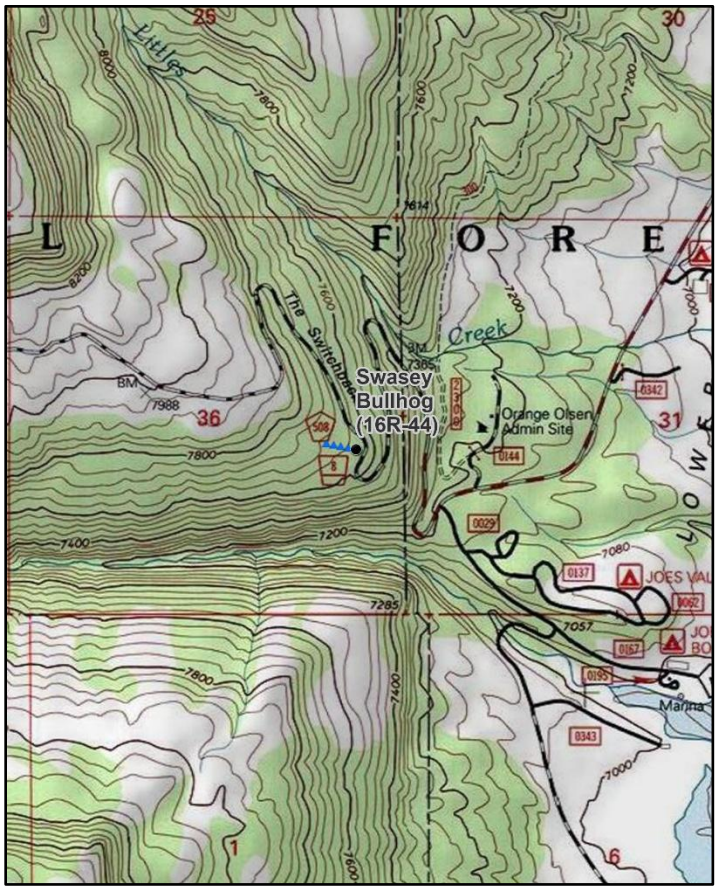
Table 16R-23.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

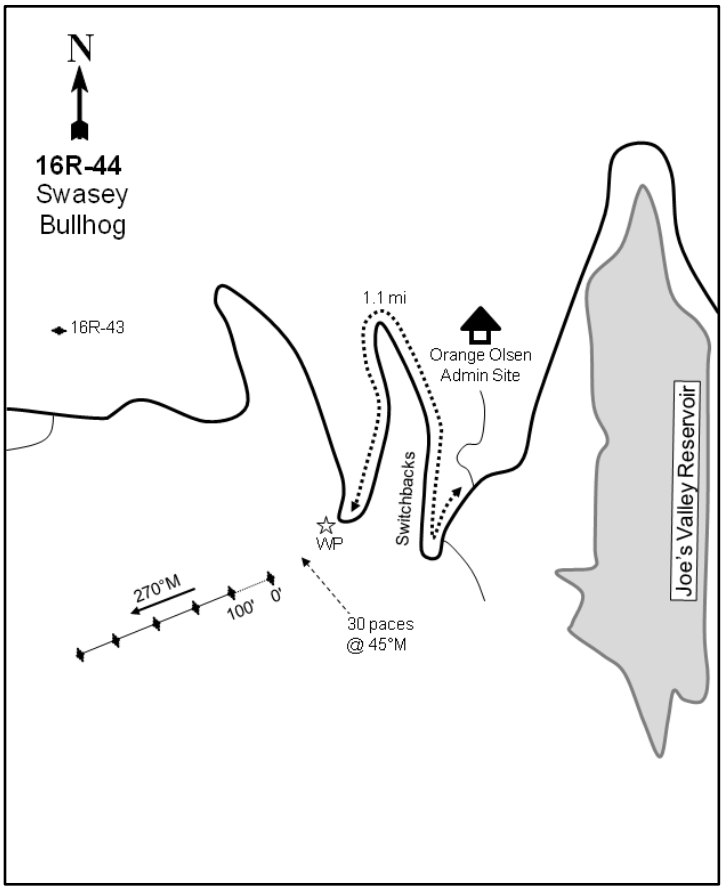
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Pinus edulis (twoneedle pinyon)							
2018	17	-	100	-	-	-	3.0
2024	3	-	100	-	-	-	6.0

Table 16R-23.15 - Deer Desirable Components Index: Semidesert Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2006	14.4	-4.7	4.7	19.5	-0.2	1.9	0.0	**35.6**	Fair
2010	10.5	11.4	15.0	20.0	0.0	2.1	0.0	**59.0**	Good
2014	9.9	12.3	12.6	7.8	0.0	0.0	0.0	**42.6**	Fair
2018	13.4	10.9	15.0	14.4	-0.3	0.1	0.0	**53.5**	Good
2024	12.4	10.4	0.9	20.0	0.0	0.5	0.0	**44.2**	Fair-Good

SWASEY BULLHOG - STUDY NO. 16R-44





Location Information

USGS 7.5 min Map Info	Joes Valley Reservoi; Township 17S, Range 5E, Section 36
GPS (0' Stake)	NAD 83 UTM ZONE 12, 473854 East 4350159 North

Transect Information

Browse Tag # (0' Stake)	9161
Transect Bearing	270° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

From the turnoff to the Orange Olsen Administration Site near Joes Valley Reservoir, drive west for 1.1 miles up the switchbacks. The witness post is on the east side of the road. The 0-foot stake is approximately 30 paces from the witness post at 45 degrees magnetic and is marked with browse tag #9161.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	OLSEN BENCH
Elevation	7,565ft (2,306m)
Aspect	Southeast
Slope	5-10%
Sample Dates	08/31/2011, 08/17/2015, 08/08/2019, 07/08/2024

Table 16R-44.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Swasey Wildlife Improvement and Hazardous Fuels Phase IV	2627	August 2013-June 2015	519

Wildlife Habitat and Vegetation History

Table 16R-44.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 16R-44.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Pinyon-Juniper	Phase II transitioning to Phase III
2015	Perennial Grass	Phase I
2019	Perennial Grass/Mixed Shrub	Phase I
2024	Perennial Grass/Mixed Shrub	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA461UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2011, this site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), placing it in Phase II transitioning to Phase III of woodland succession. The 2013-2015 bullhog treatment (Table 16R-44.1) removed many of these trees, and the site has been in Phase I since 2015 (Table 16R-44.4, Table 16R-44.12, Table 16R-44.14). However, the continued presence of trees suggests that this site may have the potential for infilling in future sample years. Although degraded prior to treatment, the browse component on this site has increased over time with antelope bitterbrush (*Purshia tridentata*) providing most of the cover (Table 16R-44.12, Table 16R-44.13). The herbaceous understory was in fair condition before the bullhog treatment and consisted of primarily perennial grass and forb species. Native perennial grasses increased in cover and have been the dominant site component since 2015. In 2024, a majority of this perennial grass cover was provided by bluebunch wheatgrass (*Pseudoroegneria spicata*), saline wildrye (*Leymus salinus*), and western wheatgrass (*Pascopyrum smithii*) (Photos, Table 16R-44.7, Table 16R-44.10, Table 16R-44.11).

Mule deer winter range conditions have ranged between very poor and good since 2011. Winter range condition is considered good as of 2024, but is limited by a lack of preferred browse recruitment and lower browse cover (Table 16R-44.15). Nearby areas are known for the winter occurrence of mule deer and elk (Wildlife Tracker). Pellet group data show that deer and/or sheep presence has remained low throughout the sample period. Elk presence, however, has increased since study establishment and was considered moderate in 2019 and 2024 (Table 16R-44.9). Mountain big sagebrush and antelope bitterbrush provide much of the winter forage for wildlife and have increased in cover since treatment; utilization of sagebrush has been low to moderate since 2011, while bitterbrush use has been heavy since 2015. More specifically, 65% of mountain big sagebrush plants sampled in density strips and 88% of bitterbrush plants were moderately to heavily hedged in 2024 (Table 16R-44.13).

Trend Summary Tables

Table 16R-44.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	2.3	0.7	14.0	3.6	0.8	41.2
2015	3.2	0.5	1.8	5.5	0.3	10.3
2019	7.3	0.5	4.1	11.4	0.3	10.1
2024	12.1	0.6	4.8	15.5	0.1	14.7

Table 16R-44.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	-	174	-	185	-	4.5	-	5.4
2015	-	180	13	131	-	9.8	0.3	3.4
2019	-	271	69	176	-	23.1	0.7	5.5
2024	-	291	11	149	-	21.1	0.4	5.3

Table 16R-44.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	39.4	0.6	34.8	2.7	9.3	25.2
2015	23.2	0.3	61.4	1.8	7.7	19.1
2019	24.0	0.1	51.9	1.9	7.8	36.9
2024	15.2	0.0	53.3	2.1	7.2	43.9

Table 16R-44.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2011	10	5	21
2015	6	4	11
2019	23	28	12
2024	14	12	5
Year	Days Use Per Acre (ha)		
2011	17.4 (43.0)	14.7 (36.4)	-
2015	10.0 (24.8)	6.0 (14.9)	-
2019	14.7 (36.4)	30.8 (76.1)	-
2024	16.1 (39.7)	25.5 (62.9)	-

Table 16R-44.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Carex rossii (Ross' sedge)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Juncus (rush)	Koeleria macrantha (prairie Junegrass)	Leymus salinus (saline wildrye)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency												
2011	9	4	6	80	-	-	3	1	-	5	38	1	53
2015	15	17	5	12	57	3	-	4	-	41	16	7	38
2019	30	14	5	9	105	5	-	3	-	49	2	4	118
2024	16	6	10	5	-	-	-	-	113	63	6	-	114
year	Average Cover (%)												
2011	0.4	0.0	0.1	1.6	-	-	0.0	0.0	-	0.0	0.5	0.0	1.7
2015	1.9	0.3	0.2	0.6	2.9	0.1	-	0.0	-	1.1	0.1	0.1	2.4
2019	3.4	0.1	0.3	0.2	6.0	0.0	-	0.1	-	3.0	0.1	0.0	9.9
2024	1.8	0.2	0.6	0.1	-	-	-	-	7.3	2.3	0.2	-	8.5

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

Table 16R-44.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus purshii (woollypod milkvetch)	Astragalus tenellus (loosefloweer milkvetch)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cirsium (thistle)	Comandra umbellata (bastard toadflax)	Cymopterus (springparsley)	Erigeron eatonii (Eaton's fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Hymenoxys richardsonii (pingue rubberweed)	Lactuca serriola[ai] (prickly lettuce)	Lithospermum incisum (narrowleaf stoneseed)
year	Nested Frequency																
2011	3	4	9	6	-	3	2	8	-	-	-	-	18	3	0	-	-
2015	-	2	-	1	-	3	5	2	4	-	-	-	2	1	1	10	0
2019	-	1	5	4	-	-	5	43	12	4	-	8	4	1	-	59	1
2024	4	4	0	1	2	3	1	11	-	8	0	1	11	13	-	6	1
year	Average Cover (%)																
2011	0.0	0.0	0.0	0.1	-	0.0	0.0	0.0	-	-	-	-	0.0	0.1	0.0	-	-
2015	-	0.0	-	0.0	-	0.2	0.0	0.0	0.1	-	-	-	0.0	0.1	0.1	0.3	0.0
2019	-	0.0	0.0	0.0	-	-	0.0	0.2	0.0	0.2	-	0.0	0.1	0.0	-	0.4	0.0
2024	0.2	0.1	0.0	0.0	0.0	0.2	0.0	0.2	-	0.1	0.0	0.0	0.3	0.3	-	0.2	0.2

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

FORB SPECIES	Machaeranthera canescens (hoary tansyaster)	Packera multilobata (lobeleaf groundsel)	Penstemon caespitosus (mat penstemon)	Phlox austromontana (mountain phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	Symphyotrichum (aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency									
2011	5	-	119	85	-	-	-	15	-	-
2015	9	8	81	50	-	-	-	7	8	-
2019	1	2	96	61	4	-	-	24	9	2
2024	1	3	87	42	2	3	2	1	3	4
year	Average Cover (%)									
2011	0.0	-	2.6	2.2	-	-	-	0.0	-	-
2015	0.2	0.1	1.7	0.6	-	-	-	0.1	0.2	-
2019	0.0	0.0	2.7	1.6	0.0	-	-	0.6	0.0	0.2
2024	0.0	0.0	2.7	0.9	0.0	0.0	0.0	0.0	0.0	0.2

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

Table 16R-44.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies concolor[t] (white fir)	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus depressus[p] (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	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)	Purshia tridentata[p] (antelope bitterbrush)	Quercus gambelii[p] (Gambel oak)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)																
2011	0.2	-	-	0.4	0.1	-	-	-	18.2	-	-	0.8	22.8	-	3	-	0.1
2015	-	-	-	1	-	-	-	-	0.8	-	-	0.3	8.5	1	4.1	-	0.4
2019	-	-	0.5	2.6	0.1	-	-	-	1.2	-	-	0.3	8.9	-	7.8	-	0.4
2024	-	-	-	3.9	0.1	0.1	-	0	1.1	-	-	-	11.8	1.8	11.2	-	0.3
year	Quadrat Cover (%)																
2011	0.0	0.4	-	0.1	0.1	-	-	-	4.7	-	-	0.7	9.3	-	1.6	-	0.1
2015	-	-	-	0.6	0.0	-	0.0	-	0.2	-	-	0.5	1.6	0.0	2.6	-	0.0
2019	-	0.0	0.1	1.8	0.2	-	-	0.1	0.2	0.1	-	0.5	3.8	-	4.8	-	0.3
2024	-	0.0	-	3.5	0.1	0.1	-	0.3	1.0	-	0.1	-	3.2	0.6	8.3	0.0	0.2

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

Table 16R-44.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2011	-	-	-	-	-	-	-	-	21/24
2015	40	-	50	0	50	50	50	50	137/45
2019	100	-	60	40	0	20	60	0	16/15
2024	40	-	100	0	0	0	0	50	- / -

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)									
2011	-	-	-	-	-	-	-	-	17/54
2015	-	-	-	-	-	-	-	-	15/46
2019	40	-	0	100	0	100	0	0	33/50
2024	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2011	1020	300	63	29	8	18	12	6	43/62
2015	400	-	20	80	0	10	20	0	38/53
2019	840	480	48	52	0	19	7	0	38/55
2024	700	120	9	89	3	54	11	9	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2011	20	-	0	100	0	0	100	0	31/41
2015	20	-	0	100	0	0	100	0	30/45
2019	-	-	-	-	-	-	-	-	34/51
2024	40	-	0	100	0	0	50	0	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2011	420	-	0	100	0	38	0	0	11/24
2015	60	-	33	67	0	33	0	0	11/20
2019	140	-	0	100	0	14	57	0	11/26
2024	280	-	0	100	0	57	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2011	20	-	0	100	0	0	0	0	10/18
2015	20	-	0	100	0	0	0	0	47/39
2019	20	-	0	100	0	0	100	0	17/29
2024	140	40	29	71	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2011	-	-	-	-	-	-	-	-	59/34
2015	-	-	-	-	-	-	-	-	-/-
2019	60	-	0	100	0	0	33	0	48/49
2024	20	-	0	100	0	0	0	0	- / -
Ericameria parryi var. parryi -- (Parry's rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2015	60	-	0	100	0	0	33	0	14/28
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2011	-	-	-	-	-	-	-	-	-/-
2015	60	-	0	100	0	0	0	0	24/32
2019	420	-	0	95	5	0	0	5	21/30
2024	1300	-	22	79	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2011	240	-	42	42	17	0	0	17	- / -
2015	20	-	0	100	0	0	0	0	- / -
2019	20	20	100	0	0	0	0	0	- / -
2024	120	60	33	67	0	0	0	0	- / -
Juniperus scopulorum[t] -- (Rocky Mountain juniper)									
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	- / -
2024	-	-	-	-	-	-	-	-	-/-

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)									
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	100	-	20	80	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2011	440	-	18	82	0	0	0	0	12/39
2015	480	-	0	92	8	0	0	4	8/36
2019	380	-	5	95	0	0	0	0	8/16
2024	220	-	55	46	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2011	80	220	75	25	0	0	0	25	- / -
2015	60	20	33	67	0	0	0	0	- / -
2019	80	20	50	50	0	0	0	0	- / -
2024	60	20	33	67	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2011	620	20	3	90	7	23	10	7	34/117
2015	640	-	3	97	0	84	0	0	27/65
2019	980	220	2	98	0	25	51	0	39/121
2024	820	-	2	98	0	51	37	0	- / -
Quercus gambelii[p] -- (Gambel oak)									
2011	-	-	-	-	-	-	-	-	53/48
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	40/51
2024	-	60	0	0	0	0	0	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2011	260	-	46	46	8	15	15	8	14/23
2015	160	-	25	75	0	13	0	0	20/35
2019	220	-	18	82	0	46	0	0	25/50
2024	220	20	9	91	0	73	9	0	- / -

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

Table 16R-44.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

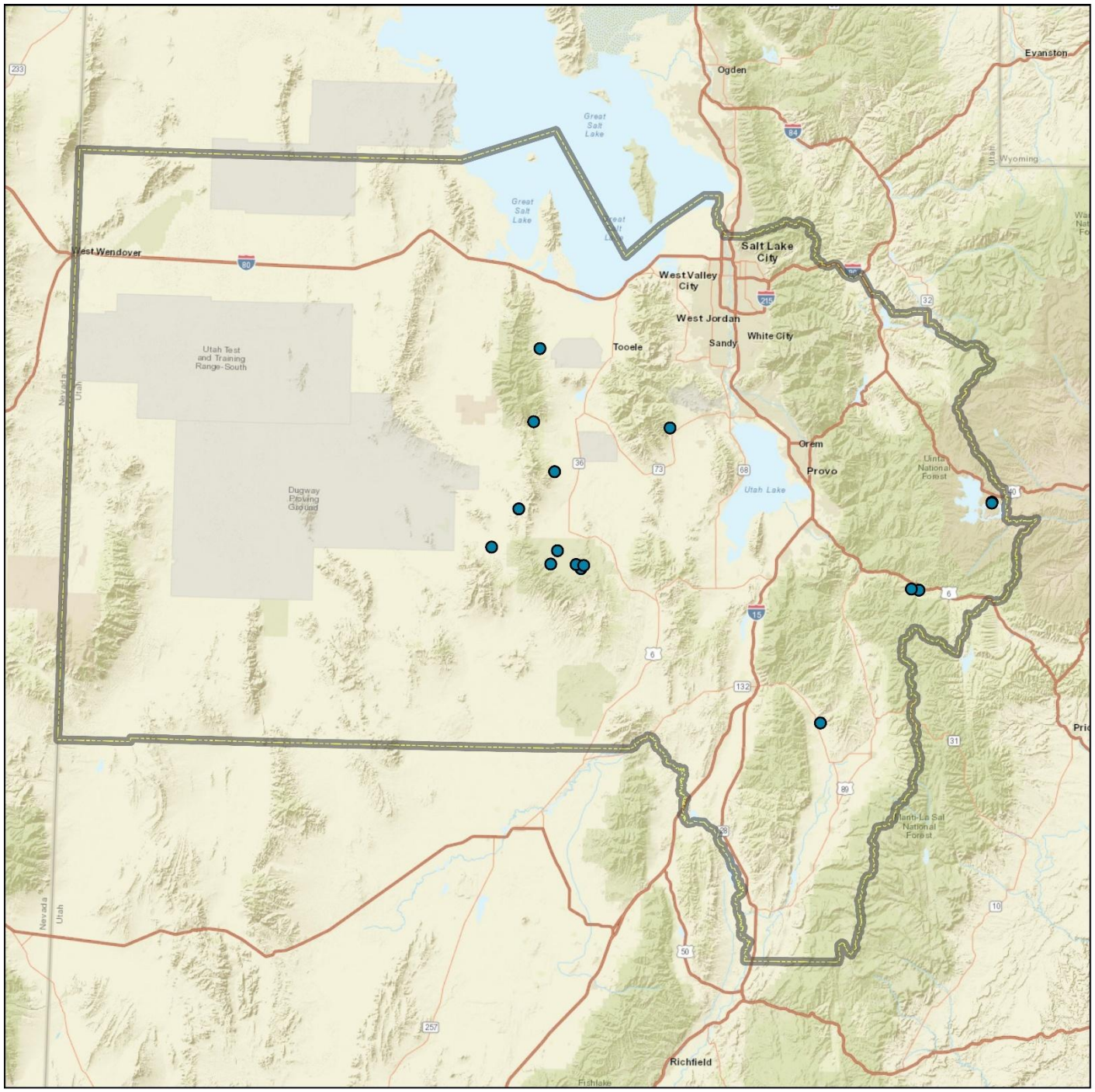
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2011	127	10	15	20	25	30	22.9
2015	20	25	42	33	-	-	6.2
2019	21	30	50	10	10	-	6.9
2024	19	-	73	9	-	18	11.2
Juniperus scopulorum (Rocky Mountain juniper)							
2019	2	-	-	100	-	-	7.5
2024	18	13	63	25	-	-	4.6
Pinus edulis (twoneedle pinyon)							
2011	98	20	15	20	25	20	10.8
2015	20	-	45	27	-	27	18.1
2019	22	-	40	20	-	40	17.4
2024	33	-	50	29	7	14	11.9
Pinus flexilis (limber pine)							
2019	1	-	-	-	-	100	42.0
Pinus ponderosa (ponderosa pine)							
2024	1	-	100	-	-	-	2.0

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Pseudotsuga menziesii (Douglas-fir)							
2019	1	-	-	-	100	-	19.0
2024	1	-	-	-	-	100	22.0

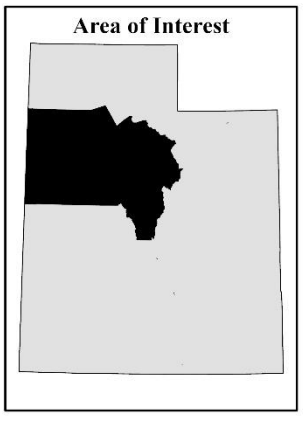
Table 16R-44.15 - Deer Desirable Components Index: Mountain Potential Scale.

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	5.2	0.0	0.0	9.0	0.0	10.0	0.0	**24.2**	Very Poor
2015	7.8	15.0	3.9	19.6	0.0	6.9	0.0	**53.2**	Poor-Fair
2019	16.1	15.0	6.4	30.0	0.0	10.0	0.0	**77.5**	Good
2024	22.1	14.8	2.0	30.0	0.0	10.0	0.0	**78.9**	Good

CENTRAL REGION



0 5 10 20 30 40 50 60 70 80 Miles



Study Locations

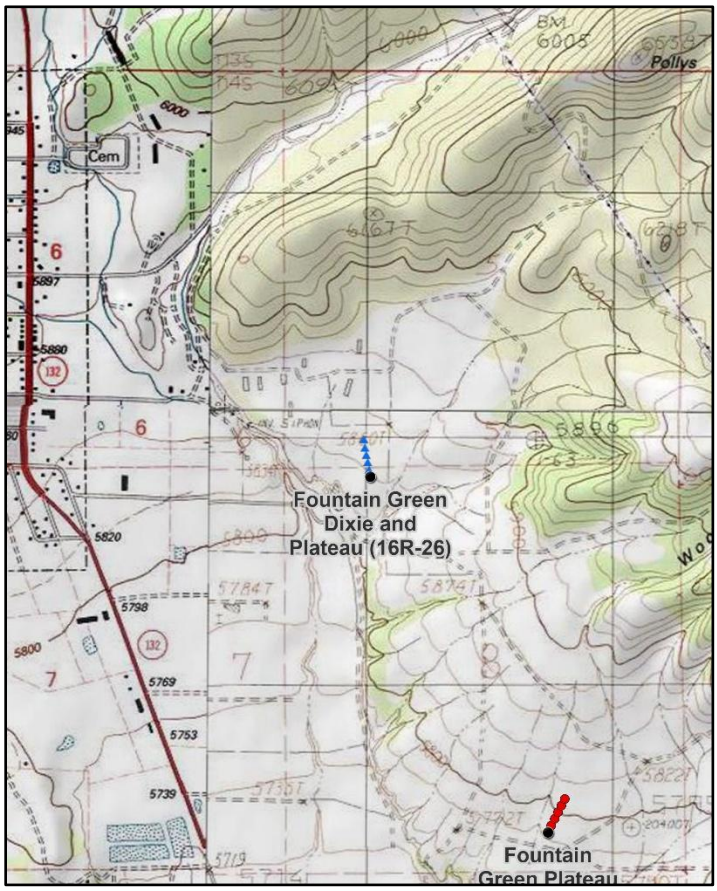
2024 WRI Study Sites

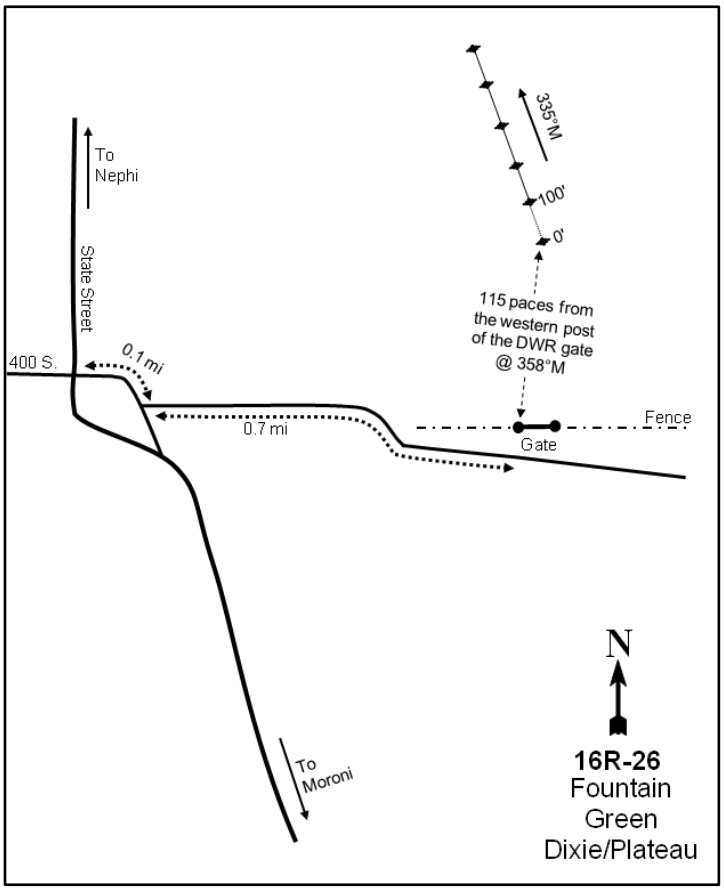
Administrative Boundaries

Central Region

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

FOUNTAIN GREEN DIXIE AND PLATEAU - STUDY NO. 16R-26





Location Information

USGS 7.5 min Map Info	Moroni NW; Township 14S, Range 3E, Section 08
GPS (0' Stake)	NAD 83 UTM ZONE 12, 446953 East 4386036 North

Transect Information

Browse Tag # (0' Stake)	192
Transect Bearing	335° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Traveling south through Fountain Green on State Route 132, drive to 400 South. Turn left here and travel 0.1 miles to another left turn. Turn left (east) here and continue to drive for 0.7 miles to a DWR gate on the left (north) side of the road. The 0-foot stake is about 115 paces from the western post of the gate at 358 degrees magnetic and is marked with browse tag #192.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,850ft (1,783m)
Aspect	Southwest
Slope	3%
Sample Dates	07/03/2007, 07/21/2010, 08/18/2015, 07/15/2019, 05/28/2024

Table 16R-26.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Plateau	Fountain Green WMA Habitat Improvement	288	September 2007	240
Harrow - Two-Way Dixie	Fountain Green WMA Habitat Improvement	288	September 2007-April 2008	20
Seeding - Broadcast Before	Fountain Green WMA Habitat Improvement	288	April 2008	35

Table 16R-26.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Fountain Green Harrow			Broadcast	Apr 2008	30
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.00	0.98
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.00	0.84
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	1.00	0.93
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.00	0.87
G	Dactylis glomerata	Orchardgrass	Paiute	0.50	0.39
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.00	0.91
G	Poa secunda	Sandberg Bluegrass	Mountain Home ID	0.50	0.46
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.85
G	Thinopyrum intermedium	Intermediate Wheatgrass		2.00	1.92
F	Achillea millefolium	Western Yarrow		0.17	0.16
F	Medicago sativa	Alfalfa	Ladak	1.00	0.92
F	Medicago sativa	Alfalfa	Ranger	1.00	0.89
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.84
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.87

Wildlife Habitat and Vegetation History

Table 16R-26.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 16R-26.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Annual Grass-Forb/Basin Big Sagebrush	No Encroachment
2010	Annual Grass-Forb	No Encroachment
2015	Annual Grass	No Encroachment
2019	Annual Grass-Forb	No Encroachment
2024	Annual Grass-Forb	No Encroachment

Site Notes

No Notes

Soils

Table 16R-26.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.2	34.2	38.0	27.8	1.4	11.4	304.0	0.7	07/03/2007

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2007 - Current Potential State: Community Phase 2.1 2010-2024 - Yellow Rabbitbrush/Invasive Annuals State: Community Phase 4.2

When the study was established in 2007, the plant community on this site was dominated by basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and annual grasses and forbs. Following the harrow and herbicide treatment in 2007-2008 (16R-26.1), sagebrush decreased and became a minor component (Table 16R-26.12, Table 16R-26.13). Annual grasses, mainly the introduced annual grass cheatgrass (*Bromus tectorum*), and/or forbs have remained dominant or codominant vegetation types following treatment; high amounts of cheatgrass can increase fuel loads and threaten the ecological resilience of the plant community. Perennial grass and forb species have remained rare, providing comparatively little cover despite reseeding efforts in 2008 (Table 16R-26.1, Table 16R-

26.10, Table 16R-26.11). Without further treatments to reduce annual grasses and forbs, this site will likely remain in this or a similar state in future sample years.

Mule deer winter range conditions have remained very poor since 2007, and have generally been limited by a lack of preferred browse cover and recruitment, and low perennial grass and forb cover (Table 16R-26.15). Nearby areas are known for the winter occurrence of mule deer and elk (Wildlife Tracker). Pellet group data show that deer and/or sheep presence was high in 2007, and again in 2015 and 2024. Elk presence has been low over the same time period, except in 2015 in which elk presence was moderate (Table 16R-26.9). Wyoming big sagebrush (*A. tridentata* ssp. *wyomingensis*) provides much of the winter forage for wildlife. The sagebrush population is small but increasing in density as of 2024; utilization of sagebrush has been fairly moderate in most sample years (Table 16R-26.13). It should be noted that this community is susceptible to competitive introduced species, and/or heavy utilization which could lead to a decrease in preferred browse abundance and loss of utility for wildlife.

Trend Summary Tables

Table 16R-26.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	2.8	0.4	-	2.0	-	-
2010	0.6	-	-	0.8	-	-
2015	0.8	0.1	-	0.9	-	-
2019	0.7	0.0	-	0.5	0.3	-
2024	1.4	1.5	-	2.1	1.0	-

Table 16R-26.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	475	79	414	100	22.3	0.6	15.1	1.7
2010	340	113	307	88	19.9	6.4	23.4	6.0
2015	444	93	209	35	21.0	2.2	1.7	0.2
2019	421	118	417	34	43.7	5.6	39.6	0.6
2024	433	140	442	66	28.3	7.6	27.0	1.8

Table 16R-26.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	14.9	1.9	42.8	1.5	5.6	42.9
2010	25.2	-	44.9	2.0	5.1	52.1
2015	15.2	0.0	60.8	2.2	5.1	26.7
2019	8.9	0.0	57.6	0.8	4.4	66.5
2024	16.5	0.1	43.4	0.8	5.0	62.6

Table 16R-26.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	4	90	2	25
2010	-	27	3	7
2015	-	46	1	50
2019	-	30	9	13
2024	-	51	-	9
Year	Days Use Per Acre (ha)			
2007	-	149.4 (369.1)	4.7 (11.6)	-
2010	-	15.4 (38.1)	6.7 (16.6)	-
2015	-	61.7 (152.3)	17.4 (43.0)	-
2019	-	29.5 (72.8)	5.3 (13.2)	-
2024	-	57.0 (140.7)	-	-

Table 16R-26.10 - 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)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa[i] (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency											
2007	4	-	475	16	-	-	64	-	-	-	-	5
2010	2	13	340	7	-	-	76	-	7	11	9	-
2015	-	5	444	13	5	-	69	-	5	-	-	-
2019	4	8	420	19	8	0	77	-	-	-	20	18
2024	10	13	433	12	3	0	76	31	7	-	25	-
year	Average Cover (%)											
2007	0.0	-	22.3	0.1	-	-	0.4	-	-	-	-	0.0
2010	0.0	0.0	19.9	0.5	-	-	5.0	-	0.0	0.2	0.6	-
2015	-	0.0	21.0	0.1	0.2	-	1.9	-	0.1	-	-	-
2019	0.4	0.8	43.4	0.3	0.1	0.1	3.2	-	-	-	0.6	0.4
2024	0.3	0.9	28.3	0.5	0.0	0.0	3.0	1.1	0.0	-	1.8	-

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

Table 16R-26.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Bassia scoparia[ai] (burningbush)	Camelina microcarpa[ai] (littlepod false flax)	Cardaria draba[ni] (whitetop)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chorispora tenella[ai] (crossflower)	Convolvulus arvensis[ni] (field bindweed)	Descurainia pinnata[a] (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Erodium cicutarium[ai] (redstem stork's bill)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Medicago sativa[i] (alfalfa)	Onobrychis viciifolia[i] (sainfoin)	Salsola tragus[ai] (prickly Russian thistle)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
2007	292	-	9	36	165	3	-	2	-	382	8	4	-	-	-	83	71
2010	112	189	-	11	66	-	-	12	-	4	13	2	52	-	140	33	30
2015	5	1	-	-	1	-	-	-	-	167	-	-	-	1	13	42	34
2019	210	-	0	7	181	17	-	15	3	283	7	-	-	-	-	105	24
2024	94	-	-	22	265	-	1	-	2	417	4	-	-	-	-	1	44
year	Average Cover (%)																
2007	0.6	-	0.0	0.4	0.5	0.1	-	0.0	-	12.7	0.0	0.0	-	-	-	1.1	1.4
2010	1.5	14.5	-	0.3	1.1	-	-	0.0	-	0.1	0.2	0.0	5.1	-	4.3	1.7	0.6
2015	0.0	0.0	-	-	0.0	-	-	-	-	1.1	-	-	-	0.0	0.1	0.5	0.2
2019	6.4	-	0.0	0.0	3.5	0.5	-	0.5	0.1	17.9	0.1	-	-	-	-	10.6	0.4
2024	0.3	-	-	0.5	3.9	-	0.0	-	0.2	22.6	0.0	-	-	-	-	0.1	1.1

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

FORB SPECIES	Tragopogon dubius[ai] (yellow salsify)
year	Nested
2007	6
2010	-
2015	-
2019	9
2024	2
year	Average Cover (%)
2007	0.0
2010	-
2015	-
2019	0.1
2024	0.1

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

Table 16R-26.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. tridentata[p] (basin big sagebrush)	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. speciosa[p] (rubber rabbitbrush)	Opuntia (pricklypear)
year	Line Intercept Cover (%)						
2007	2	-	-	-	-	-	-
2010	0.8	-	-	-	-	-	-
2015	0.1	0.8	-	-	-	-	-
2019	-	0.5	0.1	-	-	-	0.2
2024	-	1.1	0.2	0.5	0.3	1	-
year	Quadrat Cover (%)						
2007	2.8	-	-	-	-	-	0.4
2010	0.6	-	-	-	-	-	-
2015	0.0	0.8	0.1	-	-	-	-
2019	-	0.7	0.0	-	-	0.1	0.0
2024	-	1.0	0.0	0.5	1.0	0.4	-

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

Table 16R-26.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. tridentata[p] -- (basin big sagebrush)									
2007	1020	-	2	16	82	0	100	51	77/96
2010	220	400	27	73	0	46	9	0	46/65
2015	60	-	0	100	0	0	33	0	41/52
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	360	-	11	44	44	39	39	28	37/51
2019	540	-	0	89	11	15	0	7	63/56
2024	720	-	22	72	6	28	28	6	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2007	-	-	-	-	-	-	-	-	21/24
2010	-	-	-	-	-	-	-	-	44/69
2015	60	-	67	33	0	0	0	0	36/48
2019	80	-	0	100	0	0	0	0	45/47
2024	40	-	0	100	0	0	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	120	1040	17	83	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	60/60
2019	-	-	-	-	-	-	-	-	-/-
2024	220	240	73	27	0	0	0	0	- / -
Ericameria nauseosa ssp. nauseosa var. speciosa[p] -- (rubber rabbitbrush)									
2007	-	-	-	-	-	-	-	-	47/34
2010	-	-	-	-	-	-	-	-	54/80
2015	20	-	0	100	0	0	0	0	58/85
2019	180	-	0	100	0	0	0	0	54/55
2024	800	40	80	20	0	8	3	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2007	-	-	-	-	-	-	-	-	16/14
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2007	20	-	0	100	0	0	0	100	19/40
2010	40	-	0	100	0	0	0	0	20/24
2015	40	-	0	100	0	0	0	0	16/48
2019	40	-	0	100	0	0	0	0	19/53
2024	-	-	-	-	-	-	-	-	-/-

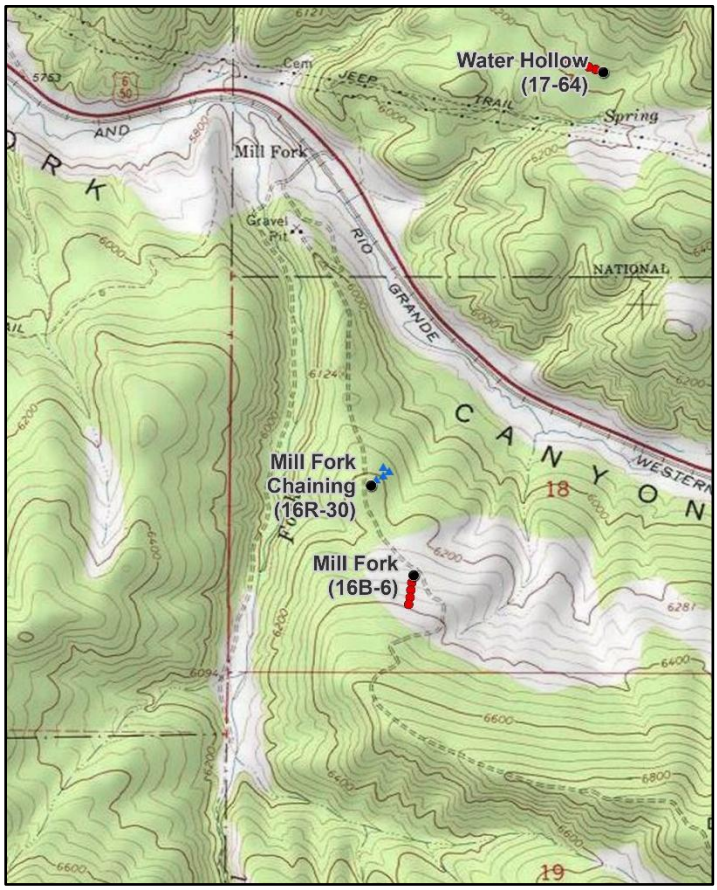
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Purshia stansburiana[p] -- (Stansbury cliffrose)									
2007	-	-	-	-	-	-	-	-	57/41
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Tetradymia canescens -- (spineless horsebrush)									
2007	-	-	-	-	-	-	-	-	52/61
2010	20	-	0	100	0	0	0	0	67/67

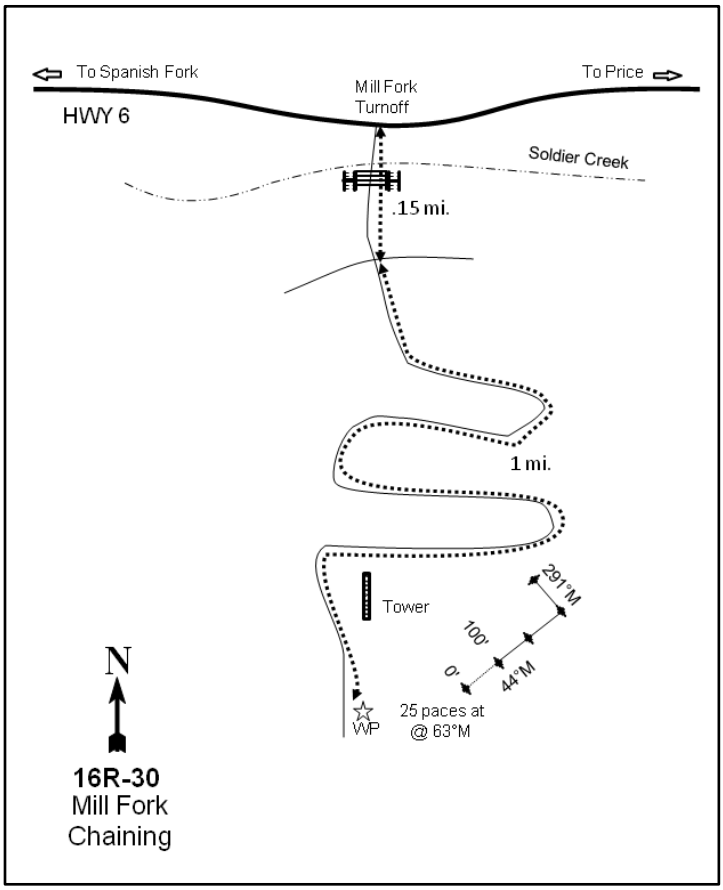
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 16R-26.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2007	2.5	0.0	0.0	1.2	-16.8	2.7	-2.0	**-12.4**	Very Poor
2010	1.0	0.0	0.0	12.9	-14.9	10.0	-2.0	**7.0**	Very Poor
2015	1.1	0.0	0.0	4.4	-15.7	0.5	0.0	**-9.7**	Very Poor
2019	0.6	0.0	0.0	11.2	-20.0	1.1	-2.0	**-9.1**	Very Poor
2024	2.6	0.0	0.0	13.0	-20.0	2.5	-4.0	**-5.9**	Very Poor

MILL FORK CHAINING - STUDY NO. 16R-30





Location Information

USGS 7.5 min Map Info	Mill Fork NE; Township 10S, Range 6E, Section 18
GPS (0' Stake)	NAD 83 UTM ZONE 12, 473936 East 4422429 North

Transect Information

Browse Tag # (0' Stake)	111
Transect Bearing	44° 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

Travel east on Highway 6 (toward Price) for 1.9 miles to the Mill Fork turnoff on the south side of the highway from the Sheep Creek Café and the Sheep Creek Turnoff. Take this road for 0.15 miles, pass through a gate, cross the river, and arrive at a fork. Stay to the left (east) and go up the hill 1 mile to a witness post on the east side of the road. From the witness post the 0-foot baseline stake is located 25 paces away at 63 degrees magnetic. The 0-foot baseline stake is marked by browse tag #111.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	6,200ft (1,890m)
Aspect	North
Slope	3%
Sample Dates	10/09/2007, 06/21/2010, 05/29/2014, 05/30/2019, 05/30/2024

Table 16R-30.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Mill Fork Wildlife Habitat Improvement	716	October-November 2007	350
Seeding - Aerial Before	Mill Fork Wildlife Habitat Improvement	716	October 2007	462
Seeding - Dribbler	Mill Fork Wildlife Habitat Improvement	716	November 2007	350
Hand Crew - Lop and Scatter	Mill Fork Wildlife Habitat Improvement Project (Phase 2)	3019	August-November 2015	553

Table 16R-30.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mill Fork Chaining			Aerial	Oct 2007	472
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.95	0.83
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.53	0.44
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.53	0.47
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.42	0.39
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.85	0.73
G	Bromus marginatus	Mountain Brome		0.85	0.79
G	Dactylis glomerata	Orchardgrass	Paiute	0.42	0.33
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.53	0.51
G	Poa secunda	Canby Bluegrass	Canbar	0.42	0.38
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.95	0.81
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.95	0.91
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.53	0.49
F	Medicago sativa	Alfalfa	Ladak	0.64	0.59
F	Medicago sativa	Alfalfa	Ranger	0.64	0.57
F	Medicago sativa	Alfalfa	Spreador 4	0.64	0.61
F	Onobrychis viciifolia	Sainfoin	Eski	1.91	1.75
F	Sanguisorba minor	Small Burnet	Delar	1.87	1.74

Mix Name			Application Type	Application Date	Acres
Mill Fork Chaining Dribbler			Dribbler	Nov 2007	370
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.27	0.10
S	Purshia tridentata	Bitterbrush	Elko NV	0.12	0.11
S	Purshia tridentata	Bitterbrush	Millard UT	0.15	0.13

Wildlife Habitat and Vegetation History

Table 16R-30.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter/spring
Rocky Mountain Elk	crucial	winter
Shiras Moose	substantial	year-long

Table 16R-30.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Juniper	Phase III
2010	Annual Grass	Phase I
2014	Perennial Grass	Phase I
2019	Perennial Grass	Phase I
2024	Perennial Grass	Phase I

Site Notes

The study was established in 2007 to monitor a big game winter range improvement project in Spanish Fork Canyon. A large portion of the sagebrush habitats in the canyon have become decadent or have been invaded by twoneedle pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). These rangelands had been heavily grazed by sheep and cattle for decades, leaving little herbaceous understory (WRI Database, 2024).

Soils

Table 16R-30.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	6.9	34.4	37.0	28.6	3.7	8.9	179.2	0.7	10/09/2007

Site Potential

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2007, this site was dominated by Utah juniper (*Juniperus osteosperma*) and considered to be within Phase III of woodland succession. A chaining treatment in 2007 and lop and scatter in 2015 (Table 16R-30.1) removed many of these trees, and the study has been in Phase I since 2010. However, point-quarter data shows that juniper has increased in the years after treatment: this indicates that this site may have the potential to be infilled over time without further treatments. Browse species have remained rare both prior to and after treatment (Table 16R-30.4, Table 16R-30.12, Table 16R-30.13, Table 16R-30.14). Although sparse before the chaining, the herbaceous understory has been abundant in the post-treatment sample years. The introduced annual grass species cheatgrass (*Bromus tectorum*) initially increased in cover and was the dominant vegetation component in 2010. However, annual grasses decreased and perennial grasses including (but not limited to) bluebunch wheatgrass (*Pseudoroegneria spicata*), squirreltail (*Elymus elymoides*), and crested wheatgrass (*Agropyron cristatum*) increased significantly following this initial post-treatment sampling. As such, perennial grasses have been the dominant vegetation component on this site since 2014 (Table 16R-30.7, Table 16R-30.10, Table 16R-30.11).

Mule deer winter range conditions have remained very poor since 2007, and have been limited by a lack of preferred browse cover and recruitment, low perennial forb cover, and the presence of annual grass and noxious weeds (Table 16R-30.15). Nearby areas are known for the winter occurrence of mule deer and elk (Wildlife Tracker). Pellet group data show that deer presence was high in 2024, but was low for much of the sample period. Elk presence has remained low since study establishment (Table 16R-30.9). Very few plants provide winter forage for wildlife; utilization of antelope bitterbrush (*Purshia tridentata*) has been high since 2019, but this utilization is represented by one plant (Table 16R-30.13). It should be noted that this community is susceptible to competitive introduced species and/or heavy utilization which could lead to a decrease in preferred browse abundance and loss of utility for wildlife.

Trend Summary Tables

Table 16R-30.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	-	1.2	7.0	-	1.0	39.2
2010	0.1	0.8	1.6	0.6	0.2	1.1
2014	0.0	0.8	2.0	-	0.6	3.1
2019	0.0	1.5	0.5	-	1.0	0.2
2024	0.7	0.8	2.5	1.1	1.2	2.8

Table 16R-30.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	226	216	201	77	2.5	4.2	0.9	0.5
2010	313	130	230	85	13.5	5.8	4.3	2.0
2014	102	362	167	91	0.9	27.7	3.2	2.9
2019	50	340	336	97	1.4	33.5	5.6	2.0
2024	41	338	244	86	0.8	30.5	2.3	1.1

Table 16R-30.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	15.9	11.7	49.9	17.8	5.5	15.5
2010	18.1	0.4	60.5	4.6	3.6	29.7
2014	12.8	0.8	59.2	2.3	3.9	37.5
2019	18.7	0.6	55.3	4.9	6.8	45.0
2024	20.7	0.5	51.8	4.8	3.6	40.1

Table 16R-30.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency			
2007	6	2	-	23
2010	4	1	-	8
2014	3	10	-	15
2019	7	3	2	15
2024	25	3	-	5
Year	Days Use Per Acre (ha)			
2007	4.7 (11.6)	2.7 (6.6)	-	-
2010	7.4 (18.2)	10.7 (26.5)	-	-
2014	11.4 (28.1)	18.1 (44.7)	-	-
2019	16.8 (41.4)	2.7 (6.6)	-	-
2024	73.7 (182.1)	3.4 (8.3)	6.4 (15.8)	-

Table 16R-30.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus marginatus (mountain brome)	Bromus tectorum[ai] (cheatgrass)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Leymus cinereus (basin wildrye)	Leymus salinus (saline wildrye)	Poa bulbosa[i] (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency													
2007	5	-	-	226	-	117	-	-	-	-	5	130	-	-
2010	6	15	11	313	7	65	-	-	-	-	18	14	-	19
2014	20	67	-	102	6	240	2	5	-	13	21	35	29	55
2019	34	109	-	50	-	70	17	-	-	7	1	35	127	95
2024	46	176	-	41	-	70	12	-	3	-	22	2	48	86
year	Average Cover (%)													
2007	0.1	-	-	2.5	-	1.4	-	-	-	-	0.0	2.7	-	-
2010	0.0	0.9	0.5	13.5	0.3	2.5	-	-	-	-	0.3	0.3	-	0.8
2014	0.4	3.8	-	0.9	0.2	15.3	0.4	0.7	-	0.3	0.6	0.8	2.6	2.6
2019	1.1	7.8	-	1.4	-	4.2	1.8	-	-	0.2	0.0	1.2	12.7	4.5
2024	3.7	12.4	-	0.8	-	3.1	1.2	-	0.0	-	0.5	0.0	5.0	4.6

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

Table 16R-30.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Alyssum desertorum[ai] (desert madwort)	Antennaria (pussytoes)	Astragalus calycosus (Torrey's milkvetch)	Astragalus cibarius (browse milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa[ai] (littlepod false flax)	Carduus nutans[ani] (nodding plumeless thistle)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus longipes (longstalk springparsley)
year	Nested Frequency																
2007	-	-	25	12	-	-	1	4	-	-	-	148	2	-	13	-	-
2010	-	2	38	2	-	-	-	1	1	-	-	12	8	3	-	-	4
2014	1	9	45	-	12	0	-	1	2	2	87	25	19	-	-	-	18
2019	-	-	205	-	2	-	7	3	15	4	58	161	8	-	7	1	20
2024	-	16	136	-	21	-	-	-	8	-	22	178	8	-	-	-	10
year	Average Cover (%)																
2007	-	-	0.1	0.0	-	-	0.0	0.0	-	-	-	0.5	0.0	-	0.0	-	-
2010	-	0.1	0.3	0.0	-	-	-	0.0	0.0	-	-	0.1	0.0	0.2	-	-	0.0
2014	0.0	0.2	0.2	-	0.3	0.0	-	0.0	0.0	0.0	1.8	0.1	0.1	-	-	-	0.2
2019	-	-	2.3	-	0.0	-	0.2	0.0	0.7	0.1	0.5	1.5	0.0	-	0.0	0.0	0.4
2024	-	0.2	0.5	-	0.2	-	-	-	0.0	-	0.7	0.5	0.1	-	-	-	0.1

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

FORB SPECIES	Cynoglossum officinale[ani] (gypsyflower)	Descurainia pinnata[a] (western tansymustard)	Eriogonum (buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua[a] (shy gilia)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa[i] (alfalfa)	Microsteris gracilis[a] (slender phlox)	Onobrychis viciifolia[i] (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon caespitosus (mat penstemon)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2007	-	86	-	-	-	-	-	-	-	-	-	28	-	6	25	-	28
2010	-	30	36	-	-	-	199	-	-	3	7	-	4	7	6	-	2
2014	2	51	-	-	-	-	13	-	13	-	2	-	9	-	14	5	8
2019	0	98	2	-	-	4	-	3	-	-	-	-	1	-	8	5	3
2024	-	7	-	0	1	-	-	-	1	-	-	-	-	-	17	3	2
year	Average Cover (%)																
2007	-	0.2	-	-	-	-	-	-	-	-	-	0.1	-	0.0	0.2	-	0.1
2010	-	0.4	0.4	-	-	-	3.5	-	-	0.0	0.1	-	0.3	0.0	0.5	-	0.0
2014	0.0	0.4	-	-	-	-	0.0	-	0.2	-	0.1	-	0.3	-	0.5	0.1	0.2
2019	0.0	1.2	0.0	-	-	0.0	-	0.0	-	-	-	-	0.0	-	0.3	0.0	0.0
2024	-	0.0	-	0.0	0.0	-	-	-	0.0	-	-	-	-	-	0.2	0.2	0.0

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

FORB SPECIES	Sanguisorba minor[i] (small burnet)	Streptanthus cordatus (heartleaf twistflower)	Taraxacum officinale (common dandelion)	Tragopogon dubius[ai] (yellow salsify)	Verbascum thapsus[ai] (common mullein)
year	Nested Frequency				
2007	-	1	-	-	-
2010	6	-	4	-	-
2014	15	-	22	11	12
2019	-	-	49	4	-
2024	-	4	7	6	7
year	Average Cover (%)				
2007	-	0.0	-	-	-
2010	0.2	-	0.0	-	-
2014	0.4	-	0.2	0.1	0.5
2019	-	-	0.4	0.0	-
2024	-	0.0	0.2	0.2	0.4

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

Table 16R-30.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Atriplex canescens[p] (fourwing saltbush)	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)	Purshia tridentata[p] (antelope bitterbrush)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)							
2007	-	-	0.1	39.2	-	0.9	-	-
2010	0.6	-	0.1	1.1	-	0.1	-	-
2014	-	-	0	3.1	-	0.6	-	-
2019	-	-	0.8	0.2	-	0.2	-	-
2024	0.4	-	1.2	2.8	-	-	0.3	0.4
year	Quadrat Cover (%)							
2007	-	-	0.0	7.0	-	1.1	-	-
2010	0.1	-	0.1	1.6	0.1	0.6	-	-
2014	-	-	0.1	2.0	-	0.8	-	0.0
2019	-	-	1.1	0.5	-	0.4	-	0.0
2024	0.6	0.0	0.4	2.5	-	0.3	0.0	0.0

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

Table 16R-30.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2007	-	-	-	-	-	-	-	-	25/25
2010	20	-	0	100	0	0	0	0	32/39
2014	-	-	-	-	-	-	-	-	61/67
2019	-	-	-	-	-	-	-	-	78/104
2024	-	-	-	-	-	-	-	-	-/-
Atriplex canescens[p] -- (fourwing saltbush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	40	-	100	0	0	0	0	0	46/59
2014	-	-	-	-	-	-	-	-	45/89
2019	-	-	-	-	-	-	-	-	79/80
2024	60	-	67	33	0	0	33	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	14/28
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	41/57
2024	-	-	-	-	-	-	-	-	-/-

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. hololeuca[p] -- (rubber rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	32/62
2024	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2007	40	-	0	100	0	0	0	0	22/29
2010	220	20	55	36	9	0	0	9	31/40
2014	280	20	14	86	0	0	0	0	17/22
2019	1180	20	20	76	3	0	0	3	17/23
2024	2560	-	24	76	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2007	340	40	6	77	18	0	0	0	- / -
2010	100	20	40	40	20	0	0	20	- / -
2014	180	200	67	33	0	0	0	0	- / -
2019	200	60	70	30	0	0	0	0	- / -
2024	400	-	75	25	0	0	0	15	- / -
Krascheninnikovia lanata[p] -- (winterfat)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	43/64
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	38/57
2024	-	-	-	-	-	-	-	-	-/-
Linanthus pungens -- (granite prickly phlox)									
2007	20	-	100	0	0	0	0	0	- / -
2010	60	-	0	100	0	0	0	0	3/10
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Opuntia fragilis -- (brittle pricklypear)									
2007	1060	-	15	79	6	0	0	2	8/34
2010	440	-	9	91	0	0	0	0	9/23
2014	560	20	11	82	7	0	0	14	9/25
2019	200	-	10	90	0	0	0	0	7/13
2024	400	-	10	90	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	20	-	100	0	0	0	0	0	24/33
2014	60	-	67	33	0	67	33	0	16/29
2019	20	-	0	100	0	0	100	0	22/45
2024	20	-	0	100	0	0	100	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	40	-	50	50	0	0	100	0	56/61
2019	40	-	0	100	0	50	0	0	38/41
2024	20	-	0	100	0	0	0	0	- / -
Tetradymia canescens -- (spineless horsebrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	30/41
2014	-	-	-	-	-	-	-	-	40/62
2019	-	-	-	-	-	-	-	-	28/47

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

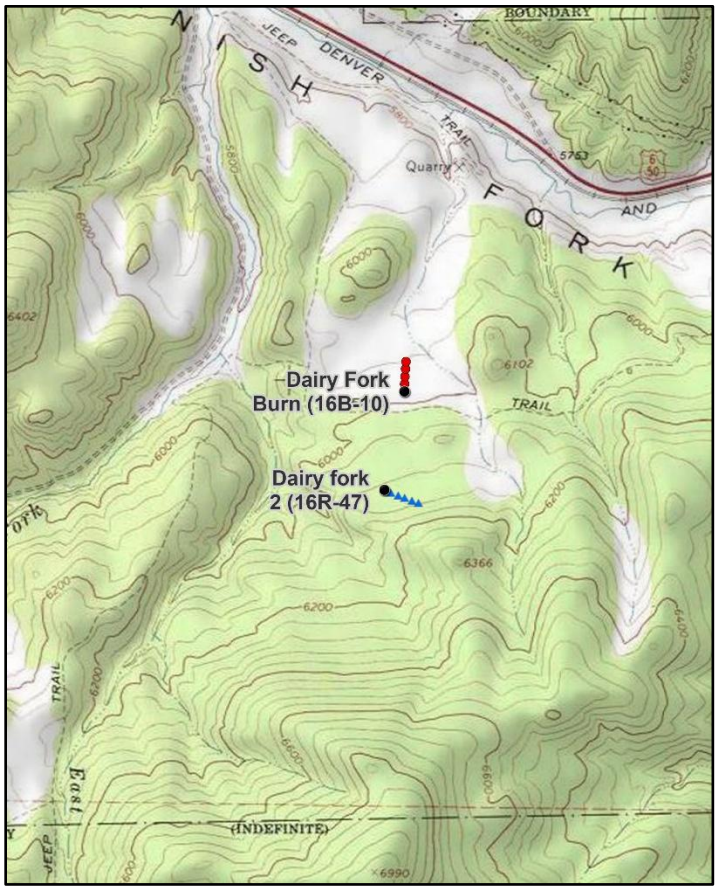
Table 16R-30.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

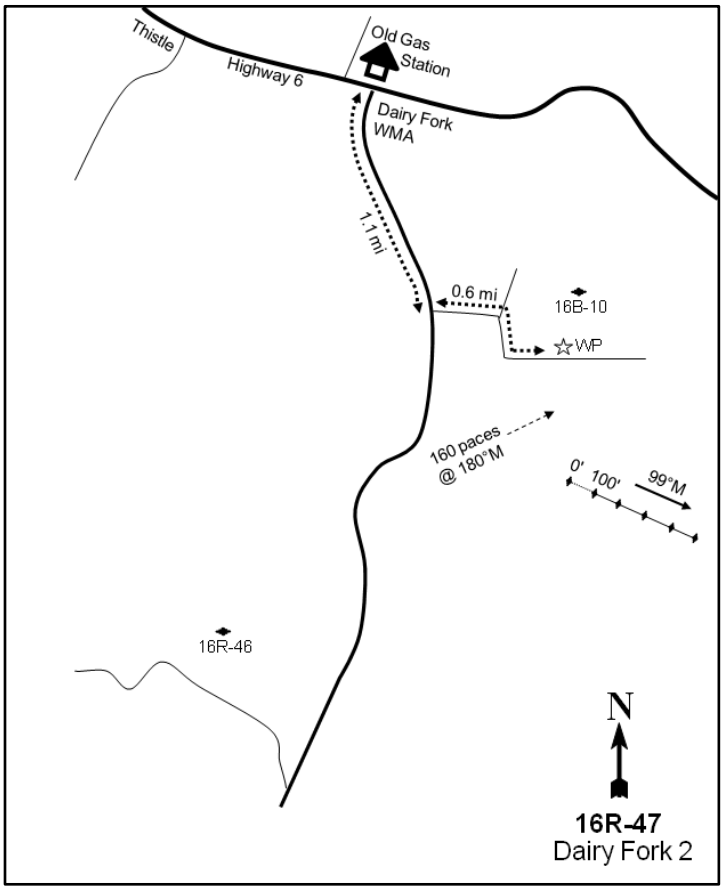
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	272	30	5	10	10	45	13.8
2010	82	25	25	6	19	25	12.4
2014	112	22	72	6	-	-	6.5
2019	128	58	37	-	-	5	4.1
2024	219	25	70	5	-	-	2.2
Juniperus scopulorum (Rocky Mountain juniper)							
2014	4	-	-	100	-	-	5.0
Pinus edulis (twoneedle pinyon)							
2010	29	-	100	-	-	-	2.0
2014	32	-	100	-	-	-	3.0
2019	7	-	67	33	-	-	5.7
2024	24	-	-	100	-	-	7.0

Table 16R-30.15 - Deer Desirable Components Index: Mountain Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2007	0.0	0.0	0.0	8.3	-1.8	1.0	0.0	**7.5**	Very Poor
2010	0.8	0.0	0.0	11.6	-10.1	4.1	0.0	**6.4**	Very Poor
2014	0.0	0.0	0.0	30.0	-0.7	5.8	-4.0	**31.1**	Very Poor
2019	0.0	0.0	0.0	30.0	-1.0	4.1	-4.0	**29.1**	Very Poor
2024	1.4	0.0	0.0	30.0	-0.6	2.2	-2.0	**31.0**	Very Poor

DAIRY FORK 2 - STUDY NO. 16R-47





Location Information	
USGS 7.5 min Map Info	Mill Fork NW; Township 10S, Range 5E, Section 13
GPS (0' Stake)	NAD 83 UTM ZONE 12, 471854 East 4422727 North

Transect Information	
Browse Tag # (0' Stake)	9167
Transect Bearing	99° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

Near the Sheep Creek Café on Highway 6, travel on the Dairy Fork Road on the south side of the highway for 0.9 miles to a left-hand fork. Take this fork, cross the creek, and go 0.35 miles staying east (left) to a sagebrush flat/burn and a three-way intersection. Turn right (south) and follow the road around the upper edge of the flat for 0.3 miles to a junction on the right (south) and a witness post on the left (north). The study is approximately 160 paces away from the south side of the road at 180 degrees magnetic.

Site Information	
Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,088ft (1,856m)
Aspect	North
Slope	7%
Sample Dates	07/03/2012, 08/20/2015, 07/16/2019, 05/28/2024

Table 16R-47.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Transplant	Bitterbrush Hand Planting	-	July 2015	-
Seeding - Aerial After	Dairy Fork Habitat Improvement Phase 2	2214	February 2014	460
Chaining - Two-Way Ely	Dairy Fork Habitat Improvement Phase 2	2214	November 2013	460
Seeding - Aerial Before	Dairy Fork Habitat Improvement Phase 2	2214	November 2013	460
Seeding - Dribbler	Dairy Fork Habitat Improvement Phase 2	2214	November 2013	460

Table 16R-47.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Dairy Fork Chaining			Aerial	Nov 2013	525
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.95	0.92
G	Agropyron cristatum	Crested Wheatgrass	CDII	1.24	1.13
G	Bromus marginatus	Mountain Brome	Bromar	1.05	1.01
G	Dactylis glomerata	Orchardgrass	Paiute	0.48	0.41
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.05	0.93
G	Festuca ovina	Sheep Fescue	Covar	0.24	0.23
G	Leymus cinereus	Great Basin Wildrye	UDWR IntMtn Tetra	0.48	0.41
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.33	0.27
F	Achillea millefolium	Western Yarrow	Hanford WA	0.10	0.09
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.05	0.99
F	Medicago sativa	Alfalfa	Big Sky Ladak	0.95	0.89
F	Medicago sativa	Alfalfa	Ladak	0.07	0.07
F	Onobrychis viciifolia	Sainfoin	Delaney	3.05	2.99
F	Penstemon palmeri	Palmer Penstemon	Emery UT	0.05	0.04
F	Penstemon palmeri	Palmer Penstemon	Carbon UT	0.10	0.07
F	Sanguisorba minor	Small Burnet		2.00	1.84

Mix Name			Application Type	Application Date	Acres
Dairy Fork Dribbler 1			Dribbler	Nov 2013	525
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet		0.10	0.09
S	Cercocarpus ledifolius	Curlleaf Mountain Mahogany	Sevier UT	0.10	0.08
S	Purshia tridentata	Bitterbrush	Oneida ID	0.10	0.08

Mix Name			Application Type	Application Date	Acres
Dairy Fork Dribbler 2			Dribbler	Nov 2013	525
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet		0.10	0.09
S	Atriplex canescens	Fourwing Saltbush	Juab/Utah/Carbon	0.10	0.05
S	Purshia tridentata	Bitterbrush	Oneida ID	0.10	0.08

Mix Name			Application Type	Application Date	Acres
Dairy Fork Sage-Kochia			Aerial	Feb 2014	461
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Big Sky Ladak	0.98	0.91
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Beaver UT	0.49	0.21
S	Bassia prostrata	Forage Kochia	Beaver UT	1.08	0.72

Wildlife Habitat and Vegetation History

Table 16R-47.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter/spring
Rocky Mountain Elk	crucial	winter
Shiras Moose	substantial	year-long

Table 16R-47.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon-Juniper	Phase III
2015	Perennial Grass	Phase I
2019	Perennial Grass	Phase I
2024	Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA461UT
States and Transitions	No state and transition model is available for this ecological site.

Utah juniper (*Juniperus osteosperma*) and lesser amounts of twoneedle pinyon (*Pinus edulis*) dominated this site upon study establishment in 2012, placing it in Phase III of woodland succession. Many of the trees were removed by a 2013 chaining and seeding treatment (Table 16R-47.1), and the study has been considered to be within Phase I of succession since the 2015 sample year. Although density is low to moderate as of 2024, the continued tree presence suggests that this site may be at risk for infilling in future sample years (Table 16R-47.4, Table 16R-47.12, Table 16R-47.14). Shrubs have remained rare, but moderately diverse throughout the study period (Table 16R-47.12, Table 16R-47.13). The herbaceous understory was moderately abundant prior to the chaining. A mixture of native and introduced perennial grasses have provided the most herbaceous cover in all sample years, and perennial grasses became the dominant vegetation component on the site in 2015. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed each year, but with low abundance (Table 16R-47.7, Table 16R-47.10). The introduced forb and noxious weed species whitetop (*Cardaria draba*) and nodding plumeless thistle (*Carduus nutans*) have been present in multiple years, with nodding plumeless thistle providing just over four percent cover in 2024 (Table 16R-47.11).

Mule deer winter range conditions have remained very poor since 2012, and have been limited by a lack of preferred browse cover and recruitment, low perennial forb cover, and the presence of annual grass and noxious weeds (Table 16R-47.15). Nearby areas are known for the winter occurrence of mule deer and elk (Wildlife Tracker). Pellet group data show that deer and elk presence has been low for much of the sample period (Table 16R-47.9). Very few plants provide winter forage for wildlife; utilization of mountain big sagebrush has been been moderate since 2019, but this utilization is represented by only a few plants in the population. Forage kochia (*Bassia prostrata*) provides additional for wildlife, and was heavily used in 2024 while utilization was considered absent or low in all other years (Table 16R-47.13). It should be noted that this community is susceptible to competitive introduced species and/or heavy utilization which could lead to a decrease in preferred browse abundance and loss of utility for wildlife.

Trend Summary Tables

Table 16R-47.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	1.8	-	19.9	1.1	-	46.7
2015	0.5	-	0.9	0.7	-	3.9
2019	1.5	-	0.5	1.7	-	3.9
2024	1.0	0.0	2.0	2.0	0.1	4.2

Table 16R-47.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	109	282	136	68	2.0	17.0	0.4	1.3
2015	75	225	84	58	1.8	11.0	2.6	1.3
2019	114	327	204	107	2.0	29.8	6.1	5.7
2024	47	258	248	117	1.0	26.0	7.5	3.3

Table 16R-47.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	18.3	10.6	53.4	3.3	3.2	39.8
2015	20.4	1.1	61.8	4.4	2.0	22.2
2019	16.2	0.2	60.7	3.3	1.7	44.1
2024	20.0	0.4	52.3	4.8	2.3	38.8

Table 16R-47.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2012	-	1	9	4
2015	-	-	3	9
2019	4	11	13	11
2024	2	18	3	6
Year	Days Use Per Acre (ha)			
2012	-	0.7 (1.7)	9.4 (23.2)	-
2015	-	11.4 (28.1)	12.1 (29.8)	-
2019	-	9.4 (23.2)	6.7 (16.6)	-
2024	1.5 (3.6)	20.1 (49.7)	2.7 (6.6)	-

Table 16R-47.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus inermis[i] (smooth brome)	Bromus tectorum[ai] (cheatgrass)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency																
2012	25	-	-	-	-	109	-	65	-	-	8	-	-	119	17	39	67
2015	18	8	6	43	1	75	25	35	3	-	7	-	-	30	20	20	101
2019	19	10	5	72	-	114	0	67	14	3	17	14	4	6	11	23	181
2024	23	-	-	63	5	47	-	4	-	21	12	18	27	-	17	32	131
year	Average Cover (%)																
2012	1.0	-	-	-	-	2.0	-	1.9	-	-	0.4	-	-	7.5	1.7	0.5	4.0
2015	0.5	0.1	0.7	1.5	0.1	1.8	0.8	0.7	0.0	-	0.6	-	-	0.6	0.9	0.2	4.4
2019	1.1	0.9	0.5	3.4	-	2.0	0.0	2.2	0.0	0.2	1.4	0.6	0.2	0.3	0.3	1.3	17.4
2024	1.0	-	-	3.9	0.1	1.0	-	0.2	-	1.1	0.9	2.8	1.1	-	0.7	0.2	14.0

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

Table 16R-47.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Alyssum desertorum[ai] (desert madwort)	Antennaria (pussytoes)	Antennaria dimorpha (low pussytoes)	Antennaria microphylla (littleleaf pussytoes)	Arabis holboellii[a] (Holboell's rockcress)	Astragalus cibarius (browse milkvetch)	Astragalus cicer[i] (chickpea milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Camelina microcarpa[ai] (littlepod false flax)	Cardaria draba[ni] (whitetop)	Carduus nutans[ani] (nodding plumeless thistle)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album[a] (lambsquarters)
year	Nested Frequency																
2012	-	-	111	6	-	-	3	-	-	20	3	-	-	-	14	7	-
2015	3	-	28	5	-	-	-	7	-	9	-	-	4	-	-	-	-
2019	12	-	73	-	6	5	-	10	8	5	-	1	31	62	22	2	1
2024	19	6	139	5	3	-	-	1	-	12	3	-	11	110	19	11	-
year	Average Cover (%)																
2012	-	-	0.3	0.2	-	-	0.0	-	-	0.1	0.0	-	-	-	0.0	0.0	-
2015	0.0	-	0.5	0.1	-	-	-	0.1	-	0.1	-	-	0.1	-	-	-	-
2019	0.5	-	1.1	-	0.2	0.1	-	0.2	0.5	0.4	-	0.0	2.2	2.4	0.1	0.0	0.0
2024	1.2	0.1	2.5	0.1	0.0	-	-	0.0	-	0.1	0.0	-	0.4	4.2	0.0	0.1	-

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

FORB SPECIES	Chenopodium atrovirens[a] (pinyon goosefoot)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chorispora tenella[ai] (crossflower)	Cirsium (thistle)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cymopterus longipes (longstalk springparsley)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Epilobium brachycarpum[a] (tall annual willowherb)	Erigeron pumilus (shaggy fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Fritillaria atropurpurea (spotted fritillary)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Medicago sativa[i] (alfalfa)	Microsteris gracilis[a] (slender phlox)	Packera multilobata (lobeleaf groundsel)
year	Nested Frequency																
2012	-	-	-	3	17	-	-	1	2	-	6	-	-	-	-	5	-
2015	-	29	-	1	-	-	37	-	-	0	-	-	4	8	14	4	2
2019	-	10	-	0	3	6	34	-	-	-	-	-	56	23	5	16	1
2024	3	5	5	-	1	7	-	-	-	-	2	3	7	8	3	-	3
year	Average Cover (%)																
2012	-	-	-	0.0	0.0	-	-	0.0	0.0	-	0.2	-	-	-	-	0.0	-
2015	-	0.3	-	0.2	-	-	1.5	-	-	0.0	-	-	0.0	0.1	0.1	0.0	0.0
2019	-	0.2	-	0.0	0.0	0.0	0.6	-	-	-	-	-	0.6	0.2	0.4	0.1	0.0
2024	0.0	0.0	0.0	-	0.0	0.0	-	-	-	-	0.0	0.0	0.0	0.0	0.1	-	0.0

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

FORB SPECIES	Penstemon caespitosus (mat penstemon)	Penstemon palmeri (Palmer's penstemon)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Senecio integerrimus[a] (lambstongue ragwort)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Taraxacum officinale (common dandelion)	Tragopogon dubius[ai] (yellow salsify)	Trifolium gymnocarpon (hollyleaf clover)	Verbascum thapsus[ai] (common mullein)
year	Nested Frequency													
2012	-	-	24	6	-	-	-	-	-	3	-	3	-	-
2015	4	1	5	-	-	17	-	0	-	3	-	2	-	0
2019	1	2	13	6	-	7	-	0	-	-	-	17	3	4
2024	5	5	17	13	2	3	3	-	1	2	8	2	3	11
year	Average Cover (%)													
2012	-	-	0.8	0.0	-	-	-	-	-	0.0	-	0.0	-	-
2015	0.0	0.0	0.1	-	-	0.4	-	0.0	-	0.0	-	0.2	-	0.0
2019	0.0	0.0	0.5	0.0	-	0.5	-	0.1	-	-	-	0.5	0.0	0.1
2024	0.0	0.1	0.6	0.0	0.0	0.3	0.0	-	0.0	0.0	0.1	0.0	0.0	0.6

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

Table 16R-47.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Bassia prostrata[pi] (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma[t] (Utah juniper)	Pinus edulis[t] (twoneedle pinyon)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)						
2012	1.1	-	-	-	42.1	4.6	-
2015	0.3	0.4	-	-	3.9	-	-
2019	1.2	0.5	-	-	3.9	-	-
2024	1.4	0.5	0.1	0	4.2	-	0.1
year	Quadrat Cover (%)						
2012	1.8	-	-	-	18.1	1.9	0.1
2015	0.1	0.3	-	-	0.9	-	-
2019	0.9	0.5	-	-	0.5	-	0.0
2024	0.7	0.3	0.0	0.0	2.0	-	0.0

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

Table 16R-47.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	100	-	20	80	0	0	0	0	55/70
2015	80	-	0	100	0	0	0	0	63/79
2019	80	-	0	100	0	25	0	0	79/89
2024	160	260	50	50	0	0	25	0	- / -
Bassia prostrata[pi] -- (forage kochia)									
2012	-	-	-	-	-	-	-	-	-/-
2015	460	-	39	61	0	0	0	0	33/44
2019	260	-	0	100	0	0	15	0	32/44
2024	400	-	25	75	0	0	75	0	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2012	-	-	-	-	-	-	-	-	67/85
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	75/87
2024	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2012	-	-	-	-	-	-	-	-	33/44
2015	20	-	0	100	0	0	0	0	36/49
2019	-	-	-	-	-	-	-	-	41/70
2024	20	-	0	100	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2012	-	-	-	-	-	-	-	-	74/64
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	102/153
2024	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 (%)		
Gutierrezia sarothrae -- (broom snakeweed)									
2012	-	-	-	-	-	-	-	-	20/17
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	20	-	0	100	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2012	520	20	19	81	0	0	0	4	- / -
2015	300	-	73	20	7	0	0	27	- / -
2019	120	40	83	17	0	0	0	0	- / -
2024	160	-	63	38	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2012	-	-	-	-	-	-	-	-	13/47
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	12/24
2024	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2012	40	40	100	0	0	0	0	0	- / -
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	100	0	0	0	0	0	- / -
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2012	-	-	-	-	-	-	-	-	19/98
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	25/76
2024	-	-	-	-	-	-	-	-	-/-
Quercus gambelii[p] -- (Gambel oak)									
2012	-	-	-	-	-	-	-	-	72/75
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	67/76
2024	-	-	-	-	-	-	-	-	-/-
Sambucus nigra ssp. cerulea[p] -- (blue elderberry)									
2012	-	-	-	-	-	-	-	-	166/150
2015	-	-	-	-	-	-	-	-	135/112
2019	-	-	-	-	-	-	-	-	149/171
2024	-	-	-	-	-	-	-	-	-/-
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2012	60	-	0	33	67	0	0	0	29/45
2015	60	-	0	100	0	0	0	0	35/42
2019	80	-	0	100	0	0	25	0	31/52
2024	80	-	25	75	0	0	50	0	- / -

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

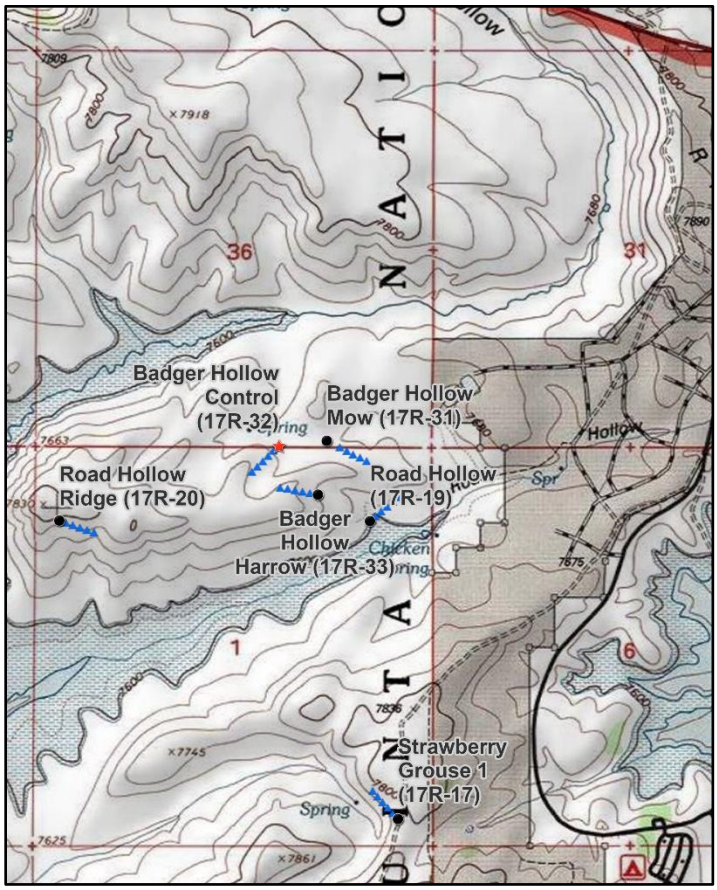
Table 16R-47.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

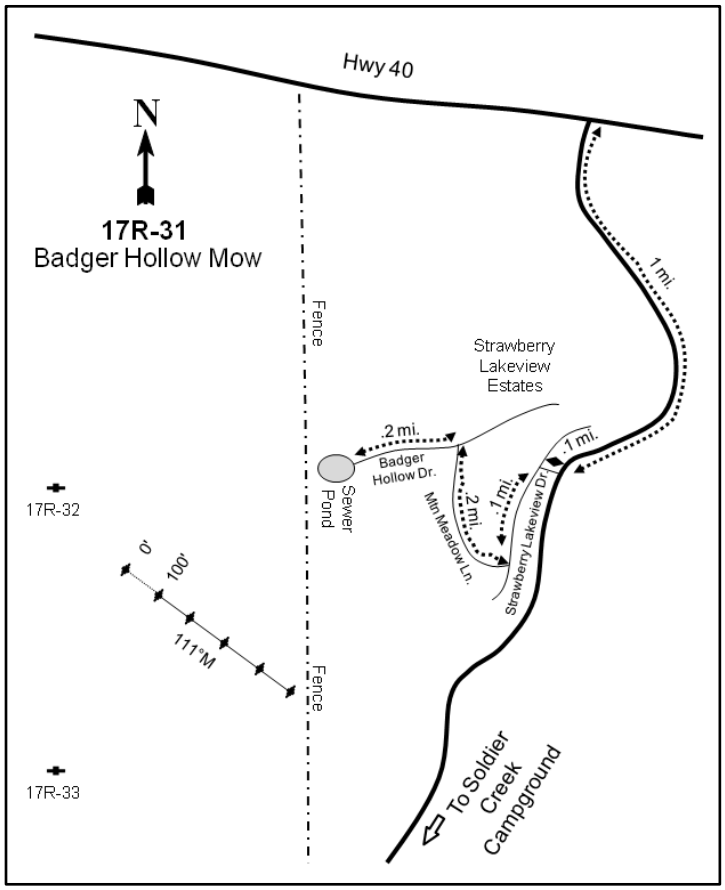
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	244	-	-	20	30	50	28.9
2015	25	-	73	27	-	-	4.7
2019	36	13	50	31	6	-	4.6
2024	34	6	38	56	-	-	9.1
Pinus edulis (twoneedle pinyon)							
2012	18	40	20	-	-	40	25.4
2019	4	67	33	-	-	-	2.0
2024	4	100	-	-	-	-	2.0

Table 16R-47.15 - 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	1.4	0.0	0.0	30.0	-1.5	2.7	0.0	**32.6**	Very Poor
2015	1.0	0.0	0.0	22.0	-1.4	2.2	-2.0	**21.8**	Very Poor
2019	2.3	0.0	0.0	30.0	-1.5	7.1	-4.0	**33.9**	Very Poor
2024	2.6	0.0	0.0	30.0	-0.8	5.9	-4.0	**33.7**	Very Poor

BADGER HOLLOW MOW - STUDY NO. 17R-31





Location Information

USGS 7.5 min Map Info	Strawberry Reservoir; Township 3S, Range 11W, Section 36
GPS (0' Stake)	NAD 83 UTM ZONE 12, 493930 East 4446518 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	111° 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 south towards the Soldier Creek campground from the US-40 and Soldier Creek campground intersection. Travel 1 mile to the Strawberry Lakeview Estates, then continue traveling west for another 0.55 miles to Mountain Ridge Dr and turn right (west). Drive 0.1 miles to Strawberry Lakeview Drive and stay straight and drive on a dirt road for another 0.6 miles and park in the first available spot next to the fence. Walk about 0.6 miles northwest (326 degrees).

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	No data
Elevation	7,680ft (2,341m)
Aspect	North-Northwest
Slope	5-10%
Sample Dates	07/26/2011, 08/05/2014, 07/20/2019, 07/02/2024

Table 17R-31.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Mower	Badger Hollow/Chicken Spring Ridge Habitat Improvement	1816	August-September 2011	60

Wildlife Habitat and Vegetation History

Table 17R-31.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	summer/fall
Rocky Mountain Elk	crucial	summer
Greater Sage-Grouse		undefined & undefined
Shiras Moose	crucial	spring/fall

Table 17R-31.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Mountain Big Sagebrush/Perennial Grass-Forb	NA
2014	Perennial Grass-Forb	NA
2019	Perennial Grass-Forb	NA
2024	Perennial Grass/Mountain Big Sagebrush	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2011, this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a robust, codominant understory of mostly native grasses and forbs. The site was treated with a mower in 2011 (Table 17R-31.1) to reduce sagebrush cover. Following treatment, perennial grasses and forbs became the main vegetation components. The perennial grass community has mainly been comprised of needle and thread (*Hesperostipa comata*) and cover has increased since 2011 (Table 17R-31.10). Perennial forb cover has generally decreased following the treatment; silvery lupine (*Lupinus argenteus*), Fendler's sandwort (*Arenaria fendleri*), and parsnipflower buckwheat (*Eriogonum heracleoides*) have been the dominant forb species (Table 17R-31.11). The shrub component has been dominated by mountain big sagebrush in all sample years. Sagebrush cover significantly decreased in the initial sampling following treatment, but increases were observed in each subsequent sample year (Table 17R-31.12, Table 17R-31.13).

