

UTAH WATERSHED RESTORATION INITIATIVE VEGETATION MONITORING 2020



PUBLICATION NUMBER 21-10
REPORT FOR FEDERAL AID PROJECT W-82-R-65

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE RESOURCES

Utah Watershed Restoration Initiative Vegetation Monitoring 2020

Written and Edited by

Jason Lane
Ciaran Payne
Jason Cox

Tables prepared by

Jason Cox
Ciaran Payne
Jason Lane

Data Collection by

Jason Cox	Luke McCarty
Ciaran Payne	Sophie Behling
Jason Cox	Savanna Johnston
Dallin Morgan	Justice Worwood
Sydney Shuler	Evan Rees
Robert Hadfield	Kierstin McClintock

Cover Photo Credit

Utah Sweetvetch (*Hedysarum boreale*) and Desert Black Swallowtail (*Papilio polyxenes coloro*) by Jason Cox (2020)

Performance Report for Federal Aid Project W-82-R-65

Publication No. 21-10

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

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

PROGRAM NARRATIVE

State: UTAH

Project Number: W-82-R-65

Grant Title: Wildlife Habitat Research and Monitoring

Project Title: Wildlife Habitat Monitoring/Range Trend Studies

Need: The ability to detect changes in vegetation composition (range trend) on big game winter ranges is an important part of the Utah Division of Wildlife Resources (UDWR) big game management program. The health and vigor of big game populations are closely correlated to the quality and quantity of forage in key areas. The majority of the permanent range trend studies are located on deer and elk winter ranges, however on certain management units, studies are located on spring and/or summer ranges, if vegetation composition on these ranges is the limiting factor for big game populations. Range trend data are used by wildlife biologists for habitat improvement planning purposes, reviewing Bureau of Land Management (BLM) and United States Forest Service (USFS) allotment management plans, and as one of several sources of information for revising deer and elk herd unit management plans. Range trend data may also be gathered where habitat information is necessary for other wildlife species such as greater sage-grouse.

Objective: Monitor, evaluate, and report range trend within designated key areas throughout the state, and inform DWR biologists, public land managers and private landowners of significant changes in plant community composition in these areas.

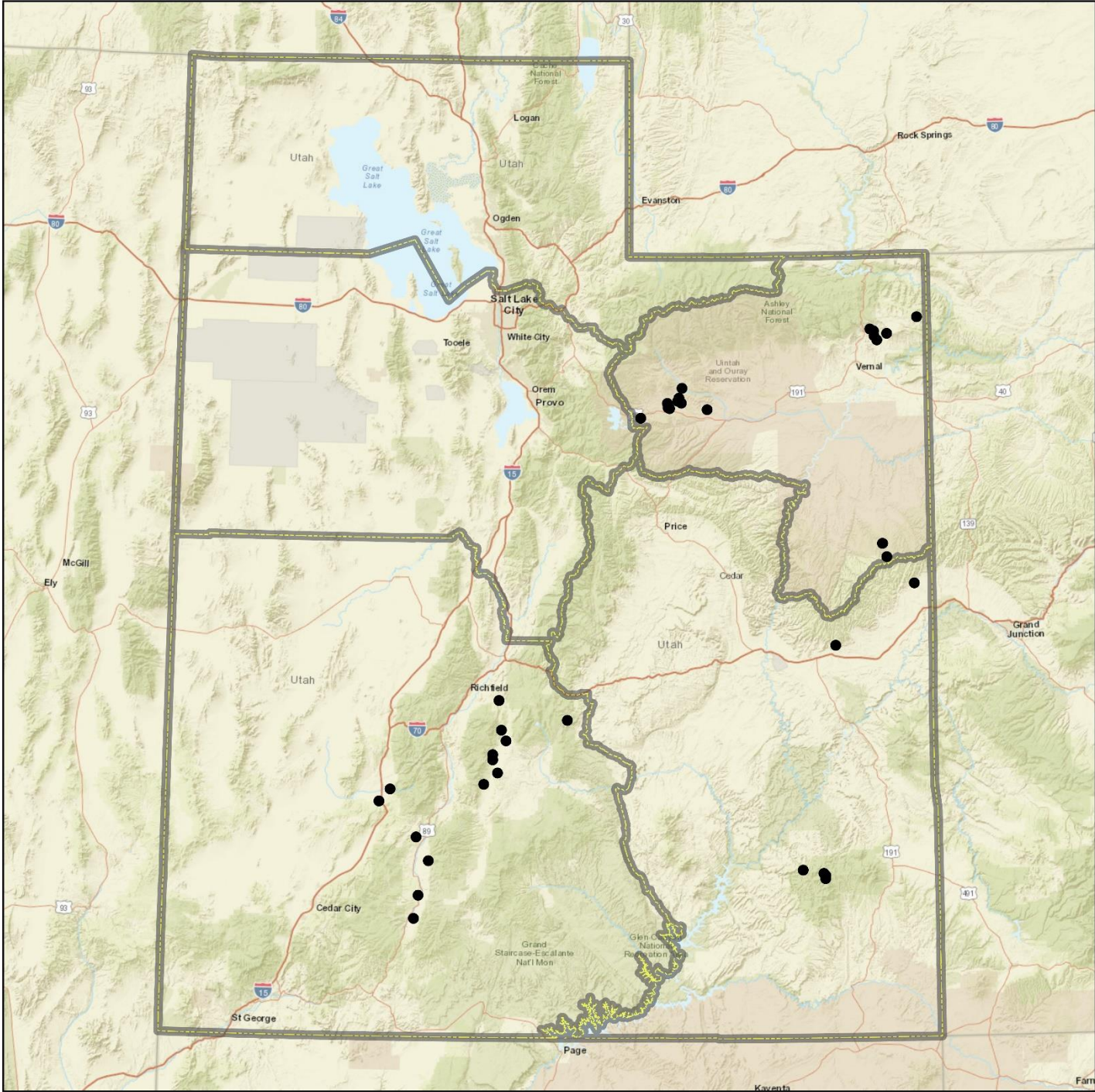
Expected Results or Benefits: Range trend studies in each region will be reread every five years, and vegetation condition and trend assessments will be made for key areas. UDWR biologists, land management personnel from the USFS and BLM, and private landowners will use the range trend database to evaluate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

REMARKS

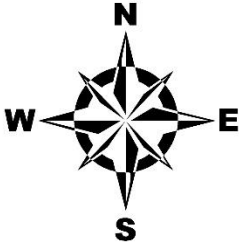
The work completed during the 2020 field season and reported in this publication is vegetation monitoring data of habitat restoration projects initiated as part of the Watershed Restoration Initiative, which occurred throughout the state of Utah.

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 SITES SURVEYED IN 2020

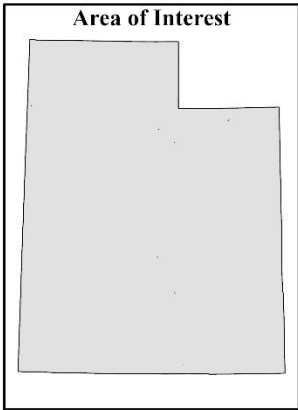


0 15 30 60 90 120 150 180 210 240 Miles



Study Location

- WRI
- ▭ Region Boundaries



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

RANGE TREND STUDY METHODS

Studies monitoring range trend depend greatly on site selection, especially when dealing with large geographic areas such as wildlife management units. Since it is impossible to intensively monitor all vegetation or habitat types within a unit, it is necessary to concentrate on specific sites and/or “key” areas within distinct plant communities on big game ranges. These “key” areas should be places where big game has demonstrated a definite pattern of use during normal climatic conditions over a long period. Trend studies are located within these areas of high use and/or crucial habitat as agreed upon by DWR, BLM, and USFS personnel. Often, range trend studies are established in conjunction with permanently marked pellet group transects. Once a “key” area has been selected, specific placement for sampling is determined. The sampling grid is carefully placed in order to adequately represent the surrounding area. Half-high steel fence posts or similar material permanently marks all sampling baselines. The first, or “0-foot baseline stake”, is marked with a metal tag for proper identification of the transect.

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

Vegetation Composition

Vegetation composition is determined by setting up five consecutive 100 foot transects in the area of interest. This 500-foot line is the baseline and one 100-foot belt is placed perpendicular to each 100-foot section of the baseline at predetermined footmarks and centered on the 50-foot mark of the belt. A rebar stake is placed at the beginning of each belt to ensure that future sampling is in consistent alignment with the originally sampled belt. A 1/4 m² quadrat is centered every 5 feet along the same side of the belt, starting at the 5-foot mark. Cover and nested frequency values are determined for vegetation, litter, rock, pavement, cryptogams, and bare ground. Cover and nested frequency values are also estimated for all plant species occurring within a quadrat, including annual species. However, prior to 1992 no data was collected for annual species.

Percent Cover: Cover is determined using an ocular cover estimation procedure using seven cover classes (Bailey and Poulton, 1968; Daubenmire, 1959). The seven cover classes are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, and 7) 95.1-100% (Figure 1). For example, to estimate vegetation cover with this method, an observer would visualize which cover class all the vegetation would fit into if the plants were moved together until they were touching. To quantify percent cover for bare ground, litter, rock, pavement, and cryptogams, the observer would visually estimate which cover class could accommodate all of the specified cover type within the quadrat. These numbers are then recorded. To determine percent cover for each belt, the midpoint for each cover class value observed is summed and divided by the number of sampling quadrats (20). The mean for the five belts is the percent cover for a given site.

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

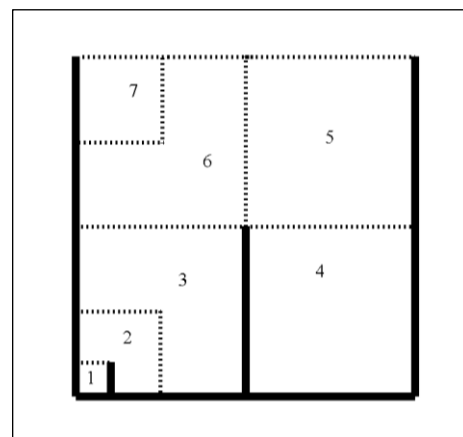


Figure 1 Cover classes of the 1/4 m² sampling quadrat

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

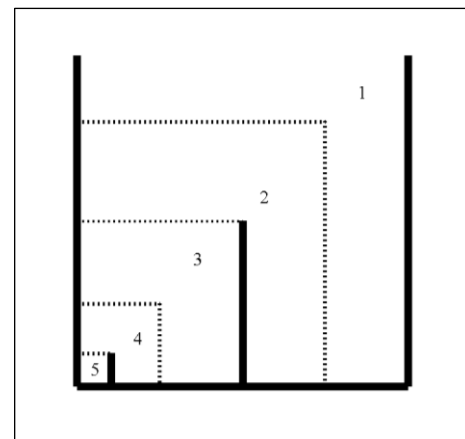


Figure 2 Nested frequency sub-quadrats of the 1/4 m² sampling quadrat.

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

Shrub Density & Characterization: Shrub densities are estimated using five, 1/100th acre strips centered over the length of each 100-foot belt. All shrubs rooted within each strip are counted and categorized using a modified Cole Browse Method (U.S. Department of Interior Bureau of Land Management, 1999):

Seedling:	Plants up to three years old, which have become firmly established, usually less than 1/8-inch diameter.
Young:	Larger with more complex branching. Does not show signs of maturity. Usually between 1/8 and 1/4-inch diameter.
Mature:	Complex branching, rounded growth form, larger size, seed is produced on healthy plants. Generally larger than 1/4-inch diameter.
Decadent:	Plant, regardless of age, that is in a state of decline, usually evidenced by 25% or more dead branches.
Dead:	A plant that is no longer living.

Data Collection for Aspen Density by Size Class: Starting in 2011, aspen density was estimated using an aspen classification method by Jones, Burton, and Tate (2005). All aspen stems within 67 cm of each side of 100 ft distance tape are counted and recorded in the following size classes:

Size Class I:	less than or equal to 1.5 feet (18 inches). Scan as <i>Seedling</i> This class size represents the annual or recent recruitment of suckers due to suckering at root buds.
Size Class II:	greater than 1.5 feet to 5 feet. Scan as <i>Young</i> This class size represents the survival of suckers and the progression of recruitment of existing suckers that are vulnerable to browsing of the terminal leader.
Size Class III:	greater than 5 feet and up to 1 inch dbh. Scan as <i>Mature</i> This class size represents the aspen regeneration grown above the height range that is vulnerable to browsing; the minimum height for size class III represents the maximum browse line height for herbivores present.
Size Class IV:	greater than 1 inch dbh. Scan as <i>Decadent</i> Class IV captures information for all remaining cohorts in the plot.

Shrubs are also rated according to their availability and the amount of use they display, and placed in one of nine form classes:

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

Lightly hedged*: 0 to 40 percent of twigs browsed.

Moderately hedged*: 41 to 60 percent of twigs browsed.

Heavily hedged*: Over 60 percent of twigs browsed.

Largely available: One-third to two-thirds of plant available to animal.

Mostly unavailable: Less than one-third of plant available to animal.

Unavailable: In classifying browse to a form class, unavailability may be the result of height, location, or density.

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

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

1. Normal and vigorous.
2. Insect infested or diseased.
3. Poor vigor
4. Dying

Poor vigor: chlorotic or discolored leaves, smaller than normal stems or leaves, flowering restricted, partially trampled, pulled up, or otherwise damaged. Stunted growth, partial crown death.

Dying: substantial portion of crown dead (more than 50%), more extreme than 3 above. Probably an irreversible condition.

In addition, each mature shrub species closest to every 10-foot mark along a sampling belt is measured to determine average height and crown. This allows a maximum sample of 50 plants per species to be measured at a given site depending on their respective densities.

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

Animal Occupancy: The pellet group transect utilizes (50) 100ft² circular plots that are placed through the study area. These are usually two parallel transects of 25 plots on each side of the vegetation transect which runs 400 feet to 500 feet in length. The number of recent pellet groups for wildlife (usually deer and elk) and pats for cattle are recorded. That number is then converted to days use per acre (hectare) (Neff, 1968). Quadrat frequency of wildlife and livestock droppings is also captured within the 1/4 m² quadrat. Rabbit pellet groups are not included in the pellet group transects but are sampled in quadrat frequency.

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

reports.

Trend Determination

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

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

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

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

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

Preferred Browse (60 points)

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

Preferred Browse Cover (30 pts. possible)

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

Percent Decadence (15 points possible)

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

Percent Young (15 points possible)

- 0.5 points for each 1% of young

Herbaceous Understory (40 points)

Perennial Grass Cover (30 points possible)

- 2 points for each 1% cover

Perennial Forb Cover (10 points possible)

- 2 points for each 1% cover

Annual Grass Cover (-20 points possible)

- -0.75 points for each 1% cover

Noxious Weeds (State List)

- -2 points for each species present

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

Very Low potential scale (Desert Ecological Site)

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

Low potential scale (Semidesert Ecological Site)

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

Mid-level potential scale (Upland Ecological Site)

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

High potential scale (Mountain and High Mountain Ecological Site)

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

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

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

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

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

REPORT FORMAT

The first page of the report is the map page, which has a topographic map and a diagrammatic sketch to illustrate the study location. The map page also contains three sections, *Location information*, *Transect Information* and *Directions to Site*, which contain directions, location, and transect setup descriptions. Following the map page, discussions of the study site are addressed by several topics including *Site Information*, *Wildlife Habitat and Vegetation History*, *Site Notes*, *Soils*, *Site Potential*, and "Trend Summary" tables. Site information contains geographic information such as land ownership, allotment, elevation, aspect, slope, and sample dates. *Disturbance History* contains all known disturbances that have occurred on the site. Known seed mixes are listed within the table named "Seed Mix." *Habitat and Vegetation Information* contains wildlife habitat that the site falls within for specific big game and other species of interest. *Vegetation History* follows *Wildlife Seasonal Habitat* and evaluates any major compositional transitions within the vegetation community. Site notes discuss any miscellaneous information as it relates to the site and immediate area. Site potential presents a table containing average annual precipitation, NRCS taxonomic soil classification, NRCS ecological site, and NRCS ecological site number. If available, the name of the NRCS ecological site will be hyperlinked to the NRCS' website for additional features concerning ecological site. The table titled "Soil Analysis Data" presents texture and chemical characteristics found on the site. The *States and Transitions* portion states if the site has a defined state and transition model available and is followed by, if available, descriptions of any state or phase transitions that have occurred on the site as it relates to the State-and-Transition diagram modeled by the NRCS. Additional assessment is made by comparing photographs from year to year which can be referred to in the accompanying CD or webpage <http://wildlife.utah.gov/range-trend.html>.

The "Trend Summary" tables contain compiled vegetation data for each site. A computer-generated data summary presents the pooled data for nested frequency, quadrat frequency, basic ground cover, soil characterization, shrub density, and shrub characterization.

Report Description

The following tables and partial tables are examples from study numbers 09-01 and 11B-06.

Map Page

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

Site Information

Table 1: The “Disturbance History” table summarizes what type of treatments and/or disturbances have affected the site over 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 09-01.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Herbicide	Taylor Mountain Fire Rehabilitation	3182	Fall 2014	2200
Chaining - Two-Way Ely Chain	Taylor Mountain Fire Rehabilitation	3182	Fall 2014	1100
Seeding - Rangeland Drill	Taylor Mountain Fire Rehabilitation	3182	October 2014	2000
Hand Crew - Lop and Scatter	Steinaker Draw PJ (CCI)	28	September 2015	266
Seeding - Aerial After	Taylor Mountain Fire--BLM ESR Supplement	3207	December 2014	2019
Fire - Wildfire	Taylor Mountain Road	-	July 2014	3146.98

Table 2: The “Seed Mix” tables are included when a seed mix is made available and are referenced to a particular WRI project. Additionally, multiple seed mixes are often associated with one particular treatment and are combined to simplify the appearance of the report.

Table 09-01.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name		Application Type	Application Date	Acres	
Taylor Mountain fire; drill seed mix		Drill	Oct 2014	200	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acr
G	Achnatherum hymenoides	Indian Ricegrass		0.50	0.00
G	Agropyron cristatum	Crested Wheatgrass		1.00	0.00
G	Agropyron fragile	Siberian Wheatgrass		1.00	0.00
F	Medicago sativa	Alfalfa		1.00	0.00
F	Onobrychis viciifolia	Sainfoin		4.00	0.00

Mix Name		Application Type	Application Date	Acres	
Taylor Mountain Fire Sage/Kochia		Aerial	Dec 2014	2020	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS lbs/acr
	Bassia prostrata	Forage Kochia	Millard UT	0.99	0.83
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Uintah UT	1.22	0.15
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.26	0.05

Habitat and Vegetation Information

Table 3: The “Wildlife Seasonal Habitat” table is a summarization of habitat for big game and other species of interest, and further categorizes the habitat into seasonal range and a value description of the habitat for the allied species.

Table 09-01.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Deer	crucial	winter
Elk	crucial	winter

Table 4: The “Vegetation History” table summarizes what major vegetation types have occurred on the site over the duration of the study. Ranges of sample years provide the length of time that the dominant vegetation type has persisted on the site with its corresponding species listed in the adjacent cell. Most vegetation types will have one dominant species listed: this is usually a shrub species (Appendix A - Vegetation Type). For example, some sites will have a shrub canopy that dominates the site with a perennial herbaceous understory that has similar average cover as the canopy, but occurs infrequently. In this case, precedence is given to the shrub layer. Vegetation type can also be shared in the case of co-dominance. Using the example above, if the herbaceous understory had a higher cover, then the shrub layer would likely share the vegetation type with the perennial understory. The history of pinyon-juniper encroachment is characterized within the table stating the phase(s) of succession and the corresponding years of persistence. Phases of woodland succession may also influence the vegetation type. For example, pinyon-juniper encroachments in phase I are not considered co-dominant and may not be listed within the vegetation type column as they are 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 09-01.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

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

Site Notes

This section contains miscellaneous information pertinent to the study site.

Soils

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

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

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

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

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

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

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

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

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

Site Potential

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

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

Trend Summary Tables

Table 6: The “Shrub/Tree Summary” table summarizes percent average quadrat cover and percent average line intercept cover for all shrub and tree species occurring on the site. Average quadrat cover is determined using cover classes in conjunction with the 1/4m² quadrat to estimate percent quadrat cover. To more accurately estimate canopy cover of trees and shrubs, the line-intercept method is used along each 100-foot belt.

Table 09-01.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees.

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1995	21.2	4.1	-	-	-	-
2000	20.0	2.1	-	-	-	-
2005	14.8	0.2	-	20.1	0.8	-
2010	16.3	0.2	-	17.6	0.6	-
2015	-	-	-	-	-	-

Table 7: The “Herbaceous Summary” table summarizes the total average cover for all grass and forb species and summarizes the nested frequency by life form.

Table 09-01.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups.

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1995	408	133	300	69	7.5	1.7	1.7	0.3
2000	356	99	121	8	7.0	1.2	0.4	0.0
2005	485	62	170	13	21.4	0.8	0.8	0.1
2010	405	78	136	9	17.6	1.6	1.6	0.2
2015	192	180	178	114	17.1	4.2	21.8	3.1

Table 8: The “Basic Ground Cover” table summarizes average cover of vegetation, rock, pavement, litter, cryptogams, and bare ground. Vegetation crown cover estimates are projected vertically while the remaining cover types’ cover estimates are a planar projection and when combined will usually exceed 100%. Therefore, comparisons can be made for all cover measurements except for general vegetation cover.

Table 09-01.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1995	21.0	15.9	43.5	0.0	0.0	34.0
2000	25.8	18.3	43.0	0.1	-	30.1
2005	16.3	14.2	44.7	0.1	0.0	37.3
2010	20.7	9.7	56.5	-	0.0	36.5
2015	72.9	0.0	14.4	2.0	0.0	36.2

Table 9: The “Pellet Group Data” table summarizes the frequency of animal pellets sampled within the 100 quadrats placed along the sampling belts as well as data from a pellet group transect read parallel to the study site baseline. Quadrat frequency of rabbit or big game pellets indicates a relative amount of presence by a particular animal. This data can help characterize changes in wildlife occupancy patterns on a site.

The data presented in the “Days Use per Acre” section of the table is reported from the pellet group transect in conjunction with the vegetation transects. The pellet group transect utilizes 50 100ft² circular plots that are placed in the study area: these are usually two parallel transects of 25 plots on each side of the vegetation transect which runs 400 feet to 500 feet in length. The number of recent pellet groups for wildlife (usually deer and elk) and pats for cattle are recorded. That number is then converted to days use per acre (hectare) (Neff, 1968). Animals that do not have a defined defecation rate are recorded as pellets per acre (ha) and are indicated by (*). Rabbit pellet groups were recorded in a few of the years close to the year 2000, but have not been sample within the transect since that time; these are also recorded as pellets per acre (ha).

Table 09-01.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Elk	Rabbit
	Quadrat Frequency				
1995	-	-	47	2	14
2000	1	-	30	1	65
2005	1	-	29	1	90
2010	-	-	40	2	28
2015	-	-	4	-	15
Year	Days Use Per Acre (ha)				
1995	-	-	-	-	-
2000	0.7 (1.8)	-	45.6 (112.6)	-	400.8 (989.9)*
2005	2.2 (5.4)	8.7 (21.5)*	59.0 (145.7)	-	-
2010	-	-	65.0 (160.6)	6.0 (14.9)	-
2015	-	-	8.7 (21.5)	-	-

*Pellets per acre (ha)

Table 10: The “Grass Species” table summarizes the average cover and nested frequency for grass species. Species may be designated as annual species, noxious weeds, and/or introduced species by the associated symbol below the graph. Only species that are on the Utah Noxious Weed List are designated as a noxious weed.

Table 09-01.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus briziformis ^{ai} (rattlesnake brome)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Poa fendleriana (nuttongrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency										
1995	-	-	-	294	26	61	3	53	18	-	290
2000	-	-	-	345	4	16	2	47	52	-	35
2005	-	-	-	476	10	16	5	25	16	-	292
2010	4	-	-	405	2	4	11	7	56	-	-
2015	85	56	5	160	-	26	5	-	30	4	50
year	Average Cover (%)										
1995	-	-	-	5.6	0.2	0.3	0.1	0.7	0.4	-	1.8
2000	-	-	-	6.9	0.0	0.1	0.0	0.4	0.6	-	0.1
2005	-	-	-	19.1	0.1	0.1	0.0	0.5	0.1	-	2.3
2010	0.0	-	-	17.6	0.0	0.0	0.1	0.2	1.2	-	-
2015	1.8	0.9	0.0	16.6	-	0.5	0.4	-	0.5	0.0	0.5

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

Table 11: The “Forb Species” table summarizes the average cover and nested frequency for forb species. Species may be designated as annual species, noxious weeds, and/or introduced species by the associated symbol below the graph. Only species that are on the Utah Noxious Weed List are designated as a noxious weed.

Table 09-01.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium (onion)	Alyssum alyssoides ^{ai} (pale madwort)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Astragalus (milkvetch)	Calochortus nuttallii (sego Lily)	Chaenactis (pincushion)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cleome serrulata ^a (Rocky Mountain beaplant)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha ^a (annual cryptantha)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum ^a (nodding buckwheat)	Gilia ^a (gilia)
year	Nested Frequency																
1995	-	11	-	4	-	2	2	17	-	3	-	18	103	-	8	2	16
2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	7
2005	-	-	-	-	2	2	-	-	-	8	-	7	11	-	2	-	-
2010	-	-	-	-	-	-	-	-	-	-	-	1	4	-	-	-	2
2015	1	-	25	-	-	2	-	-	22	-	11	-	60	1	-	-	8
year	Average Cover (%)																
1995	-	0.0	-	0.0	-	0.0	0.0	0.0	-	0.0	-	0.1	0.3	-	0.0	0.0	0.0
2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	0.0
2005	-	-	-	-	0.0	0.0	-	-	-	0.0	-	0.0	0.1	-	0.0	-	-
2010	-	-	-	-	-	-	-	-	-	-	-	0.1	0.0	-	-	-	0.0
2015	0.0	-	2.0	-	-	0.0	-	-	2.2	-	0.2	-	8.2	0.0	-	-	0.7

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

Table 12: The “Shrub and Tree Species” table summarizes the quadrat average and line intercept cover for shrub and tree species. Species may be designated as tree species, preferred browse, and/or introduced species by the associated symbol below the graph. Preferred browse species are determined by Range Trend staff.

Table 09-01.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus (yellow rabbitbrush)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
1995	-	-	-	-
2000	-	-	-	-
2005	20.1	0.8	-	-
2010	17.6	0.4	-	0.2
2015	-	-	-	-
year	Quadrat Cover (%)			
1995	21.2	4.0	0.1	-
2000	20.0	2.1	-	-
2005	14.8	0.2	-	0.0
2010	16.3	0.0	-	0.2
2015	-	-	-	-

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

Table 13: The “Shrub/Tree Characteristics” table summarizes shrub and tree species by density, age class distribution, utilization, poor vigor, and average height/crown.

Table 09-01.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding	Seedling	Young	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
1995	4360	120	8	77	15	39	8	6	83/107
2000	5440	40	1	34	65	28	3	25	74/78
2005	4360	3280	12	26	62	9	30	30	92/94
2010	3080	-	3	65	32	34	1	29	88/106
2015	-	-	-	-	-	-	-	-	-/-
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
1995	1000	-	6	86	8	0	0	2	60/81
2000	1020	20	8	65	28	0	0	12	46/56
2005	320	40	13	63	25	0	0	6	46/48
2010	120	-	0	50	50	0	0	50	49/65
2015	-	-	-	-	-	-	-	-	-/-

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

Table 13a: The “Aspen Characteristics” table summarizes characteristics of the aspen community. Only aspen that was sampled using the size class distribution method is included in this table. Aspen sampled using the modified Cole Browse method is included in the “Browse Characteristics” table. Density is reported for the aspen population and is characterized by age class distribution, which is further subdivided into its corresponding age class demographics; this method was started in 2011. Aspen data prior to 2011 is included in Table 13.

Class I:	Trees are less than or equal to 1.5 ft tall
Class II:	Trees are greater than 1.5 ft to 5 ft
Class III:	Trees are greater than 5ft and up to 1 in. dbh
Class IV:	Trees are greater than 1 in. dbh

The aspen population is then characterized by utilization, which is subcategorized by percentages of moderate and heavily hedged plants, and concluded with the percentage of plants displaying poor vigor.

Table 11B-06.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2015	1620	10	62	20	9	27	11	1

- Class I - Less than or equal to 1.5 feet
- Class II - Greater than 1.5 feet to 5 feet
- Class III - Greater than 5 feet and up to 1 inch diameter at breast height (dbh)
- Class IV - Greater than 1 in diameter at breast height (dbh)

Table 14: The “Tree Characteristics” table tree density estimates using the point-center quarter method which better estimates density of widely distributed trees than the shrub density strips. Average basal diameter is also listed in centimeters.

Table 11B-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12'	
Abies lasiocarpa (subalpine fir)							
2015	74	-	60	13	-	27	6.4
Pinus flexilis (limber pine)							
2015	6	-	-	50	50	-	6.0
Picea pungens (blue spruce)							
2015	1	-	100	-	-	-	3.0
Populus tremuloides (quaking aspen)							
2015	179	15	55	15	15	-	2.5
Pseudotsuga menziesii (Douglas-fir)							
2015	5	-	50	-	-	50	6.0

2020 BIG GAME RANGE TREND STUDIES - WRI PROJECTS

The following table is a list of big game range trend studies that were read in 2020 which had a Watershed Restoration Initiative (WRI) habitat treatment associated with it. The site report for each of these studies can be found in the “[Utah Big Game Range Trend Studies 2020 Wildlife Management Units 8, 9, 10, 11, 13B, 17B & 17C](#)” which is available on the range trend website, <https://wildlife.utah.gov/range-trends-archives.html>.