This site likely serves as adequate summer/fall habitat for mule deer due to the abundance and/or diversity of the shrub and herbaceous components (Table 17R-31.10, Table 17R-31.11, Table 17R-31.12). Pellet transect data indicates that mule deer presence has remained low throughout the study period (Table 17R-31.9). However, sagebrush has been browsed in some sample years; in 2024, 38% of sagebrush plants sampled in density strips were moderately hedged, while 8% were heavily utilized (Table 17R-31.13). This site also serves as greater sage-grouse habitat (Table 17R-31.3). Sage-grouse presence has fluctuated, but has exhibited an overall increase when comparing 2011 with 2024 data (Table 17R-31.9).

Trend Summary Tables

Table 17R-31.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	33.7	1.2	-	40.9	1.3	-
2014	2.4	0.2	-	4.1	0.6	-
2019	6.1	1.1	-	8.5	1.2	-
2024	7.3	0.6	-	13.2	1.1	-

Table 17R-31.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	-	433	149	397	-	39.4	4.7	45.6
2014	-	451	83	357	-	47.8	0.5	23.5
2019	-	448	120	361	-	42.0	1.5	28.0
2024	-	426	138	310	-	35.7	2.6	18.7

Table 17R-31.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	5.0	0.1	44.7	0.2	0.0	81.4
2014	4.1	0.1	85.2	0.1	1.0	75.0
2019	6.9	0.3	64.3	0.8	1.2	59.3
2024	11.6	0.1	33.6	0.1	0.8	62.1

Table 17R-31.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency			
2011	1	1	-	8
2014	1	-	2	4
2019	-	1	13	21
2024	4	-	1	2
Year	Days Use Per Acre (ha)			
2011	10.7 (26.5)	6.7 (16.6)	17.4 (43.0)*	-
2014	2.0 (5.0)	-	-	-
2019	2.7 (6.6)	-	104.5 (258.2)*	-
2024	4.0 (9.9)	-	69.7 (172.1)*	-

*Pellets per acre (ha)

Table 17R-31.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Bromus porteri (Porter brome)	Carex (sedge)	Carex geyeri (Geyer's sedge)	Carex phaeocephala (dunhead sedge)	Dactylis glomerata[i] (orchardgrass)	Deschampsia cespitosa (tufted hairgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Juncus arcticus (arctic rush)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)
year	Nested Frequency																
2011	58	42	58	-	-	1	1	81	10	-	9	248	4	198	-	20	118
2014	5	67	67	-	-	1	-	133	-	10	9	314	9	47	-	17	134
2019	7	26	5	176	1	3	-	130	-	9	8	366	22	83	40	47	116
2024	1	1	-	150	39	-	-	8	-	-	-	373	3	165	-	-	60
year	Average Cover (%)																
2011	4.9	0.9	0.9	-	-	0.0	0.0	1.8	0.1	-	0.1	13.8	0.0	8.9	-	0.7	5.4
2014	0.1	0.8	1.9	-	-	0.0	-	4.1	-	0.7	0.2	25.1	0.2	0.8	-	1.2	6.7
2019	0.2	0.3	0.1	4.4	0.1	0.0	-	3.1	-	0.0	0.3	26.7	0.3	1.4	0.7	1.4	2.7
2024	0.0	0.0	-	2.0	0.9	-	-	0.2	-	-	-	28.1	0.1	3.0	-	-	1.2

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

GRASS SPECIES	Poa secunda (Sandberg bluegrass)
year	Nested
2011	39
2014	112
2019	7
2024	10
year	Average Cover (%)
2011	1.9
2014	6.0
2019	0.1
2024	0.1

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

Table 17R-31.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria (pussytoes)	Antennaria microphylla (littleleaf pussytoes)	Arabis drummondii (Drummond's rockcress)	Arenaria fendleri (Fendler's sandwort)	Draba rectifructa[a] (mountain draba)	Eriogonum heracleoides (parsnipflower buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Mertensia (bluebells)	Orthocarpus luteus[a] (yellow owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon procerus (littleflower penstemon)	Polygonum douglasii[a] (Douglas' knotweed)
year	Nested Frequency																
2011	3	8	1	-	1	251	14	144	-	-	295	3	25	138	12	3	4
2014	4	18	29	-	9	219	36	111	-	2	219	7	-	41	8	2	-
2019	4	35	3	6	-	234	9	141	7	-	218	-	19	94	15	-	14
2024	3	19	3	2	4	85	-	147	-	8	188	-	-	131	5	3	-
year	Average Cover (%)																
2011	0.0	0.1	0.0	-	0.0	10.9	0.0	9.0	-	-	25.3	0.0	0.2	4.6	0.3	0.0	0.0
2014	0.0	0.1	0.9	-	0.0	6.4	0.1	4.9	-	0.0	11.2	0.0	-	0.4	0.0	0.0	-
2019	0.0	0.3	0.0	0.0	-	6.8	0.0	10.0	0.0	-	10.3	-	0.1	1.2	0.7	-	0.0
2024	0.0	0.1	0.0	0.0	0.2	1.4	-	7.9	-	0.0	9.1	-	-	2.5	0.0	0.0	-

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

Table 17R-31.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)
year	Line Intercept	
2011	40.9	1.3
2014	4.1	0.6
2019	8.5	1.2
2024	13.2	1.1
year	Quadrat Cover (%)	
2011	33.7	1.2
2014	2.4	0.2
2019	6.1	1.1
2024	7.3	0.6

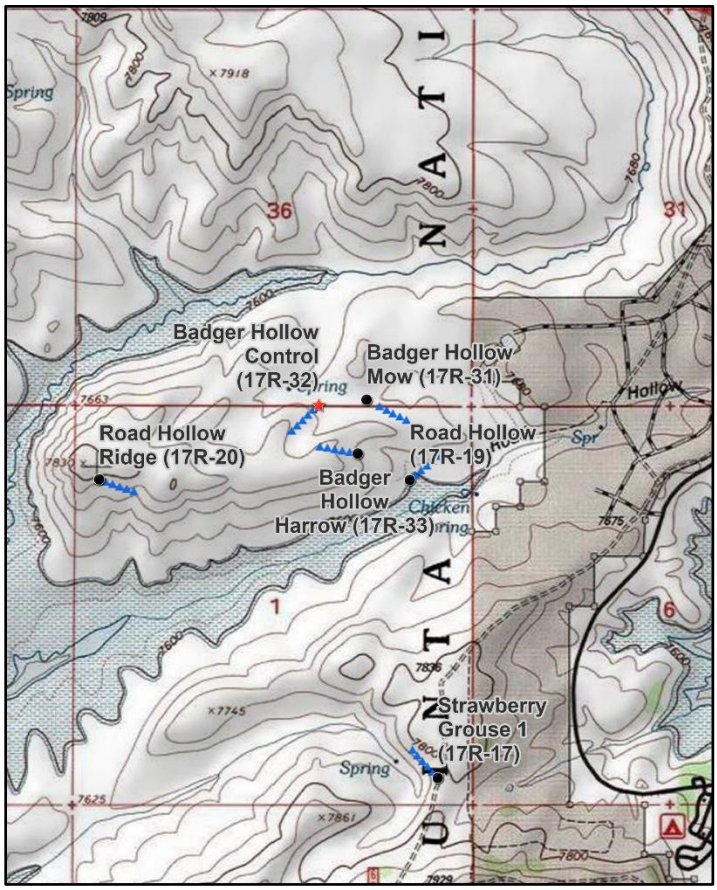
t - Tree Species; p - Preferred Browse; i - Introduced Species

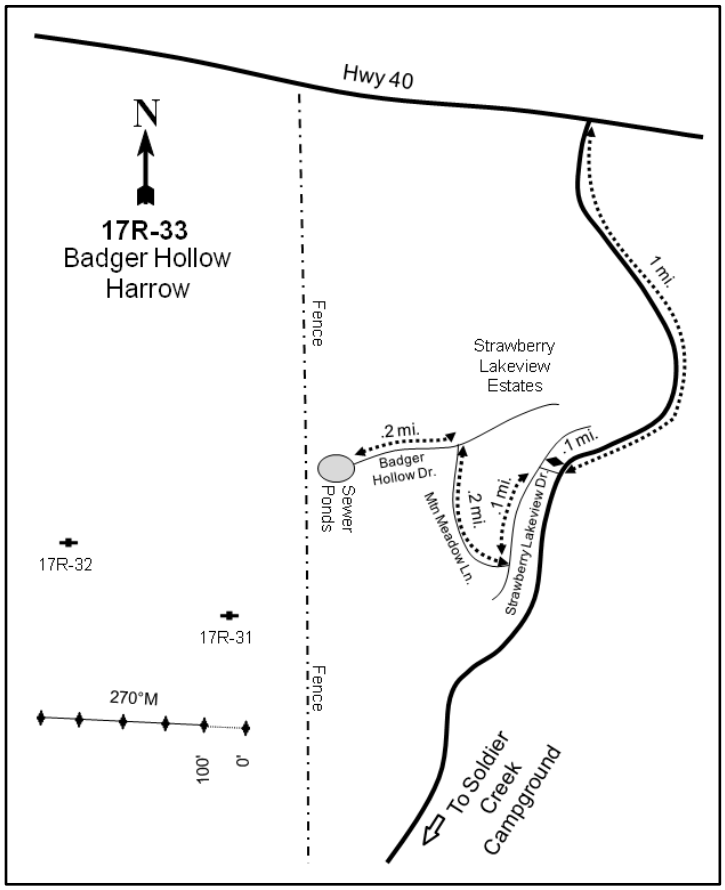
Table 17R-31.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2011	4820	40	2	89	10	42	1	12	61/96
2014	1820	80	14	80	6	39	10	3	30/48
2019	2400	-	9	88	3	3	0	5	37/63
2024	2660	240	7	84	9	38	8	8	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2011	780	340	100	0	0	0	0	0	22/23
2014	260	20	0	100	0	0	0	0	25/40
2019	360	-	6	94	0	0	0	0	32/45
2024	240	-	0	75	25	0	0	33	- / -

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

BADGER HOLLOW HARROW - STUDY NO. 17R-33





Location Information

USGS 7.5 min Map Info	Strawberry Reservoir; Township 4S, Range 11W, Section 01
GPS (0' Stake)	NAD 83 UTM ZONE 12, 493894 East 4446300 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	270° 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 south towards the Soldier Creek campground from the US-40 and Soldier Creek campground intersection. Travel 1 mile to the Strawberry Lakeview Estates, then continue traveling west for another 0.55 miles to Mountain Ridge Drive and turn right (west). Drive 0.1 miles to Strawberry Lakeview Drive, stay straight and drive on a dirt road for another 0.6 miles, then park in the first available spot next to the fence. Walk about one-half miles northwest (310 degrees).

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	No data
Elevation	7,641ft (2,329m)
Aspect	East
Slope	4%
Sample Dates	07/27/2011, 08/05/2014, 07/21/2019, 07/02/2024

Table 17R-33.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Chain	Badger Hollow /Chicken Spring Ridge Habitat Improvement	1816	August-September 2011	253

Wildlife Habitat and Vegetation History

Table 17R-33.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	summer/fall
Rocky Mountain Elk	crucial	summer
Greater Sage-Grouse		undefined & undefined
Shiras Moose	crucial	spring/fall

Table 17R-33.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Mountain Big Sagebrush	NA
2014	Perennial Grass	NA
2019	Perennial Grass/Mountain Big Sagebrush	NA
2024	Perennial Grass/Mountain Big Sagebrush	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA430UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2011, this site was in a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*)-dominated state with a robust understory of mostly native grasses and forbs. The site was treated with a harrow in the fall of 2011 to reduce sagebrush cover and increase understory vigor (Table 17R-33.1). Perennial grasses became the dominant vegetation component following treatment. Needle and thread (*Hesperostipa comata*) and Kentucky bluegrass (*Poa pratensis*) have provided most of the perennial grass cover in all sample years; cover of needle and thread has increased over time while that of Kentucky bluegrass has exhibited a slight decrease (Table 17R-33.7, Table 17R-33.10). Perennial forbs have gradually decreased following treatment, although they still contribute significant cover as of 2024; silvery lupine (*Lupinus argenteus*) and sulphur-flower buckwheat (*Eriogonum umbellatum*) have been the dominant forb species (Table 17R-33.7, Table 17R-33.11). The shrub component has been dominated by mountain big sagebrush throughout the study period. Sagebrush cover exhibited a significant decrease in the initial post-treatment sampling, but an increase has been observed in each subsequent sample year (Table 17R-33.12, Table 17R-33.13).

Due to the abundant and diverse herbaceous and shrub components (Table 17R-33.10, Table 17R-33.11, Table 17R-33.12), this site likely serves as adequate summer/fall habitat for mule deer. Mule deer presence has remained low throughout the study period according to pellet transect data (Table 17R-33.9). However, sagebrush has received utilization in some years; in 2024, 37% of sagebrush plants sampled in density strips were moderately hedged and 5% were heavily utilized (Table 17R-33.13). This site also serves as greater sage-grouse habitat (Table 17R-33.3). Sage-grouse presence has exhibited large fluctuations, but has slightly decreased overall when comparing 2011 with 2024 data (Table 17R-33.9).

Trend Summary Tables

Table 17R-33.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	41.7	0.5	-	56.3	0.4	-
2014	3.1	1.4	-	4.1	1.5	-
2019	8.8	3.4	-	8.3	3.3	-
2024	9.3	3.6	-	13.0	4.2	-

Table 17R-33.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	-	435	120	317	-	41.9	2.7	29.8
2014	-	455	86	292	-	47.6	0.7	18.7
2019	-	465	116	260	-	45.6	2.3	19.5
2024	-	443	119	228	-	42.2	1.8	13.8

Table 17R-33.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	4.1	0.1	49.5	-	0.0	83.5
2014	1.7	0.0	79.0	-	-	72.2
2019	4.1	0.2	64.8	0.4	0.0	60.4
2024	3.2	0.0	47.1	0.0	0.6	68.2

Table 17R-33.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency			
2011	3	1	-	5
2014	4	-	16	11
2019	4	-	20	30
2024	2	1	6	15
Year	Days Use Per Acre (ha)			
2011	4.0 (9.9)	2.0 (5.0)	148.1 (365.8)*	-
2014	4.7 (11.6)	-	496.6 (1226.6)*	-
2019	-	-	400.8 (989.9)*	-
2024	2.0 (5.0)	-	113.2 (279.7)*	-

*Pellets per acre (ha)

Table 17R-33.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Agrostis exarata (spike bentgrass)	Bromus porteri (Porter brome)	Carex (sedge)	Carex geyeri (Geyer's sedge)	Carex phaeocephala (dunhead sedge)	Deschampsia cespitosa (tufted hairgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender 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																
2011	84	-	48	50	-	-	1	45	1	-	15	151	124	-	5	234	13
2014	69	14	57	13	-	-	-	139	5	1	-	217	48	-	17	175	44
2019	37	-	54	-	46	52	-	116	-	4	-	252	35	66	17	220	13
2024	3	-	8	-	85	44	-	2	-	8	-	250	141	33	19	198	7
year	Average Cover (%)																
2011	6.3	-	2.4	0.7	-	-	0.0	0.9	0.0	-	0.1	7.6	8.9	-	0.4	13.6	0.8
2014	3.0	0.9	1.7	0.6	-	-	-	8.3	0.0	0.1	-	17.5	1.2	-	0.4	12.1	1.6
2019	1.9	-	2.2	-	1.1	4.9	-	2.8	-	0.0	-	16.4	1.0	2.8	0.6	11.1	0.6
2024	0.0	-	0.4	-	1.9	4.0	-	0.0	-	0.5	-	19.2	6.7	0.4	0.8	8.3	0.1

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

Table 17R-33.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis drummondii (Drummond's rockcress)	Arenaria fendleri (Fendler's sandwort)	Calochortus nuttallii (sego lily)	Cerastium (mouse-ear chickweed)	Collinsia parviflora[a] (maiden blue eyed Mary)	Draba rectifructa[a] (mountain draba)	Erigeron (fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Hackelia patens (spotted stickseed)	Hydrophyllum capitatum (ballhead waterleaf)	Lappula occidentalis[a] (flatspine stickseed)	Linum lewisii (Lewis flax)	Lupinus argenteus (silvery lupine)
year	Nested Frequency																
2011	10	12	10	1	15	-	-	3	19	-	48	5	1	10	5	-	276
2014	19	36	3	4	29	-	-	-	51	8	70	-	-	2	-	5	216
2019	18	13	4	7	26	1	8	56	13	-	77	32	2	2	1	0	163
2024	10	59	1	7	11	-	-	-	6	-	86	-	-	-	-	13	130
year	Average Cover (%)																
2011	0.6	0.1	1.6	0.0	0.6	-	-	0.0	0.3	-	3.8	0.0	0.0	0.2	0.0	-	22.6
2014	0.4	0.1	0.1	0.0	1.1	-	-	-	0.2	0.7	3.6	-	-	0.0	-	0.2	12.3
2019	0.5	0.1	0.0	0.0	1.5	0.0	0.8	0.5	0.1	-	5.2	1.0	0.0	0.0	0.0	0.0	9.7
2024	0.1	0.6	0.0	0.0	0.3	-	-	-	0.0	-	5.7	-	-	-	-	0.1	5.8

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

FORB SPECIES	Melilotus officinalis[i] (sweetclover)	Mertensia (bluebells)	Orthocarpus luteus[a] (yellow owl's-clover)	Penstemon (beardtongue)	Phacelia hastata (silverleaf phacelia)	Phacelia sericea[a] (silky phacelia)	Polygonum douglasii[a] (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)
year	Nested Frequency									
2011	1	1	77	-	6	-	26	-	6	2
2014	-	-	10	-	9	3	12	2	5	2
2019	-	6	31	-	3	2	23	-	10	20
2024	-	4	62	6	4	-	13	-	9	3
year	Average Cover (%)									
2011	0.1	0.0	2.1	-	0.2	-	0.1	-	0.0	0.0
2014	-	-	0.3	-	0.2	0.0	0.1	0.0	0.0	0.1
2019	-	0.1	0.2	-	0.4	0.1	0.2	-	1.0	0.1
2024	-	0.0	1.0	0.0	0.6	-	0.2	-	1.0	0.0

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

Table 17R-33.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Mahonia repens (creeping barberry)
year	Line Intercept Cover		
2011	56.3	0.4	-
2014	4.1	1.5	0
2019	8.3	3.2	0.1
2024	13	4.1	0.1
year	Quadrat Cover (%)		
2011	41.7	0.5	-
2014	3.1	1.3	0.0
2019	8.8	3.3	0.1
2024	9.3	3.2	0.3

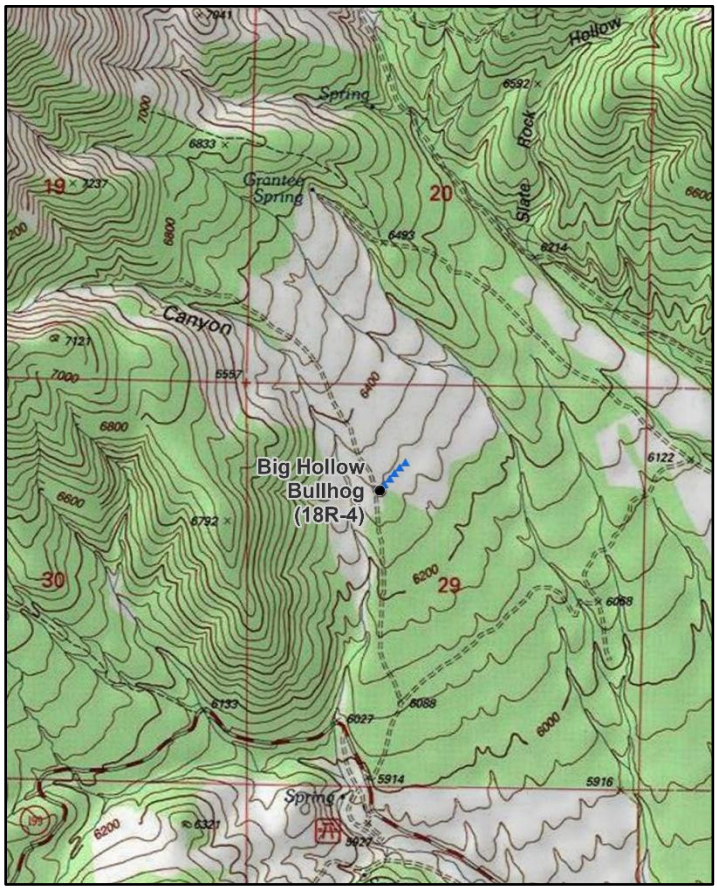
t - Tree Species; p - Preferred Browse; i - Introduced Species

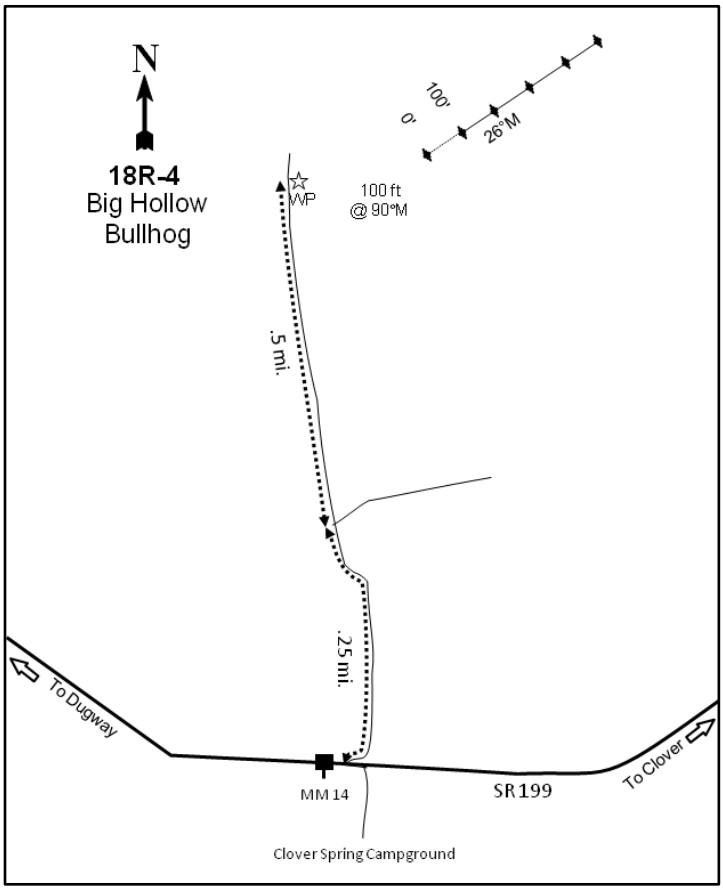
Table 17R-33.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2011	6160	100	0	91	9	1	0	11	64/101
2014	1700	20	4	79	18	28	6	14	39/60
2019	1500	20	9	81	9	0	1	16	49/84
2024	2020	280	16	67	17	37	5	17	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2011	160	-	63	38	0	0	0	0	30/47
2014	820	-	2	98	0	0	0	0	26/36
2019	1000	-	0	100	0	0	0	2	33/52
2024	860	-	0	91	9	0	0	14	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2011	-	-	-	-	-	-	-	-	-/-
2014	20	-	0	100	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	39/79
2024	80	-	0	100	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2011	-	-	-	-	-	-	-	-	51/63
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	31/86
2024	-	-	-	-	-	-	-	-	-/-
Mahonia repens -- (creeping barberry)									
2011	-	-	-	-	-	-	-	-	-/-
2014	100	-	40	60	0	0	0	0	4/4
2019	240	-	0	100	0	0	0	0	6/7
2024	1040	-	0	100	0	0	0	0	- / -

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

BIG HOLLOW BULLHOG - STUDY NO. 18R-4





Location Information

USGS 7.5 min Map Info	Johnson Pass NE; Township 5S, Range 6W, Section 29
GPS (0' Stake)	NAD 83 UTM ZONE 12, 368429 East 4468585 North

Transect Information

Browse Tag # (0' Stake)	249
Transect Bearing	28° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Drive west from Clover on SR-199 and turn north at mile marker 14 on the road across the street from the road that goes to Clover Spring Campground. From the turnoff, drive 0.25 miles to a fork and stay left. Drive 0.5 miles to a witness post on the right (east) side of the road. From the witness post, walk 100 feet at 90 degrees magnetic to the 0-foot stake that is marked with browse tag #249.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	ONAQUI MOUNTAIN EAST
Elevation	6,300ft (1,920m)
Aspect	East
Slope	2-8%
Sample Dates	06/23/2006, 08/11/2010, 08/13/2014, 08/06/2018, 07/31/2024

Table 18R-04.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Big Hollow Bullhog - Phase 2	1380	April-August 2010	220

Wildlife Habitat and Vegetation History

Table 18R-04.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	spring/fall

Table 18R-04.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Mountain Big Sagebrush/Juniper	Phase I transitioning to Phase II
2010	Mountain Big Sagebrush	Phase I
2014	Mountain Big Sagebrush/Perennial Grass	Phase I
2018	Perennial Grass/Mountain Big Sagebrush	Phase I
2024	Mixed Shrub/Perennial Grass	Phase I

Site Notes

No Notes

Soils

Table 18R-04.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.1	60.7	5.5	33.8	3.3	12.5	268.8	0.7	06/22/2006

Site Potential

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Mountain Gravelly Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA406UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2006, the plant community on this site existed as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) stand that was codominant with Utah juniper (*Juniperus osteosperma*). A small number of other browse species were also present, but they offered little cover. Tree cover decreased significantly following a bullhog treatment in 2010 (Table 18R-04.1). Shrub cover has fluctuated, but sagebrush has remained a dominant or codominant vegetation component in all post-treatment sample years (Table 18R-04.12, Table 18R-04.13). Perennial grasses have contributed a majority of the herbaceous cover throughout the study period and have been codominant site components since 2014; the introduced species bulbous bluegrass (*Poa bulbosa*) and crested wheatgrass (*Agropyron cristatum*) provided most of the perennial grass cover in 2024. Forbs have generally remained rare (Table 18R-04.7, Table 18R-04.10, Table 18R-04.11). Although most of the trees were removed by the bullhog treatment, cover and density data indicate that juniper has begun to infill in the community (Table 18R-04.12, Table 18R-04.14). Without future treatments, this study site will likely progress through the phases of woodland succession.

Condition of this site as spring/fall range for mule deer has fluctuated between poor and good since 2006. Although transitional range condition is considered to be good as of 2024, it is negatively influenced by reduced preferred browse cover and recruitment of young, preferred browse decadence, slightly reduced perennial grass cover, and limited perennial forb cover (Table 18R-04.15). Pellet transect data indicates that deer presence has increased over time and was high in 2024. More than 30% of sagebrush plants sampled in density strips have been moderately to heavily hedged in most sample years. Antelope bitterbrush (*Purshia tridentata*) has been less abundant than sagebrush, but has received higher levels of utilization; in 2024, 31% of bitterbrush plants were moderately hedged and 63% were heavily utilized. Elk were present in low amounts in 2010, but elk pellet groups have not been observed in any other sample year. However, elk presence has occurred in the larger vicinity during the spring and summer months (Wildlife Tracker, Table 18R-04.9, Table 18R-04.13).

Trend Summary Tables

Table 18R-04.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	9.6	0.2	7.7	16.2	0.2	13.7
2010	6.1	0.2	0.4	6.5	0.3	1.9
2014	9.5	2.9	0.4	13.3	3.4	2.9
2018	5.8	2.1	2.4	9.8	3.1	3.9
2024	11.4	3.4	2.0	17.7	3.9	6.0

Table 18R-04.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	45	314	272	162	0.3	12.0	1.1	1.5
2010	22	188	111	62	0.2	10.2	1.0	2.1
2014	127	353	221	87	4.2	20.2	2.4	0.9
2018	238	338	241	128	7.0	19.2	1.9	0.7
2024	18	358	210	84	0.1	18.8	1.0	1.1

Table 18R-04.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	28.1	0.9	39.3	14.8	6.3	29.0
2010	14.5	0.0	61.0	4.1	9.3	18.7
2014	8.2	0.2	62.0	11.8	3.3	43.3
2018	5.2	0.0	68.7	7.4	8.3	41.1
2024	12.4	-	51.0	12.2	6.5	34.5

Table 18R-04.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	-	12	-	60
2010	-	5	-	3
2014	1	6	-	1
2018	2	15	-	2
2024	3	28	-	5
Year	Days Use Per Acre (ha)			
2006	-	6.7 (16.6)	-	-
2010	-	2.0 (5.0)	0.7 (1.7)	-
2014	-	21.5 (53.0)	-	-
2018	3.6 (9.0)	25.5 (62.9)	-	-
2024	2.2 (5.4)	40.2 (99.3)	-	-

Table 18R-04.10 - 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 bulbosa[i] (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2006	17	32	45	19	69	55	25	61	99	61
2010	2	55	22	1	57	32	-	24	45	26
2014	15	59	127	30	26	101	3	117	53	110
2018	20	125	238	72	5	125	6	39	25	82
2024	12	91	18	38	69	200	0	13	31	67
year	Average Cover (%)									
2006	0.2	1.6	0.3	0.4	2.7	1.2	0.7	1.0	1.7	2.7
2010	0.3	3.8	0.2	0.0	2.2	0.4	-	1.5	0.7	1.2
2014	0.5	2.5	4.2	1.2	1.2	1.8	0.0	6.3	0.9	5.8
2018	0.5	5.4	7.0	2.8	0.0	3.6	0.0	2.1	0.3	4.5
2024	0.3	5.7	0.1	1.2	2.2	5.9	0.0	0.2	0.5	2.7

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

Table 18R-04.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum[ai] (desert madwort)	Arabis (rockcress)	Astragalus cibarius (browse milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora[a] (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Epilobium brachycarpum[a] (tall annual willowherb)	Eriogonum racemosum (redroot buckwheat)	Lactuca serriola[ai] (prickly lettuce)	Linum lewisii (Lewis flax)	Microsteris gracilis[a] (slender phlox)
year	Nested Frequency																
2006	5	-	168	-	1	-	159	1	-	25	19	1	2	3	-	24	8
2010	2	5	100	-	-	3	-	-	-	21	22	-	-	-	-	11	-
2014	5	-	201	2	-	-	-	2	-	2	26	2	-	2	14	29	-
2018	9	-	204	-	6	4	-	10	0	23	23	-	-	-	9	6	-
2024	-	1	154	-	-	7	14	-	7	53	15	4	-	0	-	6	4
year	Average Cover (%)																
2006	0.0	-	0.4	-	0.0	-	0.5	0.0	-	0.1	0.2	0.0	0.0	0.0	-	0.1	0.0
2010	0.0	0.0	0.7	-	-	0.0	-	-	-	0.2	0.9	-	-	-	-	0.3	-
2014	0.0	-	2.2	0.0	-	-	-	0.0	-	0.0	0.2	0.1	-	0.0	0.0	0.3	-
2018	0.0	-	1.3	-	0.0	0.0	-	0.0	0.0	0.0	0.1	-	-	-	0.1	0.1	-
2024	-	0.0	0.3	-	-	0.0	0.0	-	0.2	0.1	0.1	0.0	-	0.0	-	0.5	0.0

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

FORB SPECIES	Packera multilobata (lobeleaf groundsel)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Sphaeralcea parvifolia (smallflower globemallow)	Tragopogon dubius[ai] (yellow salsify)	Veronica biloba[ai] (twolobe speedwell)	Vicia americana (American vetch)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency							
2006	-	41	18	-	-	74	108	3
2010	-	11	4	-	-	-	17	-
2014	2	3	-	-	18	2	26	2
2018	-	-	15	-	55	11	60	20
2024	2	12	8	1	30	79	37	-
year	Average Cover (%)							
2006	-	0.2	0.0	-	-	0.1	0.9	0.0
2010	-	0.1	0.0	-	-	-	0.9	-
2014	0.0	0.0	-	-	0.1	0.0	0.2	0.0
2018	-	-	0.1	-	0.3	0.0	0.4	0.1
2024	0.1	0.1	0.0	0.0	0.2	0.4	0.2	-

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

Table 18R-04.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. speciosa[p] (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Purshia stansburiana[p] (Stansbury cliffrose)	Purshia tridentata[p] (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)									
2006	10.7	0.2	-	-	13.7	-	-	-	5.5	-
2010	5.3	0.1	0.2	0.2	1.9	-	-	-	1	-
2014	9.4	0.1	1.1	2.9	2.9	-	-	-	2.8	0.4
2018	4.6	-	1.1	2.7	3.9	0	-	0.1	4	0.4
2024	7.9	0.2	1.3	2.7	6	0.2	-	-	8.5	0.8
year	Quadrat Cover (%)									
2006	7.8	0.1	0.3	0.0	7.7	-	-	0.4	1.1	0.0
2010	5.6	0.0	0.0	0.2	0.4	-	-	-	0.5	-
2014	6.4	0.0	1.5	2.6	0.4	-	0.0	-	1.6	0.4
2018	2.9	0.0	1.0	1.4	2.4	0.0	0.0	0.0	1.9	0.6
2024	5.8	0.6	1.9	2.5	1.8	0.0	0.1	0.2	3.6	0.4

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

Table 18R-04.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2006	-	-	-	-	-	-	-	-	58/88
2010	-	-	-	-	-	-	-	-	53/78
2014	-	-	-	-	-	-	-	-	40/68
2018	-	-	-	-	-	-	-	-	44/63
2024	20	-	0	100	0	0	100	0	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2006	1580	60	0	76	24	9	1	17	55/78
2010	1220	-	2	80	18	26	7	13	58/78
2014	1220	60	10	87	3	18	39	25	47/80
2018	760	-	8	45	47	16	3	34	53/73
2024	1300	760	40	48	12	22	20	8	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	40	-	0	100	0	0	0	0	39/56
2010	80	-	0	75	25	0	25	25	35/54
2014	80	-	25	75	0	25	0	0	36/64
2018	60	-	0	67	33	0	0	67	47/69
2024	1020	-	8	90	2	0	0	2	- / -
Ericameria nauseosa ssp. nauseosa var. speciosa[p] -- (rubber rabbitbrush)									
2006	40	-	50	0	50	0	0	0	58/74
2010	40	-	0	50	50	0	0	50	65/67
2014	120	-	17	83	0	0	0	0	59/69
2018	160	-	13	88	0	0	0	0	57/73
2024	500	20	64	36	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2006	440	240	32	64	5	0	0	0	18/21
2010	260	-	46	54	0	0	0	0	25/27
2014	1780	740	3	97	0	0	0	0	25/38
2018	4080	-	11	84	5	0	0	5	20/25
2024	2120	-	7	91	3	0	0	3	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2006	100	80	60	40	0	0	0	0	- / -
2010	20	20	100	0	0	0	0	0	- / -
2014	380	220	95	5	0	0	0	0	- / -
2018	720	60	94	6	0	0	0	0	- / -
2024	840	60	41	60	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	10/14
2024	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2006	60	-	0	100	0	0	0	0	13/36
2010	20	-	0	100	0	0	0	0	13/36
2014	40	-	0	100	0	0	0	0	9/15
2018	40	-	0	100	0	0	0	0	12/23
2024	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 (%)		
Pinus edulis[t] -- (twoneedle pinyon)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2024	40	-	100	0	0	0	0	0	- / -
Purshia stansburiana[p] -- (Stansbury cliffrose)									
2006	-	-	-	-	-	-	-	-	52/69
2010	-	-	-	-	-	-	-	-	80/114
2014	40	-	50	50	0	0	0	0	55/67
2018	20	-	0	100	0	0	100	0	146/150
2024	80	-	25	75	0	25	75	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2006	320	-	6	69	25	6	94	0	41/114
2010	220	-	46	55	0	64	27	0	49/121
2014	460	-	4	96	0	78	13	0	44/111
2018	560	-	7	93	0	29	71	0	56/127
2024	640	-	0	94	6	31	63	6	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2006	-	-	-	-	-	-	-	-	28/43
2010	-	-	-	-	-	-	-	-	40/89
2014	-	-	-	-	-	-	-	-	38/58
2018	-	-	-	-	-	-	-	-	49/92
2024	-	-	-	-	-	-	-	-	-/-
Tetradymia canescens -- (spineless horsebrush)									
2006	120	60	33	50	17	0	50	0	20/32
2010	20	-	0	0	100	0	0	0	27/50
2014	40	-	0	100	0	50	0	0	28/45
2018	40	-	0	100	0	0	0	0	42/66

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

Table 18R-04.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2006	140	-	30	25	-	45	19.3
2010	34	29	43	14	-	14	8.3
2014	138	58	32	5	-	5	4.4
2018	232	32	53	11	5	-	2.9
2024	551	45	25	25	5	-	3.5

Table 18R-04.15 - Deer Desirable Components Index: Mountain Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2006	21.6	7.6	1.1	21.8	-0.2	3.1	0.0	**55.0**	Poor-Fair
2010	8.4	10.1	4.2	19.6	-0.1	4.3	0.0	**46.5**	Poor
2014	17.3	14.3	4.6	30.0	-3.2	1.9	0.0	**64.9**	Fair
2018	13.3	8.4	4.0	30.0	-5.3	1.4	0.0	**51.8**	Poor
2024	24.3	12.4	11.3	25.7	-0.1	2.3	0.0	**75.9**	Good

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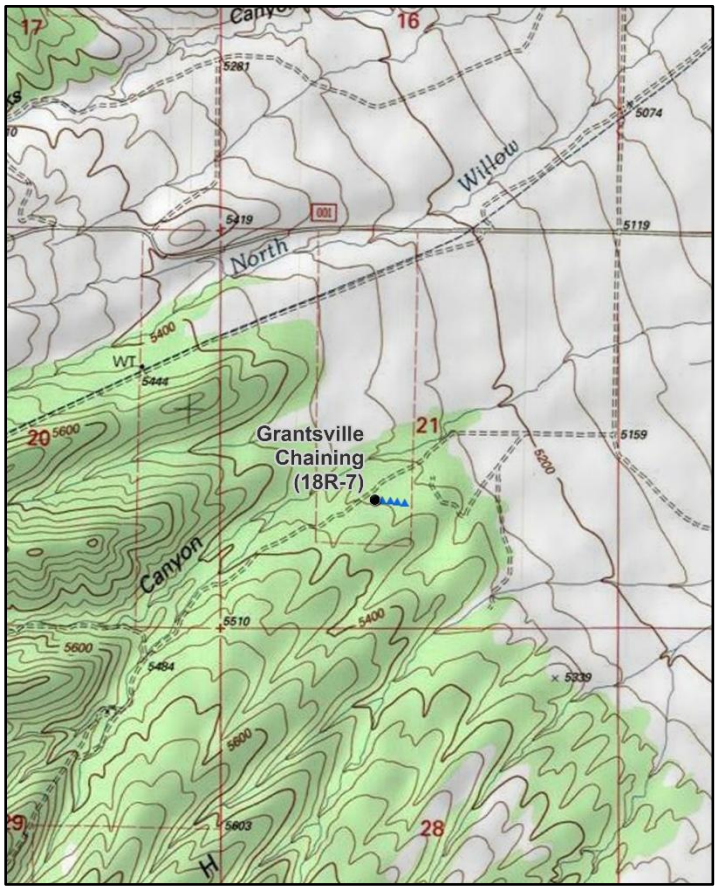
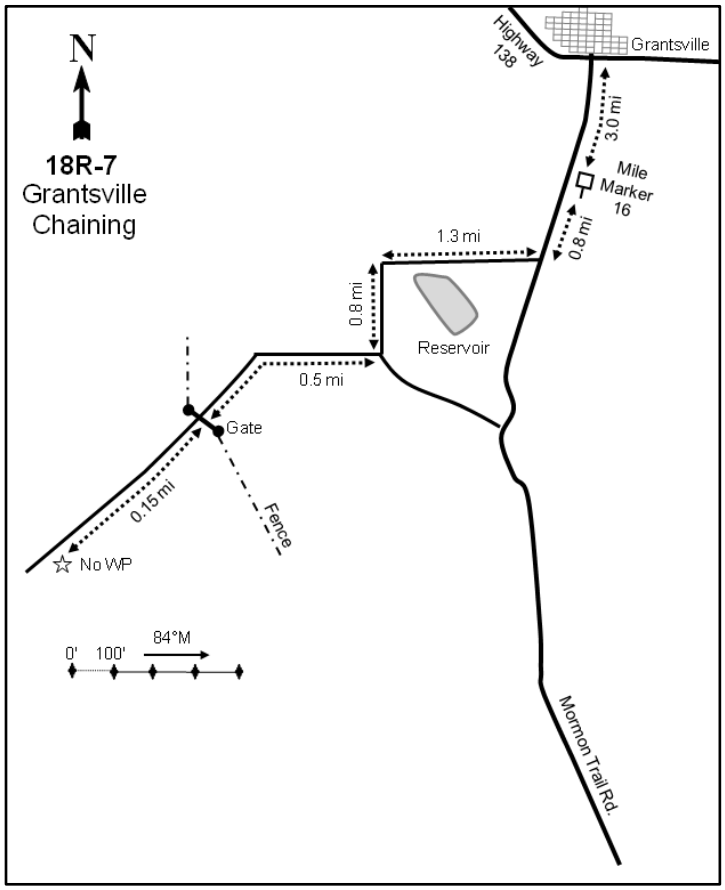




Location Information

USGS 7.5 min Map Info	North Willow Canyon ; Township 3S, Range 6W, Section 21
GPS (0' Stake)	NAD 83 UTM ZONE 12, 370139 East 4488644 North

Transect Information

Browse Tag # (0' Stake)	248
Transect Bearing	84° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (11ft)
Belt Marker Placement	Standard

Directions to Site

From Center Street in Grantsville, drive west and turn south on Cooley Street. Follow this road 0.8 miles past mile marker 16 and turn onto a road on the right. Drive 0.6 miles (pavement ends) and then another 0.4 miles to a fork. Continue on the main road. Drive 0.3 miles to a fenceline and turn left. Follow the road along the fenceline for 0.5 miles to a fork and stay right. Drive for 0.2 miles to another fork, stay right, and then continue 0.3 miles to a gate. Go 0.15 miles past the gate. The site is on the right (south) side of the road; there is no witness post. The 0-foot stake is marked with browse tag #248.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	GRANTSVILLE SCS
Elevation	5,364ft (1,635m)
Aspect	Northeast
Slope	12%
Sample Dates	08/26/2008, 06/08/2011, 07/28/2015, 08/07/2018, 07/31/2024

Table 18R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Grantsville Habitat and Grazing Improvement Project	3663	October 2016-June 2018	765
Chaining - Two-Way Ely	Grantsville Chaining	1117	October 2008	304
Seeding - Aerial Before	Grantsville Chaining	1117	October 2008	304
Seeding - Dribbler	Grantsville Chaining	1117	October 2008	304

Table 18R-07.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Grantsville Chaining			Aerial	Oct 2008	335
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.04	0.96
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.04	0.86
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.90	0.80
G	Dactylis glomerata	Orchardgrass	Paiute	0.45	0.36
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.04	0.80
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.49	1.30
G	Poa secunda	Canby Bluegrass	Canbar	0.45	0.38
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.75	0.63
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.75	0.53
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.45	0.40
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Linum perenne	Blue Flax	Appar	0.45	0.38
F	Medicago sativa	Alfalfa	Ladak	0.90	0.81
F	Medicago sativa	Alfalfa	Ranger	1.04	0.96
F	Onobrychis viciifolia	Sainfoin	Eski	1.94	1.70
F	Sanguisorba minor	Small Burnet	Delar	1.94	1.66

Mix Name			Application Type	Application Date	Acres
Grantsville Chaining Dribbler mix			Dribbler	Oct 2008	335
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet	Delar	0.15	0.13
S	Purshia tridentata	Bitterbrush	Lincoln NV	0.15	0.12

Wildlife Habitat and Vegetation History

Table 18R-07.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Greater Sage-Grouse		undefined & undefined

Table 18R-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Juniper	Phase III
2011	Perennial Grass/Juniper	Phase I
2015	Perennial Grass/Juniper	Phase I
2018	Perennial Grass	Phase I
2024	Perennial Grass	Phase I

Site Notes

In 2011, belt 4 was moved to the 11ft mark on line 4 because of a large gully that cut 10 feet deep at the end of line 4 following the chaining.

Site Potential	
1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Gravelly Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY307UT
States and Transitions	2008 - Utah Juniper/Invasive Annuals State: Community Phase 3.2 2011 - Seeded Range State: Community Phase 6.1 2015-2024 - Current Potential State: Community Phase 2.3

At the time of study establishment in 2008, this site was dominated by Utah juniper (*Juniperus osteosperma*) (Table 18R-07.6, Table 18R-07.12). Tree cover and density decreased significantly following a chaining project in 2008 and decreased even further after a lop and scatter treatment in 2018 (Table 18R-07.1, Table 18R-07.6, Table 18R-07.14). Shrub species have been rare overall. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been the most common species, albeit providing little cover and density; however, sagebrush was not sampled in 2024 (Table 18R-07.12, Table 18R-07.13). Although initially sparse, the herbaceous layer has increased following the treatments (Table 18R-07.2, Table 18R-07.7). Seeded perennial grasses have provided a majority of the herbaceous cover, with bluebunch wheatgrass (*Pseudoroegneria spicata*) as the dominant species since 2015. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been present in most sample years, but with low abundance. In addition, the introduced annual grass and noxious weed species medusahead (*Taeniatherum caput-medusae*) was sampled for the first time in 2024, but also with low abundance (Table 18R-07.10). Perennial forb cover has increased slightly over time, with the seeded species alfalfa (*Medicago sativa*) and sainfoin (*Onobrychis viciifolia*) being codominant (Table 18R-07.7, Table 18R-07.11). Considering the continued presence of juniper trees (Table 18R-07.13, Table 18R-07.14), it is likely that future infilling will occur. However, continued maintenance of the site will keep conifer cover low and allow for robust understory production.

Condition of this site as winter/spring range for mule deer has ranged from very poor to very poor-poor, but has remained very poor-poor in most sample years including 2024. Range condition is primarily limited by the lack of a preferred browse component, and the presence of annual grass and noxious weeds (Table 18R-07.15). No preferred browse plants were sampled in density strips in 2024 (Table 18R-07.13), and on-site observations for that year note little to no utilization of the herbaceous components. Pellet group data shows that mule deer presence has remained low over time, but has increased overall (Table 18R-07.9).

Trend Summary Tables

Table 18R-07.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	-	-	16.9	0.2	0.1	31.3
2011	0.0	0.0	4.6	-	-	8.4
2015	0.2	-	6.8	-	-	7.7
2018	0.1	0.0	1.4	-	-	-
2024	0.2	-	0.3	0.6	-	0.4

Table 18R-07.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	45	261	271	37	0.3	3.3	0.9	0.1
2011	223	312	276	205	2.5	13.4	5.4	7.0
2015	1	323	17	133	0.0	20.4	0.0	2.6
2018	12	309	136	77	0.0	17.4	0.4	2.4
2024	34	282	136	28	0.8	22.6	1.5	4.1

Table 18R-07.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	29.4	1.5	42.4	21.4	1.9	23.3
2011	14.8	0.6	38.6	5.4	0.6	34.6
2015	35.2	0.0	36.1	11.6	3.3	31.0
2018	28.5	0.2	50.0	11.5	3.4	26.0
2024	36.2	0.3	40.5	7.8	1.9	27.6

Table 18R-07.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
2008	-	-	2	1	-	79
2011	-	-	2	-	-	12
2015	-	-	2	-	-	21
2018	-	-	5	-	-	2
2024	10	-	2	-	1	7
Year	Days Use Per Acre (ha)					
2008	0.7 (1.8)	8.7 (21.5)*	1.3 (3.3)	-	-	-
2011	0.7 (1.8)	-	4.0 (9.9)	-	-	-
2015	3.6 (9.0)	-	0.7 (1.7)	-	-	-
2018	5.8 (14.3)	-	1.3 (3.3)	-	-	-
2024	12.3 (30.5)	-	5.3 (13.2)	-	-	-

*Pellets per acre (ha)

Table 18R-07.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus arvensis[ai] (field brome)	Bromus tectorum[ai] (cheatgrass)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Taeniatherum caput-medusae[ani] (medusahead)	Thinopyrum intermedium[i] (intermediate wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency														
2008	2	-	-	45	-	14	-	1	-	255	-	-	-	-	-
2011	-	198	-	220	19	4	8	-	59	179	-	95	-	8	3
2015	-	107	-	-	7	1	23	-	13	88	-	188	-	74	1
2018	0	98	-	6	-	17	-	-	17	181	-	179	-	44	6
2024	0	40	20	17	-	-	8	-	71	77	0	200	0	5	-
year	Average Cover (%)														
2008	0.0	-	-	0.3	-	0.1	-	0.0	-	3.2	-	-	-	-	-
2011	-	5.9	-	2.5	0.4	0.1	0.1	-	0.6	3.8	-	2.1	-	0.2	0.0
2015	-	5.1	-	-	0.1	0.0	0.8	-	0.2	1.3	-	11.3	-	1.7	0.0
2018	0.0	2.1	-	0.0	-	0.2	-	-	0.2	3.6	-	10.2	-	1.1	0.0
2024	0.0	1.4	0.5	0.2	-	-	0.6	-	1.3	0.6	0.0	18.0	0.0	0.6	-

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

Table 18R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium (onion)	Alyssum desertorum[ai] (desert madwort)	Antennaria (pussytoes)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Epilobium brachycarpum[a] (tall annual willowherb)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Machaeranthera grindelioides (rayless tansyaster)	Medicago sativa[i] (alfalfa)
year	Nested Frequency																
2008	-	2	-	4	1	-	269	-	2	4	2	-	-	6	-	-	-
2011	9	54	1	25	36	30	190	-	8	8	32	32	164	1	95	10	14
2015	-	-	17	2	2	-	-	3	-	10	-	-	-	-	50	-	4
2018	-	4	104	5	11	6	47	-	4	6	-	5	-	-	3	1	17
2024	-	-	61	-	-	-	43	-	-	-	-	-	1	-	-	-	9
year	Average Cover (%)																
2008	-	0.0	-	0.0	0.0	-	0.9	-	0.0	0.0	0.0	-	-	0.0	-	-	-
2011	0.1	0.2	0.0	0.6	1.6	0.1	2.6	-	0.2	0.2	0.5	0.1	2.0	0.0	1.3	0.0	0.3
2015	-	-	0.0	0.0	0.0	-	-	0.0	-	0.1	-	-	-	-	0.6	-	0.1
2018	-	0.0	0.3	0.2	0.3	0.0	0.1	-	0.1	0.1	-	0.0	-	-	0.0	0.0	0.8
2024	-	-	0.2	-	-	-	0.1	-	-	-	-	-	0.0	-	-	-	2.1

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

FORB SPECIES	Microsteris gracilis[a] (slender phlox)	Onobrychis viciifolia[i] (sainfoin)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency							
2008	1	-	24	-	-	-	-	-
2011	9	11	22	-	-	66	2	-
2015	-	24	3	-	-	79	2	-
2018	2	15	-	-	-	21	-	-
2024	-	16	3	2	44	-	-	6
year	Average Cover (%)							
2008	0.0	-	0.1	-	-	-	-	-
2011	0.0	0.2	0.1	-	-	2.2	0.0	-
2015	-	0.3	0.0	-	-	1.5	0.0	-
2018	0.0	0.8	-	-	-	0.2	-	-
2024	-	2.0	0.0	0.0	1.1	-	-	0.1

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

Table 18R-07.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Ericameria nauseosa ssp. nauseosa var. speciosa[p] (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
2008	0.2	-	0.1	31.3	-
2011	-	-	-	8.4	-
2015	0	-	-	7.7	-
2018	-	-	-	-	-
2024	-	0.6	-	0.4	-
year	Quadrat Cover (%)				
2008	0.0	-	0.0	16.9	-
2011	0.0	-	-	4.6	0.0
2015	0.2	-	-	6.8	-
2018	0.1	-	-	1.4	0.0
2024	-	0.2	-	0.3	-

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

Table 18R-07.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

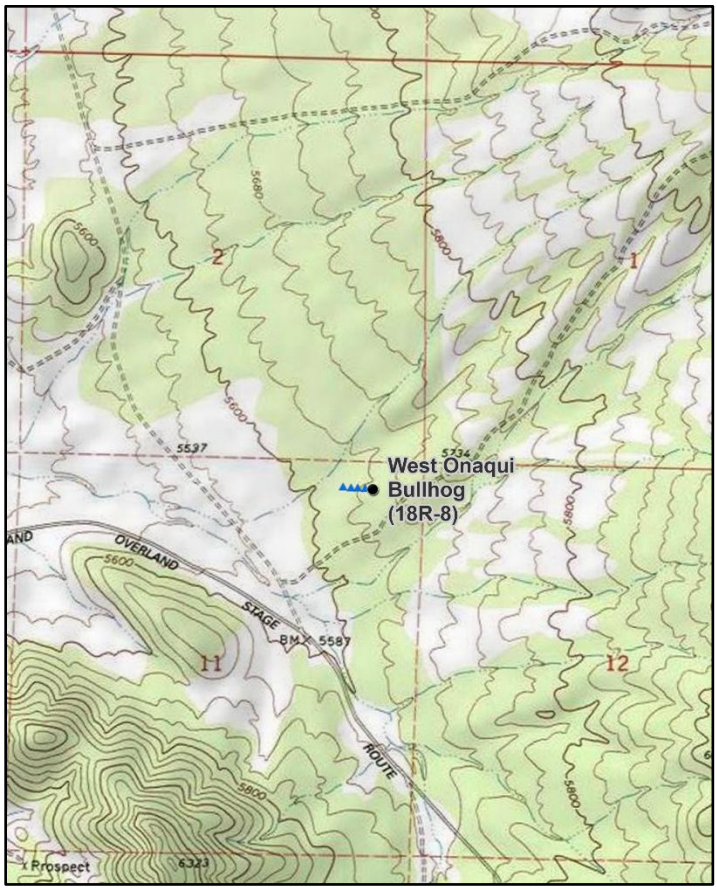
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2008	80	-	0	0	100	0	0	25	26/46
2011	60	-	33	67	0	0	0	0	31/35
2015	180	60	56	44	0	33	0	22	44/64
2018	160	40	63	38	0	0	0	0	47/56
2024	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	100	100	10/16
2018	-	-	-	-	-	-	-	-	31/37
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa ssp. nauseosa var. speciosa[p] -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	100	0	0	0	0	0	71/84
2018	-	-	-	-	-	-	-	-	65/68
2024	260	-	39	62	0	15	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2008	20	-	0	100	0	0	0	0	13/10
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	21/36
2018	60	-	0	100	0	0	0	0	19/16
2024	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma[t] -- (Utah juniper)									
2008	400	40	20	80	0	0	0	5	- / -
2011	200	40	30	50	20	0	0	20	12/18
2015	400	660	25	75	0	0	10	50	- / -
2018	100	360	80	0	20	0	0	20	- / -
2024	320	20	75	19	6	0	0	6	- / -
Opuntia -- (pricklypear)									
2008	-	-	-	-	-	-	-	-	14/32
2011	40	-	0	100	0	0	0	0	16/23
2015	40	-	0	100	0	0	0	0	13/29
2018	40	-	0	50	50	0	0	50	7/19

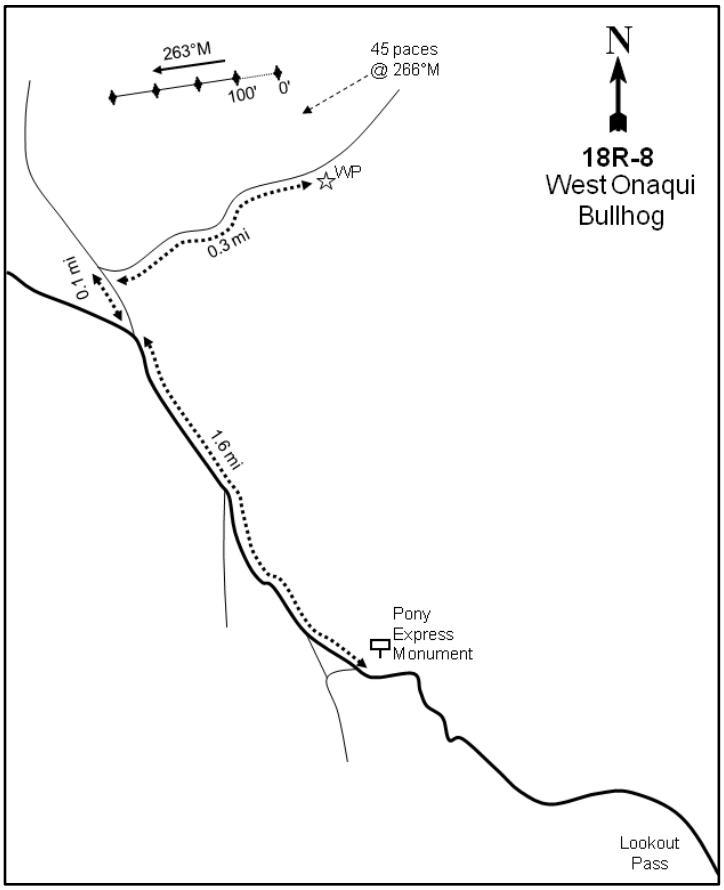
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 18R-07.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	547	15	5	20	55	5	21.3
2011	301	15	40	30	15	-	9.8
2015	476	50	40	10	-	-	3.5
2018	61	35	65	-	-	-	2.4
2024	92	47	47	5	-	-	2.4

WEST ONAQUI BULLHOG - STUDY NO. 18R-8





Location Information

USGS 7.5 min Map Info	Onaqui Mountains Sou; Township 8S, Range 7W, Section 11
GPS (0' Stake)	NAD 83 UTM ZONE 12, 364354 East 4444695 North

Transect Information

Browse Tag # (0' Stake)	258
Transect Bearing	263° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

From the Pony Express Monument on Lookout Pass, drive 1.6 miles west. Turn right (north) and travel 0.1 miles, then turn right again (east) and drive 0.3 miles to a witness post on the left (south) side of the road. From the witness post, walk 45 paces at 266 degrees magnetic to the 0-foot stake which is marked with browse tag #258.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	PONY EXPRESS TRAIL
Elevation	5,660ft (1,725m)
Aspect	Northwest
Slope	7-10%
Sample Dates	08/05/2008, 06/09/2011, 07/29/2015, 07/15/2019, 07/30/2024

Table 18R-08.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Faust Fire ESR	2484	December 2012	4532
Herbicide - Plateau	Faust Fire ESR	2484	September 2012	779
Chaining - One-Way Ely	Faust Fire ESR	2484	March-April 2013	4068
Fire - Wildfire	Faust Fire	-	August 2012	22045
Mechanical - Bullhog	West Onaqui Bullhog Phase III	1133	March-April 2009	512

Table 18R-08.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Faust Fire - BLM			Aerial	Dec 2012	4518
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Goosenest Mix		1.46	0.00
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.44	0.42
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.15	0.14
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.33	0.32
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.07	0.06
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	1.03	0.87
G	Agropyron desertorum	Crested Wheatgrass	Hycrest II	0.44	0.40
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.59	0.55
G	Elymus elymoides	Bottlebrush Squirreltail	Juab UT	0.24	0.22
G	Elymus wawawaiensis	Snake River Wheatgrass		0.34	0.28
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.08	0.06
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.58	0.52
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.23	0.21
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.02	0.02
G	Hesperostipa comata	Needle and Threadgrass	Duchesne UT	0.07	0.05
G	Hesperostipa comata	Needle and Threadgrass	Beaver UT	0.04	0.03
G	Leymus cinereus	Great Basin Wildrye	Magnar	0.24	0.23
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.33	1.08
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.15	0.13
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.53	0.44
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.66	0.54
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.66	0.59
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.33	0.29
G	Sporobolus cryptandrus	Sand Dropseed		0.08	0.08
G	Sporobolus cryptandrus	Sand Dropseed		0.03	0.03
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.85	0.70
F	Achillea millefolium	Western Yarrow		0.02	0.02
F	Linum perenne	Blue Flax	Appar	0.33	0.32
F	Medicago sativa	Alfalfa	Ladak	0.89	0.75
F	Medicago sativa	Alfalfa	Ladak DL	0.24	0.21
F	Penstemon palmeri	Palmer Penstemon	Lincoln NV	0.04	0.02
F	Penstemon palmeri	Palmer Penstemon	Lincoln NV	0.12	0.05
F	Penstemon palmeri	Palmer Penstemon	Lincoln NV	0.01	0.00
F	Sanguisorba minor	Small Burnet		1.00	0.92
F	Sanguisorba minor	Small Burnet	Delar	0.09	0.08
F	Sphaeralcea coccinea	Scarlet Globemallow		0.07	0.04
S	Purshia tridentata	Bitterbrush		0.07	0.06

Mix Name			Application Type	Application Date	Acres
Faust Fire - BLM - Dribbler Mix			Dribbler	Mar 2013	4064
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet		0.27	0.25
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.04	0.03
S	Purshia stansburiana	Stansbury Cliffrose	Millard/Juab UT	0.04	0.02
S	Purshia tridentata	Bitterbrush		0.27	0.24
S	Purshia tridentata	Bitterbrush		0.02	0.02

Wildlife Habitat and Vegetation History

Table 18R-08.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter/spring
Greater Sage-Grouse		

Table 18R-08.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Juniper	Phase III
2011	Perennial Grass	Phase I
2015	Perennial Grass	No Encroachment
2019	Perennial Grass	No Encroachment
2024	Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R028AY325UT
States and Transitions	2008 - Juniper Invasion/Non-native State: Community Phase 3.1 2011-2024 - Juniper Invasion/Non-native State: Community Phase 3.2

Upon study establishment in 2008, this site was dominated by Utah juniper (*Juniperus osteosperma*) with a sparse understory. However, juniper cover was greatly reduced and perennial grasses became the dominant community component in the years following the 2009 bullhog treatment (Table 18R-08.1, Table 18R-08.7, Table 18R-08.10, Table 18R-08.12). Sandberg bluegrass (*Poa secunda*) was the dominant grass species in the 2011 sample year. After the fire and subsequent seeding in 2011, however, the dominant perennial grass species have been bluebunch wheatgrass (*Pseudoroegneria spicata*), squirreltail (*Elymus elymoides*), and crested wheatgrass (*Agropyron cristatum*). Cheatgrass (*Bromus tectorum*) has been sampled in varying amounts, but was rare in 2024 (Table 18R-08.10). Weedy annual forbs including curveseed butterwort (*Ceratocephala testiculata*) and prickly Russian thistle (*Salsola tragus*) have been present in most sample years with a notable amount of cover in 2011 (Table 18R-08.7, Table 18R-08.11). Black sagebrush (*Artemisia nova*) was sampled in low amounts before the fire; however, black sagebrush has decreased to the point that, in 2024, it was no longer detectable (Table 18R-08.13). Utah juniper was sampled in small amounts during the first post-treatment sample year, but was not observed again until 2024 (Photos, Table 18R-08.12, Table 18R-08.14).

Condition of this site as spring/fall range for mule deer has ranged from very poor to poor, but has remained very poor in most sample years including 2024. Transitional range condition is primarily limited by the lack of a preferred browse component (Table 18R-08.15). No preferred browse plants were sampled in density strips in 2024 (Table 18R-08.13), and on-site observations for that year note little to no utilization of the herbaceous components. However, mule deer and/or pronghorn presence has increased over time and was considered to be high in 2024 (Table 18R-08.9). Although this site falls outside of mapped pronghorn habitat, much of this presence in 2024 can likely be attributed to pronghorn.

Trend Summary Tables

Table 18R-08.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	0.3	-	11.3	-	-	31.0
2011	0.2	-	1.4	-	-	1.1
2015	-	0.0	-	-	-	-
2019	-	0.7	-	-	-	-
2024	-	1.2	-	-	1.0	-

Table 18R-08.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	6	248	285	53	0.0	3.2	0.7	0.4
2011	109	255	322	135	0.5	14.1	9.4	5.7
2015	369	273	313	60	9.7	19.1	8.3	1.0
2019	359	335	408	110	15.3	24.4	5.6	3.7
2024	15	347	307	30	0.2	29.4	4.1	0.5

Table 18R-08.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	14.3	20.6	41.3	22.3	1.9	17.5
2011	10.2	1.8	52.4	3.6	0.8	29.1
2015	39.9	-	30.5	13.0	2.7	37.3
2019	22.5	0.1	39.6	7.2	4.0	48.5
2024	38.2	0.1	32.5	11.4	4.5	30.9

Table 18R-08.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Rabbit	Domestic Sheep
	Quadrat Frequency			
2008	-	4	84	-
2011	-	4	6	-
2015	-	10	13	-
2019	-	7	17	-
2024	-	24	4	-
Year	Days Use Per Acre (ha)			
2008	-	-	-	-
2011	-	5.3 (13.2)	-	1.3 (3.3)
2015	-	12.1 (29.8)	-	-
2019	1.5 (3.6)	16.8 (41.4)	-	-
2024	-	44.9 (110.9)	-	-

Table 18R-08.10 - 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)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa[i] (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency												
2008	-	-	-	6	36	-	-	-	5	-	229	-	14
2011	3	-	-	109	40	-	-	-	26	6	219	-	32
2015	34	92	-	369	115	36	29	-	14	-	29	7	67
2019	8	95	2	359	83	48	14	5	68	42	158	10	74
2024	6	152	2	13	57	4	6	3	92	21	120	40	94
year	Average Cover (%)												
2008	-	-	-	0.0	0.5	-	-	-	0.0	-	2.4	-	0.2
2011	0.0	-	-	0.5	2.0	-	-	-	0.0	0.2	10.7	-	1.2
2015	1.6	4.6	-	9.7	4.9	2.3	1.4	-	0.1	-	0.5	0.1	3.8
2019	0.2	5.1	0.0	15.3	3.6	1.8	0.6	0.4	1.8	1.2	4.6	0.3	4.9
2024	0.5	8.5	0.0	0.2	2.8	0.2	0.6	0.0	3.7	0.3	1.5	2.2	9.0

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

Table 18R-08.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Antennaria (pussytoes)	Calochortus nuttallii (sego lily)	Camelina microcarpa[ai] (littlepod false flax)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Gilia inconspicua[a] (shy gilia)	Helianthus annuus[a] (common sunflower)	Lactuca serriola[ai] (prickly lettuce)	Linum perenne[i] (blue flax)	Medicago sativa[i] (alfalfa)	Penstemon palmeri (Palmer's penstemon)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2008	89	4	-	-	272	1	4	-	-	-	-	-	-	-	-	5	-
2011	189	22	8	-	210	-	-	2	24	3	10	179	-	-	-	7	6
2015	195	3	-	-	-	1	-	-	-	-	-	7	9	1	2	13	3
2019	376	-	4	3	240	-	-	-	-	-	4	15	-	-	-	5	-
2024	53	4	-	-	307	-	-	-	-	-	2	-	-	-	-	10	1
year	Average Cover (%)																
2008	0.2	0.1	-	-	0.5	0.0	0.0	-	-	-	-	-	-	-	-	0.1	-
2011	2.8	0.3	0.0	-	4.4	-	-	0.0	0.1	0.0	0.0	1.4	-	-	-	0.2	0.1
2015	0.9	0.0	-	-	-	0.0	-	-	-	-	-	0.0	0.0	0.0	0.1	0.1	0.0
2019	3.0	-	0.0	0.0	1.9	-	-	-	-	-	0.0	0.0	-	-	-	0.1	-
2024	0.1	0.2	-	-	3.7	-	-	-	-	-	0.0	-	-	-	-	0.1	0.0

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)	Taraxacum officinale (common dandelion)	Tragopogon dubius[ai] (yellow salsify)	Vicia americana (American vetch)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency						
2008	-	-	-	-	-	42	1
2011	-	-	27	3	-	98	6
2015	191	9	31	-	16	26	-
2019	7	-	-	-	10	105	1
2024	9	-	-	-	3	15	-
year	Average Cover (%)						
2008	-	-	-	-	-	0.3	0.0
2011	-	-	0.6	0.0	-	5.1	0.0
2015	6.3	0.4	0.8	-	0.3	0.3	-
2019	0.2	-	-	-	0.3	3.5	0.0
2024	0.2	-	-	-	0.0	0.3	-

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

Table 18R-08.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma[t] (Utah juniper)
year	Line Intercept Cover		
2008	-	-	31
2011	-	-	1.1
2015	-	-	-
2019	-	-	-
2024	-	1	-
year	Quadrat Cover (%)		
2008	0.3	-	11.3
2011	0.2	-	1.4
2015	-	0.0	-
2019	-	0.7	-
2024	-	1.2	-

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

Table 18R-08.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2008	340	-	6	12	82	0	53	82	24/43
2011	100	40	20	60	20	0	0	20	25/40
2015	-	-	-	-	-	-	-	-	19/40
2019	-	-	-	-	-	-	-	-	31/50
2024	-	-	-	-	-	-	-	-	-/-
Bassia prostrata[pi] -- (forage kochia)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	33/29
2024	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	46/67
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	10/25
2015	20	-	0	100	0	0	0	0	58/76
2019	40	-	50	50	0	0	0	0	46/65
2024	140	-	14	86	0	14	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	20/22
2015	-	-	-	-	-	-	-	-	34/93
2019	-	-	-	-	-	-	-	-	29/43
2024	20	-	100	0	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2008	1000	100	42	48	10	2	2	4	- / -
2011	320	60	81	13	6	0	0	6	- / -
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	9/19
2019	-	-	-	-	-	-	-	-	13/25

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

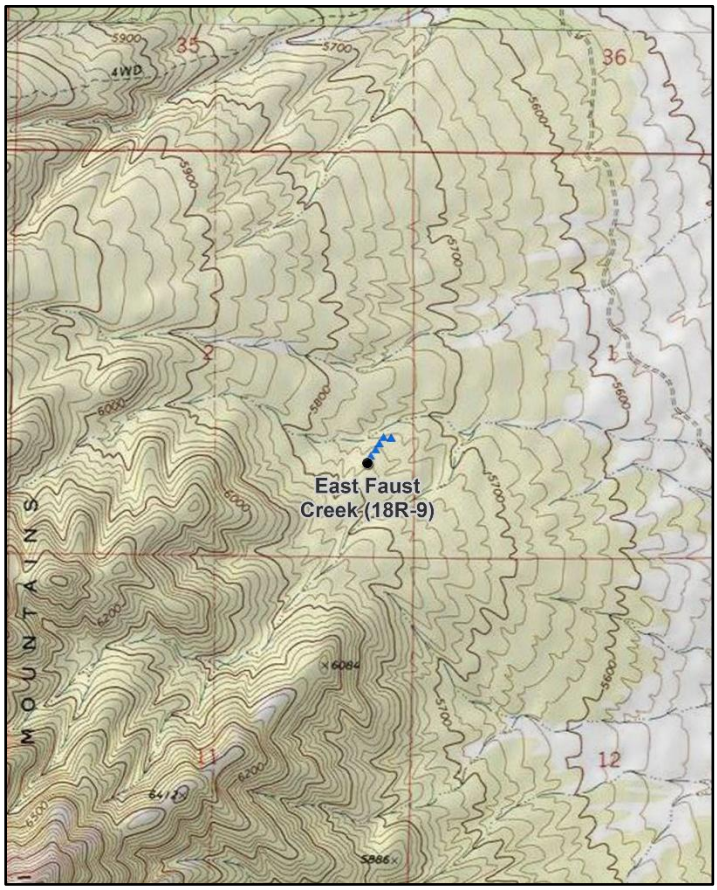
Table 18R-08.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

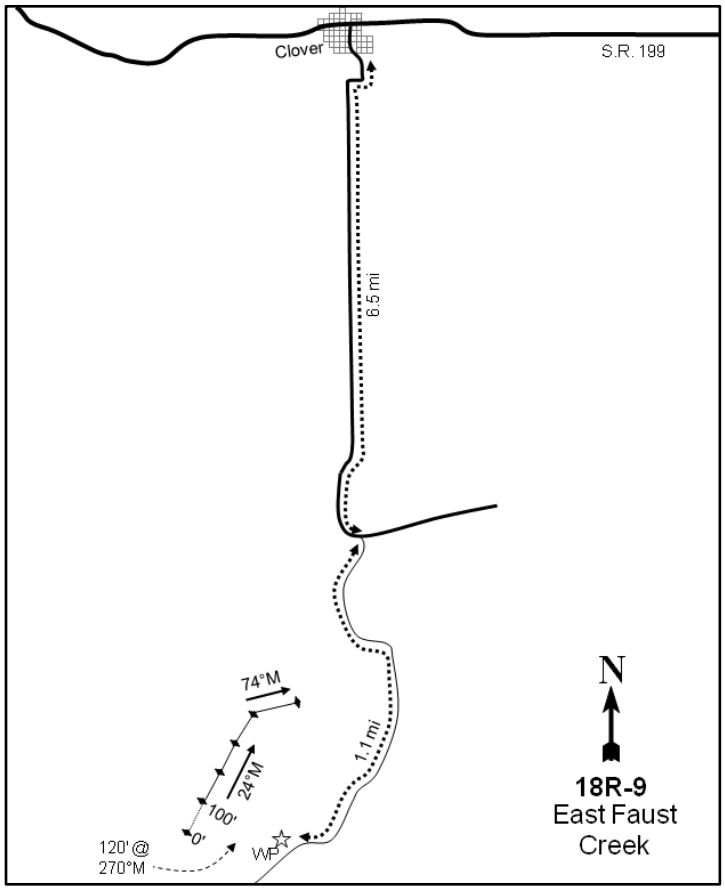
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	1425	20	40	25	15	-	10.3
2011	388	40	50	10	-	-	6.0

Table 18R-08.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2008	0.0	0.0	0.0	6.4	0.0	0.9	0.0	**7.3**	Very Poor
2011	0.0	0.0	0.0	27.8	-0.4	10.0	0.0	**37.4**	Poor
2015	0.0	0.0	0.0	30.0	-7.3	2.1	0.0	**24.8**	Very Poor
2019	0.0	0.0	0.0	30.0	-11.5	7.4	0.0	**25.9**	Very Poor
2024	0.0	0.0	0.0	30.0	-0.1	1.1	0.0	**31.0**	Very Poor

EAST FAUST CREEK - STUDY NO. 18R-9





Location Information

USGS 7.5 min Map Info	Faust NW; Township 7S, Range 6W, Section 02
GPS (0' Stake)	NAD 83 UTM ZONE 12, 374160 East 4454884 North

Transect Information

Browse Tag # (0' Stake)	522
Transect Bearing	Lines 1-4: 18° magnetic (Line 5: 53° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the intersection of State Route 36 and the Pony Express and Overland Stage Route that leads to Faust, travel north on SR-36 for 2.7 miles. Turn left (west) onto a two-track road with a green gate and continue to travel for another 1.8 miles to an intersection. Turn right (north) and drive for another 1.8 miles to a left turn (west). Proceed toward the benches for 1.2 miles to an intersection. Continue up the drainage for another 0.9 miles to a small ridgeline where the transect is located on the right (north) side of the road.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	ONAQUI MOUNTAIN EAST
Elevation	5,750ft (1,753m)
Aspect	Southeast
Slope	2-10%
Sample Dates	07/28/2015, 07/15/2019, 07/30/2024

Table 18R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Onaqui East Bench Bullhog Phase III	3249	October 2015	191
Fire - Wildfire	Two Springs	-	September 2017	84
Mechanical - Bullhog	Onaqui East Bench Bullhog Phase III	3249	September 2015-March 2016	191

Table 18R-09.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Onaqui East Bench 3			Aerial	Oct 2015	191
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.05	0.97
G	Dactylis glomerata	Orchardgrass	Paiute	0.52	0.48
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.57	1.48
G	Poa secunda	Canby Bluegrass	Canbar	0.52	0.28
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	3.01	2.60
F	Linum perenne	Blue Flax	Appar	0.16	0.13
F	Onobrychis viciifolia	Sainfoin	Eski	2.09	2.03
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.15	0.13
F	Sanguisorba minor	Small Burnet		2.09	1.73

Wildlife Habitat and Vegetation History

Table 18R-09.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Greater Sage-Grouse		undefined & undefined

Table 18R-09.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Juniper	Phase III
2019	Perennial Grass/Annual-Perennial Forb	Phase I
2024	Perennial Grass/Annual-Perennial Forb	Phase I

Site Notes

Very little use occurs on this site.

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2008 - Utah Juniper/Invasive Annuals State: Community Phase 3.2 2019-2024 - Seeded Range State: Community Phase 5.1

When this site was established in 2015 the plant community was dominated by Utah juniper (*Juniperus osteosperma*) with an understory mainly comprised of perennial grasses. The herbaceous understory increased in both cover and diversity following the bullhog and seeding treatment (Table 18R-09.1, Table 18R-09.7). Bluebunch wheatgrass (*Pseudoroegneria spicata*) has been the dominant perennial grass species following treatment. Cheatgrass (*Bromus tectorum*) has been present throughout the study period, but with varying abundance (Table 18R-09.10). Forbs have increased significantly with the weedy annual species desert madwort (*Alyssum desertorum*) and tall tumblemustard (*Sisymbrium altissimum*) contributing notable cover at times. American vetch (*Vicia americana*) was the dominant perennial species in 2011, although it has been replaced by blue flax (*Linum perenne*) and small burnet (*Sanguisorba minor*) as of 2024 (Table 18R-09.11). Browse species are rare on this site. The fire in 2017 removed much of the browse that remained following treatment, and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was sampled in density strips in only the most recent post-fire sample year (Table 18R-09.12, Table 18R-09.13). Utah juniper has decreased significantly following the bullhog and subsequent burn, and only a small number of trees were sampled in density measurements in 2019 and 2024 (Table 18R-09.4, Table 18R-09.14). Without further disturbance, this site will likely remain in the present ecological state in future years.

Condition of this site as spring/fall range for mule deer has ranged from very poor to very poor-poor, and was very poor in 2024. Transitional range condition is primarily limited by the lack of a preferred browse component and the presence of annual grass (Table 18R-09.15). Very few preferred browse plants were sampled in density strips in 2024 (Table 18R-09.13), and on-site observations for that year note little to no utilization of the herbaceous components. However, mule deer/and or pronghorn and elk presence have increased over time and was considered to be high in 2024 (Table 18R-09.9). Although this site falls outside of mapped pronghorn habitat, much of this presence in 2024 can likely be attributed to pronghorn.