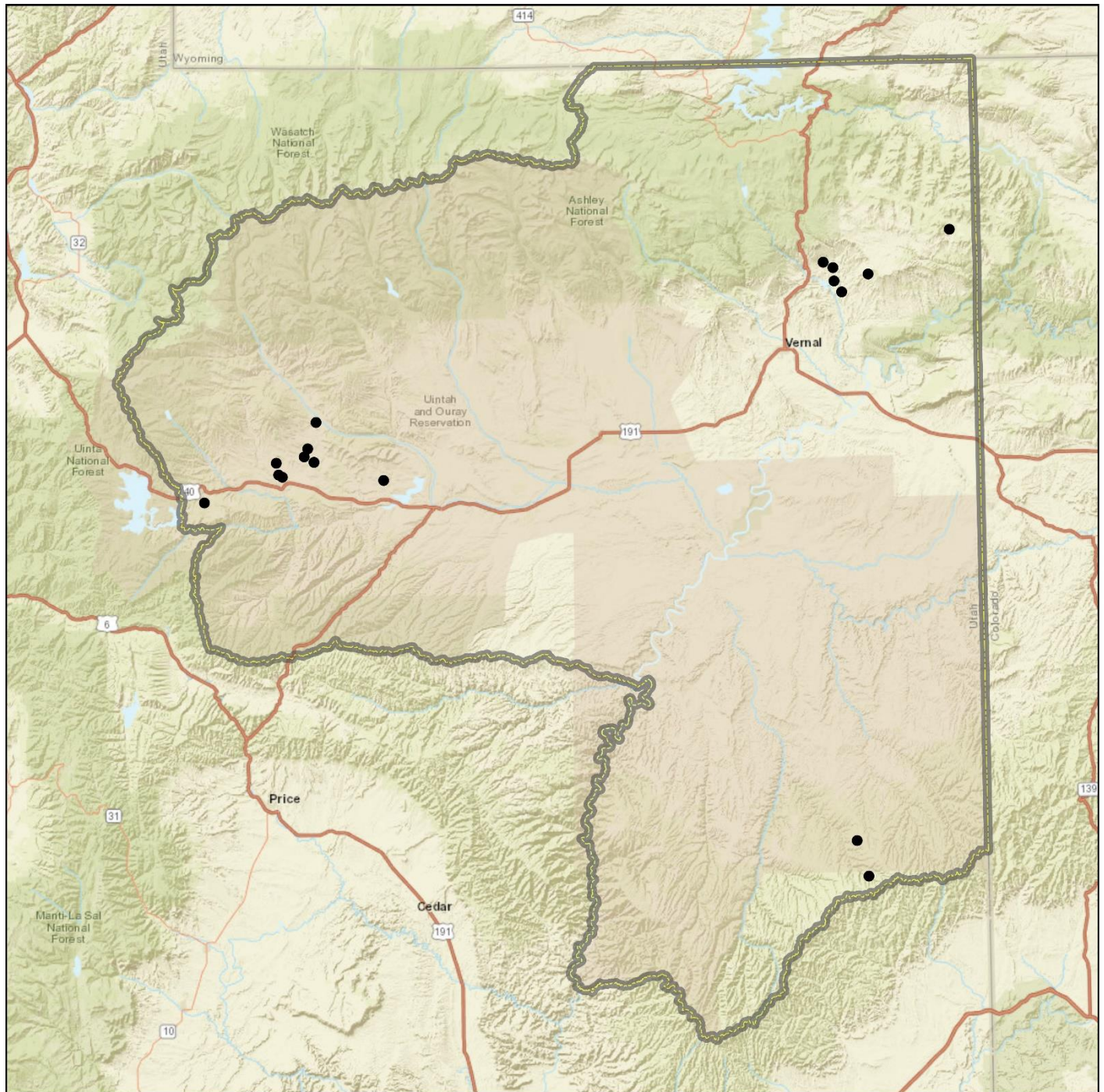
Study #	Study Name	Type	Disturbance Name (If Available)	Date	Acres	WRI Project #
09-1	Red Mountain Allotment	Aerial After	Taylor Mountain Fire--BLM ESR Supplement	December 2014	2,019	3207
		Herbicide Unknown	Taylor Mountain Fire Rehabilitation	Fall 2014	2,200	3182
		One-Way Smooth	Taylor Mountain Fire Rehabilitation	Fall 2014	1,100	3182
		Rangeland Drill	Taylor Mountain Fire Rehabilitation	October 2014	2,000	3182
		Lop and Scatter	Steinaker Draw PJ (CCI)	September 2005	266	28
09-9	Little Hole	Lop and Scatter	Little Davenport Slashing/Lop and Scatter	Fall 2017	946	3782
09-10	Toliver Creek Chaining	Lop and Scatter	Taylor Flat P/J Removal	August 2005	1,040	10
		Lop and Scatter	Diamond Mountain Maintenance Project (Proposed)	Fall 2020	2,916	5105
09-16	Mosby Mountain	Aerial Broadcast	South Slope Vegetation Restoration Phase 2	October 2019	667	4856
09-24	Brush Creek Substation	Rangeland Drill	Brush Creek Bench Seeding	October 2010	408	1659
		Plateau	Brush Creek Bench Sage Restoration	September 2008	279	315
		Aerial After	Brush Creek Bench Sage Restoration	March 2009	279	315
		One-Way Dixie	Brush Creek Bench Sage Restoration	December 2008	279	315
		Broadcast Before	Brush Creek Bench Sage Restoration	December 2008	279	315
09-25	Buckhorn Canyon	Lop and Scatter	Red Fleet Maintenance	September-October 2012	317	2273
09-27	Little Mountain	Lop and Scatter	Dry Fork Hazardous Fuel Project Phase II	August-September 2013	1,842	2789
10-1	Indian Ridge	Lop and Scatter	Seep Ridge Maintenance Lop & Scatter (Proposed)	Fall 2020	3,814	5517
		Rangeland Drill	Indian Ridge Sagebrush	September 2011	218	1952
		Lop and Scatter	Indian Ridge Lop and Scatter	June 2009	1,001	1079
		Plateau	Indian Ridge Sagebrush	October 2011	218	1952
10-2	McCook Ridge Exclosure	Lop and Scatter	Seep Ridge Maintenance Lop & Scatter (Proposed)	Fall 2020	3,814	5517
		Exclosure	Book Cliffs Three-Way Exclosure Reconstruction	August 2010-June 2011		1734
10-3	McCook Ridge Chaining	Bullhog	McCook Ridge P/J Removal	April 2005	520	260
		Lop and Scatter	Seep Ridge Maintenance Lop & Scatter (Proposed)	Fall 2020	3,814	5517
10-4	Wirefence Point	Lop and Scatter	Three Pines L and S	September 2008-March 2009	1,943	1078
10-5	Willow Flat	Lop and Scatter	Cedar Camp Lop and Scatter	May-June 2010	2,042	1337
10-7	Cherry Mesa	Bullhog	Cherry Mesa Bullhog	July 2009	576	1106
10-15	East Thompson Bench	Bullhog	South Book Cliffs Vegetation Improvement Phase 1	November-December 2013	500	2593
		Aerial After	South Book Cliffs Vegetation Improvement Phase 1	January 2014	500	2593
		Aerial Before	South Book Cliffs Vegetation Improvement Phase 1	October 2013	500	2593
10-16	West Horse Pasture	Rangeland Drill	Nash Wash WMA Wildfire Rehab	October-November 2012	81	2480
		Plateau	Nash Wash WMA Wildfire Rehab	October-November 2012	115	2480
17-51	Santaquins Cabin	Lop and Scatter	Coyote Draw Pinyon and Juniper Thinning	Summer 2006	1,240	328
17-55	Lower Horse Ridge	Bullhog	Horse Ridge Bullhog	June 2016	759	3293
17-57	Skitz Canyon	Lop and Scatter	Skitz Canyon Lop and Scatter	November-December 2010	390	1729
17-58	Buck Knoll	Lop and Scatter	Skitz Canyon Lop and Scatter	November-December 2010	390	1729
17-68	Road Hollow	Lop and Scatter	Skitz Canyon Lop and Scatter	Fall 2010	392	1729

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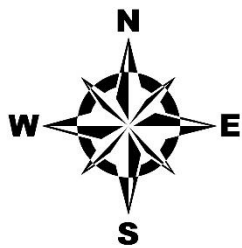
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NORTHEASTERN REGION

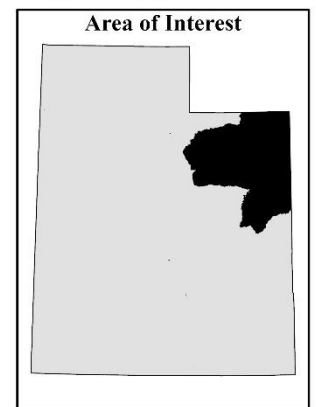


0 5 10 20 30 40 50 60 70 80 Miles



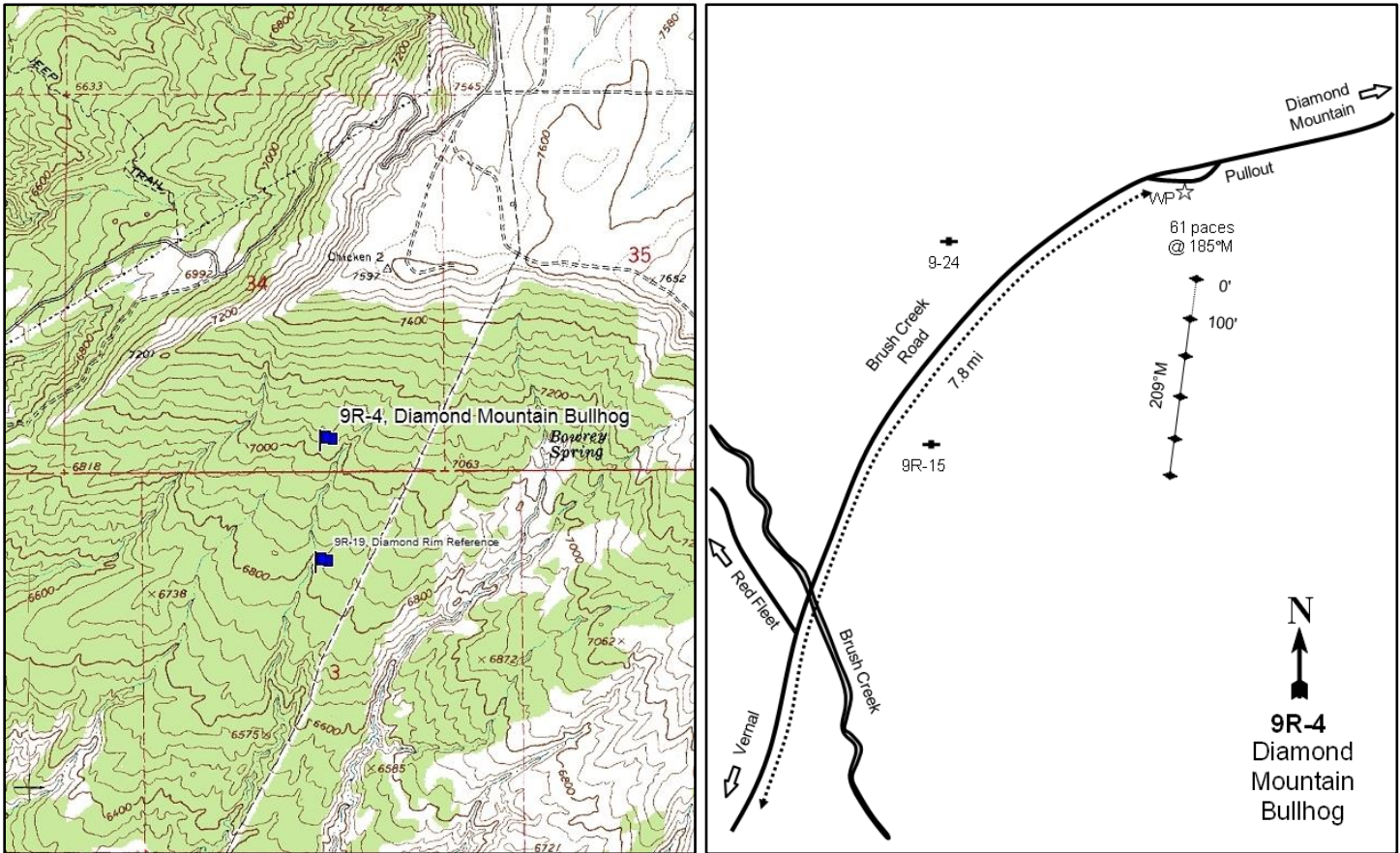
Study Location

- WRI
- ▭ Region Boundaries



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

DIAMOND MOUNTAIN BULLHOG - STUDY NO. 09R-4

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Jensen Ridge NW; Township 2S, Range 23E, Section 34
NAD 83 UTM ZONE 12, 642204 East 4495283 North

Transect Information

Browse Tag # (0' Stake)	133
Transect Bearing	193° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

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

Site Information

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

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Diamond Rim	PDB	September 2004	320
Seeding - Aerial Before	Diamond Rim	PDB	September 2004	320
Seeding - Aerial After	Diamond Rim	PDB	November 2004	320
Hand Crew - Lop and Scatter	Diamond Mountain Maintenance Project (Proposed)	5105	Fall 2020	3000

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

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

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

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

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

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

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

Site Notes

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

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

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

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R034BY320UT
States and Transitions	No state and transition model is available for this ecological site.

This site was dominated by Utah juniper (*Juniperus osteosperma*) when it was established in 2004. Juniper cover was greatly reduced following a bullhog treatment later that year (Table 09R-04.1, Table 09R-04.12) and annual and perennial grasses, particularly cheatgrass (*Bromus tectorum*) and squirreltail (*Elymus elymoides*), were the dominant vegetation components in 2007 (Table 09R-04.7, Table 09R-04.10). Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and black sagebrush (*A. nova*) increased in abundance and have been the main components of the community since 2009 (Table 09R-04.12, Table 09R-04.13). Utah juniper seedlings have been observed during post-treatment samplings and may indicate that infilling is occurring (Table 09R-04.14).

Trend Summary Tables**Table 09R-04.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	3.0	0.0	16.7	2.3	-	39.0
2007	3.3	-	-	4.6	-	-
2009	6.3	0.0	-	11.9	-	-
2010	8.3	-	-	11.0	-	-
2012	8.7	0.6	-	14.2	0.2	-
2016	15.1	0.0	-	17.0	0.2	-
2020	20.4	0.7	-	21.0	0.4	-

Table 09R-04.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	132	107	3	95	0.8	0.6	0.0	1.2
2007	344	175	30	125	14.0	8.6	0.2	5.8
2009	302	195	51	109	5.4	7.3	1.4	4.0
2010	164	241	103	151	1.5	7.5	1.7	6.1
2012	145	246	29	174	0.7	7.8	0.1	4.6
2016	154	250	47	154	2.9	11.0	0.3	8.3
2020	133	207	19	157	1.6	8.7	0.1	9.1

Table 09R-04.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	15.1	2.4	46.3	9.5	22.9	21.0
2007	3.8	0.0	62.2	2.2	8.6	32.1
2009	2.5	0.0	65.1	2.6	11.3	26.2
2010	3.3	0.0	65.6	2.8	10.1	27.1
2012	2.7	0.0	72.1	1.1	8.2	25.6
2016	1.8	0.0	58.5	2.7	7.9	38.1
2020	1.3	0.0	72.0	1.8	8.5	38.1

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

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

*Pellets per acre (ha)

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

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

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

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

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

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

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

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

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

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

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

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

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

Table 09R-04.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^p -- (black sagebrush)									
2004	2560	180	26	53	21	21	44	7	21/39
2007	1700	860	6	91	4	6	0	1	26/46
2009	-	-	-	-	-	-	-	-	29/49
2010	4340	2520	49	51	0	11	12	1	25/53
2012	3620	200	47	53	1	50	1	0	25/52
2016	3300	40	41	58	2	32	10	5	29/61
2020	4540	-	20	72	8	11	7	10	28/53
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	2020	1460	36	64	0	1	0	0	45/53
2009	-	-	-	-	-	-	-	-	52/66
2010	2900	4980	57	43	1	12	11	6	52/73
2012	2080	5300	39	62	0	73	12	4	58/77
2016	4200	-	54	45	1	20	21	1	51/77
2020	3180	20	30	55	15	19	13	15	57/93

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

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus osteosperma¹ -- (Utah juniper)									
2004	500	20	12	76	12	4	0	0	- / -
2007	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2010	-	20	0	0	0	0	0	0	- / -
2012	-	20	0	0	0	0	0	0	- / -
2016	-	20	0	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	- / -
Opuntia polyacantha -- (plains pricklypear)									
2004	40	-	0	100	0	0	0	0	9/40
2007	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	10/26
2010	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	12/35
2016	20	-	0	100	0	0	0	0	12/18
2020	-	-	-	-	-	-	-	-	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2004	60	-	0	67	33	0	100	33	18/120
2007	40	-	0	100	0	0	100	0	21/139
2009	-	-	-	-	-	-	-	-	26/109
2010	40	-	0	100	0	0	100	0	22/94
2012	40	-	0	100	0	0	100	0	22/132
2016	60	-	0	100	0	100	0	0	30/160
2020	60	-	0	100	0	67	0	0	26/155
Symphoricarpos oreophilus^p -- (mountain snowberry)									
2004	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	27/23
2020	-	-	-	-	-	-	-	-	33/96

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

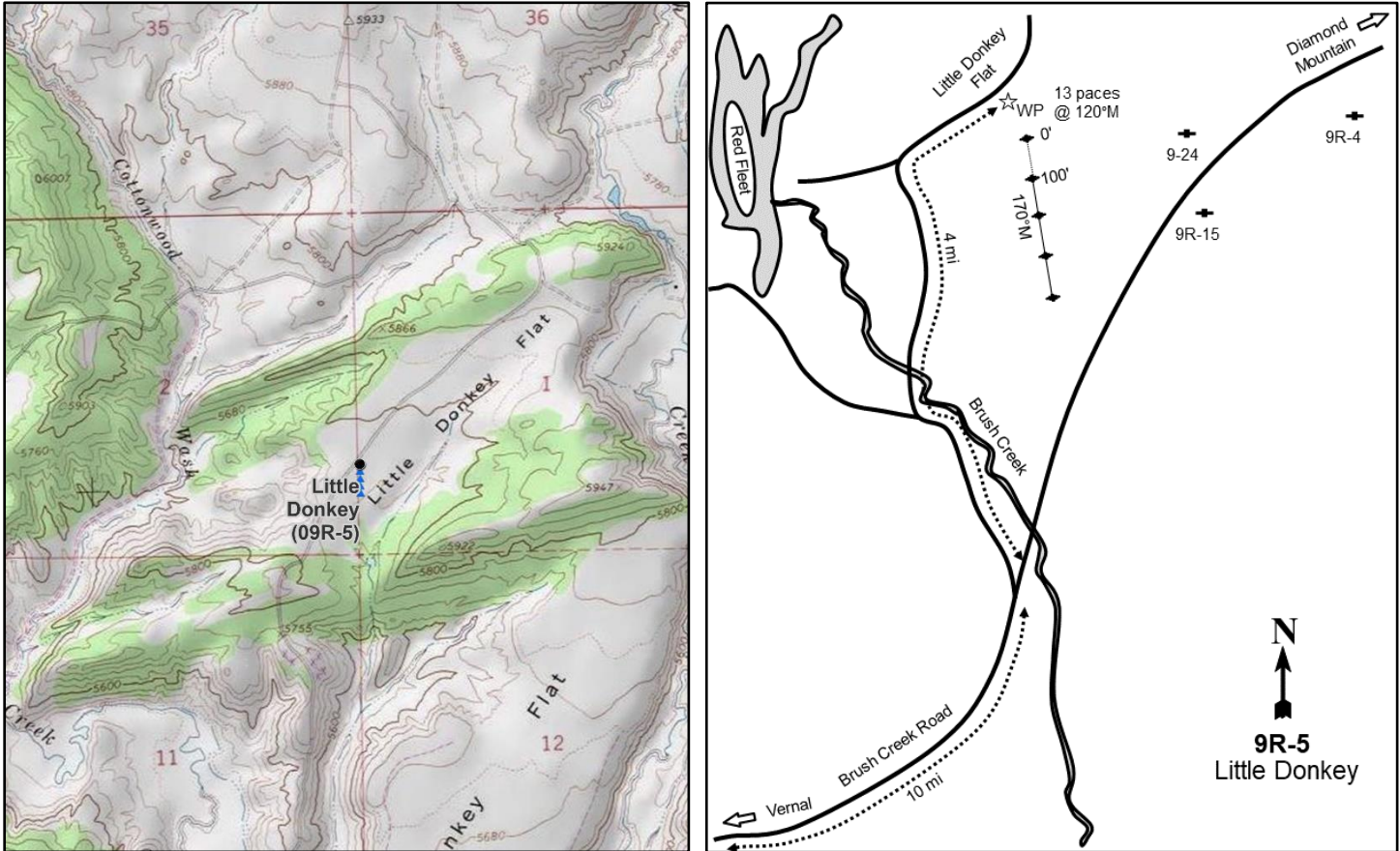
Table 09R-04.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

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

Table 09R-04.15 – Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2004	2.9	0	0	1.3	-0.6	2.3	0	5.8	Very Poor
2007	5.8	0	0	17.3	-10.5	10	0	22.5	Very Poor
2009	14.9	0	0	14.5	-4.1	7.9	0	33.3	Very Poor-Poor
2010	12.5	14.9	15	15.1	-1.1	10	0	66.4	Fair-Good
2012	17.8	14.9	15	15.6	-0.5	9.3	0	72.1	Good
2016	21.3	14.6	15	21.9	-2.2	10	0	80.7	Good-Excellent
2020	26.3	11.8	11.1	17.5	-1.2	10	0	75.5	Good

LITTLE DONKEY - STUDY NO. 09R-5

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Donkey Flat NE; Township 3S, Range 22E, Section 01
NAD 83 UTM ZONE 12, 635070 East 4493818 North

Transect Information

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

120
170° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt 1: No Rebar

Directions to Site

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

Site Information

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

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Roundup	Red Fleet	PDB	October 2004	-
Seeding - Truax Drill	Red Fleet	PDB	November 2004	470

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

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

Wildlife Habitat and Vegetation History**Table 09R-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Rocky Mountain Elk	crucial	winter
Greater Sage-Grouse	occupied	year-long & Winter

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

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

Site Notes

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

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

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

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034XY212UT
States and Transitions	A defined state and transition model is available.

When the study was established in 2004, the plant community was dominated by the perennial grass species crested wheatgrass (*Agropyron cristatum*) which was targeted for reduction in the fall of 2004 (Table 09R-05.1). In 2007, the annual grass sixweeks fescue (*Vulpia octoflora*) along with the annual forb woolly plantain (*Plantago patagonica*) responded with an increase in both cover and abundance and became the dominant plants in the community (Table 09R-05.7, Table 09R-05.10, Table 09R-05.11). In 2011, the community transitioned from one influenced by annuals to a community with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) as the major component. In 2016, forage kochia (*Bassia prostrata*) increased significantly in cover and density (Table 09R-05.6, Table 09R-05.12, Table 09R-05.13); the introduced annual grass cheatgrass (*Bromus tectorum*) was also sampled in high abundance that year (Table 09R-05.10). In 2020, annual and perennial grasses and forbs were found to have decreased substantially in both abundance and cover, while forage kochia remained the dominant component in the community (Table 09R-05.7, Table 09R-05.12). The community appears to be very dynamic and has large population shifts between sample years. With consideration of this variability, it may be difficult to determine outcomes for future land treatment implementations.

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

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	0.4	2.7	-	0.2	2.8	-
2007	2.8	1.0	-	1.9	1.8	-
2012	13.6	1.4	-	12.2	1.4	-
2016	17.5	3.5	-	22.9	4.5	-
2020	15.5	5.2	0.0	19.3	6.1	-

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^p -- (black sagebrush)									
2004	20	-	0	0	100	0	100	100	25/37
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	120	-	17	17	67	33	67	83	-/-
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	80	-	0	75	25	0	100	0	35/58
2007	6440	5380	68	32	0	22	3	0	21/25
2012	10240	60	23	77	0	8	89	74	31/42
2016	5420	20	7	63	30	49	35	31	31/44
2020	3080	20	7	75	18	29	28	23	32/46
Atriplex canescens^p -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	33/43
2016	20	-	0	100	0	0	0	0	65/67
2020	20	-	0	0	100	0	100	100	34/34
Bassia prostrata^{pi} -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	2880	540	24	76	0	24	25	0	12/19
2012	36720	54020	87	13	0	12	40	2	15/19
2016	39700	1600	24	76	0	10	0	0	15/24
2020	45300	160	6	94	0	57	34	3	8/19

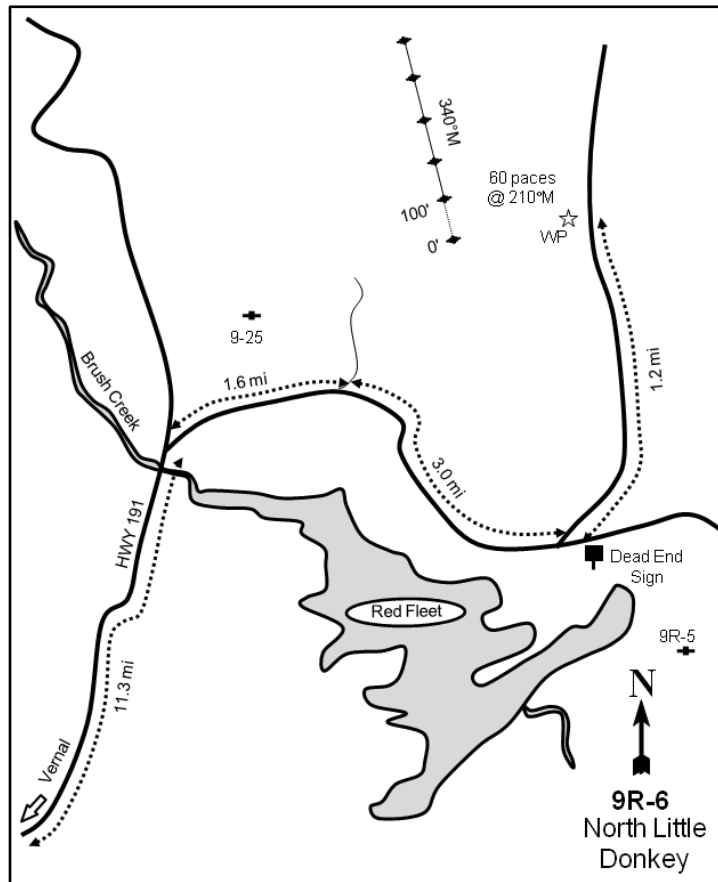
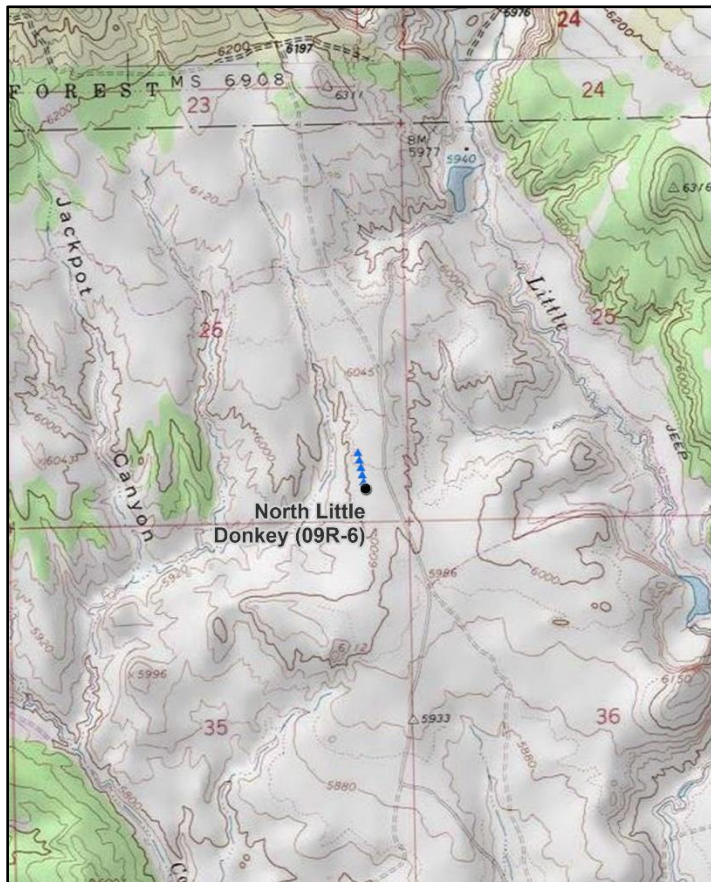
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2004	40	-	0	100	0	0	0	0	10/17
2007	200	20	20	80	0	0	0	0	14/18
2012	-	-	-	-	-	-	-	-	19/28
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	14/26
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	20	-	0	100	0	0	0	0	20/34
2007	100	20	60	40	0	20	0	0	23/27
2012	40	-	0	100	0	100	0	0	41/43
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2004	4520	-	26	74	1	0	0	0	12/15
2007	1800	320	8	68	24	4	0	22	16/21
2012	1860	-	23	77	0	4	8	11	10/14
2016	5680	80	22	79	0	0	0	0	20/19
2020	11340	20	19	78	2	0	0	2	16/17
Juniperus osteosperma¹ -- (Utah juniper)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	20	0	0	0	0	0	0	-/-
Opuntia polyacantha -- (plains pricklypear)									
2004	1260	-	5	91	5	0	0	0	10/45
2007	1000	-	2	54	44	0	0	32	8/31
2012	1220	-	8	90	2	0	0	2	9/30
2016	4380	-	1	99	1	1	0	1	10/39
2020	1060	-	4	94	2	0	0	11	9/56

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

Table 09R-05.15 – Deer Desirable Components Index: Low Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2004	0.3	0	0	30	-4	5.4	0	31.6	Fair
2007	2.4	0	0	3.4	-15.4	1.1	0	-8.5	Very Poor
2012	15	14.9	15	5.9	-1.6	0.7	0	49.9	Good
2016	30	12.2	9.4	10.6	-10.9	0.5	0	51.8	Good
2020	27.4	13.3	3.1	5.4	-3.4	0.2	0	46.1	Fair-Good

NORTH LITTLE DONKEY - STUDY NO. 09R-6



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Donkey Flat NE; Township 2S, Range 22E, Section 26
NAD 83 UTM ZONE 12, 634830 East 4496614 North

Transect Information

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

Directions to Site

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

Site Information

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

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Truax Drill	Red Fleet	PDB	Fall 2004	470

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

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

Wildlife Habitat and Vegetation History**Table 09R-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 09R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Annual Forb	No Encroachment
2007	Perennial Grass	No Encroachment
2012	Perennial Grass	No Encroachment
2016	Perennial Grass/Forage Kochia	Phase I
2020	Perennial Grass/Forage Kochia	Phase I

Site Notes

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

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

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

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034XY212UT
States and Transitions	A defined state and transition model is available.

When the study was established in 2004, this site was dominated by the annual forb flatspine stickseed (*Lappula occidentalis*) with introduced perennial grasses being the subordinate species (Table 09R-06.10, Table 09R-06.11). Since site establishment, browse cover of sagebrush has remained low with little increase. However, excluding the differences between the 2015 and 2020 sample years, forage kochia (*Bassia prostrata*) has had significant increases in cover since its seeding in 2004. Moreover, forage kochia had a significant increase in density in 2020 (Table 09R-06.1, Table 09R-06.12, Table 09R-06.13).