Trend Summary Tables

Table 18R-09.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2015	0.0	0.0	13.6	-	0.1	30.7
2019	0.1	0.0	-	-	0.1	-
2024	-	0.1	-	-	0.3	-

Table 18R-09.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2015	33	251	296	137	1.9	9.4	1.2	1.4
2019	198	171	382	196	7.4	12.7	16.8	8.5
2024	246	211	384	113	4.8	15.4	7.3	5.8

Table 18R-09.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2015	23.7	4.9	34.1	30.8	5.5	25.6
2019	21.8	0.0	39.0	19.3	5.4	40.9
2024	25.5	0.0	43.8	11.6	3.1	30.7

Table 18R-09.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2015	-	-	15
2019	-	-	25
2024	27	9	6
Year	Days Use Per Acre (ha)		
2015	-	-	-
2019	-	-	-
2024	39.6 (97.7)	16.1 (39.7)	-

Table 18R-09.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus arvensis[ai] (field brome)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Leymus cinereus (basin wildrye)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2015	-	-	33	20	-	-	154	150
2019	3	-	198	44	1	2	63	116
2024	10	2	244	35	14	7	38	143
year	Average Cover (%)							
2015	-	-	1.9	1.2	-	-	3.7	4.5
2019	0.2	-	7.4	0.9	0.1	0.8	1.2	9.5
2024	0.7	0.0	4.8	0.8	0.7	0.4	0.4	12.4

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

Table 18R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus tenellus (looseflower milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata[ai] (curveseed butterwort)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium[ai] (redstem stork's bill)	Ipomopsis congesta (ballhead ipomopsis)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Onobrychis viciifolia[i] (sainfoin)	Penstemon palmeri (Palmer's penstemon)
year	Nested Frequency																
2015	296	13	8	-	-	-	-	-	-	1	-	13	-	-	-	-	-
2019	354	4	12	2	3	86	1	13	2	1	2	-	112	11	40	4	0
2024	321	-	-	-	3	297	2	15	-	-	-	-	7	-	32	-	0
year	Average Cover (%)																
2015	1.2	0.1	0.0	-	-	-	-	-	-	0.0	-	0.0	-	-	-	-	-
2019	8.1	0.0	0.1	0.1	0.0	0.6	0.0	0.4	0.0	0.0	0.0	-	1.7	0.1	1.0	0.3	0.1
2024	0.9	-	-	-	0.0	4.6	0.0	0.1	-	-	-	-	0.0	-	2.3	-	0.0

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

FORB SPECIES	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Physaria chambersii (Chambers' twinpod)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Tragopogon dubius[ai] (yellow salsify)	Vicia americana (American vetch)
year	Nested Frequency							
2015	44	21	10	-	-	-	-	59
2019	26	26	5	10	28	72	3	92
2024	16	20	10	68	29	3	18	18
year	Average Cover (%)							
2015	0.6	0.2	0.0	-	-	-	-	0.4
2019	0.6	0.2	0.2	0.4	1.2	6.0	0.0	4.4
2024	0.1	0.3	0.0	1.2	2.8	0.0	0.5	0.1

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

Table 18R-09.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum[p] (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)
year	Line Intercept Cover (%)					
2015	-	-	-	-	30.7	0.1
2019	-	-	-	0.1	-	-
2024	-	0.2	-	0.1	-	-
year	Quadrat Cover (%)					
2015	0.0	-	-	0.0	13.6	0.0
2019	-	-	0.1	0.0	-	-
2024	-	0.1	-	0.0	-	-

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

Table 18R-09.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2015	140	-	29	29	43	14	29	57	47/66
2019	-	-	-	-	-	-	-	-	51/61
2024	20	-	0	100	0	0	0	0	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2015	-	-	-	-	-	-	-	-	-/-
2019	200	-	10	90	0	0	0	0	10/13
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	26/20
2024	100	20	60	40	0	40	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2015	140	-	29	71	0	0	0	0	15/22
2019	140	-	14	86	0	0	0	0	23/30
2024	580	-	14	79	7	0	0	7	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2015	240	40	8	92	0	0	0	0	- / -
2019	20	-	100	0	0	0	0	0	- / -
2024	20	-	0	100	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2015	40	-	0	100	0	0	0	0	16/42
2019	-	-	-	-	-	-	-	-	13/19
2024	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana[p] -- (Stansbury cliffrose)									
2015	-	-	-	-	-	-	-	-	97/244
2019	-	-	-	-	-	-	-	-	366/374
2024	-	-	-	-	-	-	-	-	-/-

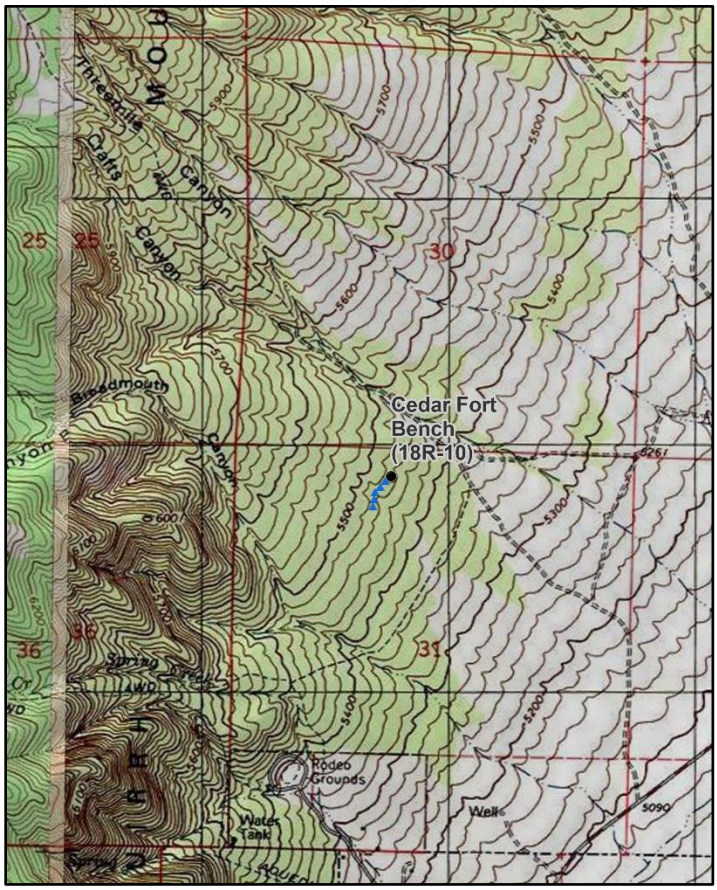
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Purshia tridentata[p] -- (antelope bitterbrush)									
2015	-	-	-	-	-	-	-	-	68/111
2019	-	-	-	-	-	-	-	-	51/83

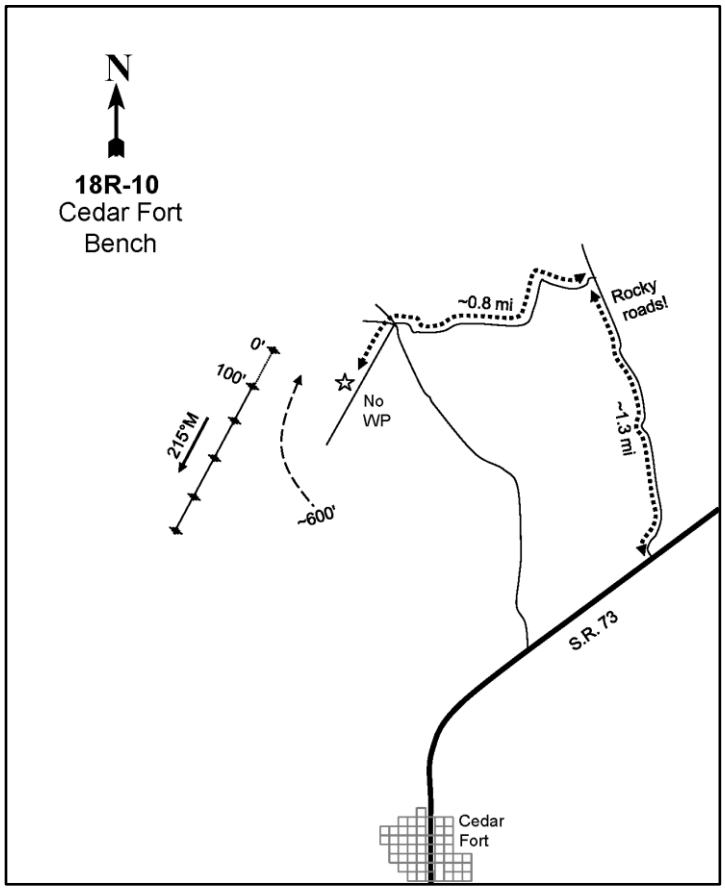
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 18R-09.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2015	486	-	40	30	30	-	13.7
2019	20	50	50	-	-	-	4.2
2024	43	63	38	-	-	-	2.1

CEDAR FORT BENCH - STUDY NO. 18R-10





Location Information

USGS 7.5 min Map Info	Cedar Fort NW; Township 5S, Range 2W, Section 31
GPS (0' Stake)	NAD 83 UTM ZONE 12, 405766 East 4466879 North

Transect Information

Browse Tag # (0' Stake)	769
Transect Bearing	Lines 1-3: 209° magnetic (Lines 4-5: 180)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Traveling southwest on State Route 73, turn right (north) onto a dirt road and continue for about 1.3 miles (this road gets very rocky). There is a road that comes in from the left (west): turn onto this road and continue for about 0.8 miles, passing an intersection. There is no witness post, but the study is about 600 feet away on the right-hand (northwest) side of the road.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	DIAMOND VALLEY
Elevation	5,470ft (1,667m)
Aspect	Southeast
Slope	5-10%
Sample Dates	08/18/2016, 07/16/2019, 07/02/2024

Table 18R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	Cedar Fort Chaining	3662	December 2016	1028
Seeding - Aerial Before	Cedar Fort Chaining	3662	October 2016	1028
Chaining - Two-Way Ely	Cedar Fort Chaining	3662	October-December 2016	1028
Seeding - Dribbler After	Cedar Fort Chaining	3662	October-December 2016	1028
Herbicide - Plateau	Cedar Fort Chaining	3662	September 2017	527

Table 18R-10.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Cedar Fort Chaining			Aerial	Oct 2016	1028
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.97	0.85
G	Agropyron cristatum	Crested Wheatgrass	Hycrest II	1.02	0.93
G	Dactylis glomerata	Orchardgrass	Paiute	0.31	0.28
G	Dactylis glomerata	Orchardgrass	Paiute	0.18	0.15
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.02	0.95
G	Poa secunda	Canby Bluegrass	Canbar	0.33	0.24
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.51	1.35
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.10	0.09
F	Helianthus annuus	Annual Sunflower	Box Elder UT	0.41	0.32
F	Helianthus annuus	Annual Sunflower	Montezuma CO	0.08	0.07
F	Linum perenne	Blue Flax	Appar	0.49	0.43
F	Medicago sativa	Alfalfa	Ladak	0.72	0.67
F	Medicago sativa	Alfalfa	Ladak+	0.78	0.75
F	Onobrychis viciifolia	Sainfoin	Eski	1.99	1.53
F	Sanguisorba minor	Small Burnet		1.99	1.86

Mix Name			Application Type	Application Date	Acres
Cedar Fort Chaining Dribbler			Dribbler	Oct 2016	1028
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet		0.39	0.36
S	Atriplex canescens	Fourwing Saltbush	Juab/Carbon UT	0.29	0.11
S	Purshia tridentata	Bitterbrush	Oneida ID	0.29	0.18

Mix Name			Application Type	Application Date	Acres
Cedar Fort Chaining Shrub			Aerial	Dec 2016	1028
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sevier UT	0.49	0.09
S	Bassia prostrata	Forage Kochia	Box Elder UT	0.97	0.73

Wildlife Habitat and Vegetation History

Table 18R-10.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 18R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Juniper	Phase III
2019	Perennial Grass-Forb	Phase I
2024	Perennial Grass-Forb	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Stony Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY334UT
States and Transitions	2016 - State Undefined: Community Phase Undefined 2019-2024 - State Undefined: Community Phase Undefined

When the study was established in 2016, it was dominated by Utah juniper (*Juniperus osteosperma*) and was considered to be in Phase III of woodland succession (Table 18R-10.4, Table 18R-10.14). The herbaceous understory was depleted in both cover and diversity (Table 18R-10.7). However, in the fall and winter of 2016, the site was seeded with a variety of species and chained to removed trees (Table 18R-10.1, Table 18R-10.2). Following treatment, perennial grasses have provided a fair amount of cover with crested wheatgrass (*Agropyron cristatum*) as the dominant species (Table 18R-10.10). Perennial forbs have been the primary component of the understory following treatment and have contributed significant cover with the introduced species alfalfa (*Medicago sativa*), small burnet (*Sanguisorba minor*), and sainfoin (*Onobrychis viciifolia*) being the dominant species (Table 18R-10.11). Shrubs were initially sparse, but mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) have been sampled in low amounts after treatment (Table 18R-10.12, Table 18R-10.13). Tree cover and density decreased drastically after treatment, and the site has been considered to be within Phase I of woodland succession since 2019 (Table 18R-10.4, Table 18R-10.12, Table 18R-10.14).

This site's condition as mule deer winter range has remained very poor throughout the study period. Winter habitat condition is primarily limited by the small preferred browse component (Table 18R-10.15). Deer presence has increased over time according to pellet transect data and was moderate in 2024 (Table 18R-10.9). The preferred browse component has remained very limited, but 50% of sagebrush and 33% of antelope bitterbrush plants sampled in density strips were moderately hedged in 2024 (Table 18R-10.13).

Trend Summary Tables

Table 18R-10.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	0.0	-	15.3	0.2	-	31.6
2019	0.4	0.1	1.3	0.2	0.2	0.6
2024	0.2	0.8	1.1	0.2	0.8	0.2

Table 18R-10.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	44	105	383	50	0.1	0.4	1.3	0.3
2019	81	160	259	242	1.3	4.7	6.7	20.6
2024	54	189	320	181	0.6	11.5	4.8	9.2

Table 18R-10.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2016	14.0	7.5	38.9	26.3	14.8	18.4
2019	15.4	0.0	47.5	7.9	21.1	32.7
2024	16.6	0.0	44.0	10.1	14.5	28.8

Table 18R-10.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rabbit
	Quadrat Frequency			
2016	-	-	-	10
2019	2	-	4	15
2024	-	-	10	11
Year	Days Use Per Acre (ha)			
2016	-	-	1.3 (3.3)	-
2019	2.9 (7.2)	-	4.0 (9.9)	-
2024	0.7 (1.8)	8.7 (21.5)*	31.5 (77.8)	-

*Pellets per acre (ha)

Table 18R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2016	1	-	44	-	63	-	-	50	-	-
2019	14	81	81	11	29	9	5	20	0	32
2024	0	97	54	-	55	-	13	12	-	59
year	Average Cover (%)									
2016	0.0	-	0.1	-	0.2	-	-	0.2	-	-
2019	0.2	2.3	1.3	0.2	0.7	0.2	0.0	0.2	0.0	0.8
2024	0.0	5.6	0.6	-	1.4	-	0.4	0.0	-	4.1

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

Table 18R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Alyssum alyssoides[ai] (pale madwort)	Alyssum desertorum[ai] (desert madwort)	Arabis (rockcress)	Astragalus eurekensis (Eureka milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Dracocephalum (dragonhead)	Eriogonum (buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Helianthus annuus[a] (common sunflower)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)
year	Nested Frequency																
2016	-	-	381	4	-	-	40	-	3	14	-	17	1	2	-	-	-
2019	32	156	52	-	7	1	18	38	-	26	2	-	-	11	12	136	1
2024	17	282	39	-	6	2	20	36	3	28	-	-	-	14	-	6	-
year	Average Cover (%)																
2016	-	-	1.2	0.0	-	-	0.1	-	0.0	0.0	-	0.1	0.0	0.0	-	-	-
2019	1.3	3.5	0.5	-	0.1	0.0	0.1	0.1	-	0.6	0.0	-	-	0.3	0.0	2.4	0.0
2024	0.2	4.2	0.3	-	0.1	0.0	0.0	0.3	0.0	0.2	-	-	-	0.2	-	0.0	-

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

FORB SPECIES	Lathyrus brachycalyx (Bonneville pea)	Linum perenne[i] (blue flax)	Medicago sativa[i] (alfalfa)	Onobrychis viciifolia[i] (sainfoin)	Onopordum acanthium[ani] (Scotch cottonthistle)	Polygonum douglasii[a] (Douglas' knotweed)	Sanguisorba minor[i] (small burnet)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency							
2016	15	-	-	-	-	-	-	1
2019	5	54	67	80	3	2	104	3
2024	-	3	49	48	1	-	52	-
year	Average Cover (%)							
2016	0.1	-	-	-	-	-	-	0.0
2019	0.1	2.8	3.3	4.1	0.1	0.0	7.9	0.0
2024	-	0.0	3.6	2.6	0.1	-	1.9	-

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

Table 18R-10.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca[p] (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Pinus monophylla[t] (singleleaf pinyon)	Purshia stansburiana[p] (Stansbury cliffrose)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)								
2016	-	-	-	-	-	31.1	0.5	0.2	-
2019	0	-	0.2	0.2	-	0.6	-	-	-
2024	0.2	-	0.8	-	-	0.2	-	-	-
year	Quadrat Cover (%)								
2016	-	-	-	-	-	15.0	0.4	0.0	-
2019	0.1	-	0.1	0.1	-	1.3	-	-	0.1
2024	0.1	0.0	0.8	-	0.0	1.1	-	-	0.0

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

Table 18R-10.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2016	-	-	-	-	-	-	-	-	-/-
2019	40	-	50	50	0	0	0	0	38/34
2024	40	-	50	50	0	50	0	0	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2016	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	27/41
2024	100	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 (%)		
Ericameria nauseosa -- (rubber rabbitbrush)									
2016	-	-	-	-	-	-	-	-	-/-
2019	60	-	0	100	0	0	0	0	38/48
2024	380	-	21	79	0	0	0	0	- / -
Ericameria nauseosa ssp. nauseosa var. hololeuca[p] -- (rubber rabbitbrush)									
2016	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	44/47
2024	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2016	20	-	100	0	0	0	0	100	14/4
2019	-	-	-	-	-	-	-	-	-/-
2024	-	20	0	0	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2016	480	160	13	75	13	0	0	21	- / -
2019	100	-	0	100	0	0	0	20	- / -
2024	180	-	89	0	11	0	0	11	- / -
Opuntia -- (pricklypear)									
2016	20	-	0	100	0	0	0	0	11/33
2019	-	-	-	-	-	-	-	-	8/15
2024	-	-	-	-	-	-	-	-	-/-
Pinus monophylla[t] -- (singleleaf pinyon)									
2016	20	60	0	100	0	0	0	0	- / -
2019	-	20	0	0	0	0	0	0	- / -
2024	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana[p] -- (Stansbury cliffrose)									
2016	20	-	0	100	0	100	0	0	82/94
2019	-	-	-	-	-	-	-	-	78/92
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2016	-	-	-	-	-	-	-	-	16/39
2019	180	-	100	0	0	0	0	0	6/12
2024	60	-	67	33	0	33	0	0	- / -

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

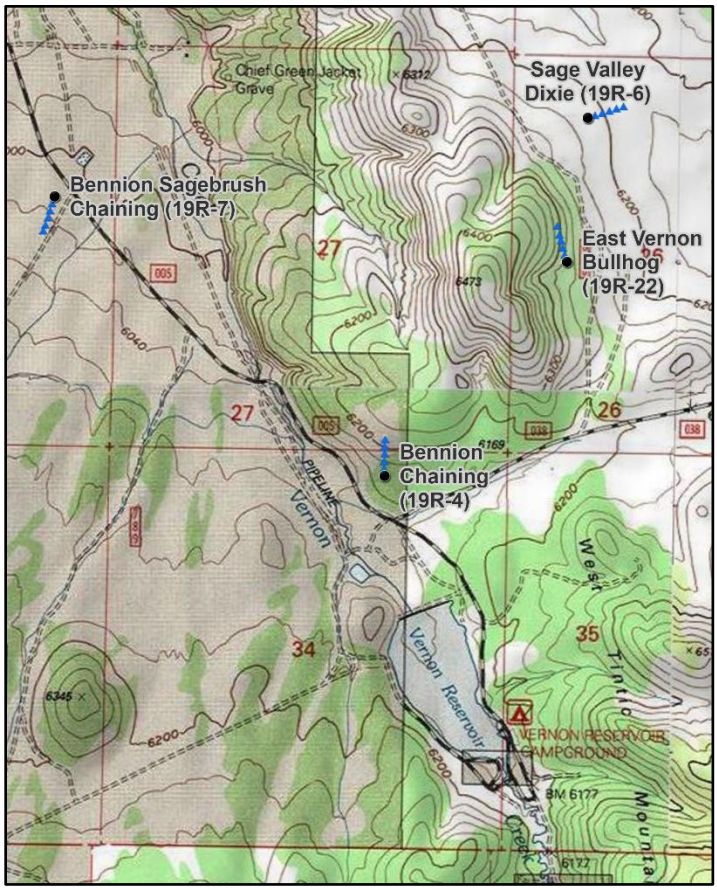
Table 18R-10.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

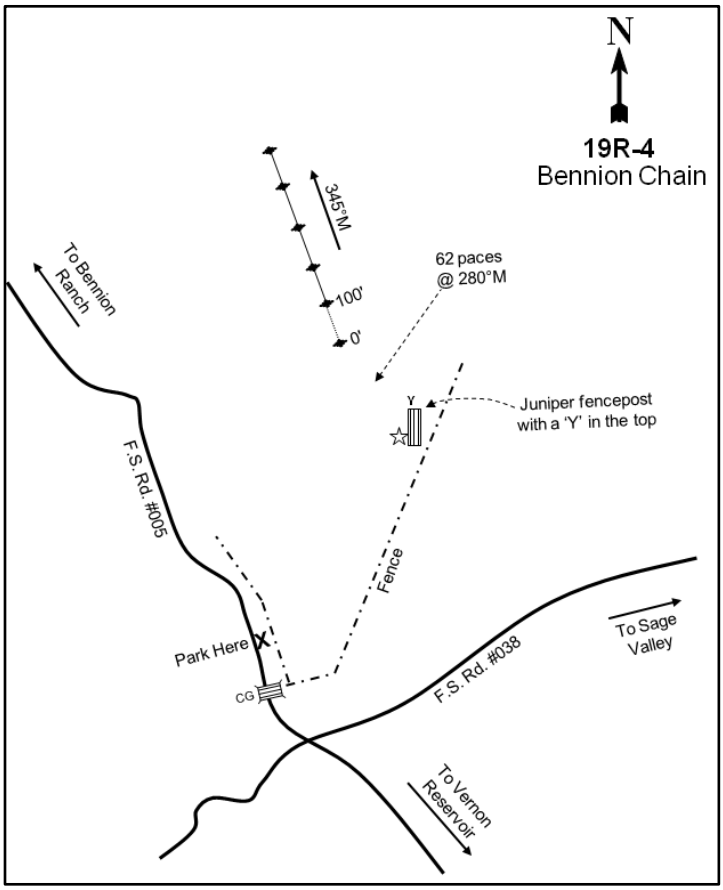
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2016	317	-	10	5	15	70	17.1
2019	106	-	100	-	-	-	15.4
2024	66	-	61	39	-	-	8.7
Pinus edulis (twoneedle pinyon)							
2019	1	100	-	-	-	-	2.0
Pinus monophylla (singleleaf pinyon)							
2019	5	-	100	-	-	-	2.8
2024	9	40	40	20	-	-	2.8

Table 18R-10.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2016	0.3	0.0	0.0	0.8	-0.1	0.5	0.0	**1.5**	Very Poor
2019	0.3	0.0	0.0	9.3	-0.9	10.0	-2.0	**16.7**	Very Poor
2024	0.3	0.0	0.0	23.0	-0.4	10.0	-2.0	**30.9**	Very Poor

BENNION CHAINING - STUDY NO. 19R-4





Location Information

USGS 7.5 min Map Info	Dutch Peak NE; Township 9S, Range 5W, Section 34
GPS (0' Stake)	NAD 83 UTM ZONE 12, 381391 East 4428323 North

Transect Information

Browse Tag # (0' Stake)	99
Transect Bearing	345° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

Drive southwest from Eureka on US-6 to Tintic Junction (State Routes 36 and 67). Turn right (northwest) on SR-36 and drive 19.5 miles to two roads that go west: take the first road that goes south towards Vernon Reservoir. Drive south for 7.3 miles to a cattle guard just before the junction with Forest Service road #038. Park here and walk along the fenceline for approximately 800 feet to a juniper fencepost. From the fencepost, walk 62 paces at 280 degrees magnetic to the 0-foot stake, which is marked with browse tag #99.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	BENNION RANCH
Elevation	6,150ft (1,875m)
Aspect	South
Slope	20%
Sample Dates	10/12/2005, 08/10/2010, 07/30/2015, 07/16/2019, 08/01/2024

Table 19R-04.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Bennion Ranch Lop and Scatter	3408	May 2016	1047
Chaining - Two-Way Smooth	Bennion Ranch Sage-Grouse Demonstration Year 1	55	September-December 2006	450
Seeding - Aerial Before	Bennion Ranch Sage-Grouse Demonstration Year 1	55	December 2006	450
Seeding - Dribbler	Bennion Ranch Sage-Grouse Demonstration Year 1	55	September-December 2006	450
Seeding - Aerial After	Bennion Ranch Sage-Grouse Demonstration Year 1	55	January 2007	450

Table 19R-04.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Bennion Ranch P-J Chaining			Aerial	Dec 2006	150
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.50	0.43
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.50	0.43
G	Agropyron cristatum	Crested Wheatgrass	CDII	0.50	0.44
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.50	0.44
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.94
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.50	0.43
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.50	0.42
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.50	0.44
F	Medicago sativa	Alfalfa	Ladak	0.50	0.46
F	Medicago sativa	Alfalfa	Ranger	0.50	0.44
F	Medicago sativa	Alfalfa	Spredor 4	0.50	0.48
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.84
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.86

Mix Name			Application Type	Application Date	Acres
Bennion Ranch Dribbler Mix			Dribbler	Dec 2006	320
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.31	0.12
S	Purshia tridentata	Bitterbrush	Millard UT	0.16	0.12

Mix Name			Application Type	Application Date	Acres
Bennion Ranch			Aerial	Jan 2007	320
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.56	0.13
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.44	0.10
S	Bassia prostrata	Forage Kochia	Rocky Mountain	1.00	0.57

Wildlife Habitat and Vegetation History

Table 19R-04.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	spring/fall
Greater Sage-Grouse		undefined & undefined

Table 19R-04.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon-Juniper	Phase III
2010	Annual-Perennial Grass-Forb	Phase I
2015	Perennial Grass/Mixed Shrub	Phase I
2019	Annual-Perennial Grass/Mixed Shrub	Phase I
2024	Mixed Shrub/Perennial Grass	Phase I

Site Notes

No Notes

Soils

Table 19R-04.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.5	37.4	36.0	26.6	2.4	9.7	169.6	0.6	10/12/2005

Site Potential	
1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Gravelly Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY306UT
States and Transitions	2005 - Utah Juniper/Invasive Annuals State: Community Phase 3.2 2010 - Seeded Range State: Community Phase 6.1 2015-2019 - Current Potential State: Community Phase 2.4 2024 - Current Potential State: Community Phase 2.1

Upon study establishment in 2005, the plant community on this site was a Utah juniper (*Juniperus osteosperma*)-dominated community considered to be in Phase III of woodland succession (Table 19R-04.4). The herbaceous understory was mostly depleted prior to the 2006 chaining and seeding treatment (Table 19R-04.1). The herbaceous understory increased following treatment, however, and annual and perennial grasses were codominant components along with perennial forbs in the first post-treatment sample year (Table 19R-04.7). Perennial grasses have generally increased with bluebunch wheatgrass (*Pseudoroegneria spicata*) as the dominant species. Annual grasses have shown fluctuations with cheatgrass (*Bromus tectorum*) being the primary annual grass species sampled; perennial and/or annual grasses have been codominant site components since 2010 (Table 19R-04.10). Cover of both perennial and annual forbs has fluctuated and has generally decreased since 2010. However, desert madwort (*Alyssum desertorum*) has been the most abundant annual species (Table 19R-04.11). Shrub species were initially rare, but have increased in the years since treatment; forage kochia (*Bassia prostrata*) and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) have been the dominant shrub species present (Table 19R-04.12, Table 19R-04.13). Juniper and twoneedle pinyon (*Pinus edulis*) were observed prior to treatment, and juniper and singleleaf pinyon (*P. monophylla*) have been sampled in low abundance in the years since the chaining and subsequent lop and scatter treatment (Table 19R-04.14).

Condition of this site as spring/fall range for mule deer has fluctuated between very poor and good-excellent since 2005. Although condition is considered to be good-excellent as of 2024, it is mainly limited by reduced cover of the preferred browse, perennial grass, and perennial forb components (Table 19R-04.15). Deer presence remained low between 2005 and 2019 according to pellet transect data, but was high in 2024 (Table 19R-04.9).

Trend Summary Tables

Table 19R-04.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	-	0.1	17.8	0.1	-	44.8
2010	2.0	0.7	0.3	4.7	0.3	0.6
2015	9.1	1.6	0.8	11.5	1.8	0.6
2019	10.0	1.3	0.3	11.0	2.0	0.6
2024	14.5	0.6	0.8	16.6	1.5	1.0

Table 19R-04.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	19	141	178	21	0.1	2.0	0.7	0.1
2010	341	146	306	146	9.9	7.6	6.3	11.2
2015	300	228	330	100	4.5	11.1	3.6	2.9
2019	342	238	419	126	13.1	16.6	5.6	5.2
2024	150	206	298	77	1.0	12.2	2.3	1.4

Table 19R-04.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	16.5	0.6	39.2	31.5	8.9	19.9
2010	12.5	0.5	49.1	9.2	8.9	36.6
2015	19.4	0.0	40.3	17.7	8.1	30.8
2019	11.7	-	46.6	14.1	11.1	49.0
2024	20.2	0.0	43.1	12.6	12.3	29.4

Table 19R-04.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	-	1	-	62
2010	2	7	1	2
2015	-	6	-	20
2019	8	5	2	22
2024	5	16	3	19
Year	Days Use Per Acre (ha)			
2005	-	0.7 (1.7)	-	-
2010	2.2 (5.4)	7.4 (18.2)	-	-
2015	8.7 (21.5)	9.4 (23.2)	-	-
2019	7.2 (17.9)	4.7 (11.6)	2.0 (5.0)	-
2024	17.4 (43.0)	45.6 (112.6)	2.7 (6.6)	-

Table 19R-04.10 - 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)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa[i] (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency										
2005	0	-	-	19	4	-	-	125	-	15	-
2010	11	20	-	341	19	1	3	26	4	64	30
2015	-	21	-	300	75	15	-	60	25	111	10
2019	-	28	4	342	59	37	3	64	27	110	34
2024	-	9	-	150	12	8	49	2	29	134	15
year	Average Cover (%)										
2005	0.0	-	-	0.1	0.0	-	-	1.8	-	0.2	-
2010	0.1	0.5	-	9.9	0.8	0.0	0.0	0.3	0.2	4.2	1.4
2015	-	1.0	-	4.5	1.4	0.7	-	0.8	1.2	5.3	0.8
2019	-	1.1	0.4	12.7	2.5	1.4	0.0	0.9	1.6	7.7	1.4
2024	-	0.4	-	1.0	0.3	0.3	0.4	0.0	2.0	7.6	1.1

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

Table 19R-04.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum[ai] (desert madwort)	Antennaria (pussytoes)	Argemone corymbosa[a] (Mojave pricklypoppy)	Astragalus (milkvetch)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus eurekensis (Eureka milkvetch)	Astragalus utahensis (Utah milkvetch)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cirsium (thistle)	Cirsium vulgare[ai] (bull thistle)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)
year	Nested Frequency																
2005	2	126	1	-	-	-	3	-	4	16	-	-	-	-	-	-	4
2010	-	291	-	0	100	-	-	-	18	-	9	-	-	-	-	3	1
2015	-	326	2	-	2	56	-	-	5	-	2	9	-	-	-	3	20
2019	-	417	-	-	-	78	3	1	8	11	8	18	1	2	-	-	16
2024	-	287	-	-	-	41	0	-	-	40	3	-	-	3	0	-	6
year	Average Cover (%)																
2005	0.0	0.3	0.0	-	-	-	0.0	-	0.0	0.0	-	-	-	-	-	-	0.0
2010	-	4.6	-	0.6	8.5	-	-	-	0.4	-	0.1	-	-	-	-	0.0	0.0
2015	-	3.3	0.1	-	0.0	1.1	-	-	0.0	-	0.0	0.6	-	-	-	0.0	0.3
2019	-	5.2	-	-	-	1.5	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	-	-	0.6
2024	-	1.4	-	-	-	0.8	0.0	-	-	0.1	0.0	-	-	0.0	0.6	-	0.0

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

FORB SPECIES	Cymopterus (springparsley)	Descurainia pinnata[a] (western tansymustard)	Erodium cicutarium[ai] (redstem stork's bill)	Gilia inconspicua[a] (shy gilia)	Lactuca serriola[ai] (prickly lettuce)	Medicago sativa[i] (alfalfa)	Microsteris gracilis[a] (slender phlox)	Onobrychis viciifolia[i] (sainfoin)	Packera multilobata (lobeleaf groundsel)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Tragopogon dubius[ai] (yellow salsify)	Trifolium (clover)
year	Nested Frequency															
2005	-	16	-	58	0	-	-	-	-	-	4	-	-	-	-	3
2010	2	19	-	-	45	24	2	1	10	-	1	19	-	-	1	-
2015	1	-	6	-	7	5	-	10	9	1	-	2	3	-	7	1
2019	-	4	15	13	7	7	1	-	-	3	0	1	-	-	7	-
2024	-	-	-	4	-	-	-	-	-	23	-	-	-	6	4	-
year	Average Cover (%)															
2005	-	0.1	-	0.3	0.0	-	-	-	-	-	0.0	-	-	-	-	0.0
2010	0.0	0.3	-	-	0.8	1.3	0.0	0.0	0.1	-	0.0	0.8	-	-	0.0	-
2015	0.0	-	0.0	-	0.1	0.1	-	0.3	0.3	0.0	-	0.0	0.1	-	0.1	0.0
2019	-	0.0	0.1	0.1	0.0	1.1	0.0	-	-	0.0	0.0	0.2	-	-	0.1	-
2024	-	-	-	0.0	-	-	-	-	-	0.5	-	-	-	0.0	0.2	-

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

Table 19R-04.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis[p] (Wyoming big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	Bassia prostrata[pi] (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca[p] (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus monophylla[t] (singleleaf pinyon)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)										
2005	0.1	-	-	-	-	-	-	33.9	-	10.9	-
2010	0.1	0.1	4.5	-	0.3	-	-	0.6	0	-	-
2015	1.8	0.1	9.6	-	1.7	-	-	0.6	0.1	-	-
2019	2.8	0.8	7.4	0.5	1.5	-	-	0.6	-	-	-
2024	3.6	0.6	10.2	0.8	0.1	2	0.6	1	-	-	0.2
year	Quadrat Cover (%)										
2005	0.0	-	-	-	-	-	-	12.2	0.1	5.6	-
2010	0.0	0.0	2.0	0.1	0.4	-	-	0.3	0.2	-	-
2015	2.9	0.4	5.8	0.0	1.5	-	0.0	0.8	0.1	-	-
2019	2.8	0.8	6.3	0.0	1.0	0.0	0.0	0.3	0.3	-	-
2024	2.3	0.4	10.1	0.3	0.1	1.6	0.2	0.8	-	-	0.1

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

Table 19R-04.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. wyomingensis[p] -- (Wyoming big sagebrush)									
2005	60	-	0	33	67	0	0	33	30/44
2010	100	-	60	40	0	0	0	0	42/48
2015	120	-	17	83	0	50	0	0	59/86
2019	220	700	18	82	0	0	0	0	74/108
2024	1380	2680	77	22	1	3	0	1	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2010	60	-	67	33	0	0	0	0	53/42
2015	40	-	0	100	0	0	0	50	91/98
2019	60	-	0	100	0	0	0	0	111/152
2024	-	-	-	-	-	-	-	-	-/-
Bassia prostrata[pi] -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2010	2860	-	12	88	0	39	0	0	43/55
2015	6440	520	34	67	0	39	0	3	32/64
2019	7020	960	12	88	0	15	0	0	33/47
2024	13400	7180	29	71	0	1	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	35/51
2015	20	-	0	100	0	0	0	0	42/65
2019	40	-	0	100	0	0	0	0	52/83
2024	40	-	0	50	50	0	0	50	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2010	40	-	0	100	0	0	0	0	50/55
2015	160	40	38	63	0	25	0	0	59/87
2019	180	-	11	89	0	0	0	0	68/87
2024	120	-	50	50	0	0	0	0	- / -
Ericameria nauseosa ssp. nauseosa var. hololeuca[p] -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	69/116
2024	320	-	63	38	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2005	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	- / -
2015	20	-	0	100	0	0	0	0	8/29
2019	20	-	0	100	0	0	0	0	32/47
2024	160	-	25	75	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2005	560	-	18	82	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	-/-
2015	100	20	40	60	0	0	0	0	- / -
2019	80	-	100	0	0	0	0	0	- / -
2024	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 (%)		
Opuntia -- (pricklypear)									
2005	180	-	33	67	0	0	0	0	10/30
2010	100	-	0	80	20	20	0	20	11/24
2015	160	-	13	88	0	0	0	0	12/36
2019	100	-	0	100	0	0	0	0	13/33
2024	160	-	0	88	13	0	0	13	- / -
Pinus monophylla[t] -- (singleleaf pinyon)									
2005	20	-	0	100	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	20	-	100	0	0	0	0	0	12/22
2019	20	-	0	100	0	0	100	0	10/19
2024	20	-	0	100	0	100	0	0	- / -
Sambucus nigra ssp. cerulea[p] -- (blue elderberry)									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	202/206
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Tetradymia canescens -- (spineless horsebrush)									
2005	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	26/34
2015	-	-	-	-	-	-	-	-	33/50
2019	-	-	-	-	-	-	-	-	34/52

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

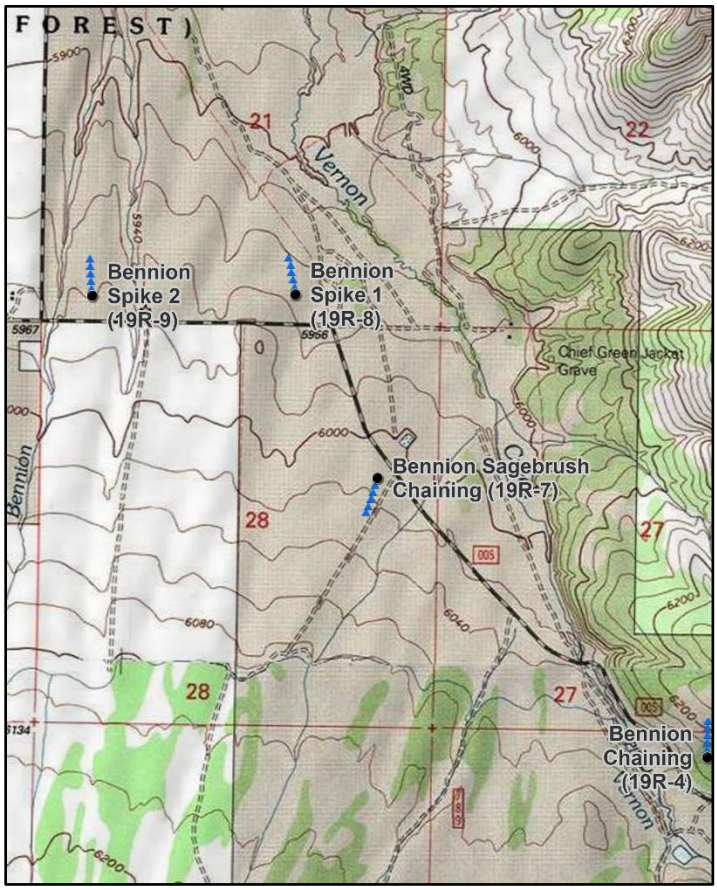
Table 19R-04.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

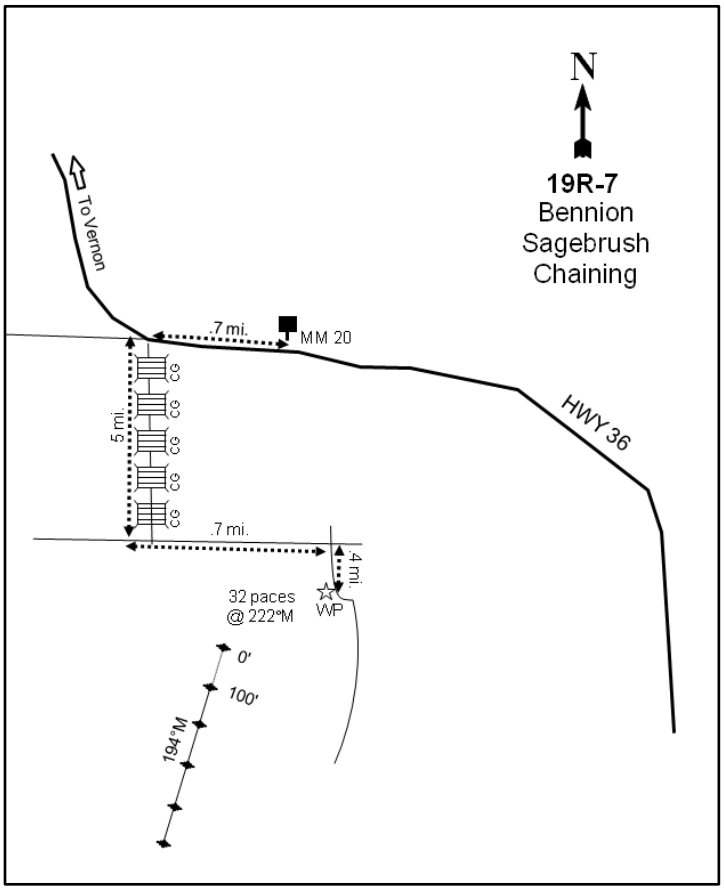
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2005	392	5	5	40	40	10	13.0
2010	43	12	53	35	-	-	5.3
2015	64	-	76	24	-	-	5.4
2019	17	-	91	9	-	-	11.1
2024	36	-	86	14	-	-	4.3
Pinus edulis (twoneedle pinyon)							
2005	22	-	-	17	8	75	21.8
Pinus monophylla (singleleaf pinyon)							
2024	1	-	100	-	-	-	3.0

Table 19R-04.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2005	0.1	0.0	0.0	4.0	-0.1	0.1	0.0	**4.1**	Very Poor
2010	7.0	0.0	0.0	15.2	-7.4	10.0	0.0	**24.8**	Very Poor
2015	16.8	14.9	15.0	22.2	-3.4	5.8	0.0	**71.3**	Good
2019	15.6	15.0	6.5	30.0	-9.8	10.0	0.0	**67.3**	Good
2024	23.4	14.4	15.0	23.7	-0.7	2.8	0.0	**78.6**	Good-Excellent

BENNION SAGEBRUSH CHAINING - STUDY NO. 19R-7





Location Information	
USGS 7.5 min Map Info	Vernon SE; Township 9S, Range 5W, Section 28
GPS (0' Stake)	NAD 83 UTM ZONE 12, 380054 East 4429455 North

Transect Information	
Browse Tag # (0' Stake)	Not Available
Transect Bearing	194° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 1: No Rebar

Directions to Site

From Highway 36 south of Vernon, drive to mile marker 20. From there, drive 0.7 miles to a turnoff on the left (west). Turn left here and drive south for 5.0 miles passing several (4 or 5) cattle guards to a fork. Turn left and drive 0.7 miles to an intersection. Turn right (south), crossing a cattle guard, and drive 0.4 miles to a witness post on the right (west) side of the road. Walk 32 paces at 222 degrees magnetic from the witness post to the 0-foot stake; there is no browse tag.

Site Information	
Land Ownership	Private
Land Administrator	Private
Allotment	BENNION RANCH
Elevation	6,000ft (1,829m)
Aspect	East
Slope	1%
Sample Dates	06/21/2006, 08/10/2010, 08/14/2014, 08/07/2018, 08/01/2024

Table 19R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Bennion Ranch Lop and Scatter	3408	May 2016	1047
Chaining - Two-Way Ely	Bennion Ranch Sage-Grouse Demonstration Year 2	396	November-December 2006	192
Seeding - Aerial Before	Bennion Ranch Sage-Grouse Demonstration Year 2	396	December 2006	192
Seeding - Dribbler	Bennion Ranch Sage-Grouse Demonstration Year 2	396	December 2006	192

Table 19R-07.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Bennion Ranch P-J Chaining			Aerial	Dec 2006	180
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.50	0.43
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.11	0.92
G	Agropyron cristatum	Crested Wheatgrass	VNS	1.11	0.96
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.11	1.00
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.11	0.93
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.83	0.71
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.83	0.70
F	Medicago sativa	Alfalfa	Ladak	0.42	0.38
F	Medicago sativa	Alfalfa	Ranger	0.42	0.37
F	Medicago sativa	Alfalfa	Spreador 4	0.42	0.40
F	Melilotus officinalis	Yellow Sweetclover		0.17	0.14
F	Onobrychis viciifolia	Sainfoin	Eski	1.94	1.79
F	Sanguisorba minor	Small Burnet	Delar	1.94	1.81

Mix Name			Application Type	Application Date	Acres
Bennion Ranch Dribbler Mix			Dribbler	Dec 2006	320
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.31	0.12
S	Purshia tridentata	Bitterbrush	Millard UT	0.16	0.12

Wildlife Habitat and Vegetation History

Table 19R-07.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	spring/fall
Greater Sage-Grouse		undefined & undefined

Table 19R-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Mountain Big Sagebrush	Phase I
2010	Yellow Rabbitbrush/Perennial Grass	Phase I
2014	Yellow Rabbitbrush/Perennial Grass	Phase I
2018	Yellow Rabbitbrush/Perennial Grass	Phase I
2024	Yellow Rabbitbrush/Perennial Grass	Phase I

Site Notes

No Notes

Soils

Table 19R-07.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Silt Loam	7.5	28.2	56.0	15.8	1.7	10.3	316.8	0.6	06/21/2006

Site Potential	
1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2005 - Utah Juniper/Invasive Annuals State: Community Phase 3.1 2010-2024 - Yellow Rabbitbrush/Invasive Annuals State: Community Phase 4.1

Upon study establishment in 2006, the plant community on this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Sagebrush cover decreased substantially following a chaining and seeding treatment later that year (Table 19R-07.1), while that of yellow rabbitrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) increased; yellow rabbitbrush became a dominant site component in 2010 (Table 19R-07.12, Table 19R-07.13). The herbaceous understory has remained abundant and diverse. Perennial grasses such as crested wheatgrass (*Agropyron cristatum*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) have been a codominant vegetation component in all post-treatment sample years (Table 19R-07.7). Cheatgrass (*Bromus tectorum*), bulbous bluegrass (*Poa bulbosa*), and Utah juniper (*Juniperus osteosperma*) have been present throughout the study period. Although they have been observed in generally low amounts, presence of these species indicates that there may be possible threats to the ecological resilience of the plant community in the future (Table 19R-07.10, Table 19R-07.14).

Condition of this site as spring/fall range for mule deer has varied between poor and poor-fair, but has remained poor in most sample years including 2024. The primary factor that negatively influences this spring/fall range condition is the limited preferred browse component (Table 19R-07.15). Deer presence was low in 2006 and 2024, but deer pellet groups were not observed in hoop data in any other sample year (Table 19R-07.9). Forty eight percent of mountain big sagebrush plants sampled in density strips were moderately to heavily hedged in 2014, but a majority of plants have shown signs of little to no utilization in other years (Table 19R-07.13).

Trend Summary Tables

Table 19R-07.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	10.7	2.4	0.1	13.2	1.6	-
2010	0.6	6.1	-	1.9	7.1	-
2014	2.7	6.4	0.0	3.2	5.6	0.1
2018	3.1	5.5	-	4.0	6.3	-
2024	3.2	4.5	-	3.1	5.8	-

Table 19R-07.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	65	339	281	136	1.1	15.9	4.1	3.2
2010	89	343	250	137	3.3	20.8	5.7	4.6
2014	82	395	159	122	0.3	19.6	0.4	2.2
2018	46	385	279	167	0.3	18.9	1.6	3.3
2024	122	368	383	144	1.7	21.7	3.7	3.9

Table 19R-07.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	45.8	2.0	30.4	0.4	0.1	33.1
2010	35.0	0.2	39.4	1.0	0.6	39.8
2014	36.0	0.6	44.9	0.8	0.0	36.1
2018	41.0	0.3	50.6	1.1	0.1	36.2
2024	40.4	-	39.9	1.5	0.1	33.9

Table 19R-07.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2006	1	5	1	59
2010	3	-	-	12
2014	2	2	-	3
2018	4	2	-	10
2024	5	-	-	2
Year	Days Use Per Acre (ha)			
2006	5.1 (12.6)	2.7 (6.6)	2.0 (5.0)	-
2010	9.4 (23.3)	-	-	-
2014	4.4 (10.8)	-	-	-
2018	6.5 (16.1)	-	-	-
2024	7.2 (17.9)	0.7 (1.7)	-	-

Table 19R-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)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa[i] (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency										
2006	24	-	65	18	-	229	45	212	-	44	6
2010	28	42	89	6	3	177	59	68	3	34	57
2014	31	114	82	10	2	129	99	160	2	85	32
2018	39	95	46	5	6	119	105	151	10	78	71
2024	29	153	122	2	-	97	188	11	14	89	23
year	Average Cover (%)										
2006	1.5	-	1.1	0.6	-	4.6	0.8	6.7	-	1.7	0.0
2010	1.6	2.0	3.3	0.3	0.1	10.8	0.7	1.3	0.1	1.8	2.0
2014	1.5	3.9	0.3	0.3	0.1	3.0	1.8	2.4	0.2	4.6	1.6
2018	1.5	3.8	0.3	0.2	0.2	3.4	1.7	2.9	0.2	3.9	1.3
2024	1.0	7.2	1.7	0.0	-	3.4	4.0	0.2	0.5	4.7	0.7

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

Table 19R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum[ai] (desert madwort)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa[ai] (littlepod false flax)	Ceratocephala testiculata[ai] (curveseed butterwort)	Cirsium (thistle)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Cymopterus (springparsley)	Descurainia pinnata[a] (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Ipomopsis congesta (ballhead ipomopsis)	Lactuca serriola[ai] (prickly lettuce)	Lepidium[a] (pepperweed)
year	Nested Frequency																
2006	-	7	112	-	19	-	-	262	-	19	8	3	-	-	4	-	-
2010	5	9	225	-	21	1	-	85	-	23	5	11	-	-	4	11	1
2014	1	-	159	-	5	-	-	-	4	28	0	3	-	-	5	-	-
2018	2	-	262	4	8	2	2	92	-	44	12	3	-	-	-	-	2
2024	-	-	339	-	19	-	-	293	3	56	27	4	6	1	-	-	-
year	Average Cover (%)																
2006	-	0.0	0.3	-	0.2	-	-	3.9	-	0.2	0.0	0.0	-	-	0.0	-	-
2010	0.0	0.1	4.2	-	0.6	0.0	-	1.3	-	0.4	0.1	0.2	-	-	0.1	0.1	0.0
2014	0.0	-	0.4	-	0.1	-	-	-	0.0	0.2	0.0	0.0	-	-	0.0	-	-
2018	0.0	-	1.1	0.0	0.0	0.0	0.0	0.5	-	0.8	0.3	0.0	-	-	-	-	0.0
2024	-	-	1.4	-	0.4	-	-	2.2	0.2	1.9	0.5	0.1	0.0	0.0	-	-	-

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

FORB SPECIES	Machaeranthera canescens (hoary tansyaster)	Melilotus officinalis[i] (sweetclover)	Microsteris gracilis[a] (slender phlox)	Onobrychis viciifolia[i] (sainfoin)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Salsola tragus[ai] (prickly Russian thistle)	Senecio integerrimus[a] (lambstongue ragwort)	Tragopogon dubius[ai] (yellow salsify)	Vicia americana (American vetch)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency										
2006	1	-	-	-	80	7	-	-	-	23	2
2010	-	-	5	5	85	3	-	5	0	6	0
2014	2	1	-	3	93	-	-	-	-	1	-
2018	-	-	-	-	88	1	-	-	-	33	4
2024	-	-	-	-	28	28	12	-	8	12	-
year	Average Cover (%)										
2006	0.0	-	-	-	2.5	0.0	-	-	-	0.2	0.1
2010	-	-	0.0	0.1	2.8	0.0	-	0.0	0.0	0.1	0.0
2014	0.0	0.0	-	0.0	1.8	-	-	-	-	0.0	-
2018	-	-	-	-	1.9	0.0	-	-	-	0.2	0.1
2024	-	-	-	-	0.6	0.2	0.1	-	0.1	0.1	-

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

Table 19R-07.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. speciosa[p] (rubber rabbitbrush)	Juniperus osteosperma[t] (Utah juniper)
year	Line Intercept Cover (%)				
2006	13	0.1	1.5	0.2	-
2010	1.3	0.2	6.9	0.6	-
2014	2.8	-	5.6	0.4	0.1
2018	3.4	0.2	6.1	0.6	-
2024	2.4	-	5.8	0.7	-
year	Quadrat Cover (%)				
2006	10.7	0.1	2.2	0.0	0.1
2010	0.6	0.0	6.1	0.0	-
2014	2.6	0.4	6.0	0.1	0.0
2018	2.7	0.6	4.9	0.4	-
2024	3.0	0.3	4.2	0.1	-

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

Table 19R-07.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2006	2140	320	1	47	52	8	0	57	63/81
2010	780	-	31	41	28	3	0	26	52/62
2014	740	-	5	87	8	32	14	14	43/59
2018	640	-	0	94	6	3	0	16	63/79
2024	1280	7660	55	44	2	2	0	2	- / -
Bassia prostrata[pi] -- (forage kochia)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	20	-	0	100	0	100	0	0	24/14
2018	-	-	-	-	-	-	-	-	9/18
2024	20	-	0	100	0	0	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2006	40	-	0	100	0	0	0	0	32/81
2010	120	-	0	100	0	0	0	0	33/55
2014	80	-	0	100	0	0	0	0	18/29
2018	40	-	100	0	0	0	0	0	29/60
2024	140	80	14	86	0	0	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	3100	20	15	85	0	0	3	0	24/31
2010	2260	-	3	97	0	0	0	11	34/56
2014	3100	40	1	94	5	5	1	21	27/50
2018	2660	-	5	73	22	1	0	52	32/54
2024	2800	500	16	79	5	0	10	6	- / -
Ericameria nauseosa ssp. nauseosa var. speciosa[p] -- (rubber rabbitbrush)									
2006	20	-	0	100	0	0	0	0	49/48
2010	20	-	0	100	0	0	0	0	61/85
2014	20	-	0	100	0	0	0	0	56/89
2018	20	-	0	100	0	0	0	0	48/86
2024	20	-	0	0	100	100	0	100	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	18/23
2024	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma[t] -- (Utah juniper)									
2006	20	-	100	0	0	0	0	0	- / -
2010	-	-	-	-	-	-	-	-	-/-
2014	-	20	0	0	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	0	- / -
2024	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	14/28
2024	120	-	0	100	0	0	0	0	- / -

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

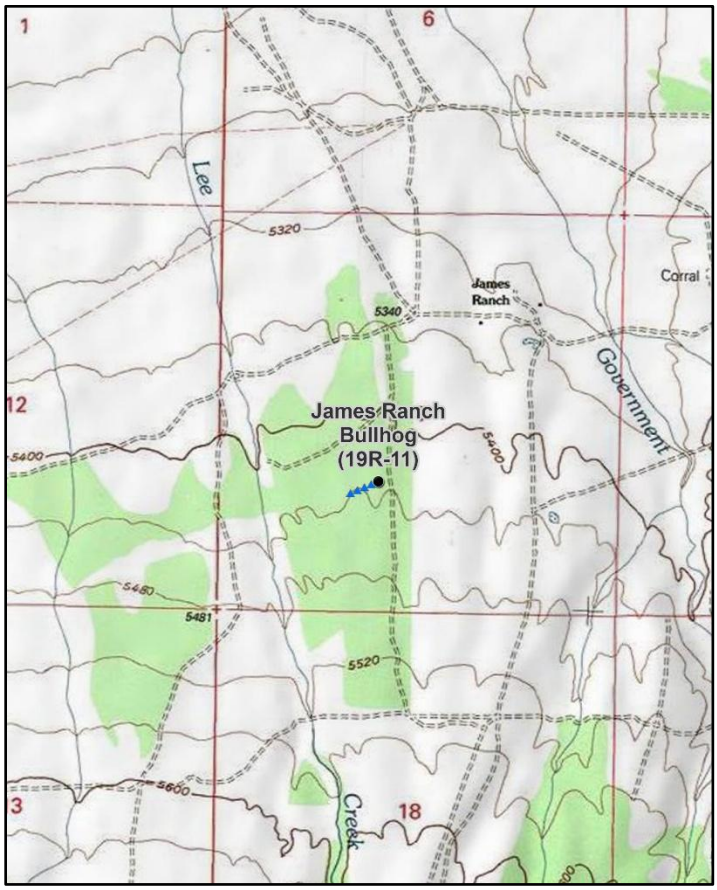
Table 19R-07.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

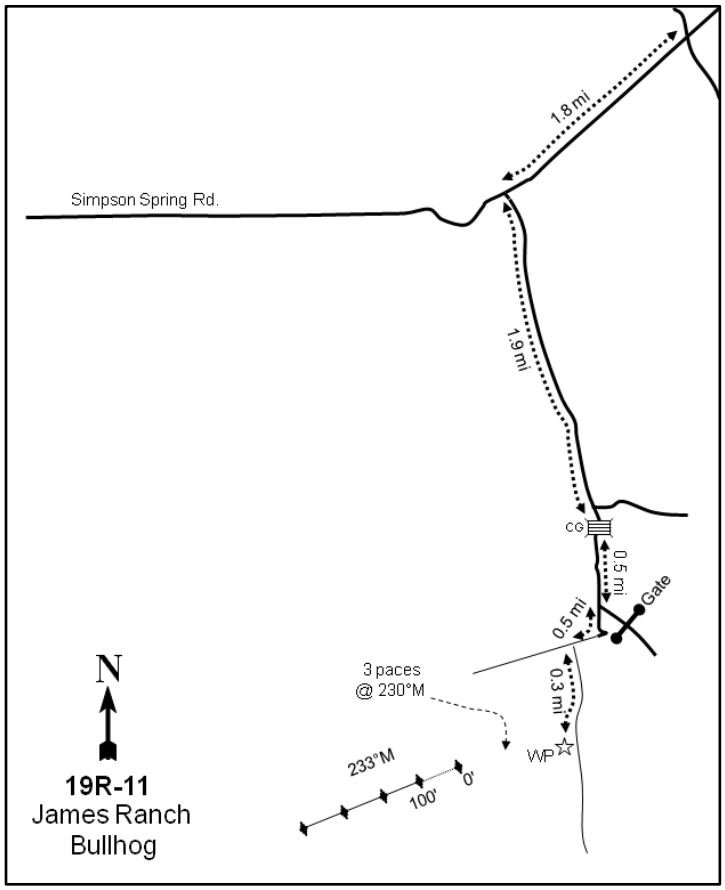
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2006	71	-	55	30	15	-	6.3
2010	36	10	90	-	-	-	3.3
2014	25	-	83	17	-	-	6.6
2018	16	33	67	-	-	-	1.7
2024	11	-	-	100	-	-	4.0

Table 19R-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
2006	16.5	-0.5	0.4	30.0	-0.9	6.3	0.0	**51.8**	Poor-Fair
2010	2.4	0.0	0.0	30.0	-2.5	9.2	0.0	**39.1**	Poor
2014	4.0	0.0	0.0	30.0	-0.2	4.4	0.0	**38.2**	Poor
2018	5.0	0.0	0.0	30.0	-0.2	6.6	0.0	**41.4**	Poor
2024	3.9	0.0	0.0	30.0	-1.3	7.9	0.0	**40.5**	Poor

JAMES RANCH BULLHOG - STUDY NO. 19R-11





Location Information

USGS 7.5 min Map Info	Indian Peaks SE; Township 9S, Range 7W, Section 07
GPS (0' Stake)	NAD 83 UTM ZONE 12, 356907 East 4434229 North

Transect Information

Browse Tag # (0' Stake)	230
Transect Bearing	233° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

Directions to Site

From the intersection of Erickson Pass and Simpson Springs Road, proceed west on Simpson Springs Road for 1.8 miles to a road on the left. Turn left and follow this road for 1.8 miles to a fork, keeping right. Continue 0.1 miles to a cattle guard, and then drive 0.5 miles to a fork and go right (the left fork leads to a gate). From here, proceed for 0.5 miles and stay left at the fork. Drive 0.3 miles to the witness post on the right (west) side of the road. The 0-foot stake is 30 paces away from the witness post at 230 degrees magnetic and is marked with browse tag #230.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	GOVERNMENT CREEK
Elevation	5,460ft (1,664m)
Aspect	Northeast
Slope	3-5%
Sample Dates	07/02/2008, 08/29/2011, 07/29/2015, 08/09/2018, 07/29/2024

Table 19R-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	James Ranch Juniper Bullhog	1131	February-March 2009	473

Wildlife Habitat and Vegetation History

Table 19R-11.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Greater Sage-Grouse		
Pronghorn	crucial	year-long

Table 19R-11.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Juniper	Phase II
2011	Perennial Grass/Mountain Big Sagebrush	Phase I
2015	Perennial Grass/Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I
2024	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2008 - Utah Juniper State: Community Phase 3.1 2011-2015 - Current Potential State: Community Phase 2.3 2018-2024 - Current Potential State: Community Phase 2.1

This site was established in 2008 and was in Phase II of woodland succession with a plant community mainly comprised of Utah juniper (*Juniperus osteosperma*) (Table 19R-11.6); shrub species such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) were also present to a lesser extent. Cover of sagebrush increased each sample year following the mastication treatment (Table 19R-11.1), and it has been a codominant vegetation component since 2011 (Table 19R-11.4, Table 19R-11.12). Perennial grasses also increased in cover overall despite yearly fluctuations, and they have been considered to be a codominant site component in all post-treatment sample years. The introduced annual grass species cheatgrass (*Bromus tectorum*) has also exhibited fluctuations in cover; cheatgrass could pose a threat to the ecological resilience of the plant community if future increases occur (Table 19R-11.7, Table 19R-11.10). In addition, point-quarter data shows an overall increase in juniper density between 2015 and 2024, indicating that the site could be prone to infilling over time (Table 19R-11.14).

The abundant grass and shrub components on this site could provide forage for pronghorn, and pronghorn presence has occurred throughout the year in the larger vicinity (Wildlife Tracker, Table 19R-11.10, Table 19R-11.12). Pellet transect data indicates that mule deer and/or pronghorn presence on this site in particular has remained low throughout the study period (Table 19R-11.9). Sagebrush has been utilized in some sample years; in 2024, 37% of sagebrush plants sampled in density strips were moderately browsed, and 3% were heavily hedged (Table 19R-11.13). However, on-site observations for 2024 note little to no utilization of the herbaceous understory.

Trend Summary Tables

Table 19R-11.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	3.4	0.0	11.5	4.4	0.2	24.1
2011	3.5	0.1	-	5.9	1.1	-
2015	6.1	2.2	-	9.0	2.7	-
2018	7.9	2.1	-	12.4	3.1	-
2024	12.0	3.3	-	19.1	6.4	-

Table 19R-11.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	58	279	221	24	0.3	8.5	0.6	0.3
2011	143	279	244	20	1.7	15.5	4.5	0.4
2015	255	269	187	26	7.3	11.1	1.1	0.4
2018	116	254	159	47	3.4	7.9	0.7	1.3
2024	84	252	311	34	1.8	11.1	3.0	1.2

Table 19R-11.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	30.9	6.3	44.5	12.6	1.1	24.3
2011	27.1	1.9	43.4	3.8	0.3	25.7
2015	29.9	1.1	49.3	4.1	1.3	27.5
2018	28.8	0.6	57.2	4.4	1.9	24.6
2024	24.7	2.5	49.0	5.6	1.0	30.1

Table 19R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Rabbit
	Quadrat Frequency		
2008	4	2	86
2011	2	1	13
2015	2	1	18
2018	1	1	19
2024	-	4	3
Year	Days Use Per Acre (ha)		
2008	4.4 (10.8)	7.4 (18.2)	-
2011	8.7 (21.5)	2.0 (5.0)	-
2015	3.6 (9.0)	1.3 (3.3)	-
2018	8.7 (21.5)	1.3 (3.3)	-
2024	2.9 (7.2)	4.0 (9.9)	-

Table 19R-11.10 - 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)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency					
2008	11	-	58	68	248	18
2011	4	-	143	106	227	28
2015	3	-	255	184	103	35
2018	9	-	116	171	115	16
2024	16	5	84	122	161	14
year	Average Cover (%)					
2008	0.4	-	0.3	2.1	5.3	0.6
2011	0.1	-	1.7	3.8	11.1	0.5
2015	0.0	-	7.3	6.8	3.0	1.2
2018	0.4	-	3.4	5.0	1.5	1.0
2024	1.0	0.0	1.8	6.9	1.9	1.2

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

Table 19R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Antennaria (pussytoes)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Comandra umbellata (bastard toadflax)	Descurainia pinnata[a] (western tansymustard)	Erigeron (fleabane)	Eriogonum ovalifolium (cushion buckwheat)	Gilia inconspicua[a] (shy gilia)	Lactuca serriola[ai] (prickly lettuce)	Petradoria pumila (rock goldenrod)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency																
2008	33	6	1	3	206	-	-	-	1	-	3	4	-	1	7	3	4
2011	106	4	1	6	210	-	1	-	1	0	2	-	7	3	8	-	-
2015	187	16	-	1	-	3	-	6	-	-	-	-	-	4	5	-	-
2018	154	2	5	4	28	6	-	9	-	-	10	-	-	9	18	-	-
2024	267	-	-	3	193	-	-	11	-	-	9	-	-	7	16	4	-
year	Average Cover (%)																
2008	0.1	0.0	0.0	0.0	0.4	-	-	-	0.0	-	0.0	0.0	-	0.2	0.1	0.0	0.0
2011	0.5	0.0	0.0	0.0	4.0	-	0.1	-	0.0	0.0	0.0	-	0.1	0.1	0.1	-	-
2015	1.1	0.2	-	0.0	-	0.0	-	0.0	-	-	-	-	-	0.1	0.1	-	-
2018	0.5	0.0	0.1	0.0	0.1	0.0	-	0.2	-	-	0.0	-	-	0.4	0.6	-	-
2024	1.9	-	-	0.0	1.1	-	-	0.2	-	-	0.1	-	-	0.3	0.5	0.0	-

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

Table 19R-11.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Linanthus pungens (granite prickly phlox)
year	Line Intercept Cover (%)					
2008	4.4	0.2	-	-	24.1	-
2011	5.9	1.1	-	-	-	-
2015	9	2.7	-	-	-	-
2018	12.4	2	-	1.1	-	-
2024	19.1	5.8	0.6	-	-	-
year	Quadrat Cover (%)					
2008	3.4	0.0	-	-	11.5	-
2011	3.5	0.1	-	-	-	-
2015	6.1	2.2	-	-	-	-
2018	7.9	1.6	-	0.5	-	0.0
2024	12.0	2.8	0.5	-	-	-

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

Table 19R-11.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2008	860	60	7	19	74	16	23	63	54/72
2011	1720	1260	45	36	19	4	0	17	55/75
2015	5620	460	66	31	3	61	10	8	48/71
2018	4640	1280	40	55	5	0	0	4	49/60
2024	4360	-	4	93	4	37	3	3	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	140	-	0	57	43	0	29	14	19/17
2011	640	560	38	63	0	0	0	0	30/41
2015	3400	140	58	28	14	0	0	81	29/44
2018	3600	40	62	37	1	0	0	1	26/36
2024	4120	-	12	87	1	0	0	73	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	100	0	0	100	0	0	57/70
2018	20	-	0	100	0	0	0	0	53/69
2024	60	-	33	67	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	60	-	0	100	0	0	0	0	14/47
2018	620	-	0	100	0	0	0	0	26/35
2024	-	-	-	-	-	-	-	-	-/-

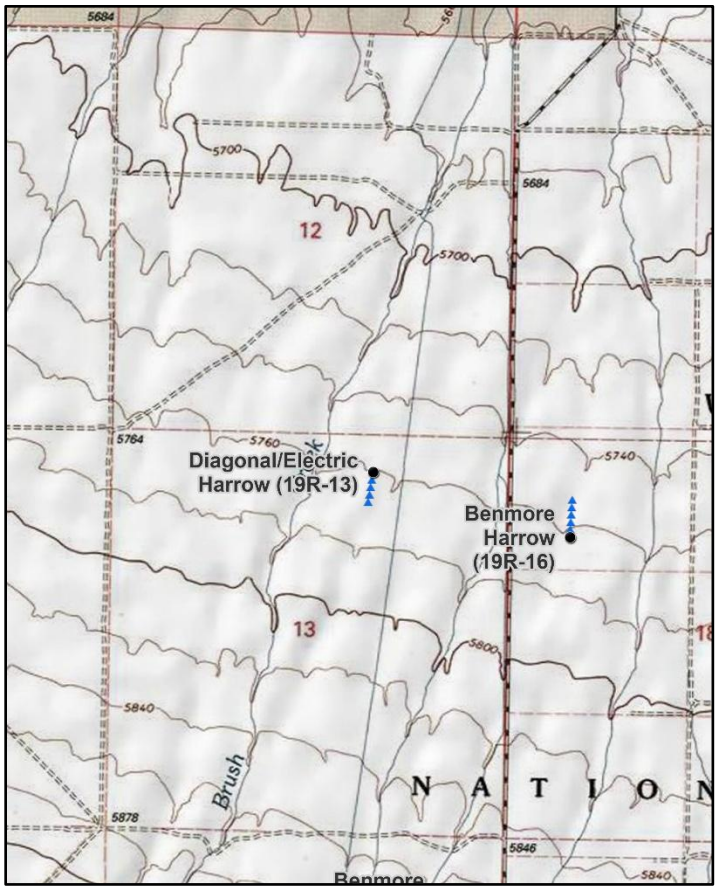
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Juniperus osteosperma[t] -- (Utah juniper)									
2008	120	-	0	50	50	0	0	17	- / -
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2024	20	-	100	0	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2008	-	-	-	-	-	-	-	-	26/29
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	27/32
2018	-	-	-	-	-	-	-	-	15/16
2024	20	-	0	100	0	0	0	0	- / -

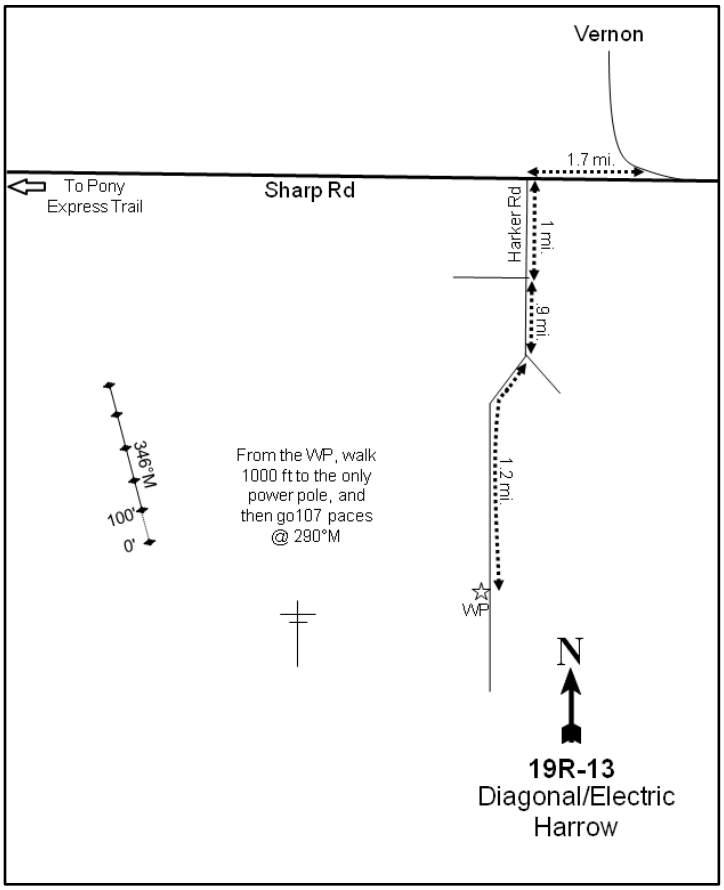
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 19R-11.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	110	-	16	11	47	26	27.6
2011	29	27	73	-	-	-	3.0
2015	39	46	54	-	-	-	2.1
2018	71	25	58	17	-	-	5.4
2024	54	23	69	8	-	-	3.2

DIAGONAL/ELECTRIC HARROW - STUDY NO. 19R-13





Location Information

USGS 7.5 min Map Info	Vernon SW; Township 9S, Range 6W, Section 13
GPS (0' Stake)	NAD 83 UTM ZONE 12, 374946 East 4433229 North

Transect Information

Browse Tag # (0' Stake)	655
Transect Bearing	175° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

Directions to Site

From Vernon, drive 1.7 miles on Sharp Road (leads to the Pony Express Trail). Turn left onto Harker Road and drive 1.0 miles to a fork. Stay left and drive 0.9 miles to another fork. Keep to the right and drive 1.2 miles to the witness post on the right (west) side of the road. From the witness post, walk 1,000 feet to the only powerpole, then go 107 paces at 290 degrees magnetic to the 0-foot stake; there is no browse tag.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	VERNON
Elevation	5,697ft (1,736m)
Aspect	North
Slope	1-3%
Sample Dates	08/05/2008, 07/20/2009, 08/09/2010, 08/12/2014, 08/06/2018, 08/01/2024

Table 19R-13.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	Diagonal-Electric Sagebrush Improvement	659	November 2008-March 2009	993
Seeding - Broadcast Before	Diagonal-Electric Sagebrush Improvement	659	November 2008-March 2009	993

Table 19R-13.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Diagonal-Electric Sagebrush Improvement			Broadcast	Nov 2008	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.50	1.38
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.64	0.49
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.35	0.32
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.08	0.07
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.90	0.77
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.00	1.74
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.30	0.93
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.70	0.57
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Cleome serrulata	Rocky Mountain Beeplant	Sevier UT	0.25	0.23
F	Linum perenne	Blue Flax	Appar	0.50	0.45
F	Medicago sativa	Alfalfa	Ladak	1.50	1.36
F	Onobrychis viciifolia	Sainfoin	Eski	3.00	2.63
F	Sanguisorba minor	Small Burnet	Delar	0.90	0.88
F	Sanguisorba minor	Small Burnet	Delar	0.65	0.54
F	Sanguisorba minor	Small Burnet	Delar	0.45	0.40

Wildlife Habitat and Vegetation History

Table 19R-13.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Greater Sage-Grouse		undefined & undefined
Pronghorn	crucial	year-long

Table 19R-13.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Mountain Big Sagebrush	No Encroachment
2009	Perennial Grass	No Encroachment
2010	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2014	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2018	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2024	Mountain Big Sagebrush/Perennial Grass	No Encroachment

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2011 - Current Potential State: Community Phase 2.1 2009-2018 - Seeded State: Community Phase 5.1 2024 - Current Potential State: Community Phase 2.1

When established in 2008, this study site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Cover of sagebrush exhibited an initial decrease following the harrow and seeding treatment, but increased in each subsequent sample year; sagebrush has been a codominant vegetation component since 2010 (Table 19R-13.1, Table 19R-13.12, Table 19R-13.13). The herbaceous understory has generally remained abundant, but not very diverse. Perennial grasses, particularly the introduced species crested wheatgrass (*Agropyron cristatum*), decreased in the first sample year following treatment, but have been a codominant vegetation component in all post-treatment sample years. Forbs have fluctuated, but have generally remained rare (Table 19R-13.7, Table 19R-13.10, Table 19R-13.11).

Mule deer and/or pronghorn presence has remained low throughout the study period. However, sagebrush has been utilized in some years; in 2024, 21% of sagebrush plants sampled in density strips were heavily hedged and 2% were moderately browsed. Greater sage-grouse presence on the site itself has remained low or pellet groups have not been observed in most sample years, but grouse have also been present in the larger area (Wildlife Tracker, Table 19R-13.9, Table 19R-13.13).

Trend Summary Tables

Table 19R-13.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	8.3	0.2	-	12.8	-	-
2009	3.3	0.1	-	3.4	-	-
2010	4.5	0.1	-	6.1	-	-
2014	5.4	0.5	-	6.9	-	-
2018	8.6	0.1	-	9.4	0.2	-
2024	11.0	0.0	-	14.4	-	-

Table 19R-13.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	-	347	266	48	-	16.5	1.4	0.4
2009	3	246	318	52	0.0	6.2	4.2	0.4
2010	-	282	358	53	-	13.0	8.2	1.5
2014	-	334	37	39	-	19.5	0.1	0.8
2018	1	330	138	36	0.0	17.6	1.7	1.2
2024	-	310	334	55	-	19.3	2.4	1.4

Table 19R-13.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	40.4	11.8	31.1	3.2	0.0	27.8
2009	67.5	0.5	22.9	4.3	0.3	14.1
2010	53.6	0.2	22.9	4.7	0.2	25.8
2014	50.1	0.4	39.3	1.9	0.2	28.3
2018	48.2	1.4	41.1	3.6	0.4	29.4
2024	47.2	1.7	31.7	2.9	0.3	31.6

Table 19R-13.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2008	7	-	1	-	97
2009	2	-	6	-	49
2010	-	-	-	-	29
2014	-	-	-	-	1
2018	3	-	1	2	16
2024	1	-	1	-	2
Year	Days Use Per Acre (ha)				
2008	9.4 (23.3)	-	-	-	-
2009	-	-	-	-	-
2010	-	8.7 (21.5)*	2.0 (5.0)	26.2 (64.6)*	-
2014	-	-	-	-	-
2018	10.2 (25.1)	-	-	-	-
2024	4.4 (10.8)	-	5.3 (13.2)	-	-

*Pellets per acre (ha)

Table 19R-13.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Leymus cinereus (basin wildrye)	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	-	230	-	-	-	-	268	-	3
2009	-	216	3	-	-	-	94	-	9
2010	3	229	-	-	19	-	128	-	1
2014	-	290	-	3	1	-	155	10	10
2018	-	276	1	-	4	3	184	2	7
2024	0	294	-	-	-	73	21	8	8
year	Average Cover (%)								
2008	-	8.6	-	-	-	-	7.7	-	0.1
2009	-	5.0	0.0	-	-	-	1.2	-	0.0
2010	0.0	10.7	-	-	0.2	-	2.1	-	0.0
2014	-	16.4	-	0.0	0.0	-	2.7	0.3	0.1
2018	-	15.0	0.0	-	0.0	0.0	2.5	0.0	0.1
2024	0.0	17.8	-	-	-	0.6	0.1	0.6	0.1

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

Table 19R-13.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Astragalus (milkvetch)	Ceratocephala testiculata[ai] (curveseed butterwort)	Cleome serrulata[a] (Rocky Mountain beeplant)	Linum lewisii (Lewis flax)	Medicago sativa[i] (alfalfa)	Onobrychis viciifolia[i] (sainfoin)	Packera multilobata (lobeleaf groundsel)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	unknown annual forb[a] (unknown forb)
year	Nested Frequency												
2008	14	1	264	-	-	-	-	1	44	2	-	-	-
2009	-	4	314	-	2	3	10	2	30	1	4	4	5
2010	10	3	358	7	9	-	4	-	37	-	-	1	-
2014	35	-	2	-	2	-	-	-	37	-	-	-	-
2018	14	-	126	-	-	-	-	-	36	-	-	-	-
2024	14	-	334	-	-	-	-	-	48	7	-	-	-
year	Average Cover (%)												
2008	0.0	0.0	1.4	-	-	-	-	0.0	0.3	0.0	-	-	-
2009	-	0.0	4.2	-	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
2010	0.0	0.0	8.2	0.0	0.0	-	0.0	-	1.4	-	-	0.0	-
2014	0.1	-	0.0	-	0.0	-	-	-	0.8	-	-	-	-
2018	0.0	-	1.7	-	-	-	-	-	1.2	-	-	-	-
2024	0.0	-	2.4	-	-	-	-	-	1.3	0.1	-	-	-

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

Table 19R-13.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover (%)			
2008	12.8	-	-	-
2009	3.4	0	-	-
2010	6.1	-	-	-
2014	6.9	-	-	-
2018	9.4	0.2	0	-
2024	14.4	-	-	-
year	Quadrat Cover (%)			
2008	8.3	0.2	-	-
2009	3.3	0.1	-	-
2010	4.5	0.1	-	-
2014	5.4	0.5	-	-
2018	8.6	0.1	0.0	-
2024	11.0	-	-	0.0

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

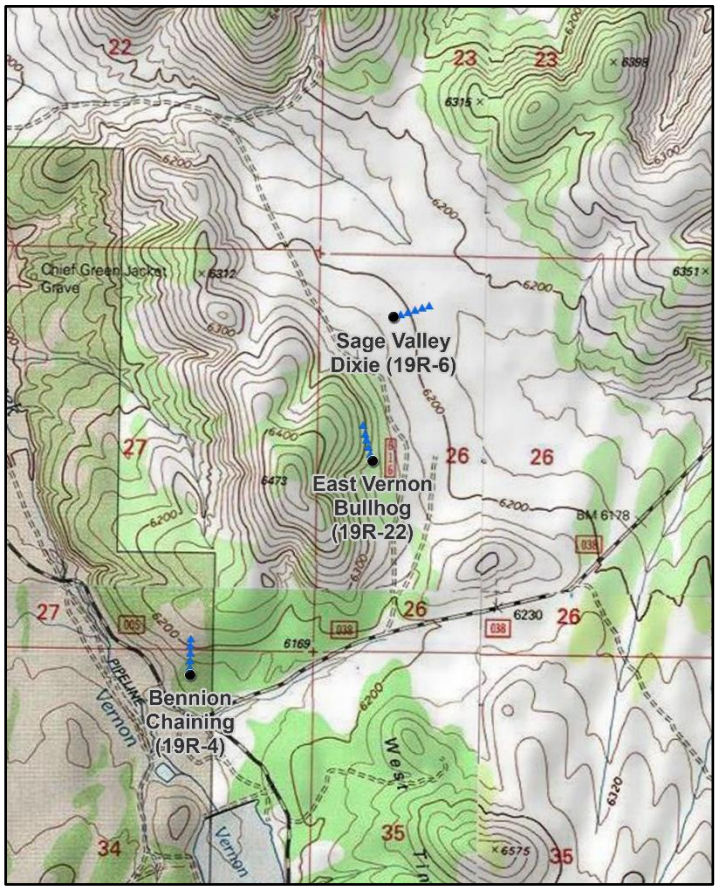
Table 19R-13.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

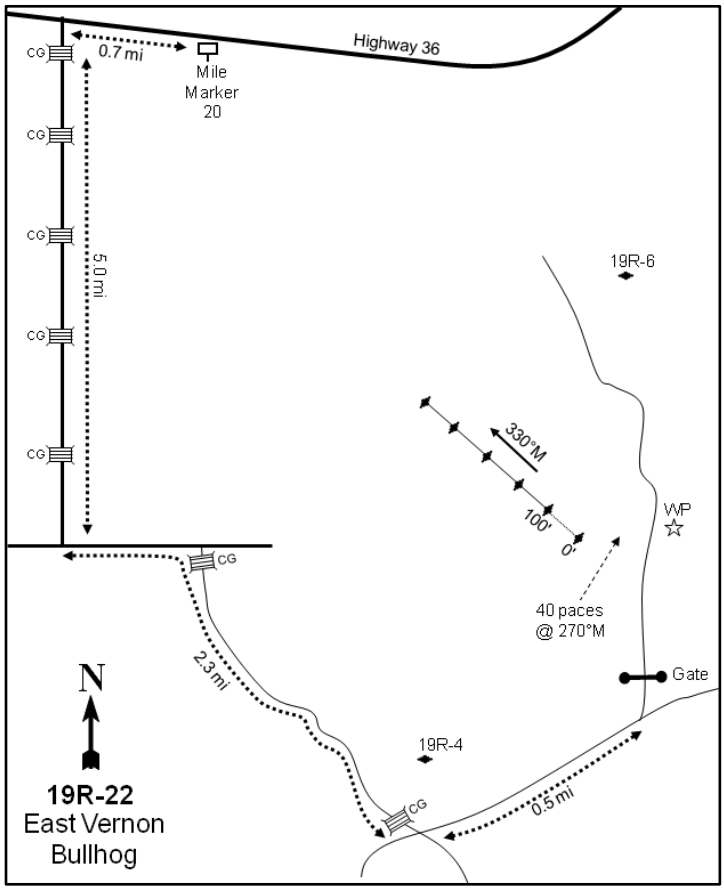
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2008	3020	80	9	37	54	30	3	33	60/80
2009	-	-	-	-	-	-	-	-	34/47
2010	3240	2200	58	35	7	5	0	6	48/63
2014	4340	160	36	58	6	38	8	7	37/55
2018	4980	-	16	76	8	12	0	6	38/49
2024	3980	-	3	85	12	2	21	11	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	80	-	0	100	0	0	0	0	17/21
2009	-	-	-	-	-	-	-	-	24/25
2010	120	-	33	67	0	0	0	0	21/22
2014	80	-	0	100	0	0	0	0	30/39
2018	160	-	0	100	0	0	0	13	19/27
2024	20	-	0	100	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	43/43
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	80	-	25	75	0	0	0	0	35/32
2018	40	-	50	50	0	0	0	0	49/58
2024	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 (%)		
Gutierrezia sarothrae -- (broom snakeweed)									
2008	40	-	0	100	0	0	0	0	22/21
2009	-	-	-	-	-	-	-	-	30/32
2010	-	-	-	-	-	-	-	-	-/-
2014	80	-	0	50	50	25	0	75	23/27
2018	40	-	0	100	0	0	0	0	21/25
2024	120	-	0	100	0	0	0	0	- / -

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

EAST VERNON BULLHOG - STUDY NO. 19R-22





Location Information

USGS 7.5 min Map Info	Vernon SE; Township 9S, Range 5W, Section 26
GPS (0' Stake)	NAD 83 UTM ZONE 12, 382131 East 4429191 North

Transect Information

Browse Tag # (0' Stake)	114
Transect Bearing	330° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (61ft)
Belt Marker Placement	No Rebar

Directions to Site

Traveling on SR-36 south of Vernon, drive to mile marker 20. From there, drive 0.7 miles to a turnoff on the left (west). Turn left and drive south for 5.0 miles, passing several (4 or 5) cattle guards, to a fork. Bear left and drive 0.7 miles to an intersection. Turn right (south), crossing a cattle guard, and drive 1.6 miles to another cattle guard. Directly after the cattle guard, turn left (east) and drive 0.5 miles to a road and gate on the left. Turn left, go through the gate, and proceed 0.45 miles to a witness post on the right (east) side of the road. Walk approximately 40 paces at 270 degrees magnetic to the 0-foot stake that is marked with browse tag #114.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	BENNION
Elevation	6,300ft (1,920m)
Aspect	Northeast
Slope	13%
Sample Dates	06/21/2012, 07/27/2015, 08/06/2018, 07/03/2024

Table 19R-22.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Vernon Ecosystem Phase 4	4900	May-August 2019	7939
Mechanical - Bullhog	East Vernon Habitat Restoration	2292	September 2012-January 2013	413

Wildlife Habitat and Vegetation History

Table 19R-22.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	spring/fall
Greater Sage-Grouse		undefined & undefined

Table 19R-22.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Juniper	Phase II transitioning to Phase III
2015	Annual-Perennial Grass	Phase I
2018	Annual-Perennial Grass	Phase I
2024	Annual-Perennial Grass	Phase I

Site Notes

The transect was shortened to 400 feet in 2015 and belt 4 was moved to the 61ft mark in order to keep the study within the treatment area. In 2018, point-quarter data for the fifth stake was collected in an untreated pinyon-juniper woodland.

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Gravelly Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY306UT
States and Transitions	2012 - Utah Juniper/Invasive Annuals State: Community Phase 3.1 2015-2024 - Utah Juniper/Invasive Annuals State: Community Phase 3.2

This site was established in 2012 and was in Phase II transitioning to Phase III of woodland succession with mainly Utah juniper (*Juniperus osteosperma*) in the overstory and a small component of singleleaf pinyon (*Pinus monophylla*). Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was also present, but with low cover. A bullhog treatment later in 2012 removed many of the trees (Table 19R-22.1), making sagebrush the dominant shrub species. Cover of sagebrush remains low as of 2024, but it has increased each sample year following treatment. Furthermore, sagebrush density increased significantly between 2018 and 2024 (Table 19R-22.4, Table 19R-22.12, Table 19R-22.13). The herbaceous understory was abundant and diverse prior to treatment, with the perennial grass species Sandberg bluegrass (*Poa secunda*) providing a vast majority of the cover. The introduced annual grass species cheatgrass (*Bromus tectorum*) increased in cover following treatment, and it has been codominant with the perennial grass species bluebunch wheatgrass (*Pseudoroegneria spicata*) since 2015 (Table 19R-22.7, Table 19R-22.10). Pinyon and juniper trees had continued presence on site following the bullhog, but a lop and scatter project in 2019 further reduced tree density (Photos, Table 19R-22.1, Table 19R-22.14).

Mule deer transitional range condition on this site has ranged from very poor to poor-fair; condition is considered to be poor-fair as of 2024. Current transitional range condition is primarily limited by reduced preferred browse cover, limited perennial forb cover, the presence of annual grasses, and reduced perennial grass cover (Table 19R-22.15). According to pellet transect data, deer presence has increased over time, but has remained low throughout the study period. Utilization of mountain big sagebrush was highest in 2015 and has since decreased: 98% of sagebrush plants sampled in density strips in 2024 showed signs of little to no utilization. However, sagebrush density increased significantly between 2018 and 2024 (Table 19R-22.9, Table 19R-22.13): the dispersal of browsing over more sagebrush plants may have contributed to the overall decreased levels of utilization.