Trend Summary Tables**Table 09R-06.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	1.0	0.0	-	1.1	-	-
2007	1.1	0.0	-	1.3	0.1	-
2012	4.2	0.0	-	4.4	-	-
2016	8.9	0.3	-	11.0	0.7	-
2020	8.2	0.7	-	6.3	0.4	-

Table 09R-06.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	-	207	437	156	-	5.1	19.1	2.2
2007	6	407	337	129	0.0	11.6	3.7	0.5
2012	9	381	30	123	0.0	20.6	0.1	0.6
2016	-	378	17	115	-	23.2	0.0	0.4
2020	2	364	2	87	0.0	18.9	0.0	0.5

Table 09R-06.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	61.9	0.9	17.8	0.5	0.0	28.5
2007	59.8	1.2	31.0	0.1	-	18.9
2012	61.4	0.9	18.8	0.3	-	28.1
2016	53.4	0.2	16.9	0.8	0.0	33.8
2020	56.6	0.3	33.9	0.2	0.4	25.0

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

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

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

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

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

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

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

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

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

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

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

Table 09R-06.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	1720	160	1	26	73	4	97	57	27/45
2007	2440	4040	35	45	20	48	36	18	21/28
2012	3760	80	28	67	5	57	41	48	21/29
2016	2640	1020	14	81	5	65	18	5	23/34
2020	1980	460	20	66	14	20	37	30	26/44
Atriplex canescens^p -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	59/64
2007	-	-	-	-	-	-	-	-	64/81
2012	-	-	-	-	-	-	-	-	52/70
2016	-	-	-	-	-	-	-	-	67/65
2020	-	20	0	0	0	0	0	0	59/60
Bassia prostrata^{pi} -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	2220	2200	41	59	0	3	3	0	10/13
2012	8620	12360	8	92	0	60	34	1	14/18
2016	19520	580	14	86	0	7	5	0	16/28
2020	22260	1400	31	69	0	43	37	1	9/20
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	27/35
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	20	-	100	0	0	0	0	100	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2004	140	-	14	86	0	0	14	0	13/18
2007	220	60	0	46	55	18	0	46	16/24
2012	140	-	0	100	0	0	0	0	13/13
2016	1220	260	38	62	0	0	0	0	23/25
2020	2540	120	6	92	2	0	0	2	14/22
Linanthus pungens -- (granite prickly phlox)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	17/30
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
2004	60	-	0	33	67	0	0	0	9/30
2007	20	-	100	0	0	0	0	0	9/17
2012	-	-	-	-	-	-	-	-	11/24
2016	-	-	-	-	-	-	-	-	10/42
2020	-	40	0	0	0	0	0	0	10/37

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

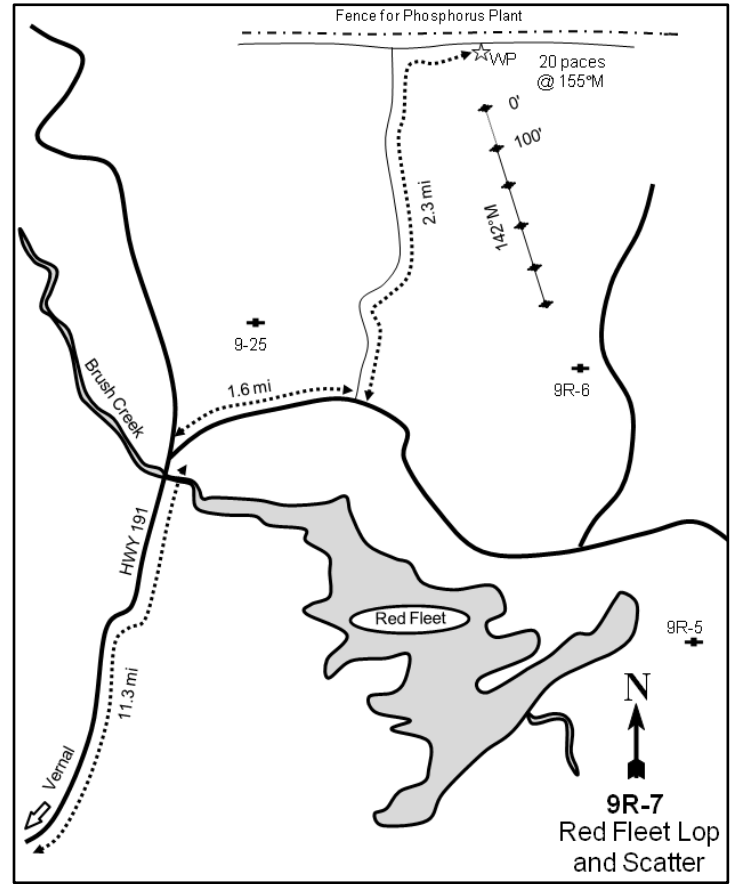
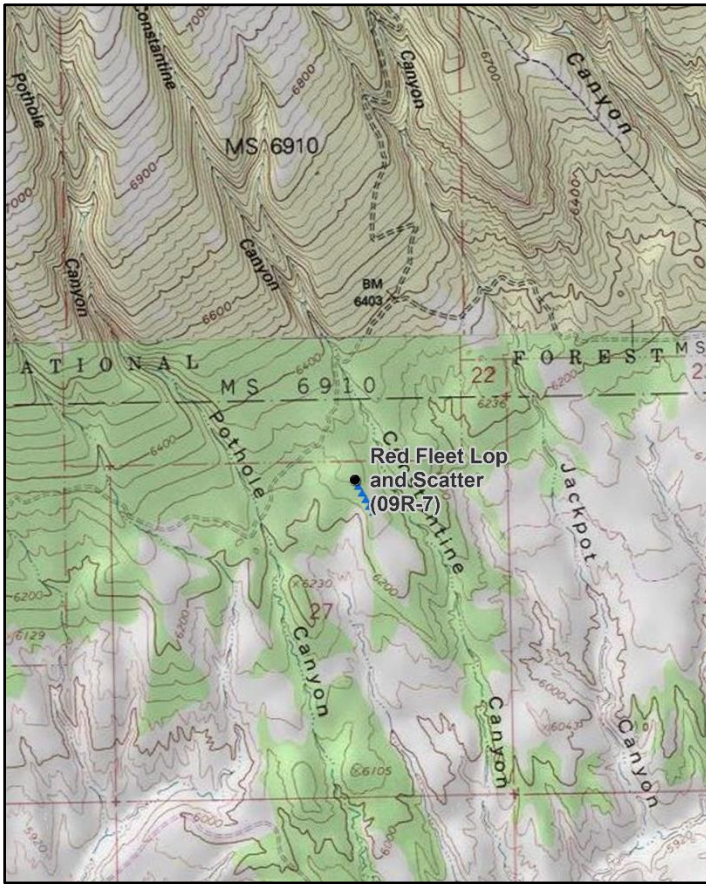
Table 09R-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

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

Table 09R-06.15 – Deer Desirable Components Index: Low Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2004	1.4	0	0	10.3	0	4.4	0	16	Poor
2007	1.7	0	0	23.3	0	1.1	0	26.1	Poor-Fair
2012	6	0	0	30	0	1.1	0	37.1	Fair
2016	15.7	14.5	7	30	0	0.8	0	68	Excellent
2020	9	13.7	13.9	30	0	0.9	0	67.6	Excellent

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



Location Information

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

Transect Information

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

Directions to Site

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

Site Information

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

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Red Fleet Phase II/Maintenance	2273	Fall 2012	300
Chaining - Chain Unknown	-	-	1960s or 70s	-
Hand Crew - Lop and Scatter	Red Fleet Lop and Scatter	PDB	Fall 2004	-
Hand Crew - Lop and Scatter	Diamond Mountain Maintenance Project (Proposed)	5105	Fall 2020	2916

Wildlife Habitat and Vegetation History**Table 09R-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 09R-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Perennial Grass	Phase I
2007	Perennial Grass	Phase I
2012	Perennial Grass	Phase I
2016	Perennial Grass	Phase I
2020	Perennial Grass	Phase I

Site Notes

The study is located approximately three miles north of Red Fleet Reservoir. The study monitors an old Utah juniper (*Juniperus osteosperma*) chaining that was treated in the 1960s or 1970s.

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

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

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Shallow Loam (Black Sagebrush)
NRCS Ecological Site #	R047XC320UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2004, this site has been dominated by perennial grasses with black sagebrush (*Artemisia nova*) as a subordinate species. Cover of sagebrush has remained relatively stable (Table 09R-07.7, Table 09R-07.12). Crested wheatgrass (*Agropyron cristatum*) has dominated the herbaceous understory and forbs have remained rare (Table 09R-07.10, Table 09R-07.11). Following a lop and scatter treatment in 2004 (Table 09R-07.1), cover and density of Utah juniper (*Juniperus osteosperma*) decreased substantially. However, young juniper trees remain on the site and provide a source for future infilling (Table 09R-07.12, Table 09R-07.13, Table 09R-07.14).

Trend Summary Tables**Table 09R-07.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	2.2	0.7	7.6	0.9	0.7	9.2
2007	1.8	0.3	0.7	0.7	0.4	2.5
2012	2.6	1.7	0.7	1.9	0.8	2.1
2016	2.5	5.3	0.0	2.9	5.5	0.4
2020	3.1	3.1	0.7	4.5	2.0	1.0

Table 09R-07.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	-	260	20	102	-	13.2	0.1	3.4
2007	28	417	96	89	0.1	20.3	0.4	1.4
2012	6	398	18	107	0.0	22.9	0.0	1.3
2016	3	380	-	125	0.0	28.7	-	1.1
2020	-	379	14	90	-	30.7	0.1	1.2

Table 09R-07.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	24.8	3.4	27.6	26.7	2.3	26.6
2007	24.6	0.9	41.1	15.9	1.4	25.6
2012	24.9	0.2	39.4	14.2	1.9	29.8
2016	6.8	0.0	32.5	28.2	2.0	37.7
2020	13.0	0.0	43.0	24.4	4.3	36.1

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

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

*Pellets per acre (ha)

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

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

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

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

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

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

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

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

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

Table 09R-07.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^p -- (black sagebrush)									
2004	1880	-	12	70	18	40	1	12	14/30
2007	2260	240	25	70	5	11	79	5	18/35
2012	3800	2580	37	63	1	0	67	1	14/32
2016	2860	-	31	62	8	25	55	8	17/36
2020	3260	-	29	70	1	9	87	9	14/40
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	-	-	-	-	-	-	-	-	26/48
2007	-	-	-	-	-	-	-	-	37/56
2012	20	-	0	100	0	100	0	0	47/63
2016	20	-	0	0	100	100	0	100	44/68
2020	60	20	33	33	33	67	33	33	44/79
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2004	20	-	0	100	0	0	0	0	- / -
2007	20	-	0	100	0	0	0	0	18/30
2012	-	-	-	-	-	-	-	-	- / -
2016	20	-	100	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	20	-	0	100	0	0	0	0	22/32
2007	-	-	-	-	-	-	-	-	40/31
2012	-	-	-	-	-	-	-	-	58/71
2016	-	-	-	-	-	-	-	-	61/49
2020	-	-	-	-	-	-	-	-	54/66

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

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

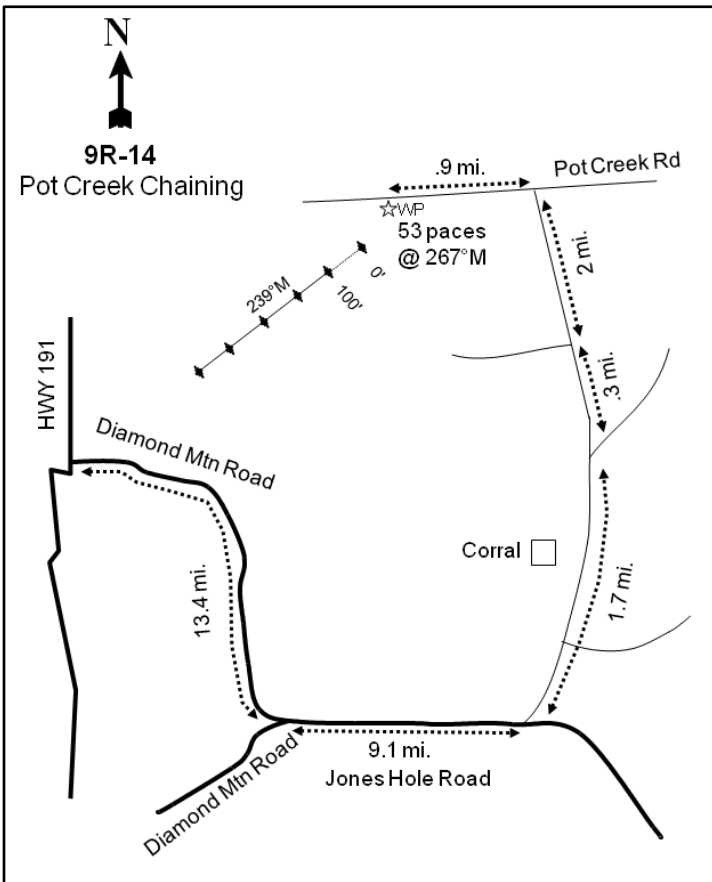
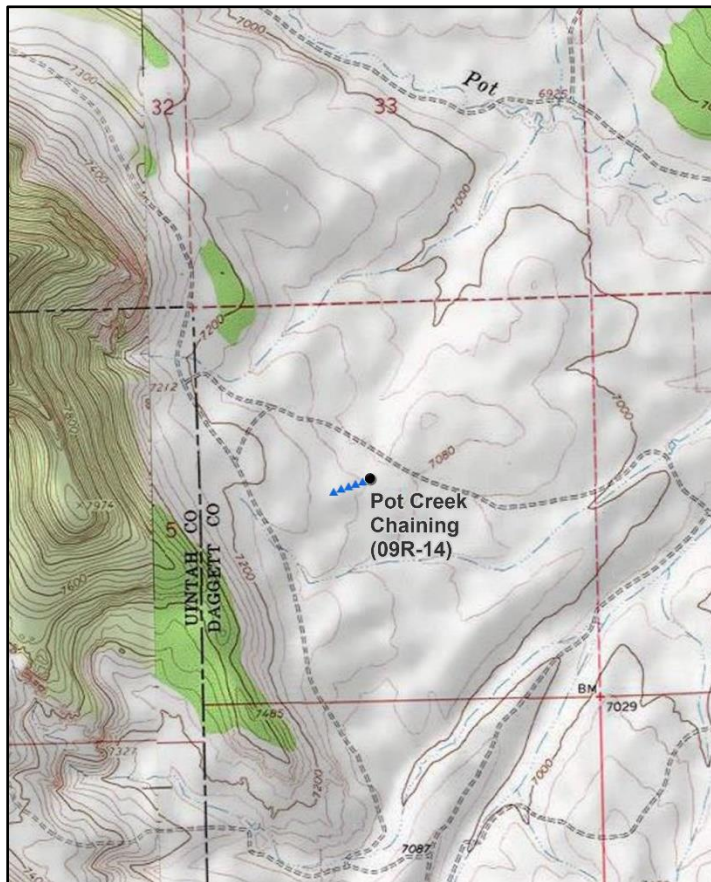
Table 09R-07.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

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

Table 09R-07.15 – Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2004	1.1	0	0	26.5	0	6.7	0	34.3	Very Poor-Poor
2007	0.9	0	0	30	-0.1	2.8	0	33.6	Very Poor-Poor
2012	2.4	0	0	30	0	2.5	0	34.9	Very Poor-Poor
2016	3.6	0	0	30	0	2.3	0	35.9	Very Poor-Poor
2020	5.6	0	0	30	0	2.4	0	38	Poor

POT CREEK CHAINING - STUDY NO. 09R-14



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Hoy Mountain SW; Township 2S, Range 25E, Section 04
NAD 83 UTM ZONE 12, 659297 East 4504682 North

Transect Information

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

132
239° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
No Rebar

Directions to Site

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

Site Information

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

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Pot Hole	-	June-July 2006	1396
Chaining - One-Way Ely	Ruple Cabin Wildfire Rehabilitation	608	September 2006	1208
Seeding - Aerial Before	Ruple Cabin Wildfire Rehabilitation	608	September 2006	1208
Seeding - Dribbler	Ruple Cabin Wildfire Rehabilitation	608	September 2006	1208
Seeding - Aerial After	Ruple Cabin Wildfire Rehabilitation	608	December 2006	1208

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

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

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

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

Wildlife Habitat and Vegetation History

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

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

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

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

Site Notes

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

Soils

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

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

Site Potential

1981 - 2010 Average Annual Precipitation 12 inches
 NRCS Ecological Site Mountain Loam (Mountain Big Sagebrush)
 NRCS Ecological Site # R047XC430UT
 States and Transitions No state and transition model is available for this ecological site.

Since establishment in 2007, this study site has been dominated by perennial grasses: in 2020 the most abundant species were hard fescue (*Festuca brevipila*) and Sandberg bluegrass (*Poa secunda*). Perennial forbs have been more common than annual forbs throughout the study period, with lesser rushy milkvetch (*Astragalus convallarius*) and alfalfa (*Medicago sativa*) providing much of the cover in most sample years (Table 09R-14.7, Table 09R-14.10, Table 09R-14.11). Much of the mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was removed by the Pot Hole Wildfire (Table 09R-14.1) and density was very low during the initial sampling. However, there has been a steady increase in cover and density of sagebrush over the study years and it was considered to be a co-dominant site component in 2017 and 2020 (Table 09R-14.12, Table 09R-12.13, Photos). Barring a major disturbance, sagebrush cover will likely continue to increase on this site.

Trend Summary Tables

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

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

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

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

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

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

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

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

*Pellets per acre (ha)

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

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

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

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

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

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

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

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

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

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

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

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

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

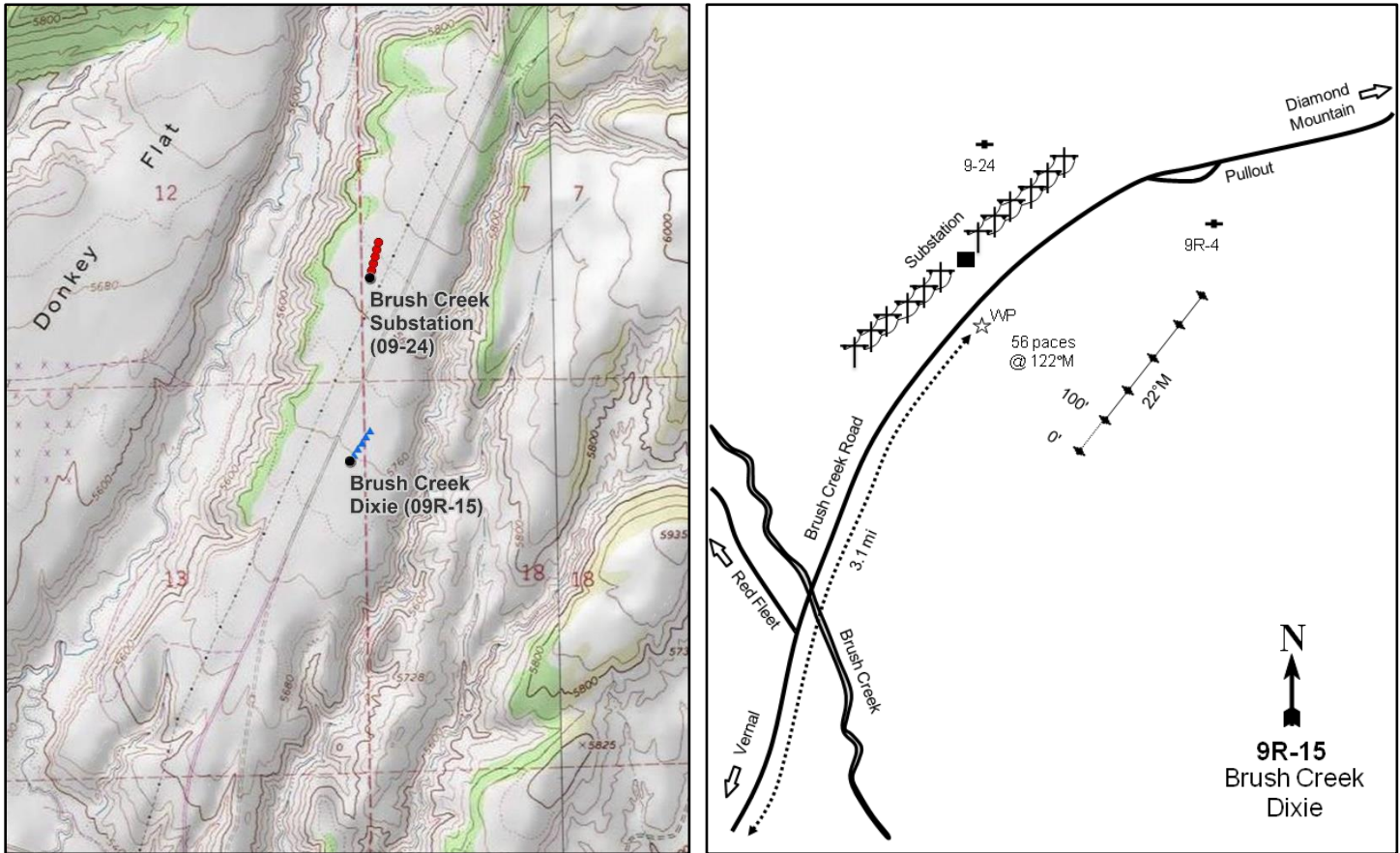
Table 09R-14.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2007	20	340	100	0	0	0	0	0	- / -
2011	620	-	45	55	0	0	0	0	33/36
2014	800	-	10	90	0	40	35	8	41/59
2017	780	-	5	95	0	10	44	5	51/72
2020	680	-	0	100	0	24	3	12	63/95
Eriogonum microthecum^p -- (slender buckwheat)									
2007	20	-	0	100	0	0	0	0	17/22
2011	20	-	0	100	0	0	0	0	18/25
2014	-	-	-	-	-	-	-	-	13/22
2017	20	-	0	100	0	100	0	0	17/26
2020	-	-	-	-	-	-	-	-	- / -
Opuntia -- (pricklypear)									
2007	40	20	0	100	0	0	0	0	7/19
2011	-	-	-	-	-	-	-	-	7/20
2014	20	-	0	100	0	0	0	0	9/30
2017	20	-	0	100	0	0	0	0	9/25
2020	20	-	0	100	0	0	0	0	10/40
Purshia tridentata^p -- (antelope bitterbrush)									
2007	20	-	0	100	0	0	100	0	15/71
2011	20	-	0	100	0	0	100	0	43/102
2014	20	-	0	100	0	0	100	0	19/76
2017	20	-	0	100	0	0	100	0	24/76
2020	20	-	0	0	100	0	100	100	- / -

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

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

BRUSH CREEK DIXIE - STUDY NO. 09R-15

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Donkey Flat NE; Township 3S, Range 22E, Section 13
NAD 83 UTM ZONE 12, 636649 East 4491523 North

Transect Information

Browse Tag # (0' Stake)	134
Transect Bearing	25° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 2: No Rebar

Directions to Site

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

Site Information

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

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

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

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

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

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

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

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

Wildlife Habitat and Vegetation History**Table 09R-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

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

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

Site Notes

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

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

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

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034XY212UT
States and Transitions	A defined state and transition model is available.

When the study was established in 2007, the community was dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Table 09R-15.12) with a poor herbaceous understory dominated by the introduced annual grass species cheatgrass (*Bromus tectorum*) (Table 09R-15.7, Table 09R-15.10). Following the herbicide treatment in 2007 (Table 09R-15.1), cheatgrass decreased significantly in abundance and cover and remained comparatively low until 2016 when cheatgrass cover was at its highest. Cheatgrass abundance and cover decreased again in 2020 (Table 09R-15.10). Despite the high abundance of cheatgrass, the vegetation on this site is classified as a sagebrush community type as of 2020. However, the community remains under threat to catastrophic fire due to the persistent presence of weedy annual species.

Trend Summary Tables**Table 09R-15.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2007	5.9	0.3	-	6.7	0.3	-
2009	7.7	0.2	-	6.1	0.2	-
2010	7.4	0.2	-	12.5	0.4	-
2012	10.4	0.1	-	13.7	0.2	-
2016	6.8	0.4	-	8.5	1.1	-
2020	10.1	1.1	-	13.4	1.3	-

Table 09R-15.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2007	480	47	225	166	31.5	0.9	1.3	2.3
2009	360	56	5	33	9.3	1.3	0.0	0.7
2010	299	60	206	121	6.3	0.7	6.2	1.8
2012	399	93	79	88	12.2	1.0	0.2	1.2
2016	457	117	242	106	42.5	2.4	3.4	1.0
2020	401	167	46	121	19.8	5.1	0.1	1.5

Table 09R-15.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2007	23.0	1.0	45.8	0.2	0.0	41.0
2009	28.4	0.2	47.9	0.1	0.0	22.5
2010	40.0	0.2	45.7	0.1	-	23.2
2012	29.9	0.2	47.2	0.2	0.0	28.6
2016	16.4	-	28.9	2.2	0.2	57.8
2020	33.6	0.0	50.6	0.1	0.1	34.7

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

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

*Pellets per acre (ha)

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

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

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

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

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

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

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

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

Table 09R-15.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)				
Bassia prostrata ^{pi} (forage kochia)				
Gutierrezia sarothrae (broom snakeweed)				
Opuntia polyacantha (plains pricklypear)				
year	Line Intercept Cover (%)			
2007	6.7	-	0.1	0.2
2009	6.1	-	0	0.2
2010	12.5	-	0.2	0.2
2012	13.7	-	-	0.2
2016	8.1	0.4	0.1	1
2020	13.2	0.2	0.2	1.1
year	Quadrat Cover (%)			
2007	5.9	-	0.1	0.1
2009	7.7	-	0.1	0.1
2010	7.4	0.0	0.0	0.1
2012	10.4	0.0	-	0.1
2016	6.5	0.2	0.1	0.3
2020	9.6	0.5	0.2	0.9

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

Table 09R-15.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

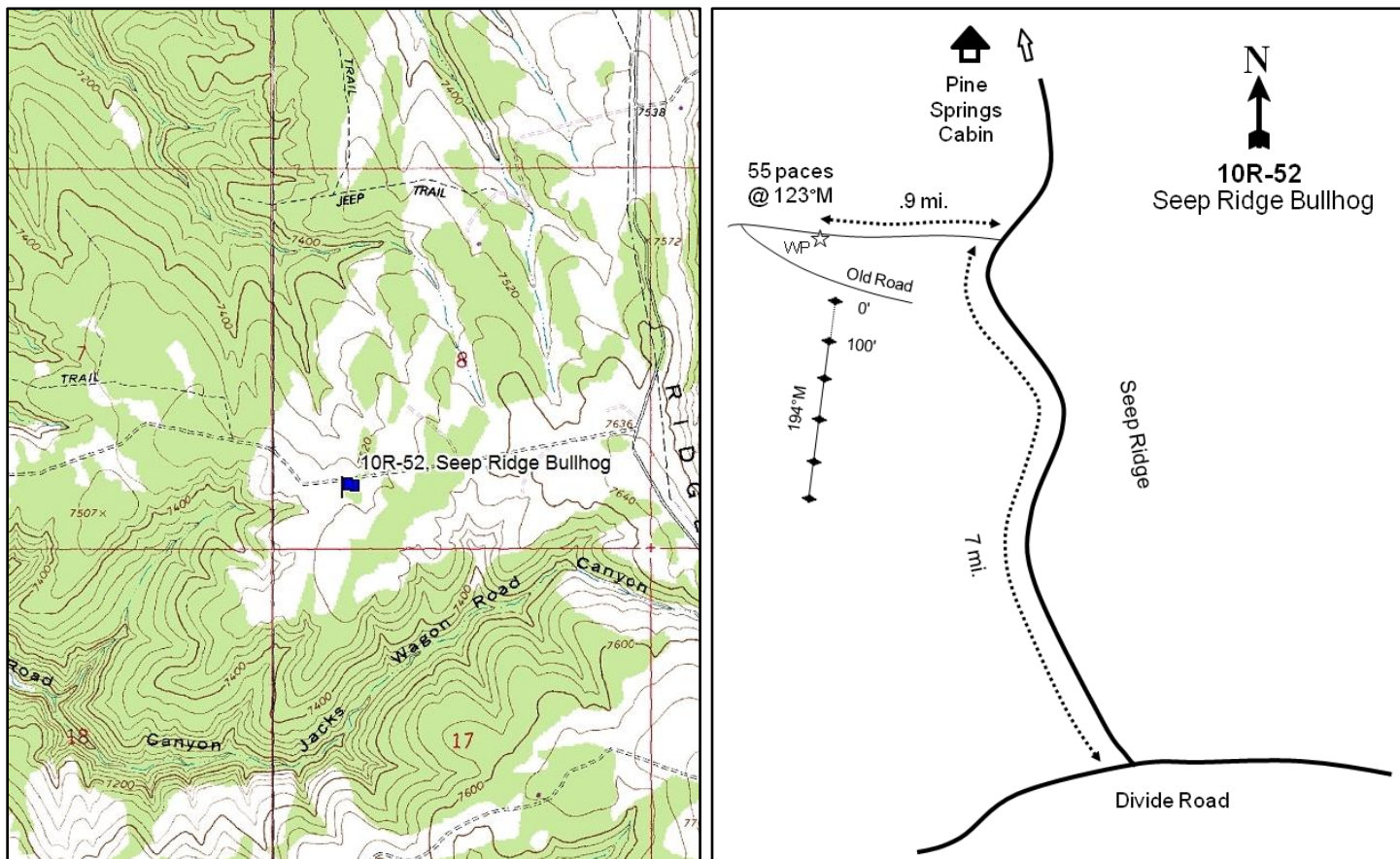
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)							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

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

Table 09R-15.15 – Deer Desirable Components Index: Low Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2007	8.4	-12	0.3	1.7	-20	4.7	0	-17	Very Poor
2009	7.6	0	0	2.6	-7	1.3	0	4.5	Very Poor
2010	15.6	8.6	3.9	1.3	-4.7	3.6	0	28.3	Fair
2012	17.1	9.9	11.5	2.1	-9.2	2.4	0	33.8	Fair
2016	10.7	6.1	4	4.8	-20	2	0	7.6	Very Poor
2020	16.8	10.1	3.5	10.3	-14.8	3	0	28.8	Fair

SEEP RIDGE BULLHOG - STUDY NO. 10R-52

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Seep Canyon SW; Township 15S, Range 23E, Section 08
NAD 83 UTM ZONE 12, 639910 East 4375992 North

Transect Information

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

Directions to Site

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

Site Information

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

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

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	Seep Ridge Bullhog Phase II	1950	December 2011	390
Seeding - Aerial Before	Seep Ridge Bullhog Phase II	1950	October 2011	390
Mechanical - Bullhog	Seep Ridge Bullhog Phase II	1950	November 2011-February 2012	390

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

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

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

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

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

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

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

Site Notes

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

Site Potential

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R048AY405UT
States and Transitions	No state and transition model is available for this ecological site.