Trend Summary Tables

Table 19R-22.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	0.9	0.1	23.8	0.6	-	42.7
2015	1.6	0.3	0.8	2.1	0.2	3.7
2018	2.3	0.2	1.4	3.3	0.5	4.5
2024	4.2	0.6	1.4	6.0	1.1	3.2

Table 19R-22.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	30	338	236	69	0.4	16.4	2.2	1.1
2015	292	214	188	10	13.5	9.2	2.9	0.0
2018	334	197	245	10	9.4	9.7	2.2	0.6
2024	305	168	301	55	5.8	7.3	4.6	1.0

Table 19R-22.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	8.3	2.2	45.5	19.0	9.2	38.6
2015	8.4	0.2	66.0	7.7	4.9	28.7
2018	6.2	1.0	72.4	5.4	4.6	31.4
2024	14.7	-	59.6	10.2	4.6	24.9

Table 19R-22.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2012	-	-	-	9
2015	-	6	-	2
2018	-	4	-	1
2024	-	6	-	5
Year	Days Use Per Acre (ha)			
2012	-	2.7 (6.6)	0.7 (1.7)	-
2015	2.9 (7.2)	-	-	-
2018	2.9 (7.2)	7.4 (18.2)	-	-
2024	-	12.8 (31.5)	-	-

Table 19R-22.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa[i] (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency						
2012	-	30	18	-	-	315	58
2015	0	292	50	3	-	101	117
2018	-	334	49	-	-	81	105
2024	-	305	59	3	13	51	74
year	Average Cover (%)						
2012	-	0.4	0.3	-	-	14.6	1.6
2015	0.0	13.5	0.9	0.1	-	2.2	5.9
2018	-	9.4	1.1	-	-	1.0	7.6
2024	-	5.8	1.8	0.0	0.3	0.8	4.4

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

Table 19R-22.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii[a] (Fremont's goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Epilobium brachycarpum[a] (tall annual willowherb)	Erigeron eatonii (Eaton's fleabane)	Erodium cicutarium[ai] (redstem stork's bill)	Lactuca serriola[ai] (prickly lettuce)	Microsteris gracilis[a] (slender phlox)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2012	216	3	1	43	14	-	-	4	3	-	3	-	-	1	3	12	14
2015	184	-	-	-	-	1	1	-	-	2	-	-	-	5	-	-	7
2018	241	-	-	-	-	-	-	-	-	6	-	-	-	7	-	4	-
2024	273	-	-	19	28	9	1	-	17	-	-	2	8	80	-	6	9
year	Average Cover (%)																
2012	1.8	0.1	0.0	0.5	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	0.5	0.0
2015	2.9	-	-	-	-	0.0	0.0	-	-	0.0	-	-	-	0.0	-	-	0.0
2018	2.2	-	-	-	-	-	-	-	-	0.6	-	-	-	0.0	-	0.0	-
2024	2.8	-	-	0.5	0.1	0.1	0.1	-	0.2	-	-	0.1	0.1	1.2	-	0.1	0.1

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

FORB SPECIES	Physaria (twinpod)	Silene antirrhina[a] (sleepy silene)	Sisymbrium altissimum[ai] (tall tumblemustard)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency			
2012	3	2	20	-
2015	-	2	-	-
2018	-	2	-	9
2024	-	-	-	13
year	Average Cover (%)			
2012	0.0	0.0	0.4	-
2015	-	0.0	-	-
2018	-	0.0	-	0.0
2024	-	-	-	0.2

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

Table 19R-22.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus monophylla[t] (singleleaf pinyon)
year	Line Intercept Cover (%)						
2012	-	0.6	-	-	42.6	-	0.1
2015	0.5	1.6	-	-	3.7	0.2	-
2018	0.4	2.9	-	-	4.5	0.5	-
2024	0.6	5.4	0.5	0.4	3.2	0.2	-
year	Quadrat Cover (%)						
2012	-	0.9	-	-	23.5	0.1	0.3
2015	0.2	1.4	-	-	0.8	0.3	-
2018	0.3	2.0	0.1	-	1.4	0.1	0.0
2024	0.4	3.7	0.2	0.3	1.4	0.0	-

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

Table 19R-22.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	100	-	40	60	0	20	0	0	29/66
2018	120	20	0	100	0	0	0	0	33/60
2024	160	20	0	100	0	0	0	0	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	480	-	0	50	50	17	4	92	29/49
2015	400	-	0	85	15	70	0	5	45/74
2018	360	-	6	78	17	6	0	33	67/94
2024	6300	1440	87	13	0	2	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	52/57
2018	-	-	-	-	-	-	-	-	76/119
2024	1360	40	88	12	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	46/61
2018	-	-	-	-	-	-	-	-	45/72
2024	300	-	7	93	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2012	300	20	7	87	7	0	0	13	- / -
2015	100	-	100	0	0	0	0	0	- / -
2018	60	-	67	33	0	0	0	0	- / -
2024	40	20	50	50	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2012	280	-	0	100	0	0	0	0	11/31
2015	440	-	0	100	0	0	0	0	14/33
2018	200	-	10	90	0	0	0	0	11/28
2024	260	-	8	92	0	0	0	0	- / -
Pinus monophylla[t] -- (singleleaf pinyon)									
2012	60	-	100	0	0	0	0	0	- / -
2015	20	-	100	0	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	0	- / -
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	16/38

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

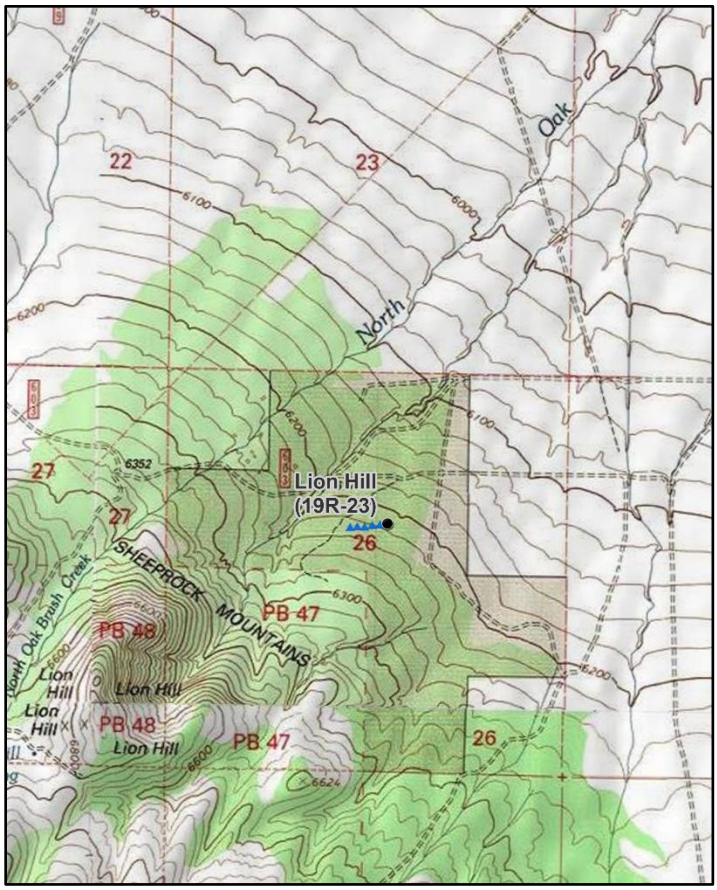
Table 19R-22.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

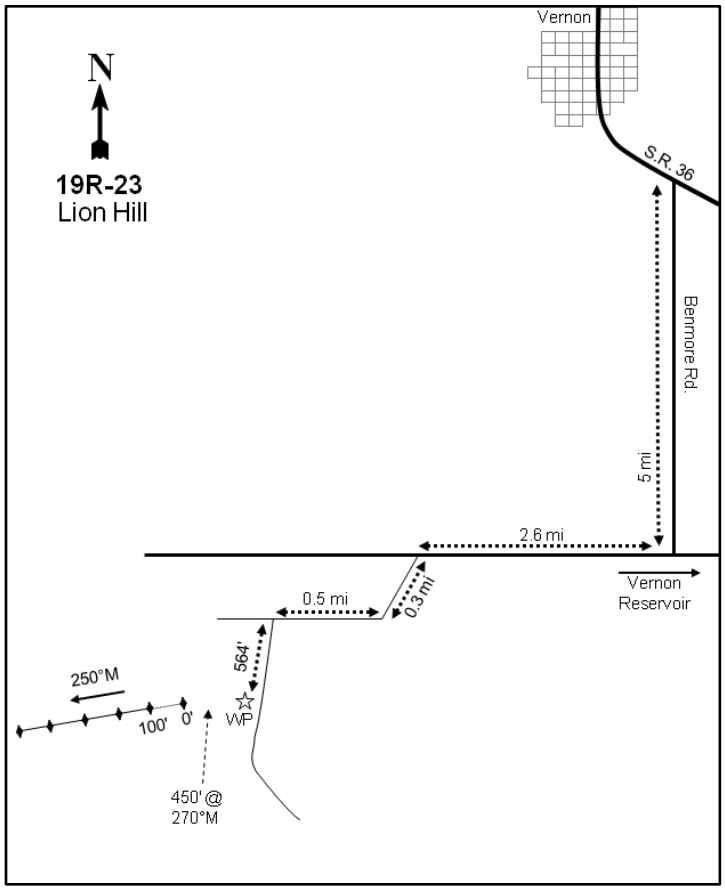
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	448	-	10	10	65	15	19.8
2015	108	33	39	-	17	11	12.4
2018	129	16	53	11	-	21	14.4
2024	63	6	38	19	-	38	23.3
Pinus monophylla (singleleaf pinyon)							
2012	16	10	-	10	20	60	14.0
2015	4	-	-	-	-	100	16.5
2018	24	-	33	-	-	67	11.3

Table 19R-22.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2012	0.8	0.0	0.0	30.0	-0.3	2.1	0.0	**32.6**	Very Poor
2015	2.6	0.0	0.0	18.3	-10.1	0.1	0.0	**10.9**	Very Poor
2018	4.1	0.0	0.0	19.4	-7.1	1.2	0.0	**17.6**	Very Poor
2024	7.5	14.9	15.0	13.9	-4.4	2.0	0.0	**48.9**	Poor-Fair

LION HILL - STUDY NO. 19R-23





Location Information

USGS 7.5 min Map Info	Vernon SW; Township 9S, Range 6W, Section 26
GPS (0' Stake)	NAD 83 UTM ZONE 12, 373099 East 4429585 North

Transect Information

Browse Tag # (0' Stake)	247
Transect Bearing	250° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Traveling on SR-36 south of Vernon, drive to mile marker 20. From there, drive 0.7 miles to a turnoff on the left (west). Turn left and drive south for 5.0 miles, passing several (4 or 5) cattle guards, to a 'T' intersection: turn right (west). Travel for 2.6 miles to a left turn. Turn left (south) and continue for 0.9 miles to a right turn (west). Turn right and travel for 0.5 miles to a two-track on the left. Turn left, drive 0.1 miles, and park near the site located on the GPS. There is no witness post.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	VERNON
Elevation	6,200ft (1,890m)
Aspect	Northeast
Slope	5-8%
Sample Dates	07/29/2015, 08/08/2018, 07/25/2024

Table 19R-23.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Push	West Vernon Phase 5: Lion Hill	3236	May 2016	285
Herbicide - Plateau	West Vernon Phase 5: Lion Hill	3236	May 2016	285
Chaining - One-Way Ely	West Vernon Phase 5: Lion Hill	3236	April 2016	285
Seeding - Aerial Before	West Vernon Phase 5: Lion Hill	3236	November 2016	285

Table 19R-23.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Lion Hill			Aerial	Nov 2016	255
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.57	1.49
G	Agropyron cristatum	Crested Wheatgrass	Hycrest II	0.78	0.74
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.78	0.71
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.49	0.39
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky II	0.98	0.87
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	2.55	2.38
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.98	0.84
F	Linum perenne	Blue Flax	Appar	0.24	0.21
F	Onobrychis viciifolia	Sainfoin	Eski	1.96	1.70
F	Sanguisorba minor	Small Burnet		1.96	1.84

Mix Name			Application Type	Application Date	Acres
Lion Hill Dribbler			Dribbler	Nov 2016	255
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Sanguisorba minor	Small Burnet		0.20	0.18
S	Purshia tridentata	Bitterbrush	Rocky Mountain	0.39	0.34

Wildlife Habitat and Vegetation History

Table 19R-23.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	spring/fall
Greater Sage-Grouse		undefined & undefined

Table 19R-23.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Juniper	Phase III
2018	Perennial Grass	Phase I
2024	Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2015 - Utah Juniper/Invasive Annuals State: Community Phase 3.1 2018 - Seeded Range State: Community Phase 5.1 2024 - Seeded Range State: Community Phase 5.2

This site was established in 2015 and was considered to be within Phase III of woodland succession (Table 19R-23.4) with Utah juniper (*Juniperus osteosperma*) dominating the community. Shrubs such as black sagebrush (*Artemisia nova*) and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) were present, but they contributed much less cover than juniper (Table 19R-23.12). The herbaceous understory was moderately diverse and not abundant prior to treatment. Many of the trees were removed by a chaining project in 2016 (Table 19R-23.1), which caused the community to transition to one dominated by perennial grasses (Table 19R-23.7, Table 19R-23.10, Table 19R-23.11). Mountain big sagebrush has exhibited an increase in both cover and density since the chaining (Table 19R-23.12, Table 19R-23.13), indicating that it may continue to increase and become a dominant vegetation component in the future. Although juniper trees were observed in point-quarter density in low amounts following treatment, juniper had a notable increase in strip density between 2018 and 2024 (Table 19R.23.13, Table 19R-23.14): this continued tree presence indicates that there

may be potential for infilling in the future.

Condition of this site as transitional range for mule deer has fluctuated between very poor and poor since 2015; transitional range condition is considered to be poor as of 2024. The primary factor negatively influencing this transitional habitat condition is the limited preferred browse component (Table 19R-23.15). Deer presence has increased each sample year and was moderate in 2024 according to pellet transect data (Table 19R-23.9). However, the highest amounts of preferred browse utilization occurred in 2015; most preferred browse plants have shown signs of little to no use in 2018 and 2024 (Table 19R-23.13).

Trend Summary Tables

Table 19R-23.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2015	1.0	0.2	15.8	1.0	0.6	30.7
2018	1.0	0.1	0.0	2.6	-	0.1
2024	2.1	0.0	-	3.6	-	0.1

Table 19R-23.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2015	16	301	345	31	0.1	8.5	2.0	0.6
2018	96	264	165	100	4.2	15.2	3.6	4.1
2024	106	341	258	61	3.2	26.2	1.3	3.9

Table 19R-23.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2015	8.0	5.4	39.9	39.6	2.1	25.3
2018	36.8	0.0	33.6	15.7	3.9	33.5
2024	22.8	0.0	40.2	14.1	1.7	34.7

Table 19R-23.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2015	-	-	18
2018	-	6	2
2024	4	13	1
Year	Days Use Per Acre (ha)		
2015	3.6 (9.0)	0.7 (1.7)	-
2018	-	14.1 (34.8)	-
2024	2.9 (7.2)	28.1 (69.5)	-

Table 19R-23.10 - 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)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency								
2015	-	-	16	47	-	297	-	-	-
2018	14	119	96	43	5	130	17	90	1
2024	3	222	106	29	29	132	16	109	-
year	Average Cover (%)								
2015	-	-	0.1	0.6	-	7.9	-	-	-
2018	0.9	4.7	4.2	1.3	0.2	4.4	0.5	3.1	0.0
2024	0.4	16.0	3.2	0.5	0.1	1.1	1.4	6.7	-

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

Table 19R-23.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Argemone corymbosa[a] (Mojave pricklypoppy)	Astragalus (milkvetch)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua[a] (shy gilia)	Lactuca serriola[ai] (prickly lettuce)	Linum perenne[i] (blue flax)	Lotus utahensis (Utah bird's-foot trefoil)	Microsteris gracilis[a] (slender phlox)	Onobrychis viciifolia[i] (sainfoin)
year	Nested Frequency																
2015	343	13	1	-	-	-	4	-	1	9	-	2	-	-	-	-	-
2018	124	-	8	1	1	16	5	1	-	-	5	1	70	9	1	-	34
2024	211	-	-	2	3	116	-	1	-	-	2	-	7	-	-	4	47
year	Average Cover (%)																
2015	1.9	0.1	0.0	-	-	-	0.0	-	0.0	0.1	-	0.0	-	-	-	-	-
2018	1.5	-	0.0	0.0	0.0	0.1	0.1	0.0	-	-	0.0	0.0	2.0	0.1	0.0	-	1.9
2024	0.7	-	-	0.1	0.1	0.5	-	0.2	-	-	0.0	-	0.0	-	-	0.0	3.3

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

FORB SPECIES	Packera multilobata (lobeleaf groundsel)	Petradoria pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Vicia americana (American vetch)
year	Nested Frequency					
2015	-	16	2	-	-	-
2018	1	15	-	24	2	19
2024	-	8	-	0	-	-
year	Average Cover (%)					
2015	-	0.5	0.0	-	-	-
2018	0.0	0.8	-	1.0	0.0	0.2
2024	-	0.3	-	0.0	-	-

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

Table 19R-23.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
2015	0.8	0.2	-	30.7	0.6
2018	0.8	1.8	-	0.1	0
2024	0.9	2.7	-	0.1	-
year	Quadrat Cover (%)				
2015	0.8	0.2	-	15.8	0.2
2018	0.4	0.7	0.1	0.0	0.0
2024	0.9	1.3	-	0.0	0.0

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

Table 19R-23.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2015	620	100	32	55	13	10	26	45	25/51
2018	200	20	10	90	0	0	0	0	35/49
2024	780	220	21	74	5	3	0	5	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2015	160	20	38	25	38	13	50	38	38/67
2018	480	-	38	63	0	0	0	0	44/71
2024	620	-	16	84	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)									
2015	20	-	0	100	0	0	0	0	21/27
2018	140	-	0	100	0	0	0	0	27/38
2024	20	-	0	100	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2015	500	40	12	88	0	0	0	8	- / -
2018	20	80	100	0	0	0	0	0	- / -
2024	140	-	100	0	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2015	620	40	16	84	0	10	0	10	15/40
2018	140	-	0	100	0	0	0	0	10/17
2024	40	-	50	50	0	0	0	0	- / -

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

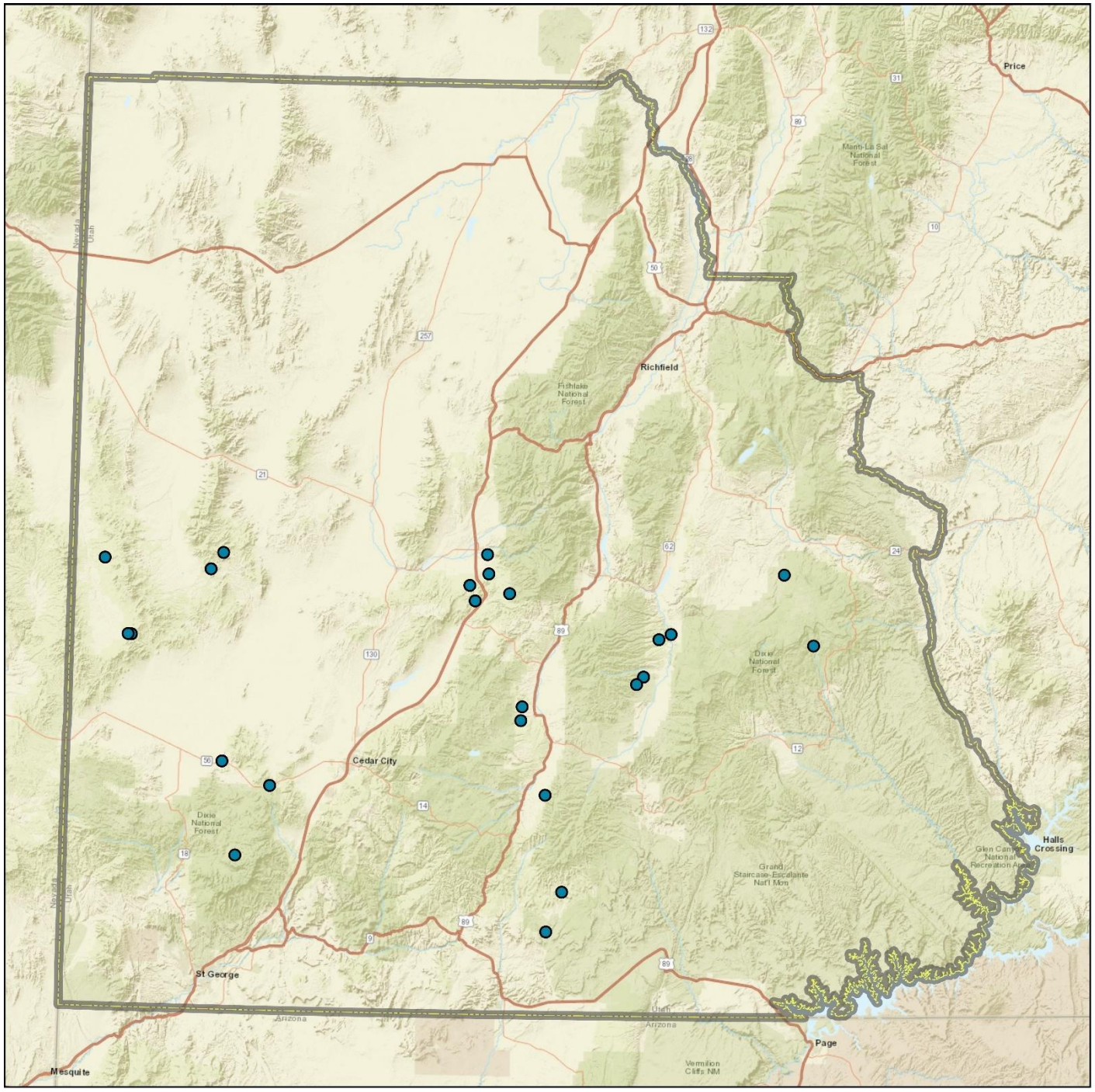
Table 19R-23.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2015	476	5	20	10	35	30	25.4
2018	11	25	75	-	-	-	3.0
2024	11	44	56	-	-	-	2.2

Table 19R-23.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2015	1.3	0.0	0.0	16.9	-0.1	1.1	0.0	**19.2**	Very Poor
2018	3.3	0.0	0.0	30.0	-3.1	8.3	0.0	**38.5**	Poor
2024	4.5	0.0	0.0	30.0	-2.4	7.7	0.0	**39.8**	Poor

SOUTHERN REGION



0 5 10 20 30 40 50 60 70 80 Miles

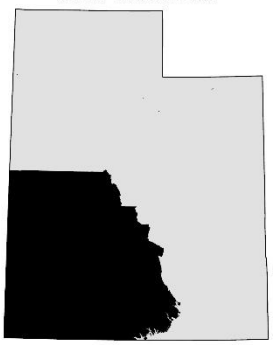
Study Locations

2024 WRI Study Sites

Administrative Boundaries

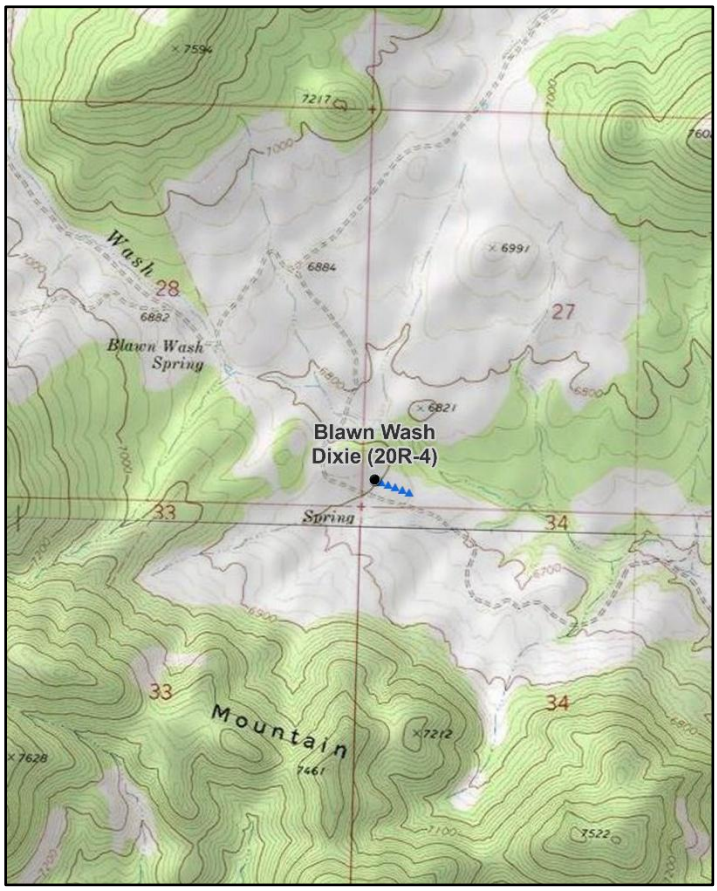
Southern Region

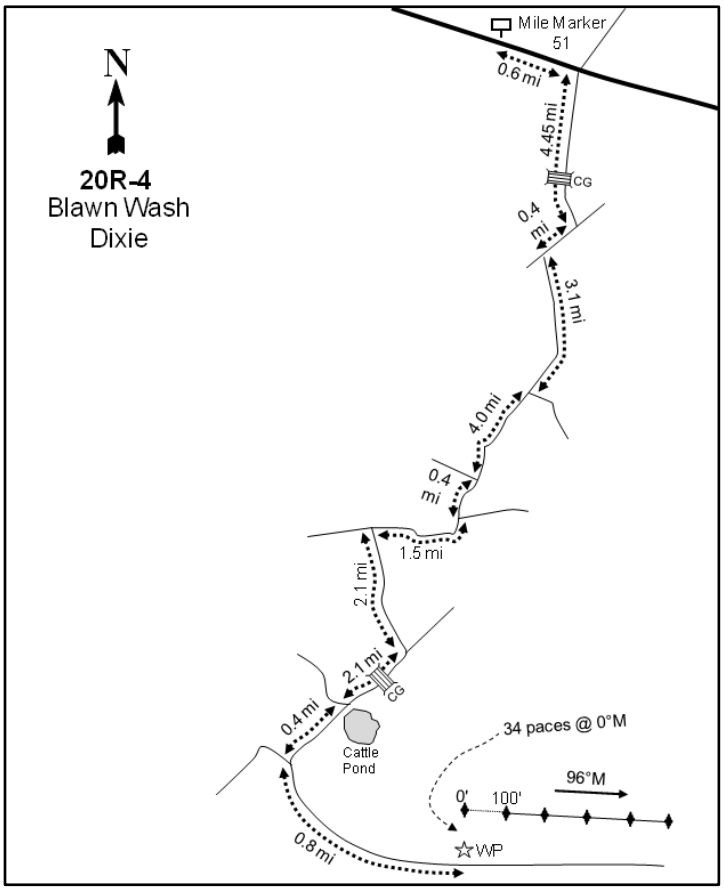
Area of Interest



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

BLAWN WASH DIXIE - STUDY NO. 20R-4





Location Information

USGS 7.5 min Map Info	Lamerdorf Peak SE; Township 29S, Range 15W, Section 27
GPS (0' Stake)	NAD 83 UTM ZONE 12, 278974 East 4236756 North

Transect Information

Browse Tag # (0' Stake)	173
Transect Bearing	96° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 3: 2ft

Directions to Site

From mile marker 51 on Highway 21, drive 0.6 miles east to an intersection. Turn right and drive 4.45 miles, crossing a cattle guard, to a junction. Proceed to the right, drive 0.4 miles to another junction, and then turn left. Drive 3.1 miles to a fork, stay right, and continue for 4.0 miles (passing a fence and corral) to another fork. At the fork, turn left and travel for 0.4 miles to another fork. Proceed to the right at this fork and continue for 1.5 miles to a junction. From there, turn and drive 2.1 miles to a fork, then go right. Drive 2.1 miles, crossing one cattle guard, to another fork. Stay left and proceed for 0.4 miles to a fork. Stay to the right for 0.8 miles to a witness post on the left-hand (north) side of the road. Walk 34 paces at 0 degrees magnetic to the 0-foot stake which is marked with browse tag #173.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	BUCKET RANCH
Elevation	6,676ft (2,035m)
Aspect	Southeast
Slope	8-9%
Sample Dates	07/18/2006, 06/28/2011, 08/05/2015, 08/08/2019, 07/30/2024

Table 20R-04.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Plow	Blawn Wash Seeding 1964	LTDL 1173-3292	July 1964-May 1965	2144
Chaining - One-Way Unknown	Blawn Wash Seeding 1964	LTDL 1173-3291	July 1964-May 1965	2144
Seeding - Rangeland Drill	Blawn Wash Seeding 1964	LTDL 1173-3293	July 1964-May 1965	2144
Harrow - One-Way Dixie	Blawn Wash Seeding Restoration	391	October 2006-January 2007	1067
Seeding - Broadcast Before	Blawn Wash Seeding Restoration	391	October 2006-January 2007	1067

Table 20R-04.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Blawn Wash			Broadcast	Nov 2006	1800
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.46	0.45
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	2.00	1.79
G	Festuca ovina	Sheep Fescue		0.12	0.09
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.33	0.27
G	Poa secunda	Canby Bluegrass	Canbar	0.19	0.18
G	Psathyrostachys juncea	Russian Wildrye		0.50	0.44
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.00	0.84
G	Thinopyrum intermedium	Intermediate Wheatgrass		1.00	0.83
F	Achillea millefolium	Western Yarrow	SID Columbia	0.05	0.04
F	Medicago sativa	Alfalfa	Nomad	0.33	0.30
F	Medicago sativa	Alfalfa	Ranger	0.33	0.29
F	Medicago sativa	Alfalfa	Spredor 4	0.33	0.32
F	Onobrychis viciifolia	Sainfoin	Eski	0.50	0.45
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.93
S	Bassia prostrata	Forage Kochia	Beaver UT	0.50	0.39

Mix Name			Application Type	Application Date	Acres
Blaun Wash Drill Seed Mix			Drill	Jul 1964	2144
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron fragile	Siberian Wheatgrass		5.60	5.19

Wildlife Habitat and Vegetation History

Table 20R-04.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 20R-04.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Mountain Big Sagebrush	Phase I transitioning to Phase II
2011	Mountain Big Sagebrush	Phase I
2015	Mountain Big Sagebrush	Phase I
2019	Mountain Big Sagebrush	Phase I
2024	Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Soils

Table 20R-04.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Silt Loam	6.8	56.0	18.1	25.9	2.1	12.6	240.0	0.7	07/18/2006

Site Potential

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Upland Gravelly Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY306UT
States and Transitions	2006-2024 - Seeded State: Community Phase 6.2

This study has been a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*)-dominated ecological site since establishment in 2006. At the beginning of the study, mature Utah juniper (*Juniperus osteosperma*) and singleleaf pinyon (*Pinus monophylla*) were present and the site was beginning to transition into Phase II of woodland succession (Table 20R-04.4). However, many of these trees were removed following a harrow and seeding treatment in the winter of 2006 (Table 20R-04.1). Perennial grasses have been moderately abundant. There was a decrease in perennial grass cover immediately following treatment, but cover has increased in each subsequent sample year with crested wheatgrass (*Agropyron cristatum*) as the dominant species (Table 20R-04.7). Annual grasses, mainly cheatgrass (*Bromus tectorum*), have been present throughout the study period, although cover has fluctuated (Table 20R-04.10). Both perennial and annual forbs have remained moderately diverse, but sparse (Table 20R-04.11). The shrub layer has been mainly comprised of mountain big sagebrush and antelope bitterbrush (*Purshia tridentata*). Although initially robust following treatment with a stable to increasing trend through 2019, preferred browse cover exhibited a notable decrease between 2019 and 2024. Furthermore, decadence within the shrub population increased to nearly pretreatment levels in 2024 despite a decrease through the 2019 sample year (Table 20R-04.12, Table 20R-04.13). The size class of both pinyon and juniper decreased following treatment, but cover has not changed significantly (Table 20R-04.12, Table 20R-04.14). Densities of these species have shown overall increases during the post-treatment period with small trees comprising a majority of the population (Table 20R-04.14). Without persistent tree maintenance, this community will likely transition to one dominated by conifer as the infilling of trees continues over time.

This site's condition as mule deer winter range has remained fair throughout the sample period. Current winter range condition is primarily limited by reduced perennial grass cover, limited recruitment of young plants to the preferred browse community, and a lack of perennial forb cover (Table 20R-04.15). Pellet transect data indicates that deer presence has remained low over time (Table 20R-04.9). Utilization of preferred browse has fluctuated from year to year, with the highest utilization of mountain big sagebrush occurring in 2015 and 2019. In 2024, 8% of sagebrush plants sampled in density strips were moderately browsed and 1% were heavily utilized. Although utilization was light during the most recent sample year, sagebrush density decreased between 2019 and 2024. Furthermore, sagebrush decadence increased between the two most recent sample years, and recruitment of young plants has remained low over time (Table 20R-04.13). Continued decreases in sagebrush density without recruitment of young plants in future sample years could lead to the loss of or decrease in the sagebrush community's utility for wildlife.

Trend Summary Tables

Table 20R-04.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	22.7	1.6	0.0	29.3	1.0	0.7
2011	18.4	0.2	0.4	23.1	0.2	0.8
2015	21.1	0.6	0.8	27.4	1.6	1.1
2019	25.5	0.2	0.7	35.4	0.7	1.3
2024	17.4	0.5	1.6	21.1	-	2.2

Table 20R-04.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	198	157	8	26	3.6	9.7	0.1	0.1
2011	305	153	82	120	9.9	4.5	0.9	1.3
2015	104	171	3	27	0.6	5.5	0.0	0.6
2019	261	177	80	76	5.5	9.3	0.6	1.0
2024	22	222	6	15	0.1	10.5	0.0	0.1

Table 20R-04.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	13.1	0.3	23.9	28.6	15.7	32.0
2011	26.5	0.0	18.5	12.4	12.8	33.9
2015	15.6	0.0	32.1	33.8	14.6	27.8
2019	18.3	0.1	37.3	27.9	13.5	34.7
2024	26.9	0.0	34.5	13.6	11.7	29.5

Table 20R-04.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2006	-	8	1	5	55
2011	-	3	-	-	1
2015	1	1	4	-	19
2019	-	8	4	4	14
2024	4	14	-	-	17
Year	Days Use Per Acre (ha)				
2006	3.6 (9.0)	5.3 (13.2)	4.7 (11.6)	7.0 (17.2)	-
2011	2.9 (7.2)	2.0 (5.0)	-	2.9 (7.2)	-
2015	-	3.4 (8.3)	2.0 (5.0)	2.3 (5.7)	-
2019	-	2.7 (6.6)	5.3 (13.2)	1.7 (4.3)	-
2024	1.5 (3.6)	4.7 (11.6)	-	1.7 (4.3)	-

Table 20R-04.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus arvensis[ai] (field brome)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency									
2006	1	131	-	198	14	-	-	3	-	23
2011	5	100	2	305	28	-	19	4	-	29
2015	2	118	4	100	44	-	4	7	2	27
2019	1	139	2	259	29	4	1	5	-	32
2024	2	176	-	22	9	-	8	9	-	38
year	Average Cover (%)									
2006	0.2	8.7	-	3.6	0.3	-	-	0.0	-	0.6
2011	0.0	3.1	0.0	9.9	0.3	-	0.5	0.1	-	0.3
2015	0.0	3.7	0.0	0.6	0.9	-	0.1	0.2	0.0	0.5
2019	0.1	6.2	0.0	5.5	0.8	0.1	0.0	0.3	-	1.7
2024	0.1	7.9	-	0.1	0.1	-	0.2	0.0	-	2.0

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

Table 20R-04.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum[ai] (desert madwort)	Arabis (rockcress)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Collinsia parviflora[a] (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata[a] (western tansymustard)	Gilia inconspicua[a] (shy gilia)	Heterotheca villosa (hairy false goldenaster)
year	Nested Frequency																
2006	-	-	-	0	-	-	-	10	8	6	-	-	-	-	-	-	-
2011	1	-	-	7	5	14	-	60	2	7	3	3	4	10	-	25	3
2015	-	-	-	2	-	-	-	1	4	3	-	-	3	-	-	-	-
2019	2	26	3	3	2	3	1	19	14	3	-	-	4	18	3	33	-
2024	-	3	-	4	-	-	-	6	4	-	-	1	3	-	-	2	-
year	Average Cover (%)																
2006	-	-	-	0.0	-	-	-	0.0	0.0	0.0	-	-	-	-	-	-	-
2011	0.0	-	-	0.1	0.0	0.1	-	0.3	0.0	0.0	0.0	0.0	0.0	0.0	-	0.2	0.0
2015	-	-	-	0.0	-	-	-	0.0	0.0	0.0	-	-	0.1	-	-	-	-
2019	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.1	0.1	0.0	-	-	0.0	0.1	0.1	0.1	-
2024	-	0.0	-	0.0	-	-	-	0.0	0.0	-	-	0.0	0.0	-	-	0.0	-

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

FORB SPECIES	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa[i] (alfalfa)	Microsteris gracilis[a] (slender phlox)	Onobrychis viciifolia[i] (sainfoin)	Orobanche fasciculata (clustered broomrape)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Sanguisorba minor[i] (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency															
2006	-	0	-	-	2	-	-	6	1	-	-	-	1	-	-	1
2011	-	9	4	6	62	5	-	4	-	-	3	4	-	3	1	-
2015	-	-	4	-	-	5	3	-	0	5	-	-	-	2	1	-
2019	1	-	3	3	29	-	11	-	-	2	-	-	-	-	-	-
2024	-	0	-	-	1	-	-	-	-	-	-	-	-	-	-	-
year	Average Cover (%)															
2006	-	0.0	-	-	0.0	-	-	0.0	0.0	-	-	-	0.0	-	-	0.0
2011	-	0.2	0.0	0.2	0.7	0.1	-	0.0	-	-	0.1	0.0	-	0.0	0.0	-
2015	-	-	0.0	-	-	0.0	0.0	-	0.0	0.1	-	-	-	0.1	0.0	-
2019	0.0	-	0.0	0.1	0.1	-	0.1	-	-	0.1	-	-	-	-	-	-
2024	-	0.0	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-

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

Table 20R-04.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca[p] (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus monophylla[t] (singleleaf pinyon)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)							
2006	24.3	-	0.8	1	-	-	0.7	4.2
2011	20.6	0.1	0.5	0.1	-	-	0.8	2
2015	23.7	0.1	0.9	1.4	-	0.1	1.1	2.8
2019	28.9	-	0.8	0.5	-	0.2	1.3	5.7
2024	13	-	0.1	-	-	-	2.2	8
year	Quadrat Cover (%)							
2006	20.6	-	0.0	1.6	-	-	0.0	2.1
2011	17.5	0.1	0.0	0.1	-	0.0	0.4	1.0
2015	19.2	0.2	0.2	0.4	0.0	0.0	0.8	1.7
2019	21.4	-	0.5	0.1	0.0	0.0	0.7	3.5
2024	11.1	-	0.0	0.5	-	-	1.6	6.3

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

Table 20R-04.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	49/68
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	55/72
2024	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2006	8920	-	1	64	35	34	3	18	37/69
2011	4860	-	11	86	3	1	0	10	34/58
2015	5700	-	1	96	3	16	79	3	45/73
2019	5420	-	2	92	7	50	2	8	50/76
2024	3600	-	1	66	33	8	1	33	- / -
Bassia prostrata[pi] -- (forage kochia)									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	7/15
2015	-	-	-	-	-	-	-	-	7/11
2019	-	-	-	-	-	-	-	-	6/7
2024	-	-	-	-	-	-	-	-	-/-
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2006	-	-	-	-	-	-	-	-	10/17
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2006	20	-	0	100	0	0	0	0	13/18
2011	20	-	100	0	0	0	0	0	9/13
2015	80	-	0	100	0	0	0	0	29/34
2019	-	-	-	-	-	-	-	-	14/22
2024	-	-	-	-	-	-	-	-	-/-
Ephedra nevadensis[p] -- (Nevada jointfir)									
2006	-	-	-	-	-	-	-	-	25/30
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa ssp. nauseosa var. hololeuca[p] -- (rubber rabbitbrush)									
2006	120	-	0	50	50	0	50	33	58/60
2011	60	-	0	100	0	0	0	0	55/70
2015	280	-	0	21	79	7	7	86	57/65
2019	60	-	0	100	0	0	0	0	76/93
2024	40	-	0	50	50	50	0	50	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2006	1560	320	9	80	12	0	0	9	19/24
2011	420	-	43	57	0	0	0	0	16/18
2015	960	180	17	81	2	0	0	2	24/26
2019	620	80	16	84	0	0	0	0	22/23
2024	440	-	9	91	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)									
2006	-	20	0	0	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	-/-
2015	-	20	0	0	0	0	0	0	- / -
2019	20	-	100	0	0	0	0	0	- / -
2024	20	-	100	0	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2006	-	-	-	-	-	-	-	-	8/12
2011	-	-	-	-	-	-	-	-	8/15
2015	40	-	0	100	0	0	0	0	13/24
2019	60	-	0	100	0	0	0	0	11/38
2024	60	-	0	100	0	0	0	67	- / -
Pinus monophylla[t] -- (singleleaf pinyon)									
2006	40	100	100	0	0	0	0	0	- / -
2011	40	20	50	50	0	0	0	0	29/28
2015	80	20	75	25	0	0	0	0	- / -
2019	80	-	75	25	0	0	0	0	- / -
2024	140	-	29	71	0	0	0	0	- / -
Purshia stansburiana[p] -- (Stansbury cliffrose)									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	56/68
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	102/166
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2006	260	-	8	85	8	62	0	8	48/105
2011	240	-	8	92	0	42	0	0	37/84
2015	340	-	18	82	0	6	82	0	36/98
2019	440	-	5	96	0	41	27	0	44/112
2024	680	-	3	97	0	32	21	0	- / -

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

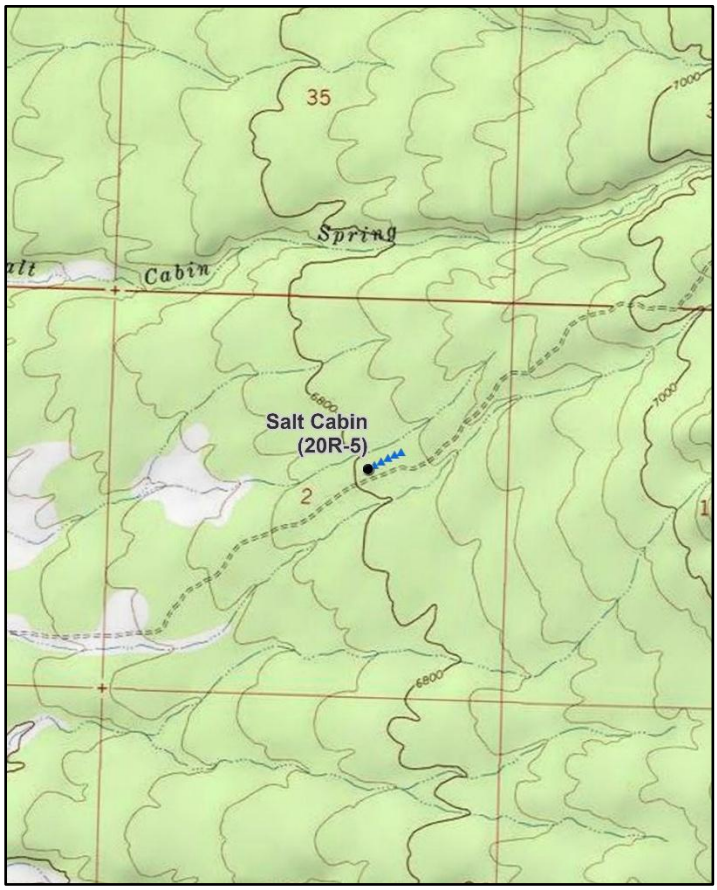
Table 20R-04.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

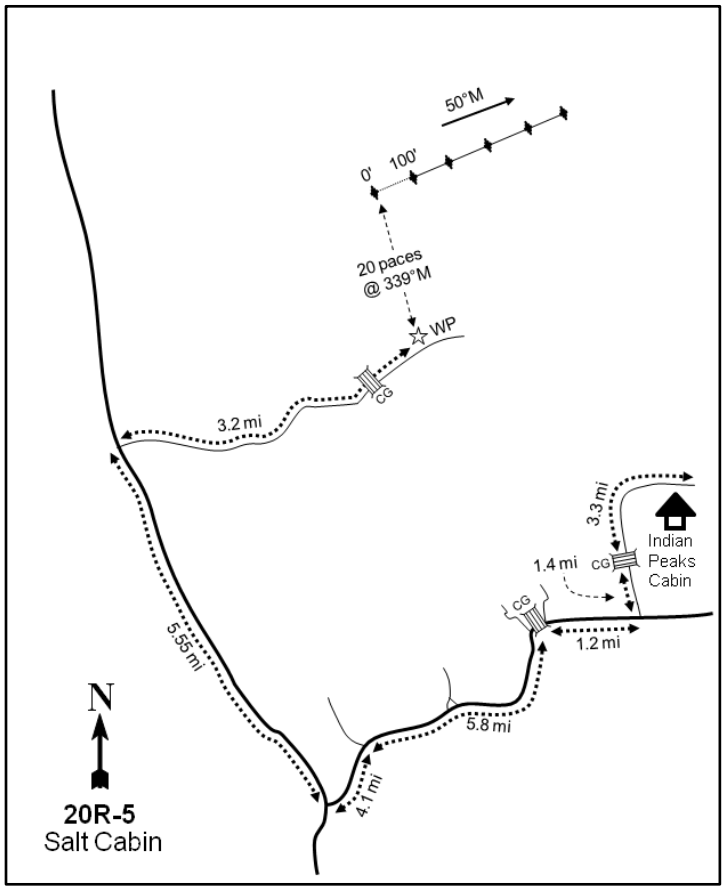
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2006	18	-	14	29	43	14	18.9
2011	5	-	25	-	75	-	15.3
2015	11	20	60	20	-	-	8.6
2019	20	78	-	22	-	-	3.1
2024	19	18	64	18	-	-	10.9
Juniperus scopulorum (Rocky Mountain juniper)							
2024	1	-	-	100	-	-	4.0
Pinus monophylla (singleleaf pinyon)							
2006	77	82	18	-	-	-	1.2
2011	35	20	80	-	-	-	1.9
2015	104	5	95	-	-	-	2.6
2019	117	10	90	-	-	-	3.3
2024	82	5	63	32	-	-	5.5

Table 20R-04.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2006	30.0	5.4	0.9	19.5	-2.7	0.3	0.0	**53.4**	Fair
2011	29.4	14.1	5.3	8.9	-7.4	2.6	0.0	**52.9**	Fair
2015	30.0	13.4	1.5	11.1	-0.5	1.1	0.0	**56.6**	Fair
2019	30.0	13.3	1.0	18.6	-4.1	2.1	0.0	**60.9**	Fair
2024	28.4	8.9	0.9	20.9	-0.1	0.3	0.0	**59.3**	Fair

SALT CABIN - STUDY NO. 20R-5





Location Information

USGS 7.5 min Map Info	Atchison Creek NE; Township 30S, Range 19W, Section 02
GPS (0' Stake)	NAD 83 UTM ZONE 12, 242924 East 4235346 North

Transect Information

Browse Tag # (0' Stake)	172
Transect Bearing	50° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Drive west from the Indian Peaks cabin for 0.3 miles to a fork and proceed to the left. Drive 0.1 miles to another fork and again stay left. From there, drive 2.9 miles to a cattle guard. From the cattle guard, drive 1.4 miles to a junction. Turn right and continue for 1.2 miles to an intersection. Go straight, crossing another cattle guard. From the cattle guard, drive 5.8 miles, staying on the main road, to a fork. Proceed to the left and drive 4.1 miles to another fork. Stay right (north) and drive 5.55 miles to a junction. Turn right and proceed 3.2 miles to a witness post on the left (north) side of the road. Walk 20 paces at 339 degrees magnetic to the 0-foot stake that is marked with browse tag #172.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	INDIAN PEAK
Elevation	6,800ft (2,073m)
Aspect	West
Slope	4%
Sample Dates	07/18/2006, 06/16/2011, 08/05/2015, 08/14/2019, 07/31/2024

Table 20R-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Salt Cabin Reseed	479	October-November 2006	733
Seeding - Aerial Before	Salt Cabin Reseed	479	November 2006	733

Table 20R-05.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Salt Cabin Re-seed			Aerial	Nov 2006	800
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.80	0.74
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.20	0.17
G	Dactylis glomerata	Orchardgrass	Paiute	0.25	0.23
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.88
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.76
G	Poa secunda	Canby Bluegrass	Canbar	0.10	0.09
G	Poa secunda	Canby Bluegrass	Canbar	0.10	0.09
G	Psathyrostachys juncea	Russian Wildrye		0.97	0.92
G	Psathyrostachys juncea	Russian Wildrye		0.03	0.02
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	1.00	0.94
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.82	0.68
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.17	0.15
F	Linum perenne	Blue Flax		0.20	0.17
F	Medicago sativa	Alfalfa	Ladak	0.50	0.47
F	Medicago sativa	Alfalfa	Nomad	0.50	0.45
F	Medicago sativa	Alfalfa	Ranger	0.50	0.44
F	Onobrychis viciifolia	Sainfoin	Eski	3.00	2.76
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.86
S	Bassia prostrata	Forage Kochia	Beaver UT	1.00	0.70

Wildlife Habitat and Vegetation History

Table 20R-05.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 20R-05.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Perennial Grass/Pinyon-Juniper	Phase II
2011	Perennial Grass/Rubber Rabbitbrush	Phase I
2015	Perennial Grass/Rubber Rabbitbrush	Phase I
2019	Rubber Rabbitbrush/Black Sagebrush/Perennial Grass	Phase I
2024	Black Sagebrush/Rubber Rabbitbrush	Phase I

Site Notes

No Notes

Soils

Table 20R-05.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.1	61.0	19.1	19.9	2.8	19.6	188.8	0.7	07/18/2006

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY309UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2006, the plant community on this site was dominated by Utah juniper (*Juniperus osteosperma*) and singleleaf pinyon (*Pinus monophylla*) with a robust understory of introduced perennial grasses. The site was chained and seeded in the fall of 2006, which reduced much of the tree cover (Table 20R-05.1, Table 20R-05.6). Perennial grasses, particularly the introduced species smooth brome (*Bromus inermis*) and crested wheatgrass (*Agropyron cristatum*), have been a significant understory component with the exception of the 2019 and 2024 sample years. Data for 2015 shows high frequency and cover of perennial grasses, but photos reveal that many of the grasses were eaten to the base (Photos, Table 20R-05.10). Both perennial and annual forbs have been observed in low abundance, but with moderate diversity (Table 20R-05.7, Table 20R-05.11). Rubber rabbitbrush (*Ericameria nauseosa* ssp. *nauseosa* var. *hololeuca*) has been the dominant browse species following treatment. However, black sagebrush (*Artemisia nova*) has been increasing in both cover and density and was a major community component in 2024. Overall preferred browse cover has increased in the post-treatment sample years: much of this can be attributed to rubber rabbitbrush (Table 20R-05.6, Table 20R-05.12). Although cover and density of pinyon and juniper decreased immediately following treatment, cover and density have increased in subsequent years (Table 20R-05.14). In addition, reduced understory vigor is likely to continue in future years considering the presence of feral horses (Table 20R-05.9).

Condition of this site as mule deer winter range has fluctuated between poor and good since 2006; winter range condition is considered to be fair as of 2024. The main factors that negatively influence this winter habitat condition include reduced perennial grass cover, decadence within the preferred browse community, and reduced perennial forb cover (Table 20R-05.15). Pellet transect data indicates that mule deer presence has remained low over the sample period, and utilization of preferred browse was low in 2024. Elk presence was moderate in 2006 and 2011, but has been low since 2015. Finally, horse presence was moderate-high in 2006, but has decreased over time (Table 20R-05.9, Table 20R-05.13); on-site observations for 2024 note only light utilization of crested wheatgrass, Indian ricegrass (*Achnatherum hymenoides*), needle and thread (*Hesperostipa comata*), and Searl's prairie clover (*Dalea searlsiae*).

Trend Summary Tables

Table 20R-05.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2006	5.5	0.7	5.1	5.4	0.5	7.6
2011	5.0	0.9	0.1	4.6	0.5	1.4
2015	9.2	2.1	1.1	6.7	0.9	1.8
2019	15.0	2.7	1.8	14.1	2.3	2.1
2024	9.9	4.6	2.3	10.7	5.7	3.5

Table 20R-05.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2006	18	319	13	87	0.1	16.6	0.1	1.5
2011	45	356	115	71	0.7	17.9	0.4	2.1
2015	16	356	-	61	0.1	14.8	-	1.0
2019	27	253	130	116	0.1	6.1	2.9	2.9
2024	32	227	5	129	0.1	5.4	0.0	2.6

Table 20R-05.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2006	23.7	0.2	33.6	28.1	1.8	27.4
2011	31.8	0.8	29.9	1.3	1.7	32.0
2015	46.0	0.0	39.9	7.7	1.1	26.9
2019	31.6	0.1	35.9	24.4	2.1	27.6
2024	44.4	0.1	29.0	15.8	0.9	24.6

Table 20R-05.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2006	4	10	11	17	55
2011	-	5	11	11	-
2015	1	-	2	14	27
2019	-	3	2	9	27
2024	-	6	3	7	7
Year	Days Use Per Acre (ha)				
2006	8.0 (19.7)	6.7 (16.6)	23.4 (57.9)	27.9 (68.9)	-
2011	2.2 (5.4)	2.7 (6.6)	26.8 (66.2)	18.6 (45.9)	-
2015	-	1.3 (3.3)	4.0 (9.9)	15.1 (37.3)	-
2019	2.9 (7.2)	3.4 (8.3)	0.7 (1.7)	11.6 (28.7)	-
2024	-	11.4 (28.1)	0.7 (1.7)	5.2 (12.9)	-

Table 20R-05.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum[i] (crested wheatgrass)	Aristida purpurea (purple threawn)	Bromus inermis[i] (smooth brome)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Psathyrostachys juncea[i] (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency											
2006	18	-	159	0	212	18	3	15	-	-	-	48
2011	13	2	145	-	271	45	17	21	28	10	-	4
2015	8	10	125	-	283	16	15	14	7	1	-	16
2019	3	-	107	-	146	27	10	29	4	2	-	-
2024	1	5	83	3	117	32	8	27	4	14	3	-
year	Average Cover (%)											
2006	0.5	-	5.3	0.0	9.6	0.1	0.1	0.4	-	-	-	0.6
2011	0.2	0.0	4.6	-	10.8	0.7	0.3	0.3	1.0	0.3	-	0.4
2015	0.1	0.1	3.3	-	10.5	0.1	0.3	0.1	0.0	0.0	-	0.4
2019	0.1	-	1.6	-	3.3	0.1	0.1	0.8	0.0	0.1	-	-
2024	0.0	0.0	1.7	0.1	2.9	0.1	0.1	0.4	0.0	0.2	0.0	-

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

Table 20R-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus utahensis (Utah milkvetch)	Caulanthus crassicaulis[a] (thickstem wild cabbage)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Dalea searlsiae (Searls' prairie clover)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gilia inconspicua[a] (shy gilia)	Ipomopsis congesta (ballhead ipomopsis)
year	Nested Frequency																
2006	11	-	-	3	-	-	-	-	8	-	-	-	2	-	-	6	8
2011	8	-	-	-	2	0	-	11	11	3	11	24	3	-	-	59	11
2015	-	-	2	-	-	-	-	-	13	-	21	-	-	1	-	-	-
2019	3	1	4	3	-	0	3	9	12	4	30	19	5	-	13	97	3
2024	-	4	10	1	-	-	-	-	8	-	37	-	-	-	1	2	6
year	Average Cover (%)																
2006	0.2	-	-	0.0	-	-	-	-	0.1	-	-	-	0.0	-	-	0.0	0.1
2011	0.2	-	-	-	0.0	0.0	-	0.0	0.3	0.0	0.1	0.1	0.0	-	-	0.2	0.3
2015	-	-	0.0	-	-	-	-	-	0.1	-	0.3	-	-	0.1	-	-	-
2019	0.1	0.0	0.0	0.0	-	0.0	0.0	0.3	0.3	0.0	1.1	0.2	0.1	-	0.1	1.7	0.0
2024	-	0.0	0.1	0.0	-	-	-	-	0.2	-	0.8	-	-	-	0.0	0.0	0.0

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

FORB SPECIES	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis[a] (slender phlox)	Oxytropis (locoweed)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon confusus (Owens Valley beardtongue)	Penstemon leiophyllus (smoothleaf beardtongue)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)	Salsola tragus[ai] (prickly Russian thistle)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency															
2006	2	-	-	6	-	-	12	1	36	-	-	1	-	41	-	3
2011	39	2	10	3	-	-	5	-	12	-	2	-	1	13	-	-
2015	-	-	1	3	-	-	1	-	4	1	3	-	-	11	10	-
2019	30	-	16	-	1	-	8	-	7	-	9	-	-	17	30	-
2024	2	-	31	-	-	1	4	-	10	-	13	-	-	18	25	-
year	Average Cover (%)															
2006	0.0	-	-	0.0	-	-	0.1	0.0	0.4	-	-	0.0	-	0.6	-	0.0
2011	0.2	0.0	0.3	0.0	-	-	0.0	-	0.4	-	0.0	-	0.0	0.3	-	-
2015	-	-	0.0	0.0	-	-	0.0	-	0.1	0.0	0.0	-	-	0.2	0.1	-
2019	0.5	-	0.7	-	0.0	-	0.0	-	0.1	-	0.0	-	-	0.1	0.3	-
2024	0.0	-	0.6	-	-	0.0	0.0	-	0.2	-	0.1	-	-	0.1	0.5	-

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

Table 20R-05.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Bassia prostrata[pi] (forage kochia)	Chrysothamnus depressus[p] (longflower rabbitbrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca[p] (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus monophylla[t] (singleleaf pinyon)	Purshia stansburiana[p] (Stansbury cliffrose)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)											
2006	1.2	0.2	-	0.1	0.3	2.4	0.2	4.8	-	2.8	-	1.5
2011	0.9	0.4	-	0.1	0.5	2.6	0	1.4	-	-	-	0.6
2015	1.3	0.5	-	-	0.1	3.9	0.8	1.8	-	-	-	1
2019	5.2	0.3	-	-	1.3	7.7	0.8	2.1	0.2	-	-	0.9
2024	4.1	0.3	-	-	2.5	4.6	3.1	3.2	0.1	0.3	-	1.7
year	Quadrat Cover (%)											
2006	1.2	0.8	-	0.0	0.5	1.8	0.2	3.7	0.0	1.4	-	1.7
2011	1.1	0.1	-	0.0	0.8	3.2	0.1	0.1	0.0	-	-	0.6
2015	1.4	0.6	0.0	0.0	0.3	5.0	1.6	1.0	0.2	0.1	-	2.2
2019	4.1	1.0	-	-	1.2	8.2	1.0	1.8	0.6	-	-	1.7
2024	4.1	0.2	-	-	2.3	3.4	2.3	2.3	0.0	0.0	0.0	2.2

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

Table 20R-05.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2006	480	240	25	71	4	0	0	4	38/66
2011	480	100	17	83	0	0	0	0	27/51
2015	520	-	27	73	0	0	0	0	31/60
2019	1020	-	28	73	0	10	4	0	38/72
2024	2980	2100	60	31	9	3	0	9	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2006	80	140	0	100	0	75	0	0	53/71
2011	220	-	64	36	0	0	0	0	36/46
2015	180	-	11	89	0	11	89	0	43/61
2019	160	20	38	63	0	38	13	0	55/86
2024	420	60	43	57	0	10	0	0	- / -
Bassia prostrata[pi] -- (forage kochia)									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	100	0	0	11/16
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2006	20	-	100	0	0	0	0	0	9/14
2011	40	-	100	0	0	0	0	0	15/18
2015	20	-	0	0	100	0	100	100	- / -
2019	20	-	0	100	0	100	0	0	15/27
2024	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2006	220	80	46	55	0	0	18	0	33/60
2011	360	-	6	94	0	0	0	28	52/45
2015	340	-	35	65	0	0	0	0	35/52
2019	420	-	14	86	0	0	0	0	36/59
2024	900	-	18	76	7	0	0	7	- / -
Ericameria nauseosa ssp. nauseosa var. hololeuca[p] -- (rubber rabbitbrush)									
2006	1120	460	64	36	0	7	2	29	65/107
2011	1480	-	30	69	1	11	3	5	37/51
2015	1300	-	19	82	0	12	37	0	48/57
2019	1960	2420	43	55	2	11	0	2	56/85
2024	1120	-	5	75	20	2	2	20	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2006	480	140	4	67	29	0	0	29	22/27
2011	280	-	21	71	7	0	0	7	18/19
2015	2180	-	0	98	2	0	0	2	25/30
2019	2500	1740	74	24	2	0	0	2	25/32
2024	8460	-	22	76	2	0	0	1	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2006	140	-	29	43	29	0	0	0	- / -
2011	40	-	100	0	0	0	0	0	- / -
2015	40	-	50	50	0	0	0	0	- / -
2019	60	-	0	100	0	0	0	0	- / -
2024	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 (%)		
Opuntia -- (pricklypear)									
2006	60	60	0	100	0	0	0	0	8/19
2011	40	-	0	100	0	0	0	0	7/15
2015	120	-	0	100	0	17	0	17	11/32
2019	100	-	0	100	0	0	0	0	10/30
2024	60	-	33	67	0	0	0	0	- / -
Pinus monophylla[t] -- (singleleaf pinyon)									
2006	60	20	67	33	0	0	0	0	- / -
2011	20	-	100	0	0	0	0	0	- / -
2015	20	-	100	0	0	0	0	0	- / -
2019	20	-	100	0	0	0	0	0	- / -
2024	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana[p] -- (Stansbury cliffrose)									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	76/75
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2006	100	40	0	80	20	60	40	20	72/171
2011	120	-	17	83	0	33	17	17	39/80
2015	180	-	11	89	0	11	89	0	42/95
2019	160	-	0	100	0	25	75	0	46/93
2024	240	-	8	92	0	25	42	0	- / -

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

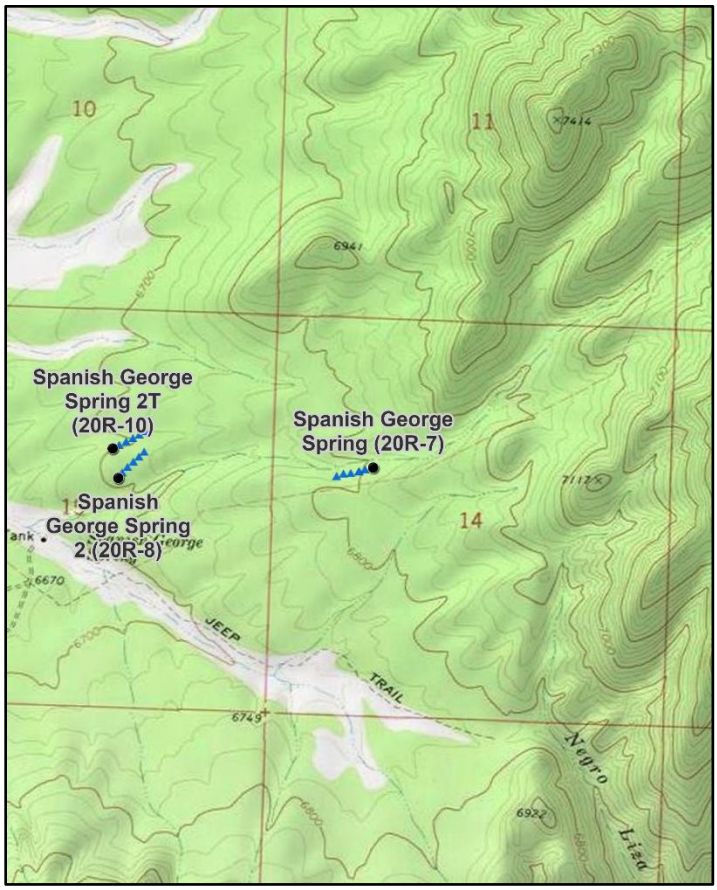
Table 20R-05.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

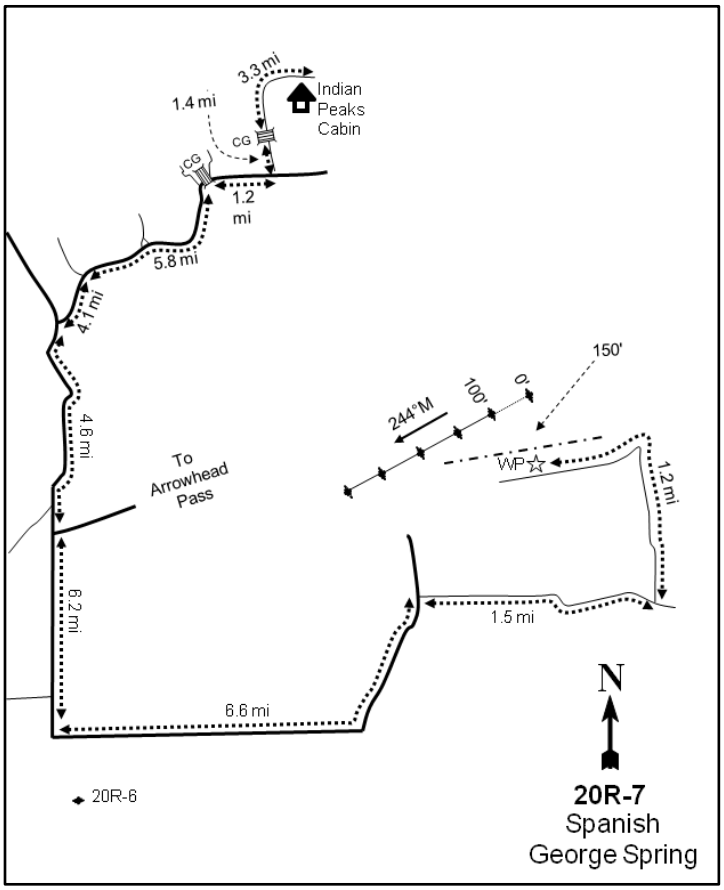
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2006	96	11	28	56	6	-	12.0
2011	42	-	56	44	-	-	11.3
2015	58	6	19	69	6	-	9.9
2019	59	-	18	76	-	6	15.2
2024	68	5	21	68	5	-	15.4
Pinus monophylla (singleleaf pinyon)							
2006	43	18	53	29	-	-	6.8
2011	15	-	70	30	-	-	5.5
2015	41	13	40	47	-	-	6.9
2019	26	14	36	43	7	-	8.5
2024	30	7	36	36	21	-	9.4

Table 20R-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
2006	7.1	13.2	15.0	30.0	-0.1	3.0	0.0	**68.2**	Good
2011	5.9	0.0	0.0	30.0	-0.5	4.2	0.0	**39.6**	Poor
2015	8.6	14.9	9.2	29.5	-0.1	2.1	0.0	**64.2**	Fair-Good
2019	17.9	14.7	15.0	12.1	-0.1	5.9	0.0	**65.5**	Fair-Good
2024	13.8	11.4	13.9	10.8	-0.1	5.3	0.0	**55.1**	Fair

SPANISH GEORGE SPRING - STUDY NO. 20R-7





Location Information

USGS 7.5 min Map Info	Steamboat Mountain S; Township 32S, Range 18W, Section 14
GPS (0' Stake)	NAD 83 UTM ZONE 12, 250906 East 4212011 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

Drive west from the Indian Peaks cabin for 0.3 miles to a fork, then proceed to the left. Continue 0.1 miles to another fork, again staying left. From there, drive 2.9 miles to a cattle guard. From the cattle guard, drive 1.4 miles to a junction. Turn right and drive 1.2 miles to an intersection. Go straight, crossing another cattle guard. From the cattle guard, drive 5.8 miles (staying on the main road) to a fork. Proceed left and drive 4.1 miles to another fork. Go left again and continue for 4.6 miles to a fork leading to Arrowhead Pass. Stay on the main road for another 6.2 miles. Turn left onto North Hamblin Valley Road and continue onto Spanish George Road. Drive for 6.6 miles (the road will turn north). Turn left onto a dirt road and drive 1.5 miles to an intersection. Turn left (north) and continue for 1.2 miles; the road will make a hairpin turn to the left. The site is 150 feet away from the road on the right (north) side.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SPANISH GEORGE
Elevation	6,824ft (2,080m)
Aspect	West
Slope	3-5%
Sample Dates	08/04/2015, 08/13/2019, 07/31/2024

Table 20R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Hamlin Valley Habitat Restoration Project - Sagebrush Restoration Year I	2076	October 2015-February 2016	1423
Seeding - Aerial Before	Hamlin Valley Habitat Restoration Project - Sagebrush Restoration Year I	2076	October 2015	1423
Seeding - Aerial After	Hamlin Valley Habitat Restoration Project - Sagebrush Restoration Year I	2076	January-February 2016	1423

Table 20R-07.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hamlin Valley			Aerial	Oct 2015	1650
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	3.00	2.78
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.48	1.31
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.48	1.31
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.12	0.96
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.55	0.46
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.33	1.14
F	Achillea millefolium	Western Yarrow	Eagle	0.18	0.16
F	Achillea millefolium	Western Yarrow	Eagle	0.18	0.16
F	Balsamorhiza sagittata	Arrowleaf Balsamroot	Box Elder/Sevier/Sanpete	0.08	0.06
F	Hedysarum boreale ssp. boreale var. boreale	Utah Sweetvetch	Timp	0.05	0.03
F	Hedysarum boreale ssp. boreale var. boreale	Utah Sweetvetch	Timp	0.19	0.14
F	Hedysarum boreale ssp. boreale var. boreale	Utah Sweetvetch	Timp	0.06	0.05
F	Heliomeris multiflora	Showy Goldeneye	Sanpete UT	0.02	0.01
F	Heliomeris multiflora	Showy Goldeneye	Sanpete UT	0.12	0.10
F	Heliomeris multiflora	Showy Goldeneye	Sanpete UT	0.04	0.04
F	Linum lewisii	Lewis Flax	Maple Grove	0.09	0.07
F	Linum lewisii	Lewis Flax	Maple Grove	0.18	0.14
F	Lomatium dissectum	Fernleaf Biscuitroot	Washington ID	0.06	0.04
F	Medicago sativa	Alfalfa	Ladak +	0.50	0.44
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.97
F	Penstemon pachyphyllus	Thickleaf Penstemon	White Pine NV	0.09	0.07
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.18	0.16
F	Penstemon palmeri	Palmer Penstemon	Iron UT	0.12	0.11
F	Penstemon palmeri	Palmer Penstemon	Sevier UT	0.06	0.06
F	Sanguisorba minor	Small Burnet		0.18	0.16
F	Sanguisorba minor	Small Burnet		0.82	0.75
F	Sphaeralcea coccinea	Scarlet Globemallow	Iron UT	0.10	0.07
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Beaver UT	0.06	0.05
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Iron UT	0.05	0.04
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Iron/Millard UT	0.06	0.04

Mix Name			Application Type	Application Date	Acres
Hamlin Valley Sagebrush			Aerial	Jan 2016	1650
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak	0.48	0.45
F	Medicago sativa	Alfalfa	Ranger	0.03	0.03
S	Artemisia nova	Black Sagebrush	Utah UT	0.39	0.07
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.25	0.04

Wildlife Habitat and Vegetation History

Table 20R-07.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 20R-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2015	Pinyon-Juniper	Phase III
2019	Rubber Rabbitbrush/Perennial Forb	Phase I
2024	Rubber Rabbitbrush/Perennial Forb-Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2015 - Utah Juniper State: Community Phase 3.2 2019 - Yellow Rabbitbrush/Invasive annuals State: Community Phase 4.2 2024 - Yellow Rabbitbrush/Invasive annuals State: Community Phase 4.1

When the study site was established in 2015, the plant community was dominated by singleleaf pinyon (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*) with a depleted understory and shrub layer. Perennial grasses have increased significantly following the bullhog treatment, likely in part due to seeding (Table 20R-07.1, Table 20R-07.2). Squirreltail (*Elymus elymoides*) and western wheatgrass (*Pascopyrum smithii*) were the dominant perennial grass species in 2019, and western wheatgrass and thickspike wheatgrass (*Elymus lanceolatus*) provided much of the cover in 2024 (Table 20R-07.10). Forbs were initially very sparse on this site, but have since increased with the dominant species being common yarrow (*Achillea millefolium*) and silvery lupine (*Lupinus argenteus*) (Table 20R-07.11). Shrubs have increased significantly in both cover and density following treatment. Rubber rabbitbrush (*Ericameria nauseosa* and/or *E. nausesosa* ssp. *nauseosa* var. *hololeuca*) has been the dominant shrub species since 2019, but lesser amounts of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) have also been present (Table 20R-07.12, Table 20R-07.13). Although pinyon and juniper have provided little cover after treatment, both species have been observed in point-quarter density measurements since 2019 (Table 20R-07.12, Table 20R-07.14).

Condition of this site as mule deer winter range has fluctuated between very poor and fair since 2015; winter habitat condition is considered to be fair as of 2024. Current condition is mainly limited by reduced recruitment of young plants to the preferred browse community and reduced perennial grass cover (Table 20R-07.15). Deer presence has increased over time according to pellet transect data, but has remained low overall (Table 20R-07.9). Utilization of preferred browse has been low throughout the study period, with a majority of plants showing signs of little to no utilization in 2024 (Table 20R-07.13).

Trend Summary Tables

Table 20R-07.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2015	0.4	0.0	13.2	0.4	0.2	77.4
2019	1.5	15.0	0.0	1.3	19.0	-
2024	7.1	12.9	0.2	9.7	16.7	-

Table 20R-07.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2015	25	90	-	29	0.1	1.4	-	0.2
2019	153	199	94	139	3.5	7.3	1.3	16.8
2024	46	199	3	107	1.0	7.6	0.0	8.3

Table 20R-07.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2015	7.6	2.8	74.4	15.4	1.1	15.7
2019	3.3	-	75.6	3.8	0.4	40.4
2024	5.5	-	71.7	2.2	0.1	37.4

Table 20R-07.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2015	1	-	-	-	36
2019	3	3	6	-	7
2024	1	2	2	-	8
Year	Days Use Per Acre (ha)				
2015	0.7 (1.8)	0.7 (1.7)	0.7 (1.7)	-	-
2019	10.2 (25.1)	1.3 (3.3)	6.7 (16.6)	0.6 (1.4)	-
2024	28.3 (69.9)	13.4 (33.1)	16.8 (41.4)	-	-

Table 20R-07.10 - 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)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency							
2015	-	25	90	-	-	-	-	-
2019	1	153	116	18	2	68	10	4
2024	5	46	72	60	-	54	20	-
year	Average Cover (%)							
2015	-	0.1	1.4	-	-	-	-	-
2019	0.0	3.5	3.6	0.7	0.0	2.6	0.3	0.0
2024	0.2	1.0	1.8	2.7	-	2.2	0.7	-

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

Table 20R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis (rockcress)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gilia inconspicua[a] (shy gilia)	Hedysarum boreale (Utah sweetvetch)	Helianthus annuus[a] (common sunflower)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Medicago sativa[i] (alfalfa)	Microsteris gracilis[a] (slender phlox)	Penstemon comarrhenus (dusty beardtongue)
year	Nested Frequency																
2015	-	-	-	-	9	-	-	-	-	-	-	-	9	4	-	-	3
2019	44	2	4	2	14	7	39	8	2	2	1	1	3	69	12	15	2
2024	20	-	-	-	-	-	-	-	-	1	-	1	4	82	-	-	2
year	Average Cover (%)																
2015	-	-	-	-	0.1	-	-	-	-	-	-	-	0.0	0.0	-	-	0.0
2019	4.4	0.0	0.0	0.0	0.2	0.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0	11.4	0.5	0.1	0.0
2024	0.8	-	-	-	-	-	-	-	-	0.0	-	0.0	0.4	6.8	-	-	0.0

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

FORB SPECIES	Penstemon leiophyllus (smoothleaf beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency							
2015	6	-	-	-	1	-	-	-
2019	-	2	1	16	5	26	0	10
2024	-	-	-	12	-	-	2	3
year	Average Cover (%)							
2015	0.0	-	-	-	0.0	-	-	-
2019	-	0.0	0.0	0.2	0.0	0.2	0.0	0.1
2024	-	-	-	0.2	-	-	0.0	0.0

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

Table 20R-07.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca[p] (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus monophylla[t] (singleleaf pinyon)
year	Line Intercept Cover (%)							
2015	-	0.4	-	-	0.2	39.5	-	37.9
2019	-	1.3	19	-	-	-	-	-
2024	-	1.2	16.7	8.5	-	-	-	-
year	Quadrat Cover (%)							
2015	-	0.4	-	-	0.0	2.1	0.0	11.0
2019	0.1	1.4	14.9	-	0.0	0.0	-	-
2024	0.8	1.2	12.9	5.0	-	0.2	-	0.0

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

Table 20R-07.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2015	-	-	-	-	-	-	-	-	18/27
2019	20	-	0	100	0	0	0	0	31/60
2024	20	-	0	100	0	0	0	0	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2015	240	20	42	25	33	17	42	33	83/46
2019	100	20	0	100	0	0	0	0	59/84
2024	280	-	7	86	7	21	0	7	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2015	20	-	0	100	0	0	0	0	36/27
2019	4440	9800	76	24	0	0	0	0	96/117
2024	4420	-	29	63	8	1	0	8	- / -
Ericameria nauseosa ssp. nauseosa var. hololeuca[p] -- (rubber rabbitbrush)									
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	84/102
2024	860	-	14	77	9	2	0	9	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2015	80	-	0	100	0	0	0	0	25/26
2019	-	160	0	0	0	0	0	0	30/37
2024	40	-	0	100	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2015	240	80	33	67	0	0	8	0	- / -
2019	120	-	100	0	0	0	0	0	- / -
2024	140	-	71	29	0	0	0	14	- / -
Opuntia -- (pricklypear)									
2015	-	20	0	0	0	0	0	0	15/38
2019	-	-	-	-	-	-	-	-	15/70
2024	-	-	-	-	-	-	-	-	-/-

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 monophylla[t] -- (singleleaf pinyon)									
2015	260	780	31	62	8	0	0	8	- / -
2019	40	-	100	0	0	0	0	0	- / -
2024	20	-	100	0	0	0	0	0	- / -

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

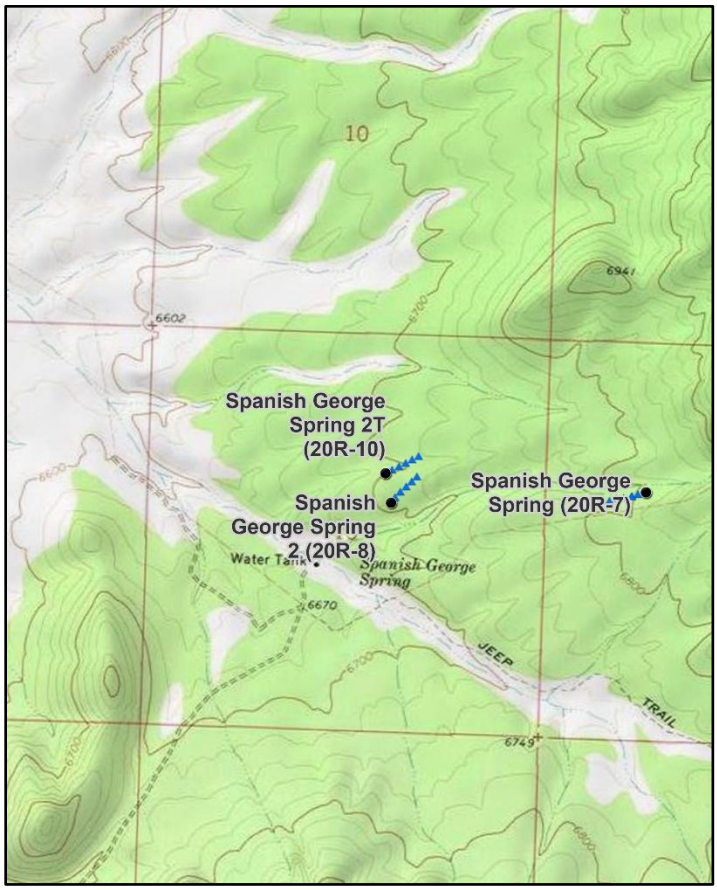
Table 20R-07.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

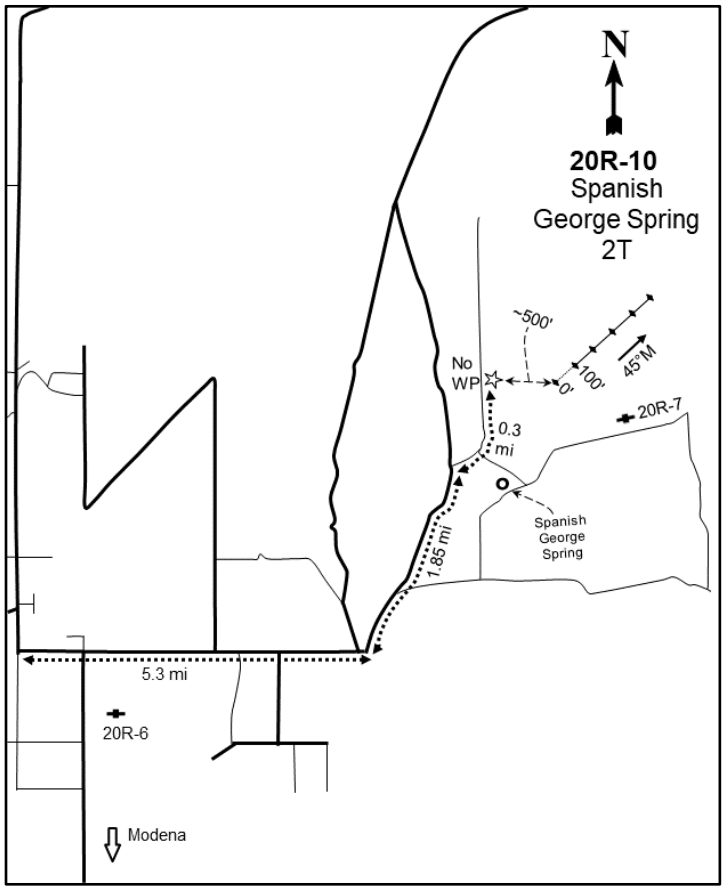
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2015	85	6	11	6	17	61	16.4
2019	33	43	57	-	-	-	4.1
2024	31	-	69	31	-	-	4.4
Pinus monophylla (singleleaf pinyon)							
2015	555	70	5	10	15	-	2.5
2019	7	100	-	-	-	-	1.5
2024	1	-	50	50	-	-	4.5

Table 20R-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
2015	0.5	0.0	0.0	2.8	-0.1	0.4	0.0	**3.6**	Very Poor
2019	1.6	0.0	0.0	14.6	-2.6	10.0	0.0	**23.6**	Very Poor
2024	12.1	12.3	6.6	15.2	-0.7	10.0	0.0	**55.5**	Fair

SPANISH GEORGE SPRING 2T - STUDY NO. 20R-10





Location Information

USGS 7.5 min Map Info	Steamboat Mountain S; Township 32S, Range 18W, Section 15
GPS (0' Stake)	NAD 83 UTM ZONE 12, 249907 East 4212105 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	45° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Drive west from the Indian Peaks cabin for 0.3 miles to a fork and turn left. Proceed 0.1 miles to another fork, again staying left. From there, drive 2.9 miles to a cattle guard. From the cattle guard, drive 1.4 miles to a junction. Turn right and proceed 1.2 miles to an intersection. Go straight, crossing another cattle guard. From the cattle guard, drive 5.8 miles (staying on the main road) to a fork. Proceed left and drive 4.1 miles to another fork. Go left again and continue for 4.6 miles to a fork leading to Arrowhead Pass. Stay on the main road for another 6.2 miles. Turn left onto North Hamblin Valley Road and continue onto Spanish George Road. Drive for 6.6 miles (the road will turn north). Turn left onto a dirt road and drive 1.5 miles to an intersection. Turn left (north) and continue for 2.2 miles, passing study #20R-07; the road will make a hairpin turn to the left. A road comes in from the right (north): turn onto this road and continue for 0.1 miles. The site is on the left-hand side of the road, about 150 feet away; there is no witness post.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SPANISH GEORGE
Elevation	6,700ft (2,042m)
Aspect	Northwest
Slope	5%

Sample Dates 08/13/2019, 07/31/2024

Table 20R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Hamlin Valley Habitat Restoration Project - Sagebrush Restoration Year 2	3686	October 2016-June 2017	848
Seeding - Aerial Before	Hamlin Valley Habitat Restoration Project - Sagebrush Restoration Year 2	3686	January 2017	848

Table 20R-10.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hamlin Valley			Aerial	Sep 2015	1650
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	3.00	2.78
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.48	1.31
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.48	1.31
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.12	0.96
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.55	0.46
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.33	1.14
F	Balsamorhiza sagittata	Arrowleaf Balsamrood	Box Elder/Sevier/Sanpete	0.08	0.06
F	Hedysarum boreale	Utah Sweetvetch	Timp	0.05	0.03
F	Hedysarum boreale	Utah Sweetvetch	Timp	0.19	0.14
F	Hedysarum boreale	Utah Sweetvetch	Timp	0.06	0.05
F	Heliomeris multiflora	Showy Goldeneye	Sanpete UT	0.02	0.01
F	Heliomeris multiflora	Showy Goldeneye	Sanpete UT	0.12	0.10
F	Heliomeris multiflora	Showy Goldeneye	Sanpete UT	0.04	0.04
F	Linum lewisii	Lewis Flax	Maple Grove	0.09	0.07
F	Linum lewisii	Lewis Flax	Maple Grove	0.18	0.14
F	Lomatium dissectum	Fernleaf Biscuitrood	Washington ID	0.06	0.04
F	Medicago sativa	Alfalfa	Ladak +	0.50	0.44
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.97
F	Penstemon pachyphyllus	Thickleaf Penstemon	White Pine NV	0.09	0.07
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.18	0.16
F	Penstemon palmeri	Palmer Penstemon	Iron UT	0.12	0.11
F	Penstemon palmeri	Palmer Penstemon	Sevier UT	0.06	0.06
F	Sanguisorba minor	Small Burnet		0.18	0.16
F	Sanguisorba minor	Small Bernet		0.82	0.75
F	Sphaeralcea coccinea	Scarlet Globemallow	Iron UT	0.10	0.07
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Beaver UT	0.06	0.05
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Iron UT	0.05	0.04
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Iron/Millard UT	0.06	0.04

Mix Name			Application Type	Application Date	Acres
Hamlin Valley Sagebrush			Aerial	Jan 2016	1650
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak	0.48	0.45
F	Medicago sativa	Alfalfa	Ranger	0.03	0.03
S	Artemisia nova	Black Sagebrush		0.39	0.07
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		2.56	0.44

Wildlife Habitat and Vegetation History

Table 20R-10.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 20R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2019	Perennial Grass-Forb	Phase I
2024	Perennial Grass-Forb/Mountain Big Sagebrush	Phase I

Site Notes

This is a paired site to the Spanish George Spring 2 study. The original Spanish George Spring 2 study did not fall within the treatment.

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2019-2024 - Current Potential State: Community Phase 2.3

Since the time of study establishment in 2019, this site has been considered to be in a perennial grass and forb-dominated ecological state; the herbaceous understory has remained robust and moderately diverse (Table 20R-10.7). Perennial grasses have been the dominant vegetation community component, with squirreltail (*Elymus elymoides*) and western wheatgrass (*Pascopyrum smithii*) providing most of the perennial grass cover (Table 20R-10.10). Perennial forbs, particularly silvery lupine (*Lupinus argenteus*), have also contributed notable cover (Table 20R-10.11). Although shrubs remained relatively sparse in 2024, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was the dominant species and a codominant vegetation component in that year (Table 20R-10.12, Table 20R-11.13). A small population of Utah juniper (*Juniperus osteosperma*) and singeleaf pinyon (*Pinus monophylla*) remains on this site. Although density is low to moderate as of 2024, trees will likely mature and continue to infill in future sample years (Table 20R-10.14). It is likely that this community will remain in a similar state in the future without a significant disturbance.

This site's condition as mule deer winter range was very poor-poor in 2019 and poor in 2024. Current winter range condition is mainly negatively affected by the limited preferred browse component (Table 20R-10.15). Mule deer pellet groups were not sampled in hoop data in 2019, but deer presence was low in 2024. Preferred browse was limited in 2019: 80% of the small number of black sagebrush plants (*A. nova*) and 20% of mountain big sagebrush plants sampled in density strips were moderately hedged in that year. Density of mountain big sagebrush increased significantly in 2024, and 99% of plants sampled in density strips showed signs of little to no utilization during the most recent sample year. Elk presence has remained low over time (Table 20R-10.9, Table 20R-10.13).

Trend Summary Tables

Table 20R-10.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2019	2.2	0.8	-	1.5	1.3	-
2024	2.5	2.1	-	2.1	1.8	-

Table 20R-10.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2019	51	323	41	154	0.3	11.7	0.2	9.5
2024	31	292	20	183	0.4	16.7	0.9	9.6

Table 20R-10.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2019	21.9	-	58.9	7.7	3.8	21.6
2024	21.8	-	49.6	7.2	2.2	33.4

Table 20R-10.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2019	6	1	4	-	25
2024	9	4	4	-	16
Year	Days Use Per Acre (ha)				
2019	14.5 (35.9)	-	1.3 (3.3)	-	-
2024	2.2 (5.4)	5.3 (13.2)	5.3 (13.2)	0.6 (1.4)	-

Table 20R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency								
2019	13	-	51	253	62	27	54	1	3
2024	54	8	31	114	96	10	122	23	14
year	Average Cover (%)								
2019	0.2	-	0.3	7.7	1.3	0.8	1.6	0.0	0.0
2024	2.8	0.2	0.4	3.5	2.4	0.4	6.2	0.9	0.3

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

Table 20R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Cryptantha (cryptantha)	Dalea searlsiae (Searls' prairie clover)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Heliomeris multiflora (showy goldeneye)	Ipomopsis aggregata (scarlet gilia)	Ipomopsis congesta (ballhead ipomopsis)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Medicago sativa[i] (alfalfa)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)
year	Nested Frequency																
2019	9	11	3	2	9	15	3	13	-	19	5	43	21	65	9	-	-
2024	5	11	2	-	13	-	3	2	2	3	12	22	21	135	-	2	6
year	Average Cover (%)																
2019	0.2	0.1	0.0	0.0	0.2	0.0	0.0	0.1	-	0.2	0.2	0.3	0.6	6.1	0.0	-	-
2024	0.0	0.2	0.0	-	0.5	-	0.0	0.1	0.1	0.0	0.1	0.5	0.7	6.8	-	0.0	0.1

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

FORB SPECIES	Penstemon leonardii (Leonard's beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)	Polygonum douglasii[a] (Douglas' knotweed)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Verbascum thapsus[ai] (common mullein)
year	Nested Frequency									
2019	8	4	10	3	3	-	11	3	7	-
2024	2	1	2	8	9	2	9	0	6	7
year	Average Cover (%)									
2019	0.9	0.0	0.3	0.2	0.0	-	0.0	0.0	0.1	-
2024	0.0	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.7

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

Table 20R-10.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca[p] (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover (%)					
2019	-	1.5	-	0.5	-	0.8
2024	-	1.9	0.5	1.3	0.2	-
year	Quadrat Cover (%)					
2019	0.2	2.0	-	0.2	-	0.7
2024	0.6	1.8	0.2	1.9	0.0	0.0

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

Table 20R-10.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2019	100	-	40	60	0	80	0	0	37/61
2024	120	-	0	100	0	0	0	0	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2019	200	60	40	50	10	20	0	10	46/86
2024	2660	260	67	32	2	1	0	2	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2019	-	-	-	-	-	-	-	-	34/51
2024	60	-	67	33	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2019	80	-	25	75	0	25	0	0	55/68
2024	600	20	73	27	0	0	0	3	- / -
Ericameria nauseosa ssp. nauseosa var. hololeuca[p] -- (rubber rabbitbrush)									
2019	-	-	-	-	-	-	-	-	-/-
2024	40	-	50	0	50	0	0	50	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2019	340	-	0	100	0	0	0	0	34/57
2024	160	-	38	63	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2019	-	-	-	-	-	-	-	-	-/-
2024	20	-	0	100	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2019	-	-	-	-	-	-	-	-	14/45
2024	-	-	-	-	-	-	-	-	-/-
Pinus monophylla[t] -- (singleleaf pinyon)									
2019	80	-	50	0	50	0	0	50	- / -
2024	40	-	100	0	0	0	0	0	- / -

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

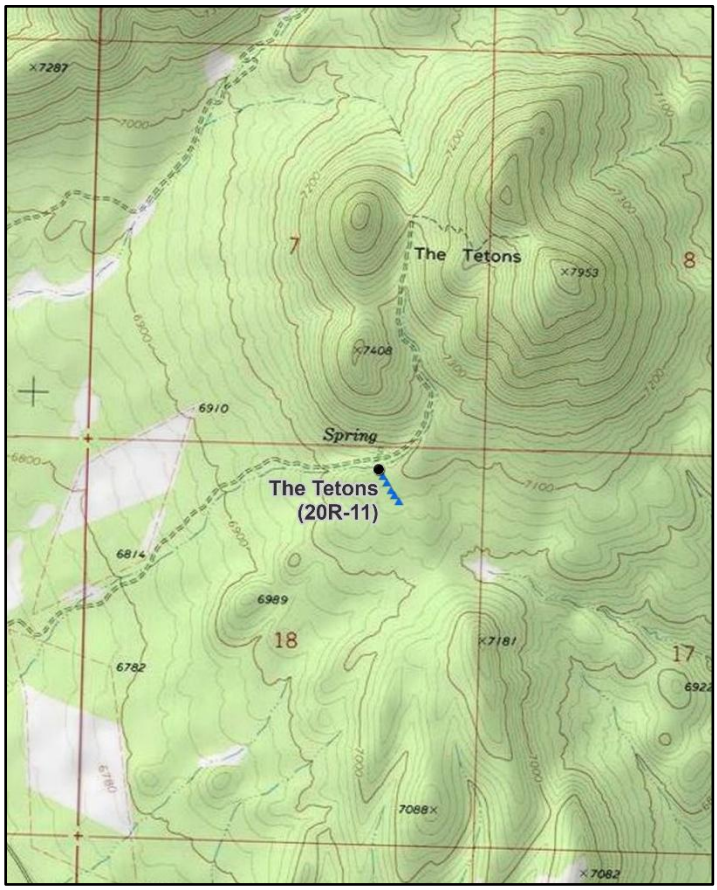
Table 20R-10.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

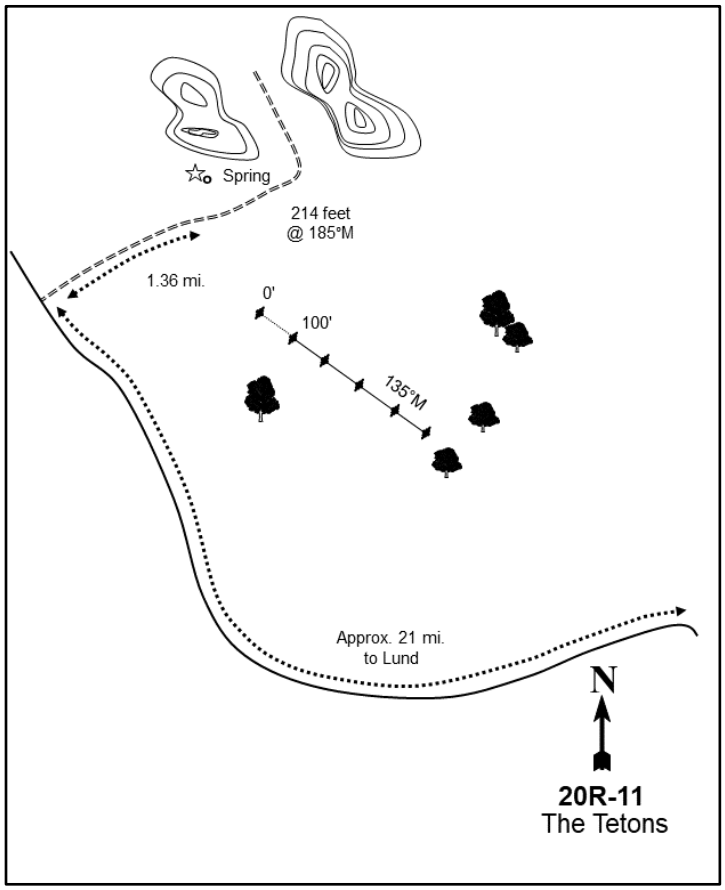
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2019	20	17	83	-	-	-	4.7
2024	38	13	75	13	-	-	3.3
Pinus monophylla (singleleaf pinyon)							
2019	68	33	67	-	-	-	2.7
2024	37	43	57	-	-	-	2.4

Table 20R-10.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2019	1.9	0.0	0.0	23.3	-0.3	10.0	0.0	**34.9**	Very Poor-Poor
2024	2.6	0.0	0.0	30.0	-0.3	10.0	0.0	**42.3**	Poor

THE TETONS - STUDY NO. 20R-11





Location Information

USGS 7.5 min Map Info	The Tetons NW; Township 30S, Range 15W, Section 18
GPS (0' Stake)	NAD 83 UTM ZONE 12, 275145 East 4231767 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	135° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the town of Lund, travel west on Pine Valley Road for approximately 1.3 miles. Turn right (north) on to Blue Mountain Road and travel approximately 22 miles to a jeep trail that intersects the main road; right turn (east). Travel 1.4 miles to a spring and water tank: park here. The site is located across the road to the south and up the hill. Use the GPS to locate the 0-foot and baseline stakes.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	JOCKEYS
Elevation	7,120ft (2,170m)
Aspect	Southwest
Slope	2%
Sample Dates	08/24/2021, 07/30/2024

Table 20R-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Blawn Mountain Wildlife Habitat and Watershed Enhancement Phase I	5669	Fall 2021	3474
Chaining - Two-Way Ely	Blawn Mountain Wildlife Habitat and Watershed Enhancement Phase I	5669	Fall 2021	3474

Table 20R-11.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Blawn Mountain BLM			Aerial	Nov 2021	2885
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.59	1.43
G	Agropyron cristatum	Crested Wheatgrass	Hycrest II	1.01	0.87
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock II	0.52	0.45
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock II	0.97	0.82
G	Pascopyrum smithii	Western Wheatgrass	Recovery	0.34	0.29
G	Pascopyrum smithii	Western Wheatgrass	Recovery	0.68	0.61
G	Poa secunda	Sandberg Bluegrass	Reliable	0.28	0.26
G	Poa secunda	Sandberg Bluegrass	Reliable	0.21	0.18
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky II	0.80	0.70
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.40	1.28
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.09	0.08
F	Linum perenne	Blue Flax	Appar	0.42	0.34
F	Medicago sativa	Alfalfa	Big Sky Ladak	0.52	0.51
F	Melilotus officinalis	Yellow Sweetclover		0.52	0.51
F	Penstemon palmeri	Palmer Penstemon	Iron UT	0.09	0.08
F	Sanguisorba minor	Small Burnet	Delar	0.47	0.44
F	Sanguisorba minor	Small Burnet	Delar	0.54	0.49
S	Atriplex canescens	Fourwing Saltbush	Beaver UT	0.50	0.22
S	Bassia prostrata	Forage Kochia	Box Elder, UT	0.38	0.23
S	Bassia prostrata	Forage Kochia	Humboldt, NV	0.12	0.10
S	Purshia tridentata	Antelope Bitterbrush	Elko NV	0.50	0.49

Wildlife Habitat and Vegetation History

Table 20R-11.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 20R-11.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2021	Pinyon-Juniper	Phase III
2024	Annual-Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Mountain Gravelly Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XA406UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2021, the site was considered to be in Phase III of woodland succession (Table 20R-11.4) and being infilled by Utah juniper (*Juniperus osteosperma*) and singleleaf pinyon (*Pinus monophylla*) (Photos, Table 20R-11.12, Table 20R-11.14). The herbaceous understory was not particularly abundant and provided little cover, with both grasses and forbs being rare. Following the chaining and seeding treatment (Table 20R-11.1), however, cover of perennial grasses increased with the majority of that cover being provided by squirreltail (*Elymus elymoides*). There was also a marked increase in cheatgrass (*Bromus tectorum*) cover following treatment, and annual and perennial grasses were codominant site components in 2024. Perennial forbs -- particularly thickleaf beardtongue (*Penstemon pachyphyllus*) -- also had a notable post-treatment increase in cover (Table 20R-11.7, Table 20R-11.10, Table 20R-11.11). Shrubs were sparse and contributed little to the community prior to chaining. However, black sagebrush (*Artemisia nova*) density exhibited a notable increase when the site was sampled in 2024 (Table 20R-11.12, Table 20R-11.13). As

expected with the removal of juniper and pinyon, tree cover was reduced and the understory increased in abundance and diversity (Table 20R-11.6, Table 20R-11.7); it is expected that the community will continue to experience a rebound in community health.

Condition of this site as mule deer winter range has remained very poor in both 2021 and 2024. Current winter range condition is negatively influenced by the limited preferred browse community, reduced perennial grass cover, and the amount of annual grass cover (Table 20R-11.15). Mule deer presence has been low throughout the study period according to pellet transect data. No utilization was observed on sagebrush plants that were sampled in density strips in 2024. Mormon tea (*Ephedra viridis*) was sampled in density strips in low amounts in 2024, but all plants observed were moderately browsed. Elk presence has been moderate in both sample years. Finally, horse presence was low in 2021, but moderate in 2024 (Table 20R-11.9, Table 20R-11.13); on-site observations for 2024 noted light utilization of squirreltail and Indian ricegrass (*Achnatherum hymenoides*).

Trend Summary Tables

Table 20R-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
2021	0.1	0.0	11.8	0.2	0.2	27.9
2024	2.2	0.2	1.8	0.6	-	1.6

Table 20R-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
2021	-	82	13	27	-	0.9	0.1	0.2
2024	133	243	92	104	5.5	12.9	2.2	4.5

Table 20R-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
2021	3.9	0.3	56.4	36.0	4.3	12.9
2024	14.6	-	57.7	10.9	4.7	30.4

Table 20R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2021	-	1	16	5	23
2024	1	4	9	2	6
Year	Days Use Per Acre (ha)				
2021	-	2.0 (5.0)	22.8 (56.3)	7.0 (17.2)	-
2024	-	7.4 (18.2)	23.4 (57.9)	19.8 (48.8)	-

Table 20R-11.10 - 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)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
2021	0	-	74	-	6	1	2	-
2024	5	133	225	3	-	7	16	3
year	Average Cover (%)							
2021	0.0	-	0.9	-	0.0	0.0	0.0	-
2024	0.1	5.5	12.5	0.0	-	0.0	0.2	0.0

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

Table 20R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Astragalus lentiginosus (freckled milkvetch)	Astragalus purshii (woollypod milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Conyza canadensis[a] (Canadian horseweed)	Dalea searlsiae (Searls' prairie clover)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Eriogonum caespitosum (matted buckwheat)	Eriogonum cernuum[a] (nodding buckwheat)	Eriogonum umbellatum (sulphur-flower 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)	Packera multilobata (lobeleaf groundsel)
year	Nested Frequency																
2021	-	-	1	-	-	-	2	-	7	-	10	-	1	-	4	-	-
2024	6	4	6	7	3	3	49	1	13	4	9	18	-	5	28	3	5
year	Average Cover (%)																
2021	-	-	0.0	-	-	-	0.0	-	0.1	-	0.0	-	0.0	-	0.0	-	-
2024	0.1	0.3	0.1	0.1	0.0	0.0	1.6	0.0	0.3	0.0	0.2	0.1	-	0.0	0.4	0.0	0.0

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

FORB SPECIES	Penstemon leonardii (Leonard's beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Phlox austromontana (mountain phlox)	Physaria (twinpod)	Polygonum douglasii[a] (Douglas' knotweed)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency					
2021	-	6	-	-	8	5
2024	8	45	7	2	-	8
year	Average Cover (%)					
2021	-	0.0	-	-	0.0	0.0
2024	0.1	3.0	0.1	0.0	-	0.1

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

Table 20R-11.12 - 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)	Ephedra viridis[p] (mormon tea)	Juniperus osteosperma[t] (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus monophylla[t] (singleleaf pinyon)
year	Line Intercept Cover (%)					
2021	0.2	-	-	19.3	0.2	8.6
2024	0.1	0.3	0.2	1.5	-	0.1
year	Quadrat Cover (%)					
2021	0.1	-	-	8.6	0.0	3.2
2024	1.4	0.7	0.1	1.2	0.2	0.6

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

Table 20R-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 nova[p] -- (black sagebrush)									
2021	100	20	0	80	20	40	0	20	- / -
2024	320	40	0	100	0	0	0	6	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2021	-	-	-	-	-	-	-	-	-/-
2024	160	-	63	38	0	0	0	0	- / -
Ephedra viridis[p] -- (mormon tea)									
2021	-	-	-	-	-	-	-	-	-/-
2024	60	-	33	67	0	100	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2021	480	-	21	63	17	0	4	17	- / -
2024	280	-	50	43	7	0	0	7	- / -
Opuntia polyacantha -- (plains pricklypear)									
2021	180	-	0	100	0	0	0	11	- / -
2024	240	-	8	92	0	0	0	0	- / -
Pinus monophylla[t] -- (singleleaf pinyon)									
2021	560	80	89	11	0	0	0	4	- / -
2024	160	20	75	13	13	0	0	13	- / -

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

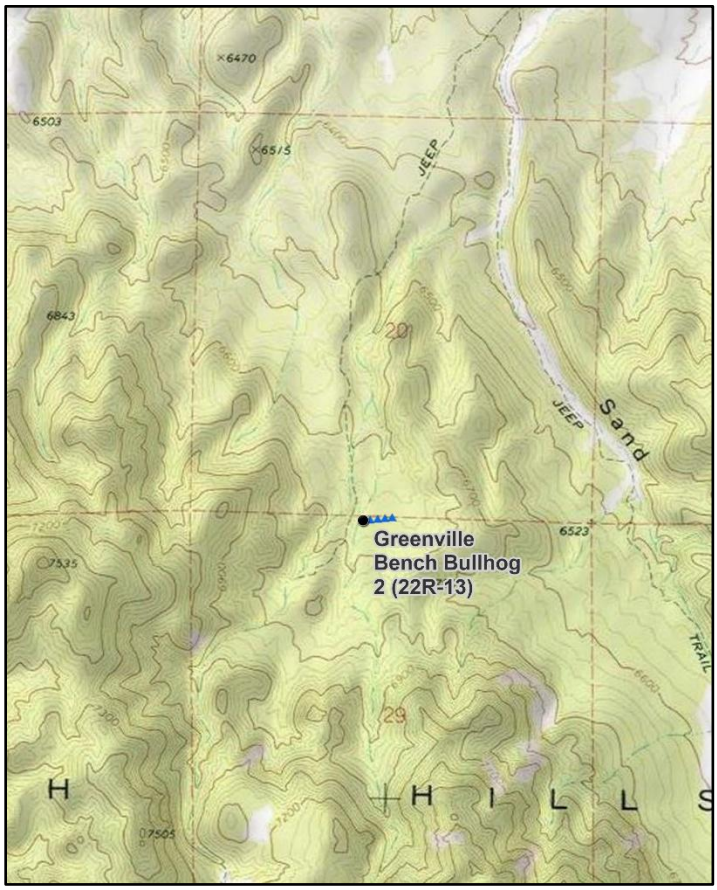
Table 20R-11.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

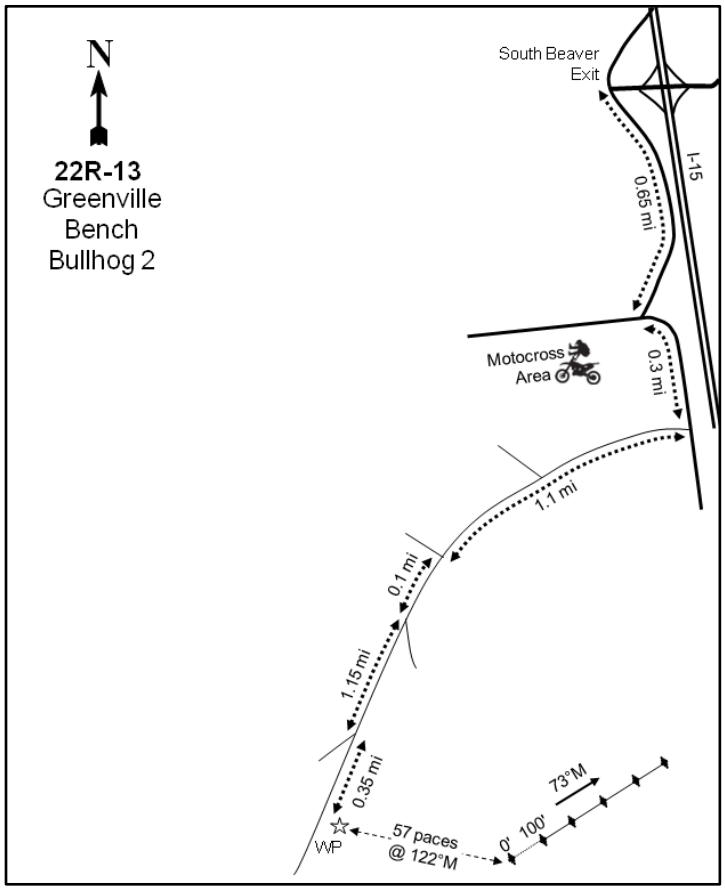
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2021	341	-	20	15	35	30	25.8
2024	132	16	79	5	-	-	10.4
Pinus monophylla (singleleaf pinyon)							
2021	224	45	20	15	15	5	7.0
2024	116	29	65	6	-	-	4.3

Table 20R-11.15 - Deer Desirable Components Index: Mountain Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2021	0.3	0.0	0.0	1.8	0.0	0.5	0.0	**2.6**	Very Poor
2024	0.8	0.0	0.0	25.7	-4.1	8.9	0.0	**31.3**	Very Poor

GREENVILLE BENCH BULLHOG 2 - STUDY NO. 22R-13





Location Information	
USGS 7.5 min Map Info	Greenville Bench SE; Township 30S, Range 7W, Section 29
GPS (0' Stake)	NAD 83 UTM ZONE 12, 353847 East 4226733 North

Transect Information	
Browse Tag # (0' Stake)	112
Transect Bearing	73° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

Take exit 109 off of I-15 and travel west on the overpass toward a Chevron Station. Driving from the Chevron Station, travel south on 600 West for 0.7 miles, then turn left before the motocross area. Continue on the road to where the road turns more toward the south. From here, travel 2.0 miles to a road on the right: turn onto this road and travel 1.1 miles to a fork. Stay left and continue 0.1 miles to another fork. Proceed to the right and travel 1.15 miles to another fork. Go left and proceed 0.5 miles on a small two-track in the bottom of a drainage to a witness post to the left (east) side of the two-track. The 0-foot stake is 57 paces from the witness post at 122 degrees magnetic, and is marked with browse tag #112.

Site Information	
Land Ownership	Federal
Land Administrator	BLM
Allotment	BALD HILLS
Elevation	6,667ft (2,032m)
Aspect	North
Slope	6%
Sample Dates	08/22/2007, 06/28/2011, 07/29/2015, 08/06/2019, 08/21/2024

Table 22R-13.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	BLM Project	-	2008 or 2009	-
Seeding - Aerial	Greenville Bench Aerial Seeding	993	December 2007	11048
Hand Crew - Lop and Scatter	Bone Hollow and Greenville Bench Project Maintenance	4513	November 2018	1939

Table 22R-13.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Greenville Bench Mix #2			Aerial	Dec 2007	4030
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		SITLA MIX		0.13	0.00
G	Achnatherum hymenoides	Indian Ricegrass		0.19	0.00
G	Achnatherum hymenoides	Indian Ricegrass		0.12	0.00
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.30	0.27
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	1.00	0.93
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.30	0.26
G	Dactylis glomerata	Orchardgrass	Paiute	0.14	0.11
G	Dactylis glomerata	Orchardgrass	Paiute	0.22	0.19
G	Dactylis glomerata	Orchardgrass	Paiute	0.74	0.63
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.31	0.29
G	Elymus elymoides	Bottlebrush Squirreltail		0.01	0.00
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	0.21	0.00
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.30	0.28
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.24	0.00
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.06	0.00
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.66	0.53
G	Poa secunda	Canby Bluegrass	Canbar	0.43	0.32
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.10	0.09
G	Psathyrostachys juncea	Russian Wildrye		0.04	0.00
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	0.81	0.75
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.30	0.25
G	Sporobolus cryptandrus	Sand Dropseed		0.04	0.00
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	0.26	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.60	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.66	0.58
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.61	0.55
F	Achillea millefolium	Western Yarrow		0.02	0.00
F	Linum lewisii	Lewis Flax	Maple Grove	0.20	0.19
F	Linum perenne	Blue Flax		0.02	0.00
F	Linum perenne	Blue Flax	Appar	0.07	0.06
F	Medicago sativa	Alfalfa	Ladak	0.10	0.00
F	Medicago sativa	Alfalfa	Ladak	0.81	0.77
F	Medicago sativa	Alfalfa	Ladak	0.10	0.09
F	Medicago sativa	Alfalfa	Ranger	0.10	0.09
F	Melilotus officinalis	Yellow Sweetclover		0.62	0.51
F	Melilotus officinalis	Yellow Sweetclover		0.37	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.10	0.09
F	Onobrychis viciifolia	Sainfoin	Eski	0.61	0.59
F	Onobrychis viciifolia	Sainfoin	Eski	2.01	1.77
F	Penstemon palmeri	Palmer Penstemon		0.02	0.00
F	Penstemon palmeri	Palmer Penstemon	Carbon/Washington/Iron	0.05	0.04
F	Sanguisorba minor	Small Burnet	Delar	2.01	1.86
F	Sanguisorba minor	Small Burnet		0.60	0.00
F	Sanguisorba minor	Small Burnet	Delar	0.61	0.57
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow		0.01	0.00
S	Atriplex canescens	Fourwing Saltbush		0.04	0.00
S	Bassia prostrata	Forage Kochia	Humbolt/Lander NV	0.14	0.09

Wildlife Habitat and Vegetation History

Table 22R-13.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 22R-13.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon-Juniper	Phase III
2011	Annual Forb	Phase I
2015	Perennial Grass/Bitterbrush/Gambel Oak	Phase I
2019	Perennial Grass/Bitterbrush/Gambel Oak	Phase I
2024	Perennial Grass/Bitterbrush/Gambel Oak	Phase I

Site Notes

No Notes

Soils

Table 22R-13.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.8	63.4	20.0	16.6	1.6	6.6	124.8	0.5	08/22/2007

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2007 - Utah Juniper/Invasive Annuals State: Community Phase 3.2 2011-2015 - Yellow Rabbitbrush/Invasive Annuals State: Community Phase 4.2 2019-2024 - Seeded Range State: Community Phase 5.2

Upon study establishment in 2007, this site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be in Phase III of woodland succession. Many of these trees were removed during a bullhog treatment in 2008 or 2009 and again by a lop and scatter in 2018 (Table 22R-13.1), and the site has been considered to be in Phase I of woodland succession since 2011 (Table 22R-13.4, Table 22R-13.14). Cover of browse species has increased following treatment, and antelope bitterbrush (*Purshia tridentata*) and Gambel oak (*Quercus gambelii*) attained codominance in 2015 (Table 22R-13.12). Although the herbaceous understory was initially scarce, diversity and abundance increased over time; annual forbs were the dominant site component in 2011. Perennial grasses, particularly the native species squirreltail (*Elymus elymoides*) and introduced species intermediate wheatgrass (*Thinopyrum intermedium*), increased and have been codominant with browse species since 2015. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in varying abundance throughout the duration of the study period and contributed notable cover in 2024 (Table 22R-13.7, Table 22R-13.10, Table 22R-13.11).

This site has ranged from being in very poor to fair condition for wintering mule deer since 2007. Winter range condition is considered to be fair as of 2024, and negatively influential factors include reduced preferred browse cover and recruitment of young, the amount of annual grass cover, and limited cover of perennial forbs (Table 22R-13.15). Deer presence has increased overall according to pellet transect data and was moderate in 2024 (Table 22R-13.9). Over 60% of bitterbrush plants sampled in density strips have been moderately to heavily hedged in most sample years, while about 70% or more of oak plants have received little to no utilization throughout the study period (Table 22R-13.13).

Trend Summary Tables

Table 22R-13.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	1.7	0.0	8.2	4.2	0.1	43.4
2011	3.9	0.2	-	4.4	0.5	0.1
2015	6.3	1.1	0.2	8.3	1.7	2.4
2019	6.5	2.9	-	9.3	3.3	2.1
2024	9.2	3.0	0.0	12.2	5.6	4.3

Table 22R-13.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	8	14	101	21	0.0	0.1	0.6	0.1
2011	217	189	397	73	7.7	7.3	20.9	1.6
2015	73	307	45	21	1.1	20.3	0.5	0.4
2019	203	296	188	17	7.2	21.9	1.6	0.6
2024	208	283	9	8	11.0	19.3	0.2	0.4

Table 22R-13.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	15.8	1.6	56.7	24.1	3.8	10.3
2011	7.6	-	60.2	2.0	3.3	38.9
2015	8.8	0.0	64.9	8.6	0.4	32.1
2019	10.6	-	73.8	2.9	1.8	35.1
2024	11.4	-	59.2	3.5	1.9	40.8

Table 22R-13.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	-	13	1	43
2011	-	6	-	7
2015	-	9	1	18
2019	5	12	-	3
2024	10	17	-	4
Year	Days Use Per Acre (ha)			
2007	-	11.4 (28.1)	1.3 (3.3)	-
2011	-	10.7 (26.5)	-	-
2015	-	14.7 (36.4)	-	-
2019	8.7 (21.5)	23.4 (57.9)	1.3 (3.3)	-
2024	23.2 (57.4)	20.8 (51.3)	0.7 (1.7)	-

Table 22R-13.10 - 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)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium[i] (intermediate wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency												
2007	1	-	-	8	-	13	-	-	-	-	-	-	-
2011	3	11	4	213	-	170	-	6	1	3	-	4	10
2015	1	10	-	73	2	274	0	-	-	6	2	82	2
2019	0	14	-	203	-	165	-	1	1	18	-	165	10
2024	-	73	-	208	-	58	3	21	-	3	6	170	-
year	Average Cover (%)												
2007	0.0	-	-	0.0	-	0.1	-	-	-	-	-	-	-
2011	0.0	0.9	0.0	7.7	-	6.0	-	0.1	0.0	0.1	-	0.2	0.0
2015	0.0	1.4	-	1.1	0.0	15.6	0.0	-	-	0.6	0.0	2.6	0.0
2019	0.2	1.0	-	7.2	-	6.4	-	0.1	0.0	2.1	-	12.1	0.0
2024	-	2.6	-	11.0	-	3.0	0.1	1.8	-	0.5	0.2	10.9	-

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

Table 22R-13.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis holboellii[a] (Holboell's rockcress)	Astragalus argophyllus (silverleaf milkvetch)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cirsium (thistle)	Collinsia parviflora[a] (maiden blue eyed Mary)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Eriogonum caespitosum (matted buckwheat)	Eriogonum cernuum[a] (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gilia inconspicua[a] (shy gilia)	Hackelia patens (spotted stickseed)	Hymenopappus filifolius (fineleaf hymenopappus)
year	Nested Frequency																
2007	-	4	-	-	-	-	-	-	27	-	3	32	-	1	-	-	-
2011	-	5	1	3	43	-	1	21	41	7	5	10	0	12	32	2	-
2015	-	-	-	-	-	-	8	-	3	1	10	3	1	-	-	-	-
2019	3	1	-	-	1	3	2	1	2	-	7	28	1	9	32	-	2
2024	4	1	2	-	-	-	0	-	-	1	2	5	-	2	-	-	-
year	Average Cover (%)																
2007	-	0.0	-	-	-	-	-	-	0.1	-	0.1	0.3	-	0.0	-	-	-
2011	-	0.0	0.0	0.0	0.2	-	0.0	0.1	0.2	0.0	0.2	0.3	0.0	0.0	0.1	0.0	-
2015	-	-	-	-	-	-	0.2	-	0.0	0.0	0.1	0.0	0.0	-	-	-	-
2019	0.2	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.2	0.2	0.2	0.0	0.2	-	0.0
2024	0.2	0.0	0.0	-	-	-	0.0	-	-	0.0	0.1	0.1	-	0.0	-	-	-

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

FORB SPECIES	Lactuca serriola[ai] (prickly lettuce)	Linum lewisii (Lewis flax)	Lygodesmia (skeletonplant)	Medicago sativa[i] (alfalfa)	Microsteris gracilis[a] (slender phlox)	Onobrychis viciifolia[i] (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Streptanthus cordatus (heartleaf twistflower)	Taraxacum officinale (common dandelion)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency																
2007	-	-	-	-	24	-	8	3	-	1	41	-	-	-	6	-	-
2011	329	6	1	3	284	4	-	-	0	-	11	9	16	1	-	3	17
2015	5	0	-	-	-	-	-	-	-	-	7	2	-	-	-	-	26
2019	20	1	-	-	95	-	-	-	-	1	66	-	-	-	-	-	3
2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
year	Average Cover (%)																
2007	-	-	-	-	0.1	-	0.0	0.0	-	0.0	0.2	-	-	-	0.0	-	-
2011	15.6	0.1	0.0	0.2	4.3	0.2	-	-	0.0	-	0.0	0.7	0.1	0.0	-	0.0	0.3
2015	0.0	0.0	-	-	-	-	-	-	-	-	0.2	0.0	-	-	-	-	0.3
2019	0.1	0.0	-	-	0.8	-	-	-	-	0.0	0.3	-	-	-	-	-	0.0
2024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Table 22R-13.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia fragilis (brittle pricklypear)	Peraphyllum ramosissimum[p] (wild crab apple)	Pinus edulis[t] (twoneedle pinyon)	Purshia tridentata[p] (antelope bitterbrush)	Quercus gambelii[p] (Gambel oak)
year	Line Intercept Cover (%)								
2007	-	-	0.1	8.8	-	0.9	34.6	0.8	2.5
2011	-	0.3	0.2	0.1	-	0.1	-	2.1	2.2
2015	-	1.4	0.3	0.6	-	0.3	1.8	4	4
2019	-	3.2	0.1	-	-	0.5	2.1	5.9	2.9
2024	-	5.3	0.3	-	-	0.7	4.3	8.5	3
year	Quadrat Cover (%)								
2007	-	-	0.0	0.9	0.0	0.1	7.3	0.8	0.8
2011	0.4	0.1	0.0	0.0	-	0.0	-	2.0	1.5
2015	-	1.0	0.1	0.0	-	0.3	0.2	3.2	2.7
2019	-	2.9	0.0	-	-	0.1	0.0	4.9	1.5
2024	-	2.4	0.6	-	-	0.2	0.0	6.9	2.1

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

Table 22R-13.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia frigida[p] -- (prairie sagewort)									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	30/39
2015	-	-	-	-	-	-	-	-	34/71
2019	-	-	-	-	-	-	-	-	28/95
2024	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2007	40	-	0	0	100	0	50	100	- / -
2011	20	-	0	100	0	0	100	0	28/25
2015	-	-	-	-	-	-	-	-	43/52
2019	-	-	-	-	-	-	-	-	51/84
2024	-	-	-	-	-	-	-	-	-/-
Bassia prostrata[pi] -- (forage kochia)									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	34/60
2024	-	-	-	-	-	-	-	-	-/-
Cercocarpus ledifolius[p] -- (curl-leaf mountain mahogany)									
2007	20	-	0	100	0	0	100	0	61/75
2011	-	-	-	-	-	-	-	-	77/81
2015	20	-	100	0	0	100	0	0	63/94
2019	-	-	-	-	-	-	-	-	142/155
2024	20	-	0	100	0	0	100	0	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	70/86
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2011	40	-	50	50	0	0	0	0	32/54
2015	40	-	0	100	0	0	0	0	91/140
2019	160	-	13	88	0	0	0	0	88/130
2024	300	-	13	87	0	13	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2007	80	-	0	100	0	0	0	0	23/22
2011	60	-	0	100	0	0	0	0	20/26
2015	140	80	14	57	29	0	14	29	30/39
2019	60	-	0	67	33	0	0	0	27/30
2024	320	-	0	100	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2007	120	-	33	67	0	0	0	0	- / -
2011	-	40	0	0	0	0	0	0	- / -
2015	120	-	83	17	0	0	0	0	- / -
2019	60	-	100	0	0	0	0	0	- / -
2024	40	-	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 (%)		
Kraschenninnikovia lanata[p] -- (winterfat)									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	65/83
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Opuntia fragilis -- (brittle pricklypear)									
2007	-	80	0	0	0	0	0	0	9/20
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	12/24
2015	-	-	-	-	-	-	-	-	13/31
2019	-	-	-	-	-	-	-	-	15/48
2024	-	-	-	-	-	-	-	-	-/-
Peraphyllum ramosissimum[p] -- (wild crab apple)									
2007	120	-	17	33	50	17	33	50	115/129
2011	40	-	0	100	0	50	0	0	55/79
2015	80	-	0	100	0	100	0	25	78/99
2019	80	-	0	100	0	25	75	0	79/124
2024	60	-	0	100	0	0	33	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2007	300	160	53	47	0	0	0	0	- / -
2011	-	20	0	0	0	0	0	0	- / -
2015	20	20	100	0	0	0	0	0	- / -
2019	20	-	100	0	0	0	0	0	- / -
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2007	180	20	11	78	11	22	44	11	69/118
2011	160	20	38	63	0	38	13	0	47/88
2015	480	-	8	88	4	58	13	8	57/104
2019	380	-	5	95	0	26	68	0	62/128
2024	580	-	3	97	0	21	76	0	- / -
Quercus gambelii[p] -- (Gambel oak)									
2007	460	40	13	83	4	0	0	0	117/99
2011	1080	-	0	100	0	0	0	0	- / -
2015	1100	-	20	80	0	31	0	0	92/68
2019	940	-	15	85	0	4	15	0	118/59
2024	740	-	16	84	0	0	0	0	- / -
Sambucus[p] -- (elderberry)									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	93/161
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	194/186

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

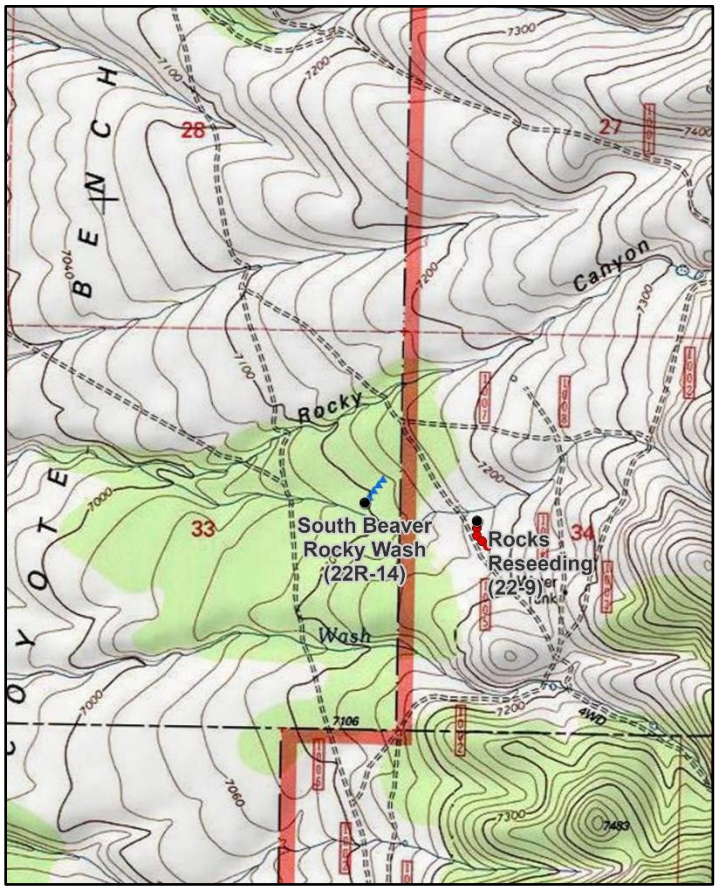
Table 22R-13.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

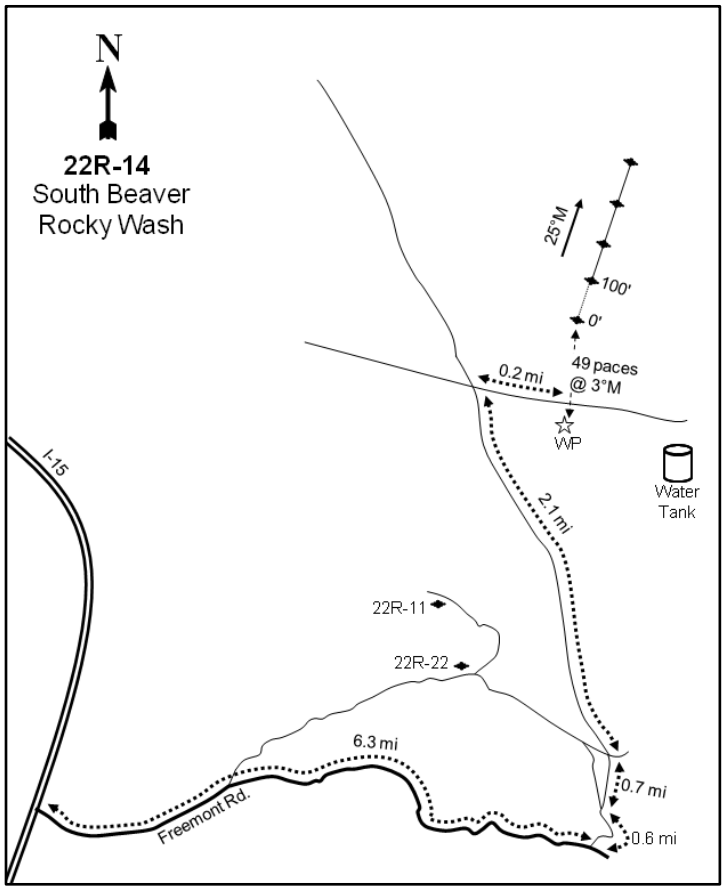
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	143	-	10	15	25	50	19.9
2011	10	50	33	-	-	17	11.6
2015	95	65	35	-	-	-	1.9
2019	25	57	43	-	-	-	4.1
2024	42	33	47	13	-	7	6.2
Pinus edulis (twoneedle pinyon)							
2007	245	25	40	15	5	15	5.4
2015	35	50	50	-	-	-	2.5
2019	5	-	-	-	-	100	48.0

Table 22R-13.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2007	4.6	0.0	0.0	0.2	0.0	0.2	0.0	**5.0**	Very Poor
2011	5.5	0.0	0.0	14.5	-5.8	3.2	0.0	**17.4**	Very Poor
2015	10.3	14.3	6.8	30.0	-0.8	0.7	0.0	**61.3**	Fair
2019	12.3	15.0	4.0	30.0	-5.4	1.2	0.0	**57.1**	Fair
2024	16.5	15.0	3.2	30.0	-8.2	0.7	0.0	**57.2**	Fair

SOUTH BEAVER ROCKY WASH - STUDY NO. 22R-14





Location Information

USGS 7.5 min Map Info	Kane Canyon SE; Township 30S, Range 6W, Section 33
GPS (0' Stake)	NAD 83 UTM ZONE 12, 365946 East 4224197 North

Transect Information

Browse Tag # (0' Stake)	109
Transect Bearing	25° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Belt 3: No Rebar

Directions to Site

Begin on I-15 at exit 100, 9 miles south of Beaver. On the east side of the freeway there is a frontage road and a road going east. Travel east for 6.3 miles up Fremont Wash to a road to the left. Turn onto this road and continue 0.6 miles up the road (which has several switchbacks) to the top to a gate. Pass through the gate and continue straight for 0.7 miles to a four-way intersection. Go straight and proceed for 0.65 miles to a fork. Take the middle fork and drive for 0.8 miles to a fork with roads #1002 and 1003. Go right and continue for 1 mile on #1002 to a stock pond. Proceed up a steep hill 0.1 miles to a fork, turn left (#1005), and continue 0.2 miles to another fork. Stay right and travel another 0.1 miles to another fork, then proceed left for 0.3 miles to the witness post on the right (south) side of the road. From the witness post, walk 49 paces to the 0-foot stake at 3 degrees magnetic. The 0-foot stake is marked with browse tag #109.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SOUTH CREEK
Elevation	7,104ft (2,165m)
Aspect	Southwest
Slope	4-5%

Sample Dates 06/09/2008, 06/29/2011, 07/28/2015, 08/08/2019, 08/20/2024

Table 22R-14.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop (No Scatter)	Project Maintenance - South Beaver	3296	September-October 2015	4251
Mechanical - Bullhog	South Beaver Vegetation Enhancement Yr 4	1224	July 2008-August 2009	1520
Seeding - Aerial Before	South Beaver Vegetation Enhancement Yr 4	1224	December 2008	1358

Table 22R-14.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Beaver SITLA vegetation enhancement			Aerial	Dec 2008	1480
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.30	0.27
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.30	0.26
G	Dactylis glomerata	Orchardgrass	Paiute	0.14	0.11
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.30	0.28
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.10	0.09
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.30	0.25
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.61	0.55
F	Linum perenne	Blue Flax	Appar	0.07	0.06
F	Medicago sativa	Alfalfa	Ladak	0.10	0.09
F	Medicago sativa	Alfalfa	Ranger	0.10	0.09
F	Melilotus officinalis	Yellow Sweetclover		0.10	0.09
F	Onobrychis viciifolia	Sainfoin	Eski	0.61	0.59
F	Sanguisorba minor	Small Burnet	Delar	0.61	0.57
S	Bassia prostrata	Forage Kochia	Humbolt/Lander NV	0.14	0.09

Wildlife Habitat and Vegetation History

Table 22R-14.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 22R-14.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Pinyon-Juniper/Mountain Big Sagebrush	Phase II transitioning to Phase III
2011	Perennial Grass/Mountain Big Sagebrush/Bitterbrush	Phase I
2015	Perennial Grass/Mountain Big Sagebrush/Bitterbrush	Phase I
2019	Perennial Grass/Mountain Big Sagebrush/Bitterbrush	Phase I
2024	Mountain Big Sagebrush/Bitterbrush/Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2008 - Utah Juniper/Invasive Annuals State: Community Phase 3.1 2011 - Seeded State: Community Phase 5.2 2015-2024 - Current Potential State: Community Phase 2.2

Prior to the bullhog and seeding treatment in 2008 (22R-14.1), this site was within Phase II transitioning to Phase III of woodland succession. Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) provided the most overstory cover and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was dominant in the shrub layer. In the sample years following the treatment, juniper and pinyon became minor components while mountain big sagebrush and antelope bitterbrush (*Purshia tridentata*) increased and became dominant in the community (Table 22R-14.12, Table 22R-14.13, Table 22R-14.14). The herbaceous understory was fairly diverse, yet not abundant before the treatment (Table 22R-14.7). In subsequent sample years, the condition of the herbaceous layer improved and it has been a codominant site component since 2011; the understory has been mainly comprised of a mixture of native and introduced perennial grasses in the post-treatment sample years. The introduced annual grass species cheatgrass

(*Bromus tectorum*) has been observed in fluctuating amounts, but has contributed little cover in most sample years (Table 22R-14.10). This study site has been classified as being in Phase I of woodland succession throughout the post-treatment study period (Table 22R-14.4). The cover and density of juniper increased from 2011 to 2015, but a lop (no scatter) project in 2015 (Table 22R-14.1) decreased the amount of infilling trees (Table 22R-14.12, Table 22R-14.13).

This site's condition as winter range for mule deer has ranged from very poor to excellent since 2008. Winter range condition is considered to be good as of 2024, and is mainly limited by reduced recruitment of young plants to the preferred browse population and limited perennial forb cover (Table 22R-14.15). According to pellet transect data, deer presence was moderate in 2008, but has remained low since 2011; elk presence has been low throughout the study period (Table 22R-14.9). Utilization of sagebrush has fluctuated over time, but was highest in 2008 and 2019. In 2024, 13% of sagebrush plants sampled in density strips were moderately hedged and 5% were heavily browsed. Antelope bitterbrush density has been lower than that of sagebrush throughout the study period, but utilization has consistently remained higher: 60% or greater of bitterbrush plants have been moderately to heavily utilized in most sample years (Table 22R-14.13).

Trend Summary Tables

Table 22R-14.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	10.7	-	12.7	12.1	-	19.6
2011	5.5	-	0.2	9.4	-	-
2015	14.4	-	0.4	21.1	-	0.3
2019	17.9	-	-	26.6	-	0.1
2024	20.2	-	-	32.6	-	0.2

Table 22R-14.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	36	183	99	156	0.3	6.3	0.3	1.0
2011	236	277	227	139	7.0	19.5	3.3	3.0
2015	78	359	38	49	0.4	23.6	0.1	2.1
2019	57	378	141	17	0.4	29.5	1.3	1.3
2024	29	341	52	21	0.5	20.3	0.1	0.0

Table 22R-14.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	31.8	0.0	39.3	10.8	11.0	27.0
2011	14.5	-	45.4	3.0	6.2	40.8
2015	10.2	0.0	56.6	4.0	5.0	41.5
2019	9.0	2.0	61.5	2.8	8.9	45.0
2024	16.6	0.1	51.2	2.9	7.5	38.1

Table 22R-14.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	1	14	7	90
2011	4	8	4	6
2015	4	9	7	52
2019	5	16	10	14
2024	3	6	4	30
Year	Days Use Per Acre (ha)			
2008	0.7 (1.8)	29.5 (72.8)	12.8 (31.5)	-
2011	3.6 (9.0)	10.7 (26.5)	18.1 (44.7)	-
2015	-	13.4 (33.1)	6.0 (14.9)	-
2019	4.4 (10.8)	5.3 (13.2)	12.1 (29.8)	-
2024	3.6 (9.0)	10.7 (26.5)	2.7 (6.6)	-

Table 22R-14.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus arvensis[ai] (field brome)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency											
2008	5	13	-	36	58	-	-	20	37	23	88	-
2011	22	50	6	236	108	-	-	20	29	22	91	66
2015	29	86	-	78	150	1	3	75	7	15	63	99
2019	2	96	-	57	73	-	-	50	5	11	83	189
2024	7	119	-	29	13	1	1	35	18	19	65	186
year	Average Cover (%)											
2008	0.0	0.4	-	0.3	1.5	-	-	0.2	0.8	0.3	3.1	-
2011	0.5	2.3	0.0	7.0	5.2	-	-	1.1	1.1	0.3	6.3	2.5
2015	1.0	3.0	-	0.4	6.2	0.0	0.0	4.4	0.2	0.2	3.7	4.9
2019	0.2	5.6	-	0.4	2.4	-	-	4.1	0.1	0.7	5.3	11.1
2024	0.3	6.1	-	0.5	0.3	0.1	0.0	0.6	0.3	0.3	4.0	8.4

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

Table 22R-14.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum[ai] (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus megacarpus (great bladdery milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora[a] (maiden blue eyed Mary)	Crepis acuminata (tapertip hawksbeard)	Cymopterus (springparsley)	Delphinium nuttallianum (twolobe larkspur)	Erigeron aphanactis[a] (rayless shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Lactuca serriola[ai] (prickly lettuce)
year	Nested Frequency																
2008	10	-	2	3	2	1	3	16	-	4	-	9	7	3	-	29	-
2011	17	12	-	1	3	9	1	84	22	10	4	13	2	3	-	11	80
2015	-	24	-	1	-	-	-	-	2	-	-	2	-	3	1	-	8
2019	-	126	-	-	-	-	-	6	4	2	-	-	-	3	-	15	1
2024	-	52	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-
year	Average Cover (%)																
2008	0.1	-	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	-	0.1	0.0	0.0	-	0.1	-
2011	0.1	0.1	-	0.0	0.0	0.2	0.0	0.7	0.1	0.1	0.1	0.1	0.2	0.0	-	0.1	1.2
2015	-	0.1	-	0.0	-	-	-	-	0.0	-	-	0.0	-	0.0	0.0	-	0.0
2019	-	1.0	-	-	-	-	-	0.0	0.0	0.0	-	-	-	0.0	-	0.1	0.0
2024	-	0.1	-	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-

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

FORB SPECIES	Linum perenne[i] (blue flax)	Lithospermum incisum (narrowleaf stoneseed)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa[i] (alfalfa)	Melilotus officinalis[i] (sweetclover)	Microsteris gracilis[a] (slender phlox)	Onobrychis viciifolia[i] (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Sanguisorba minor[i] (small burnet)	Tragopogon dubius[ai] (yellow salsify)	Verbascum thapsus[ai] (common mullein)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency																
2008	-	-	43	3	-	-	-	51	-	6	-	96	11	-	-	-	4
2011	27	4	25	15	6	6	1	125	3	4	0	15	12	4	-	-	3
2015	20	-	-	15	-	-	-	-	-	4	-	8	3	2	1	-	-
2019	-	-	2	10	-	-	-	6	-	-	-	4	22	-	-	1	-
2024	-	-	3	1	-	-	-	-	-	-	-	14	-	-	-	-	-
year	Average Cover (%)																
2008	-	-	0.2	0.0	-	-	-	0.1	-	0.0	-	0.5	0.0	-	-	-	0.1
2011	0.9	0.0	0.1	0.4	0.0	0.3	0.1	1.2	0.0	0.2	0.0	0.1	0.0	0.0	-	-	0.0
2015	0.1	-	-	1.8	-	-	-	-	-	0.1	-	0.0	0.0	0.0	0.0	-	-
2019	-	-	0.0	1.2	-	-	-	0.1	-	-	-	0.0	0.1	-	-	0.0	-
2024	-	-	0.0	0.0	-	-	-	-	-	-	-	0.0	-	-	-	-	-

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

Table 22R-14.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Juniperus osteosperma[t] (Utah juniper)	Pinus edulis[t] (twoneedle pinyon)	Purshia stansburiana[p] (Stansbury cliffrose)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)				
2008	8.6	17.6	2	-	3.5
2011	4.7	-	-	-	4.7
2015	10.7	0.3	-	-	10.4
2019	10.5	0.1	-	-	16.1
2024	15.2	0.2	-	-	17.4
year	Quadrat Cover (%)				
2008	7.0	11.5	1.2	0.0	3.7
2011	2.9	0.2	-	-	2.6
2015	6.4	0.4	-	-	7.9
2019	10.0	0.0	-	0.1	7.8
2024	11.5	0.0	-	-	8.7

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

Table 22R-14.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2008	-	20	0	0	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2008	3440	240	4	19	77	19	49	54	47/56
2011	1180	160	24	59	17	17	0	15	45/56
2015	2420	60	26	61	12	31	17	17	55/70
2019	1540	5020	7	77	17	44	13	17	59/80
2024	2280	-	11	83	6	13	5	6	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	30/31
2024	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma[t] -- (Utah juniper)									
2008	100	100	40	60	0	0	0	0	- / -
2011	40	60	100	0	0	0	0	0	- / -
2015	160	20	38	63	0	0	0	0	- / -
2019	60	-	67	33	0	0	0	0	- / -
2024	40	-	0	100	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2008	20	40	0	100	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Purshia stansburiana[p] -- (Stansbury cliffrose)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	60	-	0	100	0	0	100	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2008	420	120	5	76	19	24	71	10	79/120
2011	380	-	11	90	0	26	5	5	40/82
2015	840	-	12	88	0	64	5	0	77/133
2019	480	800	0	100	0	17	79	0	102/175
2024	560	-	0	89	11	21	39	11	- / -

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

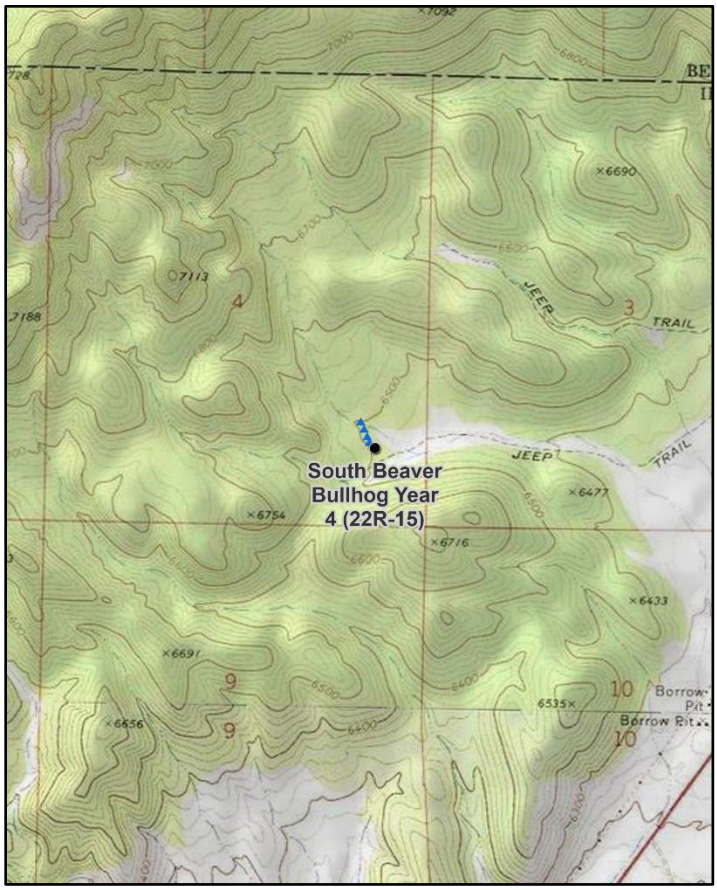
Table 22R-14.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

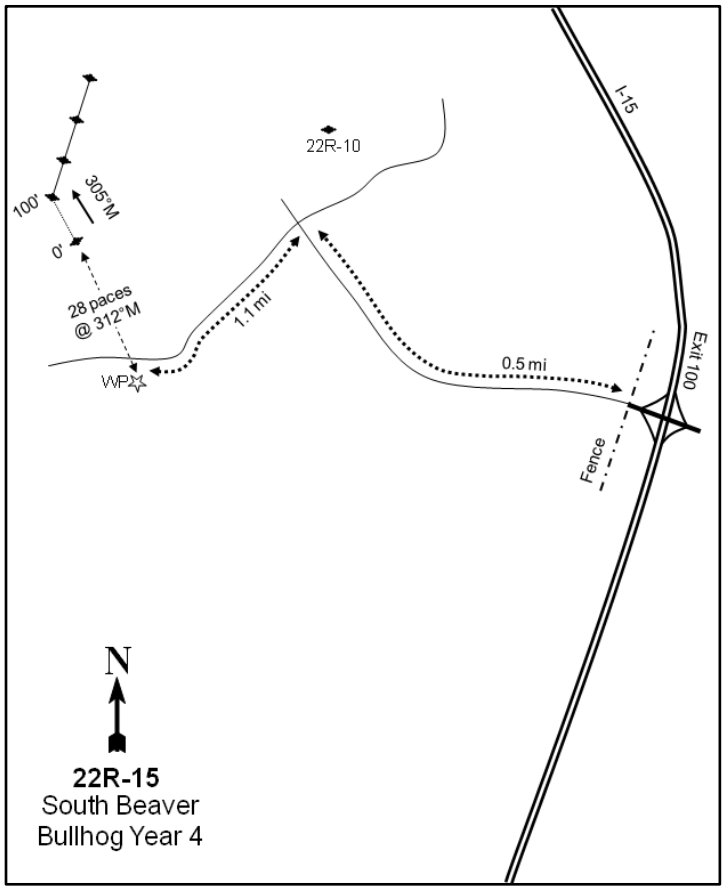
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	128	5	5	25	15	50	23.6
2011	60	44	50	6	-	-	2.6
2015	94	40	45	15	-	-	2.6
2019	17	57	43	-	-	-	4.0
2024	26	-	100	-	-	-	2.5
Pinus edulis (twoneedle pinyon)							
2008	16	-	33	25	25	17	7.8
2015	182	100	-	-	-	-	2.0
2019	2	100	-	-	-	-	4.0
2024	8	-	50	50	-	-	2.5

Table 22R-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
2008	16.0	-3.1	1.9	12.7	-0.2	2.1	0.0	**29.4**	Very Poor
2011	12.9	12.5	8.6	30.0	-5.2	6.0	0.0	**64.8**	Fair-Good
2015	29.0	13.1	9.6	30.0	-0.3	4.2	0.0	**85.6**	Excellent
2019	30.0	13.0	1.3	30.0	-0.3	2.5	0.0	**76.5**	Good
2024	30.0	12.4	2.7	30.0	-0.4	0.1	0.0	**74.8**	Good

SOUTH BEAVER BULLHOG YEAR 4 - STUDY NO. 22R-15





Location Information

USGS 7.5 min Map Info	Greenville Bench SE; Township 31S, Range 7W, Section 04
GPS (0' Stake)	NAD 83 UTM ZONE 12, 355468 East 4222011 North

Transect Information

Browse Tag # (0' Stake)	106
Transect Bearing	305° magnetic (Lines 2-4: 325° magnetic)
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

Proceed south of Beaver on I-15 to exit #100. From the off-ramp, turn right and drive west for 0.5 miles to a left turn onto a jeep trail that is difficult to see (the right turn leads to study #22R-10). Drive 1.1 miles on this road to the witness post on the left (south) side of the road. From the witness post, walk 28 paces to the 0-foot stake at 312 degrees magnetic (across the road). The 0-foot stake is marked with browse tag #106.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	FREMONT
Elevation	6,500ft (1,981m)
Aspect	Northeast
Slope	3-8%
Sample Dates	06/11/2008, 06/27/2011, 07/29/2015, 08/06/2019, 08/21/2024

Table 22R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver	3296	September-October 2015	4251
Mechanical - Bullhog	South Beaver Vegetation Enhancement Yr 4	1224	July 2008-August 2009	1520
Seeding - Aerial Before	South Beaver Vegetation Enhancement Yr 4	1224	December 2008	1358

Table 22R-15.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
S Beaver Veg Enhancement			Aerial	Dec 2008	1224
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.23	1.13
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.94	0.77
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.12	0.11
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.82	0.77
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.84	1.55
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.84	1.69
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.33	0.28
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.17	0.96
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	0.04	0.03
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	0.61	0.56
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	2.45	2.21
F	Linum perenne	Blue Flax	Appar	0.61	0.55
F	Medicago sativa	Alfalfa	Ladak 65	0.61	0.54
F	Medicago sativa	Alfalfa	Ranger	0.61	0.56
F	Melilotus officinalis	Yellow Sweetclover		0.61	0.55
F	Onobrychis viciifolia	Sainfoin	Eski	0.61	0.59
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.12	0.09
F	Sanguisorba minor	Small Burnet	Delar	0.53	0.50
F	Sanguisorba minor	Small Burnet	Delar	0.69	0.64

Wildlife Habitat and Vegetation History

Table 22R-15.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 22R-15.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Pinyon-Juniper/Mountain Big Sagebrush	Phase III
2011	Mountain Big Sagebrush/Annual Forb	Phase I
2015	Mountain Big Sagebrush/Perennial Grass	Phase I
2019	Mountain Big Sagebrush/Perennial Grass	Phase I
2024	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2008 - Utah Juniper/Invasive Annuals State: Community Phase 3.1 2011-2024 - Seeded Range State: Community Phase 5.2

When this site was established in 2008, it was dominated by twoneedle pinyon (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and considered to be within Phase III of woodland succession. A bullhog treatment in 2008-2009 and lop and scatter in 2015 (Table 22R-15.1) removed most of the pinyon and juniper, and the shrub layer has been primarily composed of mountain big sagebrush since that time (Table 22R-15.4, Table 22R-15.12, Table 22R-15.13, Table 22R-15.14). The herbaceous understory was in poor condition prior to the treatment, but improved in subsequent sample years. Annual forbs provided most of the herbaceous cover in 2011. However, perennial grasses such as the introduced species intermediate wheatgrass (*Thinopyrum intermedium*) and native species squirreltail (*Elymus elymoides*) increased and became codominant

vegetation components in 2015. The introduced annual grass species cheatgrass (*Bromus tectorum*) was present with low abundance in most post-treatment sample years, but was not observed in 2024 (Table 22R-15.7, Table 22R-15.10, Table 22R-15.11). Stands of pinyon and juniper are located adjacent to the transect, but these species have remained rare on the site itself since 2019. However, continued tree presence indicates that this site may have the potential for infilling over time (Photos, Table 22R-15.14).

Condition of this site as winter range for mule deer has varied between very poor and good since 2008. Although winter range condition is considered to be good as of 2024, it is negatively affected by reduced preferred browse cover, decadence within the browse community, and reduced recruitment of young plants to the preferred browse population (Table 22R-15.15). Pellet transect data indicates that deer presence has remained low throughout the study period. However, preferred browse utilization has fluctuated from year to year: over 40% of sagebrush plants sampled in density strips were moderately to heavily hedged in 2015 and 2019, but less than 20% have received that level of utilization in other years (Table 22R-15.9, Table 22R-15.13).

Trend Summary Tables

Table 22R-15.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	9.8	0.3	10.6	8.6	0.1	27.5
2011	4.3	0.5	-	6.8	0.4	-
2015	7.1	2.6	0.0	8.7	1.3	-
2019	8.8	0.9	-	9.4	0.4	0.2
2024	10.7	0.2	0.0	12.0	0.3	0.4

Table 22R-15.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	-	38	1	35	-	0.1	0.0	0.8
2011	104	150	375	111	0.8	7.0	15.6	5.0
2015	25	280	5	92	1.1	14.3	0.0	8.2
2019	86	320	155	88	1.8	26.8	2.3	5.9
2024	-	316	4	80	-	22.3	0.0	5.0

Table 22R-15.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	20.2	0.2	43.9	30.1	5.9	20.2
2011	9.1	0.1	53.0	8.9	2.1	34.5
2015	5.5	0.0	65.6	7.1	2.6	34.6
2019	7.0	0.6	63.0	8.9	2.3	41.9
2024	12.4	-	51.9	10.8	2.3	37.0

Table 22R-15.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	-	-	-	80
2011	-	2	-	1
2015	1	4	1	57
2019	1	7	-	34
2024	2	4	-	15
Year	Days Use Per Acre (ha)			
2008	-	-	-	-
2011	1.5 (3.6)	3.4 (8.3)	-	-
2015	-	-	-	-
2019	8.0 (19.7)	5.3 (13.2)	-	-
2024	0.7 (1.8)	2.7 (6.6)	-	-

Table 22R-15.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Agropyron fragile[i] (Siberian wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus arvensis[ai] (field brome)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium[i] (intermediate wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency														
2008	1	-	-	-	3	-	-	34	-	-	-	-	-	-	-
2011	15	26	42	-	2	12	91	53	25	-	5	19	-	28	3
2015	10	29	23	4	5	-	25	158	5	3	4	7	-	117	-
2019	-	44	38	3	5	10	77	114	-	2	-	28	2	187	6
2024	1	36	41	2	2	-	-	49	4	0	1	2	5	227	-
year	Average Cover (%)														
2008	0.0	-	-	-	0.0	-	-	0.1	-	-	-	-	-	-	-
2011	0.2	0.9	1.4	-	0.0	0.0	0.8	2.1	0.9	-	0.0	0.4	-	1.1	0.0
2015	0.3	1.1	1.5	0.0	0.4	-	1.1	4.4	0.2	0.1	0.0	0.6	-	5.6	-
2019	-	3.8	2.8	0.0	0.2	0.1	1.7	5.6	-	0.1	-	2.9	0.0	11.3	0.0
2024	0.0	3.2	2.7	0.0	0.1	-	-	1.7	0.8	0.0	0.0	0.2	0.2	13.3	-

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

Table 22R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Collinsia parviflora[a] (maiden blue eyed Mary)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erysimum (wallflower)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gilia inconspicua[a] (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Ipomopsis aggregata (scarlet gilia)
year	Nested Frequency																
2008	0	-	6	-	-	-	3	4	-	-	-	1	-	-	-	-	2
2011	6	1	5	-	4	4	-	9	42	-	-	31	2	82	86	-	2
2015	-	-	-	-	-	-	9	-	-	-	2	3	-	-	-	5	2
2019	-	3	-	-	17	-	10	3	8	28	-	4	-	28	32	3	-
2024	-	-	-	10	-	-	4	-	-	-	2	3	-	4	-	6	-
year	Average Cover (%)																
2008	0.0	-	0.0	-	-	-	0.0	0.0	-	-	-	0.0	-	-	-	-	0.0
2011	0.4	0.0	0.2	-	0.0	0.0	-	0.4	0.2	-	-	0.3	0.0	0.3	0.3	-	0.0
2015	-	-	-	-	-	-	0.1	-	-	-	0.0	0.0	-	-	-	0.1	0.1
2019	-	0.0	-	-	0.3	-	0.4	0.0	0.0	0.3	-	0.0	-	0.6	0.3	0.2	-
2024	-	-	-	0.0	-	-	0.2	-	-	-	0.1	0.0	-	0.0	-	0.1	-

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

FORB SPECIES	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Lepidium ramosissimum var. bourgeauanum[a] (Bourgeau's pepperweed)	Linum perenne[i] (blue flax)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Lygodesmia (skeletonplant)	Machaeranthera canescens (hoary tansyaster)	Mentzelia albicaulis[a] (whitestem blazingstar)	Microsteris gracilis[a] (slender phlox)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon eatonii (firecracker penstemon)	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Salsola tragus[ai] (prickly Russian thistle)
year	Nested Frequency																
2008	-	-	-	-	10	5	-	-	-	-	-	9	-	-	-	-	1
2011	344	9	7	14	23	22	-	2	9	128	6	-	2	7	-	-	-
2015	4	-	-	1	30	44	1	-	-	-	1	5	-	4	1	-	-
2019	8	2	-	-	18	39	-	2	-	78	2	8	6	1	-	9	-
2024	-	-	-	-	16	35	-	-	-	-	0	7	3	-	1	-	-
year	Average Cover (%)																
2008	-	-	-	-	0.0	0.6	-	-	-	-	-	0.0	-	-	-	-	0.0
2011	12.9	0.0	0.0	0.2	1.6	1.8	-	0.0	0.2	1.6	0.1	-	0.0	0.0	-	-	-
2015	0.0	-	-	0.0	2.1	5.6	0.0	-	-	-	0.0	0.0	-	0.0	0.0	-	-
2019	0.2	0.0	-	-	0.3	4.9	-	0.0	-	0.6	0.0	0.0	0.0	0.0	-	0.0	-
2024	-	-	-	-	0.2	4.2	-	-	-	-	0.0	0.1	0.1	-	0.0	-	-

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

FORB SPECIES	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency			
2008	-	-	-	-
2011	3	-	-	-
2015	0	-	-	1
2019	-	2	-	-
2024	-	-	1	-
year	Average Cover (%)			
2008	-	-	-	-
2011	0.0	-	-	-
2015	0.0	-	-	0.0
2019	-	0.1	-	-
2024	-	-	0.0	-

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

Table 22R-15.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida[p] (prairie sagewort)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)							
2008	-	8.6	-	0.1	14.6	-	-	12.9
2011	0.8	6	-	0.4	-	-	-	0
2015	0.1	8.6	-	1.3	-	-	-	-
2019	-	9.4	-	0.4	-	-	-	0.2
2024	-	12	0.1	0.2	-	-	-	0.4
year	Quadrat Cover (%)							
2008	-	9.8	-	0.3	6.0	-	-	4.6
2011	0.1	4.2	-	0.4	-	0.1	-	0.0
2015	0.0	7.1	-	2.6	0.0	-	0.0	-
2019	-	8.8	0.0	0.9	-	0.0	-	0.0
2024	-	10.7	0.0	0.0	-	0.1	-	0.0

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

Table 22R-15.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia frigida[p] -- (prairie sagewort)									
2008	20	-	0	0	100	0	0	100	- / -
2011	80	-	0	100	0	0	0	0	40/46
2015	40	-	0	100	0	0	0	0	15/13
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2008	3600	60	4	22	74	9	3	45	48/60
2011	1300	-	17	77	6	5	0	5	42/62
2015	1920	60	20	51	29	30	14	26	57/79
2019	1580	380	6	81	13	58	3	14	66/94
2024	1920	1500	13	72	16	8	9	16	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	-	20	0	0	0	0	0	0	21/26
2011	-	-	-	-	-	-	-	-	42/63
2015	20	-	0	100	0	0	0	0	59/106
2019	40	-	0	100	0	0	0	0	78/116
2024	60	-	0	33	67	0	0	67	- / -
Ephedra viridis[p] -- (mormon tea)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	71/126
2019	-	-	-	-	-	-	-	-	71/136
2024	-	-	-	-	-	-	-	-	-/-

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)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	75/114
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2008	900	120	11	73	16	29	18	0	15/13
2011	200	-	30	70	0	0	0	0	21/27
2015	1520	20	11	86	4	13	0	11	31/41
2019	880	40	2	91	7	0	0	7	25/28
2024	400	-	10	90	0	0	0	10	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2008	40	40	0	100	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	100	0	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Linanthus pungens -- (granite prickly phlox)									
2008	40	-	0	50	50	0	50	50	17/23
2011	20	-	0	100	0	0	0	0	21/31
2015	-	-	-	-	-	-	-	-	13/29
2019	40	-	0	100	0	0	0	0	21/27
2024	40	-	0	0	100	0	0	100	- / -
Opuntia -- (pricklypear)									
2008	20	-	0	100	0	0	0	0	10/26
2011	20	-	0	100	0	0	0	0	14/19
2015	-	40	0	0	0	0	0	0	19/26
2019	-	-	-	-	-	-	-	-	13/26
2024	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2008	200	180	80	20	0	0	0	0	- / -
2011	60	20	100	0	0	0	0	0	- / -
2015	60	-	100	0	0	0	0	0	- / -
2019	20	-	100	0	0	0	0	0	- / -
2024	20	-	0	100	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	69/113
2019	-	-	-	-	-	-	-	-	65/143

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

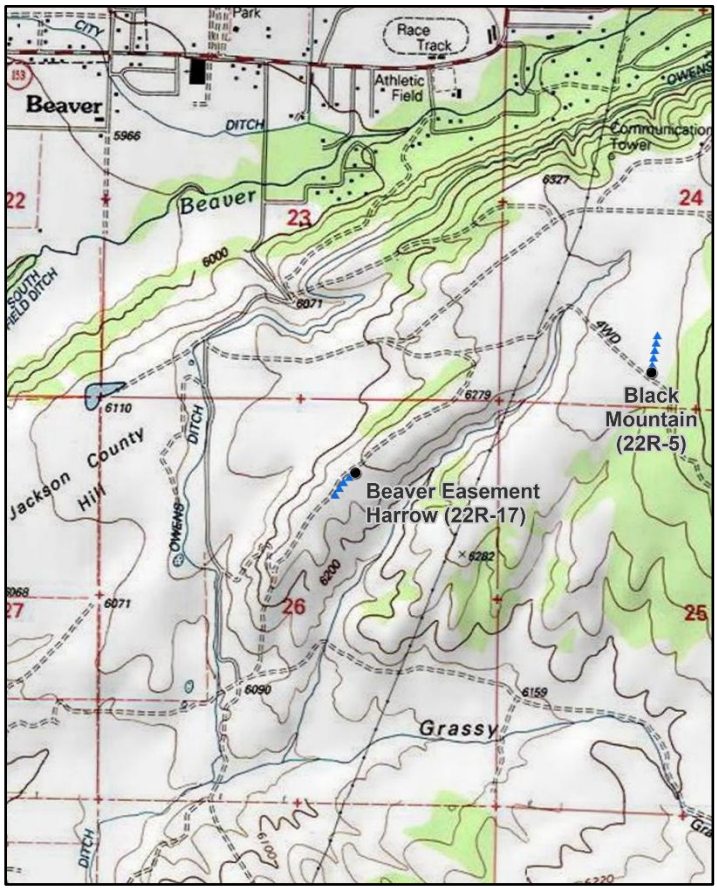
Table 22R-15.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

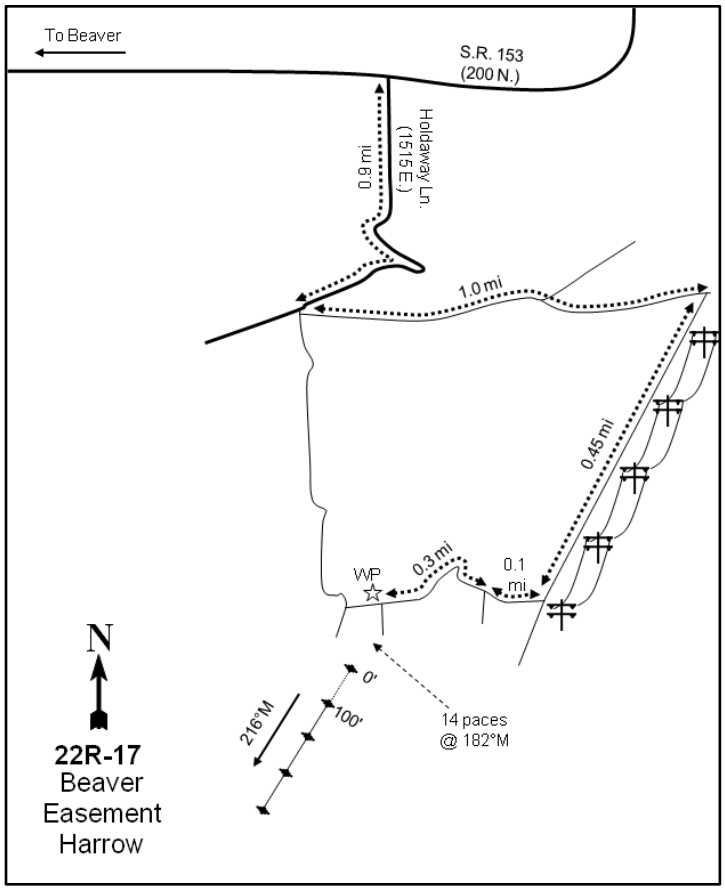
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	61	-	13	13	13	60	22.9
2011	4	100	-	-	-	-	1.0
2015	9	-	33	67	-	-	2.7
2019	5	75	25	-	-	-	1.8
2024	6	-	80	20	-	-	3.8
Pinus edulis (twoneedle pinyon)							
2008	259	30	35	5	10	20	6.6
2011	5	100	-	-	-	-	2.0
2015	6	40	40	20	-	-	2.0
2019	4	50	50	-	-	-	3.0
2024	4	-	100	-	-	-	2.5

Table 22R-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
2008	10.8	0.8	2.2	0.3	0.0	1.6	0.0	**15.7**	Very Poor
2011	8.3	13.4	7.5	14.1	-0.6	9.9	0.0	**52.6**	Fair
2015	10.9	6.4	9.8	28.6	-0.8	10.0	0.0	**64.9**	Fair-Good
2019	11.8	11.2	3.2	30.0	-1.3	10.0	0.0	**64.9**	Fair-Good
2024	15.0	10.3	6.3	30.0	0.0	10.0	0.0	**71.6**	Good

BEAVER EASEMENT HARROW - STUDY NO. 22R-17





Location Information	
USGS 7.5 min Map Info	Black Ridge SW; Township 29S, Range 7W, Section 26
GPS (0' Stake)	NAD 83 UTM ZONE 12, 359224 East 4236095 North

Transect Information	
Browse Tag # (0' Stake)	104
Transect Bearing	217° 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

Proceed east on 200 North in Beaver to Holdaway Lane (1515 East). Drive 0.9 miles on Holdaway Lane (which turns into a dirt road), then turn left. Drive 1.0 miles to a road on the right, turn, then drive south 0.45 miles on Powerline Road. Turn right, drive 0.1 miles to a fork, and keep right. Drive 0.3 miles to a road on the left and continue to the witness post on the right (north) side of the road. From the witness post, walk 14 paces to the 0-foot stake at 182 degrees magnetic. The 0-foot stake is marked with browse tag #104.