When this site was established in 2011, it was in Phase III of woodland succession (Table 10R-52.4), being encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with other browse species such as antelope bitterbrush (*Purshia tridentata*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) also present. Tree cover was greatly reduced following a bullhog and seeding treatment (Table 10R-52.1), and mountain big sagebrush became a dominant vegetation component in 2017 (Table 10R-52.12). Before treatment, the herbaceous understory was depleted and sparse. Afterwards, however, the herbaceous understory became a dominant component on the site with both forbs and grasses being fairly diverse. Squirreltail (*Elymus elymoides*) and thickspike wheatgrass (*E. lanceolatus*) have contributed most of the perennial grass cover following treatment. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed on site, but in low amounts (Table 10R-52.10). Although this site has remained in Phase I of woodland succession since 1997 (Table 10R-52.4), the persistent tree component indicates that there may be potential for infilling in future sample years (Table 10R-52.14, Photos).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

FORB SPECIES										
<i>Packera multilobata</i> (lobeleaf groundsel)										
<i>Penstemon caespitosus</i> (mat penstemon)										
<i>Penstemon pachyphyllus</i> (thickleaf beardtongue)										
<i>Phacelia</i> ^a (phacelia)										
<i>Phlox longifolia</i> (longleaf phlox)										
<i>Polygonum douglasii</i> ^a (Douglas' knotweed)										
<i>Sanguisorba minor</i> ⁱ (small burnet)										
<i>Sphaeralcea coccinea</i> (scarlet globemallow)										
<i>Taraxacum officinale</i> (common dandelion)										
<i>Tragopogon dubius</i> ^{ai} (yellow salsify)										
year	Nested Frequency									
2011	-	1	2	-	3	21	-	-	-	-
2014	-	1	7	1	3	6	66	4	-	-
2017	-	6	13	-	3	5	55	17	4	-
2020	6	6	-	-	28	45	19	17	1	1
year	Average Cover (%)									
2011	-	0.0	0.0	-	0.0	0.1	-	-	-	-
2014	-	0.0	0.2	0.0	0.0	0.0	2.2	0.1	-	-
2017	-	0.1	0.2	-	0.0	0.0	2.1	0.3	0.0	-
2020	0.1	0.1	-	-	0.1	0.1	0.6	0.1	0.0	0.0

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

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

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

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

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

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
2011	-	-	-	-	-	-	-	-	7/26
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2011	1060	20	15	53	32	19	2	23	66/81
2014	760	-	32	68	0	34	3	16	53/65
2017	780	680	41	51	8	5	0	5	59/86
2020	2080	1100	60	39	1	12	2	2	63/85
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2011	60	-	33	67	0	0	0	0	104/111
2014	60	-	33	67	0	0	100	0	43/52
2017	40	-	50	50	0	0	50	0	39/51
2020	40	-	0	100	0	0	100	0	41/46
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	10/17
2020	-	-	-	-	-	-	-	-	14/21
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	20	-	0	100	0	0	100	0	25/13
2017	60	-	0	100	0	0	0	0	26/29
2020	20	-	0	100	0	0	100	0	34/28
Ericameria nauseosa -- (rubber rabbitbrush)									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2017	40	-	50	50	0	50	0	0	49/79
2020	80	-	50	50	0	25	0	0	36/42
Gutierrezia sarothrae -- (broom snakeweed)									
2011	20	-	0	100	0	0	0	0	-/-
2014	60	-	0	100	0	67	0	0	31/47
2017	20	-	0	100	0	0	0	0	21/33
2020	-	-	-	-	-	-	-	-	14/17
Juniperus osteosperma¹ -- (Utah juniper)									
2011	220	80	55	46	0	0	0	0	-/-
2014	80	20	100	0	0	0	0	0	-/-
2017	100	40	80	20	0	0	0	0	-/-
2020	160	-	100	0	0	0	0	0	-/-
Juniperus scopulorum¹ -- (Rocky Mountain juniper)									
2011	40	20	100	0	0	0	0	0	-/-
2014	20	-	100	0	0	0	0	0	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Opuntia fragilis -- (brittle pricklypear)									
2011	100	-	0	100	0	0	0	0	10/25
2014	120	-	33	67	0	0	0	0	10/33
2017	100	-	20	80	0	0	0	0	9/38
2020	120	-	33	50	17	0	0	17	6/27

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pediocactus simpsonii -- (mountain ball cactus)									
2011	-	-	-	-	-	-	-	-	4/4
2014	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Pinus edulis^t -- (twoneedle pinyon)									
2011	580	480	55	45	0	0	0	3	- / -
2014	40	40	100	0	0	0	0	0	- / -
2017	160	-	88	13	0	0	0	0	- / -
2020	60	-	100	0	0	0	0	0	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2011	1440	80	31	67	3	11	10	6	48/68
2014	1040	60	21	79	0	33	40	2	29/57
2017	1060	40	25	76	0	2	94	2	30/66
2020	1080	340	19	82	0	11	83	0	31/68
Symphoricarpos oreophilus^p -- (mountain snowberry)									
2011	560	-	71	29	0	0	0	11	30/51
2014	760	-	5	95	0	26	3	0	34/67
2017	500	-	0	100	0	4	8	0	42/85
2020	500	-	12	88	0	20	4	0	46/94

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

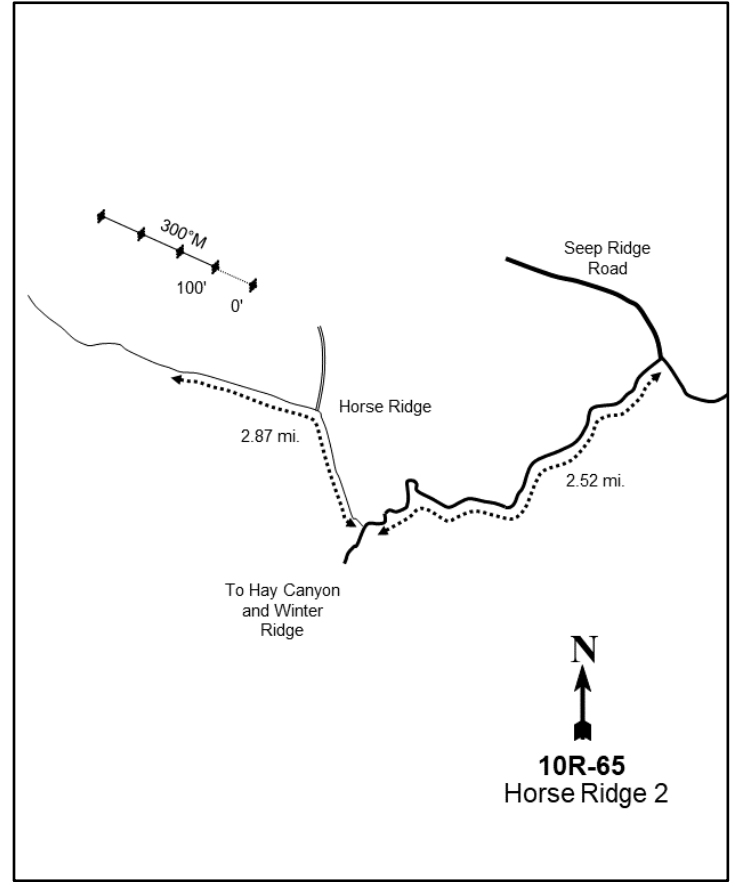
Table 10R-52.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

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

Table 10R-52.15 – Deer Desirable Components Index: High Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2011	18.4	10.9	13.2	7.8	0	0.2	0	50.4	Poor
2014	6.8	15	11.3	24.1	0	10	0	67.2	Fair
2017	11.4	13.9	13.8	30	-0.4	10	0	78.7	Good
2020	12.5	14.8	15	26	-0.1	4.8	0	73.2	Good

HORSE RIDGE 2 - STUDY NO. 10R-65

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

P R Spring NW; Township 15S, Range 23E, Section 35
NAD 83 UTM ZONE 12, 642373 East 4368492 North

Transect Information

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

129
300° magnetic
400ft
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
No Rebar

Directions to Site

From the intersection of Seep Ridge Road and the Book Cliffs Divide Road, turn west (right) and drive along the Book Cliffs Divide Road for approximately 2.9 miles to Horse Ridge. Turn north (right) onto Horse Ridge and travel roughly 2.5 miles to the study site which is on the right (east) side of the road; there is no witness post.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	BOOKCLIFFS PASTURE
Elevation	7,900ft (2,408m)
Aspect	North
Slope	3%
Sample Dates	08/18/2020

Table 10R-65.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Spike	Book Cliffs West Water Developments and Spike Treatment (Proposed)	5376	Fall 2020	461

Wildlife Habitat and Vegetation History**Table 10R-65.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 10R-65.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2020	Mixed Mountain Brush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Loam (Browse)
NRCS Ecological Site #	R047XA420UT
States and Transitions	No state and transition model is available for this ecological site.

At the time of study establishment in 2020, this site existed as a mature mixed shrub community with Utah serviceberry (*Amelanchier utahensis*), mountain snowberry (*Symphoricarpos oreophilus*), and alderleaf mountain mahogany (*Cercocarpus montanus*) dominating much of the shrub understory, while Douglas-fir (*Pseudotsuga menziesii*) dominated the upper canopy (Table 10R-65.6, Table 10R-65.12). Although snowberry and Utah serviceberry dominated the preferred browse component, other browse species such as antelope bitterbrush (*Purshia tridentata*), Gambel oak (*Quercus gambelii*), and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) were also present (Table 10R-65.12, Table 10R-65.13). Grasses and forbs were rare and undiversified in the initial sample year (Table 10R-65.7, Table 10R-65.10, Table 10R-65.11). Following the proposed Spike treatment (Table 10R-65.1), the herbaceous understory is expected to increase in cover and diversity, and mature and decadent shrub populations are expected to diversify in age structure. Furthermore, less dominant shrubs species that are valuable to wildlife may increase in cover following treatment.

Trend Summary Tables**Table 10R-65.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2020	42.3	8.2	5.6	65.3	7.4	27.6

Table 10R-65.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2020	-	297	9	152	-	8.2	0.0	5.0

Table 10R-65.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2020	11.8	0.1	57.9	2.4	1.5	57.7

Table 10R-65.9 - Pellet Group 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
	2020	4	7	10
Year	Days Use Per Acre (ha)			
2020	14.5 (35.9)	30.2 (74.5)	42.2 (104.3)	-

Table 10R-65.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency							
Achnatherum hymenoides (Indian ricegrass)	9	3	164	136	4	1	42	70
Achnatherum nelsonii (Columbia needlegrass)								
Carex (sedge)								
Elymus lanceolatus (thickspike wheatgrass)								
Hesperostipa comata (needle and thread)								
Koeleria macrantha (prairie Junegrass)								
Poa fendleriana (muttongrass)								
Poa pratensis ⁱ (Kentucky bluegrass)								
year	Average Cover (%)							
2020	0.1	0.0	4.0	1.2	0.1	0.0	1.0	1.8

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

Table 10R-65.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Antennaria (pussytoes)	5	53	3	39	1	1	9	6	6	28	3	1	19	1	4	3	62
Arenaria congesta (ballhead sandwort)																	
Astragalus convallarius (lesser rusby milkvetch)																	
Astragalus miser (timber milkvetch)																	
Balsamorhiza sagittata (arrowleaf balsamroot)																	
Cirsium (thistle)																	
Comandra umbellata (bastard toadflax)																	
Crepis acuminata (tapertip hawkbeard)																	
Cryptantha (cryptantha)																	
Erigeron eatonii (Eaton's fleabane)																	
Erigeron flagellaris (trailing fleabane)																	
Eriogonum alatum (winged buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Ipomopsis aggregata (scarlet gilia)																	
Linum lewisii (Lewis flax)																	
Machaeranthera grindelioides (rayless tansyaster)																	
Penstemon caespitosus (mat penstemon)																	
year	Average Cover (%)																
2020	0.0	0.9	0.0	1.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.4	0.0	0.0	0.0	1.9

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

FORB SPECIES	Nested Frequency				
Phlox longifolia (longleaf phlox)	19	9	1	3	1
Polygonum douglasii ^a (Douglas' knotweed)					
Sphaeralcea coccinea (scarlet globemallow)					
Symphoricarpos ascendens (western aster)					
Townsendia incana (hoary Townsend daisy)					
year	Average Cover (%)				
2020	0.2	0.0	0.0	0.0	0.0

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

Table 10R-65.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)														
	year														
Amelanchier utahensis ^p (Utah serviceberry)	22.6	1.4	9.9	0.8	1	0.2	2.2	7	5.7	0.5	2.1	16.3	1.1	3.2	26.3
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	13.5	2.4	5.4	0.8	1.6	0.1	0.6	1.9	5.9	0.6	0.3	2.8	0.0	2.9	17.3
Cercocarpus montanus ^p (alderleaf mountain mahogany)	Quadrat Cover (%)														
Chrysothamnus depressus ^p (longflower rabbitbrush)															
Chrysothamnus viscidiflorus ssp. lanceolatus															
Gutierrezia sarothrae (broom snakeweed)															
Juniperus osteosperma ⁱ (Utah juniper)															
Juniperus scopulorum ⁱ (Rocky Mountain juniper)															
Mahonia repens (creeping barberry)															
Opuntia polyacantha (plains pricklypear)															
Pinus edulis ⁱ (twoneedle pinyon)															
Pseudotsuga menziesii ⁱ (Douglas-fir)															
Purshia tridentata ^p (antelope bitterbrush)															
Quercus gambelii ^p (Gambel oak)															
Symphoricarpos oreophilus ^p (mountain snowberry)															

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

Table 10R-65.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Yar	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis ^p -- (Utah serviceberry)									
2020	1360	2380	31	65	4	24	10	9	192/164
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2020	820	100	32	49	20	24	7	22	61/71
Cercocarpus montanus ^p -- (alderleaf mountain mahogany)									
2020	1380	40	17	64	19	38	38	19	116/99
Chrysothamnus depressus ^p -- (longflower rabbitbrush)									
2020	800	-	0	100	0	95	0	0	12/20
Chrysothamnus viscidiflorus ssp. lanceolatus -- (yellow rabbitbrush)									
2020	1260	40	2	81	18	6	0	18	34/36
Gutierrezia sarothrae -- (broom snakeweed)									
2020	1140	-	0	100	0	0	0	0	22/20
Juniperus osteosperma ⁱ -- (Utah juniper)									
2020	20	-	0	100	0	0	0	0	- / -
Juniperus scopulorum ⁱ -- (Rocky Mountain juniper)									
2020	20	-	0	100	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
2020	17980	-	0	100	0	0	0	0	9/14
Opuntia polyacantha -- (plains pricklypear)									
2020	500	-	0	100	0	0	0	0	9/29
Pinus edulis ⁱ -- (twoneedle pinyon)									
2020	60	20	67	33	0	0	0	33	- / -
Pseudotsuga menziesii ⁱ -- (Douglas-fir)									
2020	140	-	57	43	0	0	0	14	- / -
Purshia tridentata ^p -- (antelope bitterbrush)									
2020	180	-	11	89	0	0	100	0	43/74
Quercus gambelii ^p -- (Gambel oak)									
2020	1340	-	40	60	0	15	3	0	54/42
Symphoricarpos oreophilus ^p -- (mountain snowberry)									
2020	11880	60	9	91	0	3	0	1	28/46
Tetradymia canescens -- (spineless horsebrush)									
2020	80	-	0	50	50	25	25	50	17/22

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

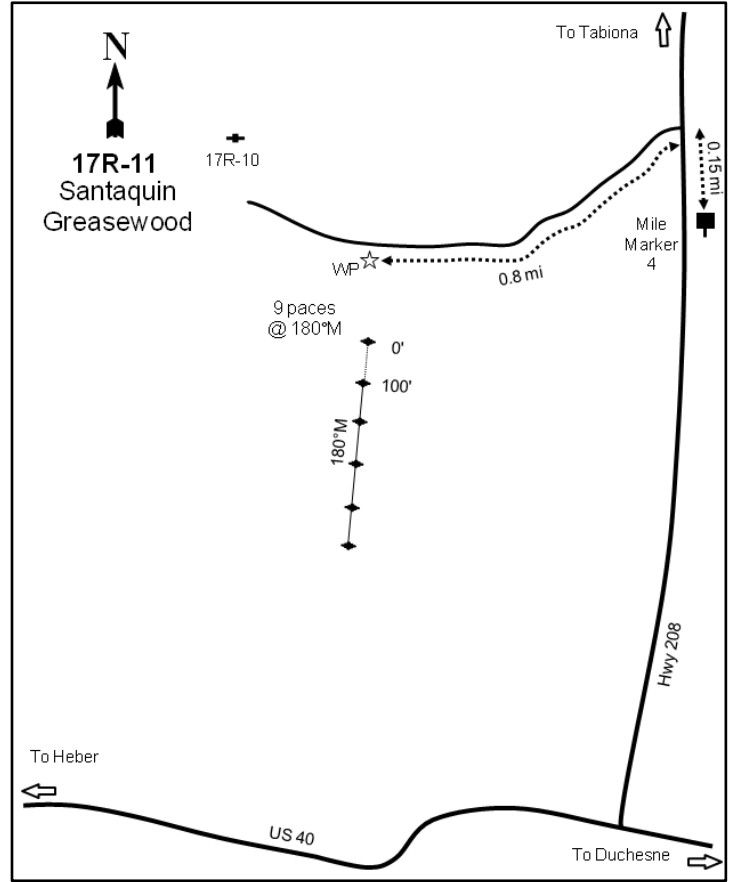
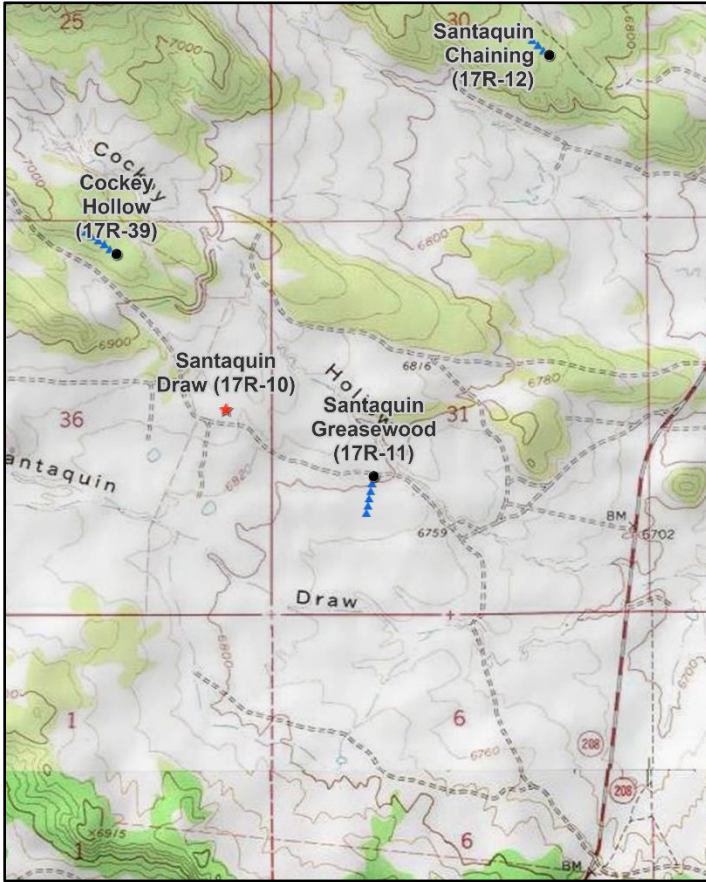
Table 10R-65.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2020	11	17	-	-	17	67	20.0
Juniperus scopulorum (Rocky Mountain juniper)							
2020	21	17	33	-	17	33	17.2
Pinus edulis (twoneedle pinyon)							
2020	3	-	-	33	-	67	18.7
Pseudotsuga menziesii (Douglas-fir)							
2020	65	-	20	7	7	67	22.7

Table 10R-65.15 – Deer Desirable Components Index: High Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2020	30	13.5	9.9	16.4	0	10	0	79.8	Good

SANTAQUIN GREASEWOOD - STUDY NO. 17R-11



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Tabiona SW; Township 2S, Range 7W, Section 31
NAD 83 UTM ZONE 12, 523633 East 4456728 North

Transect Information

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

Directions to Site

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

Site Information

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

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

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

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

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

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

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

Wildlife Habitat and Vegetation History**Table 17R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

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

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

Site Notes

This study is located eighteen miles northwest of Duchesne within a greasewood (*Sarcobatus vermiculatus*) and big sagebrush (*Artemisia tridentata*) flat.

Soils**Table 17R-11.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.2	49.6	32.9	17.5	1.1	4.5	137.6	1.0	07/15/2004

Site Potential

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

Between the 2004 and 2010 sample years, the plant community on this site was dominated by greasewood (*Sarcobatus vermiculatus*) and basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) with mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) as a subordinate species. With the exception of 2010, cover of basin big sagebrush decreased each sample year since 2010, while mountain big sagebrush cover has increased and it has become co-dominant with greasewood (Table 17R-11.12). The herbaceous understory has been mainly comprised of perennial grasses in most sample years, and forbs have remained depauperate in both composition and quantity. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in most years, but in extremely low amounts (Table 17R-11.10, Table 17R-11.11).

Trend Summary Tables**Table 17R-11.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	7.5	11.9	-	4.7	14.4	-
2007	5.1	11.1	-	6.0	19.4	-
2009	8.5	12.5	-	9.0	19.8	-
2010	14.6	8.8	-	20.7	18.2	-
2012	12.3	10.9	-	11.7	12.6	-
2016	10.7	8.6	-	12.6	5.9	-
2020	15.5	11.9	-	18.0	14.4	-

Table 17R-11.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	2	53	233	9	0.0	1.6	3.2	0.0
2007	7	150	256	99	0.0	5.6	1.5	2.3
2009	-	146	39	127	-	6.2	0.2	1.2
2010	8	185	58	95	0.0	5.7	0.5	2.1
2012	1	226	25	57	0.0	6.8	0.1	0.2
2016	2	220	23	23	0.0	8.5	0.1	0.0
2020	13	230	116	35	0.0	15.3	0.8	0.1

Table 17R-11.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	35.2	10.0	43.7	0.2	0.4	25.2
2007	34.5	3.8	49.7	0.1	0.0	25.2
2009	26.9	1.0	55.4	0.0	0.0	31.9
2010	31.5	1.3	49.7	-	0.1	31.6
2012	33.5	1.1	52.6	0.0	0.2	29.9
2016	37.3	0.8	42.1	0.0	0.0	29.1
2020	26.4	1.4	47.9	0.0	0.1	42.4

Table 17R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
2004	-	-	49	7	-	13
2007	-	-	33	17	2	42
2009	2	-	27	12	-	35
2010	2	-	10	11	-	14
2012	5	-	13	27	1	42
2016	3	-	34	8	-	68
2020	5	-	26	22	1	37
Year	Days Use Per Acre (ha)					
2004	0.7 (1.8)	-	243.3 (600.9)	27.5 (67.9)	-	-
2007	0.7 (1.8)	-	27.5 (67.9)	28.8 (71.2)	-	-
2009	6.5 (16.1)	-	11.4 (28.1)	47.6 (117.5)	-	-
2010	12.3 (30.5)	-	23.4 (57.9)	28.1 (69.5)	-	-
2012	8.7 (21.5)	-	2.7 (6.6)	34.9 (86.1)	-	-
2016	5.8 (14.3)	-	38.9 (96.0)	31.5 (77.8)	-	-
2020	8.0 (19.7)	17.4 (43.0)*	5.3 (13.2)	46.2 (114.2)	-	-

*Pellets per acre (ha)

Table 17R-11.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron fragile ⁱ (Siberian wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	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)
year	Nested Frequency									
2004	-	-	2	1	-	-	31	35	-	-
2007	12	7	7	16	5	-	36	78	35	-
2009	7	49	-	13	-	1	19	65	10	20
2010	38	39	8	5	12	-	32	89	11	14
2012	17	69	1	6	3	-	35	109	31	24
2016	4	62	2	27	-	-	72	85	48	-
2020	18	88	13	11	-	7	40	108	27	20
year	Average Cover (%)									
2004	-	-	0.0	0.0	-	-	1.1	0.5	-	-
2007	0.7	0.3	0.0	0.3	0.0	-	1.3	1.4	1.6	-
2009	0.1	2.7	-	0.2	-	0.0	0.3	2.0	0.5	0.4
2010	1.3	1.8	0.0	0.0	0.1	-	0.8	1.2	0.2	0.2
2012	0.1	2.9	0.0	0.2	0.0	-	0.5	1.7	0.6	0.8
2016	0.0	1.2	0.0	0.7	-	-	1.6	1.6	3.3	-
2020	0.4	5.9	0.0	0.3	-	1.1	1.2	2.9	2.5	1.0

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

Table 17R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcross)	Chenopodium album ^a (lambsquarters)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Descurainia pinnata ^a (western tansymustard)	Erigeron (fleabane)	Gilia inconspicua ^a (shy gilia)	Lappula occidentalis ^a (flatspine stickseed)	Linum lewisii (Lewis flax)	Phlox longifolia (longleaf phlox)	Schoenocrambe limifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency												
2004	-	-	27	111	5	199	8	3	13	-	1	-	-
2007	1	10	-	18	-	242	78	-	48	3	6	11	2
2009	1	-	4	39	-	-	102	-	-	4	2	27	4
2010	20	-	3	26	-	7	74	-	9	2	4	19	-
2012	5	1	-	16	3	6	55	-	-	-	1	3	-
2016	9	7	-	-	9	11	4	-	-	-	-	15	-
2020	74	4	-	-	-	56	30	-	-	-	1	-	1
year	Average Cover (%)												
2004	-	-	0.2	1.0	0.0	1.9	0.0	0.0	0.1	-	0.0	-	-
2007	0.0	0.0	-	0.0	-	1.2	2.0	-	0.2	0.2	0.0	0.1	0.0
2009	0.0	-	0.0	0.2	-	-	1.0	-	-	0.1	0.0	0.1	0.0
2010	0.0	-	0.0	0.4	-	0.0	1.9	-	0.0	0.0	0.0	0.2	-
2012	0.0	0.0	-	0.0	0.0	0.0	0.2	-	-	-	0.0	0.0	-
2016	0.0	0.0	-	-	0.0	0.1	0.0	-	-	-	-	0.0	-
2020	0.6	0.0	-	-	-	0.2	0.1	-	-	-	0.0	-	0.0

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

Table 17R-11.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. tridentata ^p (basin big sagebrush)	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Atriplex confertifolia ^p (shadscale saltbush)	Bassia prostrata ^{pt} (forage kochia)	Krascheninnikovia lanata ^p (winterfat)	Opuntia (pricklypear)	Sarcobatus vermiculatus (greasewood)
year	Line Intercept Cover (%)						
2004	4.4	-	0.3	-	-	0.4	14
2007	5.7	-	0.3	-	-	0.7	18.7
2009	6.5	0.5	0.2	1.8	-	1.2	18.6
2010	10.9	5.2	1.1	3.5	-	0.3	17.9
2012	3.3	7.2	0.3	0.9	-	0.4	12.2
2016	1	8.7	0.1	2.8	-	0.6	5.3
2020	-	12.1	0.5	5.4	-	1.4	13
year	Quadrat Cover (%)						
2004	6.7	0.3	0.5	-	-	0.5	11.4
2007	4.8	-	0.3	0.0	0.0	0.5	10.6
2009	5.8	1.5	0.4	0.8	-	0.2	12.3
2010	5.6	5.8	0.1	3.0	-	0.1	8.7
2012	5.0	6.1	0.4	0.8	-	0.1	10.8
2016	1.0	7.7	0.1	1.8	0.0	0.4	8.2
2020	-	11.4	0.2	3.9	-	0.7	11.2

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

Table 17R-11.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. tridentata^p -- (basin big sagebrush)									
2004	2640	2260	4	11	85	25	7	66	75/77
2007	3760	9860	60	12	29	5	1	27	46/60
2009	-	-	-	-	-	-	-	-	39/41
2010	7000	640	44	53	4	15	0	37	49/55
2012	3520	-	44	53	3	11	0	34	51/49
2016	460	-	0	74	26	13	83	61	47/48
2020	40	-	0	100	0	100	0	0	- / -
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2004	-	-	-	-	-	-	-	-	45/95
2007	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	29/33
2010	5480	2840	72	27	1	0	0	1	40/48
2012	8040	100	45	51	4	18	28	41	34/37
2016	5100	40	4	52	44	19	20	51	37/43
2020	4620	20	0	58	42	47	22	65	43/52

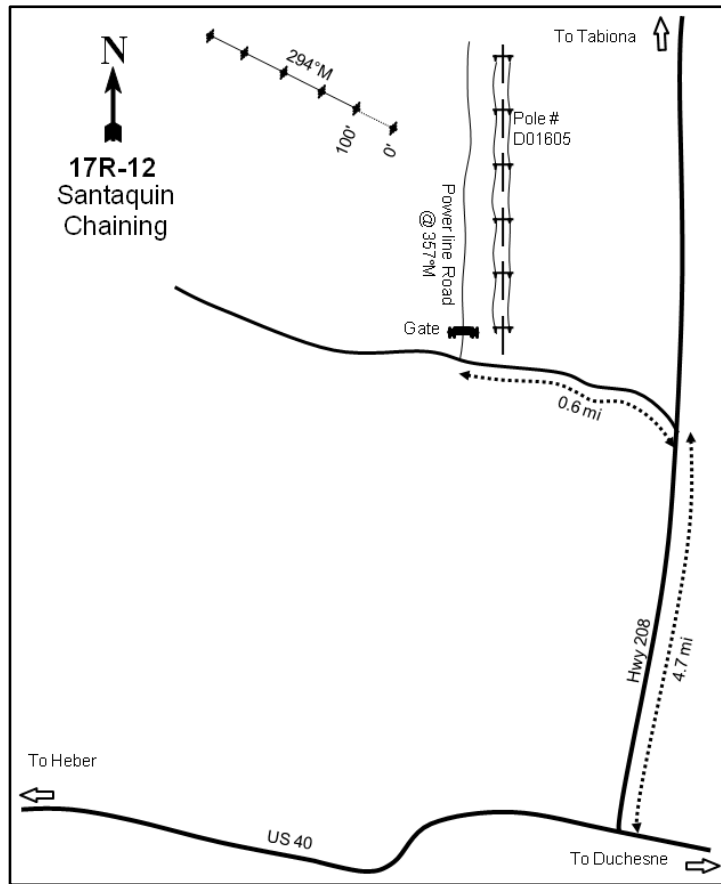
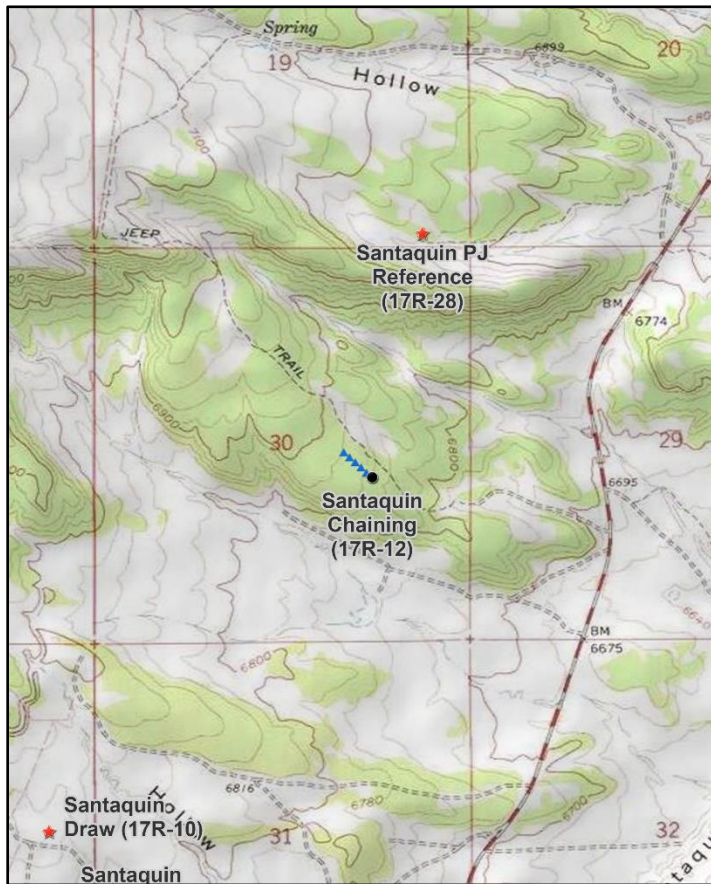
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Atriplex confertifolia^p -- (shadscale saltbush)									
2004	160	200	13	75	13	0	13	0	31/47
2007	1040	440	75	25	0	0	0	0	23/37
2009	-	-	-	-	-	-	-	-	26/41
2010	780	260	44	56	0	0	0	0	28/42
2012	1080	-	6	93	2	6	6	2	21/31
2016	720	-	33	64	3	3	0	0	11/20
2020	600	-	13	83	3	13	23	7	21/31
Bassia prostrata^{pi} -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	60	140	33	67	0	0	0	0	12/14
2009	-	-	-	-	-	-	-	-	11/14
2010	8880	200	50	50	0	0	0	0	16/22
2012	4660	60	5	95	0	1	94	0	7/18
2016	4580	-	1	99	0	2	11	0	18/28
2020	6380	120	1	99	0	21	0	35	18/30
Echinocereus -- (hedgehog cactus)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	2/8
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Krascheninnikovia lanata^p -- (winterfat)									
2004	-	-	-	-	-	-	-	-	-/-
2007	20	-	100	0	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	80	60	100	0	0	0	0	0	12/13
2020	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2004	1120	-	7	59	34	0	0	16	13/30
2007	920	-	0	74	26	2	0	13	11/25
2009	-	-	-	-	-	-	-	-	13/24
2010	560	-	0	93	7	7	0	14	9/23
2012	1380	-	0	93	7	0	0	7	7/19
2016	1680	20	0	100	0	0	0	0	12/26
2020	940	-	0	100	0	0	0	2	11/38
Sarcobatus vermiculatus -- (greasewood)									
2004	1340	2140	16	79	5	3	0	2	80/128
2007	1280	3060	16	75	9	0	0	16	86/126
2009	-	-	-	-	-	-	-	-	83/112
2010	1380	20	23	77	0	4	0	12	84/115
2012	2260	40	43	57	0	4	5	1	74/103
2016	1700	140	22	69	8	6	9	8	66/90
2020	1340	-	13	79	8	6	0	9	77/108

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

Table 17R-11.15 – Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2004	5.8	0	0	3.3	0	0.1	0	9.2	Very Poor
2007	7.4	6.8	15	11.2	0	4.6	0	45	Poor
2009	9.1	0	0	12.5	0	2.4	0	24	Very Poor
2010	23.9	14.3	15	11.3	0	4.1	0	68.7	Good
2012	14.8	14	15	13.7	0	0.4	0	57.8	Fair
2016	16.4	5.3	1.7	16.9	0	0.1	0	40.4	Poor
2020	23.7	6.5	0.4	30	0	0.2	0	60.8	Fair

SANTAQUIN CHAINING - STUDY NO. 17R-12



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Tabiona SW; Township 2S, Range 7W, Section 30
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

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	Whitstem 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	Brood/Young Rearing
Mule Deer	crucial	winter	
Rocky Mountain Elk	crucial	winter	
Greater Sage-Grouse	occupied	year-long & Winter	brood-rearing

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

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). 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 co-dominant in 2009 (Table 17R-12.12). Although cover and density of pinyon and juniper were relatively low in 2020, their presence indicates that this site has the potential for future infilling and returning to advanced phases of woodland succession (Table 17R-12.12, Table 17R-12.13, Table 17R-12.14).