Site Information	
Land Ownership	Private
Land Administrator	Private
Allotment	LEE SPRINGS
Elevation	6,300ft (1,920m)
Aspect	South
Slope	1%
Sample Dates	06/16/2008, 06/29/2011, 07/28/2015, 08/06/2019, 08/21/2024

Table 22R-17.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Unknown	-	-	Historic	-
Harrow - Two-Way Dixie	Beaver Easement Property Treatment	1294	September 2008-January 2009	205
Seeding - Broadcast Before	Beaver Easement Property Treatment	1294	November 2008-January 2009	205
Seeding - Aerial After	Beaver Easement Property Treatment	1294	January 2009	205
Herbicide - Plateau	Beaver WMA's Cheatgrass Control Project	5751	July-September 2021	732

Table 22R-17.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Beaver Easement			Broadcast	Nov 2008	210
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	2.14	1.97
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.43	1.17
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	2.14	1.94
F	Cleome serrulata	Rocky Mountain Beeplant	Iron UT	0.48	0.43
F	Medicago sativa	Alfalfa	Ladak	1.43	1.30
F	Melilotus officinalis	Yellow Sweetclover		0.48	0.43
F	Onobrychis viciifolia	Sainfoin	Eski	3.10	2.72
F	Sanguisorba minor	Small Burnet	Delar	1.90	1.80
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Lincoln NV	0.12	0.09

Mix Name			Application Type	Application Date	Acres
Beaver Easement - Kochia			Aerial	Jan 2009	200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak 65	1.00	0.89
S	Bassia prostrata	Forage Kochia	Lander NV	1.00	0.66

Wildlife Habitat and Vegetation History

Table 22R-17.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 22R-17.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Mountain Big Sagebrush	Phase I
2011	Annual Grass/Mountain Big Sagebrush	Phase I
2015	Annual-Perennial Grass/Mountain Big Sagebrush	Phase I
2019	Annual Grass/Mountain Big Sagebrush	Phase I
2024	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2008 - Current Potential State: Community Phase 2.2 2011 - Yellow Rabbitbrush/Invasive Annuals State: Community Phase 4.2 2015-2024 - Current Potential State: Community Phase 2.3

Upon study establishment in 2008, the plant community on this site existed as a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a perennial grass-dominated understory, although cheatgrass (*Bromus tectorum*) was common. Following a harrow and seeding treatment in 2011 (Table 22R-17.1), the plant community transitioned to one dominated by annual grasses, primarily cheatgrass (*Bromus tectorum*), with a reduced sagebrush component. Sagebrush cover has increased over time, however, and it has been considered to be a dominant site component in all post-treatment sample years (Table 22R-17.7, Table 22R-17.12). Perennial grass cover increased in 2015 and 2024 with needle and thread (*Hesperostipa comata*) becoming the dominant species in those sample years. Cheatgrass increased again and was a codominant vegetation component in 2019, but decreased in 2024 (Table 22R-17.10). Additional treatments may be needed if cheatgrass is observed in significant amounts in future sample years; high

amounts of annual grasses can increase fuel loads and may effect the ecological resiliency of a plant community.

This site's condition as mule deer winter range has fluctuated between poor and good since 2008. Although winter range condition is considered to be good as of 2024, it is primarily limited by reduced preferred browse cover, little recruitment of young plants into the preferred browse community, and reduced perennial forb cover (Table 22R-17.15). Pellet transect data indicates that deer presence was high in 2008, but has remained low in all post-treatment sample years. Furthermore, less than 45% of mountain big sagebrush plants sampled in density strips have been moderately to heavily hedged throughout the study period (Table 22R-17.9, Table 22R-17.13).

Trend Summary Tables

Table 22R-17.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	11.6	-	-	15.3	-	-
2011	5.8	-	-	5.4	-	-
2015	7.0	-	-	7.1	-	-
2019	8.1	-	-	9.4	-	-
2024	15.0	-	-	15.5	-	-

Table 22R-17.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	359	299	408	88	3.4	11.7	6.2	4.0
2011	488	257	287	133	47.9	11.9	6.8	5.9
2015	380	342	156	114	7.5	21.1	0.6	1.7
2019	433	266	379	34	32.5	12.0	8.8	0.2
2024	30	247	1	68	1.6	19.0	0.0	2.1

Table 22R-17.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	8.9	0.1	49.7	21.6	2.5	33.4
2011	0.9	0.1	20.0	14.9	4.5	73.8
2015	3.8	-	40.1	30.9	3.7	37.9
2019	2.5	0.0	53.6	21.6	3.9	53.9
2024	20.1	0.0	35.3	23.8	4.3	33.9

Table 22R-17.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	14	30	1	89
2011	3	8	-	7
2015	6	5	-	29
2019	13	3	2	21
2024	8	10	1	20
Year	Days Use Per Acre (ha)			
2008	13.1 (32.3)	59.0 (145.7)	0.7 (1.7)	-
2011	9.4 (23.3)	6.0 (14.9)	0.7 (1.7)	-
2015	21.1 (52.0)	9.4 (23.2)	-	-
2019	27.6 (68.1)	5.3 (13.2)	0.7 (1.7)	-
2024	11.6 (28.7)	10.7 (26.5)	-	-

Table 22R-17.10 - 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)	Pleuraphis jamesii (James' galleta)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency							
2008	9	42	359	21	177	193	-	7
2011	11	31	488	4	188	3	96	67
2015	5	26	380	12	295	1	108	11
2019	7	2	429	26	200	2	109	26
2024	5	4	30	9	220	-	42	-
year	Average Cover (%)							
2008	0.6	0.3	3.4	0.3	7.1	3.4	-	0.0
2011	0.1	0.9	47.5	0.0	8.5	0.0	2.3	0.5
2015	0.1	1.0	7.5	0.2	16.6	0.0	3.1	0.0
2019	0.3	0.0	32.2	1.2	8.9	0.0	1.6	0.3
2024	0.4	0.2	1.6	0.7	16.0	-	1.8	-

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

Table 22R-17.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaetopappa ericoides (rose heath)	Chamaesyce (sandmat)	Chenopodium fremontii[a] (Fremont's goosefoot)	Collinsia parviflora[a] (maiden blue eyed Mary)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gilia inconspicua[a] (shy gilia)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Lupinus brevicaulis[a] (shortstem lupine)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2008	97	-	7	357	3	-	3	2	4	3	-	49	-	102	19	-	12
2011	164	3	18	206	2	-	-	-	-	63	-	7	8	67	-	1	3
2015	146	-	2	-	2	-	-	-	2	-	-	1	-	11	-	-	5
2019	362	-	-	36	-	13	-	-	2	6	2	28	-	17	-	-	-
2024	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
year	Average Cover (%)																
2008	0.3	-	0.0	2.8	0.1	-	0.0	0.0	0.0	0.0	-	0.3	-	2.7	0.2	-	0.1
2011	1.4	0.0	0.7	3.4	0.1	-	-	-	-	0.3	-	0.0	0.0	1.5	-	0.0	0.0
2015	0.5	-	0.2	-	0.0	-	-	-	0.0	-	-	0.0	-	0.1	-	-	0.0
2019	8.3	-	-	0.1	-	0.0	-	-	0.0	0.0	0.0	0.2	-	0.1	-	-	-
2024	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	-

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

FORB SPECIES	Salsola tragus[ai] (prickly Russian thistle)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency		
2008	-	-	72
2011	-	8	112
2015	-	-	108
2019	2	-	21
2024	-	-	68
year	Average Cover (%)		
2008	-	-	3.8
2011	-	0.1	5.0
2015	-	-	1.5
2019	0.0	-	0.1
2024	-	-	2.1

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

Table 22R-17.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)
year	Line
2008	15.3
2011	5.4
2015	7.1
2019	9.4
2024	15.5
year	Quadrat Cover (%)
2008	11.6
2011	5.8
2015	7.0
2019	8.1
2024	15.0

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

Table 22R-17.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2008	4980	21360	39	39	22	11	16	12	55/86
2011	3800	1320	53	41	6	10	0	5	34/49
2015	3940	20	27	63	10	31	10	13	38/54
2019	3240	60	22	68	11	40	4	11	43/62
2024	3320	-	11	86	2	20	12	21	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	20	-	0	100	0	0	100	0	- / -
2011	-	-	-	-	-	-	-	-	28/30
2015	20	-	0	100	0	0	0	0	22/25
2019	-	-	-	-	-	-	-	-	31/35
2024	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	9/17
2024	-	-	-	-	-	-	-	-	-/-
Pediocactus simpsonii -- (mountain ball cactus)									
2008	20	-	0	100	0	0	0	0	7/9
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	20	-	0	100	0	0	0	0	- / -

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

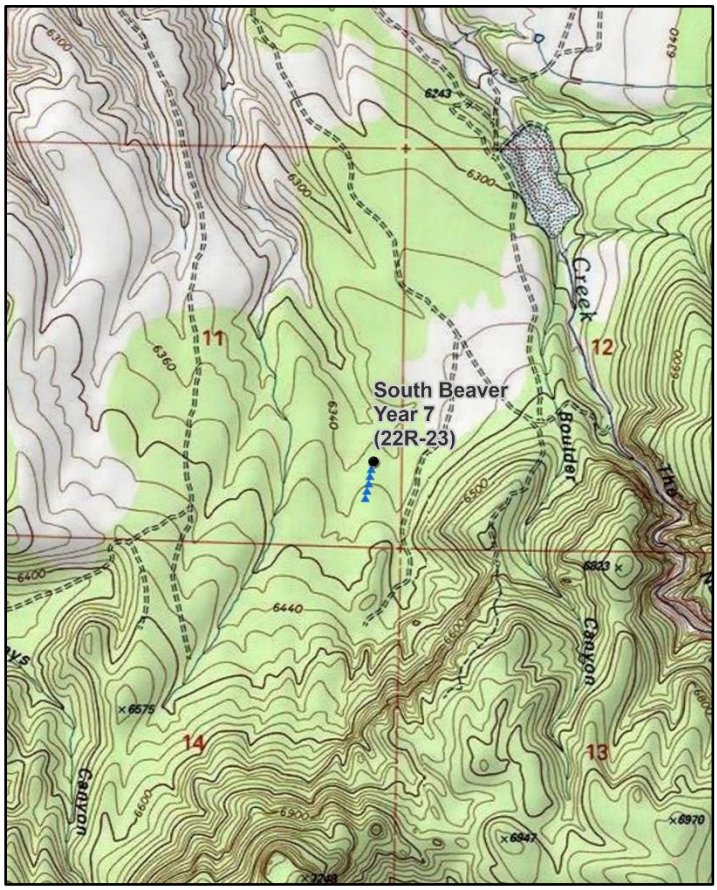
Table 22R-17.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

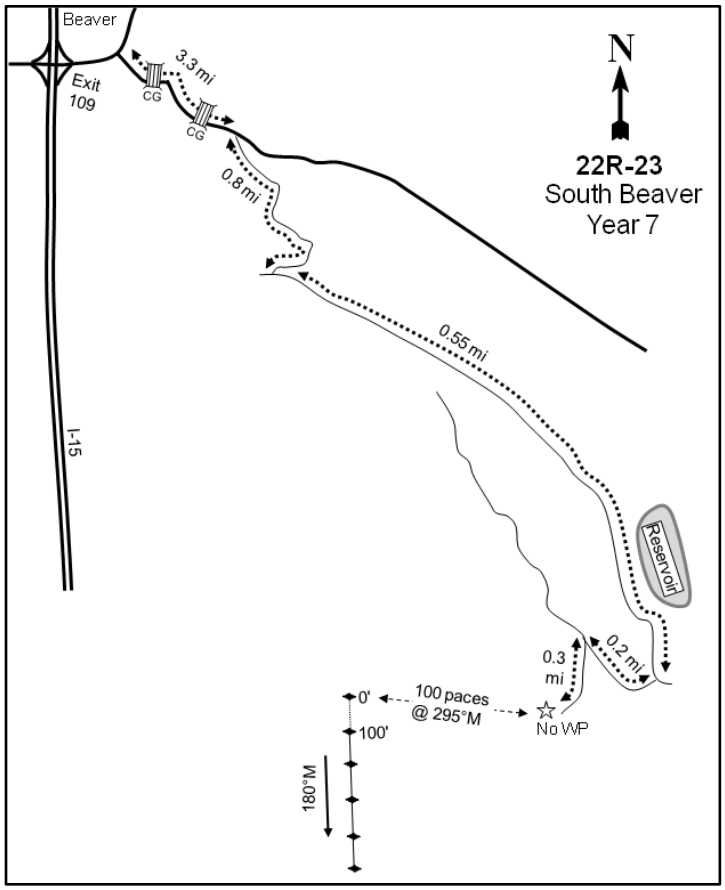
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2011	1	-	100	-	-	-	7.0
2019	1	-	100	-	-	-	5.0
2024	2	50	50	-	-	-	3.5

Table 22R-17.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2008	19.1	8.4	15.0	23.5	-2.5	8.1	0.0	**71.6**	Good
2011	6.8	13.3	15.0	23.8	-20.0	10.0	0.0	**48.9**	Poor-Fair
2015	8.9	11.9	13.5	30.0	-5.6	3.3	0.0	**62.0**	Fair
2019	11.8	11.9	10.8	24.1	-20.0	0.3	0.0	**38.9**	Poor
2024	19.4	14.3	5.7	30.0	-1.2	4.2	0.0	**72.4**	Good

SOUTH BEAVER YEAR 7 - STUDY NO. 22R-23





Location Information

USGS 7.5 min Map Info	Kane Canyon NW; Township 30S, Range 7W, Section 11
GPS (0' Stake)	NAD 83 UTM ZONE 12, 359623 East 4230217 North

Transect Information

Browse Tag # (0' Stake)	9164
Transect Bearing	180° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

Travel 3.4 miles east on South Creek Road from exit #109 on I-15. Turn right and travel 0.8 miles to an intersection. Turn right again and continue for 0.55 miles. Turn right, travel 0.2 miles, then turn left and proceed for 0.3 miles. Park here: there is no witness post. Walk 100 paces to the 0-foot stake at 295 degrees magnetic. There may be other routes that are closer to the 0-foot stake, which is marked with browse tag #9164.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	LEE SPRINGS
Elevation	6,350ft (1,935m)
Aspect	Northwest
Slope	6%
Sample Dates	06/26/2012, 07/28/2015, 08/07/2019, 08/21/2024

Table 22R-23.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	South Beaver Vegetation Enhancement Year 7	2227	September 2014	1366
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver Phase II	4831	May-June 2019	6241
Mechanical - Bullhog	South Beaver Vegetation Enhancement Year 7	2227	August-November 2014	1366

Table 22R-23.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Beaver Year 7			Aerial	Sep 2014	850
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.53	1.42
G	Agropyron desertorum	Crested Wheatgrass	Hycrest II	1.50	1.30
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	2.00	1.54
G	Thinopyrum intermedium	Intermediate Wheatgrass	Clarke	1.50	0.93
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.81	0.66
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.18	0.15
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.00	0.95
F	Linum perenne	Blue Flax	Appar	0.52	0.45
F	Medicago sativa	Alfalfa	Ranger	0.76	0.69
F	Melilotus officinalis	Yellow Sweetclover		1.00	0.88
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.06	0.05
F	Sanguisorba minor	Small Burnet	Delar	1.59	1.44

Wildlife Habitat and Vegetation History

Table 22R-23.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 22R-23.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon-Juniper	Phase II transitioning to Phase III
2015	Mountain Big Sagebrush/Broom Snakeweed	Phase I
2019	Mountain Big Sagebrush/Perennial Grass	Phase I
2024	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Gravelly Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY306UT
States and Transitions	2012 - Utah Juniper/Invasive Annuals State: Community Phase 3.1 2015-2024 - Current Potential State: Community Phase 2.2

Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) dominated this site upon study establishment in 2012, and the site was considered to be in Phase II transitioning to Phase III of woodland succession. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was present in the understory, contributing moderate cover. A bullhog treatment in 2014 (Table 22R-23.1) removed most of the trees, and the study has been within Phase I of succession since 2015 (Table 22R-23.4, Table 22R-23.14). Broom snakeweed (*Gutierrezia sarothrae*) and sagebrush increased in 2015 and became codominant, but snakeweed has varied in dominance while sagebrush has increased over the sample period. Furthermore, decadence within the sagebrush population has decreased over time while recruitment of young has increased (Photos, Table 22R-23.12, Table 22R-23.13). The herbaceous understory was in poor condition prior to the treatment, but improved with the introduction of seeded species (Table 22R-23.2). Perennial grasses, primarily the introduced species intermediate wheatgrass (*Thinopyrum intermedium*) and native species squirreltail (*Elymus elymoides*), increased and became codominant with sagebrush in 2019 (Table 22R-23.7, Table 22R-23.10). Although juniper density is moderate as of the most recent sampling (Table 22R-23.14), continued presence indicates that this site may have the potential to be infilled over time.

Condition of this site as mule deer winter range has ranged from very poor to fair since 2012; winter habitat condition is considered to

be fair as of 2024. Current winter range condition is limited by reduced preferred browse cover and recruitment of young into the population, limited perennial forb cover, and reduced perennial grass cover (Table 22R-23.15). According to pellet transect data, deer presence has increased following treatment, but has been low throughout the study period. Utilization of mountain big sagebrush was highest in 2019, but less than 30% of plants sampled in density strips have been moderately to heavily hedged in other sample years (Table 22R-23.9, Table 22R-23.13).

Trend Summary Tables

Table 22R-23.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	5.8	0.4	14.1	6.1	0.3	23.6
2015	4.9	3.9	0.0	6.6	4.3	-
2019	5.0	0.0	0.0	9.6	-	-
2024	8.3	3.9	0.2	11.2	4.8	0.1

Table 22R-23.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	38	25	32	59	0.1	0.4	0.1	0.7
2015	2	130	42	142	0.0	3.4	0.6	8.6
2019	68	254	287	109	0.9	11.9	6.2	2.2
2024	50	236	6	65	0.7	8.8	0.2	1.3

Table 22R-23.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	28.2	1.1	42.5	17.4	5.4	20.0
2015	8.4	0.0	62.8	15.3	3.6	21.7
2019	14.3	0.2	58.0	18.5	3.5	24.3
2024	26.6	-	46.6	18.6	3.9	20.1

Table 22R-23.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2012	-	1	-	-	13
2015	-	6	3	-	19
2019	1	7	-	1	20
2024	4	6	-	-	6
Year	Days Use Per Acre (ha)				
2012	-	0.7 (1.7)	-	-	-
2015	-	3.4 (8.3)	14.7 (36.4)	-	-
2019	8.0 (19.7)	3.4 (8.3)	1.3 (3.3)	1.7 (4.3)	-
2024	21.1 (52.0)	5.3 (13.2)	-	-	-

Table 22R-23.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency							
2012	-	-	-	38	25	-	-	-
2015	3	40	-	2	49	1	3	72
2019	9	51	3	68	170	-	36	95
2024	8	35	21	50	93	0	3	131
year	Average Cover (%)							
2012	-	-	-	0.1	0.4	-	-	-
2015	0.1	0.8	-	0.0	1.2	0.0	0.2	1.2
2019	0.2	1.5	0.1	0.9	4.5	-	0.9	4.8
2024	0.3	1.6	0.3	0.7	2.4	0.0	0.1	4.1

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

Table 22R-23.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Astragalus (milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Collinsia parviflora[a] (maiden blue eyed Mary)	Conyza canadensis[a] (Canadian horseweed)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Gilia inconspicua[a] (shy gilia)	Lactuca serriola[ai] (prickly lettuce)	Linum perenne[i] (blue flax)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa[i] (alfalfa)	Melilotus officinalis[i] (sweetclover)	Oenothera caespitosa (tufted evening primrose)
year	Nested Frequency																
2012	5	-	18	15	16	-	9	-	4	3	-	-	-	-	-	-	-
2015	-	12	12	-	19	-	-	3	4	7	-	27	63	0	14	19	1
2019	3	-	10	8	39	3	4	-	-	61	228	78	15	4	1	1	-
2024	-	-	15	-	-	2	-	-	2	3	-	3	-	-	-	-	-
year	Average Cover (%)																
2012	0.0	-	0.4	0.0	0.1	-	0.0	-	0.0	0.0	-	-	-	-	-	-	-
2015	-	0.5	0.2	-	0.5	-	-	0.0	0.0	0.0	-	0.4	4.9	0.0	0.2	1.5	0.0
2019	0.0	-	0.1	0.0	0.1	0.1	0.0	-	-	0.5	4.7	1.0	0.7	0.0	0.0	0.0	-
2024	-	-	0.3	-	-	0.2	-	-	0.0	0.0	-	0.1	-	-	-	-	-

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

FORB SPECIES	Penstemon (beardtongue)	Penstemon confusus (Owens Valley beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Townsendia (Townsend daisy)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency											
2012	8	-	-	-	7	-	-	-	5	3	-	-
2015	-	-	14	5	3	2	3	13	15	-	1	4
2019	3	-	6	-	3	-	3	6	27	-	2	3
2024	-	3	4	2	-	1	-	1	36	2	-	-
year	Average Cover (%)											
2012	0.1	-	-	-	0.1	-	-	-	0.0	0.0	-	-
2015	-	-	0.1	0.0	0.1	0.0	0.0	0.3	0.1	-	0.0	0.2
2019	0.0	-	0.1	-	0.1	-	0.0	0.1	0.8	-	0.0	0.0
2024	-	0.0	0.1	0.0	-	0.0	-	0.0	0.7	0.0	-	-

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

Table 22R-23.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Eriogonum microthecum[p] (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)							
2012	6.1	-	-	-	0.3	6.2	0	17.4
2015	6.6	-	-	-	4.2	-	0.1	-
2019	9.6	-	-	-	-	-	-	-
2024	11	-	1.8	0.2	3	-	-	0.1
year	Quadrat Cover (%)							
2012	5.8	-	-	-	0.3	5.9	0.0	8.2
2015	4.9	0.1	-	-	3.7	0.0	0.1	-
2019	5.0	-	-	0.0	-	0.0	0.0	-
2024	8.3	0.2	1.3	0.0	2.4	0.2	-	0.0

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

Table 22R-23.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	2340	120	6	45	49	25	0	66	39/52
2015	2040	-	9	73	19	17	10	25	38/58
2019	1740	-	15	64	21	41	14	21	42/68
2024	2320	-	17	80	3	8	7	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 (%)		
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2012	20	-	0	100	0	0	0	0	12/13
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	2240	-	7	93	0	0	0	0	- / -
Eriogonum microthecum[p] -- (slender buckwheat)									
2012	80	-	50	50	0	0	0	0	17/30
2015	20	-	0	100	0	0	0	0	20/28
2019	80	-	0	100	0	25	25	0	15/22
2024	20	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2012	720	40	42	58	0	0	0	3	19/21
2015	4740	40	12	88	0	0	0	0	30/42
2019	40	-	0	0	100	0	0	100	23/30
2024	3060	-	18	82	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2012	120	-	17	83	0	0	0	0	- / -
2015	120	40	100	0	0	0	0	0	- / -
2019	80	-	100	0	0	0	0	0	- / -
2024	120	-	100	0	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2012	120	-	0	100	0	0	0	0	9/22
2015	100	-	0	100	0	0	0	0	11/30
2019	140	-	0	71	29	0	0	29	9/29
2024	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2012	260	-	62	39	0	0	0	0	- / -
2015	60	-	100	0	0	0	0	33	- / -
2019	-	-	-	-	-	-	-	-	-/-
2024	20	-	100	0	0	0	0	0	- / -

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

Table 22R-23.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	116	10	15	35	10	30	17.0
2015	59	86	14	-	-	-	0.9
2019	71	93	7	-	-	-	1.9
2024	72	19	81	-	-	-	2.2
Pinus edulis (twoneedle pinyon)							
2012	217	20	20	35	25	-	6.9
2015	15	57	43	-	-	-	2.3
2019	7	80	20	-	-	-	1.8
2024	9	38	63	-	-	-	1.5

Table 22R-23.15 - 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	7.6	0.4	3.0	0.7	-0.1	1.4	0.0	**13.0**	Very Poor
2015	8.3	9.4	4.4	6.9	0.0	10.0	0.0	**39.0**	Poor
2019	12.0	8.8	7.5	23.9	-0.6	4.4	0.0	**56.0**	Fair
2024	14.0	14.3	8.4	17.5	-0.5	2.7	0.0	**56.4**	Fair

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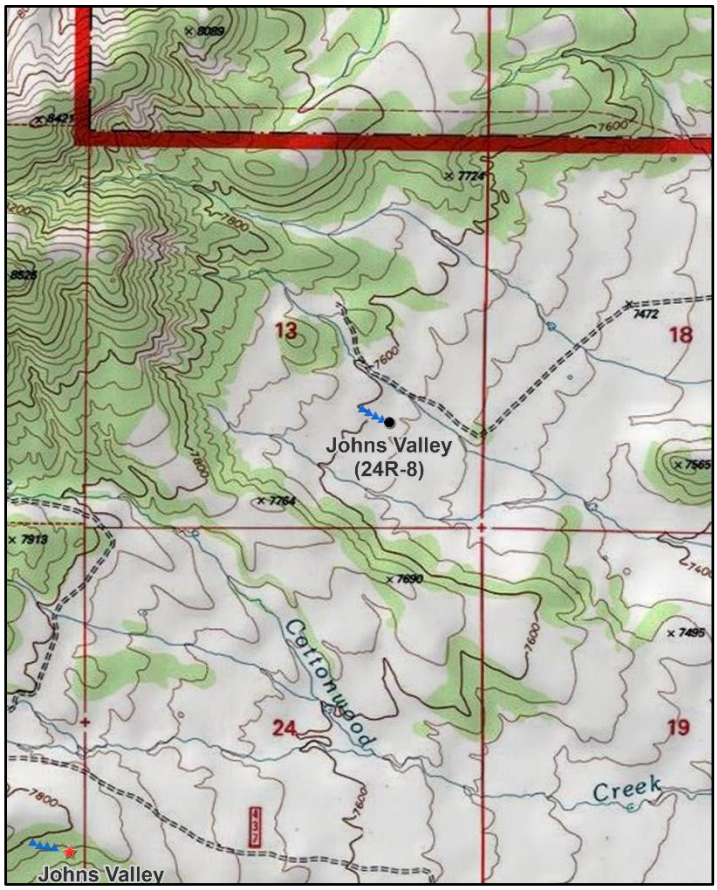
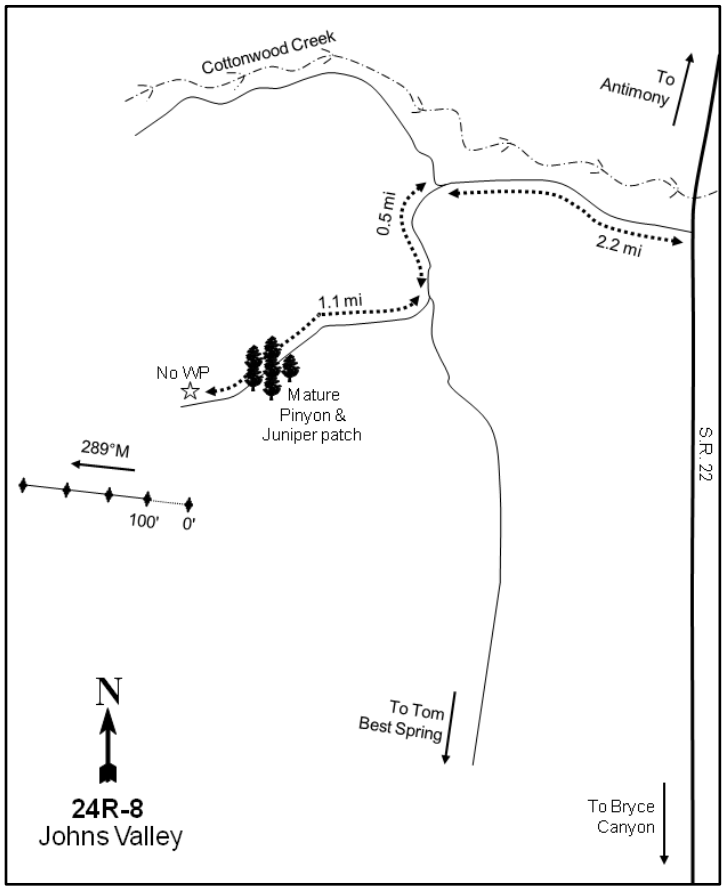




Location Information

USGS 7.5 min Map Info	Cow Creek SE; Township 33S, Range 3W, Section 13
GPS (0' Stake)	NAD 83 UTM ZONE 12, 406657 East 4198823 North

Transect Information

Browse Tag # (0' Stake)	191
Transect Bearing	289° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	No Rebar

Directions to Site

Driving from State Route 22, turn west onto Cottonwood Road. Continue west for 2.2 miles and turn right, traveling south towards Tom Best Spring. Turn right onto a two-track road and travel south for 0.5 miles. The 0-foot stake is 100 paces south of the road and is marked with browse tag #191.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Widtsoe C&H
Elevation	7,600ft (2,316m)
Aspect	East
Slope	4%
Sample Dates	07/13/2011, 08/18/2015, 08/28/2019, 08/19/2024

Table 24R-08.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	2012 John's Valley Sage-Steppe Restoration	2055	January-July 2013	1236
Chaining - Chain Unknown	-	-	Historic	7685
Seeding - Seed Unknown	-	-	Historic	7685
Mechanical - Bullhog	Johns Valley Sage-Steppe Restoration Phase II	2400	July-October 2013	772

Wildlife Habitat and Vegetation History

Table 24R-08.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 24R-08.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Pinyon-Juniper/Mountain Big Sagebrush	Phase II
2015	Mountain Big Sagebrush	Phase I
2019	Mountain Big Sagebrush	Phase I
2024	Mountain Big Sagebrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2011, this site was in Phase II of woodland succession and being infilled by twoneedle pinyon (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and Rocky Mountain juniper (*Juniperus scopulorum*); mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was the dominant shrub species. Following the bullhog treatment in 2013 (Table 24R-08.1), tree presence was greatly reduced and sagebrush increased substantially in cover, becoming the sole dominant vegetation component in 2015 (Table 24R-08.4, Table 24R-08.12, Table 24R-08.13, Table 24R-08.14). The herbaceous understory has been abundant in all sample years. A majority of the herbaceous cover has been provided by mainly native perennial grasses and graminoids, including obtuse sedge (*Carex obtusata*), blue grama (*Bouteloua gracilis*), and needle and thread (*Hesperostipa comata*); forbs have remained comparatively rare (Table 24R-08.7, Table 24R-08.10, Table 24R-08.11). Although currently in Phase I of succession as of 2024 (Table 24R-08.4), continued presence of trees suggests that there may be potential for infilling in future years.

This site's condition as winter range for mule deer has fluctuated between fair and good-excellent since 2011. Although winter habitat condition is considered to be good as of 2024, it is currently limited by preferred browse decadence, limited recruitment of young plants to the preferred browse community, and reduced perennial forb cover (Table 24R-08.15). Pellet transect data indicates that deer presence has remained low throughout the study period and has decreased each sample year. However, utilization of preferred browse has fluctuated over time. More than 80% of black sagebrush plants sampled in density strips were moderately to heavily hedged in 2015 and 2024, while less than 10% were utilized to that level in 2011 and 2019. Less than 45% of mountain big sagebrush plants have been moderately to heavily browsed in all sample years. Both elk and cattle presence have remained low over time, and no cattle pellet groups were sampled in hoop data in 2024 (Table 24R-08.9, Table 24R-08.13).

Trend Summary Tables

Table 24R-08.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	10.2	0.8	6.5	15.6	1.3	16.2
2015	13.9	1.6	0.1	18.9	0.6	0.3
2019	14.5	0.9	0.4	25.3	1.2	0.3
2024	15.6	1.6	0.1	24.1	1.6	0.2

Table 24R-08.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	-	335	46	102	-	13.2	0.2	1.7
2015	-	346	3	65	-	22.7	0.0	0.8
2019	-	355	34	100	-	23.1	0.4	2.2
2024	-	354	3	112	-	18.6	0.0	2.5

Table 24R-08.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	44.5	2.1	27.6	4.0	6.8	30.1
2015	33.5	1.1	47.9	2.1	8.1	33.9
2019	32.0	2.2	46.6	4.9	7.9	33.3
2024	26.7	1.4	43.9	3.8	5.9	39.1

Table 24R-08.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2011	1	9	2	28
2015	-	1	-	19
2019	4	5	5	31
2024	-	6	3	18
Year	Days Use Per Acre (ha)			
2011	1.5 (3.6)	6.0 (14.9)	4.7 (11.6)	-
2015	2.2 (5.4)	2.0 (5.0)	0.7 (1.7)	-
2019	2.9 (7.2)	1.3 (3.3)	7.4 (18.2)	-
2024	-	0.7 (1.7)	0.7 (1.7)	-

Table 24R-08.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bouteloua gracilis (blue grama)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)
year	Nested Frequency								
2011	3	3	102	85	201	29	7	85	17
2015	5	18	55	122	225	38	25	64	-
2019	6	18	49	114	264	12	25	79	13
2024	21	12	99	117	233	5	14	58	-
year	Average Cover (%)								
2011	0.2	0.0	3.2	1.5	5.9	0.5	0.0	1.6	0.3
2015	0.2	1.0	3.3	7.7	5.7	1.2	0.8	2.9	-
2019	0.3	0.3	2.9	3.6	11.6	0.1	0.1	3.7	0.3
2024	1.6	0.2	3.6	4.7	5.4	0.2	0.0	2.9	-

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

Table 24R-08.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Erigeron divergens[a] (spreading fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Hymenopappus filifolius (fineleaf hymenopappus)	Lotus utahensis (Utah bird's-foot trefoil)	Lygodesmia (skeletonplant)	Machaeranthera canescens (hoary tansyaster)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)
year	Nested Frequency																
2011	-	1	11	16	3	3	6	3	21	-	27	6	30	-	2	1	2
2015	-	-	13	-	-	-	-	9	13	5	3	10	12	-	-	3	1
2019	-	2	20	10	-	-	5	3	12	1	27	10	29	2	-	5	6
2024	3	-	27	3	-	-	9	2	14	-	-	44	19	-	-	11	2
year	Average Cover (%)																
2011	-	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.3	-	0.1	0.2	0.4	-	0.0	0.0	0.3
2015	-	-	0.1	-	-	-	-	0.1	0.1	0.1	0.0	0.3	0.1	-	-	0.0	0.0
2019	-	0.0	0.2	0.0	-	-	0.0	0.3	0.5	0.0	0.3	0.3	0.5	0.0	-	0.1	0.0
2024	0.0	-	0.3	0.0	-	-	0.3	0.0	0.2	-	-	0.9	0.4	-	-	0.1	0.0

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Silene drummondii (Drummond's campion)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius[ai] (yellow salsify)	Trifolium gymnocarpon (hollyleaf clover)
year	Nested Frequency				
2011	5	-	4	0	32
2015	3	-	8	-	2
2019	6	-	17	-	12
2024	5	1	19	-	4
year	Average Cover (%)				
2011	0.0	-	0.0	0.0	0.2
2015	0.0	-	0.0	-	0.0
2019	0.0	-	0.3	-	0.0
2024	0.0	0.2	0.2	-	0.0

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

Table 24R-08.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Cercocarpus ledifolius[p] (curl-leaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus scopulorum[t] (Rocky Mountain juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Opuntia polyacantha (plains pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis[t] (twoneedle pinyon)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)												
2011	6.6	7.8	-	-	-	1	4.4	0.3	-	-	-	11.8	1.2
2015	7.2	10.3	0	-	-	0.3	0.2	0.3	-	-	-	0.1	1.4
2019	8.8	15	0.2	0.2	0.2	0.7	-	0.1	-	-	-	0.3	1.3
2024	6.4	15.9	0.1	-	0.2	1.1	-	0.1	-	0.2	-	0.2	1.7
year	Quadrat Cover (%)												
2011	4.9	4.9	-	-	-	0.4	3.4	0.4	-	-	0.0	3.1	0.4
2015	3.9	9.4	0.0	-	0.0	1.1	0.1	0.5	0.0	-	-	0.0	0.6
2019	4.7	9.4	0.0	0.1	0.0	0.3	0.4	0.5	0.0	0.0	-	0.0	0.4
2024	3.6	10.7	0.0	-	0.0	1.1	0.1	0.4	-	0.0	0.0	0.0	1.4

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

Table 24R-08.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2011	2600	60	12	65	23	2	0	15	32/58
2015	2100	40	1	89	11	16	77	5	30/57
2019	2680	-	2	73	25	4	5	25	31/61
2024	2480	-	2	79	19	44	47	20	- / -

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)									
2011	1660	40	0	58	42	42	1	16	55/92
2015	2220	-	16	78	6	18	23	5	50/78
2019	1740	-	10	83	7	38	0	12	67/105
2024	1680	40	2	76	21	10	18	23	- / -
Cercocarpus ledifolius[p] -- (curl-leaf mountain mahogany)									
2011	20	-	0	100	0	0	100	0	66/84
2015	20	-	0	100	0	0	100	0	55/69
2019	20	-	0	100	0	0	100	0	80/86
2024	20	-	0	100	0	0	100	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2011	20	-	0	100	0	0	0	0	14/28
2015	-	-	-	-	-	-	-	-	14/25
2019	40	-	0	100	0	0	0	0	26/37
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2011	-	-	-	-	-	-	-	-	88/85
2015	20	-	100	0	0	0	0	0	41/26
2019	80	-	25	75	0	0	0	0	75/67
2024	100	-	20	60	20	20	0	20	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2011	1580	-	1	99	0	0	0	0	21/22
2015	1360	-	22	77	2	0	0	2	23/26
2019	1140	-	4	97	0	0	0	0	21/20
2024	2940	20	12	78	10	0	0	10	- / -
Juniperus scopulorum[t] -- (Rocky Mountain juniper)									
2011	40	-	0	100	0	0	0	0	- / -
2015	20	-	0	100	0	0	0	0	- / -
2019	20	-	0	100	0	0	0	100	- / -
2024	20	-	0	0	100	0	0	100	- / -
Linanthus pungens -- (granite prickly phlox)									
2011	560	-	4	82	14	0	0	0	16/21
2015	460	-	0	100	0	0	13	0	16/23
2019	340	-	6	94	0	0	0	0	20/27
2024	360	-	0	94	6	0	0	6	- / -
Opuntia polyacantha -- (plains pricklypear)									
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	100	0	0	0	0	0	16/69
2024	140	-	0	100	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2011	20	-	0	100	0	0	0	0	14/43
2015	40	-	0	100	0	0	0	0	10/18
2019	60	-	0	100	0	0	0	0	10/33
2024	-	-	-	-	-	-	-	-	-/-
Pediocactus simpsonii -- (mountain ball cactus)									
2011	40	-	0	100	0	0	0	0	4/4
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	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 (%)		
Pinus edulis[t] -- (twoneedle pinyon)									
2011	180	-	33	67	0	0	0	0	- / -
2015	40	40	100	0	0	0	0	0	- / -
2019	60	20	67	33	0	0	0	0	- / -
2024	100	20	100	0	0	0	0	0	- / -
Purshia tridentata[p] -- (antelope bitterbrush)									
2011	40	-	0	100	0	100	0	0	48/91
2015	100	-	40	60	0	40	60	0	48/89
2019	200	-	0	100	0	0	100	0	67/113
2024	100	-	0	100	0	0	20	0	- / -
Ribes[p] -- (currant)									
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	25/30

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

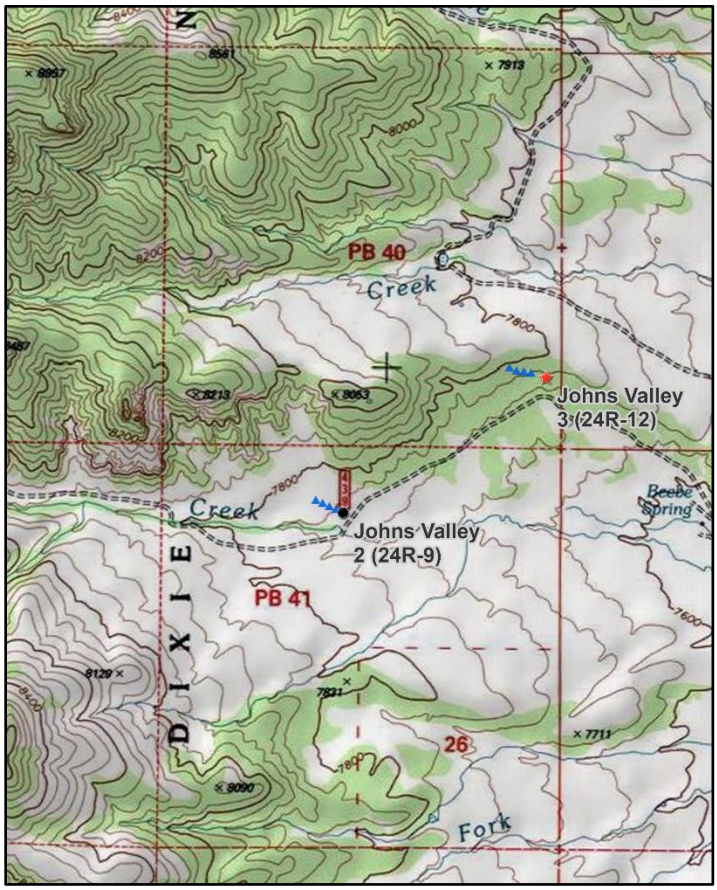
Table 24R-08.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

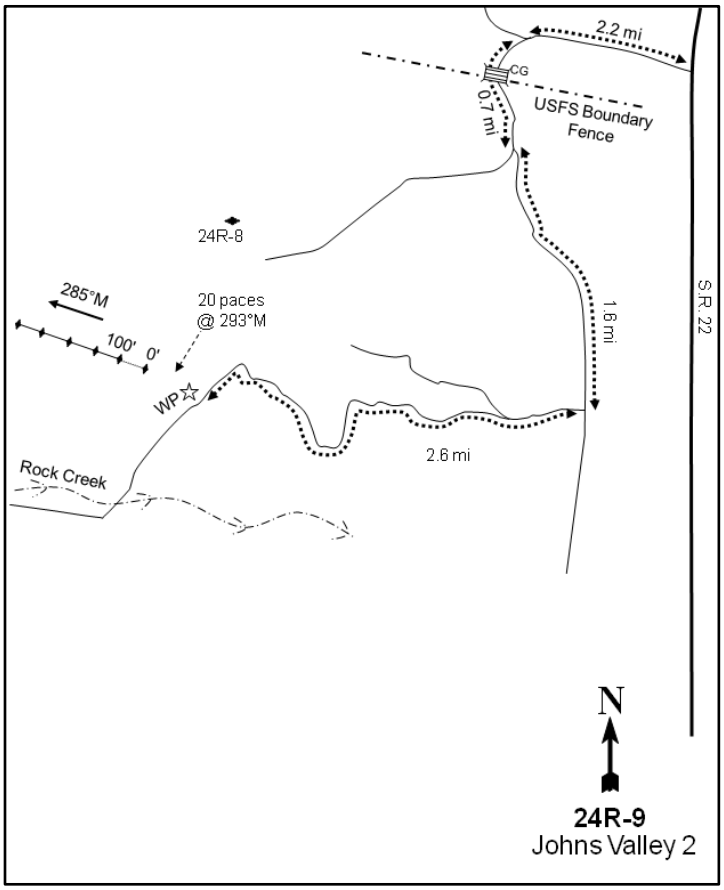
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2011	4	-	25	25	25	25	12.0
2015	2	-	100	-	-	-	21.0
2024	4	-	33	67	-	-	5.0
Juniperus scopulorum (Rocky Mountain juniper)							
2011	17	8	8	33	33	17	13.5
2015	14	10	40	50	-	-	11.8
2019	14	-	33	67	-	-	6.4
2024	10	-	29	71	-	-	9.4
Pinus edulis (twoneedle pinyon)							
2011	80	-	5	26	37	32	13.8
2015	18	29	71	-	-	-	3.0
2019	23	36	64	-	-	-	2.7
2024	37	14	86	-	-	-	2.5

Table 24R-08.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2011	19.8	5.8	2.6	26.5	0.0	3.4	0.0	**58.1**	Fair
2015	24.0	12.7	6.1	30.0	0.0	1.6	0.0	**74.4**	Good
2019	30.0	11.3	3.4	30.0	0.0	4.4	0.0	**79.1**	Good-Excellent
2024	30.0	9.4	1.1	30.0	0.0	5.0	0.0	**75.5**	Good

JOHNS VALLEY 2 - STUDY NO. 24R-9





Location Information

USGS 7.5 min Map Info	Cow Creek SW; Township 33S, Range 3W, Section 41
GPS (0' Stake)	NAD 83 UTM ZONE 12, 404537 East 4196535 North

Transect Information

Browse Tag # (0' Stake)	9153
Transect Bearing	285° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Belts 1, 3, 4, 5: No Rebar

Directions to Site

From Johns Valley Road, travel 2.2 miles west on Cottonwood Road, then turn right. Travel 0.3 miles to the U.S. Forest Service boundary. Continue for 0.4 miles to a fork in the road. Stay left at the fork, continue for 1.6 miles, and turn right. Travel for 2.6 miles to a witness post on the right (north) side of the road. From the witness post, walk 20 paces at 293 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Widtsoe C&H
Elevation	7,770ft (2,368m)
Aspect	East
Slope	8%
Sample Dates	08/08/2012, 08/19/2015, 08/28/2019, 08/15/2024

Table 24R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Historic	7685
Seeding - Seed Unknown	-	-	Historic	7685
Mechanical - Bullhog	-	-	2012	-

Wildlife Habitat and Vegetation History

Table 24R-09.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 24R-09.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Mixed Shrub	Phase I
2015	Perennial Grass/Mixed Shrub	Phase I
2019	Perennial Grass/Mixed Shrub	Phase I
2024	Perennial Grass/Mixed Shrub	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2012, this site has been codominated by basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidflorus*), and rubber rabbitbrush (*Ericameria nauseosa*). Following the 2012 sampling, a bullhog treatment (Table 24R-09.1) removed most of the Rocky Mountain juniper (*Juniperus scopulorum*) trees that were scattered throughout the area (Photos, Table 24R-09.12, Table 24R-09.13, Table 24R-09.14). The herbaceous understory has remained abundant, but has not been overly diverse. The introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) has provided much of the herbaceous cover throughout the study period, and perennial grasses have been a codominant vegetation component since 2015 (Table 24R-09.7, Table 24R-09.10). Although the site is classified as being within Phase I of woodland succession as of 2024 (Table 24R-09.4), continued tree presence indicates that there may be potential for infilling in future sample years as enough time since treatment elapses.

Condition of mule deer winter range on this site has ranged from fair-good to good since 2012; winter habitat condition is considered to be fair-good as of 2024. Current factors that limit winter range condition include reduced preferred browse cover and recruitment of young, decadence within the preferred browse community, and reduced perennial forb cover (Table 24R-09.15). According to pellet transect data, mule deer pellet groups were not sampled in 2012 or 2015, and presence has been low since 2019. In addition, less than 30% of basin big sagebrush plants sampled in density strips have been moderately to heavily hedged in all post-treatment sample years. Elk presence was low between 2012 and 2019, and no pellet groups were sampled in hoop data in 2024. Finally, cattle presence was high in 2012 and 2015, but has remained low since 2019 (Table 24R-09.9, Table 24R-09.13).

Trend Summary Tables

Table 24R-09.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	10.4	13.1	3.2	11.3	18.0	3.5
2015	9.2	15.4	-	12.5	21.5	-
2019	13.1	17.1	-	15.4	25.9	-
2024	12.7	12.1	0.4	15.9	18.4	-

Table 24R-09.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	-	340	-	56	-	15.0	-	3.9
2015	0	353	-	52	0.0	26.2	-	2.6
2019	-	355	1	60	-	26.7	0.1	2.1
2024	-	347	5	40	-	17.2	0.1	2.0

Table 24R-09.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	40.5	1.1	33.7	0.8	0.6	41.0
2015	35.0	0.2	49.9	0.9	1.1	43.5
2019	34.1	0.2	42.5	2.9	2.0	49.1
2024	32.7	0.1	44.8	1.6	0.5	42.3

Table 24R-09.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2012	8	8	2	-	2
2015	7	5	3	-	19
2019	6	13	3	-	31
2024	2	5	2	-	5
Year	Days Use Per Acre (ha)				
2012	32.7 (80.7)	-	6.0 (14.9)	-	-
2015	26.8 (66.3)	-	7.4 (18.2)	-	-
2019	8.0 (19.7)	8.7 (21.5)	14.1 (34.8)	0.6 (1.4)	-
2024	4.4 (10.8)	2.7 (6.6)	-	-	-

Table 24R-09.10 - 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 (sedge)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)
year	Nested Frequency						
2012	6	294	3	-	4	-	71
2015	0	314	-	0	-	4	82
2019	8	305	-	-	-	4	89
2024	5	315	-	-	-	2	62
year	Average Cover (%)						
2012	0.1	13.3	0.0	-	0.4	-	1.2
2015	0.0	24.5	-	0.0	-	0.0	1.5
2019	0.2	24.4	-	-	-	0.1	2.0
2024	0.0	16.1	-	-	-	0.1	0.8

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

Table 24R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus kentrophyta (spiny milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Castilleja linariifolia (Wyoming Indian paintbrush)	Cordylanthus[a] (bird's-beak)	Cryptantha (cryptantha)	Descurainia[a] (tansymustard)	Erigeron pumilus (shaggy fleabane)	Ipomopsis aggregata (scarlet gilia)	Lupinus argenteus (silvery lupine)	Medicago sativa[i] (alfalfa)	Mentzelia albicaulis[a] (whitestem blazingstar)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)
year	Nested Frequency																
2012	-	-	-	9	-	-	-	-	5	-	20	2	-	2	11	6	3
2015	7	0	-	4	-	-	1	-	5	4	10	1	-	11	9	-	3
2019	-	-	4	3	29	1	7	-	4	-	8	-	-	-	12	-	-
2024	-	-	-	-	11	-	3	3	-	-	3	-	2	1	18	-	7
year	Average Cover (%)																
2012	-	-	-	0.2	-	-	-	-	0.0	-	3.3	0.1	-	0.0	0.1	0.0	0.1
2015	0.0	0.0	-	0.0	-	-	0.0	-	0.0	0.0	2.0	0.0	-	0.1	0.1	-	0.4
2019	-	-	0.0	0.0	0.7	0.1	0.1	-	0.1	-	0.9	-	-	-	0.3	-	-
2024	-	-	-	-	0.5	-	0.0	0.0	-	-	0.4	-	0.0	0.0	0.8	-	0.2

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

FORB SPECIES	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Symphyotrichum (aster)
year	Nested Frequency		
2012	2	-	2
2015	-	-	-
2019	3	2	-
2024	3	-	-
year	Average Cover (%)		
2012	0.0	-	0.0
2015	-	-	-
2019	0.0	0.0	-
2024	0.0	-	-

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

Table 24R-09.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida[p] (prairie sagewort)	Artemisia tridentata ssp. tridentata[p] (basin big sagebrush)	Bassia prostrata[pi] (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus scopulorum[t] (Rocky Mountain juniper)	Linanthus pungens (granite prickly phlox)	Opuntia polyacantha (plains pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Symphoricarpos oreophilus[p] (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)											
2012	0.1	10.8	-	5.4	11.1	1.2	3.5	-	0.3	0	0.4	-
2015	-	12.5	-	9.9	10.4	0.7	-	0.1	0.2	-	-	0.2
2019	-	15.4	-	12.3	10.3	3.3	-	-	-	-	-	0
2024	0.1	15.8	-	7	9.9	1.5	-	-	-	-	-	-
year	Quadrat Cover (%)											
2012	0.1	9.9	-	4.2	7.5	0.8	3.2	-	0.6	0.0	0.4	0.0
2015	0.2	9.1	-	6.3	7.6	1.3	-	0.0	0.2	-	-	0.0
2019	0.1	12.9	-	7.6	7.4	1.9	-	0.0	0.1	-	0.0	0.0
2024	0.2	12.4	0.0	5.8	5.1	1.0	0.4	-	0.0	-	0.0	0.2

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

Table 24R-09.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia frigida[p] -- (prairie sagewort)									
2012	80	-	0	100	0	0	0	0	17/24
2015	80	-	0	100	0	75	25	0	20/30
2019	100	-	20	80	0	0	0	0	28/23
2024	180	-	33	67	0	0	22	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 (%)		
Artemisia tridentata ssp. tridentata[p] -- (basin big sagebrush)									
2012	1540	40	4	87	9	30	7	3	89/118
2015	1360	20	6	78	16	24	4	13	88/112
2019	1420	-	9	82	10	18	0	20	95/125
2024	1940	200	8	68	24	9	12	24	- / -
Bassia prostrata[pi] -- (forage kochia)									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	-/-
2024	40	-	0	100	0	100	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2012	2200	-	3	93	5	3	0	8	37/54
2015	2820	-	4	93	3	15	13	4	47/61
2019	3140	-	4	94	2	0	0	2	50/61
2024	2540	-	6	80	15	0	0	17	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2012	1260	-	6	76	18	10	0	0	102/110
2015	1320	-	14	71	15	11	5	17	91/114
2019	1100	-	7	69	24	2	0	27	99/125
2024	1220	20	8	61	31	7	0	30	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2012	660	-	6	94	0	0	0	0	25/33
2015	1720	180	8	92	0	0	0	0	27/35
2019	2540	-	4	96	0	0	0	0	27/31
2024	3160	-	7	93	0	0	0	0	- / -
Juniperus scopulorum[t] -- (Rocky Mountain juniper)									
2012	100	-	20	80	0	0	0	0	- / -
2015	-	-	-	-	-	-	-	-	-/-
2019	-	20	0	0	0	0	0	0	- / -
2024	40	-	50	50	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2012	-	-	-	-	-	-	-	-	-/-
2015	120	-	0	100	0	0	0	0	9/8
2019	300	-	0	100	0	0	0	0	17/23
2024	100	-	0	100	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2012	100	-	0	100	0	0	0	0	12/34
2015	120	-	0	100	0	0	0	0	11/26
2019	120	-	0	100	0	0	0	0	11/25
2024	100	-	0	100	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2012	20	-	100	0	0	0	0	0	- / -
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	160	0	0	0	0	0	0	- / -
2024	-	-	-	-	-	-	-	-	-/-

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)									
2012	20	-	0	100	0	0	0	0	41/69
2015	-	-	-	-	-	-	-	-	65/111
2019	20	-	0	100	0	0	0	0	55/139
2024	20	-	0	100	0	0	0	0	- / -
Tetradymia canescens -- (spineless horsebrush)									
2012	80	-	25	75	0	0	0	0	27/44
2015	140	-	14	86	0	0	29	0	21/25
2019	140	-	0	100	0	0	0	0	34/38
2024	40	-	0	50	50	0	0	50	- / -

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

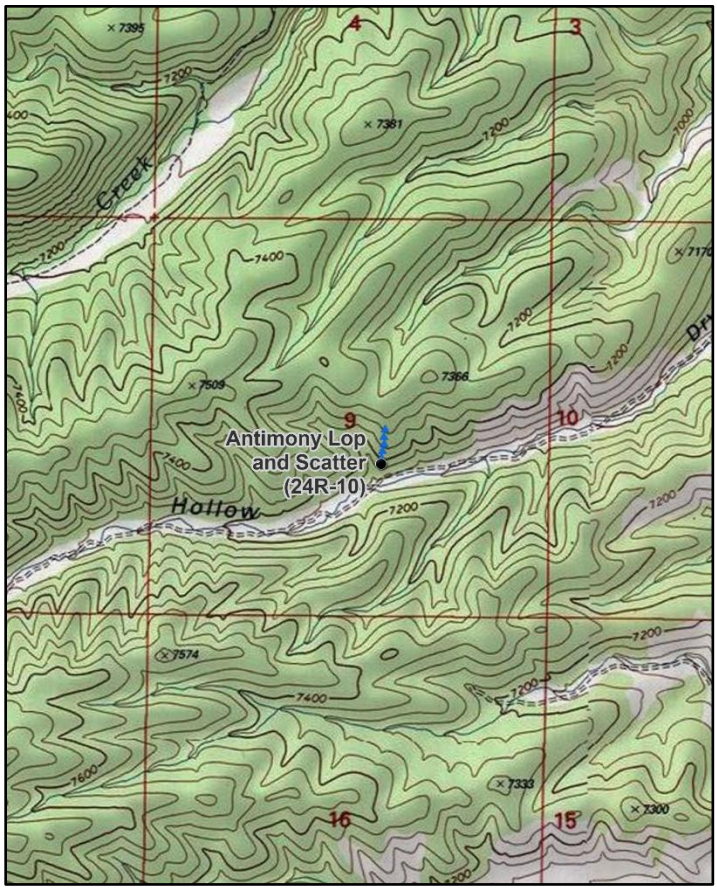
Table 24R-09.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

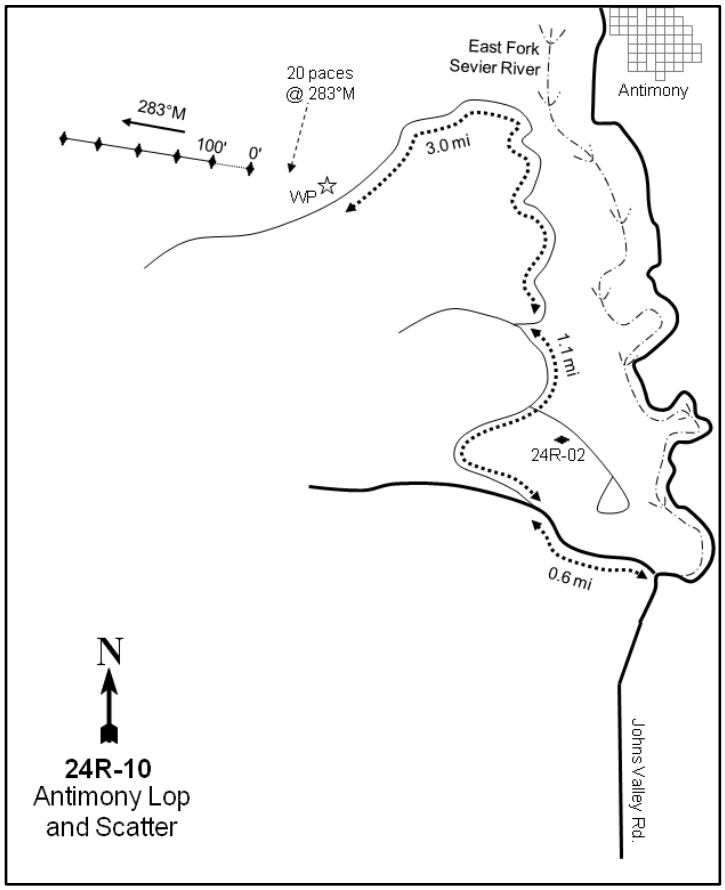
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2012	74	-	8	8	31	54	23.6
2015	8	-	67	33	-	-	14.7
2019	9	-	-	100	-	-	5.0
2024	8	17	33	50	-	-	3.5
Pinus edulis (twoneedle pinyon)							
2012	7	-	50	-	50	-	6.5
2015	7	-	100	-	-	-	2.5
2019	14	-	100	-	-	-	4.0
2024	5	-	100	-	-	-	2.0

Table 24R-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
2012	14.0	12.3	1.9	29.9	0.0	7.8	0.0	**65.9**	Fair-Good
2015	15.6	10.1	3.0	30.0	0.0	5.3	0.0	**64.0**	Fair-Good
2019	19.3	12.0	4.3	30.0	0.0	4.2	0.0	**69.8**	Good
2024	19.9	7.9	4.2	30.0	0.0	4.0	0.0	**66.0**	Fair-Good

ANTIMONY LOP AND SCATTER - STUDY NO. 24R-10





Location Information

USGS 7.5 min Map Info	Deep Creek SE; Township 32S, Range 2W, Section 09
GPS (0' Stake)	NAD 83 UTM ZONE 12, 411332 East 4210195 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	347° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 3: No Rebar

Directions to Site

From Johns Valley Road near Deer Creek, travel 0.6 miles and turn right. Travel 1.1 miles and continue for another 3.0 miles to a parking spot and witness post on the right (north) side of the road. Using a GPS, walk to the 0-foot stake of the transect that is in the chained area.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	PINE CREEK ANTIMONY
Elevation	7,200ft (2,195m)
Aspect	South
Slope	30-40%
Sample Dates	08/08/2012, 08/18/2015, 08/28/2019, 08/19/2024

Table 24R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Antimony Fuels Reduction and Habitat Improvement FY14	2597	November 2014-February 2015	587
Fire - Prescribed	Antimony Fuels Reduction and Habitat Improvement FY14	2597	November 2014-February 2015	736
Hand Crew - Lop and Scatter	Antimony PJ reduction and riparian improvement (Phase V)	2239	May-August 2012	587

Wildlife Habitat and Vegetation History

Table 24R-10.3 - 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
Pronghorn	crucial	winter

Table 24R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon-Juniper	Phase III
2015	Perennial Grass	No Encroachment
2019	Perennial Grass-Annual Forb	Phase I
2024	Perennial Grass	Phase I

Site Notes

When the site was established in 2012, the lop and scatter treatment had already occurred a few weeks prior. To better capture pre-treatment data, the site was placed in an untreated portion of the project. Then in 2015 the site was moved a few hundred feet to be within the treatment area. The pre-treatment and post-treatment transects are very similar and for the purposes of this report are considered to be the same study site and are being analyzed together.

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB336UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2012, this site was in Phase III of woodland succession with Utah juniper (*Juniperus osteosperma*) providing most of the vegetation cover (Table 24R-10.4, Table 24R-10.14). Forbs and grasses were moderately sparse and not very diverse. After the lop and scatter and prescribed burn treatment (Table 24R-10.1), perennial grass and forb cover increased with perennial grass species as the dominant vegetation component since 2015. Annual forbs increased in 2019 and became codominant along with perennial grasses, but decreased in 2024 (Table 24R-10.7, Table 24R-10.10, Table 24R-10.11). Although pinyon and juniper were absent in the first post-treatment sample year, they began to infill in 2019 and 2024 (Table 24R-10.14): this suggests that the site may have the potential for further infilling as time since treatment increases.

Condition of this site as mule deer winter range has remained very poor to poor over the study period; winter range condition is considered to be very poor-poor as of 2024. Current winter habitat condition is primarily limited by the very small preferred browse component and reduced perennial forb cover (Table 24R-10.15). Pellet transect data indicates that no deer pellet groups were sampled in hoop data during the initial post-treatment sampling. Deer presence has increased over time, but has remained low over the study period. Shrubs have been and are limited on this site as of 2024, and utilization has varied over time. In 2024, all winterfat (*Krascheninnikovia lanata*) and rubber rabbitbrush (*Ericameria nauseosa*) plants sampled in density strips were heavily hedged, although the total number of plants sampled was very low overall. Both cattle and elk presences have remained low over time (Table 24R-10.9, Table 24R-10.13).

Trend Summary Tables

Table 24R-10.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	1.1	0.2	16.0	1.7	-	25.7
2015	0.1	2.0	-	0.1	0.5	-
2019	0.2	0.7	-	0.6	0.9	-
2024	0.8	1.0	-	0.3	0.5	-

Table 24R-10.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	-	144	35	42	-	4.5	0.2	0.6
2015	2	256	54	25	0.0	16.9	3.0	1.6
2019	66	314	294	56	1.5	22.9	17.4	1.6
2024	137	299	132	71	0.9	23.5	3.3	2.7

Table 24R-10.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	10.8	0.0	29.0	29.8	32.5	22.1
2015	31.0	0.8	10.5	28.8	30.3	20.7
2019	17.4	-	15.3	26.8	35.8	35.0
2024	17.6	-	16.1	22.3	33.6	28.0

Table 24R-10.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2012	-	3	-	2
2015	-	2	-	9
2019	10	-	-	5
2024	2	5	1	-
Year	Days Use Per Acre (ha)			
2012	-	6.7 (16.6)	-	-
2015	1.5 (3.6)	-	0.7 (1.7)	-
2019	3.6 (9.0)	0.7 (1.7)	0.7 (1.7)	-
2024	5.1 (12.6)	6.0 (14.9)	-	-

Table 24R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency												
2012	-	-	-	132	-	4	-	-	9	-	-	-	-
2015	14	3	-	178	2	-	78	-	68	0	-	-	-
2019	34	-	2	224	66	-	61	-	125	7	1	-	6
2024	20	-	-	209	137	-	8	0	120	3	2	11	41
year	Average Cover (%)												
2012	-	-	-	4.4	-	0.0	-	-	0.1	-	-	-	-
2015	1.5	0.0	-	8.1	0.0	-	2.3	-	4.9	0.0	-	-	-
2019	1.3	-	0.0	13.8	1.5	-	1.5	-	6.2	0.0	0.0	-	0.1
2024	1.0	-	-	12.2	0.9	-	0.2	0.0	8.4	0.0	0.1	0.4	1.2

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

Table 24R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Aliciella hutchinsifolia[a] (desert pale gilia)	Arabis (rockcress)	Astragalus brandegeei (Brandegee's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Chamaesyce (sandmat)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriogonum alatum (winged buckwheat)	Gilia inconspicua[a] (shy gilia)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Lupinus brevicaulis[a] (shortstem lupine)	Lygodesmia juncea (rush skeletonplant)	Mentzelia albicaulis[a] (whitestem blazingstar)
year	Nested Frequency																
2012	-	6	-	26	-	6	-	-	-	35	4	-	-	-	-	-	-
2015	-	-	-	4	1	-	1	18	-	6	-	9	-	-	-	0	7
2019	21	-	23	15	-	-	39	85	1	102	-	95	16	48	56	0	68
2024	-	-	-	1	-	12	10	-	-	17	-	-	-	7	-	-	-
year	Average Cover (%)																
2012	-	0.0	-	0.6	-	0.0	-	-	-	0.2	0.0	-	-	-	-	-	-
2015	-	-	-	0.0	0.0	-	0.2	1.0	-	0.2	-	0.0	-	-	-	0.2	0.2
2019	0.3	-	0.2	0.2	-	-	0.4	2.1	0.0	3.8	-	3.6	0.6	1.4	1.0	0.0	1.5
2024	-	-	-	0.0	-	0.0	0.1	-	-	0.1	-	-	-	0.6	-	-	-

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

FORB SPECIES	Nicotiana attenuata[a] (coyote tobacco)	Salsola tragus[ai] (prickly Russian thistle)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Townsendia (Townsend daisy)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency					
2012	-	-	-	-	-	-
2015	15	5	-	20	-	-
2019	-	78	7	18	-	12
2024	-	100	-	62	2	8
year	Average Cover (%)					
2012	-	-	-	-	-	-
2015	0.4	1.0	-	1.4	-	-
2019	-	2.1	0.4	1.2	-	0.3
2024	-	2.5	-	2.6	0.0	0.1

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

Table 24R-10.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Atriplex canescens[p] (fourwing saltbush)	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)	Krascheninnikovia lanata[p] (winterfat)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)										
2012	1.7	-	-	-	-	-	6.9	-	-	-	18.8
2015	-	-	0.1	-	-	0.5	-	-	-	-	-
2019	-	-	-	-	-	0.9	-	0.6	-	-	-
2024	-	0.2	-	0.2	0	0.3	-	0.1	-	-	-
year	Quadrat Cover (%)										
2012	1.1	-	-	-	-	0.2	4.3	-	0.0	-	11.6
2015	-	-	0.0	-	-	2.0	-	0.1	-	-	-
2019	-	-	-	-	-	0.7	-	0.2	-	0.0	-
2024	-	0.4	-	0.0	0.0	1.0	-	0.4	-	-	-

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

Table 24R-10.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	220	-	0	64	36	9	18	18	50/80
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-

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)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	61/59
2019	20	-	0	100	0	0	0	0	93/134
2024	20	-	0	100	0	0	0	0	- / -
Bassia prostrata[pi] -- (forage kochia)									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	5/22
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2012	-	-	-	-	-	-	-	-	11/12
2015	-	-	-	-	-	-	-	-	-/-
2019	60	-	33	67	0	0	0	0	- / -
2024	40	-	0	100	0	0	0	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	70/72
2024	20	-	0	100	0	0	100	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2012	440	-	55	46	0	0	0	0	17/22
2015	260	-	8	92	0	0	0	0	28/42
2019	1060	-	13	87	0	0	0	0	24/29
2024	1580	-	28	72	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2012	100	-	0	100	0	0	0	20	- / -
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	20	-	100	0	0	0	0	0	- / -
Krascheninnikovia lanata[p] -- (winterfat)									
2012	-	-	-	-	-	-	-	-	-/-
2015	40	-	0	100	0	0	0	0	37/33
2019	60	-	33	67	0	0	0	0	49/62
2024	40	-	0	100	0	0	100	0	- / -
Opuntia -- (pricklypear)									
2012	-	-	-	-	-	-	-	-	7/28
2015	-	-	-	-	-	-	-	-	9/17
2019	-	-	-	-	-	-	-	-	11/37
2024	-	-	-	-	-	-	-	-	-/-
Pediocactus simpsonii -- (mountain ball cactus)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	2/3
2024	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2012	100	-	20	80	0	0	0	0	- / -
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-

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 (%)		
Sclerocactus -- (fishhook cactus)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	8/29
2019	-	-	-	-	-	-	-	-	10/39

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

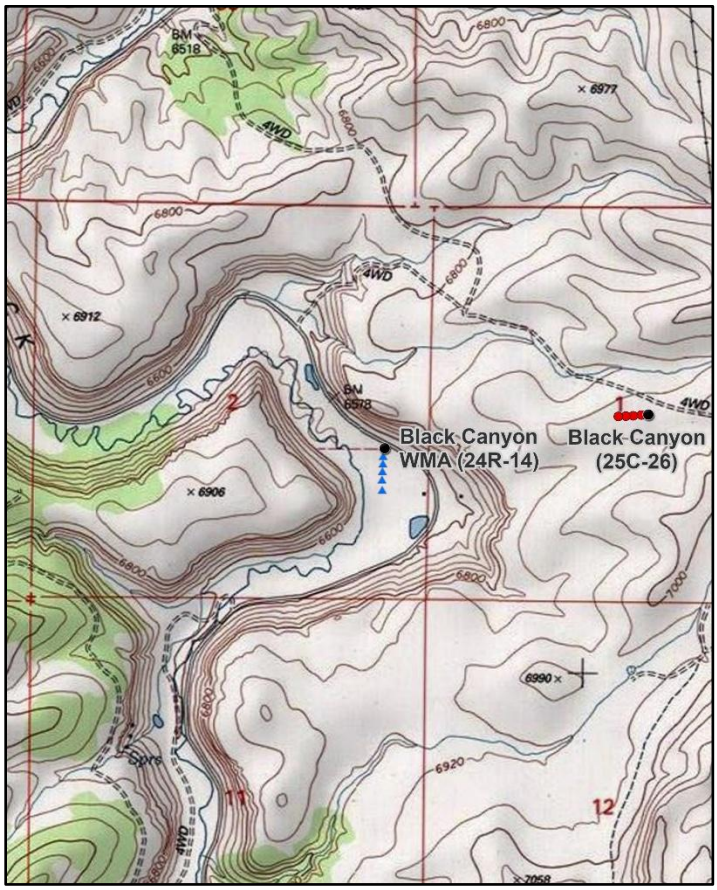
Table 24R-10.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

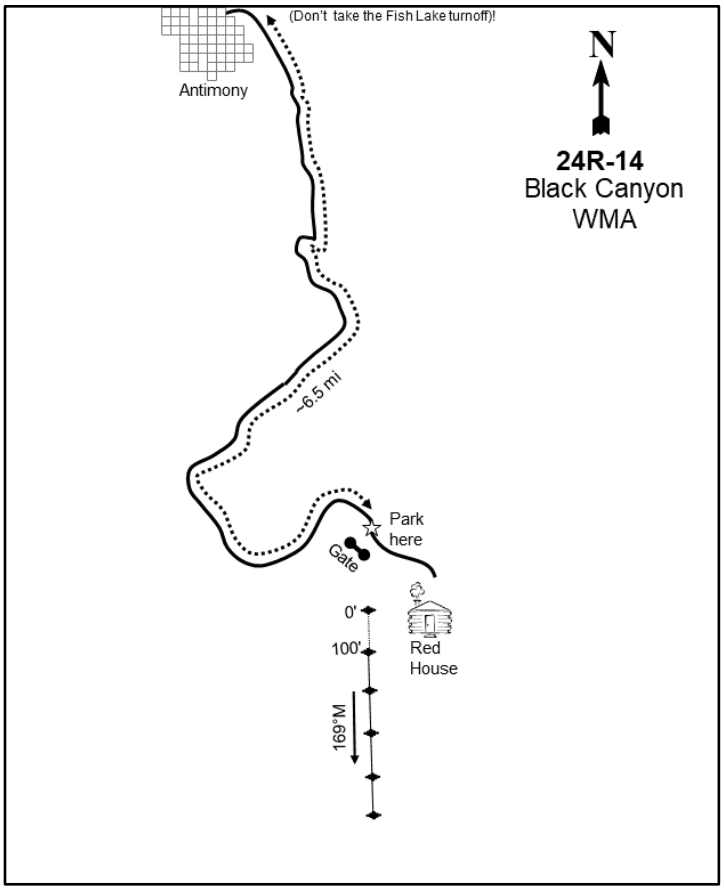
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	33	-	-	7	13	80	49.1
2019	12	83	17	-	-	-	1.6
2024	14	25	75	-	-	-	2.3
Pinus edulis (twoneedle pinyon)							
2012	166	-	10	10	15	65	22.9
2019	2	100	-	-	-	-	1.0
2024	2	-	100	-	-	-	2.0

Table 24R-10.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2012	2.1	0.0	0.0	9.0	0.0	1.3	0.0	**12.4**	Very Poor
2015	0.2	0.0	0.0	30.0	0.0	3.2	0.0	**33.4**	Very Poor-Poor
2019	0.8	0.0	0.0	30.0	-1.2	3.3	0.0	**32.9**	Very Poor
2024	0.4	0.0	0.0	30.0	-0.7	5.4	0.0	**35.1**	Very Poor-Poor

BLACK CANYON WMA - STUDY NO. 24R-14





Location Information

USGS 7.5 min Map Info	Antimony SW; Township 32S, Range 2W, Section 02
GPS (0' Stake)	NAD 83 UTM ZONE 12, 415041 East 4211773 North

Transect Information

Browse Tag # (0' Stake)	557
Transect Bearing	169° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From Antimony, travel south on South Black Canyon Road for about 6.5 miles. There will be a gate and a red house on the right (west) side of the road. Park here; the transect is near the gate and the 0-foot stake is marked with browse tag #557.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	PINE CREEK ANTIMONY
Elevation	6,588ft (2,008m)
Aspect	South
Slope	1%
Sample Dates	08/31/2016, 08/29/2019, 08/15/2024

Table 24R-14.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Seed Unknown	-	-	Historic	-
Herbicide - Tordon	Black Canyon WMA Rabbitbrush Removal Phase 2	3069	October-November 2016	24
Mechanical - Mower	Black Canyon WMA Rabbitbrush Removal Phase 2	3069	October-November 2016	24

Table 24R-14.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Kingston/Black Canyon WMA			Drill	Nov 2012	38
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	1.50	1.14
G	Agropyron cristatum	Crested Wheatgrass	Nordan	2.00	1.87
G	Leymus cinereus	Great Basin Wildrye	UDWR IntMtn Tetra	1.00	0.85
G	Thinopyrum intermedium	Intermediate Wheatgrass	Clarke	2.00	1.76
G	Thinopyrum ponticum	Tall Wheatgrass	Alkar	2.00	1.88
F	Helianthus annuus	Annual Sunflower	Montezuma CO	1.50	1.41
F	Melilotus officinalis	Yellow Sweetclover		1.50	1.40
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Sanpete UT	0.50	0.18

Mix Name			Application Type	Application Date	Acres
Kingston/Black Canyon WMA - Kochia			Broadcast	Jan 2013	38
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Bassia prostrata	Forage Kochia	Beaver UT	1.00	0.62

Wildlife Habitat and Vegetation History

Table 24R-14.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 24R-14.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Rubber Rabbitbrush/Perennial Grass	NA
2019	Perennial Grass-Annual Forb	NA
2024	Annual Forb	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Upland - Interzonal Loamy Bottom (Basin Wildrye)
NRCS Ecological Site #	R047XB016UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2016, this site was dominated by rubber rabbitbrush (*Ericameria nauseosa*) (Table 24R-14.12) and a diverse mixture of perennial grasses. In addition, the annual grass species cheatgrass (*Bromus tectorum*) provided notable cover. A mower and herbicide treatment in October-November of 2016 (Table 24R-14.1) removed a majority of the rubber rabbitbrush, causing the site to transition to one dominated by perennial grasses and annual forbs in 2019. Perennial grasses decreased in 2024, leaving annual forbs -- primarily the introduced species burningbush (*Bassia scoparia*) -- as the sole dominant vegetation component. Cheatgrass exhibited a significant increase in cover in 2019, but decreased during the most recent sample year (Table 24R-14.7, Table 24R-14.10, Table 24R-14.11). However, cheatgrass could increase fuel loads and may affect the ecological resilience of the plant community should it increase again in the future. Although rubber rabbitbrush decreased between 2016 and 2019, it has increased slightly in cover and density as of 2024 (Table 24R-14.12, Table 24R-14.13). This site could transition to one again dominated by rubber rabbitbrush should these trends continue in the future.

This site's condition as mule deer winter range has remained very poor throughout the study period. Current winter range condition is mainly limited by the lack of preferred browse and limited perennial grass cover (Table 24R-14.15). Deer presence was moderate in 2016 according to pellet transect data, but has been low since 2019. A majority of the rubber rabbitbrush plants sampled in density strips have received little to no use over the study years, although 11% were heavily hedged in 2024 (Table 24R-14.9, Table 24R-14.13). In addition, on-site observations for 2024 note that little to no utilization of the herbaceous understory was observed.

Trend Summary Tables

Table 24R-14.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	-	7.8	-	-	9.7	-
2019	-	0.9	-	-	0.6	-
2024	-	1.7	-	-	2.1	-

Table 24R-14.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	262	277	91	202	11.8	23.0	5.9	9.5
2019	276	291	315	240	20.1	30.9	31.7	16.6
2024	97	69	441	176	2.7	4.0	58.9	6.6

Table 24R-14.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2016	13.1	0.0	43.1	1.3	1.4	54.5
2019	12.8	0.0	36.0	0.2	0.9	82.5
2024	18.2	0.0	36.2	0.8	0.7	68.0

Table 24R-14.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2016	1	16	1	1	13
2019	4	4	-	-	2
2024	-	3	-	-	-
Year	Days Use Per Acre (ha)				
2016	2.9 (7.2)	23.4 (57.9)	-	-	-
2019	4.4 (10.8)	4.7 (11.6)	0.7 (1.7)	-	-
2024	1.5 (3.6)	6.7 (16.6)	-	-	-

Table 24R-14.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agrostis stolonifera[i] (creeping bentgrass)	Bouteloua gracilis (blue grama)	Bromus arvensis[ai] (field brome)	Bromus inermis[i] (smooth brome)	Bromus tectorum[ai] (cheatgrass)	Deschampsia cespitosa (tufted hairgrass)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Juncus ensifolius (swordleaf rush)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Phalaris arundinacea (reed canarygrass)	Phleum pratense[i] (timothy)	Poa pratensis[i] (Kentucky bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency																
2016	13	2	-	6	262	-	-	-	13	7	110	36	1	78	49	2	4
2019	10	5	9	21	268	5	195	12	-	8	1	-	-	65	18	-	-
2024	-	-	77	1	33	-	1	-	-	5	-	-	-	-	5	4	5
year	Average Cover (%)																
2016	0.4	0.0	-	0.2	11.8	-	-	-	0.3	1.3	5.0	3.9	0.0	3.3	3.8	0.2	0.0
2019	0.5	0.8	0.7	1.3	19.4	0.1	13.6	0.4	-	0.9	0.0	-	-	4.0	2.0	-	-
2024	-	-	1.8	0.0	0.9	-	0.0	-	-	0.3	-	-	-	-	0.6	0.4	0.2

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

GRASS SPECIES	Thinopyrum ponticum[i] (tall wheatgrass)
year	Nested
2016	68
2019	74
2024	48
year	Average Cover (%)
2016	4.5
2019	7.2
2024	2.4

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

Table 24R-14.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Ambrosia artemisiifolia[a] (annual ragweed)	Bassia scoparia[ai] (burningbush)	Camelina microcarpa[ai] (littlepod false flax)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cirsium (thistle)	Clematis (leather flower)	Cleome serrulata[a] (Rocky Mountain beeplant)	Comandra umbellata (bastard toadflax)	Convolvulus arvensis[ni] (field bindweed)	Descurainia pinnata[a] (western tansymustard)	Equisetum laevigatum (smooth horsetail)	Iva axillaris (povertyweed)	Lactuca serriola[ai] (prickly lettuce)	Melilotus officinalis[i] (sweetclover)	Potentilla (cinquefoil)	Salsola tragus[ai] (prickly Russian thistle)	Sisymbrium altissimum[ai] (tall tumblemustard)
year	Nested Frequency																
2016	2	68	-	8	3	18	0	1	4	5	116	63	4	5	2	3	7
2019	-	305	10	-	-	-	40	-	0	39	208	42	-	4	-	-	6
2024	-	439	-	0	-	-	6	-	-	8	163	29	-	-	-	-	22
year	Average Cover (%)																
2016	0.0	4.9	-	0.5	0.0	0.4	0.0	0.0	0.1	0.0	4.7	3.7	0.0	0.0	0.1	0.3	0.1
2019	-	27.7	0.5	-	-	-	1.8	-	0.0	1.3	11.6	3.4	-	0.2	-	-	0.5
2024	-	57.7	-	0.0	-	-	0.1	-	-	0.1	5.2	1.4	-	-	-	-	1.0

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

FORB SPECIES	Sphaeralcea coccinea (scarlet globemallow)	Symphyotrichum ascendens (western aster)	Tragopogon dubius[ai] (yellow salsify)	Viola (violet)
year	Nested Frequency			
2016	-	3	3	8
2019	2	11	-	-
2024	1	-	-	-
year	Average Cover (%)			
2016	-	0.1	0.1	0.2
2019	0.0	1.4	-	-
2024	0.0	-	-	-

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

Table 24R-14.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Ericameria nauseosa (rubber rabbitbrush)	Salix lucida (shining willow)
year	Line Intercept	
2016	9.7	-
2019	0.6	-
2024	2	0.1
year	Quadrat Cover (%)	
2016	7.8	-
2019	0.9	-
2024	1.7	0.0

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

Table 24R-14.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2016	-	-	-	-	-	-	-	-	86/85
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Atriplex canescens[p] -- (fourwing saltbush)									
2016	60	-	0	100	0	0	0	0	110/184
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-

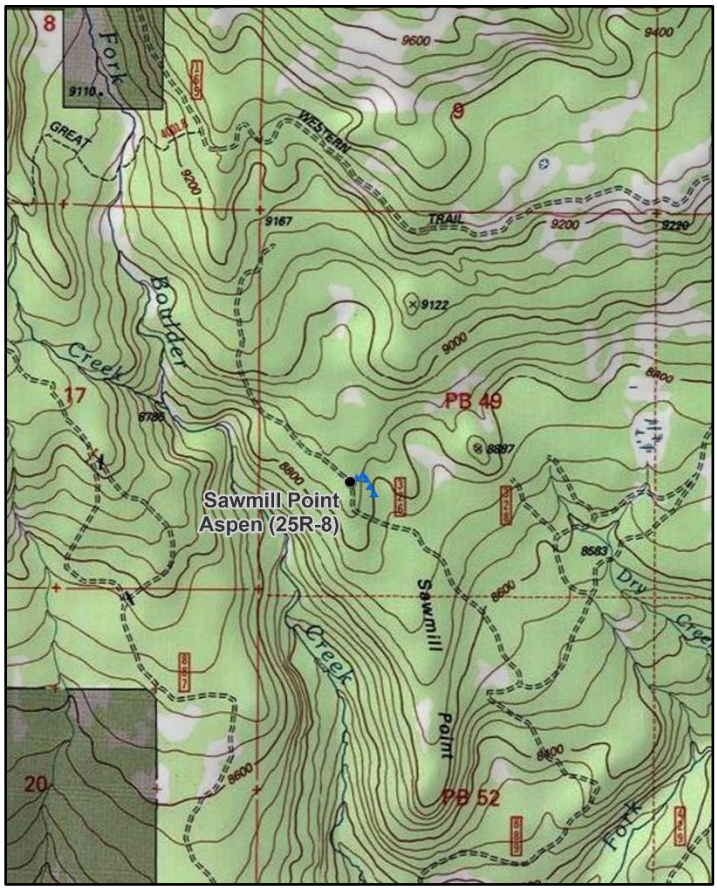
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Ericameria nauseosa -- (rubber rabbitbrush)									
2016	820	-	2	90	7	0	0	10	113/138
2019	60	-	0	100	0	0	0	0	98/124
2024	180	-	33	67	0	0	11	0	- / -
Salix lucida -- (shining willow)									
2016	60	-	100	0	0	0	100	0	- / -

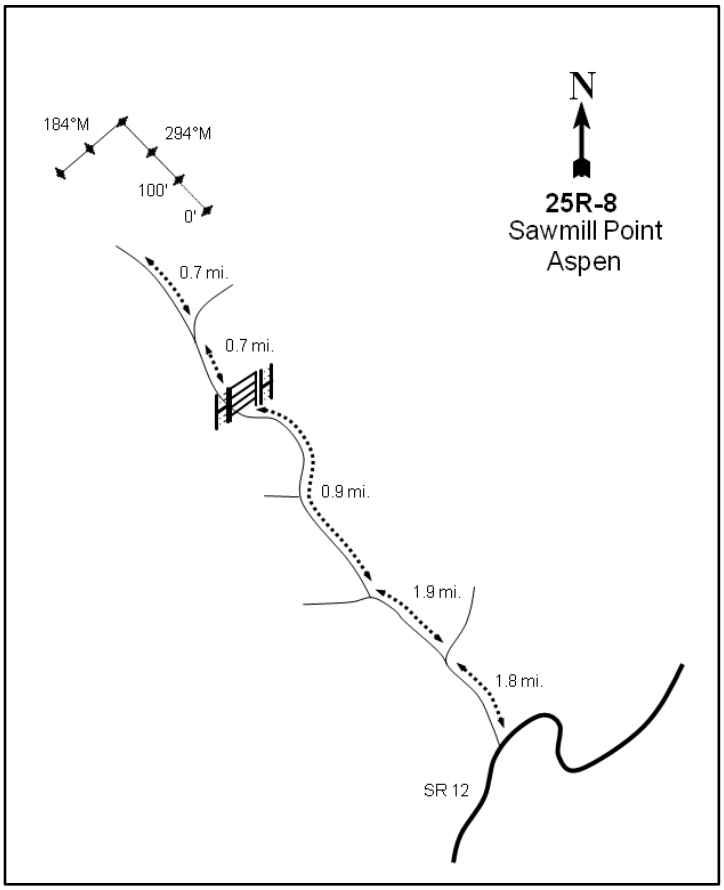
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 24R-14.15 - Deer Desirable Components Index: 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	0.0	0.0	0.0	30.0	-8.8	10.0	-2.0	**29.2**	Very Poor
2019	0.0	0.0	0.0	30.0	-15.1	10.0	-2.0	**22.9**	Very Poor
2024	0.0	0.0	0.0	7.9	-2.0	10.0	0.0	**15.9**	Very Poor

SAWMILL POINT ASPEN - STUDY NO. 25R-8





Location Information

USGS 7.5 min Map Info	Deer Creek Lake SW; Township 32S, Range 4E, Section 49
GPS (0' Stake)	NAD 83 UTM ZONE 12, 458359 East 4208268 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	45° magnetic (Lines 3-5: 130° magnetic)
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

On the Boulder Highway travel 0.1 miles north of mile marker 92 and turn left (west) towards the Garkane power plant. Continue 1.8 miles to a fork towards Bear Creek, then stay left on Forest Service Road #166. Continue for 1.9 miles to a road on the right. Turn and go 0.9 miles, passing through a Forest Service gate shortly after turning right at a fork. Drive for 0.7 miles to another fork and bear left. Travel for another 0.7 miles to a witness post on the right (east) side of the road. The witness post is actually the 0-foot stake; there is no browse tag.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Boulder
Elevation	8,745ft (2,665m)
Aspect	East
Slope	3-21%
Sample Dates	08/18/2010, 08/14/2013, 08/08/2018, 08/20/2024

Table 25R-08.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop (No Scatter)	Sawmill Point/Baldy's Ridge Aspen Improvement Stewardship	1691	July 2010-June 2011	940

Wildlife Habitat and Vegetation History

Table 25R-08.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 25R-08.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2010	Quaking Aspen-Conifer Encroached	NA
2013	Quaking Aspen	NA
2018	Quaking Aspen	NA
2024	Quaking Aspen	NA

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	22 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R047XB508UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2010, the plant community on this site was composed mainly of quaking aspen (*Populus tremuloides*) that was being infilled by ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*). Conifer cover and density decreased following a lop (no scatter) treatment (Table 25R-08.1), and aspen has been the sole dominant vegetation component since 2013. Aspen cover and density decreased between 2018 and 2024, but density in 2024 was greater than in the first post-treatment sample year (Table 25R-08.12, Table 25R-08.13, Table 25R-08.13a, Table 25R-08.14). There was a robust herbaceous understory consisting of both perennial grasses and forbs in 2010, with perennial forbs being especially diverse. Understory cover exhibited an initial decrease in the first sample year following treatment, but was greater than pretreatment values in 2018 and 2024 (Table 25R-08.7, Table 25R-08.10, Table 25R-08.11). Although conifer density and cover are low as of the 2024 sample year (Table 25R-08.12, Table 25R-08.14), the post-treatment presence of these trees indicates that infilling may be possible in future sample years as time since treatment elapses.