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

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

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

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
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)	-

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	-	-
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	-	-

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)	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)	Lappula occidentalis ^a (flatspine stickseed)
year	Nested Frequency																
2004	21	-	10	-	-	2	-	-	1	11	4	1	-	4	-	-	-
2007	6	-	-	5	3	1	2	-	12	7	17	-	-	4	11	10	29
2009	-	2	-	19	6	-	20	2	-	1	6	-	-	-	-	-	5
2010	-	-	-	27	16	-	10	-	-	-	-	2	4	-	10	-	7
2012	3	-	12	20	10	-	3	-	4	23	4	-	5	12	6	-	1
2016	11	-	-	2	-	-	5	-	-	1	2	3	-	2	-	3	-
2020	-	-	-	4	-	-	-	-	-	-	8	-	-	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	0.6
2009	-	0.0	-	0.8	0.0	-	0.7	0.0	-	0.0	0.1	-	-	-	-	-	0.2
2010	-	-	-	1.0	0.0	-	0.0	-	-	-	-	0.0	0.0	-	0.1	-	0.0
2012	0.0	-	0.0	0.7	0.0	-	0.0	-	0.0	0.1	0.0	-	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	-	-	-

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

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

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 ^p (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia fragilis (brittle pricklypear)	Pinus edulis ⁱ (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	-	-
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	-	-

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			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
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
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
Atriplex canescens^P -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	53/41
2009	-	-	-	-	-	-	-	-	46/43
2010	-	-	-	-	-	-	-	-	64/55
2012	-	-	-	-	-	-	-	-	68/58
2016	-	-	-	-	-	-	-	-	81/81
2020	-	-	-	-	-	-	-	-	74/80
Atriplex confertifolia^P -- (shadscale saltbush)									
2004	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	37/32
2010	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	- / -
2020	-	-	-	-	-	-	-	-	- / -
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	-	-	-	-	-	-	-	-	- / -
Chrysothamnus depressus^P -- (longflower rabbitbrush)									
2004	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	8/16
2009	-	-	-	-	-	-	-	-	- / -
2010	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	- / -
2020	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	34/56
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	60	-	33	67	0	0	0	0	19/18
2020	-	-	-	-	-	-	-	-	-/-
Echinocereus -- (hedgehog cactus)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	8/25
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	100	0	0	35/38
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	52/67
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
Juniperus osteosperma¹ -- (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	-/-
Krascheninnikovia lanata^p -- (winterfat)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	21/23
2009	-	-	-	-	-	-	-	-	16/20
2010	-	-	-	-	-	-	-	-	22/17
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	40/39
2020	-	-	-	-	-	-	-	-	42/37

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
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
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
Opuntia polyacantha -- (plains pricklypear)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	9/15
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	-	-	-	-	-	-	-	-	-/-
Pinus edulis[†] -- (two-needle 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	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	67/174
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	94/287

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Tetradymia canescens -- (spineless horsebrush)									
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

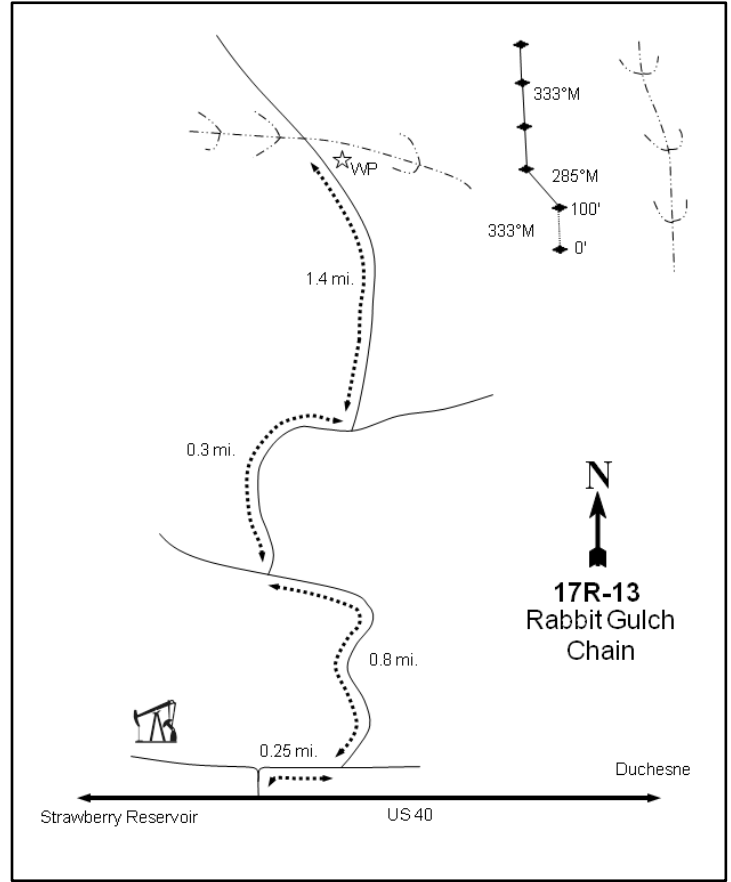
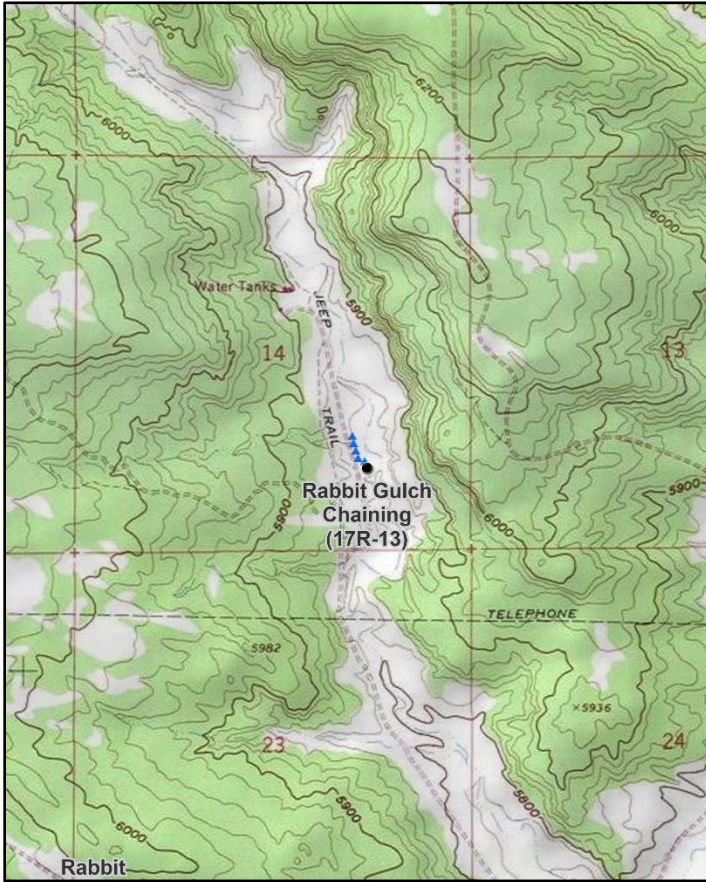
Table 17R-12.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

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
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

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

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2004	3.8	0	0	4.2	0	3.6	0	11.6	Very Poor
2007	4.4	0	0	19.7	-0.4	10	0	33.6	Very Poor-Poor
2009	5.5	0	0	30	-0.7	10	0	44.8	Poor
2010	6	0	0	30	-0.9	6.9	0	42	Poor
2012	7.9	13.5	15	30	-0.6	5.2	0	71	Good
2016	6.6	14.4	15	30	0	2.3	0	68.2	Good
2020	13	14.3	11.5	30	-0.1	2.5	0	71.3	Good

RABBIT GULCH CHAINING - STUDY NO. 17R-13



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Rabbit Gulch NE; Township 3S, Range 6W, Section 14
NAD 83 UTM ZONE 12, 540348 East 4451794 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	333° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From Strawberry River Road on US 40, drive east for 1.3 miles to a road on the left (north) side of the road (if coming from the east, drive 1.5 miles from the bridge over Starvation Reservoir). Turn left (north) onto this road and immediately turn right, then drive 0.3 miles to a road on the left. Turn left and continue for 0.8 miles to a fork where the pavement will end. From the fork, stay right and proceed for 0.3 miles to another fork. Stay left at the fork and drive 1.4 miles to the witness post on the right (east) side of the road. From the witness post, walk 150 feet at 152 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	5,840ft (1,780m)
Aspect	Southeast
Slope	2%
Sample Dates	07/29/2005, 07/29/2008, 06/26/2013, 08/02/2017, 07/29/2020

Table 17R-13.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Tordon, 2,4-D	Rabbit Gulch WMA Range Rehabilitation	66	June 2005	167
Chaining - Two-Way Ely	Rabbit Gulch WMA Range Rehabilitation	66	January 2006	167
Seeding - Aerial Before	Rabbit Gulch WMA Range Rehabilitation	66	November 2005	300
Seeding - Aerial After	Rabbit Gulch WMA Range Rehabilitation	66	January 2006	167

Table 17R-13.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Rabbit Gulch Greasewood			Aerial	Nov 2005	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	2.00	1.62
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.92	1.63
G	Leymus cinereus	Great Basin Wildrye	Trailhead	2.00	1.64
G	Psathyrostachys juncea	Russian Wildrye		2.00	1.70
F	Medicago sativa	Alfalfa	Spredor 4	1.00	0.93
F	Sanguisorba minor	Small Burnet		1.08	1.04
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.94
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	1.50	0.44

Mix Name			Application Type	Application Date	Acres
Rabbit Gulch - Browse			Aerial	Jan 2006	190
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Bassia prostrata	Forage Kochia	Beaver UT	1.05	0.71
S	Ericameria nana	Whitestem Rubber Rabbitbrush	Sanpete/Beaver	0.45	0.11

Wildlife Habitat and Vegetation History**Table 17R-13.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 17R-13.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Greasewood	No Encroachment
2008	Greasewood/Annual Forb	No Encroachment
2013	Greasewood/Annual Forb	No Encroachment
2017	Greasewood/Annual Grass	No Encroachment
2020	Greasewood/Annual Forb	No Encroachment

Site Notes

There is an oil/gas pad with storage tanks about 200 feet from this site.

Soils**Table 17R-13.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loamy Fine Sand	7.6	77.7	15.1	7.2	0.2	6.9	121.6	0.7	07/29/2005

Site Potential

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semidesert Alkali Loam (Black Greasewood/Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY213UT
States and Transitions	No state and transition model is available for this ecological site.

This study was established in 2005 in conjunction with a range rehabilitation treatment (Table 17R-13.1). Despite treatment, however, the browse component has remained dominated by greasewood (*Sarcobatus vermiculatus*). Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is also present, but contributes much less cover than greasewood with density decreasing substantially since 2005 (Table 17R-13.6, Table 17R-13.12, Table 17R-13.13). The introduced annual forb prickly Russian thistle (*Salsola tragus*) and the introduced annual grass species cheatgrass (*Bromus tectorum*) have had significant fluctuations in cover and abundance, and at times have been considered to be co-dominant vegetation components with greasewood. Perennial grasses have remained rare, and perennial forbs have not been observed in any sample year (Table 17R-13.7, Table 17R-13.10, Table 17R-13.11).

Trend Summary Tables**Table 17R-13.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	0.5	5.9	-	0.3	9.8	-
2008	0.6	3.9	-	0.7	5.5	-
2013	0.2	6.6	-	3.7	8.1	-
2017	0.2	7.0	-	1.0	11.0	-
2020	0.2	11.1	-	0.1	14.2	-

Table 17R-13.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	63	20	345	-	0.8	1.0	14.5	-
2008	80	34	337	-	0.6	0.7	35.6	-
2013	136	6	374	-	2.5	0.3	20.0	-
2017	380	17	168	-	25.9	0.6	8.8	-
2020	186	10	292	-	8.5	0.5	20.5	-

Table 17R-13.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	28.3	18.3	44.4	0.2	0.1	18.4
2008	25.3	6.3	42.5	0.1	-	40.0
2013	23.6	5.6	50.7	0.0	-	33.5
2017	13.3	8.7	54.0	-	0.3	42.5
2020	14.4	15.2	64.1	0.0	0.5	39.2

Table 17R-13.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2005	-	15	7	-	70
2008	-	13	-	-	54
2013	-	6	-	-	3
2017	-	5	-	-	70
2020	-	18	3	-	31
Days Use Per Acre (ha)					
2005	-	52.3 (129.1)	10.7 (26.5)	-	-
2008	-	24.8 (61.2)	19.4 (48.0)	-	-
2013	-	5.3 (13.2)	-	-	-
2017	-	30.2 (74.5)	0.7 (1.7)	0.6 (1.4)	-
2020	5.1 (12.6)	33.5 (82.8)	2.0 (5.0)	-	-

Table 17R-13.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Psathyrostachys juncea ⁱ (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (sixweeks fescue)
year	Nested Frequency							
2005	-	3	4	5	-	-	12	63
2008	5	3	4	3	-	7	15	78
2013	1	70	-	1	0	1	3	100
2017	-	367	1	1	4	4	7	82
2020	2	175	2	1	5	-	-	15
year	Average Cover (%)							
2005	-	0.2	0.2	0.5	-	-	0.3	0.6
2008	0.2	0.0	0.0	0.2	-	0.0	0.3	0.6
2013	0.0	2.3	-	0.1	0.1	0.0	0.1	0.2
2017	-	25.2	0.0	0.0	0.4	0.2	0.1	0.7
2020	0.1	8.3	0.0	0.0	0.3	-	-	0.2

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

Table 17R-13.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Bassia scoparia ^{ai} (bumingbush)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cleome lutea ^a (yellow spiderflower)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha ^a (annual cryptantha)	Descurainia pinnata ^a (western tansymustard)	Epilobium brachycarpum ^a (tall annual willowherb)	Eriogonum cernuum ^a (nodding buckwheat)	Halogeton glomeratus ^{ai} (saltlover)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium ^a (pepperweed)	Malcolmia africana ^{ai} (African mustard)	Mentzelia albicaulis ^a (whitestem blazingstar)
year	Nested Frequency																
2005	18	1	1	153	23	5	41	-	141	-	12	5	-	200	-	40	9
2008	-	9	-	5	1	1	-	-	11	1	4	89	-	113	-	-	31
2013	-	19	11	6	3	9	2	140	8	1	-	44	4	12	6	18	45
2017	1	11	-	-	-	1	-	13	10	-	-	0	1	75	17	-	-
2020	-	19	4	-	-	-	-	-	-	-	-	22	-	-	-	-	-
year	Average Cover (%)																
2005	0.2	0.0	0.0	2.8	0.1	0.0	0.1	-	2.0	-	0.1	0.0	-	4.8	-	1.2	0.2
2008	-	0.3	-	0.0	0.0	0.0	-	-	0.1	0.0	0.1	4.8	-	3.8	-	-	1.6
2013	-	0.1	0.2	0.1	0.0	0.3	0.0	1.0	0.0	0.0	-	1.0	0.0	0.0	0.0	0.4	0.7
2017	0.0	0.5	-	-	-	0.0	-	0.1	0.9	-	-	0.1	0.0	1.1	0.1	-	-
2020	-	0.9	0.0	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-

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

FORB SPECIES				
<i>Oenothera pallida</i> ^a (pale evening primrose)				
<i>Plantago patagonica</i> ^a (woolly plantain)				
<i>Salsola tragus</i> ^{ai} (prickly Russian thistle)				
<i>Sisymbrium altissimum</i> ^{ai} (tall tumblemustard)				
year	Nested Frequency			
2005	44	3	74	-
2008	1	4	275	1
2013	2	6	310	21
2017	24	17	18	44
2020	-	8	256	4
year	Average Cover (%)			
2005	0.8	0.0	2.2	-
2008	0.4	0.0	24.3	0.0
2013	0.1	0.0	16.0	0.1
2017	0.8	0.0	2.1	3.2
2020	-	0.4	18.6	0.0

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

Table 17R-13.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> ^p (Wyoming big sagebrush)					
<i>Atriplex confertifolia</i> ^p (shadscale saltbush)					
<i>Opuntia polyacantha</i> (plains pricklypear)					
<i>Sarcobatus vermiculatus</i> (greasewood)					
<i>Suaeda moquimi</i> (Mojave seablite)					
year	Line Intercept Cover (%)				
2005	0.3	-	1.5	8.3	-
2008	0.7	-	-	5.5	-
2013	3.7	-	-	8.1	-
2017	1	-	-	11	-
2020	0.1	-	0.9	13.1	0.2
year	Quadrat Cover (%)				
2005	0.5	-	0.8	5.0	-
2008	0.5	0.1	-	3.9	-
2013	0.2	-	-	6.6	-
2017	0.2	-	-	7.0	-
2020	0.2	-	0.0	10.1	1.0

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

Table 17R-13.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

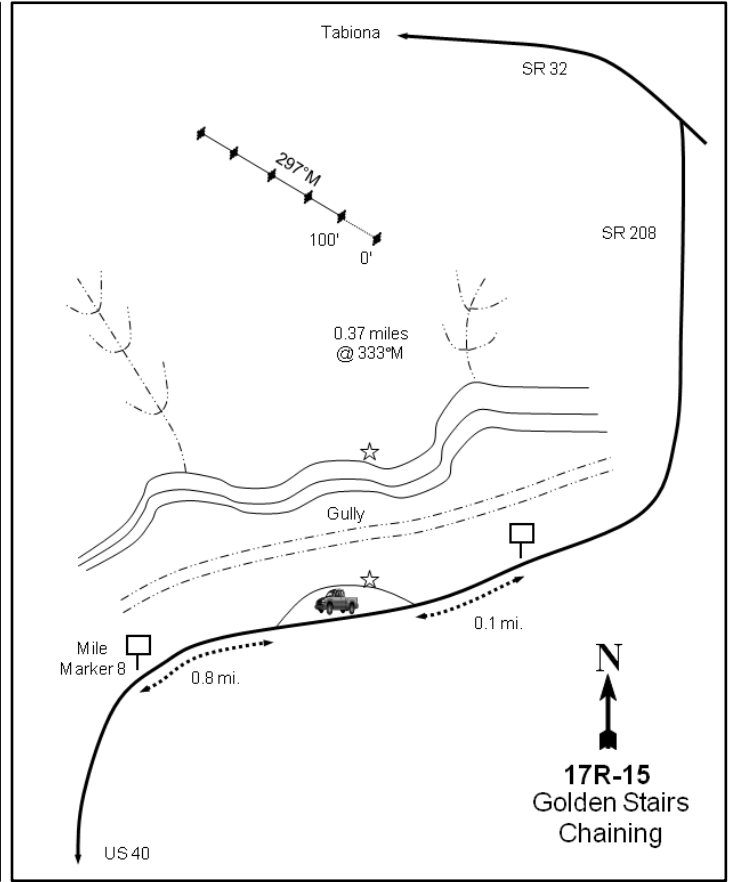
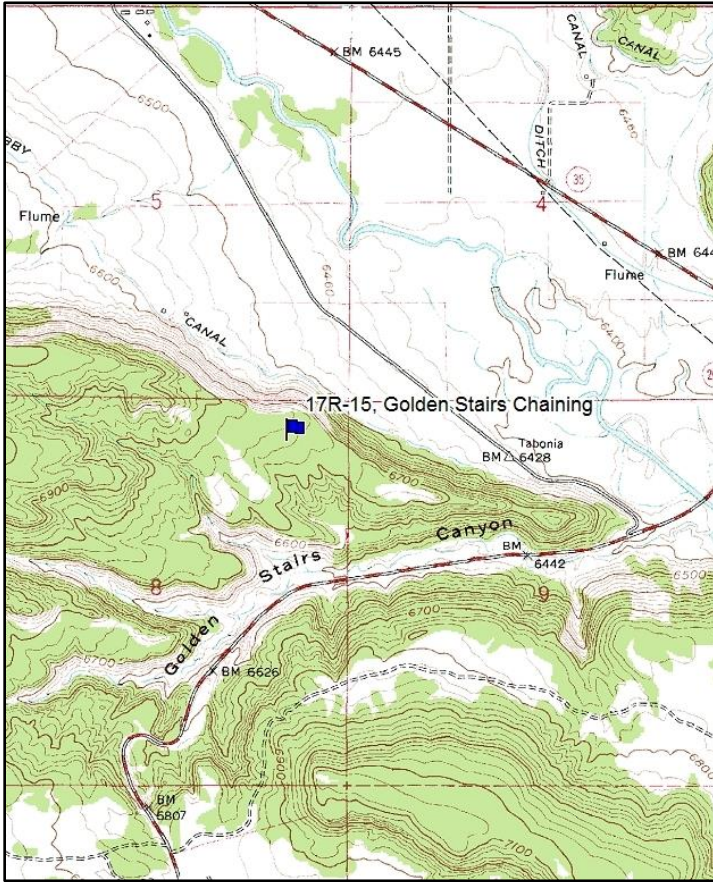
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2005	540	5340	63	4	33	0	0	26	87/82
2008	280	-	64	36	0	0	0	0	67/66
2013	260	-	0	100	0	77	0	77	81/102
2017	220	-	18	46	36	36	9	36	87/94
2020	100	-	40	20	40	60	40	40	88/108
Atriplex canescens^p -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	125/195
Atriplex confertifolia^p -- (shadscale saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	110/125
2017	-	-	-	-	-	-	-	-	84/111
2020	-	-	-	-	-	-	-	-	128/197
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	60/70
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	57/70
2020	-	-	-	-	-	-	-	-	47/39
Gutierrezia sarothrae -- (broom snakeweed)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	24/33
2020	-	-	-	-	-	-	-	-	-/-
Opuntia polyacantha -- (plains pricklypear)									
2005	820	-	0	88	12	0	0	7	18/72
2008	20	-	0	0	100	0	0	100	-/-
2013	20	-	0	100	0	0	0	0	13/38
2017	40	-	0	100	0	0	0	0	16/47
2020	100	-	40	60	0	0	0	0	17/66
Sarcobatus vermiculatus -- (greasewood)									
2005	720	420	11	36	53	0	0	94	124/157
2008	320	-	13	88	0	0	0	0	84/115
2013	260	-	0	100	0	0	0	8	109/195
2017	680	20	59	41	0	3	0	0	108/179
2020	400	-	20	80	0	0	0	5	135/212
Suaeda moquinii -- (Mojave seablite)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	40	-	0	100	0	0	0	0	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	40	20	0	100	0	0	0	100	50/56

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

Table 17R-13.15 – Deer Desirable Components Index: Low Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2005	0.4	0	0	2.1	-0.6	0	0	1.9	Very Poor
2008	0.9	0	0	1.4	-0.5	0	0	1.7	Very Poor
2013	4.6	0	0	0.7	-1.9	0	0	3.4	Very Poor
2017	1.3	0	0	1.2	-19.4	0	0	-16.9	Very Poor
2020	0.1	0	0	1	-6.4	0	0	-5.3	Very Poor

GOLDEN STAIRS CHAINING - STUDY NO. 17R-15



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Tabiona NW; Township 2S, Range 7W, Section 08
NAD 83 UTM ZONE 12, 526077 East 4464013 North

Transect Information

Browse Tag # (0' Stake)	85
Transect Bearing	297° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From the junction of US 40 and State Route (SR) 208, drive north on SR-208 to mile marker 8. Drive 0.8 miles past the mile marker to a pullout on the left (north) side of the road: park at this pullout (there is a sign just 0.1 miles north of the pullout). From the pullout, walk 0.37 miles at 333 degrees magnetic to the 0-foot stake. There are some steep cliffs to the right and some less steep cliffs on the left: go between the cliffs to a big wash valley. The 0-foot stake is marked with browse tag #85.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,770ft (2,063m)
Aspect	Southeast
Slope	5%
Sample Dates	08/01/2005, 07/31/2008, 06/25/2013, 08/01/2017, 07/27/2020

Table 17R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Golden Stairs Range Rehabilitation	52	October-November 2005	170
Seeding - Aerial Before	Golden Stairs Range Rehabilitation	52	September 2005	170
Seeding - Dribbler	Golden Stairs Range Rehabilitation	52	November 2005	170
Seeding - Aerial After	Golden Stairs Range Rehabilitation	52	December 2005	170
Hand Crew - Lop and Scatter	Tabby Mountain Chaining Maintenance	2570	October 2013	2200

Table 17R-15.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Golden Stairs P/J Chaining			Aerial	Sep 2005	190
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.79	0.74
G	Dactylis glomerata	Orchardgrass	Paiute	0.53	0.48
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.05	0.90
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.53	0.49
G	Poa secunda	Canby Bluegrass	Canbar	0.26	0.21
G	Psathyrostachys juncea	Russian Wildrye		1.05	0.95
F	Linum perenne	Blue Flax		0.26	0.23
F	Medicago sativa	Alfalfa	Ladak+	0.53	0.50
F	Onobrychis viciifolia	Sainfoin	Eski	2.11	1.97
F	Sanguisorba minor	Small Burnet	Delar	1.05	0.99
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	1.05	0.51

Mix Name			Application Type	Application Date	Acres
Golden Stairs P/J Chaining Dribbler			Dribbler	Nov 2005	190
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.13	0.06
S	Cercocarpus montanus	True Mountain Mahogany		0.13	0.10
S	Ephedra viridis	Green Ephedra		0.13	0.05
S	Purshia tridentata	Bitterbrush	Ada/Boise ID	0.13	0.11

Mix Name			Application Type	Application Date	Acres
Golden Stair - Browse			Aerial	Dec 2005	190
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.05	0.31
S	Bassia prostrata	Forage Kochia	Millard UT	1.05	0.67

Wildlife Habitat and Vegetation History**Table 17R-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 17R-15.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon-Juniper	Phase III
2008	Perennial Grass	Phase I
2013	Perennial Grass	Phase I
2017	Perennial Grass	Phase I
2020	Perennial Grass	Phase I

Site Notes

An estimated 55 acres of scattered islands of twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were left unchained within the treatment area to provide wildlife with protective cover. The study transect ran through an untreated island of the treatment, and as such, parts of belts two and three were not treated.

Soils**Table 17R-15.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.6	57.0	27.4	15.6	2.0	3.5	89.6	0.8	08/01/2005

Site Potential

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

When the study was established in 2005, this site was encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was considered to be within Phase III of woodland succession; very few browse species were present. Following the chaining and seeding treatment (Table 17R-15.1), much of the tree cover was removed and the browse component increased in both diversity and cover; the site has remained in Phase I of woodland succession in all years following the treatment (Table 17R-15.4, Table 17R-15.12, Table 17R-15.13, Table 17R-15.14, Photos). A mixture of native and introduced perennial grasses, including thickspike wheatgrass (*Elymus lanceolatus*) and crested wheatgrass (*Agropyron cristatum*), has been the dominant vegetation component in post-treatment sample years. Annual grasses have remained rare. In addition, perennial and annual forbs have not been abundant in any sample year (Table 17R-15.7, Table 17R-15.10, Table 17R-15.11).