Due to the abundance and diversity of the herbaceous and shrub components (Table 25R-08.10, Table 25R-08.11, Table 25R-08.12), this site likely serves as adequate habitat for summering mule deer. Mule deer and elk presence have increased over time according to pellet transect data, but have remained low throughout the duration of the study. Utilization of quaking aspen has decreased over the study period: 53% of aspen plants sampled in density strips were moderately to heavily browsed in 2013, and only 16% exhibited that level of utilization in 2024. Conversely, size class distribution of aspen has increased over time. This trend of aspen growing taller with less of the trees being available to big game may have also contributed to the decrease in utilization. Mountain snowberry has also received some use, but in generally low levels: less than 30% of plants have been moderately to heavily hedged since 2010. Finally, cattle presence was moderate to high between 2010 and 2018, but was very high in 2024 (Table 25R-08.9, Table 25R-08.13, Table 25R-08.13a). However, on-site observations for 2024 mention little to no utilization of the grass and forb components.

Trend Summary Tables

Table 25R-08.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2010	7.3	-	3.6	8.4	-	59.5
2013	2.6	-	0.9	4.3	-	24.6
2018	4.8	-	3.1	7.6	-	40.3
2024	6.4	-	2.7	11.9	-	25.9

Table 25R-08.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2010	-	305	17	254	-	12.3	0.1	14.8
2013	-	259	16	188	-	6.0	0.1	4.8
2018	-	358	24	232	-	19.4	0.3	11.7
2024	-	368	39	227	-	20.3	0.1	14.1

Table 25R-08.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2010	4.4	0.1	71.4	0.1	3.3	34.4
2013	11.9	0.2	72.3	0.1	3.9	15.2
2018	12.4	0.4	71.0	1.1	5.3	33.8
2024	13.5	0.0	57.1	2.0	7.2	36.0

Table 25R-08.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2010	1	-	-	-
2013	1	1	-	-
2018	3	1	2	1
2024	9	5	6	-
Year	Days Use Per Acre (ha)			
2010	10.2 (25.1)	1.3 (3.3)	-	-
2013	6.5 (16.1)	4.7 (11.6)	0.7 (1.7)	-
2018	13.1 (32.3)	8.1 (19.9)	8.7 (21.5)	-
2024	18.1 (44.8)	17.4 (43.0)	12.1 (29.8)	-

Table 25R-08.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Bouteloua gracilis (blue grama)	Bromus porteri (Porter brome)	Carex obtusata (obtuse sedge)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Muhlenbergia montana (mountain muhly)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency													
2010	15	-	-	-	55	109	-	23	16	-	-	29	200	2
2013	17	-	6	-	84	76	-	-	2	-	-	110	92	1
2018	13	10	24	-	140	191	33	42	3	1	-	148	60	-
2024	20	-	28	14	140	157	22	45	9	8	25	78	109	4
year	Average Cover (%)													
2010	0.2	-	-	-	1.3	2.6	-	1.0	0.7	-	-	0.7	5.9	0.0
2013	0.2	-	0.0	-	1.3	0.7	-	-	0.0	-	-	2.0	1.8	0.0
2018	0.3	0.2	0.7	-	2.9	6.2	0.7	2.2	0.1	0.0	-	4.1	2.1	-
2024	0.6	-	0.3	0.4	4.7	4.9	1.0	1.9	0.1	0.5	0.3	2.7	2.7	0.1

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

Table 25R-08.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria parvifolia (small-leaf pussytoes)	Arabis holboellii[a] (Holboell's rockcress)	Artemisia carruthii (Carruth's sagewort)	Ceratocephala testiculata[ai] (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Clematis (leather flower)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)	Erigeron eatonii (Eaton's fleabane)	Erigeron flagellaris (trailing fleabane)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Geranium richardsonii (Richardson's geranium)	Hieracium fendleri (yellow hawkweed)	Hymenoxys richardsonii (pingue rubberweed)
year	Nested Frequency																
2010	64	-	143	-	-	-	3	-	-	1	-	58	10	3	-	9	7
2013	29	-	82	-	4	3	-	-	2	10	-	43	6	-	3	3	6
2018	39	10	89	7	-	-	-	3	-	-	7	91	3	-	5	3	-
2024	50	2	69	4	-	-	-	-	-	-	9	77	9	4	9	11	1
year	Average Cover (%)																
2010	1.2	-	4.4	-	-	-	0.0	-	-	0.0	-	1.3	0.0	0.0	-	0.1	0.0
2013	0.6	-	1.2	-	0.0	0.0	-	-	0.0	0.0	-	0.5	0.1	-	0.0	0.0	0.0
2018	0.9	0.0	2.3	0.0	-	-	-	0.1	-	-	0.0	3.8	0.0	-	0.0	0.1	-
2024	1.5	0.0	2.3	0.0	-	-	-	-	-	-	0.1	3.9	0.1	0.0	0.1	0.0	0.0

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

FORB SPECIES	Lathyrus lanszwertii (Nevada pea)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Packera multilobata (lobeleaf groundsel)	Penstemon strictus (Rocky Mountain penstemon)	Phacelia hastata (silverleaf phacelia)	Polygonum douglasii[a] (Douglas' knotweed)	Potentilla hippiana (woolly cinquefoil)	Pseudocymopterus montanus (alpine false springparsley)	Silene drummondii (Drummond's campion)	Streptanthus cordatus (heartleaf twistflower)	Taraxacum officinale (common dandelion)	Tetraneuris acaulis (stemless four-nerve daisy)	Trifolium longipes (longstalk clover)	Verbascum thapsus[ai] (common mullein)
year	Nested Frequency														
2010	-	5	38	16	10	-	14	52	36	2	2	69	1	-	-
2013	2	18	39	7	21	-	13	33	-	-	-	27	-	2	-
2018	-	-	45	38	2	-	6	27	24	2	-	68	-	-	2
2024	-	-	37	39	9	3	32	27	16	-	-	43	-	-	1
year	Average Cover (%)														
2010	-	0.0	3.4	1.1	0.1	-	0.0	1.6	0.5	0.0	0.0	0.9	0.0	-	-
2013	0.0	0.1	1.2	0.0	0.3	-	0.0	0.5	-	-	-	0.2	-	0.0	-
2018	-	-	1.2	0.2	0.0	-	0.0	0.9	0.5	0.0	-	1.6	-	-	0.2
2024	-	-	3.6	0.4	0.1	0.1	0.1	1.3	0.3	-	-	0.5	-	-	0.0

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

Table 25R-08.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Pinus ponderosa[t] (ponderosa pine)	Populus tremuloides[tp] (quaking aspen)	Pseudotsuga menziesii[t] (Douglas-fir)	Purshia tridentata[p] (antelope bitterbrush)	Symphoricarpos oreophilus[p] (mountain snowberry)
year	Line Intercept Cover (%)				
2010	21.7	37.6	0.2	-	8.4
2013	0.5	24.1	-	-	4.3
2018	0.2	40.1	-	-	7.6
2024	0.2	25.7	-	-	11.9
year	Quadrat Cover (%)				
2010	3.2	0.2	0.1	-	7.3
2013	0.2	0.7	-	0.1	2.4
2018	0.1	2.9	0.0	0.1	4.7
2024	0.1	2.5	-	0.0	6.3

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

Table 25R-08.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Juniperus communis -- (common juniper)									
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	57/338
2024	-	-	-	-	-	-	-	-	-/-

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)									
2010	260	20	62	39	0	0	0	0	- / -
2013	40	20	100	0	0	0	0	0	- / -
2018	40	-	100	0	0	0	0	50	- / -
2024	80	-	75	25	0	0	0	0	- / -
Populus tremuloides[tp] -- (quaking aspen)									
2010	400	-	65	35	0	0	0	0	- / -
2013	See table 13a - Aspen Characteristics								
2018	See table 13a - Aspen Characteristics								
2024	See table 13a - Aspen Characteristics								
Pseudotsuga menziesii[t] -- (Douglas-fir)									
2010	-	20	0	0	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2010	40	-	50	50	0	0	100	0	10/26
2013	40	-	0	100	0	50	50	0	15/31
2018	20	-	100	0	0	0	100	0	31/33
2024	20	-	0	100	0	0	100	0	- / -
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2010	1940	-	27	73	0	16	0	0	46/85
2013	1980	20	33	67	0	5	0	3	43/61
2018	2760	-	9	91	0	10	11	0	39/66
2024	3220	-	8	91	1	21	4	1	- / -

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

Table 25R-08.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

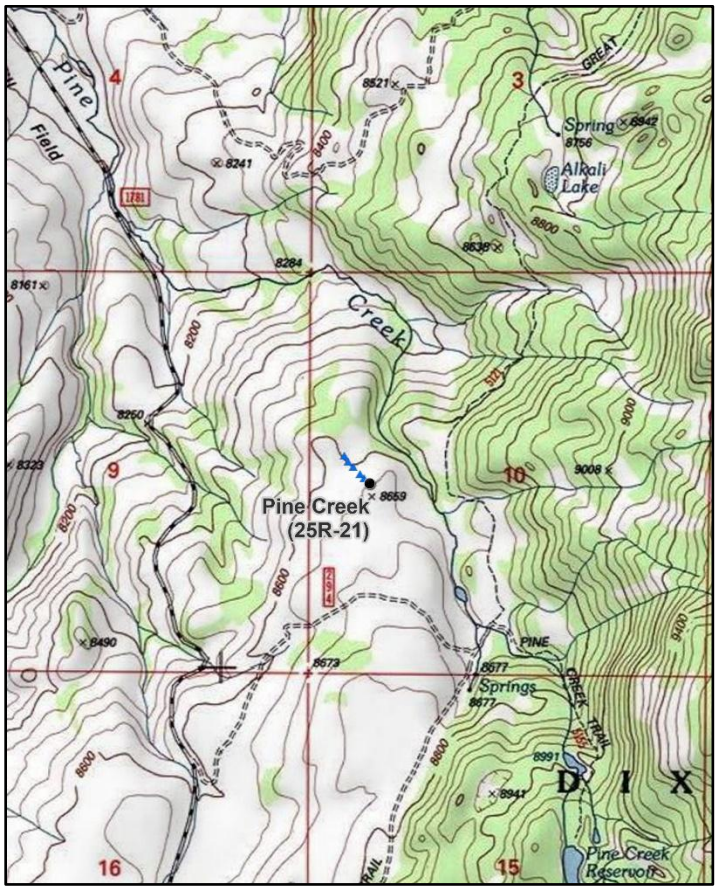
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2013	820	54	37	10	-	11	42	5
2018	1640	38	49	4	10	26	8	4
2024	1060	28	40	8	25	3	13	11

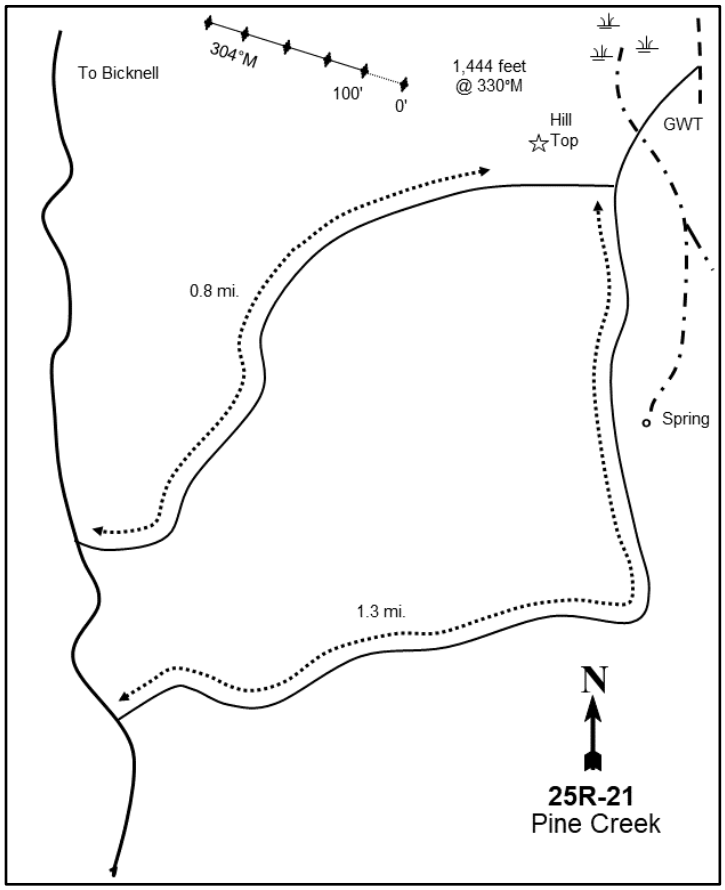
Class I - <= 1.5 feet; Class II - > 1.5 feet to 5 feet; Class III - > 5 feet and up to 1 inch diameter at breast height (dbh); Class IV - > 1 in diameter at breast height (dbh)

Table 25R-08.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Pinus ponderosa (ponderosa pine)							
2010	196	-	10	15	15	60	18.9
2013	22	50	-	50	-	-	3.5
2018	30	14	57	14	14	-	3.6
2024	18	-	45	45	-	9	5.5
Populus tremuloides (quaking aspen)							
2010	127	20	-	5	-	75	16.4
2013	304	50	35	-	5	10	2.8
2018	1288	30	50	5	10	5	2.3
2024	982	10	50	15	5	20	9.1
Pseudotsuga menziesii (Douglas-fir)							
2024	1	-	100	-	-	-	4.0

PINE CREEK - STUDY NO. 25R-21





Location Information

USGS 7.5 min Map Info	Government Point NW; Township 30S, Range 3E, Section 10
GPS (0' Stake)	NAD 83 UTM ZONE 12, 449464 East 4229836 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	304° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the intersection of State Route 24 and Hatchery Road just south of the town of Bicknell, travel 6.7 miles along Hatchery Road until the road turns into Smooth Knoll Road and stay left (south). Travel for approximately 1.3 miles and stay left onto Pine Creek Road. Drive for another 5.1 miles along Pine Creek Road to a jeep trail (Great Western OHV Alt/Pine Creek Reservoir Road) on the left; turn left (east) and drive another 1.3 miles to where Pine Creek crosses the road. Turn left (west) before the creek crossing and park on top of the hill. Use the GPS to find the stake locations.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Dark Valley Common Use
Elevation	8,659ft (2,639m)
Aspect	Northwest
Slope	5-15%
Sample Dates	08/25/2021, 08/20/2024

Table 25R-21.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Government Creek Improvement Phase II	5533	October 2022-June 2023	2014

Wildlife Habitat and Vegetation History

Table 25R-21.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 25R-21.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2021	Pinyon	Phase II
2024	Perennial Grass/Black Sagebrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Stony Loam (Black Sagebrush)
NRCS Ecological Site #	R048AY449UT
States and Transitions	2021 - State Undefined: Community Phase Undefined 2024 - Current Potential State: Community Phase 2.1

At the time of study establishment in 2021, the vegetation community on this site existed as twoneedle pinyon (*Pinus edulis*) woodland that was in Phase II of woodland succession. Black sagebrush (*Artemisia nova*) dominated the shrub component, and native perennial grasses contributed most of the relatively little herbaceous cover (Table 25R-21.4, Table 25R-21.7, Table 25R-21.12, Table 25R-21.14). A 2022-2023 bullhog treatment (Table 25R-21.1) removed many of the trees (Photos, Table 25R-21.14), leaving black sagebrush as a dominant overstory component in 2024. Sagebrush density decreased between the two sample years. However, the amount of decadent sagebrush individuals and those with poor vigor decreased significantly, and recruitment of young exhibited a slight increase (Table 25R-21.12, Table 25R-21.13). Perennial grasses -- particularly blue grama (*Bouteloua gracilis*), squirreltail (*Elymus elymoides*), and muttongrass (*Poa fendleriana*) -- increased in cover and became codominant with black sagebrush following treatment. Forbs have been rare in both sample years (Table 25R-21.10, Table 25R-21.11). Although the site is considered to be within Phase I of woodland succession as of 2024 (Table 25R-21.4), the high density value of pinyon trees (Table 25R-21.14) indicates that there may be potential for infilling in the future.

Although this site falls within the boundaries of currently mapped mule deer summer range, it may also serve as transitional or winter range. Condition of this site as transitional or winter range was considered to be very poor in 2021 and fair in 2024. Current mule deer transitional or winter range condition as of 2024 is primarily limited by reduced recruitment of young into and reduced cover of the preferred browse community, limited perennial forb cover, and reduced perennial grass cover. Mule deer presence has increased according to pellet transect data, but remains low as of 2024. Black sagebrush provides a majority of the preferred browse available to wildlife, but less than 10% of plants sampled in density strips have been moderately to heavily hedged in either sample year. Elk presence was low in 2021, but elk pellet groups were not observed in 2024 (Table 25R-21.9, Table 25R-21.13).

Trend Summary Tables

Table 25R-21.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2021	7.2	1.3	16.4	9.5	2.3	35.0
2024	7.2	7.5	0.0	9.7	7.6	-

Table 25R-21.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2021	-	217	83	63	-	4.1	0.3	0.4
2024	-	222	24	131	-	10.7	0.1	1.7

Table 25R-21.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2021	15.6	1.8	48.4	6.9	18.7	29.0
2024	23.5	0.7	47.7	8.6	9.8	22.9

Table 25R-21.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2021	3	11	-	12
2024	4	7	-	3
Year	Days Use Per Acre (ha)			
2021	4.4 (10.8)	8.1 (19.9)	2.0 (5.0)	-
2024	5.1 (12.6)	12.8 (31.5)	-	-

Table 25R-21.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bouteloua gracilis (blue grama)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)
year	Nested Frequency							
2021	3	26	110	79	19	-	51	6
2024	8	27	77	20	69	8	11	67
year	Average Cover (%)							
2021	0.0	0.5	2.5	0.4	0.2	-	0.1	0.3
2024	0.2	0.8	4.2	0.7	2.2	0.2	0.4	1.9

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

Table 25R-21.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis[a] (pygmyflower rockjasmine)	Antennaria parvifolia (small-leaf pussytoes)	Arabis holboellii[a] (Holboell's rockcress)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus beckwithii (Beckwith's milkvetch)	Cirsium (thistle)	Cryptantha (cryptantha)	Descurainia incana[a] (mountain tansymustard)	Erigeron aphanactis[a] (rayless shaggy fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Hymenoxys richardsonii (pingue rubberweed)	Ipomopsis aggregata (scarlet gilia)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Petradoria pumila (rock goldenrod)
year	Nested Frequency																
2021	42	10	-	1	3	2	5	48	10	-	2	3	-	4	3	6	16
2024	14	9	8	6	10	-	5	2	-	34	5	3	1	47	-	18	3
year	Average Cover (%)																
2021	0.1	0.0	-	0.0	0.0	0.0	0.0	0.1	0.0	-	0.0	0.0	-	0.0	0.0	0.0	0.1
2024	0.1	0.1	0.0	0.1	0.2	-	0.0	0.0	-	0.3	0.1	0.0	0.0	0.2	-	0.3	0.1

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)	Potentilla (cinquefoil)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)
year	Nested Frequency				
2021	17	-	-	1	-
2024	-	3	4	9	1
year	Average Cover (%)				
2021	0.1	-	-	0.0	-
2024	-	0.0	0.2	0.0	0.0

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

Table 25R-21.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia nova[p] (black sagebrush)	Chrysothamnus depressus[p] (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Echinocereus engelmannii (Engelmann's hedgehog cactus)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum[p] (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus scopulorum[t] (Rocky Mountain juniper)	Linanthus pungens (granite prickly phlox)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis[t] (twoneedle pinyon)	Pinus ponderosa[t] (ponderosa pine)	Purshia tridentata[p] (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)	Yucca baccata (banana yucca)
year	Line Intercept Cover (%)															
2021	-	9	-	0.6	-	0.6	-	-	1.4	0.7	-	30	3.6	0.5	-	0.4
2024	0.1	9.1	0.4	3.4	-	0.4	0.1	3.1	-	0.4	-	-	-	-	0.3	-
year	Quadrat Cover (%)															
2021	-	7.2	-	0.2	0.0	0.2	-	-	0.3	0.5	0.0	15.8	0.3	0.0	0.1	0.2
2024	0.1	6.8	0.1	4.3	-	0.2	0.2	2.5	0.0	0.3	0.0	0.0	-	-	0.2	0.0

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

Table 25R-21.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

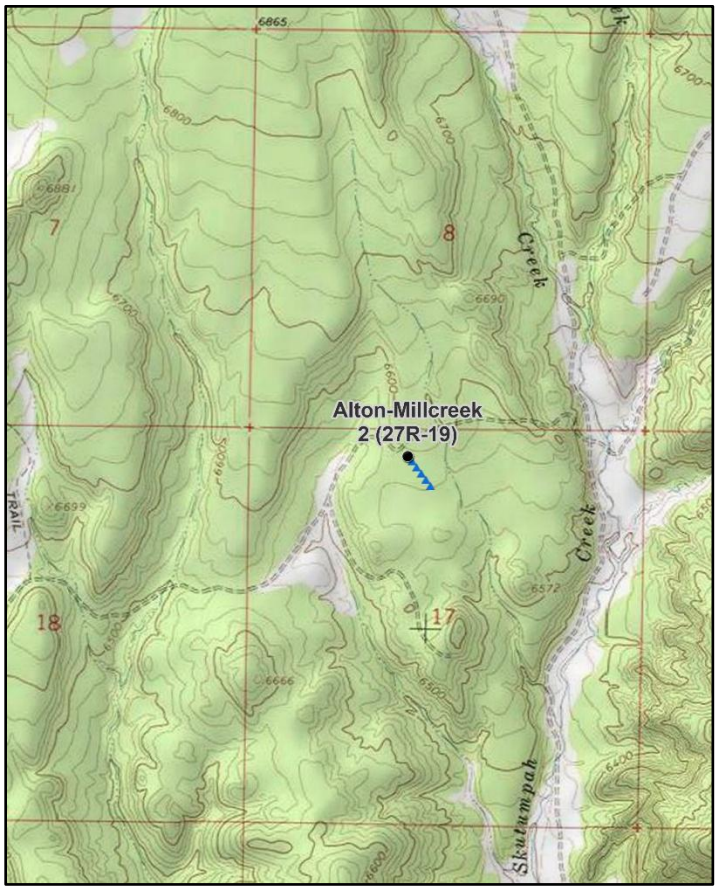
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2021	-	-	-	-	-	-	-	-	-/-
2024	20	-	0	100	0	0	100	0	- / -
Artemisia nova[p] -- (black sagebrush)									
2021	6020	-	12	46	43	2	0	47	- / -
2024	5300	620	19	74	7	5	8	7	- / -
Atriplex canescens[p] -- (fourwing saltbush)									
2021	-	-	-	-	-	-	-	-	-/-
2024	40	-	100	0	0	0	50	0	- / -
Chrysothamnus depressus[p] -- (longflower rabbitbrush)									
2021	-	-	-	-	-	-	-	-	-/-
2024	100	-	0	100	0	0	0	0	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2021	860	-	5	58	37	0	0	47	- / -
2024	2440	-	9	90	1	2	0	1	- / -
Echinocereus engelmannii -- (Engelmann's hedgehog cactus)									
2021	20	-	0	100	0	0	0	0	- / -
2024	-	-	-	-	-	-	-	-	-/-
Eriogonum microthecum[p] -- (slender buckwheat)									
2021	20	-	0	100	0	0	0	0	- / -
2024	40	-	0	100	0	0	50	0	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2021	260	-	23	54	23	8	0	39	- / -
2024	140	-	29	71	0	14	29	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2021	140	-	14	71	14	0	0	14	- / -
2024	3900	-	9	91	0	0	0	0	- / -
Juniperus scopulorum[t] -- (Rocky Mountain juniper)									
2021	20	-	0	100	0	0	0	100	- / -
2024	40	-	100	0	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2021	1200	-	0	85	15	0	0	17	- / -
2024	1640	-	16	84	0	0	0	0	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2021	160	-	63	38	0	0	0	0	- / -
2024	40	-	50	50	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2021	260	120	46	54	0	8	0	23	- / -
2024	80	20	100	0	0	0	0	25	- / -
Pinus ponderosa[t] -- (ponderosa pine)									
2021	40	-	0	100	0	0	0	50	- / -
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2021	100	-	40	40	20	20	20	60	- / -
2024	-	-	-	-	-	-	-	-	-/-
Tetradymia canescens -- (spineless horsebrush)									
2021	20	-	0	0	100	0	0	100	- / -
2024	120	-	0	100	0	0	0	0	- / -
Yucca baccata -- (banana yucca)									
2021	260	-	23	77	0	0	0	0	- / -
2024	20	-	0	100	0	0	0	0	- / -

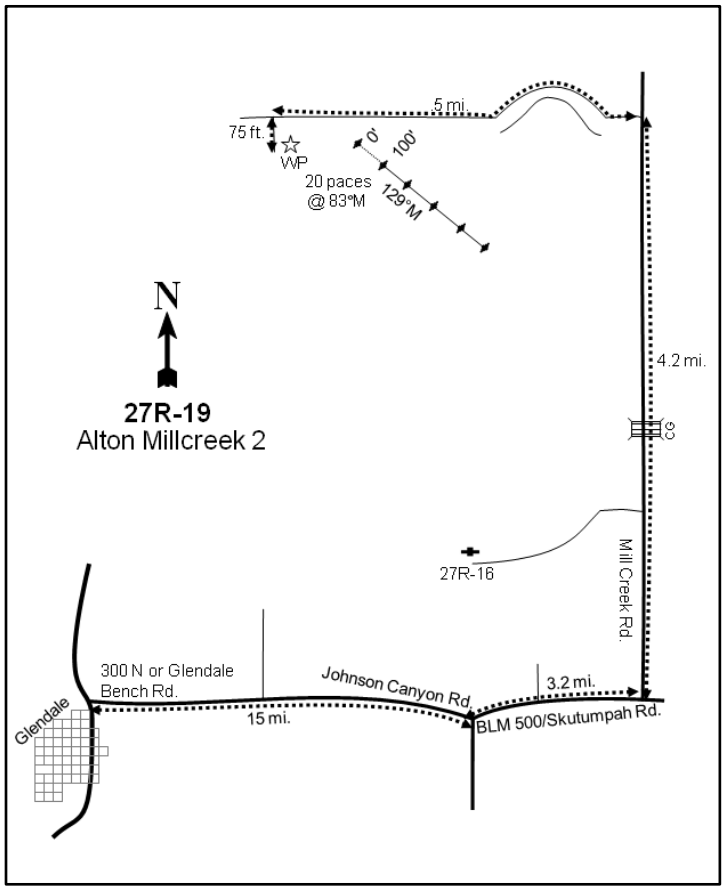
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 25R-21.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2021	1	-	-	-	100	-	11.0
Juniperus scopulorum (Rocky Mountain juniper)							
2021	10	-	20	60	20	-	8.2
2024	6	-	-	25	50	25	22.5
Pinus edulis (twoneedle pinyon)							
2021	365	21	26	11	21	21	12.2
2024	143	28	50	6	-	17	9.7
Pinus ponderosa (ponderosa pine)							
2021	1	-	-	-	-	100	43.0

ALTON-MILLCREEK 2 - STUDY NO. 27R-19





Location Information

USGS 7.5 min Map Info	Skutumpah Creek NW; Township 40S, Range 4W, Section 17
GPS (0' Stake)	NAD 83 UTM ZONE 12, 381746 East 4133372 North

Transect Information

Browse Tag # (0' Stake)	259
Transect Bearing	129° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From the junction of US-89 and 300 North (Glendale Bench Road) in Glendale, drive east on 300 North for 15 miles to a fork or a road leading to the northeast (there is a sign that says Deer Spring Ranch and Cannonville). Turn left and drive 3.2 miles to a road on the left with a stop sign. Turn left (north) onto Mill Creek Road and drive for 4.2 miles. Turn left here, pass through a gate, and continue for 0.5 miles to a two-track road to the left (alternatively, Mill Creek Road curves around and leads up the hill to the same two-track). Seventy five feet down the two-track is the witness post on the left (south) side of the road. The 0-foot stake is 20 paces away from the witness post at 83 degrees magnetic and is marked with browse tag #259.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	BALD KNOLL
Elevation	6,600ft (2,012m)
Aspect	Southeast
Slope	2%
Sample Dates	06/19/2007, 07/15/2010, 08/13/2014, 08/14/2019, 08/20/2024

Table 27R-19.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Alton/Mill Creek Sagebrush Restoration - Year 1	188	December 2005-February 2006	1630
Mechanical - Bullhog	Alton/Mill Creek Sagebrush Restoration - Year 3	900	October 2008-February 2009	912
Seeding - Aerial Before	Mill Creek Aerial Seeding	1313	October 2008	912
Hand Crew - Lop and Scatter	Kanab Area Project Maintenance	3428	August-November 2015	2784

Table 27R-19.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Mill Creek Seeding			Aerial	Oct 2008	900
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.39	1.28
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.22	1.00
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.86	0.80
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.36	0.32
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	2.50	1.90
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	0.97	0.93
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	1.00	0.91
F	Linum perenne	Blue Flax	Appar	0.50	0.42
F	Medicago sativa	Alfalfa	Ladak	1.00	0.91
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.86
S	Bassia prostrata	Forage Kochia	Immigrant	0.50	0.35

Wildlife Habitat and Vegetation History

Table 27R-19.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 27R-19.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Utah Juniper	Phase I transitioning to Phase II
2010	Annual-Perennial Forb/Perennial Grass	Phase I
2014	Perennial Grass	Phase I
2019	Perennial Grass/Mountain Big Sagebrush	Phase I
2024	Perennial Grass/Mountain Big Sagebrush	Phase I

Site Notes

A dead elk was found on the study site in 2007.

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2007, the plant community on this site was dominated by Utah juniper (*Juniperus osteosperma*) with a depleted understory. Following treatment (Table 27R-19.1), however, the site transitioned into a perennial grass dominated state. The herbaceous understory re-established following the seeding and perennial grasses increased -- intermediate wheatgrass (*Thinopyrum intermedium*) and crested wheatgrass (*Agropyron cristatum*) -- and became the dominant grass species (Table 27R-19.6, Table 27R-19.7, Table 27R-19.10). Forbs were scarce prior to treatment. Perennial forb cover increased between 2010 and 2019, but decreased in 2024; mat penstemon (*Penstemon caespitosus*) has provided the most cover of any single perennial forb species over the study period (Table 27R-19.11). Shrub cover has steadily increased after treatment with most of the cover being provided by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), although black sagebrush (*A. nova*) contributed a majority of the shrub cover prior to treatment (Table 27R-19.12, Table 27R-19.13). Although cover and density decreased following the bullhog and later lop and scatter treatments, twoneedle pinyon (*Pinus edulis*) and juniper have been observed in all post-treatment years (Table 27R-19.12, Table 27R-19.14). Barring a major tree-removing disturbance, this site may have the potential to transition to one again dominated by juniper and/or pinyon as time since treatment increases.

This site falls within the perimeters of currently mapped mule deer summer range, but may also serve as transitional range. Although

transitional range condition is considered to be good as of 2024, it is limited by reduced preferred browse and perennial forb cover. Pellet transect data indicates that mule deer presence was moderate in 2019, but has remained low in every other sample year. Furthermore, a majority of the black and big sagebrush plants sampled in density strips during the two most recent sample years have shown signs of little to no utilization. However, on-site observations for 2024 noted light utilization of intermediate wheatgrass, crested wheatgrass, and alfalfa (*Medicago sativa*). Cattle presence was moderate to high in 2014 and 2019, but low in 2024. Finally, elk presence has remained low throughout the study period (Table 27R-19.9, Table 27R-19.13).

Trend Summary Tables

Table 27R-19.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	1.3	-	4.2	1.7	-	18.6
2010	0.8	-	0.0	1.7	-	-
2014	2.4	-	0.0	2.8	-	0.2
2019	5.5	-	-	6.4	-	-
2024	11.1	0.0	0.0	12.0	-	0.2

Table 27R-19.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	42	8	17	107	0.1	0.0	0.1	1.0
2010	11	112	180	159	0.0	3.9	5.7	5.6
2014	17	290	32	144	0.1	9.8	0.2	3.5
2019	18	320	100	146	0.1	25.0	1.1	6.5
2024	42	302	19	77	0.4	17.7	0.3	1.1

Table 27R-19.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	48.6	3.0	45.3	0.4	0.3	6.9
2010	40.3	-	54.5	0.2	0.3	15.6
2014	40.5	0.0	47.3	0.6	0.1	18.4
2019	38.5	0.4	46.8	0.3	0.4	36.0
2024	36.6	0.2	46.4	0.4	0.1	29.7

Table 27R-19.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	-	2	1	53
2010	-	4	1	12
2014	10	14	6	28
2019	6	10	8	41
2024	3	18	-	8
Year	Days Use Per Acre (ha)			
2007	-	7.4 (18.2)	1.3 (3.3)	-
2010	-	14.1 (34.8)	7.4 (18.2)	-
2014	21.1 (52.0)	13.4 (33.1)	14.7 (36.4)	-
2019	14.5 (35.9)	25.5 (62.9)	8.1 (19.9)	-
2024	2.2 (5.4)	6.0 (14.9)	0.7 (1.7)	-

Table 27R-19.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis[i] (Kentucky bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency										
2007	-	-	-	33	8	-	-	-	-	-	9
2010	1	-	52	9	13	26	2	-	3	34	5
2014	-	3	153	17	1	86	-	2	22	132	-
2019	2	-	94	9	9	-	-	1	6	261	10
2024	-	-	60	42	1	24	1	-	3	259	-
year	Average Cover (%)										
2007	-	-	-	0.1	0.0	-	-	-	-	-	0.0
2010	0.0	-	1.1	0.0	0.1	1.5	0.0	-	0.0	1.1	0.0
2014	-	0.1	4.5	0.1	0.0	1.1	-	0.1	0.8	3.2	-
2019	0.0	-	4.0	0.0	0.2	-	-	0.0	0.5	20.3	0.0
2024	-	-	3.3	0.4	0.0	1.0	0.0	-	0.0	13.3	-

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

Table 27R-19.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus 2 (Milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Caulanthus crassicaulis[a] (thickstem wild cabbage)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora[a] (maiden blue eyed Mary)	Cordylanthus[a] (bird's-beak)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Erigeron flagellaris (trailing fleabane)	Eriogonum cernuum[a] (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium[ai] (redstem stork's bill)
year	Nested Frequency																
2007	-	-	-	-	2	3	-	-	-	-	10	-	-	-	-	1	-
2010	1	1	2	-	-	2	2	46	-	1	4	-	-	9	-	12	3
2014	-	-	-	-	-	3	-	14	-	-	-	-	2	2	-	12	4
2019	-	-	-	7	1	6	22	8	4	-	0	6	-	1	2	13	-
2024	-	-	-	3	-	-	-	-	-	4	-	-	-	-	2	5	-
year	Average Cover (%)																
2007	-	-	-	-	0.0	0.0	-	-	-	-	0.1	-	-	-	-	0.0	-
2010	0.0	0.0	0.0	-	-	0.0	0.0	1.4	-	0.1	0.0	-	-	0.0	-	0.1	0.0
2014	-	-	-	-	-	0.0	-	0.1	-	-	-	-	0.0	0.0	-	0.1	0.0
2019	-	-	-	0.0	0.0	0.0	0.3	0.1	0.0	-	0.0	0.0	-	0.0	0.0	0.2	-
2024	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	-	0.0	0.2	-

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

FORB SPECIES	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gilia inconspicua[a] (shy gilia)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Linum lewisii (Lewis flax)	Lupinus (lupine)	Medicago sativa[i] (alfalfa)	Microsteris gracilis[a] (slender phlox)	Penstemon (beardtongue)	Penstemon caespitosus (mat penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii[a] (Douglas' knotweed)	Sanguisorba minor[i] (small burnet)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius[ai] (yellow salsify)	Trifolium (clover)
year	Nested Frequency																
2007	-	4	-	-	-	-	-	2	-	99	2	-	-	-	-	-	3
2010	38	83	57	10	36	18	14	11	1	90	1	4	9	-	1	-	15
2014	-	3	2	5	22	-	1	-	1	112	3	6	6	3	-	2	10
2019	6	14	21	4	2	34	3	9	-	96	6	4	3	4	3	24	-
2024	-	-	4	4	-	-	3	-	1	62	9	-	-	4	-	12	-
year	Average Cover (%)																
2007	-	0.0	-	-	-	-	-	0.0	-	0.9	0.0	-	-	-	-	-	0.0
2010	1.1	1.2	1.4	0.5	1.4	0.5	0.1	0.0	0.0	2.9	0.0	0.0	0.1	-	0.0	-	0.3
2014	-	0.0	0.0	0.0	0.7	-	0.0	-	0.0	2.5	0.1	0.0	0.1	0.0	-	0.0	0.0
2019	0.0	0.0	0.1	0.0	0.0	0.5	0.5	0.1	-	5.0	0.0	0.0	0.2	0.0	0.0	0.4	-
2024	-	-	0.0	0.0	-	-	0.2	-	0.0	0.6	0.0	-	-	0.0	-	0.2	-

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

Table 27R-19.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Ericameria nauseosa (rubber 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)
year	Line Intercept Cover (%)							
2007	1.6	-	-	-	18	0.6	-	0.1
2010	0.9	0.8	-	-	-	-	-	-
2014	1.2	1.6	-	-	0.2	-	-	-
2019	2	4.3	-	-	-	-	0.1	-
2024	2.7	8.4	-	-	0.2	-	0.9	-
year	Quadrat Cover (%)							
2007	1.3	0.0	-	-	3.8	0.3	-	0.0
2010	0.3	0.5	-	-	-	0.0	-	-
2014	0.8	1.6	-	-	0.0	-	-	-
2019	1.9	3.2	-	-	-	-	0.4	-
2024	2.9	7.6	0.0	0.0	0.0	-	0.6	-

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

Table 27R-19.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2007	860	-	0	35	65	35	65	40	28/48
2010	340	40	24	77	0	35	0	0	37/46
2014	2100	260	74	26	0	34	0	0	34/59
2019	1920	-	20	78	2	7	1	2	35/51
2024	6380	220	71	28	1	14	0	1	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2007	140	-	14	29	57	14	86	43	44/46
2010	540	-	63	37	0	0	0	0	41/43
2014	1280	540	48	52	0	80	17	0	34/50
2019	3440	40	14	85	1	1	0	1	37/50
2024	3880	2360	30	68	3	25	3	3	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	40	-	0	100	0	50	50	0	54/48
2019	-	-	-	-	-	-	-	-	84/87
2024	60	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	30/40
2024	20	-	0	100	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2007	460	80	22	52	26	0	26	30	- / -
2010	20	-	100	0	0	0	0	0	- / -
2014	80	100	75	25	0	0	0	0	- / -
2019	100	-	100	0	0	0	0	0	- / -
2024	100	-	100	0	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2007	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	7/34
2024	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2007	60	40	33	67	0	0	0	33	- / -
2010	-	20	0	0	0	0	0	0	- / -
2014	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2007	-	-	-	-	-	-	-	-	37/89
2010	-	-	-	-	-	-	-	-	36/52
2014	-	-	-	-	-	-	-	-	41/142
2019	20	-	0	100	0	100	0	0	64/200
2024	60	-	0	100	0	100	0	0	- / -

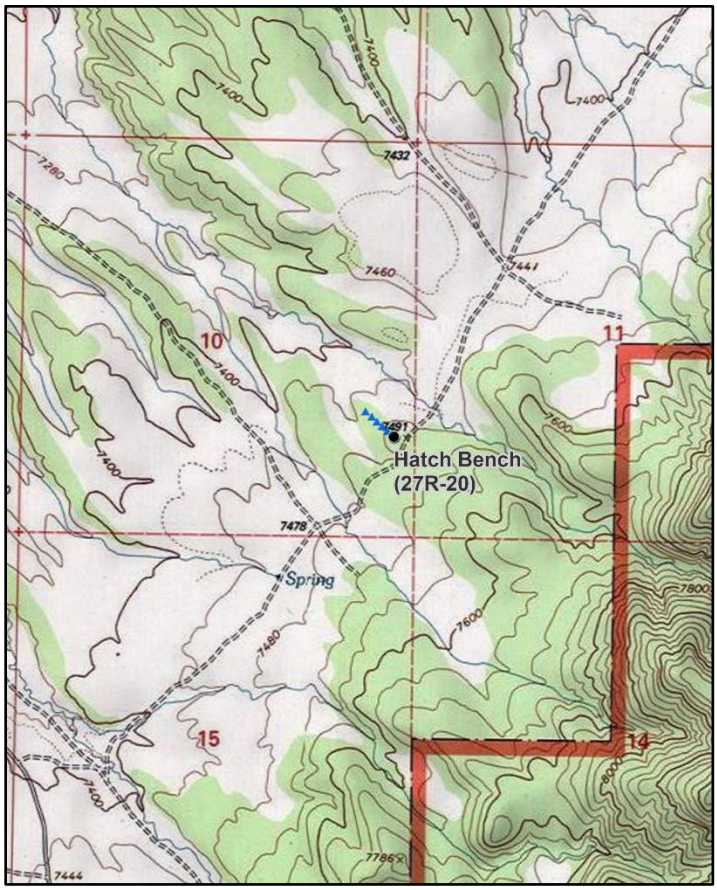
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Quercus gambelii[p] -- (Gambel oak)									
2007	-	-	-	-	-	-	-	-	91/79
2010	-	-	-	-	-	-	-	-	58/110
2014	-	-	-	-	-	-	-	-	79/72
2019	-	-	-	-	-	-	-	-	100/138
2024	40	-	0	100	0	0	0	0	- / -

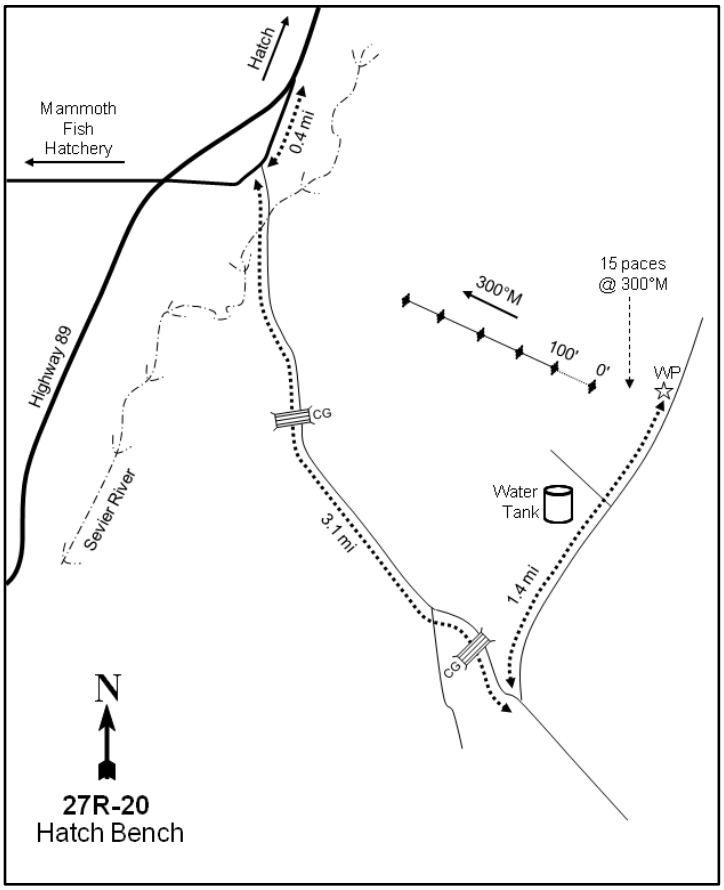
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 27R-19.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2007	237	-	45	25	5	25	16.6
2010	9	75	25	-	-	-	1.5
2014	43	40	60	-	-	-	2.4
2019	30	31	69	-	-	-	1.8
2024	77	-	100	-	-	-	3.1
Pinus edulis (twoneedle pinyon)							
2007	37	-	64	27	9	-	6.8
2010	1	50	50	-	-	-	1.5
2014	3	50	50	-	-	-	1.5

HATCH BENCH - STUDY NO. 27R-20





Location Information

USGS 7.5 min Map Info	George Mountain NE; Township 37S, Range 5W, Section 10
GPS (0' Stake)	NAD 83 UTM ZONE 12, 376709 East 4162864 North

Transect Information

Browse Tag # (0' Stake)	758
Transect Bearing	293° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From Highway 89 near Hatch, drive 0.4 miles on South Old Highway 89 and turn left (east). Continue for 3.1 miles and turn left. Travel for 1.4 miles to the witness post on the left (west) side of the road. The 0-foot stake is 15 paces away from the witness post at 300 degrees magnetic.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	7,511ft (2,289m)
Aspect	Northwest
Slope	6%
Sample Dates	08/22/2012, 08/17/2015, 08/14/2019, 08/19/2024

Table 27R-20.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Hatch Bench Vegetation Enhancement Phase I	2069	September-October 2012	1134
Seeding - Aerial Before	Hatch Bench Vegetation Enhancement Phase I	2069	September 2012	1134
Seeding - Dribbler	Hatch Bench Vegetation Enhancement Phase I	2069	September 2012	1134
Seeding - Aerial After	Hatch Bench Vegetation Enhancement Phase I	2069	January 2013	1134
Hand Crew - Lop and Scatter	Hatch Bench Vegetation Enhancement Phase II	2690	July 2013-January 2015	2990

Table 27R-20.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Hatch Bench Vegetation Enhancement			Aerial	Sep 2012	1134
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.75	0.70
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.49	0.46
G	Agropyron desertorum	Crested Wheatgrass	Hycrest II	0.53	0.47
G	Poa secunda	Canby Bluegrass	Canbar	0.49	0.26
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.53	0.52
G	Thinopyrum ponticum	Tall Wheatgrass	Alkar	0.31	0.29
G	Thinopyrum ponticum	Tall Wheatgrass	Alkar	0.68	0.64
F	Achillea millefolium	Western Yarrow	Eagle Mountain	0.10	0.09
F	Astragalus cicer	Cicer Milkvetch	Lutana	0.23	0.18
F	Astragalus cicer	Cicer Milkvetch	Lutana	1.28	0.93
F	Medicago sativa	Alfalfa	Ladak DL	1.98	1.84
F	Melilotus officinalis	Yellow Sweetclover		0.53	0.50
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.24	0.19
F	Sanguisorba minor	Small Burnet	Delar	1.85	1.65

Mix Name			Application Type	Application Date	Acres
Hatch Bench Vegetation Enhancement - Dribbler Mix			Dribbler	Sep 2012	1134
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Balsamorhiza sagittata	Arrowleaf Balsamroot	Paiute UT	0.04	0.03
F	Sanguisorba minor	Small Burnet	Delar	0.18	0.16
S	Ephedra viridis	Green Ephedra		0.02	0.01
S	Ephedra viridis	Green Ephedra	Emery UT	0.09	0.08
S	Purshia tridentata	Bitterbrush	Garfield UT	0.20	0.16

Mix Name			Application Type	Application Date	Acres
Hatch Bench Vegetation Enhancement - Browse Mix			Aerial	Jan 2013	1134
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Sevier UT	0.25	0.07
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Paiute UT	0.35	0.10
S	Bassia prostrata	Forage Kochia	Beaver UT	0.06	0.04
S	Bassia prostrata	Forage Kochia	Beaver/Millard UT	0.18	0.12

Wildlife Habitat and Vegetation History

Table 27R-20.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 27R-20.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon-Juniper	Phase III
2015	Perennial Grass-Forb	Phase I
2019	Perennial Grass-Forb/Mountain Big Sagebrush	Phase I
2024	Perennial Grass/Mountain Big Sagebrush	Phase I

Site Notes

The 0, 100, 200, and 400-foot stakes are rebar. A new 300-foot stake was placed in 2024.

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2012, this was a Rocky Mountain juniper (*Juniperus scopulorum*) and twoneedle pinyon (*Pinus edulis*)-dominated site in Phase III of woodland succession (Table 27R-20.4) with a depleted understory. Following a chaining and seeding treatment later that year (Table 27R-20.1), the site transitioned to a perennial grass-dominated state. The herbaceous understory re-established following the seeding and perennial grasses -- primarily intermediate wheatgrass (*Thinopyrum intermedium*) and crested wheatgrass (*Agropyron cristatum*) -- have been a dominant site component in all post-treatment years (Table 27R-20.7, Table 27R-20.10). Forbs were scarce prior to treatment. However, forb cover has increased after the chaining and seeding (Table 27R-20.11). Perennial forbs were codominant with perennial grasses in 2015 and 2019, but cover decreased in 2024. Shrub cover has steadily increased following treatment with a majority of the cover being contributed by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), which became a codominant vegetation component in 2024 (Table 27R-20.12, Table 27R-20.13). Although cover and density of pinyon and juniper decreased following treatment, they have remained present in all post-treatment years. Furthermore, density of pinyon in particular has increased since 2015, suggesting that there may be potential for this site to again transition to a tree-dominated state as time since treatment elapses (Table 27R-20.12, Table 27R-20.14).

The abundant and diverse perennial grass component on this site may have some forage value for summering mule deer; although the site falls within the perimeters of mapped mule deer summer range, it may also have value as transitional range. Condition of this site as transitional range for mule deer is considered to be fair as of 2024, with condition being mainly limited by reduced preferred browse cover and limited recruitment of young to the preferred browse population. Pellet transect data indicates that deer presence has remained low throughout the study period, and more than 50% of black and mountain big sagebrush plants have shown signs of little to no utilization since 2015. Elk presence has been low in all sample years (Table 27R-20.9, Table 27R-20.13).

Trend Summary Tables

Table 27R-20.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	1.6	0.2	13.4	1.6	0.2	29.6
2015	2.4	3.1	0.2	3.1	2.9	0.8
2019	4.5	1.7	1.2	2.4	1.4	0.4
2024	6.7	1.8	1.5	5.5	1.2	1.8

Table 27R-20.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	-	1	-	54	-	0.0	-	0.3
2015	13	192	36	195	0.2	12.8	0.6	9.5
2019	20	250	29	196	0.3	23.5	0.2	12.5
2024	3	264	3	227	0.0	16.1	0.0	4.3

Table 27R-20.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	31.0	2.9	37.8	29.1	0.8	17.3
2015	23.3	0.0	61.9	9.3	1.8	25.2
2019	18.2	0.0	51.3	13.0	1.3	41.5
2024	16.1	0.4	51.4	15.5	1.1	30.9

Table 27R-20.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2012	-	-	-	-
2015	1	2	5	4
2019	7	10	2	22
2024	2	1	1	4
Year	Days Use Per Acre (ha)			
2012	-	-	0.7 (1.7)	-
2015	15.3 (37.7)	1.3 (3.3)	4.0 (9.9)	-
2019	4.4 (10.8)	8.1 (19.9)	6.0 (14.9)	-
2024	9.4 (23.3)	1.3 (3.3)	-	-

Table 27R-20.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bromus tectorum[ai] (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum ponticum[i] (tall wheatgrass)
year	Nested Frequency										
2012	0	-	-	-	1	-	-	-	-	-	-
2015	36	74	13	-	32	2	0	0	13	15	84
2019	27	80	20	2	47	7	3	4	17	42	104
2024	18	63	3	1	22	-	0	1	27	101	97
year	Average Cover (%)										
2012	0.0	-	-	-	0.0	-	-	-	-	-	-
2015	1.0	2.6	0.2	-	0.8	0.0	0.0	0.0	0.5	1.4	6.5
2019	1.6	5.0	0.3	0.4	1.5	0.2	0.4	0.2	1.2	3.6	9.5
2024	0.9	2.7	0.0	0.0	0.6	-	0.0	0.0	0.6	6.4	4.9

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

Table 27R-20.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Amaranthus[ai] (pigweed)	Arabis (rockcress)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus cibarius (browse milkvetch)	Astragalus cicer[i] (chickpea milkvetch)	Calylophus lavandulifolius (lavenderleaf sundrops)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Chamaesyce albomarginata (whitemargin sandmat)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Conyza canadensis[a] (Canadian horseweed)	Cordylanthus[a] (bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata[a] (western tansymustard)
year	Nested Frequency																
2012	-	-	-	2	10	-	-	-	-	8	-	18	-	-	-	6	-
2015	15	1	2	-	5	3	7	14	-	8	-	39	-	5	3	3	13
2019	40	1	-	-	8	5	-	37	1	12	-	21	12	-	-	5	10
2024	27	-	-	-	4	-	12	19	-	1	3	30	-	-	-	-	-
year	Average Cover (%)																
2012	-	-	-	0.0	0.1	-	-	-	-	0.0	-	0.1	-	-	-	0.0	-
2015	1.0	0.0	0.0	-	0.3	0.0	0.1	0.7	-	0.0	-	0.8	-	0.1	0.1	0.1	0.3
2019	2.3	0.0	-	-	1.0	0.1	-	3.5	0.0	0.4	-	0.3	0.0	-	-	0.0	0.1
2024	0.6	-	-	-	0.0	-	0.1	0.5	-	0.0	0.0	0.1	-	-	-	-	-

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

FORB SPECIES	Draba[a] (draba)	Erigeron divergens[a] (spreading fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola[ai] (prickly lettuce)	Linum lewisii (Lewis flax)	Lithospermum (stoneseed)	Machaeranthera canescens (hoary tansyaster)	Madia glomerata[a] (mountain tarweed)	Medicago sativa[i] (alfalfa)	Melilotus officinalis[i] (sweetclover)	Oenothera (evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Penstemon palmeri (Palmer's penstemon)	Pleiacanthus spinosus (thorn skeletonweed)
year	Nested Frequency																
2012	-	-	3	-	-	-	-	-	-	-	-	-	-	7	1	-	2
2015	-	-	3	0	0	11	-	-	1	2	15	2	9	95	5	3	6
2019	2	1	1	-	2	-	-	-	2	-	6	-	1	11	3	3	20
2024	3	-	3	-	4	-	3	3	-	-	15	-	7	102	-	1	18
year	Average Cover (%)																
2012	-	-	0.0	-	-	-	-	-	-	-	-	-	-	0.0	0.0	-	0.0
2015	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1	0.8	0.2	0.2	2.2	0.1	0.2	0.1
2019	0.0	0.0	0.0	-	0.1	-	-	-	0.0	-	1.2	-	0.1	0.1	0.0	0.0	0.4
2024	0.0	-	0.0	-	0.0	-	0.0	0.0	-	-	0.2	-	0.0	0.8	-	0.0	0.2

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

FORB SPECIES	Sanguisorba minor[i] (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Tetraneuris acaulis (stemless four-nerve daisy)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency						
2012	-	-	4	-	-	-	-
2015	41	39	4	-	-	-	0
2019	13	73	1	8	1	-	4
2024	-	78	4	2	-	4	-
year	Average Cover (%)						
2012	-	-	0.0	-	-	-	-
2015	1.7	1.0	0.0	-	-	-	0.0
2019	0.3	2.5	0.0	0.2	0.0	-	0.1
2024	-	1.3	0.1	0.0	-	0.1	-

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

Table 27R-20.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus scopulorum[t] (Rocky Mountain juniper)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Pinus ponderosa[t] (ponderosa pine)	Symphoricarpos oreophilus[p] (mountain snowberry)	Yucca (yucca)
year	Line Intercept Cover (%)									
2012	1.6	-	-	-	2.2	0.2	27.4	-	-	0
2015	2.3	0.6	0.9	1.7	0.7	-	0.1	-	0.2	0.3
2019	0.9	1.3	1.2	0.2	0.4	-	-	-	0.2	-
2024	2	2.7	0.6	0.6	1.8	-	-	-	0.8	-
year	Quadrat Cover (%)									
2012	1.6	-	-	-	2.5	0.1	10.9	-	-	0.1
2015	1.9	0.5	0.6	2.2	0.2	-	0.0	0.0	0.0	0.2
2019	2.9	1.5	0.6	0.8	0.3	-	0.9	-	0.0	0.3
2024	3.2	3.4	0.8	0.9	1.4	-	0.0	-	0.0	0.1

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

Table 27R-20.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2012	1100	-	4	47	49	60	2	31	30/44
2015	600	20	13	83	3	0	13	10	34/59
2019	500	20	8	92	0	16	4	0	45/78
2024	560	-	7	82	11	0	21	11	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	260	60	62	39	0	15	0	0	44/40
2019	340	20	12	88	0	12	6	0	61/68
2024	360	-	6	89	6	33	11	11	- / -
Bassia prostrata[pi] -- (forage kochia)									
2012	-	-	-	-	-	-	-	-	-/-
2015	60	-	0	100	0	0	100	0	12/24
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	44/41
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	60	-	33	67	0	0	0	0	69/72
2019	80	-	0	100	0	0	0	0	86/103
2024	60	-	0	67	33	0	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)									
2012	40	-	0	100	0	0	0	0	19/15
2015	920	-	4	96	0	0	0	0	30/46
2019	560	40	0	100	0	0	0	0	22/28
2024	1180	-	12	86	2	0	0	2	- / -
Juniperus scopulorum[t] -- (Rocky Mountain juniper)									
2012	60	40	100	0	0	0	0	0	- / -
2015	60	20	67	33	0	0	0	33	- / -
2019	140	-	71	29	0	0	0	0	- / -
2024	200	-	40	60	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2012	20	-	0	100	0	0	0	100	7/23
2015	-	-	-	-	-	-	-	-	5/20
2019	-	-	-	-	-	-	-	-	7/13
2024	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2012	560	200	54	39	7	0	0	14	- / -
2015	80	140	75	25	0	0	0	0	- / -
2019	200	20	100	0	0	0	0	0	- / -
2024	320	-	88	13	0	0	0	0	- / -
Pinus ponderosa[t] -- (ponderosa pine)									
2012	-	-	-	-	-	-	-	-	-/-
2015	20	20	100	0	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	-/-
2024	20	-	100	0	0	0	0	0	- / -
Purshia stansburiana[p] -- (Stansbury cliffrose)									
2012	-	-	-	-	-	-	-	-	- / -
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2012	-	-	-	-	-	-	-	-	36/80
2015	-	-	-	-	-	-	-	-	44/127
2019	-	-	-	-	-	-	-	-	40/104
2024	20	-	0	100	0	100	0	0	- / -
Sambucus[p] -- (elderberry)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	118/104
2024	-	-	-	-	-	-	-	-	-/-
Symphoricarpos oreophilus[p] -- (mountain snowberry)									
2012	40	-	0	100	0	0	0	0	19/37
2015	60	-	0	100	0	0	0	0	26/75
2019	140	-	0	100	0	0	0	0	23/34
2024	100	-	0	100	0	0	0	0	- / -
Tetradymia canescens -- (spineless horsebrush)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	32/46
2024	-	-	-	-	-	-	-	-	-/-

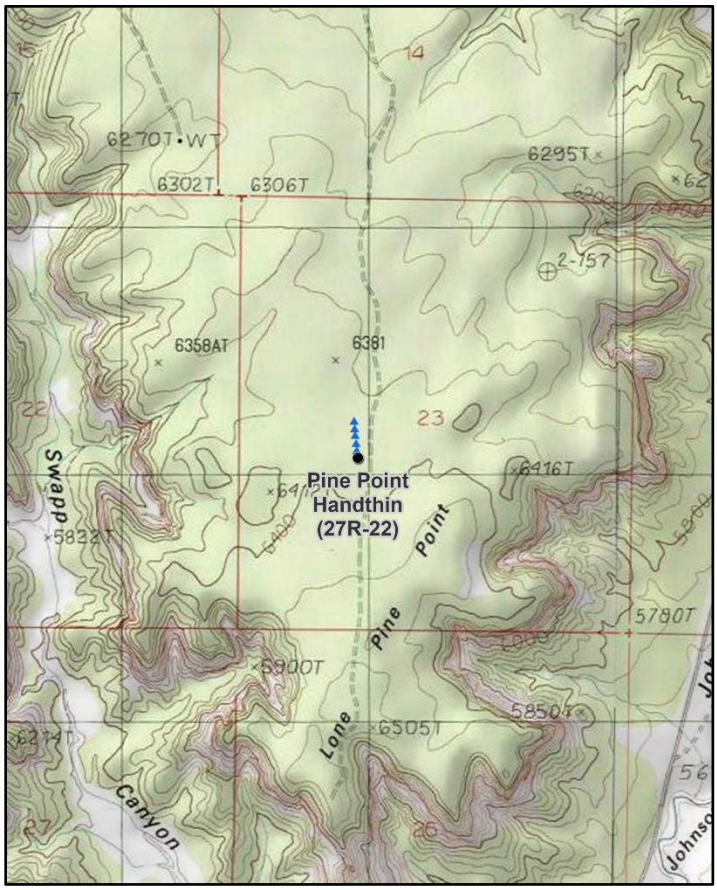
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Yucca -- (yucca)									
2012	140	-	57	43	0	0	0	0	24/25
2015	280	-	57	43	0	0	0	0	38/61
2019	100	-	0	100	0	0	0	0	43/54
2024	160	-	13	88	0	0	0	0	- / -

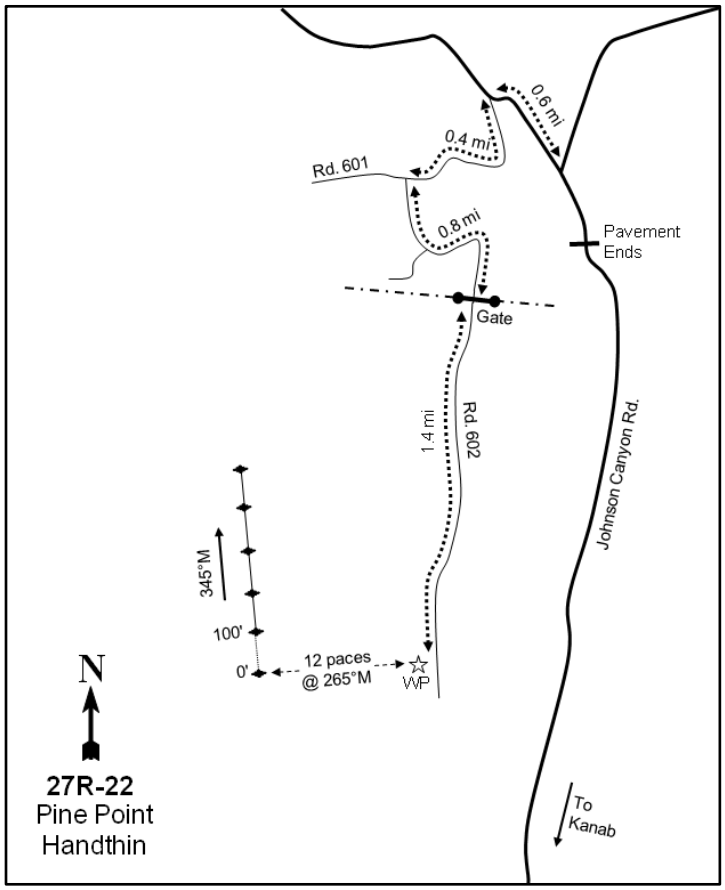
t - Tree Species; p - Preferred Browse; i - Introduced Species

Table 27R-20.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2012	62	6	12	18	35	29	14.9
2015	31	7	80	13	-	-	4.9
2019	28	6	44	50	-	-	9.3
2024	33	-	29	71	-	-	14.4
Pinus edulis (twoneedle pinyon)							
2012	666	16	26	16	16	26	7.5
2015	47	60	40	-	-	-	3.6
2019	74	42	58	-	-	-	3.5
2024	120	16	74	11	-	-	2.9
Pinus ponderosa (ponderosa pine)							
2012	2	-	-	-	-	100	22.5
2015	16	-	100	-	-	-	2.0
2019	1	-	100	-	-	-	23.0
2024	4	-	100	-	-	-	1.0

PINE POINT HANDTHIN - STUDY NO. 27R-22





Location Information

USGS 7.5 min Map Info	Cutler Point NE; Township 41S, Range 5W, Section 23
GPS (0' Stake)	NAD 83 UTM ZONE 12, 376910 East 4121269 North

Transect Information

Browse Tag # (0' Stake)	81
Transect Bearing	344° 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 Johnson Canyon Road and Road #601, drive south for 0.4 miles on Road #601 and turn onto Road #602. Drive 0.8 miles to a gate. Continue for 1.4 miles to a witness post on the right (west) side of the road. The 0-foot stake is 12 paces away from the witness post at 265 degrees magnetic and is marked by browse tag #81.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	PINE POINT
Elevation	6,400ft (1,951m)
Aspect	Northeast
Slope	1-4%
Sample Dates	08/14/2012, 08/20/2015, 08/14/2019, 08/20/2024

Table 27R-22.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Pine Point Handthin	2359	December 2012-May 2013	2525
Seeding - Aerial Before	Pine Point Handthin	2359	November 2012	2525
Herbicide - Tebuthiuron	Pine Pine Teburhiuron	LTDL 8791 - 23983	June 2009-August 2009	1472

Table 27R-22.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Pine Point Handthin			Aerial	Nov 2012	1280
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.48	1.39
G	Agropyron cristatum	Crested Wheatgrass	Nordan	1.99	1.87
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	0.98	0.95
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.25	1.15
G	Psathyrostachys juncea	Russian Wildrye		0.78	0.59
G	Sporobolus cryptandrus	Sand Dropseed		0.16	0.14
G	Thinopyrum intermedium	Intermediate Wheatgrass	Clarke	1.99	1.75
F	Linum perenne	Blue Flax	Appar	0.20	0.17
F	Medicago sativa	Alfalfa	Ladak +	0.51	0.49
F	Sanguisorba minor	Small Burnet	Delar	1.02	0.95
S	Atriplex canescens	Fourwing Saltbush	Beaver UT	0.16	0.09
S	Bassia prostrata	Forage Kochia	Beaver UT	0.47	0.29
S	Purshia tridentata	Bitterbrush	Elko NV	0.16	0.12

Wildlife Habitat and Vegetation History

Table 27R-22.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 27R-22.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon-Juniper/Mountain Big Sagebrush	Phase II transitioning to Phase III
2015	Mountain Big Sagebrush/Perennial Grass	Phase I
2019	Mountain Big Sagebrush/Perennial Grass	Phase I
2024	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	2012 - Pinyon-Juniper State: Community Phase 4.1 2015-2024 - Current Potential State: Community Phase 2.1

Upon study establishment in 2012, this site was in a Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*)-dominated state with a depleted understory and shrub layer. Following a lop and scatter and seeding treatment later that year (Table 27R-22.1), the site transitioned to a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and perennial grass-dominated state. The herbaceous understory re-established following the seeding, with Indian ricegrass (*Achnatherum hymenoides*), needle and thread (*Hesperostipa comata*), and intermediate wheatgrass (*Thinopyrum intermedium*) as the dominant grass species (Table 27R-22.7). Annual grasses, primarily cheatgrass (*Bromus tectorum*), have been consistently present in low amounts (Table 27R-22.10). Perennial forbs were rare prior to treatment, but have increased in cover and frequency afterwards with lobeleaf groundsel (*Packera multilobata*) and Utah bird's-foot trefoil (*Lotus utahensis*) as the dominant species (Table 27R-22.11). Shrub cover has steadily increased following treatment with most of the cover provided by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Rocky Mountain juniper and twoneedle pinyon decreased in cover and density following treatment, but have remained present in all post-treatment years (Table 27R-22.12, Table 27R-22.14). This extant tree component indicates that over time and without a tree-removing disturbance, this site may again be infilled by pinyon and juniper.

This site's condition as mule deer winter range has fluctuated between poor and excellent since 2012; winter range condition is considered to be fair-good as of 2024. Negative factors that deleteriously influence the current condition include reduced recruitment of young plants to and cover of the preferred browse community; preferred browse decadence; and slightly reduced perennial grass and forb cover (Table 27R-22.15). According to pellet transect data, deer presence has increased each sample year, but remains low as of 2024. Less than 15% of sagebrush plants sampled in density strips were moderately to heavily hedged between 2012 and 2019, but 58% exhibited that level of utilization in 2024. Sagebrush decadence also increased between the two most recent sample years, from 12% in 2019 to 30% in 2024. A combination of climatic and other factors likely drove this trend, but higher amounts of utilization may have also contributed to the increase in sagebrush decadence. Cattle presence was low to moderate in 2012 and 2015, but has been very high since 2019 (Table 27R-22.9, Table 27R-22.13). On-site observations noted only light utilization of needle and thread and intermediate wheatgrass, but also mentioned that cattle pellet groups appeared to be from the previous year's grazing rotation.

Trend Summary Tables

Table 27R-22.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	6.8	0.0	8.9	6.5	-	16.6
2015	10.6	0.2	0.5	16.7	-	0.6
2019	17.3	0.2	1.5	20.9	0.2	1.4
2024	14.9	-	0.8	18.3	-	2.2

Table 27R-22.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	281	136	51	41	5.5	2.5	0.2	0.3
2015	61	247	25	173	0.6	12.3	0.7	4.3
2019	117	233	116	190	2.0	11.1	1.0	9.4
2024	21	295	35	170	0.4	13.5	0.6	3.7

Table 27R-22.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	56.2	0.1	39.1	-	0.0	22.6
2015	40.1	0.0	50.1	-	0.6	23.9
2019	27.1	0.8	55.7	0.0	0.0	40.6
2024	31.5	0.2	54.9	0.0	-	32.7

Table 27R-22.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2012	-	2	1	15
2015	2	4	-	40
2019	1	7	2	35
2024	1	1	1	8
Year	Days Use Per Acre (ha)			
2012	3.6 (9.0)	-	-	-
2015	4.4 (10.8)	6.0 (14.9)	-	-
2019	28.3 (69.9)	9.4 (23.2)	2.7 (6.6)	-
2024	29.8 (73.5)	17.4 (43.0)	2.7 (6.6)	-

Table 27R-22.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium[i] (intermediate wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency												
2012	3	-	-	-	99	13	48	23	4	-	32	40	237
2015	42	-	-	8	34	51	64	56	13	0	60	49	35
2019	45	-	-	4	69	37	100	29	18	-	17	49	70
2024	54	13	6	17	16	18	91	53	37	4	61	65	5
year	Average Cover (%)												
2012	0.1	-	-	-	1.0	0.2	0.5	0.5	0.0	-	0.2	1.0	4.4
2015	2.2	-	-	0.5	0.4	2.3	3.2	1.6	0.6	0.0	1.0	0.9	0.2
2019	1.5	-	-	0.4	1.8	0.6	3.9	0.9	1.5	-	0.1	2.3	0.3
2024	2.8	0.4	0.1	0.9	0.4	0.3	4.4	0.6	1.1	0.2	0.9	1.8	0.0

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

Table 27R-22.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Asteraceae (null)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Chamaesyce (sandmat)	Collinsia parviflora[a] (maiden blue eyed Mary)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Erigeron divergens[a] (spreading fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum (buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Gilia inconspicua[a] (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Linum lewisii (Lewis flax)
year	Nested Frequency																
2012	1	4	-	-	3	-	4	3	39	5	-	3	2	-	-	-	-
2015	2	1	1	1	31	-	6	-	9	46	12	-	1	-	-	-	1
2019	6	-	-	8	2	24	1	-	12	40	-	-	6	4	49	-	3
2024	-	-	4	-	27	-	-	-	14	13	-	-	-	-	-	3	-
year	Average Cover (%)																
2012	0.0	0.0	-	-	0.0	-	0.0	0.0	0.1	0.1	-	0.0	0.0	-	-	-	-
2015	0.0	0.0	0.0	0.0	0.1	-	0.0	-	0.7	1.5	0.6	-	0.0	-	-	-	0.0
2019	0.0	-	-	0.0	0.0	0.2	0.0	-	0.1	0.8	-	-	0.2	0.0	0.5	-	0.2
2024	-	-	0.0	-	0.1	-	-	-	0.4	0.3	-	-	-	-	-	0.0	-

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

FORB SPECIES	Lotus utahensis (Utah bird's-foot trefoil)	Microsteris gracilis[a] (slender phlox)	Oenothera (evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Plantago patagonica[a] (woolly plantain)	Senecio spartioides (broom-like ragwort)	Silene antirrhina[a] (sleepy silene)	Sphaeralcea parvifolia (smallflower globemallow)	Tragopogon dubius[ai] (yellow salsify)
year	Nested Frequency											
2012	7	-	-	4	3	8	3	4	3	1	-	-
2015	53	-	7	73	12	6	-	10	-	-	13	-
2019	71	3	0	84	4	17	5	39	-	-	2	1
2024	39	4	-	81	17	20	2	17	-	-	15	1
year	Average Cover (%)											
2012	0.1	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-
2015	0.5	-	0.2	1.0	0.2	0.1	-	0.1	-	-	0.1	-
2019	4.5	0.0	0.0	3.1	0.0	0.5	0.0	0.2	-	-	0.0	0.0
2024	0.9	0.1	-	1.9	0.1	0.3	0.0	0.1	-	-	0.1	0.0

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

Table 27R-22.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Ephedra viridis[p] (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Purshia tridentata[p] (antelope bitterbrush)
year	Line Intercept Cover (%)						
2012	6.5	-	-	14	-	2.6	0
2015	15.3	1.4	-	0.6	-	-	-
2019	19.5	1.4	0.2	1.4	-	-	0
2024	16.7	1.3	-	2.2	-	-	0.3
year	Quadrat Cover (%)						
2012	6.6	0.1	0.0	7.4	-	1.5	0.0
2015	9.2	1.5	0.2	0.5	-	-	-
2019	16.2	1.0	0.2	1.5	0.0	-	0.1
2024	13.2	1.3	-	0.8	-	-	0.4

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

Table 27R-22.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2012	-	-	-	-	-	-	-	-	532/782
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	377/595
2024	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2012	6600	1280	87	12	1	0	0	2	74/106
2015	5700	240	47	53	0	11	3	0	69/106
2019	4300	20	4	84	12	7	5	12	68/99
2024	4620	-	5	65	30	8	50	30	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2012	-	-	-	-	-	-	-	-	75/91
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	66/44
2024	-	-	-	-	-	-	-	-	-/-
Ephedra viridis[p] -- (mormon tea)									
2012	80	-	100	0	0	0	0	0	99/162
2015	-	-	-	-	-	-	-	-	85/161
2019	300	-	0	100	0	0	0	0	78/106
2024	120	-	0	83	17	0	0	17	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2012	20	-	100	0	0	0	0	0	- / -
2015	40	20	0	100	0	0	0	0	29/41
2019	140	-	29	57	14	0	0	14	29/33
2024	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma[t] -- (Utah juniper)									
2012	160	-	0	100	0	0	0	0	- / -
2015	80	-	100	0	0	0	0	0	- / -
2019	100	-	0	100	0	0	0	0	- / -
2024	100	-	0	100	0	0	0	0	- / -
Opuntia -- (pricklypear)									
2012	-	-	-	-	-	-	-	-	8/17
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	6/12
2024	40	-	0	100	0	0	0	0	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2012	20	-	0	100	0	0	0	0	- / -
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	- / -
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2012	40	-	0	0	100	50	0	50	61/142
2015	20	-	0	0	100	0	100	100	42/71
2019	-	-	-	-	-	-	-	-	91/125
2024	20	-	0	100	0	100	0	0	- / -
Quercus gambelii[p] -- (Gambel oak)									
2012	-	-	-	-	-	-	-	-	347/265
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	187/149

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

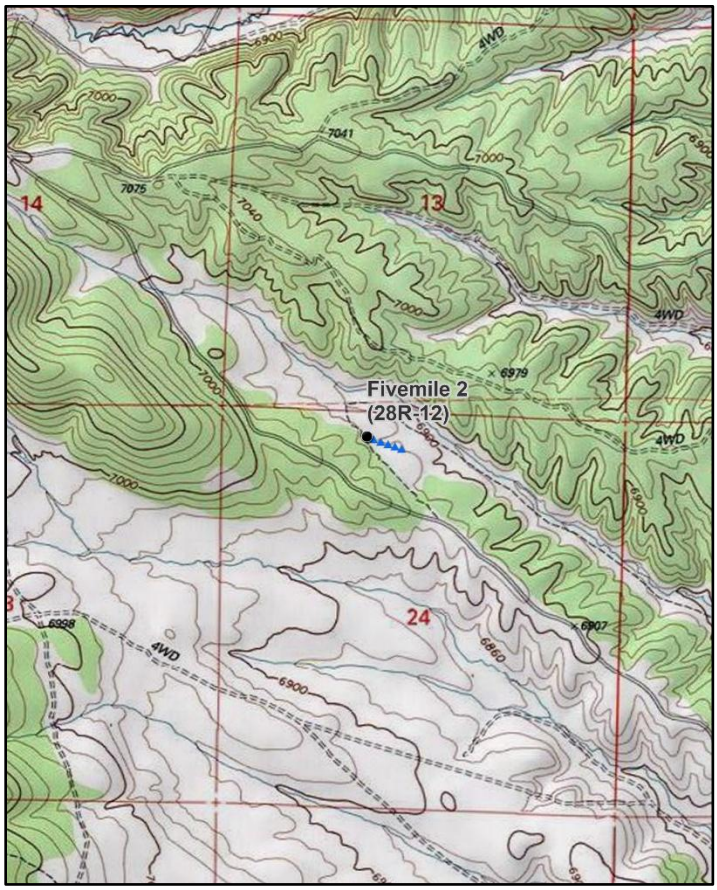
Table 27R-22.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

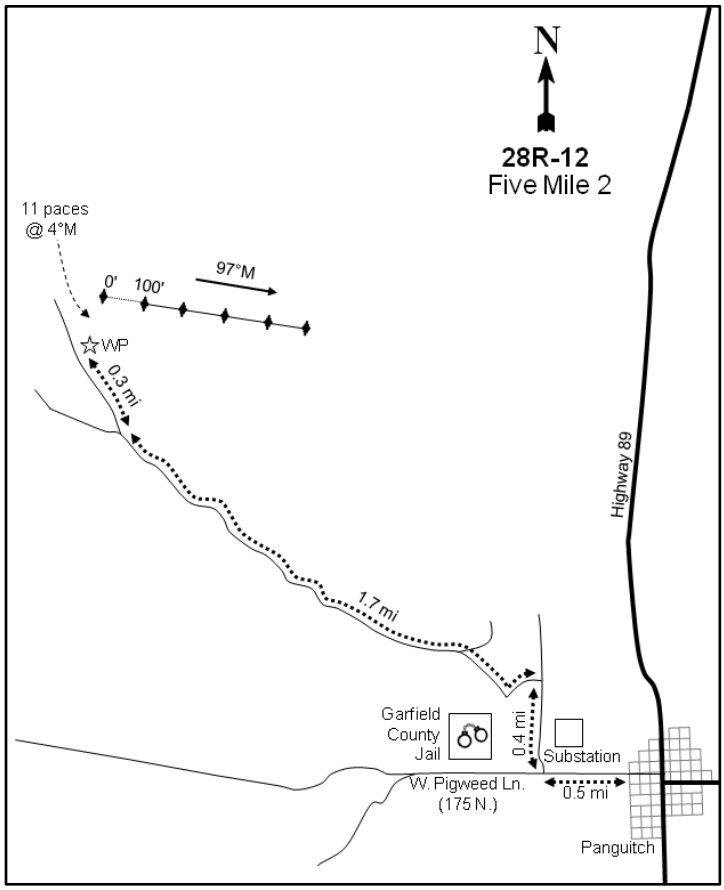
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	113	-	-	5	53	42	26.3
2015	27	-	86	14	-	-	11.2
2019	20	9	45	45	-	-	11.6
2024	24	7	7	79	7	-	7.1
Pinus edulis (twoneedle pinyon)							
2012	26	-	-	9	36	55	19.5
2019	3	-	100	-	-	-	6.0
2024	3	-	100	-	-	-	8.0

Table 27R-22.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2012	8.1	14.6	15.0	4.9	-4.1	0.6	0.0	**39.1**	Poor
2015	20.9	13.7	15.0	24.5	-0.5	8.7	0.0	**82.3**	Excellent
2019	26.1	11.6	1.7	22.3	-1.5	10.0	0.0	**70.2**	Good
2024	23.0	6.3	2.2	26.9	-0.3	7.5	0.0	**65.6**	Fair-Good

FIVEMILE 2 - STUDY NO. 28R-12





Location Information

USGS 7.5 min Map Info	Panguitch NW; Township 34S, Range 6W, Section 24
GPS (0' Stake)	NAD 83 UTM ZONE 12, 369741 East 4189766 North

Transect Information

Browse Tag # (0' Stake)	186
Transect Bearing	97° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

Driving from the intersection of 200 North and Main Street in Panguitch, drive east on 200 North to 300 West. Turn left, traveling south to 175 North. Continue right (east) for 0.5 miles, passing a substation on the right. Go right (north) for 0.4 miles, passing the Garfield County Jail, to a road on the left. Turn left onto this road and continue for 1.7 miles to a fork. Proceed to the right and drive 0.3 miles to a witness post on the right (east) side of the road. From the witness post, the 0-foot stake is 11 paces away at 4 degrees magnetic and is marked with browse tag #186.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SHEARING CORRAL
Elevation	6,868ft (2,093m)
Aspect	Northwest
Slope	3-5%
Sample Dates	06/20/2007, 07/12/2011, 08/19/2015, 08/12/2019, 08/21/2024

Table 28R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Five Mile Hollow Sagebrush Restoration - Year 3	901	November 2008-May 2009	6465

Wildlife Habitat and Vegetation History

Table 28R-12.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 28R-12.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2007	Pinyon-Juniper	Phase II transitioning to Phase III
2011	Black Sagebrush	Phase I
2015	Black Sagebrush/Perennial Grass	Phase I
2019	Black Sagebrush/Perennial Grass	Phase I
2024	Black Sagebrush/Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB309UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 2007, this site was dominated by twoneedle pinyon (*Pinus edulis*) and was considered to be within Phase II transitioning to Phase III of woodland succession (Table 28R-12.4). Following the lop and scatter treatment in 2011 (Table 28R-12.1), cover of pinyon decreased substantially while black sagebrush (*Artemisia nova*) cover increased, making it the dominant browse species (Table 28R-12.12, Table 28R-12.13). The herbaceous understory was sparse in 2007 and 2011. However, herbaceous cover has increased significantly since that time (Table 28R-12.7), and the understory has been primarily composed of the perennial grass species blue grama (*Bouteloua gracilis*) in all sample years. Diversity for both forbs and grasses has remained low throughout the study period (Table 28R-12.10, Table 28R-12.11). Barring a major disturbance or infilling by pinyon and juniper, it is predicted that this site will continue to exist as a plant community dominated by black sagebrush and perennial grasses.