Trend Summary Tables**Table 17R-15.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	0.1	1.3	12.6	1.0	1.6	23.5
2008	0.5	1.4	3.0	1.2	1.6	3.3
2013	0.5	0.9	3.8	1.1	2.3	5.7
2017	1.6	2.6	0.9	1.9	4.0	2.4
2020	1.3	2.8	3.1	2.6	2.9	3.1

Table 17R-15.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	18	261	174	52	0.3	9.1	2.4	0.7
2008	70	290	99	66	0.6	15.6	1.6	1.5
2013	61	367	22	101	0.1	12.2	0.1	1.2
2017	38	376	147	83	0.6	18.9	1.5	1.3
2020	53	349	4	42	0.7	24.2	0.0	0.3

Table 17R-15.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	40.2	6.6	39.0	1.6	1.3	22.9
2008	38.8	2.4	47.7	1.2	2.0	20.3
2013	29.5	0.1	54.0	0.5	3.1	25.1
2017	32.0	0.4	43.8	1.8	2.6	29.8
2020	27.6	2.9	51.4	6.4	4.2	33.5

Table 17R-15.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2005	-	6	22	-	56
2008	-	20	15	-	30
2013	-	5	12	2	14
2017	-	10	29	3	29
2020	-	26	14	-	13
Year	Days Use Per Acre (ha)				
2005	4.4 (10.8)	13.4 (33.1)	41.5 (102.6)	-	-
2008	-	30.8 (76.1)	26.8 (66.2)	-	-
2013	-	8.1 (19.9)	63.7 (157.3)	1.7 (4.3)	-
2017	-	142.1 (350.9)	14.1 (34.8)	-	-
2020	-	45.6 (112.6)	25.5 (62.9)	1.7 (4.3)	-

Table 17R-15.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency													
2005	26	-	-	18	8	-	-	-	211	68	41	30	-	-
2008	77	47	1	70	17	-	-	23	154	57	51	20	1	-
2013	108	102	1	61	10	2	1	151	32	135	14	20	16	11
2017	65	85	-	38	8	6	20	258	18	88	7	5	12	2
2020	51	84	3	53	17	-	19	214	11	45	3	29	12	27
year	Average Cover (%)													
2005	0.5	-	-	0.3	0.6	-	-	-	6.2	0.9	0.2	0.7	-	-
2008	2.6	0.9	0.1	0.6	1.0	-	-	0.7	7.3	1.9	0.7	0.3	0.1	-
2013	1.8	2.6	0.0	0.1	0.2	0.0	0.0	3.0	0.7	3.2	0.2	0.1	0.3	0.1
2017	2.9	3.5	-	0.6	0.2	0.1	0.4	7.9	0.3	3.0	0.1	0.0	0.6	0.1
2020	2.3	6.9	0.0	0.7	0.6	-	1.3	9.4	1.3	1.2	0.0	0.3	0.2	0.7

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

Table 17R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcress)	Artemisia dracunculus (tarragon)	Astragalus chamaeleuce var. chamaeleuce (cicada milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericooides (rose heath)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Draba ^a (draba)	Eriogonum cernuum ^a (nodding buckwheat)	Gilia inconspicua ^a (shy gilia)	Ipomopsis congesta (ballhead ipomopsis)
year	Nested Frequency																
2005	-	7	-	-	0	-	-	4	15	10	96	20	55	36	13	-	11
2008	-	3	-	-	-	1	-	1	-	20	6	9	8	4	24	-	13
2013	10	16	1	-	2	-	3	1	-	-	-	26	12	-	-	-	1
2017	41	7	-	2	1	-	-	5	2	-	-	20	78	17	3	4	-
2020	-	1	-	-	7	-	-	3	1	-	3	22	-	-	-	-	-
year	Average Cover (%)																
2005	-	0.2	-	-	0.0	-	-	0.1	0.5	0.2	0.4	0.1	0.5	0.2	0.0	-	0.1
2008	-	0.0	-	-	-	0.0	-	0.0	-	0.3	0.0	0.7	0.1	0.0	0.2	-	0.1
2013	0.0	0.0	0.0	-	0.1	-	0.0	0.0	-	-	-	0.4	0.0	-	-	-	0.0
2017	0.2	0.0	-	0.0	0.0	-	-	0.1	0.0	-	-	0.2	0.9	0.1	0.0	0.0	-
2020	-	0.0	-	-	0.0	-	-	0.0	0.0	-	0.0	0.2	-	-	-	-	-

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

FORB SPECIES													
<i>Lappula occidentalis</i> ^a (flatspine stickseed)													
<i>Lepidium montanum</i> ^a (mountain pepperweed)													
<i>Lesquerella</i> (bladderpod)													
<i>Linum perenne</i> ⁱ (blue flax)													
<i>Lygodesmia grandiflora</i> (largeflower skeletonplant)													
<i>Machaeranthera canescens</i> (hoary tansyaster)													
<i>Packera multilobata</i> (lobeleaf groundsel)													
<i>Polygonum douglasii</i> ^a (Douglas' knotweed)													
<i>Salsola tragus</i> ^{ai} (prickly Russian thistle)													
<i>Sanguisorba minor</i> ⁱ (small burnet)													
<i>Schoenocrambe linifolia</i> (flaxleaf plainsmustard)													
<i>Townsendia</i> (Townsend daisy)													
<i>Tragopogon dubius</i> ^{ai} (yellow salsify)													
year	Nested Frequency												
2005	25	2	3	-	-	-	-	19	-	-	12	-	-
2008	53	4	-	20	9	-	-	7	6	2	17	2	-
2013	2	-	-	52	-	-	1	-	-	-	7	11	-
2017	25	3	-	39	-	0	1	-	-	1	13	10	1
2020	-	-	-	5	-	-	-	-	-	-	-	6	-
year	Average Cover (%)												
2005	0.2	0.3	0.0	-	-	-	-	0.1	-	-	0.2	-	-
2008	0.6	0.0	-	0.4	0.0	-	-	0.0	0.5	0.0	0.3	0.0	-
2013	0.0	-	-	0.6	-	-	0.0	-	-	-	0.0	0.0	-
2017	0.2	0.0	-	0.8	-	0.0	0.0	-	-	0.1	0.0	0.0	0.0
2020	-	-	-	0.0	-	-	-	-	-	-	-	0.0	-

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

Table 17R-15.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES										
<i>Atriplex canescens</i> ^p (fourwing saltbush)										
<i>Bassia prostrata</i> ^{pi} (forage kochia)										
<i>Cercocarpus montanus</i> ^p (alderleaf mountain mahogany)										
<i>Ericameria nauseosa</i> (rubber rabbitbrush)										
<i>Eriogonum corymbosum</i> (crisp-leaf buckwheat)										
<i>Gutierrezia sarothrae</i> (broom snakeweed)										
<i>Juniperus osteosperma</i> ⁱ (Utah juniper)										
<i>Linanthus pungens</i> (granite prickly phlox)										
<i>Opuntia polyacantha</i> (plains pricklypear)										
<i>Pinus edulis</i> ⁱ (twoneedle pinyon)										
year	Line Intercept Cover (%)									
2005	-	-	1	-	1.2	-	12.8	-	0.4	10.7
2008	0.3	0.5	0.4	-	0.9	0.5	0.4	0.1	0.1	2.9
2013	-	0.8	0.3	-	2.1	-	1	-	0.2	4.7
2017	-	1.9	-	-	3.1	0.5	0.4	-	0.4	2
2020	0.3	1.9	0.4	0.6	1.1	0.5	0.6	0	0.7	2.5
year	Quadrat Cover (%)									
2005	-	-	0.1	-	0.4	0.1	3.2	-	0.7	9.4
2008	0.0	0.5	0.0	-	0.6	0.4	1.0	0.0	0.4	2.0
2013	-	0.5	0.0	-	0.5	0.1	1.5	0.0	0.3	2.3
2017	-	1.4	0.2	-	1.3	0.4	0.2	0.0	0.9	0.8
2020	0.0	1.3	0.0	0.0	1.1	0.7	0.2	0.0	1.1	3.0

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

Table 17R-15.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^P -- (mountain big sagebrush)									
2005	-	-	-	-	-	-	-	-	53/58
2008	20	-	0	100	0	0	0	0	31/15
2013	40	-	0	100	0	0	0	0	31/38
2017	40	-	0	100	0	0	100	0	33/48
2020	20	-	100	0	0	0	100	0	45/55
Atriplex canescens^P -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	1020	260	28	73	0	0	0	0	41/49
2013	-	-	-	-	-	-	-	-	64/78
2017	-	-	-	-	-	-	-	-	89/101
2020	20	-	0	100	0	0	0	0	96/127
Bassia prostrata^{PI} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	1100	180	6	93	2	7	0	0	23/29
2013	4820	300	68	32	0	24	0	0	20/24
2017	5820	20	1	99	0	0	0	0	14/21
2020	3040	20	45	55	0	22	55	0	15/28
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2005	60	-	0	0	100	0	100	33	111/92
2008	40	-	0	0	100	100	0	0	88/85
2013	40	-	0	100	0	50	0	0	86/92
2017	60	-	0	100	0	0	0	33	84/94
2020	40	-	0	100	0	0	100	50	74/82
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	- / -
2017	60	-	0	100	0	0	0	0	18/31
2020	-	-	-	-	-	-	-	-	-/-
Eriogonum corymbosum -- (crispleaf buckwheat)									
2005	260	80	0	92	8	31	0	8	45/69
2008	980	200	18	82	0	0	0	0	36/55
2013	1880	40	54	46	0	2	0	0	30/38
2017	1540	-	23	77	0	0	0	0	37/58
2020	1080	40	52	46	2	4	0	2	35/50
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	30/30
2017	-	-	-	-	-	-	-	-	38/54
2020	-	-	-	-	-	-	-	-	48/80
Gutierrezia sarothrae -- (broom snakeweed)									
2005	480	20	4	96	0	0	0	0	15/19
2008	760	20	0	97	3	0	0	0	18/27
2013	1360	60	84	16	0	0	0	0	14/17
2017	920	100	0	76	24	0	0	24	17/23
2020	1420	-	42	58	0	0	0	0	15/20

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus osteosperma^t -- (Utah juniper)									
2005	120	20	67	0	33	0	0	33	- / -
2008	60	-	33	67	0	0	0	0	- / -
2013	60	20	100	0	0	0	0	0	- / -
2017	80	-	75	25	0	0	0	0	- / -
2020	80	20	100	0	0	0	0	0	- / -
Krascheninnikovia lanata^p -- (winterfat)									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	34/52
2020	-	-	-	-	-	-	-	-	- / -
Linanthus pungens -- (granite prickly phlox)									
2005	300	-	0	93	7	13	0	0	8/15
2008	160	-	0	100	0	0	0	0	11/15
2013	80	-	50	50	0	0	0	0	12/23
2017	200	-	0	100	0	0	0	0	9/18
2020	40	-	0	100	0	0	0	0	10/14
Opuntia polyacantha -- (plains pricklypear)									
2005	1380	40	12	78	10	0	0	1	12/33
2008	1020	60	6	57	37	0	2	10	11/30
2013	1060	-	9	89	2	0	0	0	11/19
2017	1080	20	2	96	2	0	0	2	11/25
2020	1240	-	16	82	2	0	0	0	12/27
Pediocactus -- (pincushion cactus)									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	5/7
2020	-	-	-	-	-	-	-	-	- / -
Pinus edulis^t -- (twoneedle pinyon)									
2005	260	60	69	31	0	0	0	0	- / -
2008	200	40	70	30	0	0	0	30	- / -
2013	180	20	89	11	0	0	0	0	- / -
2017	60	20	0	100	0	0	0	0	- / -
2020	100	-	100	0	0	0	0	0	- / -

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

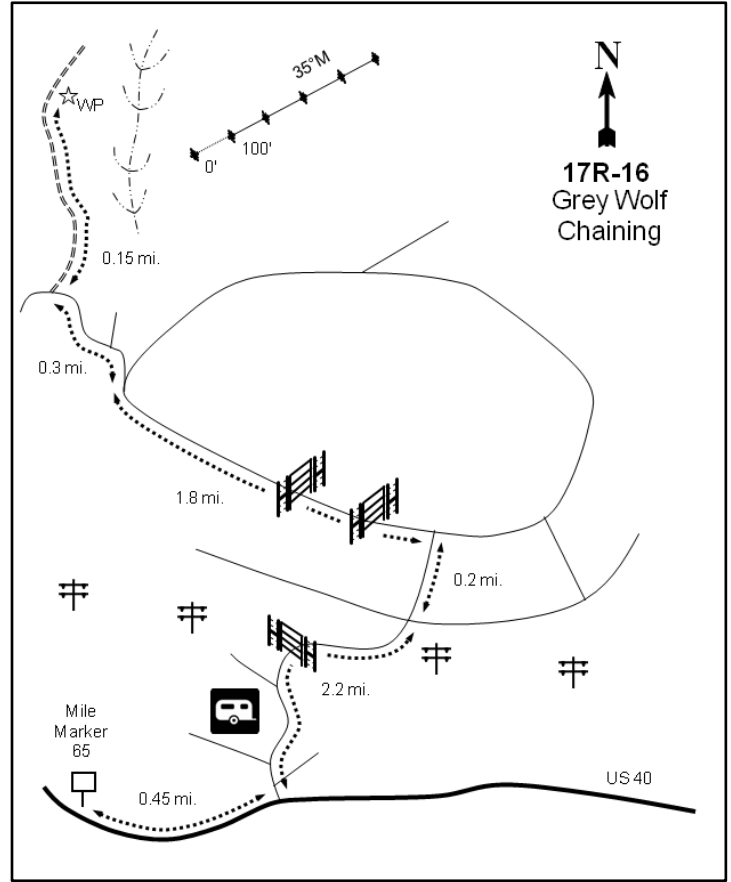
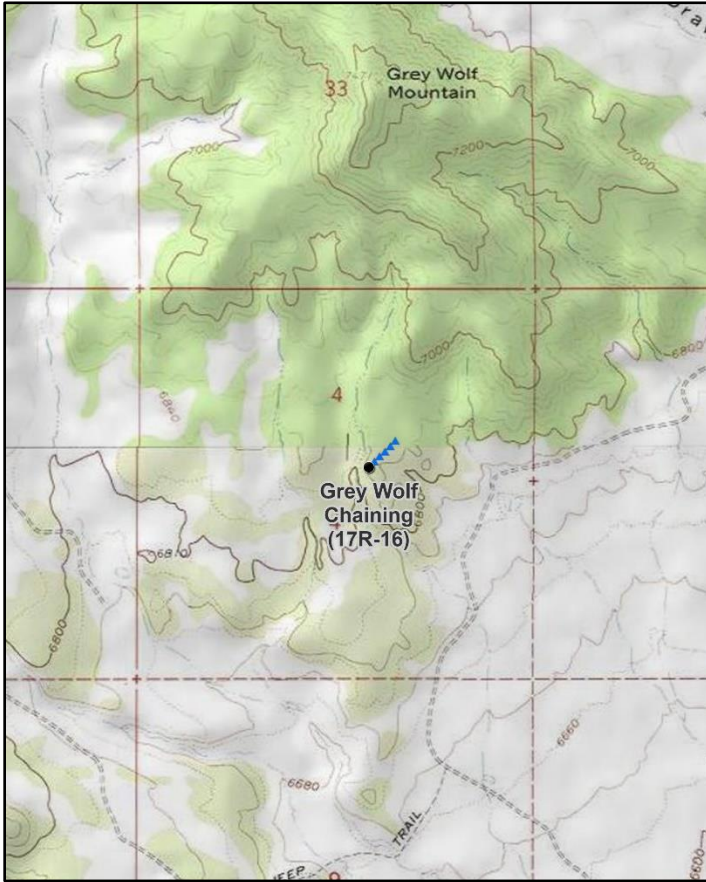
Table 17R-15.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2005	91	11	33	17	6	33	25.4
2008	76	31	15	15	8	31	26.1
2013	54	8	67	-	-	25	20.9
2017	63	29	36	14	7	14	13.6
2020	70	7	64	7	7	14	19.5
Pinus edulis (twoneedle pinyon)							
2005	251	10	35	25	10	20	12.7
2008	133	10	45	40	-	5	4.2
2013	70	12	53	29	6	-	5.1
2017	55	7	67	20	-	7	7.1
2020	48	7	71	7	7	7	8.2

Table 17R-15.15 – Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2005	1.5	0	0	18.1	-0.2	1.4	0	20.9	Very Poor
2008	1.7	0	0	30	-0.4	3.1	0	34.4	Very Poor-Poor
2013	1.7	0	0	24.4	-0.1	2.3	0	28.3	Very Poor
2017	2.9	0	0	30	-0.4	2.7	0	35.1	Very Poor-Poor
2020	3.8	0	0	30	-0.5	0.6	0	33.9	Very Poor-Poor

GREY WOLF CHAINING - STUDY NO. 17R-16



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Fruitland NE; Township 3S, Range 8W, Section 04
NAD 83 UTM ZONE 12, 517755 East 4455435 North

Transect Information

Browse Tag # (0' Stake)	86
Transect Bearing	40° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From Fruitland, drive east on US-40 to mile marker 65. Continue 0.45 miles past the mile marker to a road on the left (north). Turn left onto this road and drive 2.2 miles past several trailers and through a gate to a fork. Stay left at the fork and drive 0.2 miles to another fork, passing through an enclosure. Take the left fork and proceed for 1.8 miles through a gate to a road on the left (west) side. Turn left and continue for 0.3 miles to a two-track on the right (which may be hard to see). Turn right (north) onto the two-track and drive for 0.15 miles to the witness post on the right (east) side of the road. From the witness post, walk 520 feet at 75 degrees magnetic to the 0-foot stake which is marked with browse tag #86.

Site Information

Land Ownership	State
Land Administrator	UDWR
Allotment	No data
Elevation	6,800ft (2,073m)
Aspect	Southwest
Slope	2-4%
Sample Dates	08/02/2005, 08/04/2008, 06/24/2013, 08/01/2017, 07/28/2020

Table 17R-16.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Grey Wolf Mountain Rehabilitation	93	October-November 2005	463
Seeding - Aerial Before	Grey Wolf Mountain Rehabilitation	93	October 2005	463
Seeding - Dribbler	Grey Wolf Mountain Rehabilitation	93	November 2005	463
Seeding - Aerial After	Grey Wolf Mountain Rehabilitation	93	February 2006	463
Hand Crew - Lop and Scatter	Tabby Mountain Chaining Maintenance	2570	October 2013	2200

Table 17R-16.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Grey Wolf Mtn. P/J Chaining			Aerial	Oct 2005	775
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.97	0.77
G	Dactylis glomerata	Orchardgrass	Paiute	0.15	0.13
G	Dactylis glomerata	Orchardgrass	Paiute	0.33	0.30
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.03	0.88
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	0.52	0.48
G	Poa secunda	Canby Bluegrass	Canbar	0.26	0.21
G	Psathyrostachys juncea	Russian Wildrye		0.97	0.87
F	Linum perenne	Blue Flax		0.26	0.22
F	Medicago sativa	Alfalfa	Ladak+	0.52	0.49
F	Onobrychis viciifolia	Sainfoin	Eski	2.39	2.24
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.89
S	Atriplex canescens	Fourwing Saltbush	Emery UT	0.52	0.27
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.39	0.19

Mix Name			Application Type	Application Date	Acres
Grey Wolf Mtn. P/J Chaining - Dribbler			Dribbler	Nov 2005	775
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Atriplex canescens	Fourwing Saltbush	Juab/Millard UT	0.06	0.03
S	Cercocarpus montanus	True Mountain Mahogany		0.03	0.02
S	Ephedra viridis	Green Ephedra		0.06	0.03
S	Purshia tridentata	Bitterbrush	Ada/Boise ID	0.03	0.03

Mix Name			Application Type	Application Date	Acres
Grey Wolf - Browse			Aerial	Feb 2006	610
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Sanpete UT	1.00	0.29
S	Bassia prostrata	Forage Kochia	Millard UT	1.00	0.63

Wildlife Habitat and Vegetation History**Table 17R-16.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 17R-16.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon-Juniper	Phase III
2008	Perennial Grass	Phase I
2013	Perennial Grass	Phase I
2017	Perennial Grass	Phase I
2020	Perennial Grass	Phase I

Site Notes

Scattered islands of twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were left unchained within the treatment area to provide wildlife with protective cover. The treatment area is near the Lower Red Creek sage-grouse lek.

Soils**Table 17R-16.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.6	49.4	32.7	17.8	2.4	8.4	115.2	0.4	08/02/2005

Site Potential

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

This site was in Phase III of woodland succession upon study establishment in 2005, being encroached by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*); shrubs were rare. However, diversity and cover of browse increased following treatment (Table 17R-16.1), with forage kochia (*Bassia prostrata*) and alderleaf mountain mahogany (*Cercocarpus montanus*) providing the most preferred browse cover (Table 17R-16.4, Table 17R-16.12, Table 17R-16.13, Table 17R-16.14, Photos). The herbaceous understory was sparse prior to treatment. However, perennial grasses, particularly Indian ricegrass (*Achnatherum hymenoides*), thickspike wheatgrass (*Elymus lanceolatus*), and Russian wildrye (*Psathrostachys juncea*), have generally increased in cover and have been the dominant vegetation component in all post-treatment sample years. Forbs have remained diverse and, although they initially increased following treatment, have since decreased in both cover and frequency (Table 17R-16.7, Table 17R-16.10, Table 17R-16.11). Tree infilling appears to be active within the community with cover and density increasing following each pinyon and juniper-targeted treatment in 2005 and 2013 (Table 17R-16.1, Table 17R-16.6, Table 17R-16.12, Table 17R-16.13).

Trend Summary Tables**Table 17R-16.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	0.3	2.2	0.7	1.8	1.3	21.5
2008	1.5	3.9	0.0	3.6	3.3	-
2013	2.8	1.3	0.4	4.2	2.6	0.5
2017	3.1	4.8	0.0	5.0	4.1	0.1
2020	3.7	6.1	0.0	4.6	4.6	0.2

Table 17R-16.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	-	147	126	73	-	2.3	1.9	1.3
2008	4	221	140	77	0.0	14.2	3.0	2.0
2013	-	324	41	63	-	13.0	0.4	1.0
2017	-	315	58	36	-	19.8	1.0	1.2
2020	0	288	6	24	0.0	18.9	0.1	0.5

Table 17R-16.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	51.8	2.7	38.3	1.9	1.9	8.0
2008	41.7	-	36.6	1.4	1.6	29.1
2013	42.7	-	41.8	0.1	1.6	24.8
2017	43.3	-	32.9	1.1	1.4	27.1
2020	38.9	-	39.8	0.6	1.7	30.6

Table 17R-16.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Owl	Rabbit
	Quadrat Frequency					
2005	-	-	12	22	-	56
2008	2	-	17	16	-	34
2013	1	-	7	27	-	23
2017	-	-	13	9	-	38
2020	-	-	25	16	-	23
Year	Days Use Per Acre (ha)					
2005	-	-	6.7 (16.6)	34.9 (86.1)	8.7 (21.5)*	-
2008	-	-	5.3 (13.2)	12.8 (31.5)	-	-
2013	2.9 (7.2)	-	6.7 (16.6)	73.0 (180.4)	-	-
2017	-	-	26.2 (64.6)	30.2 (74.5)	-	-
2020	-	8.7 (21.5)*	14.7 (36.4)	38.2 (94.4)	-	-

*Pellets per acre (ha)

Table 17R-16.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency													
2005	88	-	-	6	-	-	-	61	21	2	10	-	3	-
2008	77	44	4	-	3	3	87	3	23	5	5	43	13	-
2013	129	49	-	-	2	17	158	2	35	3	-	79	2	10
2017	108	8	-	3	-	18	150	-	41	16	1	103	1	7
2020	77	32	0	3	-	4	72	5	49	-	10	106	44	-
year	Average Cover (%)													
2005	0.8	-	-	0.0	-	-	-	0.9	0.5	0.0	0.1	-	0.0	-
2008	2.6	1.3	0.0	-	0.0	0.1	5.4	0.2	1.3	0.0	0.1	2.5	0.7	-
2013	5.3	0.7	-	-	0.0	0.2	3.0	0.1	0.9	0.0	-	2.6	0.0	0.1
2017	6.4	0.1	-	0.0	-	0.3	4.5	-	2.1	0.1	0.0	6.3	0.0	0.1
2020	4.8	1.0	0.0	0.0	-	0.0	2.0	0.0	1.8	-	0.1	7.6	1.6	-

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

Table 17R-16.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Arenaria (sandwort)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Caulanthus crassicaulis ^a (thickstem wild cabbage)	Chaetopappa ericoides (rose heath)	Chenopodium fremontii ^a (Fremont's goosefoot)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Chorispora tenella ^{ai} (crossflower)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua ^a (shy gilia)	Hedysarum boreale (Utah sweetvetch)
year	Nested Frequency																
2005	-	6	-	4	-	-	20	40	-	71	21	-	11	17	3	8	13
2008	-	6	-	1	7	-	14	25	3	-	9	1	10	24	3	18	7
2013	-	5	0	-	-	-	-	2	-	-	14	-	-	-	2	-	14
2017	-	3	0	-	3	1	-	1	-	2	2	-	20	-	-	-	9
2020	1	-	-	-	-	1	-	-	0	-	2	-	4	-	1	-	-
year	Average Cover (%)																
2005	-	0.0	-	0.0	-	-	0.5	0.3	-	0.5	0.1	-	0.1	0.0	0.1	0.0	0.8
2008	-	0.1	-	0.0	0.2	-	0.2	0.1	0.0	-	0.4	0.0	0.0	0.3	0.2	0.1	0.3
2013	-	0.0	0.0	-	-	-	-	0.0	-	-	0.0	-	-	-	0.0	-	0.5
2017	-	0.0	0.0	-	0.0	0.0	-	0.0	-	0.0	0.0	-	0.6	-	-	-	0.7
2020	0.0	-	-	-	-	0.0	-	-	0.0	-	0.0	-	0.1	-	0.0	-	-

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

FORB SPECIES	Ipomopsis congesta (ballhead ipomopsis)	Lappula occidentalis ^a (flatspine stickseed)	Lepidium montanum ^a (mountain pepperweed)	Lesquerella (bladderpod)	Linum perenne ⁱ (blue flax)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Onobrychis vicifolia ⁱ (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox hoodii (spiny phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Salsola tragus ^a (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sisymbrium altissimum ^a (tall tumblemustard)	Thelypodium integrifolium ^a (entireleaved thelypody)
year	Nested Frequency																
2005	-	10	12	-	-	-	-	-	12	1	13	1	-	-	7	-	18
2008	0	13	7	2	15	-	3	5	13	5	9	1	67	15	9	1	2
2013	-	2	-	4	16	-	1	-	-	4	3	-	41	3	8	-	-
2017	-	21	4	-	-	-	3	-	3	-	6	5	11	-	5	-	-
2020	-	2	0	-	-	2	4	9	-	3	4	-	-	-	-	-	-
year	Average Cover (%)																
2005	-	0.0	0.2	-	-	-	-	-	0.1	0.0	0.1	0.0	-	-	0.0	-	0.2
2008	0.0	0.1	0.0	0.0	0.2	-	0.0	0.2	0.1	0.0	0.1	0.0	1.5	0.5	0.0	0.0	0.4
2013	-	0.0	-	0.0	0.1	-	0.0	-	-	0.0	0.1	-	0.4	0.0	0.0	-	-
2017	-	0.3	0.0	-	-	-	0.1	-	0.0	-	0.0	0.0	0.1	-	0.0	-	-
2020	-	0.0	0.0	-	-	0.0	0.0	0.4	-	0.0	0.0	-	-	-	-	-	-

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

FORB SPECIES	Townsendia (Townsend daisy)	Tragopogon dubius ^a (yellow salsify)	Vicia americana (American vetch)
year	Nested Frequency		
2005	-	-	-
2008	1	-	-
2013	-	-	3
2017	-	1	5
2020	-	-	0
year	Average Cover (%)		
2005	-	-	-
2008	0.0	-	-
2013	-	-	0.1
2017	-	0.0	0.4
2020	-	-	0.0

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

Table 17R-16.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Atriplex canescens ^p (fourwing saltbush)	Bassia prostrata ^{pi} (forage kochia)	Cercocarpus montanus ^p (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi (Parry's rabbitbrush)	Eriogonum corymbosum (crisp-leaf buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)
year	Line Intercept Cover (%)											
2005	-	-	-	1.8	-	-	-	1.1	0.2	14.6	-	6.9
2008	0	0.2	3	0.4	-	-	-	2.4	0.9	-	-	-
2013	0.6	0.8	1.5	1.3	-	0.2	-	2.4	-	0.5	-	-
2017	0.7	0.9	2.1	1.3	0	0.2	0.1	3.2	0.6	0.1	-	-
2020	0.8	1	1.6	1.2	-	0.3	-	3.2	1.1	0.1	-	0.1
year	Quadrat Cover (%)											
2005	-	-	-	0.3	-	-	-	1.6	0.6	0.7	0.0	0.0
2008	0.0	0.0	1.4	0.0	0.0	-	-	3.0	0.8	-	-	0.0
2013	0.0	0.6	1.2	1.0	-	0.0	-	1.1	0.0	0.4	0.1	0.0
2017	0.1	0.2	1.7	1.0	0.1	0.4	0.1	3.4	0.7	0.0	0.0	-
2020	0.1	1.1	1.7	0.8	-	0.6	-	4.1	1.5	0.0	-	0.0

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

Table 17R-16.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^p -- (black sagebrush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	15/36
2013	-	-	-	-	-	-	-	-	-/-
2017	20	-	0	100	0	0	0	0	-/-
2020	-	-	-	-	-	-	-	-	33/68
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2005	-	-	-	-	-	-	-	-	30/32
2008	100	20	100	0	0	0	0	0	27/39
2013	240	-	17	83	0	25	58	8	30/37
2017	200	-	0	100	0	20	0	0	43/57
2020	180	-	0	100	0	56	22	0	56/71
Atriplex canescens^p -- (fourwing saltbush)									
2005	-	-	-	-	-	-	-	-	-/-
2008	80	-	50	25	25	0	0	0	80/69
2013	40	-	0	50	50	0	0	50	79/89
2017	60	-	0	100	0	0	0	0	75/85
2020	40	-	0	50	50	50	0	50	89/110
Bassia prostrata^{pi} -- (forage kochia)									
2005	-	-	-	-	-	-	-	-	-/-
2008	1740	100	26	74	0	2	1	0	44/51
2013	3060	120	24	77	0	9	21	3	16/26
2017	2640	20	1	99	0	0	0	0	19/32
2020	1700	40	6	93	1	0	0	5	17/25