Condition of this site as mule deer winter range has ranged from very poor to good since 2007, and condition is considered to be fair as of 2024. Current winter range condition is limited by reduced cover of and recruitment of young individuals to the preferred browse community; preferred browse decadence; and a lack of perennial forb cover (Table 28R-12.15). Pellet transect data indicates that deer presence was moderate to high in 2007 and 2011, but has remained low since 2015. Furthermore, less than 50% of black and mountain big sagebrush plants sampled in density strips have been moderately to heavily utilized throughout the sample period, with 14% of black sagebrush and 49% of mountain big sagebrush exhibiting that level of use in 2024. Elk presence was low in 2007 and 2015, but pellet groups were not observed in any other sample year (Table 28R-12.9, Table 28R-12.13).

Trend Summary Tables

Table 28R-12.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	6.4	0.0	7.9	6.3	0.1	17.3
2011	8.5	0.1	0.1	9.4	0.2	0.2
2015	12.8	1.1	-	13.9	1.6	-
2019	12.8	1.0	-	14.4	0.4	-
2024	8.9	2.3	-	12.4	1.6	-

Table 28R-12.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	-	161	29	-	-	5.2	0.1	-
2011	-	178	222	30	-	5.9	3.5	0.2
2015	-	309	26	3	-	23.6	0.1	0.0
2019	-	326	101	26	-	24.8	1.3	0.2
2024	-	360	5	5	-	26.9	0.0	0.1

Table 28R-12.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	36.2	5.3	39.4	11.3	1.8	20.8
2011	36.3	0.8	44.4	5.9	0.8	18.5
2015	24.8	1.2	50.1	9.3	2.9	33.7
2019	20.0	0.4	44.7	11.5	2.3	39.6
2024	19.5	0.1	40.5	11.0	0.9	36.9

Table 28R-12.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2007	-	16	-	86
2011	-	31	-	6
2015	-	9	-	48
2019	-	20	-	37
2024	1	21	-	5
Year	Days Use Per Acre (ha)			
2007	-	34.2 (84.4)	2.0 (5.0)	-
2011	-	40.2 (99.3)	-	-
2015	-	7.4 (18.2)	0.7 (1.7)	-
2019	-	12.8 (31.5)	-	-
2024	0.7 (1.8)	4.0 (9.9)	-	-

Table 28R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Pleuraphis jamesii (James' galleta)
year	Nested Frequency			
2007	7	153	10	4
2011	-	157	25	7
2015	0	300	25	7
2019	1	319	25	-
2024	4	357	18	6
year	Average Cover (%)			
2007	0.1	5.1	0.0	0.0
2011	-	5.6	0.3	0.0
2015	0.0	22.5	0.9	0.2
2019	0.1	24.3	0.4	-
2024	0.2	25.9	0.6	0.1

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

Table 28R-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Chenopodium fremontii[a] (Fremont's goosefoot)	Chenopodium leptophyllum[a] (narrowleaf goosefoot)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Gayophytum ramosissimum[a] (pinyon groundsmoke)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Orobanche fasciculata (clustered broomrape)	Phlox longifolia (longleaf phlox)
year	Nested Frequency										
2007	-	-	-	-	16	9	5	2	-	-	-
2011	27	2	50	79	127	17	83	12	38	-	1
2015	3	-	4	14	1	6	2	-	-	-	-
2019	18	1	4	22	46	35	12	-	15	3	4
2024	2	-	-	-	5	-	-	-	-	-	3
year	Average Cover (%)										
2007	-	-	-	-	0.0	0.0	0.0	0.0	-	-	-
2011	0.2	0.0	1.2	0.4	1.0	0.1	0.5	0.2	0.2	-	0.0
2015	0.0	-	0.0	0.0	0.0	0.0	0.0	-	-	-	-
2019	0.1	0.0	0.0	0.1	0.6	0.4	0.2	-	0.1	0.0	0.0
2024	0.1	-	-	-	0.0	-	-	-	-	-	0.0

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

Table 28R-12.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)					
2007	4.5	1.8	-	0.1	-	17.3
2011	6.9	2.5	-	0.2	-	0.2
2015	9.8	4.1	0.4	1.2	-	-
2019	9.8	4.6	-	0.4	-	-
2024	5.9	6.5	-	1.6	-	-
year	Quadrat Cover (%)					
2007	4.7	1.7	-	0.0	0.0	7.9
2011	6.2	2.3	-	0.1	-	0.1
2015	9.1	3.7	0.4	0.7	-	-
2019	8.3	4.5	0.1	0.9	-	-
2024	4.1	4.8	-	2.3	-	-

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

Table 28R-12.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2007	2780	500	2	39	59	22	25	58	31/50
2011	2960	5540	16	55	28	24	4	20	31/52
2015	4200	180	25	69	6	19	25	2	33/59
2019	3980	-	6	61	33	28	16	32	42/68
2024	2740	20	14	66	20	12	2	20	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2007	540	100	4	56	41	26	0	48	85/85
2011	760	7940	11	50	40	29	8	3	92/101
2015	2260	20	66	32	3	7	3	3	72/94
2019	1760	60	17	61	22	24	18	23	77/90
2024	2320	-	12	50	38	18	31	38	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	20	0	0	0	0	0	0	- / -
2015	40	-	0	100	0	0	0	0	72/88
2019	40	-	0	0	100	0	0	100	86/103
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa ssp. nauseosa var. speciosa[p] -- (rubber rabbitbrush)									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	106/118
2024	-	-	-	-	-	-	-	-	-/-

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)									
2007	360	280	78	22	0	0	0	0	9/9
2011	500	60	4	96	0	0	0	0	24/20
2015	2200	40	36	65	0	0	0	0	27/30
2019	1200	20	3	97	0	2	0	0	21/19
2024	4940	-	15	85	0	0	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2007	20	-	100	0	0	0	0	100	- / -
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2007	20	20	100	0	0	0	0	0	10/26
2011	-	-	-	-	-	-	-	-	12/32
2015	-	-	-	-	-	-	-	-	7/31
2019	20	-	0	100	0	0	0	0	8/17
2024	20	-	0	100	0	0	0	0	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	3/7
2024	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2007	180	40	22	78	0	0	0	0	- / -
2011	40	20	100	0	0	0	0	0	- / -
2015	-	20	0	0	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	- / -
2024	20	-	100	0	0	0	0	0	- / -
Ribes aureum[p] -- (golden currant)									
2007	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	123/169
2019	-	-	-	-	-	-	-	-	124/180

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

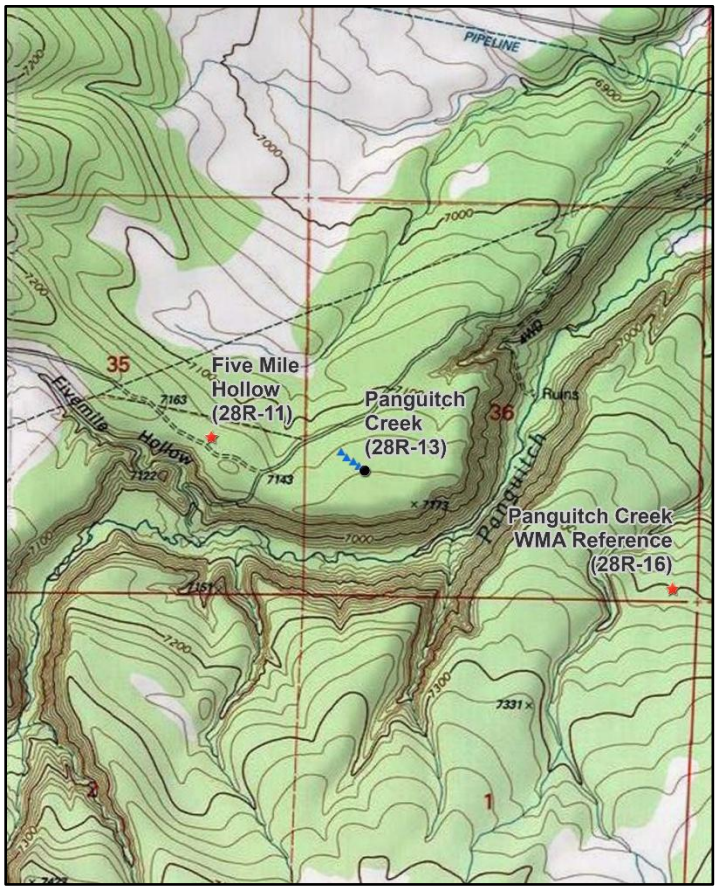
Table 28R-12.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

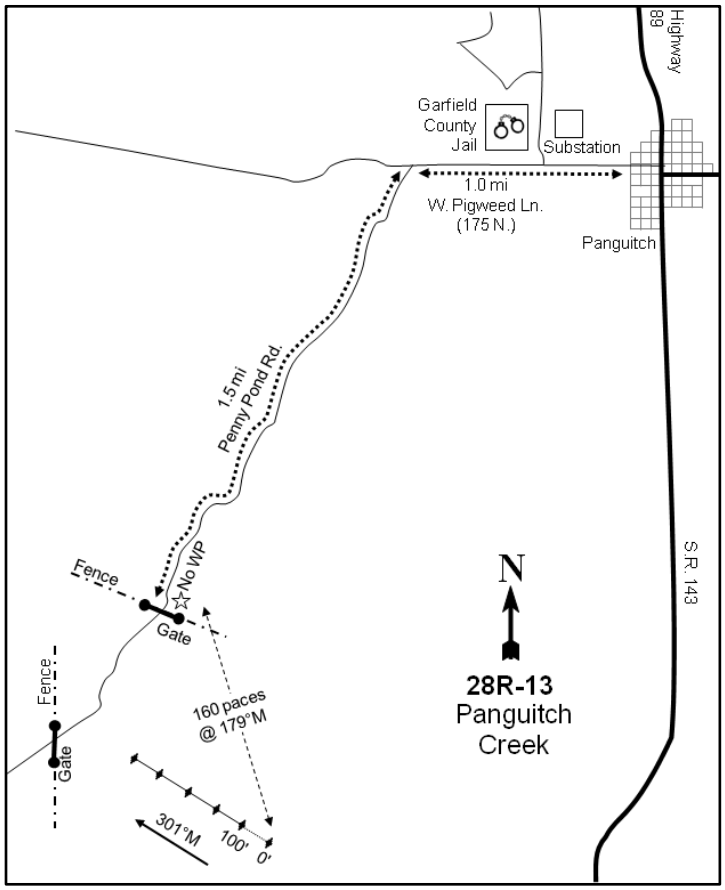
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Pinus edulis (twoneedle pinyon)							
2007	101	-	5	40	30	25	18.8
2011	11	56	44	-	-	-	1.8
2015	22	44	56	-	-	-	2.9
2019	6	50	50	-	-	-	2.8
2024	10	17	83	-	-	-	2.5

Table 28R-12.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2007	7.9	3.1	1.3	10.3	0.0	0.0	0.0	**22.6**	Very Poor
2011	11.8	5.6	7.3	11.8	0.0	0.5	0.0	**37.0**	Very Poor-Poor
2015	17.4	13.5	15.0	30.0	0.0	0.0	0.0	**75.9**	Good
2019	18.0	6.2	4.8	30.0	0.0	0.4	0.0	**59.4**	Fair
2024	15.5	6.1	6.5	30.0	0.0	0.1	0.0	**58.2**	Fair

PANGUITCH CREEK - STUDY NO. 28R-13





Location Information

USGS 7.5 min Map Info	Panguitch SW; Township 34S, Range 6W, Section 36
GPS (0' Stake)	NAD 83 UTM ZONE 12, 369328 East 4185567 North

Transect Information

Browse Tag # (0' Stake)	108
Transect Bearing	294° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Belts 2, 4: No Rebar

Directions to Site

Driving from US-89 in Panguitch, travel west on 200 North. Drive to 300 West and turn left (south), then make an immediate right (west) onto 175 North (Penny Pond Road). Drive 0.5 miles to a four-way intersection. Continue straight (west) for 0.5 miles to a fork in the road. Proceed to the left and drive 0.9 miles to another fork in the road. Take the right fork and drive 0.7 miles to a fence; continue straight (right fork leads to study #28R-11) to the site. The 0-foot stake is 160 paces (960 feet) away at 179 degrees magnetic from where the fence and road meet. The 0-foot stake is marked with browse tag #108.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	7,100ft (2,164m)
Aspect	Northwest
Slope	2-5%
Sample Dates	06/10/2008, 07/11/2011, 08/19/2015, 08/12/2019, 08/21/2024

Table 28R-13.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Panguitch Creek WMA PJ Thinning	1206	Spring 2009	28
Seeding - Aerial Before	Panguitch Creek WMA PJ Thinning	1206	November 2008	383

Table 28R-13.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Panguitch Creek WMA PJ Chain/Bullhog			Aerial	Nov 2008	383
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.91	0.84
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.13	0.11
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.04	0.80
G	Poa secunda	Canby Bluegrass	Canbar	0.39	0.34
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.04	0.89
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	1.57	1.42
F	Linum perenne	Blue Flax	Appar	0.39	0.33
F	Medicago sativa	Alfalfa	Ladak	0.52	0.47
F	Medicago sativa	Alfalfa	Ranger	0.52	0.48
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.26	0.20
F	Sanguisorba minor	Small Burnet	Delar	1.17	1.01
S	Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	Sanpete UT	0.52	0.09
S	Bassia prostrata	Forage Kochia	Immigrant	0.52	0.36

Mix Name			Application Type	Application Date	Acres
Panguitch Creek Chaining Dribbler			Dribbler	Nov 2008	332
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Bassia prostrata	Forage Kochia	Immigrant	0.30	0.21
S	Cercocarpus ledifolius	Curlleaf Mountain Mahogany	Sevier UT	0.15	0.10
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.11	0.09
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.08	0.05
S	Purshia tridentata	Bitterbrush	Lincoln NV	0.45	0.36

Wildlife Habitat and Vegetation History

Table 28R-13.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		

Table 28R-13.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Pinyon-Juniper	Phase III
2011	Pinyon-Juniper/Perennial Forb	Phase II
2015	Pinyon-Juniper/Broom Snakeweed	Phase II
2019	Pinyon-Juniper/Black Sagebrush	Phase II
2024	Pinyon-Juniper/Black Sagebrush	Phase II

Site Notes

Following a 2008-2009 bullhog and seeding treatment, the study transect was rotated on the 0-foot stake in 2011 to be within the treated portions of the project.

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB309UT
States and Transitions	No state and transition model is available for this ecological site.

This site was dominated by twoneedle pinyon (*Pinus edulis*) and was within Phase III of woodland succession when the study was established in 2008. Cover of pinyon decreased in 2011 following a bullhog and seeding treatment (Table 28R-13.1, Table 28R-13.12), but it continued to be a dominant vegetation component; the site has remained in Phase II of woodland succession in all post-treatment sample years (Table 28R-13.4). The herbaceous understory was depauperate in 2008 and cryptantha (*Cryptantha* sp.) was

the sole species present, providing minimal cover. Diversity of both grasses and forbs increased following treatment, but they have generally remained minor vegetation components (Table 28R-13.10, Table 28R-13.11). Shrub cover has increased over time; broom snakeweed (*Gutierrezia sarothrae*) dominated the shrub understory in 2015 and 2024 and black sagebrush (*Artemisia nova*) has been a dominant or codominant species since 2019. Both pinyon and Utah juniper (*Juniperus osteosperma*) have been present as codominant vegetation components in all post-treatment years (Table 28R-13.12, Table 28R-13.13, Table 28R-13.14). Without a further tree-removing disturbance, this site will likely again transition from a Phase II woodland to a Phase III woodland.

This site's condition as mule deer winter range has fluctuated between very poor and poor-fair since 2008; winter range condition is considered to be poor-fair as of 2024. Factors that negatively influence current condition include reduced cover of and recruitment of young plants to the preferred browse community; limited perennial forb cover; and reduced perennial grass cover (Table 28R-13.15). Deer presence was low between 2008 and 2011 according to pellet transect data, but has remained moderate since 2015. Less than 50% of black sagebrush plants sampled in density strips have been moderately to heavily hedged since study establishment. Density of mountain big sagebrush has remained much lower than that of black sagebrush, but 50% or more of plants have been moderately to heavily utilized each year since 2015 (Table 28R-13.9, Table 28R-13.13).

Trend Summary Tables

Table 28R-13.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	0.9	0.0	16.3	0.8	-	40.9
2011	2.9	1.0	0.9	2.3	1.1	5.6
2015	4.5	6.1	1.3	3.7	7.2	7.4
2019	3.3	3.6	2.5	5.6	3.2	5.6
2024	8.2	14.4	1.4	8.5	15.2	6.1

Table 28R-13.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	-	-	-	12	-	-	-	0.1
2011	-	59	87	146	-	1.0	1.6	7.7
2015	-	127	6	68	-	3.5	0.0	0.6
2019	-	96	58	190	-	2.7	0.5	6.3
2024	-	157	11	125	-	6.6	0.1	1.6

Table 28R-13.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	22.2	0.3	59.6	17.1	2.7	17.6
2011	15.2	0.2	62.1	8.4	3.5	14.4
2015	14.1	0.1	66.6	9.6	7.8	13.8
2019	25.1	0.0	59.5	9.5	4.6	19.0
2024	17.0	0.0	51.0	11.7	3.2	29.9

Table 28R-13.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2008	14	-	67
2011	15	1	5
2015	16	-	27
2019	35	3	45
2024	20	1	10
Year	Days Use Per Acre (ha)		
2008	16.1 (39.7)	-	-
2011	15.4 (38.1)	0.7 (1.7)	-
2015	24.8 (61.2)	-	-
2019	22.1 (54.6)	0.7 (1.7)	-
2024	21.5 (53.0)	-	-

Table 28R-13.10 - 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)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency								
2008	-	-	-	-	-	-	-	-	-
2011	3	4	5	29	1	-	-	3	17
2015	5	-	18	83	11	3	2	16	3
2019	8	-	15	76	-	-	-	5	2
2024	0	6	42	65	4	23	6	21	7
year	Average Cover (%)								
2008	-	-	-	-	-	-	-	-	-
2011	0.0	0.0	0.3	0.3	0.0	-	-	0.0	0.2
2015	0.3	-	0.3	2.3	0.3	0.0	0.0	0.2	0.0
2019	0.0	-	0.6	2.0	-	-	-	0.1	0.0
2024	0.2	0.3	0.9	3.1	0.0	0.7	0.1	1.3	0.0

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

Table 28R-13.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Asteraceae (null)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Astragalus miser (timber milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cryptantha (cryptantha)	Cryptantha[a] (annual cryptantha)	Descurainia pinnata[a] (western tansymustard)	Eriogonum cernuum[a] (nodding buckwheat)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola[ai] (prickly lettuce)	Lappula occidentalis[a] (flatspine stickseed)	Linum perenne[i] (blue flax)	Medicago sativa[i] (alfalfa)	Penstemon comarrhenus (dusty beardtongue)
year	Nested Frequency																
2008	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-
2011	-	-	-	102	1	-	-	21	-	43	5	25	43	-	27	2	-
2015	1	1	-	20	-	2	-	26	-	-	2	7	1	-	7	-	-
2019	-	-	1	154	3	3	3	37	11	29	3	6	-	2	-	-	-
2024	3	-	-	73	5	11	-	5	4	-	-	9	-	-	-	-	11
year	Average Cover (%)																
2008	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-
2011	-	-	-	5.6	0.0	-	-	0.6	-	0.7	0.1	0.7	0.8	-	0.6	0.1	-
2015	0.0	0.0	-	0.1	-	0.0	-	0.1	-	-	0.0	0.0	0.0	-	0.0	-	-
2019	-	-	0.0	5.7	0.0	0.0	0.0	0.4	0.0	0.3	0.0	0.1	-	0.0	-	-	-
2024	0.0	-	-	1.5	0.0	0.1	-	0.0	0.0	-	-	0.0	-	-	-	-	0.1

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

FORB SPECIES	Penstemon palmeri (Palmer's penstemon)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Sisymbrium altissimum[ai] (tall tumblemustard)	Solanum triflorum[a] (cutleaf nightshade)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)
year	Nested Frequency						
2008	-	-	-	-	-	-	-
2011	6	-	0	-	-	-	-
2015	15	3	-	-	-	-	3
2019	8	12	-	0	4	-	6
2024	14	3	-	4	-	3	-
year	Average Cover (%)						
2008	-	-	-	-	-	-	-
2011	0.1	-	0.0	-	-	-	-
2015	0.3	0.0	-	-	-	-	0.0
2019	0.0	0.1	-	0.0	0.0	-	0.1
2024	0.0	0.0	-	0.0	-	0.0	-

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

Table 28R-13.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Pinus edulis[t] (twoneedle pinyon)	Rhus trilobata var. trilobata[p] (skunkbush sumac)
year	Line Intercept Cover (%)							
2008	0.8	-	-	-	0	-	40.9	-
2011	2.3	0	-	1.1	2.3	-	3.3	-
2015	3.4	0.3	-	7.2	3.4	-	4	-
2019	5.2	0.4	-	3.1	-	0.1	5.6	-
2024	6.5	2	0.1	15.1	0.1	-	6	-
year	Quadrat Cover (%)							
2008	0.9	-	-	0.0	0.0	-	16.3	-
2011	2.8	0.0	-	1.0	0.8	0.0	0.2	0.0
2015	4.5	0.0	-	6.1	0.5	-	0.8	0.0
2019	3.3	0.0	0.1	3.2	-	0.2	2.5	0.0
2024	7.2	1.1	0.1	14.1	0.0	0.2	1.4	-

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

Table 28R-13.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[p] -- (black sagebrush)									
2008	600	20	0	13	87	23	23	73	19/43
2011	1180	1000	19	58	24	15	0	10	26/54
2015	2860	140	57	41	2	9	17	2	24/51
2019	3020	140	28	64	8	9	36	9	30/57
2024	2980	160	11	83	6	11	24	6	- / -
Artemisia tridentata ssp. vaseyana[p] -- (mountain big sagebrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	80	-	100	0	0	0	0	0	22/28
2015	120	20	50	50	0	33	17	0	29/46
2019	140	-	0	86	14	14	43	14	32/53
2024	460	40	35	52	13	13	74	13	- / -
Bassia prostrata[pi] -- (forage kochia)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	19/14
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	48/32
2019	80	-	75	25	0	0	0	0	86/115
2024	40	-	0	50	50	50	50	50	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2008	740	400	11	89	0	0	0	0	8/5
2011	2720	660	27	73	1	0	0	1	26/25
2015	16600	80	25	75	1	0	0	1	22/24
2019	5780	-	5	92	3	0	0	3	19/19
2024	50960	140	8	92	0	2	0	0	- / -
Juniperus osteosperma[t] -- (Utah juniper)									
2008	-	20	0	0	0	0	0	0	- / -
2011	20	20	0	100	0	0	0	0	- / -
2015	20	40	0	100	0	0	0	0	- / -
2019	60	-	100	0	0	0	0	0	- / -
2024	80	-	100	0	0	25	0	0	- / -
Opuntia -- (pricklypear)									
2008	80	20	0	75	25	0	0	0	11/32
2011	-	-	-	-	-	-	-	-	11/28
2015	20	-	0	100	0	0	0	0	9/23
2019	80	-	25	75	0	0	0	0	11/30
2024	40	-	0	100	0	0	0	0	- / -
Pediocactus simpsonii -- (mountain ball cactus)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	3/7
2015	-	-	-	-	-	-	-	-	-/-
2019	20	-	0	100	0	0	0	0	3/6
2024	-	-	-	-	-	-	-	-	-/-

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 edulis[t] -- (twoneedle pinyon)									
2008	1000	80	46	52	2	0	0	0	- / -
2011	80	180	50	50	0	0	0	0	- / -
2015	100	380	60	40	0	0	0	0	- / -
2019	120	40	67	33	0	0	0	0	- / -
2024	320	20	88	13	0	0	6	0	- / -
Rhus trilobata var. trilobata[p] -- (skunkbush sumac)									
2008	-	-	-	-	-	-	-	-	52/56
2011	20	-	100	0	0	100	0	0	29/28
2015	-	-	-	-	-	-	-	-	52/64
2019	20	-	0	0	100	100	0	100	24/33
2024	20	-	0	0	100	0	0	100	- / -

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

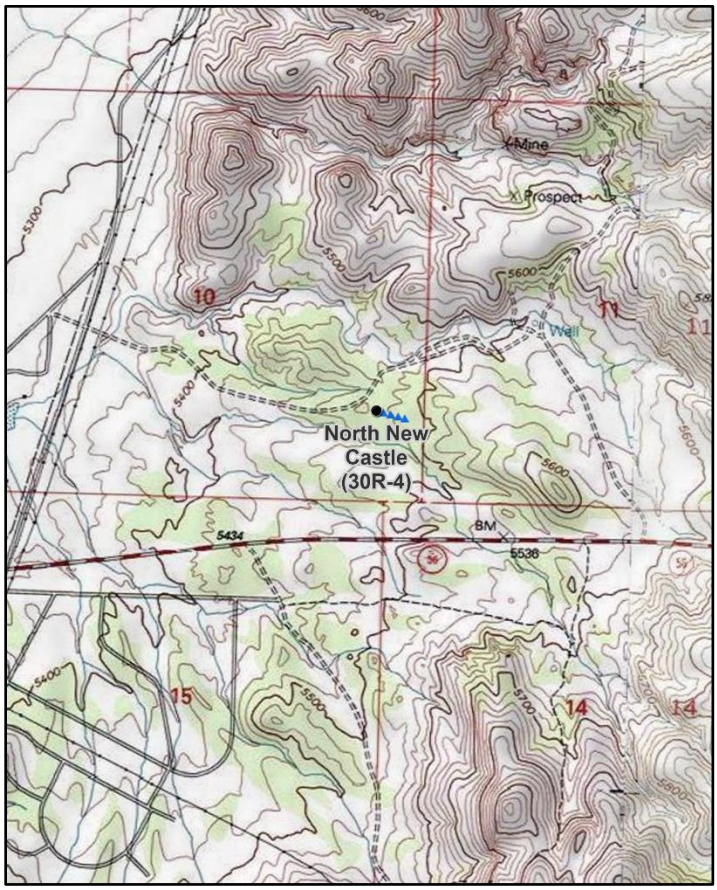
Table 28R-13.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

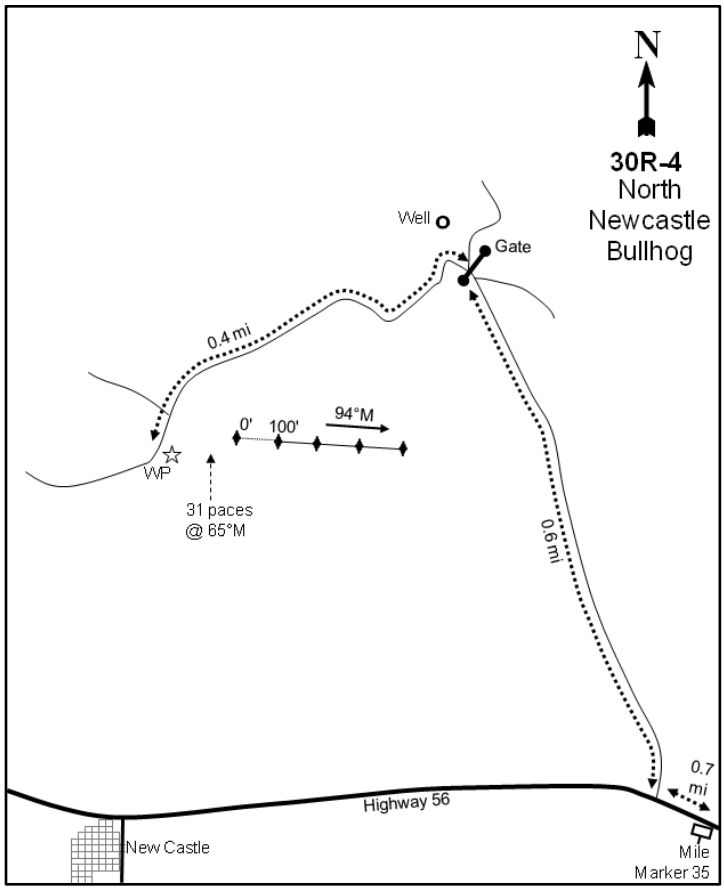
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	22	-	25	50	25	-	9.0
2011	15	43	14	-	-	43	16.6
2015	20	11	56	11	22	-	8.7
2019	16	60	20	20	-	-	6.6
2024	25	23	62	15	-	-	3.2
Pinus edulis (twoneedle pinyon)							
2008	483	5	40	30	15	10	7.8
2011	96	47	16	-	-	37	12.8
2015	158	30	50	-	5	15	7.5
2019	59	25	31	6	-	38	14.7
2024	157	35	30	5	-	30	11.9

Table 28R-13.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2008	1.0	0.0	0.0	0.0	0.0	0.2	0.0	**1.2**	Very Poor
2011	2.9	0.0	0.0	2.0	0.0	10.0	0.0	**14.9**	Very Poor
2015	4.6	0.0	0.0	7.0	0.0	1.2	0.0	**12.8**	Very Poor
2019	7.0	12.5	13.2	5.5	0.0	10.0	0.0	**48.2**	Poor-Fair
2024	10.6	12.7	8.5	13.1	0.0	3.3	0.0	**48.2**	Poor-Fair

NORTH NEW CASTLE - STUDY NO. 30R-4





Location Information	
USGS 7.5 min Map Info	Newcastle SE; Township 36S, Range 15W, Section 10
GPS (0' Stake)	NAD 83 UTM ZONE 12, 278431 East 4173311 North

Transect Information	
Browse Tag # (0' Stake)	217
Transect Bearing	94° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

Directions to Site

Driving from Cedar City, travel west on Highway 56 and turn right 0.7 miles after mile marker 35. Drive 0.6 miles to a well on the right. Proceed left at the fork, continue to a gate, stay left, and drive 0.1 miles to another fork. Stay left, drive 0.3 miles to a left turn, and continue 0.1 miles to the witness post on the right (south) side of the road. The 0-foot stake is 31 paces from the witness post at 65 degrees magnetic and is marked with browse tag #217.

Site Information	
Land Ownership	Federal
Land Administrator	BLM
Allotment	SILVER PEAK
Elevation	5,480ft (1,670m)
Aspect	Southeast
Slope	4%
Sample Dates	06/24/2008, 06/14/2011, 08/06/2015, 08/12/2019, 07/30/2024

Table 30R-04.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	North Newcastle	446	December 2008-January 2009	870
Seeding - Aerial Before	North Newcastle	446	October 2008	870
Hand Crew - Lop and Scatter	Enterprise/Hwy 56 Project Maintenance	3431	August-December 2015	1323

Table 30R-04.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
North Newcastle			Aerial	Oct 2008	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.50	0.39
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	0.55	0.44
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.76
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.94
G	Poa secunda	Big Bluegrass	Sherman	0.50	0.35
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	0.12	0.11
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	1.35	1.29
F	Achillea millefolium	Western Yarrow		0.10	0.10
F	Medicago sativa	Alfalfa	Ladak	0.50	0.47
F	Medicago sativa	Alfalfa	Ranger	0.50	0.46
F	Onobrychis viciifolia	Sainfoin	Eski	2.00	1.75
F	Sanguisorba minor	Small Burnet	Delar	1.50	1.39

Wildlife Habitat and Vegetation History

Table 30R-04.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 30R-04.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Pinyon-Juniper/Mixed Shrub	Phase II
2011	Annual Grass/Mixed Shrub	Phase I
2015	Mixed Shrub/Perennial Grass	Phase I
2019	Mixed Shrub/Perennial Grass	Phase I
2024	Mixed Shrub/Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2008 - Utah Juniper/Invasive Annuals State: Community Phase 3.1 2011-2024 - Current Potential State: Community Phase Undefined

Upon study establishment in 2008, Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) codominated this site along with mixed shrubs such as broom snakeweed (*Gutierrezia sarothrae*), black and mountain big sagebrush (*Artemisia nova* and *A. tridentata* ssp. *vaseyana*), and Nevada jointfir (*Ephedra nevadensis*). Pinyon and juniper have become minor species in the community since the bullhog and seeding treatment in the fall-winter of 2008 (Table 30R-04.1), leaving mixed shrubs as the dominant community components (Photos, Table 30R-04.12, Table 30R-04.13). The herbaceous understory was present, but not abundant prior to treatment. Diversity and cover of herbaceous species increased in the sample years following treatment (Table 30R-04.7), and the introduced annual grass species cheatgrass (*Bromus tectorum*) was dominant in 2011. Cheatgrass decreased in 2015 and the perennial grass species James' galleta (*Pleuraphis jamesii*) has been the primary component of the herbaceous layer since that year (Table 30R--04.10). Forbs have slightly increased in diversity following the bullhog treatment, but have remained scarce; rose heath (*Chaetopappa ericoides*) has provided the most cover of any single forb species since 2011 (Table 30R-04.11). Although there is potential for infill by juniper and pinyon, no notable increase in density or cover has been observed in the sample years following the treatment, indicating that this is likely not an immediate concern (Table 30R-04.12, Table 30R-04.14).

Condition of this site as deer winter range has fluctuated between very poor and fair-good since 2008. Winter range is considered to be

in fair condition as of 2024, and current condition is mainly limited by reduced cover of and recruitment of young individuals to the preferred browse community; preferred browse decadence; and reduced perennial forb cover (Table 30R-04.15). Deer presence has remained low throughout the study period and no pellet groups were sampled in pellet hoops in 2024. However, over 50% of black sagebrush, mountain big sagebrush, and Nevada jointfir plants sampled in density strips were moderately to heavily hedged during the most recent sample year (Table 30R-04.9, Table 30R-04.13).

Trend Summary Tables

Table 30R-04.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	3.5	4.9	2.9	4.6	3.9	3.9
2011	5.3	3.6	0.4	6.5	4.1	1.7
2015	5.9	3.8	0.6	9.6	3.5	1.6
2019	5.6	6.6	-	8.3	7.1	1.3
2024	5.2	0.7	-	9.0	1.0	1.3

Table 30R-04.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	153	188	108	67	0.4	5.0	0.8	0.7
2011	329	255	53	110	8.7	6.5	0.4	2.1
2015	152	298	6	164	1.4	15.8	0.1	2.8
2019	166	304	166	160	3.0	8.0	3.8	3.3
2024	24	333	16	151	0.1	15.8	0.1	2.0

Table 30R-04.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	39.1	0.1	22.3	31.0	2.0	18.2
2011	35.7	-	19.3	8.6	1.2	33.7
2015	48.5	-	29.1	19.5	2.3	26.3
2019	41.0	0.0	34.2	15.0	2.1	25.8
2024	46.5	-	25.7	13.9	2.7	25.4

Table 30R-04.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	5	13	2	95
2011	6	-	-	6
2015	11	-	-	41
2019	25	-	-	43
2024	15	1	3	14
Year	Days Use Per Acre (ha)			
2008	0.7 (1.8)	8.1 (19.9)	-	-
2011	10.9 (26.9)	3.4 (8.3)	-	-
2015	20.3 (50.2)	2.7 (6.6)	-	-
2019	38.5 (95.0)	0.7 (1.7)	-	-
2024	12.3 (30.5)	-	-	-

Table 30R-04.10 - 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)	Bromus tectorum[ai] (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Secale cereale[ai] (cereal rye)	Sporobolus cryptandnus (sand dropseed)	Thinopyrum intermedium[i] (intermediate wheatgrass)	Vulpia octoflora[a] (sixweeks fescue)
year	Nested Frequency												
2008	53	-	-	-	153	20	6	-	148	-	-	-	-
2011	55	18	-	6	329	69	2	11	171	-	-	3	-
2015	61	4	22	-	151	81	20	9	223	1	-	4	-
2019	52	2	18	6	166	18	37	-	255	-	-	-	4
2024	31	1	56	-	24	13	18	3	297	-	11	-	-
year	Average Cover (%)												
2008	0.7	-	-	-	0.4	0.1	0.1	-	4.1	-	-	-	-
2011	1.1	0.1	-	0.2	8.7	1.2	0.0	0.1	3.8	-	-	0.0	-
2015	1.5	0.1	0.3	-	1.4	2.2	0.8	0.0	10.7	0.0	-	0.0	-
2019	0.5	0.1	0.1	0.4	3.0	0.3	0.7	-	6.0	-	-	-	0.0
2024	0.2	0.0	0.8	-	0.1	0.1	0.1	0.1	14.3	-	0.1	-	-

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

Table 30R-04.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus flexuosus (winding mariposa lily)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Chamaesyce albomarginata (whitemargin sandmat)	Chenopodium fremontii[a] (Fremont's goosefoot)	Cordylanthus[a] (bird's-beak)	Cryptantha (cryptantha)	Cryptantha gracilis[a] (narrowstem cryptantha)	Descurainia pinnata[a] (western tansymustard)	Draba[a] (draba)	Eriogonum cernuum[a] (nodding buckwheat)	Erodium cicutarium[ai] (redstem stork's bill)	Gilia inconspicua[a] (shy gilia)
year	Nested Frequency																
2008	0	-	0	-	-	1	41	16	-	68	1	-	-	-	43	-	3
2011	-	2	8	6	13	4	55	18	2	15	-	2	5	8	-	-	16
2015	-	3	15	-	-	2	106	34	-	4	-	1	-	-	1	-	-
2019	-	-	10	-	3	1	115	39	3	40	-	3	22	-	12	8	107
2024	-	-	12	-	5	5	87	34	-	-	2	8	1	-	-	4	1
year	Average Cover (%)																
2008	0.0	-	0.0	-	-	0.0	0.4	0.1	-	0.6	0.0	-	-	-	0.2	-	0.0
2011	-	0.1	0.2	0.0	0.0	0.0	1.4	0.1	0.0	0.0	-	0.0	0.0	0.0	-	-	0.1
2015	-	0.0	0.2	-	-	0.0	2.1	0.2	-	0.0	-	0.0	-	-	0.0	-	-
2019	-	-	0.0	-	0.0	0.0	2.5	0.7	0.0	1.5	-	0.0	0.4	-	0.0	0.0	1.5
2024	-	-	0.1	-	0.2	0.1	1.2	0.3	-	-	0.0	0.0	0.0	-	-	0.0	0.0

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

FORB SPECIES	Ipomopsis congesta (ballhead ipomopsis)	Lepidium ramosissimum[a] (manybranched pepperweed)	Lygodesmia grandiflora (largeflower skeletonplant)	Microsteris gracilis[a] (slender phlox)	Navarretia intertexta[a] (needleleaf navarretia)	Penstemon confusus (Owens Valley beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Sisymbrium altissimum[ai] (tall tumblemustard)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency										
2008	1	-	2	-	-	2	-	6	-	-	3
2011	3	5	7	11	-	2	-	13	0	-	6
2015	-	-	-	-	-	12	2	30	0	-	5
2019	-	9	9	-	10	3	-	5	-	-	9
2024	-	3	-	-	-	7	-	36	-	4	1
year	Average Cover (%)										
2008	0.0	-	0.0	-	-	0.0	-	0.0	-	-	0.0
2011	0.0	0.0	0.1	0.2	-	0.0	-	0.1	0.0	-	0.0
2015	-	-	-	-	-	0.1	0.0	0.1	0.0	-	0.0
2019	-	0.2	0.1	-	0.1	0.0	-	0.0	-	-	0.0
2024	-	0.0	-	-	-	0.1	-	0.1	-	0.0	0.0

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

Table 30R-04.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova[p] (black sagebrush)	Artemisia tridentata ssp. vaseyana[p] (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ephedra nevadensis[p] (Nevada jointfir)	Eriogonum microthecum[p] (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma[t] (Utah juniper)	Pinus edulis[t] (twoneedle pinyon)
year	Line Intercept Cover (%)							
2008	1.6	1.2	0.8	1.6	0.2	3.1	2.7	1.2
2011	1.4	2	2.3	2.9	0.2	1.8	1.7	-
2015	1.7	2.5	2.1	4.7	0.7	1.4	1.6	-
2019	2.2	2.7	2.2	3.2	0.2	4.9	1.3	-
2024	2.1	2.7	0.8	4.2	0	0.2	1.3	-
year	Quadrat Cover (%)							
2008	0.8	1.9	1.4	0.7	0.1	3.6	1.9	1.0
2011	2.1	0.5	1.6	2.3	0.4	2.0	0.4	-
2015	0.1	2.2	1.6	3.2	0.4	2.2	0.6	-
2019	0.9	3.0	1.5	1.4	0.3	5.1	0.0	-
2024	1.1	2.3	0.7	1.6	0.2	0.0	0.0	-

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

Table 30R-04.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Artemisia nova[P] -- (black sagebrush)									
2008	480	40	4	38	58	25	13	54	37/74
2011	760	40	3	84	13	3	0	11	24/54
2015	380	40	5	90	5	11	58	5	32/64
2019	500	-	8	84	8	8	0	20	39/77
2024	520	-	8	73	19	50	12	8	- / -
Artemisia tridentata ssp. vaseyana[P] -- (mountain big sagebrush)									
2008	200	-	0	80	20	30	0	20	42/74
2011	400	60	35	65	0	10	5	40	37/62
2015	420	-	5	86	10	5	95	10	41/76
2019	300	-	0	73	27	40	40	33	47/100
2024	360	-	0	83	17	39	17	17	- / -
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	1740	60	1	69	30	26	44	24	17/25
2011	1740	20	6	94	0	0	0	0	20/30
2015	1480	-	5	93	1	23	49	5	20/30
2019	1340	-	2	85	13	10	64	51	18/33
2024	1020	20	0	39	61	35	22	78	- / -
Ephedra nevadensis[P] -- (Nevada jointfir)									
2008	860	-	2	65	33	0	95	28	34/66
2011	860	-	2	98	0	33	12	5	35/58
2015	1560	120	21	67	13	32	37	14	48/81
2019	1160	-	12	88	0	10	69	0	44/76
2024	1120	-	5	79	16	30	55	32	- / -
Ephedra viridis[P] -- (mormon tea)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	100	0	0	- / -
2019	-	-	-	-	-	-	-	-	47/89
2024	-	-	-	-	-	-	-	-	-/-
Eriogonum microthecum[P] -- (slender buckwheat)									
2008	1220	-	3	97	0	13	72	2	12/17
2011	580	40	17	83	0	7	0	10	14/21
2015	840	20	0	100	0	21	14	0	17/23
2019	380	-	5	95	0	21	16	11	13/13
2024	280	-	7	79	14	7	0	21	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2008	4460	-	0	99	1	0	0	0	18/25
2011	1480	-	15	84	1	0	1	1	18/28
2015	2580	140	5	94	1	1	0	1	20/26
2019	3820	80	1	99	1	0	0	3	21/29
2024	160	-	0	88	13	0	0	13	- / -
Juniperus osteosperma[T] -- (Utah juniper)									
2008	20	-	100	0	0	0	0	0	- / -
2011	20	-	100	0	0	0	0	0	- / -
2015	20	-	0	100	0	0	0	0	- / -
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-

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)									
2008	-	-	-	-	-	-	-	-	15/38
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	10/13
2024	-	-	-	-	-	-	-	-	-/-
Pinus edulis[t] -- (twoneedle pinyon)									
2008	20	-	0	100	0	0	0	0	- / -
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Salvia dorrii -- (purple sage)									
2008	-	-	-	-	-	-	-	-	24/56
2011	-	-	-	-	-	-	-	-	16/65
2015	-	-	-	-	-	-	-	-	21/66
2019	-	-	-	-	-	-	-	-	18/62

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

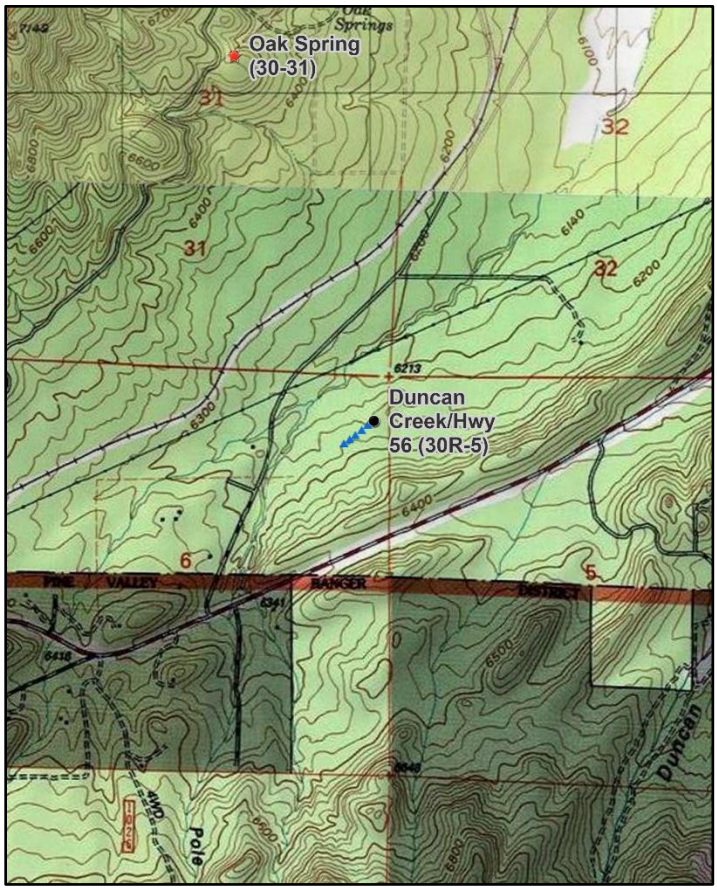
Table 30R-04.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

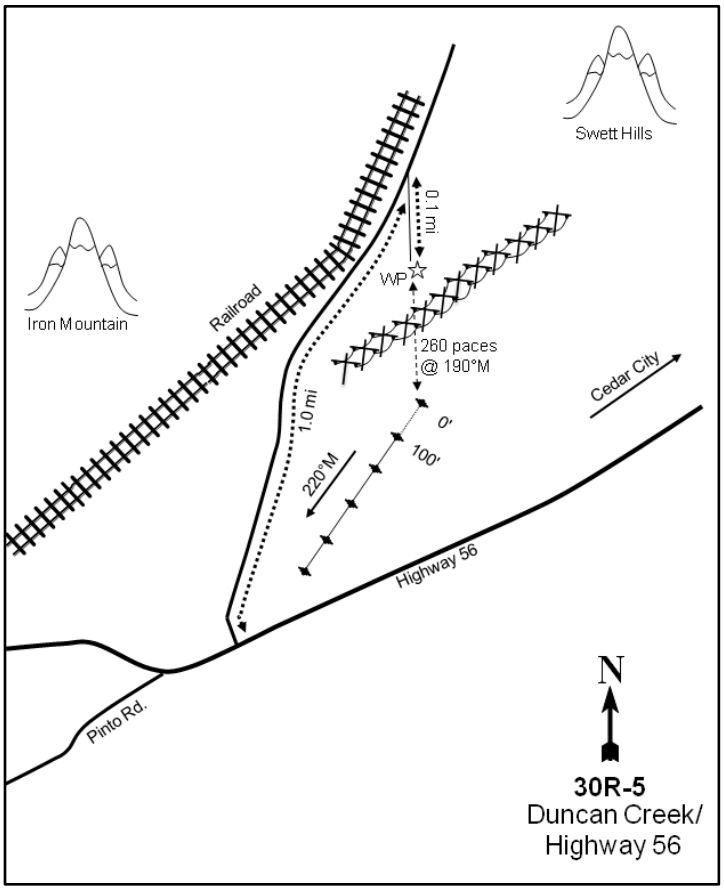
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	68	-	6	22	11	61	38.7
2011	22	-	38	-	50	13	47.1
2015	41	23	38	-	-	38	27.5
2019	23	20	40	-	-	40	28.7
2024	18	9	55	9	-	27	23.5
Pinus edulis (twoneedle pinyon)							
2008	1	-	-	100	-	-	12.0
2015	1	-	100	-	-	-	2.0
2024	2	-	100	-	-	-	2.5

Table 30R-04.15 - Deer Desirable Components Index: Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
2008	5.8	0.0	0.0	10.0	-0.3	1.4	0.0	**16.9**	Very Poor
2011	8.1	14.2	6.4	12.9	-6.6	4.2	0.0	**39.2**	Poor
2015	12.0	12.2	6.1	30.0	-1.0	5.7	0.0	**65.0**	Fair-Good
2019	10.4	11.8	3.5	16.1	-2.3	6.6	0.0	**46.1**	Poor
2024	11.3	9.9	2.2	30.0	-0.1	4.0	0.0	**57.3**	Fair

DUNCAN CREEK/HWY 56 - STUDY NO. 30R-5





Location Information

USGS 7.5 min Map Info	Stoddard Mountain NW; Township 37S, Range 13W, Section 06
GPS (0' Stake)	NAD 83 UTM ZONE 12, 292948 East 4165856 North

Transect Information

Browse Tag # (0' Stake)	9165
Transect Bearing	220° 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 Highway 56, turn north on Iron Mountain Road, drive 1.0 miles, and turn right. Drive 0.1 miles to a witness post south of the road. From the witness post, walk 260 paces at 190 degrees magnetic to the 0-foot stake which is marked by browse tag #9165.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	No data
Elevation	6,260ft (1,908m)
Aspect	Northwest
Slope	10%
Sample Dates	06/27/2012, 08/03/2015, 08/14/2019, 08/01/2024

Table 30R-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	2022 Cedar City and Kanab Field Offices BLM Maintenance	5888	-	4452
Mechanical - Bullhog	Duncan Creek/Hwy 56 Interface - Phase 1	2303	October 2012-April 2013	2146
Seeding - Aerial Unknown	Duncan Creek/Hwy 56 Interface - Phase 1	2303	October 2012-April 2013	2146

Table 30R-05.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Duncan Creek/HWY 56 Interface Phase I			Aerial	Nov 2012	2080
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.54	0.44
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.48	0.45
G	Agropyron desertorum	Crested Wheatgrass	Hycrest II	1.49	1.35
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.01	0.98
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.67	0.55
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.34	0.28
G	Poa secunda	Sandberg Bluegrass	UP/Colorado Plateau	0.50	0.43
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	1.51	1.34
F	Linum perenne	Blue Flax	Appar	1.01	0.93
F	Melilotus officinalis	Yellow Sweetclover		0.38	0.36
F	Melilotus officinalis	Yellow Sweetclover		0.12	0.11
F	Sanguisorba minor	Small Burnet	Delar	1.01	0.94

Mix Name			Application Type	Application Date	Acres
Duncan Creek/HWY 56 Interface Phase I - Kochia			Aerial	Jan 2013	2080
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Spredor 4	1.01	0.89
S	Bassia prostrata	Forage Kochia	Beaver UT	1.01	0.46

Wildlife Habitat and Vegetation History

Table 30R-05.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 30R-05.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon-Juniper/Alderleaf Mountain Mahogany	Phase III
2015	Perennial Grass/Alderleaf Mountain Mahogany	Phase I
2019	Perennial Grass/Alderleaf Mountain Mahogany	Phase I
2024	Perennial Grass/Alderleaf Mountain Mahogany	Phase I

Site Notes

Hybridization of singleleaf pinyon (*Pinus monophylla*) and twoneedle pinyon (*P. edulis*) was occurring on this site when the study was established in 2012. For the purposes of this study, all pinyon species have been called twoneedle pinyon.

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Loam (Shrub)
NRCS Ecological Site #	R047XB420UT
States and Transitions	No state and transition model is available for this ecological site.

At the time of study establishment in 2012, this site was dominated by Utah juniper (*Juniperus osteosperma*), twoneedle pinyon (*Pinus edulis*), and alderleaf mountain mahogany (*Cercocarpus montanus*). However, a bullhog and seeding project in the winter of 2012 (Table 30R-05.1) removed a majority of the trees on the site. In addition to decreases in cover and abundance, the tree population has transitioned to a younger age class following treatment. Furthermore, cover and density of alderleaf mountain mahogany have increased overall from pretreatment levels (Table 30R-05.12, Table 30R-05.13, Table 30R-05.14). The herbaceous understory was sparse prior to treatment, but perennial grasses established and have become a dominant vegetation component following the seeding. Dominant perennial grass species as of 2024 include western wheatgrass (*Pascopyrum smithii*), bluebunch wheatgrass (*Pseudoroegneria spicata*) and thickspike wheatgrass (*Elymus lanceolatus*). Cheatgrass (*Bromus tectorum*) was sampled from 2012 through 2019 in low abundance, but was not observed in 2024 (Table 30R-05.10). Forbs displayed an initial increase

following the seeding with most of the cover provided by blue flax (*Linum perenne*). However, cover of blue flax and forbs in general has decreased in subsequent years (Table 30R-05.11). Although density is low as of 2024 (Table 30R-05.14), the persistent tree component indicates that this site may have the potential to be infilled in future sample years.

Condition of this site as mule deer winter range has fluctuated between very poor and good since 2012; winter range condition is considered to be fair as of 2024. Current range condition is primarily limited by reduced cover of and recruitment of young individuals to the preferred browse community and a lack of perennial forb cover (Table 30R-05.15). Pellet transect data indicates that deer presence was low in 2012, but has remained moderate throughout the post-treatment study period. Moderate to heavy utilization of alderleaf mountain mahogany plants sampled in density strips was 42% in 2012, 55% in 2015, and 76% in 2019. However, only 15% of mountain mahogany was moderately hedged and no plants were heavily utilized in 2024 (Table 30R-05.9, Table 30R-05.13).

Trend Summary Tables

Table 30R-05.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	6.3	0.2	21.0	8.7	-	45.4
2015	3.0	0.2	0.0	6.7	-	0.3
2019	5.9	-	0.0	12.1	-	0.3
2024	5.2	-	0.1	11.1	-	0.2

Table 30R-05.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	22	-	65	70	0.0	-	0.2	1.6
2015	75	241	54	152	1.9	19.2	1.0	6.3
2019	61	354	84	74	0.4	31.2	0.8	1.8
2024	-	360	8	14	-	29.8	0.1	0.3

Table 30R-05.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	19.7	2.4	50.9	7.2	9.6	28.4
2015	9.4	0.0	77.1	2.6	4.8	29.6
2019	8.3	0.0	70.9	3.1	6.5	34.1
2024	7.7	-	64.4	3.1	2.5	38.2

Table 30R-05.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency			
2012	2	-	-	6
2015	18	1	-	28
2019	13	-	-	29
2024	13	1	-	8
Year	Days Use Per Acre (ha)			
2012	12.1 (29.8)	-	-	-
2015	23.4 (57.9)	-	-	-
2019	28.8 (71.2)	-	0.6 (1.4)	-
2024	22.8 (56.3)	-	-	-

Table 30R-05.10 - 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 lanceolatus (thickspike wheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium[i] (intermediate wheatgrass)
year	Nested Frequency									
2012	-	-	-	22	-	-	-	-	-	-
2015	2	91	4	75	14	36	76	18	84	2
2019	2	90	-	61	44	75	182	19	108	-
2024	-	79	-	-	23	92	217	23	87	-
year	Average Cover (%)									
2012	-	-	-	0.0	-	-	-	-	-	-
2015	0.8	4.1	0.1	1.9	0.5	2.3	5.3	0.6	5.6	0.0
2019	0.2	6.2	-	0.4	1.6	3.7	9.4	0.2	10.0	-
2024	-	3.7	-	-	0.7	5.8	11.5	0.1	8.1	-

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

Table 30R-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum[ai] (desert madwort)	Arabis (rockcress)	Astragalus beckwithii (Beckwith's milkvetch)	Calochortus flexuosus (winding mariposa lily)	Calochortus nuttallii (sego lily)	Caulanthus crassicaulis[a] (thickstem wild cabbage)	Ceratocephala testiculata[ai] (curveseed butterwort)	Collinsia parviflora[a] (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata[a] (western tansymustard)	Draba cuneifolia[a] (wedgeleaf draba)	Erigeron flagellaris (trailing fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua[a] (shy gilia)	Lactuca serriola[ai] (prickly lettuce)
year	Nested Frequency																
2012	-	1	-	-	-	-	17	28	3	1	2	7	27	-	7	-	1
2015	-	3	1	-	-	8	-	-	-	-	-	5	8	1	1	-	33
2019	-	-	-	3	4	1	2	-	-	1	3	13	15	0	1	60	12
2024	1	-	-	-	-	-	1	-	-	3	-	-	-	-	-	3	3
year	Average Cover (%)																
2012	-	0.0	-	-	-	-	0.1	0.1	0.0	0.0	0.0	0.0	0.1	-	0.2	-	0.0
2015	-	0.0	0.0	-	-	0.1	-	-	-	-	-	0.0	0.1	0.0	0.1	-	0.7
2019	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.1	0.0	0.0	0.4	0.1
2024	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)	Linum perenne[i] (blue flax)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa[i] (alfalfa)	Melilotus officinalis[i] (sweetclover)	Packera multilobata (lobeleaf groundsel)	Pedicularis centranthera (dwarf lousewort)	Penstemon caespitosus (mat penstemon)	Penstemon confusus (Owens Valley beardtongue)	Penstemon leonardii (Leonard's beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Physaria (twinpod)	Physaria chambersii (Chambers' twinpod)	Salsola tragus[ai] (prickly Russian thistle)	Sanguisorba minor[i] (small burnet)	Silene antirrhina[a] (sleepy silene)
year	Nested Frequency																
2012	-	-	-	-	-	-	42	7	-	2	3	1	-	3	-	-	7
2015	3	118	-	7	1	0	4	-	1	12	8	3	1	-	4	26	-
2019	7	17	4	4	-	7	-	-	-	9	3	-	-	-	-	21	-
2024	-	-	-	-	-	-	-	-	-	4	3	-	-	-	-	7	-
year	Average Cover (%)																
2012	-	-	-	-	-	-	1.1	0.2	-	0.1	0.0	0.0	-	0.0	-	-	0.0
2015	0.0	4.4	-	0.1	0.0	0.0	0.0	-	0.0	0.6	0.1	0.0	0.0	-	0.0	1.0	-
2019	0.0	0.2	0.1	0.2	-	0.1	-	-	-	0.3	0.1	-	-	-	-	0.8	-
2024	-	-	-	-	-	-	-	-	-	0.1	0.1	-	-	-	-	0.1	-

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

FORB SPECIES	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius[ai] (yellow salsify)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency			
2012	-	3	-	-
2015	1	-	-	-
2019	-	4	2	3
2024	-	-	0	-
year	Average Cover (%)			
2012	-	0.0	-	-
2015	0.0	-	-	-
2019	-	0.0	0.0	0.0
2024	-	-	0.0	-

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

Table 30R-05.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis[p] (Utah serviceberry)	Artemisia frigida[p] (prairie sagewort)	Bassia prostrata[pi] (forage kochia)	Cercocarpus montanus[p] (alderleaf mountain mahogany)	Juniperus osteosperma[t] (Utah juniper)	Opuntia (pricklypear)	Peraphyllum ramosissimum[p] (wild crab apple)	Pinus edulis[t] (twoneedle pinyon)	Purshia tridentata[p] (antelope bitterbrush)	Quercus gambelii[p] (Gambel oak)
year	Line Intercept Cover (%)									
2012	2	-	-	5.7	29.2	-	0.4	16.2	-	0.6
2015	1.2	-	-	4.4	0.3	-	0.6	-	-	0.5
2019	0.5	-	-	8	0.3	-	2.9	-	0.3	0.4
2024	2.3	-	-	6.6	0.2	-	1.7	-	0.3	0.2
year	Quadrat Cover (%)									
2012	1.5	-	-	3.7	13.7	0.2	0.9	7.3	-	0.1
2015	0.4	0.0	0.2	1.6	0.0	0.2	0.8	0.0	0.0	0.0
2019	0.7	-	0.1	3.0	0.0	-	1.9	0.0	0.1	0.1
2024	0.5	-	-	2.6	0.1	-	1.9	-	0.0	0.1

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

Table 30R-05.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2012	680	80	53	41	6	9	0	3	73/78
2015	640	-	78	22	0	6	0	0	56/86
2019	300	-	0	100	0	40	0	0	74/86
2024	240	-	8	83	8	33	0	8	- / -
Artemisia frigida[p] -- (prairie sagewort)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	34/71
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-
Bassia prostrata[pi] -- (forage kochia)									
2012	-	-	-	-	-	-	-	-	-/-
2015	180	-	0	100	0	0	0	0	25/31
2019	80	-	0	100	0	0	50	0	17/28
2024	60	-	0	100	0	33	0	0	- / -
Cercocarpus montanus[p] -- (alderleaf mountain mahogany)									
2012	320	-	0	88	13	38	6	6	120/140
2015	720	-	53	47	0	44	11	3	75/91
2019	580	60	3	90	7	52	24	7	95/102
2024	520	-	0	100	0	15	0	0	- / -
Echinocereus -- (hedgehog cactus)									
2012	-	-	-	-	-	-	-	-	17/47
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	-/-
2024	-	-	-	-	-	-	-	-	-/-

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)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	80/101
2024	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	55/86
2024	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma[t] -- (Utah juniper)									
2012	360	20	17	78	6	0	0	0	- / -
2015	60	60	100	0	0	0	0	0	- / -
2019	140	20	100	0	0	0	0	14	- / -
2024	180	40	100	0	0	0	0	22	- / -
Opuntia polyacantha -- (plains pricklypear)									
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2019	-	-	-	-	-	-	-	-	10/29
2024	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2012	200	-	0	60	40	0	0	40	12/32
2015	300	-	33	67	0	20	0	0	9/17
2019	-	-	-	-	-	-	-	-	8/24
2024	-	-	-	-	-	-	-	-	-/-
Peraphyllum ramosissimum[p] -- (wild crab apple)									
2012	120	-	17	83	0	0	0	0	47/57
2015	120	20	83	17	0	17	83	0	48/75
2019	80	-	0	100	0	25	75	0	55/74
2024	100	-	20	80	0	20	0	20	- / -
Pinus edulis[t] -- (twoneedle pinyon)									
2012	480	280	50	50	0	0	0	0	- / -
2015	20	40	100	0	0	0	0	0	- / -
2019	60	-	100	0	0	0	0	33	- / -
2024	-	-	-	-	-	-	-	-	-/-
Purshia tridentata[p] -- (antelope bitterbrush)									
2012	20	-	100	0	0	100	0	0	31/75
2015	40	-	0	100	0	50	50	50	41/131
2019	40	-	0	100	0	0	50	0	62/157
2024	40	-	0	100	0	0	0	0	- / -
Quercus gambelii[p] -- (Gambel oak)									
2012	180	-	100	0	0	0	0	0	73/74
2015	200	-	100	0	0	0	0	100	69/71
2019	120	-	100	0	0	17	83	0	58/66
2024	120	-	50	50	0	0	0	0	- / -

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

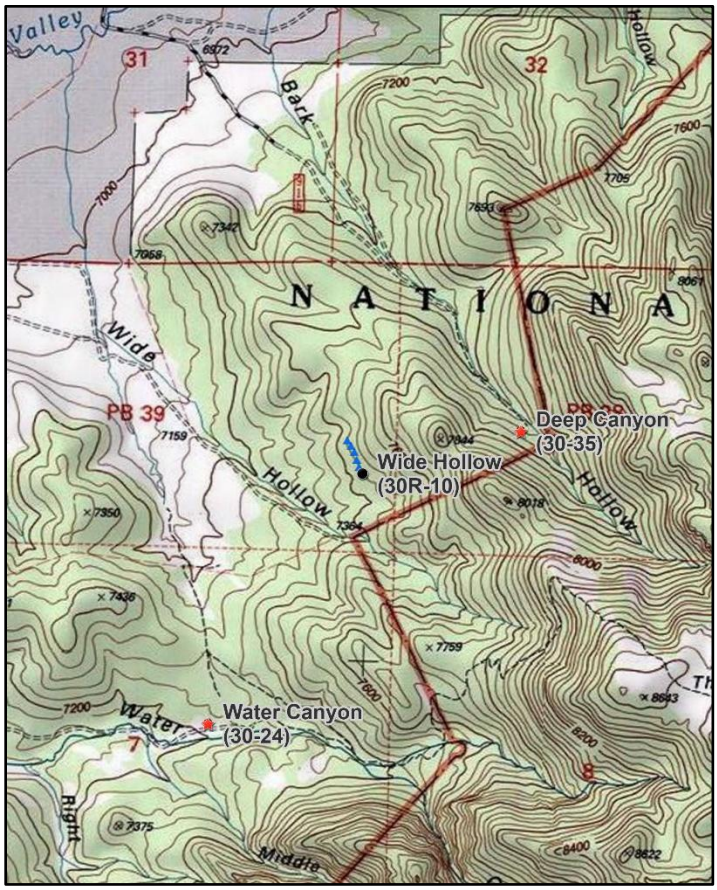
Table 30R-05.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

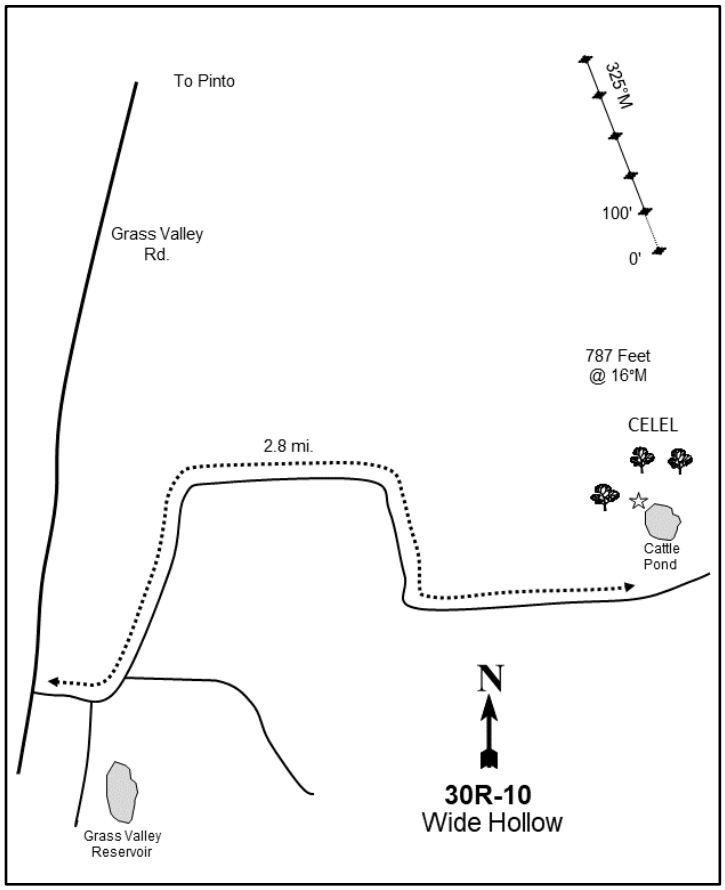
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	224	-	5	10	15	70	29.9
2015	29	50	50	-	-	-	3.1
2019	29	44	56	-	-	-	2.4
2024	28	50	50	-	-	-	2.4
Pinus edulis (twoneedle pinyon)							
2012	326	-	45	40	10	5	4.9
2015	47	25	75	-	-	-	2.1
2019	35	25	75	-	-	-	3.0
2024	6	25	75	-	-	-	2.0

Table 30R-05.15 - 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	12.6	12.1	9.9	0.0	0.0	3.2	0.0	**37.8**	Very Poor
2015	9.5	15.0	15.0	30.0	-1.4	10.0	0.0	**78.1**	Good
2019	16.5	13.6	2.8	30.0	-0.3	3.6	0.0	**66.2**	Fair
2024	15.7	14.5	2.8	30.0	0.0	0.6	0.0	**63.6**	Fair

WIDE HOLLOW - STUDY NO. 30R-10





Location Information

USGS 7.5 min Map Info	Grass Valley SW; Township 39S, Range 14W, Section 06
GPS (0' Stake)	NAD 83 UTM ZONE 12, 282373 East 4144682 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	269° magnetic (Lines 3-5: 272° 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 Pine Valley Road and Grass Valley Road in Pine Valley, Utah, travel north along Grass Valley Road for approximately 1.9 miles to the road that leads to Grass Valley Reservoir. Turn right (west) and travel 1.2 miles along this road (while passing the right turn to the reservoir and staying left) to a fence-line. Turn right (west) at the fence-line and drive for 0.6 miles to a right turn. Turn right (south) and follow the road up Wide Hollow for 0.93 miles to the USFS boundary: park here. Use a GPS to find the stake locations. The site is approximately 790 feet north of the stock pond that is located on the north side of the road.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Pine Valley
Elevation	7,380ft (2,249m)
Aspect	Southwest
Slope	25%
Sample Dates	08/25/2021, 07/29/2024

Table 30R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Upper Santa Clara Watershed Restoration and Defensible Fire Space project Phase I	5588	Fall 2021	742
Mechanical - Bullhog	Upper Santa Clara Watershed Restoration and Defensible Fire Space project Phase I	5588	Fall 2021	742

Table 30R-10.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Upper Santa Clara			Aerial	Nov 2021	907
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.77	0.72
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.99	0.93
G	Bouteloua gracilis	Blue Grama	Alma	0.33	0.22
G	Elymus elymoides	Bottlebrush Squirreltail	Pueblo	0.77	0.67
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock II	0.99	0.86
G	Pascopyrum smithii	Western Wheatgrass	Recovery	0.99	0.86
G	Poa fendleriana	Muttongrass	Montezuma CO	0.50	0.42
G	Poa secunda	Big Bluegrass	Sherman	0.77	0.65
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.77	0.71
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.98	1.79
G	Sporobolus cryptandrus	Sand Dropseed		0.20	0.19
F	Linum perenne	Blue Flax	Appar	0.50	0.40
F	Medicago sativa	Alfalfa	Big Sky Ladak	1.98	1.94
F	Medicago sativa ssp. falcata	Yellow Alfalfa	Don	0.50	0.49
F	Ratibida columnifera	Prairie Coneflower	Stillwater	0.50	0.39
F	Sanguisorba minor	Small Burnet	Delar	1.98	1.82

Wildlife Habitat and Vegetation History

Table 30R-10.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	summer

Table 30R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2021	Pinyon	Phase III
2024	Perennial Grass	Phase I

Site Notes

The transect was rotated in 2024 to fit entirely within the treated area. In 2021, it was noted that both singleleaf pinyon (*Pinus monophylla*) and twoneedle pinyon (*P. edulis*) were present on site, but for purposes of the study everything was called singleleaf pinyon.

Site Potential

1981 - 2010 Average Annual Precipitation	23 inches
NRCS Ecological Site	Mountain Stony Loam (Curlleaf Mountain Mahogany)
NRCS Ecological Site #	R047XC461UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2021, this site was a singleleaf pinyon (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*)-dominated ecological site within Phase III of woodland succession; pinyon was present in higher amounts than juniper. Browse species were present in low amounts with Gambel oak (*Quercus gambelii*), curl-leaf mountain mahogany (*Cercocarpus ledifolius*), and Utah serviceberry (*Amelanchier utahensis*) as the representative preferred browse species (Table 30R-10.4, Table 30R-10.12, Table 30R-10.13, Table 30R-10.14). The herbaceous understory was especially depauperate and provided little cover (Table 30R-10.7), and muttongrass (*Poa fendleriana*) was the only grass species observed (Table 30R-10.10). A bullhog and seeding project took place later in 2021 (Table 30R-10.1) that removed many of the trees and augmented the herbaceous understory. The site transitioned to one dominated by perennial grasses in 2024, with much of the cover provided by the introduced species crested wheatgrass (*Agropyron cristatum*) and native species squirreltail (*Elymus elymoides*) and bluebunch wheatgrass (*Pseudoroegneria spicata*). Forbs contributed little cover in both sample years (Table 30R-10.7, Table 30R-10.10, Table 30R-10.11). No preferred browse cover was observed and density was low following treatment, but curl-leaf mountain mahogany was still scattered throughout the area during the most recent sampling (Photos, Table 30R-10.6, Table 30R-10.12, Table 30R-10.13). Although many of the trees were removed by the bullhog treatment, pinyon is present with moderate density as of 2024 (Table 30R-10.14). This extant tree

component indicates that infilling will likely occur as time since treatment elapses.

The abundant and diverse perennial grass component on this site may provide valuable forage for summering mule deer, but range condition is negatively affected by limited perennial forb cover and the reduced preferred browse component. Pellet transect data indicates that deer presence has remained low since 2021. Only Utah serviceberry and Gambel oak plants were sampled in density strips in 2024 and with very low measurements, but all plants sampled were moderately utilized (Table 30R-10.7, Table 30R-10.9, Table 30R-10.10, Table 30R-10.11, Table 30R-10.13). Condition of this site as deer summer range may improve as time since treatment passes.

Trend Summary Tables

Table 30R-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
2021	0.0	0.0	6.2	4.3	-	43.7
2024	-	0.0	-	-	-	-

Table 30R-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
2021	-	3	3	13	-	0.0	0.0	0.1
2024	28	272	18	137	0.3	14.6	0.9	2.8

Table 30R-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
2021	5.0	0.2	66.2	16.4	15.6	6.3
2024	8.7	-	73.7	1.5	3.7	20.0

Table 30R-10.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2021	-	7	3
2024	2	1	-
Year	Days Use Per Acre (ha)		
2021	0.7 (1.8)	6.0 (14.9)	-
2024	8.0 (19.7)	1.3 (3.3)	-

Table 30R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum[i] (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus arvensis[ai] (field brome)	Bromus tectorum[ai] (cheatgrass)	Dactylis glomerata[i] (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea[i] (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency													
2021	-	-	-	-	-	-	-	-	-	3	-	-	-	-
2024	2	110	8	7	21	1	106	25	42	50	8	23	74	3
year	Average Cover (%)													
2021	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-
2024	0.2	4.2	0.4	0.0	0.3	0.2	3.0	0.7	1.4	1.1	0.1	0.9	2.5	0.0

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

Table 30R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Chenopodium atrovirens[a] (pinyon goosefoot)	Linum perenne[i] (blue flax)	Lithospermum (stoneseed)	Medicago sativa[i] (alfalfa)	Polygonum douglasii[a] (Douglas' knotweed)	Ratibida columnifera (upright prairie coneflower)	Sanguisorba minor[i] (small burnet)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Viola (violet)
year	Nested Frequency									
2021	-	3	-	-	-	0	-	-	1	12
2024	3	4	37	12	47	17	9	70	7	-
year	Average Cover (%)									
2021	-	0.0	-	-	-	0.0	-	-	0.0	0.0
2024	0.0	0.0	0.6	0.1	0.4	0.8	0.1	1.6	0.0	-

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

Table 30R-10.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Cercocarpus ledifolius[p] (curl-leaf mountain mahogany)	Juniperus osteosperma[t] (Utah juniper)	Juniperus scopulorum[t] (Rocky Mountain juniper)	Mahonia repens (creeping barberry)	Opuntia polyacantha (plains pricklypear)	Pinus monophylla[t] (singleleaf pinyon)	Quercus gambelii[p] (Gambel oak)
year	Line Intercept Cover (%)						
2021	3	7.9	1.8	-	-	34	1.3
2024	-	-	-	-	-	-	-
year	Quadrat Cover (%)						
2021	0.0	0.1	0.5	0.0	-	5.5	0.0
2024	-	-	-	-	0.0	-	-

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

Table 30R-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						
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)	Moderate (%)	Heavy (%)		
Amelanchier utahensis[p] -- (Utah serviceberry)									
2021	20	-	100	0	0	0	0	0	- / -
2024	40	-	100	0	0	100	0	0	- / -
Cercocarpus ledifolius[p] -- (curl-leaf mountain mahogany)									
2021	40	20	0	0	100	0	0	100	- / -
2024	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma[t] -- (Utah juniper)									
2021	80	-	75	0	25	0	0	25	- / -
2024	-	-	-	-	-	-	-	-	-/-
Mahonia repens -- (creeping barberry)									
2021	260	-	0	100	0	0	0	0	- / -
2024	-	-	-	-	-	-	-	-	-/-

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)									
2021	60	-	0	100	0	0	0	100	- / -
2024	20	-	0	100	0	0	0	100	- / -
Pinus monophylla[t] -- (singleleaf pinyon)									
2021	1020	240	75	20	6	0	0	6	- / -
2024	120	20	83	0	17	0	0	33	- / -
Quercus gambelii[p] -- (Gambel oak)									
2021	120	40	67	17	17	0	0	17	- / -
2024	20	-	100	0	0	100	0	0	- / -

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

Table 30R-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)							
2021	47	-	-	7	29	64	35.1
Pinus monophylla (singleleaf pinyon)							
2021	536	33	17	22	6	22	7.5
2024	41	80	13	7	-	-	2.7

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APPENDIX A - VEGETATION TYPE

VEGETATION COMMUNITY TYPE CLASSIFICATION--

Vegetation Type Code	Vegetation Community Type Name*	Description
ANN GRASS	Annual Grass	Annual grasses provide the dominant vegetation cover.
PER GRASS	Perennial Grass	Perennial grasses provide the dominant vegetation cover.
ANN-PER GRASS	Annual-Perennial Grass	Mixture of Annual and Perennial grass species provide the dominant vegetation cover.
ANN GRASS-FORB	Annual Grass-Forb	Mixture of Annual grass and forb species provide the dominant vegetation cover.
PER GRASS-FORB	Perennial Grass-Forb	Mixture of Perennial grass and forb species provide the dominant vegetation cover.
ANN FORB	Annual Forb	Annual forbs provide the dominant vegetation cover
PER FORB	Perennial Forb	Perennial forbs provide the dominant vegetation cover
ANN-PER FORB	Annual-Perennial Forb	Mixture of Annual and Perennial forb species provide the dominant vegetation cover.
WEED	Annual-Perennial Weed	Annual and/or Perennial weedy species provide the dominant vegetation cover.
WET MEADOW	Wet Meadow	Riparian vegetation species provide the dominant vegetation cover
DRY MEADOW	Dry Meadow	High elevation subalpine meadow
RIPAR	Riparian	Riparian vegetation species provide the dominant vegetation cover.
ALP GRASS	Alpine Grass	Grass or grass-like species provide the dominant vegetation cover
ALP FORB	Alpine Forb	Forb species provide the dominant vegetation cover
ALP SHRUB	Alpine Shrub	Alpine shrub species provide the dominant vegetation cover
ALP MIX	Alpine-Mixed	Mixture of grass, forb, or shrub species provide the dominant vegetation cover
ARTRT	Basin Big Sagebrush	Major component of the site (typically >5% cover).
ARTRV	Mountain Big Sagebrush	Major component of the site (typically > 5% cover).
ARTRW	Wyoming Big Sagebrush	Major component of the site (typically >5% cover).
ARAR	Low Sagebrush	Major component of the site (typically >5% cover).
ARCA	Silver Sagebrush	Major component of the site (typically >5% cover).
ARNO	Black Sagebrush	Major component of the site (typically >5% cover).
ARSP	Bud Sagebrush	Major component of the site (typically >5% cover).
ARFR	Fringed Sagebrush	Major component of the site (typically >5% cover).
CHNA	Rubber Rabbitbrush	Major component of the site (typically >5% cover).
CHPA	Parry Rabbitbrush	Major component of the site (typically >5% cover).
CHVI	Low Rabbitbrush	Major component of the site (typically >5% cover).
GUSA	Broom Snakeweed	Major component of the site (typically >5% cover).
SAVE	Black Greasewood	Major component of the site (typically >5% cover).
CELA	Winterfat	Major component of the site (typically >5% cover).
ATCO	Shadscale	Major component of the site (typically >5% cover).
ATCA	Fourwing Saltbush	Major component of the site (typically >5% cover).
GRSP	Spiny Hopsage	Major component of the site (typically >5% cover).
MSDS	Mixed Salt Desert Shrub	Mixture of one or more Salt Desert species (ATCO, ATCA, GRSP, etc.) with no one species expressing dominance.
LARRE	Creosote Bush	Major component of the site (typically >5% cover).
CORA	Blackbrush	Major component of the site (typically >5% cover).
PRFA	Desert Almond	Major component of the site (typically >5% cover).
EPHED	Ephedra	Major component of the site (typically >5% cover).
QUGA	Gambel Oak	Major component of the site (typically >5% cover).

Vegetation Type Code	Vegetation Community Type Name*	Description
QUTU	Live Oak	Major component of the site (typically >5% cover).
SYOR	Snowberry	Major component of the site (typically >5% cover).
AMAL	Serviceberry	Major component of the site (typically >5% cover).
PUTR	Bitterbrush	Major component of the site (typically >5% cover).
PUGL	Desert Bitterbrush	Major component of the site (typically >5% cover).
ARCT2	Manzanita	Major component of the site (typically >5% cover).
CEMOM	True Mountain Mahogany	Major component of the site (typically >5% cover).
CELEL	Curlleaf Mountain Mahogany	Major component of the site (typically >5% cover).
COMES	Stansbury Cliffrose	Major component of the site (typically >5% cover).
KOPR	Forage Kochia	Major component of the site (typically >5% cover).
TAMARIX	Tamarix	Major component of the site (typically >5% cover).
MMB	Mixed Mountain Brush	Mixture of one or more Mountain brush species (ARTRV, AMAL, CEMOM, etc.) with no one species expressing dominance.
MB	Mixed Shrub	Mixture of various shrub species with none expressing dominance.
CHAPARRAL	Chaparral	Mixture of fire tolerant shrub species.
JUNIPER	Juniper	Major component of the site (Phase III[1]). No pinyon present.
PINYON	Pinyon	Major component of the site (Phase III[1]). No juniper present.
PJ	Pinyon-Juniper	Major components of the site (Phase III[1]). Pinyon and Juniper present.
POTR	Quaking Aspen	POTR provides the dominant overstory (typically >5% cover).
POTR-CE	Quaking Aspen-Conifer Encroached	Mixture of QUGA and Conifers (conifers typically provide >5% cover).
PIPO	Ponderosa Pine	PIPO provides the dominant overstory (typically >5% cover).
PSMEM	Douglas Fir	Major component of the site (typically >5% cover).
ABCO	White Fir	Major component of the site (typically >5% cover).
PIFL	Limber Pine	Major component of the site (typically >5% cover).
PICO	Lodgepole Pine	Major component of the site (typically >5% cover).
PILO	Bristlecone Pine	Major component of the site (typically >5% cover).
PIEN	Engelmann Spruce	Major component of the site (typically >5% cover).
ABLA	Subalpine Fir	Major component of the site (typically >5% cover).
SUBALP	Subalpine Forest	Mixture of PIEN and ABLA provide the dominant vegetation cover
MIX CON	Mixed Conifer Forest	Mixture of conifer tree species provide the dominant vegetation cover
AG-PAST	Agricultural-Pasture	Active or abandoned agricultural pasture
AG-CL	Agricultural-Cropland	Active or abandoned agricultural cropland

*Vegetation types can be co-dominant on the study site and when more than one vegetation community types are co-dominant and are major components of the site a (/) is used to separate vegetation community types.
[1]Phase of woodland succession