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Cercocarpus montanus^P -- (alderleaf mountain mahogany)									
2005	200	-	0	100	0	20	80	0	95/99
2008	120	-	17	67	17	33	50	0	68/80
2013	140	-	29	71	0	0	57	0	66/78
2017	100	-	0	100	0	0	40	20	76/84
2020	100	-	0	100	0	40	20	0	78/91
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2005	20	-	0	100	0	0	0	0	16/27
2008	40	60	0	100	0	0	0	0	22/34
2013	20	-	0	100	0	0	0	0	47/73
2017	160	-	0	100	0	0	0	0	14/26
2020	20	-	0	100	0	0	0	0	- / -
Eriogonum corymbosum -- (crispleaf buckwheat)									
2005	1300	480	35	62	3	22	11	0	38/47
2008	3560	980	38	57	5	0	0	0	29/45
2013	3760	100	50	51	0	32	9	0	32/43
2017	3700	-	16	84	0	4	1	0	32/40
2020	2640	20	14	83	3	33	5	10	37/46
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	120	-	67	33	0	67	17	0	24/34
2017	-	-	-	-	-	-	-	-	61/115
2020	220	-	0	100	0	0	0	0	29/40
Ericameria parryi -- (Parry's rabbitbrush)									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	200	-	0	100	0	0	0	0	19/36
2020	20	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2005	880	-	7	89	5	0	0	0	15/20
2008	720	-	8	92	0	0	0	0	20/35
2013	220	-	73	27	0	0	0	0	13/17
2017	800	100	3	98	0	0	0	0	15/21
2020	1780	120	25	75	0	0	0	0	17/27
Juniperus osteosperma¹ -- (Utah juniper)									
2005	40	-	50	50	0	0	0	0	- / -
2008	20	20	100	0	0	0	0	0	- / -
2013	60	-	67	33	0	0	0	0	- / -
2017	60	80	67	0	33	0	0	0	- / -
2020	120	-	100	0	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2005	-	-	-	-	-	-	-	-	7/13
2008	-	-	-	-	-	-	-	-	10/21
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
2020	-	-	-	-	-	-	-	-	13/11
Opuntia -- (pricklypear)									
2005	80	-	0	75	25	0	0	25	9/39
2008	40	-	100	0	0	0	0	0	8/20
2013	20	-	0	100	0	0	0	0	9/18
2017	20	-	0	100	0	0	0	0	12/36
2020	-	-	-	-	-	-	-	-	13/30

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pinus edulis^t -- (twoneedle pinyon)									
2005	120	40	67	33	0	0	0	0	- / -
2008	-	40	0	0	0	0	0	0	- / -
2013	40	40	100	0	0	0	0	0	- / -
2017	-	-	-	-	-	-	-	-	- / -
2020	20	-	100	0	0	0	0	0	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2005	-	-	-	-	-	-	-	-	24/155
2008	-	-	-	-	-	-	-	-	42/36

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

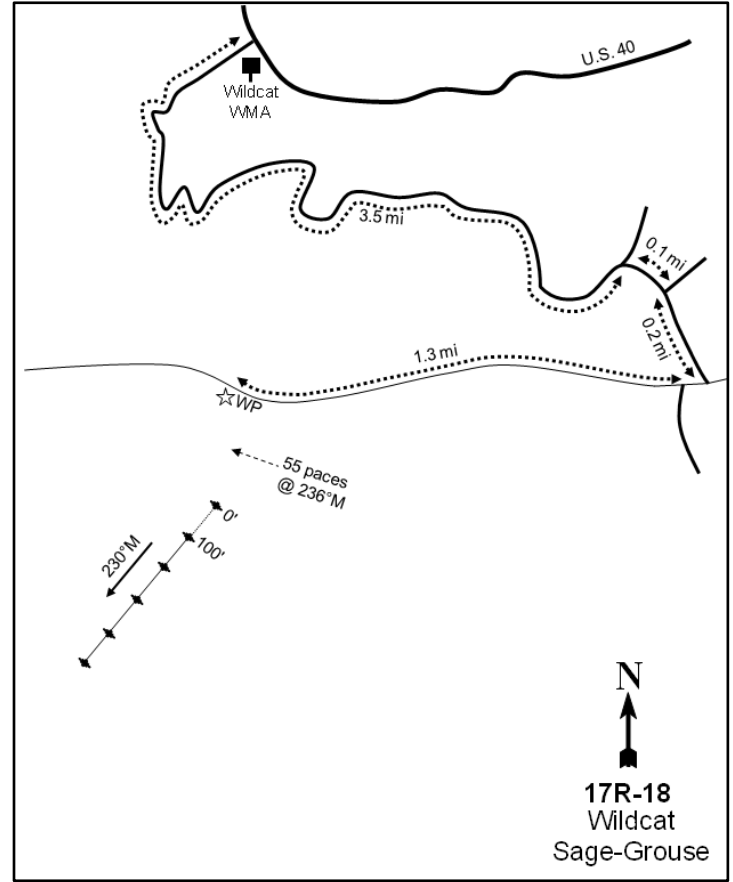
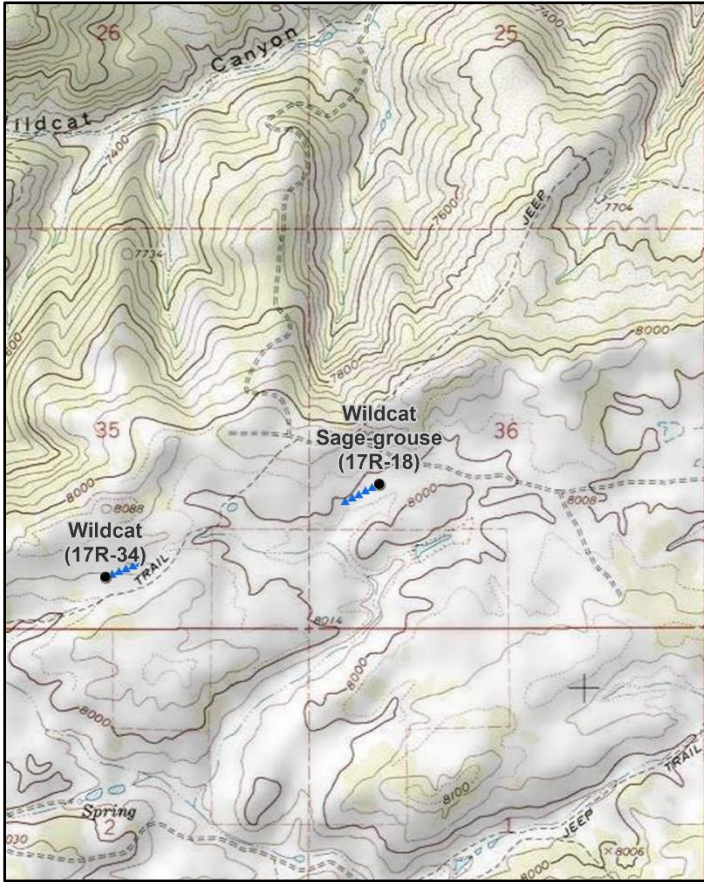
Table 17R-16.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2005	70	5	-	5	21	68	62.3
2008	5	-	100	-	-	-	31.0
2013	20	45	45	-	-	9	14.2
2017	20	83	17	-	-	-	1.2
2020	8	83	17	-	-	-	1.8
Pinus edulis (twoneedle pinyon)							
2005	48	20	7	13	7	53	23.3
2008	8	17	83	-	-	-	3.7
2013	16	75	13	13	-	-	3.5
2017	1	-	100	-	-	-	2.0
2020	3	33	67	-	-	-	2.7

Table 17R-16.15 – Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2005	2.7	0	0	4.7	0	2.5	0	9.9	Very Poor
2008	5.4	0	0	28.4	0	3.9	0	37.6	Poor
2013	6	0	0	26	0	2	0	33.9	Very Poor-Poor
2017	7.1	0	0	30	0	2.5	0	39.6	Poor
2020	6.5	0	0	30	0	1	0	37.5	Poor

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

Wildlife Habitat and Vegetation History**Table 17R-18.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 17R-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

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). In addition, perennial forbs are diverse and fairly 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.

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	-

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

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

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
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)*	-	-

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)	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)	Poa pratensis ⁱ (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency															
2005	39	45	3	164	-	15	24	5	319	13	62	41	-	58	49	-
2012	74	34	15	242	-	-	1	83	399	9	113	120	22	43	50	-
2015	21	24	26	166	6	-	71	36	356	43	24	108	7	7	57	7
2020	37	29	6	223	1	5	13	64	373	11	99	18	-	-	3	13
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	0.4	-
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	0.9	-
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	3.7	0.1
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	-	-	0.1	0.4

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 (pygmy flower rockjasmine)	Antennaria (pussytoes)	Arabis (rockcross)	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)	Iris missouriensis (Rocky Mountain iris)	Lactuca serriola ^a (prickly lettuce)
year	Nested Frequency																
2005	164	1	-	31	-	-	9	-	-	11	-	-	-	112	4	-	-
2012	163	5	123	35	-	-	-	-	4	13	7	-	2	62	4	2	2
2015	173	-	16	41	4	5	3	2	-	21	-	5	-	41	0	3	6
2020	154	3	-	27	1	-	3	-	1	17	-	-	3	24	-	-	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	0.0	0.0
2015	1.7	-	0.1	1.5	0.0	0.0	0.0	0.0	-	1.0	-	0.0	-	0.9	0.0	0.0	0.1
2020	2.5	0.0	-	0.6	0.0	-	0.0	-	0.0	0.2	-	-	0.0	0.4	-	-	0.0

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

FORB SPECIES	Lupinus caespitosus var. utahensis (Utah lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis ^a (slender phlox)	Orthocarpus tolmiei ^a (Tolmie's owl's-clover)	Pedicularis groenlandica (elephanthead lousewort)	Penstemon watsonii (Watson's penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Potentilla (cinquefoil)	Potentilla gracilis (slender cinquefoil)	Potentilla hippiana (woolly cinquefoil)	Potentilla pennsylvanica (Pennsylvania cinquefoil)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Silene drummondii (Drummond's campion)	Solidago multiradiata (Rocky Mountain goldenrod)	Symphotrichum (aster)	Taraxacum officinale (common dandelion)
year	Nested Frequency																
2005	40	-	2	135	0	80	20	29	29	48	-	-	-	-	-	151	18
2012	95	-	-	10	5	105	7	2	-	47	8	6	2	-	-	171	12
2015	1	3	-	14	-	20	4	-	-	33	24	4	5	1	7	200	2
2020	86	-	-	89	2	16	22	71	-	17	17	7	5	-	-	270	-
year	Average Cover (%)																
2005	0.7	-	0.0	1.2	0.0	2.0	0.2	0.1	0.8	1.5	-	-	-	-	-	4.3	0.1
2012	0.8	-	-	0.0	0.0	0.8	0.0	0.0	-	0.5	0.2	0.1	0.0	-	-	1.5	0.0
2015	0.0	0.0	-	0.1	-	0.1	0.0	-	-	0.5	0.6	0.1	0.0	0.0	0.1	6.4	0.0
2020	2.1	-	-	0.4	0.0	0.1	0.0	0.2	-	0.2	0.5	0.3	0.0	-	-	9.3	-

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

FORB SPECIES	Trifolium (clover)
year	Nested Frequency
2005	-
2012	32
2015	2
2020	-
year	Average Cover (%)
2005	-
2012	0.1
2015	0.0
2020	-

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	Line Intercept Cover (%)					
	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
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

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			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
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
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
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
Dasiphora fruticosa -- (shrubby cinquefoil)									
2005	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	24/44
2015	-	-	-	-	-	-	-	-	49/87
2020	-	-	-	-	-	-	-	-	-/-
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

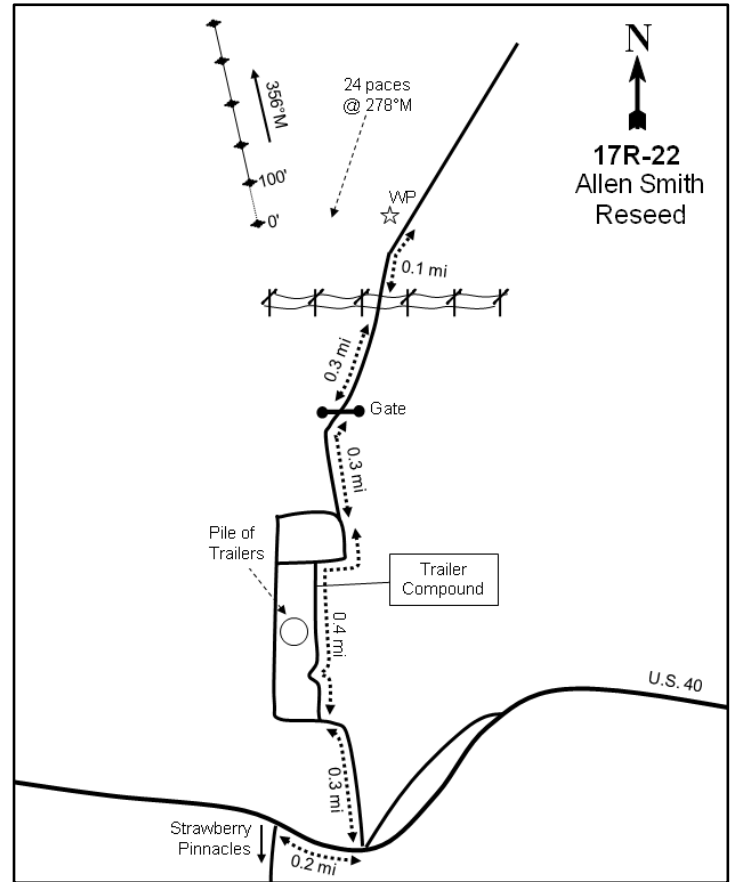
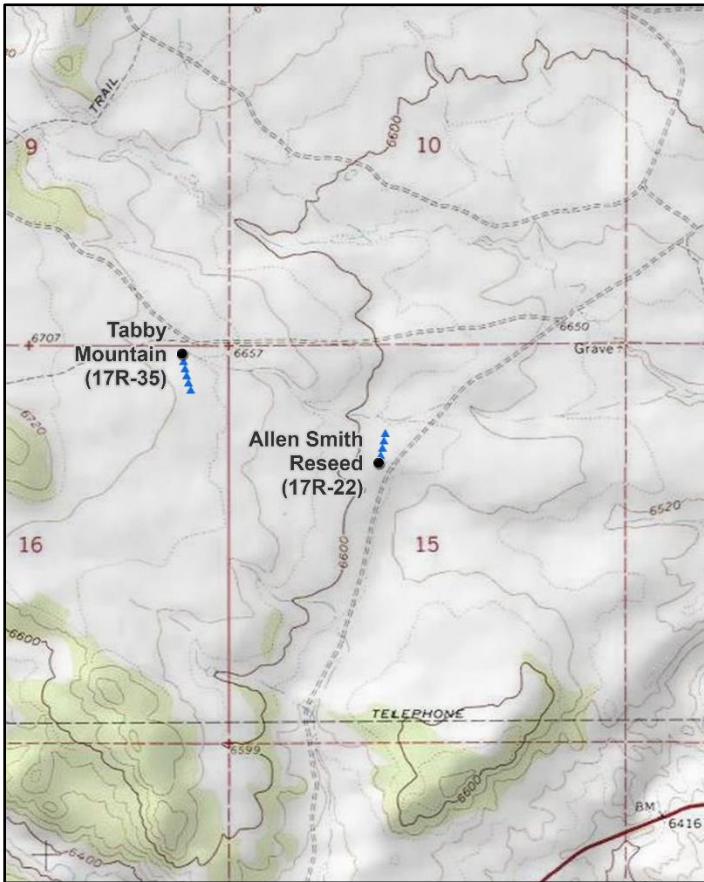
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ribes^p -- (currant)									
2005	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	86/163
2015	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Ribes cereum^p -- (wax currant)									
2005	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	79/143

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

Table 17R-18.15 – Deer Desirable Components Index: High Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2005	28.5	11.7	4.6	30	0	10	0	84.8	Good
2012	18.9	7.9	5.3	30	0	10	0	72	Good
2015	30	8.9	7.3	30	0	10	0	86.2	Good
2020	29.1	7.8	3.6	30	0	10	0	80.5	Good

ALLEN SMITH RESEED - STUDY NO. 17R-22

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Fruitland NE; Township 3S, Range 8W, Section 15
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 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

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 - Spike	-	-	Early 2000s	-
Seeding - Aerial Before	Sink Draw Interseeding	417	November 2006	546
Intensive Grazing - Cattle	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	<i>Bouteloua gracilis</i>	Blue Grama		0.00	0.00
G	<i>Dactylis glomerata</i>	Orchardgrass	Paiute	0.00	0.00
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	0.00	0.00
G	<i>Poa secunda</i>	Sandberg Bluegrass	Toole MT	0.00	0.00
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	0.00	0.00
F	<i>Linum perenne</i>	Blue Flax	Appar	0.00	0.00
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.42	0.39
F	<i>Medicago sativa</i>	Alfalfa	Ranger	0.42	0.37
F	<i>Medicago sativa</i>	Alfalfa	Spredor 4	0.42	0.39
F	<i>Onobrychis vicifolia</i>	Sainfoin	Eski	0.00	0.00
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.00	0.00
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Sanpete UT	0.00	0.00
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Juab/Millard UT	0.00	0.00
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	0.00	0.00
S	<i>Krascheninnikovia lanata</i>	Winterfat	Iron UT	0.08	0.03
S	<i>Krascheninnikovia lanata</i>	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	<i>Atriplex canescens</i>	Fourwing Saltbush	Duchesne UT	2.50	0.88
S	<i>Purshia tridentata</i>	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	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	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	Brood/Young Rearing
Mule Deer	crucial	winter	
Rocky Mountain Elk	crucial	winter	
Greater Sage-Grouse	occupied	year-long & Winter	brood-rearing

Table 17R-22.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type
2006	Perennial Grass
2010	Perennial Grass
2015	Perennial Grass
2020	Perennial Grass

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 study site has been dominated by perennial grasses since its establishment in 2006 (Table 17R-22.7) with the introduced species crested wheatgrass (*Agropyron cristatum*) as the most dominant species. In 2020, there was a significant increase in both cover and abundance of Russian wildrye (*Psathyrostachys juncea*). The introduced annual grass species cheatgrass (*Bromus tectorum*) was present on the site in 2006, but was not 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 on the site, density of forage kochia (*Bassia prostrata*) nearly doubled between 2015 and 2020 (Table 17R-22.6, Table 17R-22.12).

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	-

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

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

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
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)	-	-

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

GRASS SPECIES	Nested Frequency											
Achnatherum hymenoides (Indian ricegrass)	37	403	3	14	-	-	-	1	34	4	21	
Agropyron cristatum ⁱ (crested wheatgrass)	5	376	-	27	-	3	13	9	19	-	16	
Bromus tectorum ^{ai} (cheatgrass)	-	388	-	12	11	-	18	4	32	-	10	
Carex (sedge)	-	370	-	10	-	-	29	23	92	-	-	
Elymus lanceolatus (thickspike wheatgrass)	Average Cover (%)											
Hesperostipa comata (needle and thread)	2006	0.2	20.5	0.0	0.1	-	-	-	0.0	1.3	0.0	0.1
Pascopyrum smithii (western wheatgrass)	2010	0.1	20.8	-	0.5	-	0.0	0.5	0.3	1.1	-	0.3
Poa secunda (Sandberg bluegrass)	2015	-	21.4	-	0.1	0.2	-	0.2	0.0	1.2	-	0.1
Psathyrostachys juncea ⁱ (Russian wildrye)	2020	-	33.8	-	0.0	-	-	0.3	0.6	6.2	-	-
Pseudoroegneria spicata (bluebunch wheatgrass)	Nested Frequency											
Thinopyrum intermedium ⁱ (intermediate wheatgrass)	2006	1	34	4	21	-	-	-	-	-	-	-
	2010	9	19	-	16	-	-	-	-	-	-	-
	2015	4	32	-	10	-	-	-	-	-	-	-
	2020	23	92	-	-	-	-	-	-	-	-	-

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

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	-	-
year	Average Cover (%)		
2006	0.3	-	0.0
2010	0.3	-	0.1
2015	0.3	0.0	0.0
2020	0.5	-	-

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	-
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	-

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			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
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
Atriplex canescens^P -- (fourwing saltbush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	15/33
2020	-	-	-	-	-	-	-	-	-/-
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
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	20	-	0	100	0	0	0	0	- / -
2015	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	19/38
Eriogonum corymbosum -- (crispleaf buckwheat)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	26/35
2015	20	-	0	100	0	0	0	0	22/24
2020	-	-	-	-	-	-	-	-	40/53
Eriogonum microthecum^P -- (slender buckwheat)									
2006	-	-	-	-	-	-	-	-	30/40
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	42/60
2015	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	35/55
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
Krascheninnikovia lanata^P -- (winterfat)									
2006	-	-	-	-	-	-	-	-	36/60
2010	-	-	-	-	-	-	-	-	34/37
2015	-	-	-	-	-	-	-	-	19/29
2020	-	-	-	-	-	-	-	-	23/24
Linanthus pungens -- (granite prickly phlox)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2020	20	-	0	100	0	0	0	0	15/30

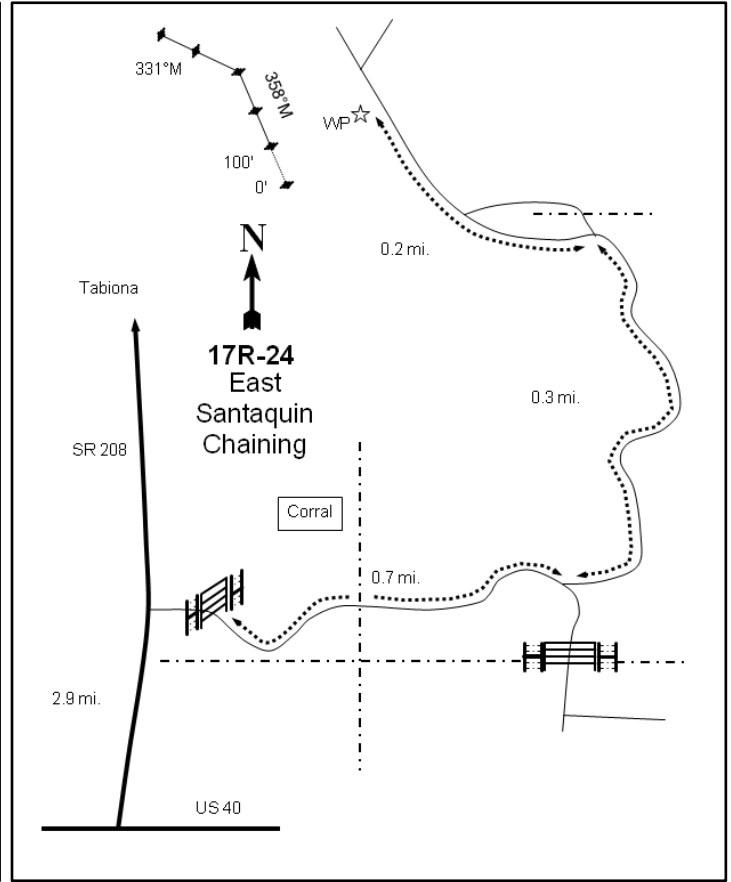
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Opuntia -- (pricklypear)									
2006	180	-	11	56	33	0	0	22	10/39
2010	100	-	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
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: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2006	0	0	0	30	0	4.3	0	34.3	Very Poor-Poor
2010	0.2	0	0	30	0	2.6	0	32.7	Very Poor
2015	1.8	0	0	30	0	2.9	0	34.7	Very Poor-Poor
2020	2.1	0	0	30	0	2.8	0	34.9	Very Poor-Poor

EAST SANTAQUIN CHAINING - STUDY NO. 17R-24



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Tabiona SW; Township 3S, Range 7W, Section 05
NAD 83 UTM ZONE 12, 525694 East 4455581 North

Transect Information

Browse Tag # (0' Stake)	Not Available
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 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	NW
Slope	3-5%
Sample Dates	07/07/2006, 06/30/2010, 06/25/2013, 07/31/2017, 07/28/2020

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

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

Site Notes

Over 217,000 acres of the Uintah Basin/Northeastern Region suffered sagebrush (*Artemisia sp.*) die-off following a six-year drought. Deer carcasses and limbs were found on site in 2017.

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 (Table 17R-24.4, Table 17R-24.14, Photos). The browse component diversified and became a co-dominant 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, namely thickspike wheatgrass (*Elymus lanceolatus*), Indian ricegrass (*Achnatherum hymenoides*), crested wheatgrass (*Agropyron cristatum*), and needle and thread (*Hesperostipa comata*), have provided the most herbaceous cover and were considered to be co-dominant with mixed browse in each post-treatment sample year. 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).

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	5.6	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

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	35	68	2.1	13.3	0.1	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

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	59.2	0.0	0.5	24.9
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

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
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)	-

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
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

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 ^{ai} (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	13	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	-
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	-

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

FORB SPECIES	Nested Frequency											
<i>Lappula occidentalis</i> ^a (flatspine stickseed)												
<i>Linum perenne</i> ⁱ (blue flax)												
<i>Medicago sativa</i> ⁱ (alfalfa)												
<i>Onobrychis vicifolia</i> ⁱ (sainfoin)												
<i>Packera multiflora</i> (lobeleaf groundsel)												
<i>Penstemon cyananthus</i> (Wasatch beardtongue)												
<i>Phlox austromontana</i> (mountain phlox)												
<i>Polygonum douglasii</i> ^a (Douglas' knotweed)												
<i>Sanguisorba minor</i> ⁱ (small burnet)												
<i>Sisymbrium altissimum</i> ^{at} (tall tumblemustard)												
<i>Taraxacum officinale</i> (common dandelion)												
<i>Tragopogon dubius</i> ^{at} (yellow salsify)												
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	-	-

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	Line Intercept Cover (%)									
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> ^p (mountain big sagebrush)										
<i>Bassia prostrata</i> ^{pi} (forage kochia)										
<i>Cercocarpus montanus</i> ^p (alderleaf mountain mahogany)										
<i>Chrysothamnus viscidiflorus</i> sp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)										
<i>Juniperus osteosperma</i> ⁱ (Utah juniper)										
<i>Linanthus pungens</i> (granite prickly phlox)										
<i>Opuntia</i> (pricklypear)										
<i>Opuntia fragilis</i> (brittle pricklypear)										
<i>Pinus edulis</i> ⁱ (twoneedle pinyon)										
<i>Purshia tridentata</i> ^p (antelope bitterbrush)										
year	Quadrat Cover (%)									
2006	-	-	-	0.0	1.3	-	0.6	2.0	0.7	1.0
2010	1.1	2.8	-	-	-	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

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			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^P -- (Utah serviceberry)									
2006	-	-	-	-	-	-	-	-	49/101
2010	-	-	-	-	-	-	-	-	77/140
2013	-	-	-	-	-	-	-	-	113/190
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	150/211
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
Atriplex canescens^P -- (fourwing saltbush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	79/114
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	128/195
2020	-	-	-	-	-	-	-	-	-/-
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
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
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
Ephedra viridis^P -- (mormon tea)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	29/8
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	32/66
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2010	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	63/63
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	102/143

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus osteosperma^t -- (Utah juniper)									
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	- / -
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
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
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
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	-	-	-	-	-	-	-	-	- / -
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

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

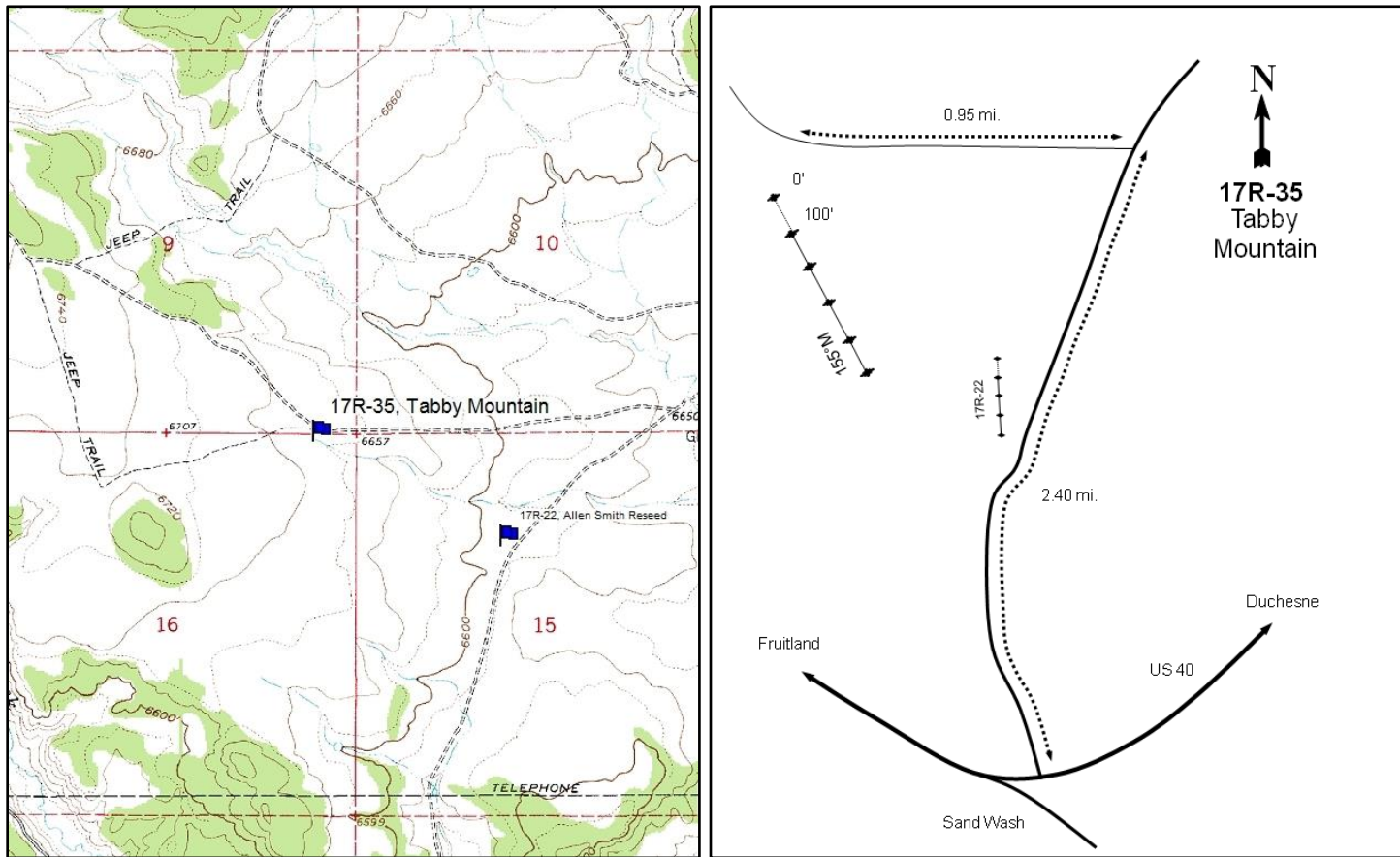
Table 17R-24.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

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
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

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

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2006	2	0	0	7.6	-0.4	1.3	0	10.3	Very Poor
2010	10.9	15	15	26.7	-1.6	2.8	0	68.8	Good
2013	16.8	15	15	22.9	-0.1	1.4	0	71	Good
2017	21.2	14.8	5.7	30	-0.1	1.9	-2	71.4	Good
2020	22.4	14.7	6.8	30	-0.3	1	0	74.5	Good

TABBY MOUNTAIN - STUDY NO. 17R-35



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Fruitland NE; Township 3S, Range 8W, Section 16
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	No Rebar

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

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	<i>Atriplex canescens</i>	Fourwing Saltbush	Duchesne UT	2.50	0.88
S	<i>Purshia tridentata</i>	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	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	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	Brood/Young Rearing
Mule Deer	crucial	winter	
Rocky Mountain Elk	crucial	winter	
Greater Sage-Grouse	occupied	year-long & Winter	brood-rearing

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

Site 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.

This site was established in 2013 and has remained dominated by the perennial grass species crested wheatgrass (*Agropyron cristatum*) since that time (Table 17R-35.10). Forbs have remained depauperate in both composition and abundance (Table 17R-35.11), and forage kochia (*Bassia prostrata*) has contributed the majority of the shrub cover in each sample year. Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) cover significantly increased in 2020, but this increase can only be attributed to a few individual plants (Table 17R-35.12, Table 17R-35.13).

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	-

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

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

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
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)	-

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)	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
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

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 limifolia (flaxleaf plainsmustard)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	Trifolium (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	-
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	-

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 ^{pt} (forage kochia)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ephedra viridis ^p (mormon tea)	Ericameria nauseosa (rubber rabbitbrush)	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
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

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			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
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
Bassia prostrata^{pt} -- (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
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
Ephedra viridis^p -- (mormon tea)									
2013	20	-	0	100	0	0	100	0	17/16
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	20	-	0	100	0	0	0	0	47/46
2016	-	-	-	-	-	-	-	-	64/72
2020	-	-	-	-	-	-	-	-	77/80
Ericameria nauseosa ssp. nauseosa var. speciosa^p -- (rubber rabbitbrush)									
2013	-	-	-	-	-	-	-	-	54/86
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	77/66
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

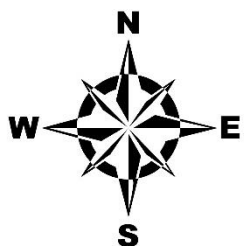
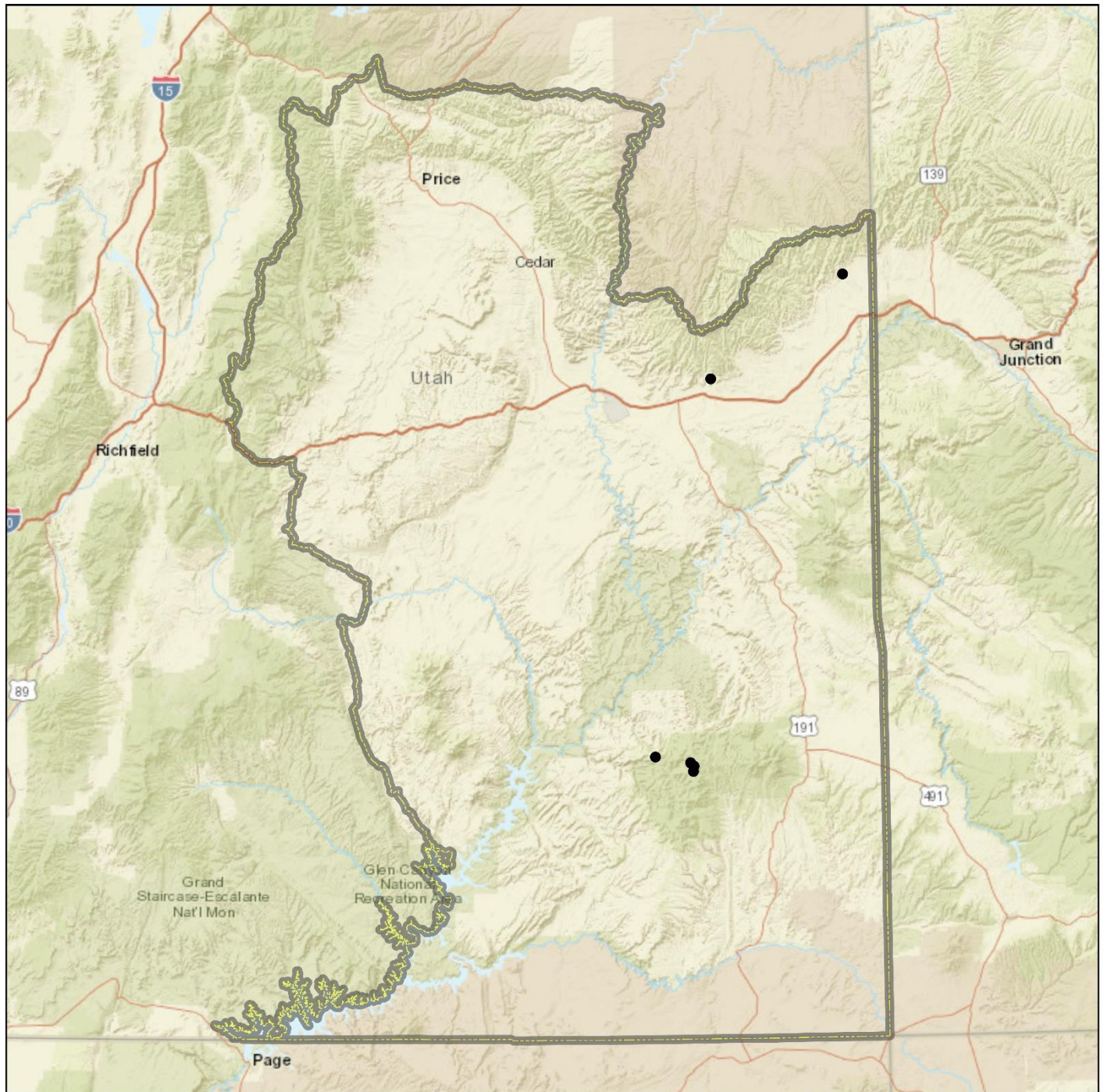
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Linanthus pungens -- (granite prickly phlox)									
2013	20	-	0	100	0	0	0	0	20/16
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
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

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

Table 17R-35.15 – Deer Desirable Components Index: Mid Potential Scale.

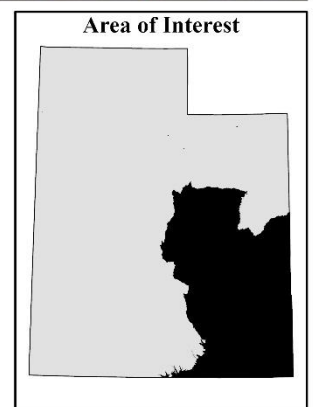
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	2.3	0	0	30	0	2.2	0	34.5	Very Poor-Poor
2016	5.7	0	0	30	0	1.6	0	37.2	Poor
2020	8	14.9	15	30	0	2.7	0	70.5	Good

SOUTHEASTERN REGION



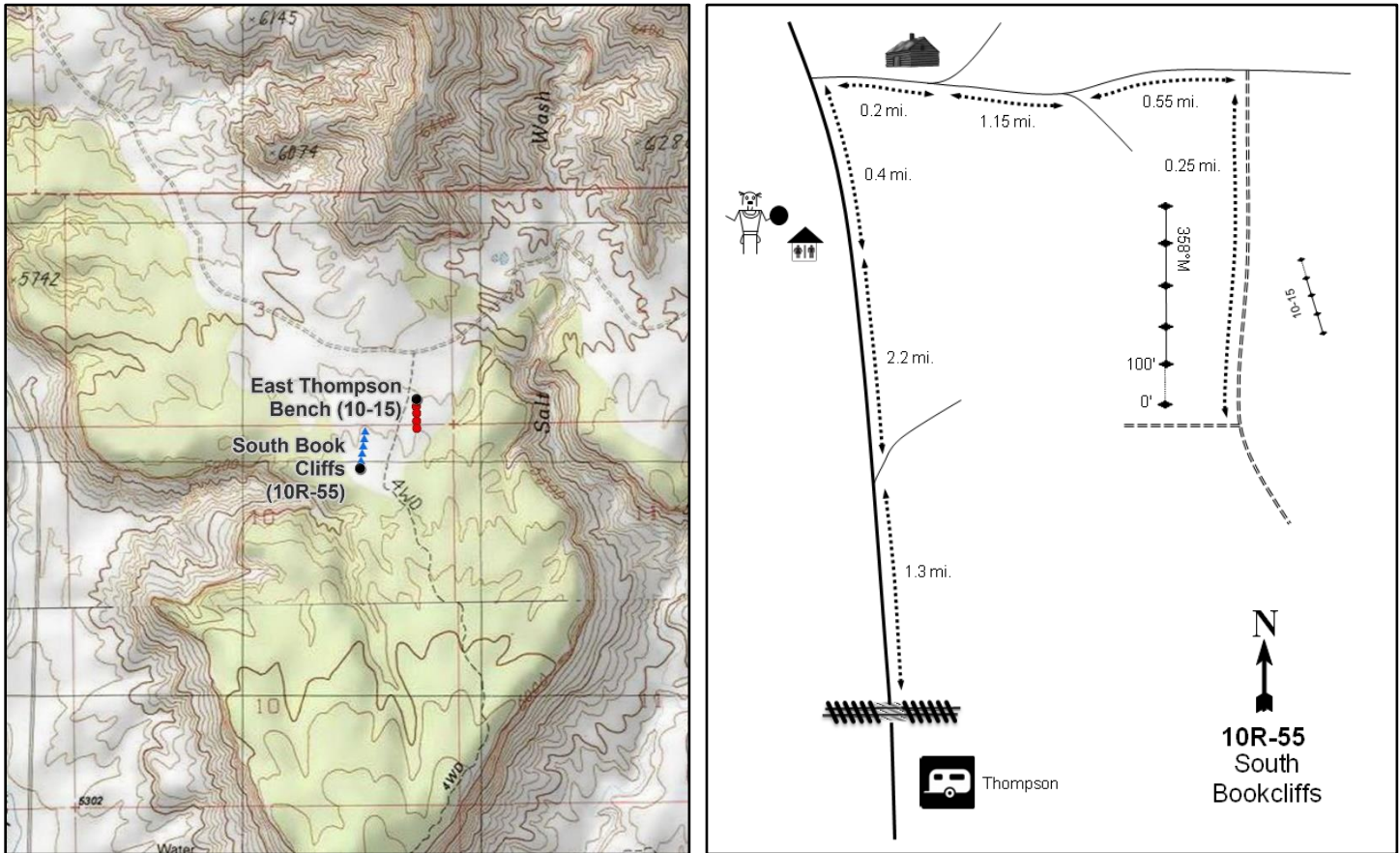
Study Location

- WRI
- ▭ Region Boundaries



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

SOUTH BOOK CLIFFS - STUDY NO. 10R-55

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Sego Canyon SW; Township 21S, Range 20E, Section 10
NAD 83 UTM ZONE 12, 613435 East 4318158 North

Transect Information

Browse Tag # (0' Stake)	759
Transect Bearing	358° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From the railroad crossing in the town of Thompson, travel 1.3 miles north on the main road to a fork. Stay left and go 2.2 miles to the Thompson Canyon pictographs, then continue for 0.4 miles. Make a sharp right turn and go 0.2 miles past an old house and a railroad cut to a fork. Turn right, cross a deep gully, and travel 1.15 miles to another fork. Stay left and continue 0.55 miles to a very faint road on the right. Turn on this road and drive south for 0.25 miles; there is no witness post. The stakes are rebar.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	CISCO
Elevation	6,253ft (1,906m)
Aspect	North
Slope	7%
Sample Dates	06/27/2013, 08/01/2016, 08/19/2020

Table 10R-55.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Book Cliffs Vegetation Phase 1	2593	November 2013	512
Seeding - Aerial Before	South Book Cliffs Vegetation Phase 1	2593	October 2013	512
Seeding - Aerial After	South Book Cliffs Vegetation Phase 1	2593	January 2014	512

Table 10R-55.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Book Cliffs I			Aerial	Oct 2013	315
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Emery UT	0.16	0.11
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rio Grande CO	3.02	2.86
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	2.38	2.13
G	<i>Pleuraphis jamesii</i>	Galleta		0.48	0.35
G	<i>Pleuraphis jamesii</i>	Galleta		0.32	0.19
G	<i>Poa secunda</i>	Sandberg Bluegrass	UP Colorado Plateau	0.63	0.47
G	<i>Sporobolus cryptandrus</i>	Sand Dropseed	Washington CO	0.08	0.08
F	<i>Linum perenne</i>	Blue Flax	Appar	1.59	1.38
F	<i>Sanguisorba minor</i>	Small Burnet		1.59	1.46
F	<i>Sphaeralcea coccinea</i>	Scarlet Globemallow		0.10	0.04
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Kane UT	0.11	0.04
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Kane UT	3.02	1.12

Mix Name			Application Type	Application Date	Acres
South Book Cliffs 1 Shrub			Aerial	Jan 2014	500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Uintah UT	1.00	0.14

Wildlife Habitat and Vegetation History**Table 10R-55.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 10R-55.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Wyoming Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2016	Wyoming Big Sagebrush/Broom Snakeweed	Phase I
2020	Wyoming Big Sagebrush/Annual Grass	Phase I

Site Notes

In 2016, a deer carcass was strewn between the 200 and 400-foot stakes.

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034XY212UT
States and Transitions	A defined state and transition model is available.

This site was established in 2013 and was dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) with few other shrubs present that provided limited cover. Cover and density of twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees placed the site in Phase I transitioning to Phase II of woodland succession, thus posing a risk to the resilience of this site (Table 10R-55.4, Table 10R-55.12, Table 10R-55.14). The herbaceous understory was composed of introduced annual grasses and forbs that provided relatively low cover (Table 10R-55.7, Table 10R-55.10, Table 10R-55.11). Following the bullhog and seeding treatments (Table 10R-55.1), tree cover and density decreased and the site has been considered to be within Phase I of woodland succession since 2016. However, the remaining tree component indicates that there may be potential for infilling in future sample years (Table 10R-55.4, Table 10R-55.12, Table 10R-55.14). Broom snakeweed (*Gutierrezia sarothrae*) increased and was a co-dominant vegetation component during the first post-treatment sampling, but has since decreased. Cheatgrass (*Bromus tectorum*) increased in cover and abundance following treatment, becoming a co-dominant vegetation component in 2020 (Table 10R-55.10).

Trend Summary Tables**Table 10R-55.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	10.3	0.3	2.3	12.2	0.1	6.6
2016	7.1	4.0	0.3	7.1	8.7	-
2020	9.5	1.4	0.6	7.6	0.7	0.1

Table 10R-55.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	286	27	324	56	2.1	0.3	5.8	1.2
2016	380	49	369	96	6.0	0.9	2.4	5.0
2020	417	54	344	58	14.1	2.3	4.3	2.4

Table 10R-55.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	46.8	5.7	34.1	-	0.1	26.4
2016	45.9	7.1	37.4	-	-	22.4
2020	22.8	5.1	46.5	-	0.5	31.7

Table 10R-55.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2013	55	18	14
2016	38	1	57
2020	41	21	27
Days Use Per Acre (ha)			
2013	138.7 (342.6)	4.7 (11.6)	-
2016	50.2 (124.1)	12.8 (31.5)	-
2020	35.5 (87.7)	59.6 (147.3)	-

Table 10R-55.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora ^a (six weeks fescue)
year	Nested Frequency							
2013	3	1	284	16	-	7	-	5
2016	6	-	380	35	-	-	11	-
2020	3	-	409	47	3	1	3	20
year	Average Cover (%)							
2013	0.0	0.0	2.1	0.2	-	0.1	-	0.0
2016	0.2	-	6.0	0.6	-	-	0.1	-
2020	0.0	-	14.1	1.7	0.2	0.0	0.3	0.1

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

Table 10R-55.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Astragalus coltonii (Colton's milkvetch)	Calochortus nuttallii (sego lily)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gilia inconspicua ^a (shy gilia)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Orobancha fasciculata (clustered broomrape)	Plantago patagonica ^a (woolly plantain)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{ai} (tall tumbled mustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency															
2013	324	52	1	1	-	30	-	-	2	20	-	1	-	-	-	2
2016	353	66	-	-	3	9	7	6	8	29	31	2	10	1	6	-
2020	342	57	-	12	-	-	1	-	-	-	0	-	-	-	1	1
year	Average Cover (%)															
2013	5.5	1.1	0.0	0.0	-	0.2	-	-	0.0	0.1	-	0.0	-	-	-	0.0
2016	1.9	3.4	-	-	0.0	0.0	0.2	0.0	0.0	0.1	1.6	0.0	0.0	0.1	0.2	-
2020	4.2	2.4	-	0.0	-	-	0.0	-	-	-	0.0	-	-	-	0.0	0.0

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

Table 10R-55.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	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 (%)						
2013	12.2	-	0.1	5.6	0	1	-
2016	6.7	0.2	7.4	-	1.3	-	0.2
2020	7.6	-	0.3	0.1	0.4	-	-
year	Quadrat Cover (%)						
2013	10.3	-	0.1	2.1	0.3	0.1	-
2016	7.1	0.0	2.9	0.3	1.1	-	0.0
2020	9.5	-	1.1	0.6	0.3	-	-

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

Table 10R-55.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2013	1880	60	1	60	39	35	61	63	56/80
2016	2760	-	29	48	23	17	41	28	51/86
2020	2060	-	14	53	33	26	38	33	52/86
Atriplex canescens^p -- (fourwing saltbush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	87/124
Ephedra viridis^p -- (mormon tea)									
2013	-	-	-	-	-	-	-	-	-/-
2016	20	-	100	0	0	0	0	0	-/-
2020	20	-	0	100	0	0	0	0	48/33
Gutierrezia sarothrae -- (broom snakeweed)									
2013	160	40	75	13	13	0	13	13	13/17
2016	3800	20	4	96	0	0	0	0	34/49
2020	1060	20	11	89	0	0	0	0	16/24
Juniperus osteosperma^t -- (Utah juniper)									
2013	40	-	50	50	0	0	0	0	-/-
2016	-	100	0	0	0	0	0	0	-/-
2020	20	40	100	0	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2013	240	-	0	67	33	0	0	50	12/50
2016	600	-	7	93	0	3	0	10	16/58
2020	480	-	4	83	13	0	0	13	12/59
Yucca -- (yucca)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	20/17

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

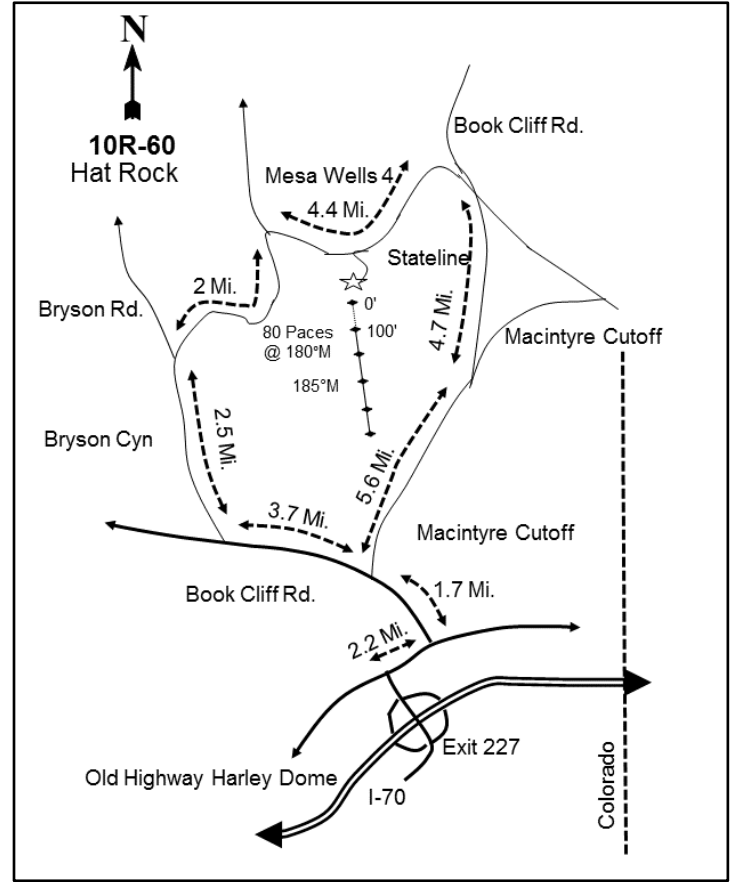
Table 10R-55.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	24	8	-	42	50	-	16.3
2016	9	-	75	13	13	-	7.3
2020	13	13	63	13	13	-	6.0
Pinus edulis (twoneedle pinyon)							
2016	1	-	-	-	100	-	10.0
2020	2	-	50	50	-	-	7.5

Table 10R-55.15 – Deer Desirable Components Index: Low Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	15.3	3.2	0.6	0.6	-1.6	2.3	0	20.3	Poor
2016	8.9	8	15	1.8	-4.5	10	0	39.2	Fair
2020	9.5	5.1	6.8	4.6	-10.6	4.8	0	20.2	Poor

HAT ROCK - STUDY NO. 10R-60



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Bryson Canyon NE; Township 17S, Range 25E, Section 20
NAD 83 UTM ZONE 12, 657938 East 4353537 North

Transect Information

Browse Tag # (0' Stake)	702
Transect Bearing	185° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From I-70, take exit #227 and turn north toward the Old Highway Harley Dome. Turn right on the Old Highway and continue for 2.2 miles to Book Cliff Road. On Book Cliff Road, proceed for 5.4 miles to Bryson Canyon Road. Take this road for 2.5 Miles to a "Y," bear right, continue another 2 miles to a "T," and turn right. Proceed for another 2.1 miles and the site will be on the right (south) side of the road, about 80 paces away at 180 degrees magnetic.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SAN ARROYO
Elevation	5,435ft (1,657m)
Aspect	West
Slope	5-7%
Sample Dates	07/25/2017, 08/18/2020

Table 10R-60.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Bookcliffs Phase 5 (Bryson)	3961	Fall 2017	324
Seeding - Aerial Before	South Bookcliffs Phase 5 (Bryson)	3961	Fall 2017	324

Table 10R-60.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Bookcliffs Bryson			Aerial	Sep 2017	325
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Emery, UT	1.00	0.96
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.00	0.91
G	Poa secunda	Sandberg Bluegrass	UP Colorado Plateau	0.03	0.02
G	Poa secunda	Sandberg Bluegrass	UP Colorado Plateau	0.17	0.15
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.00	0.93
F	Achillea millefolium	Western Yarrow	Eagle	0.02	0.02
F	Achillea millefolium	Western Yarrow	Eagle	0.08	0.07
F	Cleome serrulata	Rocky Mountain Beeplant	Davis UT	0.45	0.40
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete UT	0.55	0.47
F	Dalea purpurea	Purple Prairie Clover	Bismark	0.62	0.61
F	Dalea purpurea	Purple Prairie Clover	Bismark	0.15	0.12
F	Helianthus annuus	Annual Sunflower	Montezuma CO	0.62	0.55
F	Linum perenne	Blue Flax	Appar	1.00	0.80
F	Medicago sativa	Alfalfa	Ladak	0.46	0.45
F	Medicago sativa	Alfalfa, Yellow	Don	0.31	0.30
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.87
F	Penstemon palmeri	Palmer Penstemon		0.20	0.13
F	Ratibida columnifera	Prairie Coneflower	Stillwater	1.00	0.81
F	Sanguisorba minor	Small Burnet		1.00	0.90
F	Sphaeralcea coccinea	Scarlet Globemallow	Uintah, UT	0.09	0.03
F	Sphaeralcea munroana	Munro Globemallow	Tooele UT	0.01	0.01
F	Sphaeralcea munroana	Munro Globemallow	Uintah UT	0.10	0.03
S	Atriplex canescens	Fourwing Saltbush	Carbon UT	1.00	0.48

Wildlife Habitat and Vegetation History**Table 10R-60.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 10R-60.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Pinyon-Juniper	Phase III
2020	Perennial Grass-Forb	Phase I

Site Notes

A midget faded rattlesnake was seen on the site in 2017.

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Semidesert Shallow Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034BY225UT
States and Transitions	A defined state and transition model is available.

At the time of study establishment in 2017, this site was a twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) dominated plant community with juniper being more common than pinyon. However, a bullhog and seeding treatment in the fall of 2017 (Table 10R-60.1) removed nearly all of the trees, and the site was considered to be in Phase I of woodland succession in 2020 (Table 10R-60.4). There were no grasses sampled in 2017 and only two forb species observed. Following treatment, perennial grasses and forbs increased in cover and became the dominant vegetation component on this study site (Table 10R-60.7, Table 10R-60.10, Table 10R-60.11). Shrub species have been sparse prior to and after treatment, with broom snakeweed (*Gutierrezia sarothrae*) contributing a majority of the cover. However, cover and density data show that diversity of shrub species increased slightly in 2020 (Table 10R-60.12, Table 10R-60.13); the site will likely continue to recover as time since treatment increases. Although the phase that this site is in as of 2020 is not described by the current state and transition model, it is likely in the Seeded State (Jornada, 2020).

Trend Summary Tables**Table 10R-60.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2017	0.0	0.4	11.2	-	0.7	28.3
2020	0.0	2.4	0.6	-	3.0	-

Table 10R-60.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2017	-	-	-	130	-	-	-	4.1
2020	16	91	79	197	0.1	3.4	2.2	9.7

Table 10R-60.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2017	44.3	8.1	32.6	10.9	6.1	14.9
2020	17.3	0.6	49.2	14.6	4.2	18.4

Table 10R-60.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2017	-	1	4	25
2020	-	1	2	18
Days Use Per Acre (ha)				
2017	-	-	4.0 (9.9)	-
2020	0.7 (1.8)	2.0 (5.0)	2.0 (5.0)	-

Table 10R-60.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency					
<i>Bromus tectorum</i> ^{ai} (cheatgrass)	-	-	-	-	-	-
<i>Elymus elymoides</i> (squirreltail)	13	3	51	2	45	3
<i>Elymus lanceolatus</i> (thickspike wheatgrass)						
<i>Poa secunda</i> (Sandberg bluegrass)						
<i>Pseudoroegneria spicata</i> (bluebunch wheatgrass)						
<i>Vulpia octoflora</i> ^a (sixweeks fescue)						
year	Average Cover (%)					
2017	-	-	-	-	-	-
2020	0.1	0.0	1.5	0.1	1.7	0.0

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

Table 10R-60.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
<i>Achillea millefolium</i> (Common yarrow)	-	-	115	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Alyssum desertorum</i> ^{ai} (desert madwort)	15	6	137	12	14	12	40	6	8	2	3	3	55	3	5	0	0	
<i>Chaetopappa ericoides</i> (rose heath)																		
<i>Chamaesyce fendleri</i> (Fendler's sandmat)																		
<i>Cleome serrulata</i> ^a (Rocky Mountain beeplant)																		
<i>Cryptantha</i> (cryptantha)																		
<i>Descurainia pinnata</i> ^a (western tansymustard)																		
<i>Eriogonum cernuum</i> ^a (nodding buckwheat)																		
<i>Gilia inconspicua</i> ^a (shy gilia)																		
<i>Helianthus annuus</i> ^a (common sunflower)																		
<i>Lappula occidentalis</i> ^a (flatspine stickseed)																		
<i>Lesquerella</i> (bladderpod)																		
<i>Linum perenne</i> ⁱ (blue flax)																		
<i>Lithospermum incisum</i> (narrowleaf stoneseed)																		
<i>Lygodesmia</i> (skeletonplant)																		
<i>Medicago sativa</i> ⁱ (alfalfa)																		
<i>Mirabilis multiflora</i> (Colorado four o'clock)																		
year	Average Cover (%)																	
2017	-	-	3.8	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2020	0.1	0.0	5.2	0.8	0.9	0.0	0.6	0.0	0.2	0.2	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0

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

FORB SPECIES	Penstemon palmeri (Palmer's penstemon)	Ratibida columnifera (upright prairie coneflower)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency						
2017	-	-	-	-	-	-	-
2020	11	12	0	3	6	11	5
year	Average Cover (%)						
2017	-	-	-	-	-	-	-
2020	1.9	0.3	0.1	0.2	0.2	0.3	0.0

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

Table 10R-60.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Ephedra nevadensis ^p (Nevada jointfir)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis ⁱ (twoneedle pinyon)
year	Line Intercept Cover (%)						
2017	-	-	-	0.7	24.7	0	3.6
2020	-	-	-	2.1	-	0.9	-
year	Quadrat Cover (%)						
2017	0.0	-	0.0	0.2	10.9	0.2	0.4
2020	-	0.0	0.0	1.6	0.6	0.8	-

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

Table 10R-60.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2017	-	-	-	-	-	-	-	-	55/46
2020	-	-	-	-	-	-	-	-	28/20
Atriplex canescens^p -- (fourwing saltbush)									
2017	-	-	-	-	-	-	-	-	-/-
2020	40	-	50	50	0	0	0	0	97/100
Ephedra nevadensis^p -- (Nevada jointfir)									
2017	-	-	-	-	-	-	-	-	100/112
2020	40	-	50	50	0	100	0	0	54/85
Eriogonum microthecum^p -- (slender buckwheat)									
2017	40	-	0	100	0	0	50	0	8/13
2020	160	20	38	63	0	0	0	0	12/21

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2017	700	-	6	94	0	0	0	0	20/22
2020	3560	-	4	95	1	0	0	1	24/34
Juniperus osteosperma¹ -- (Utah juniper)									
2017	260	-	0	69	31	23	0	31	- / -
2020	20	-	0	100	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2017	180	-	0	100	0	0	0	0	7/17
2020	300	-	13	87	0	0	0	0	8/25
Pinus edulis¹ -- (twoneedle pinyon)									
2017	60	-	0	100	0	0	0	0	- / -

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

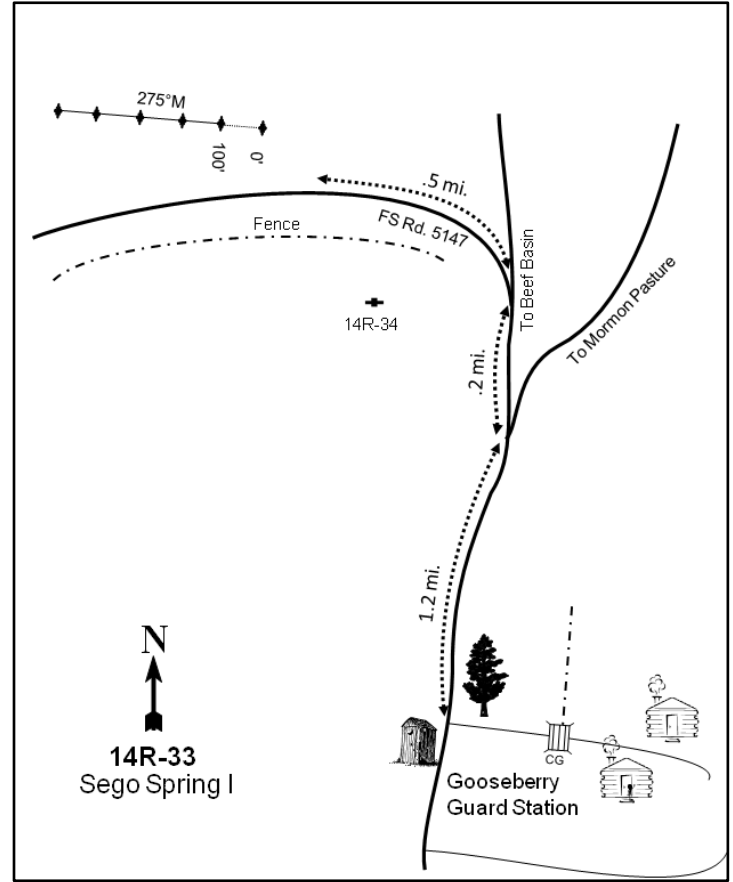
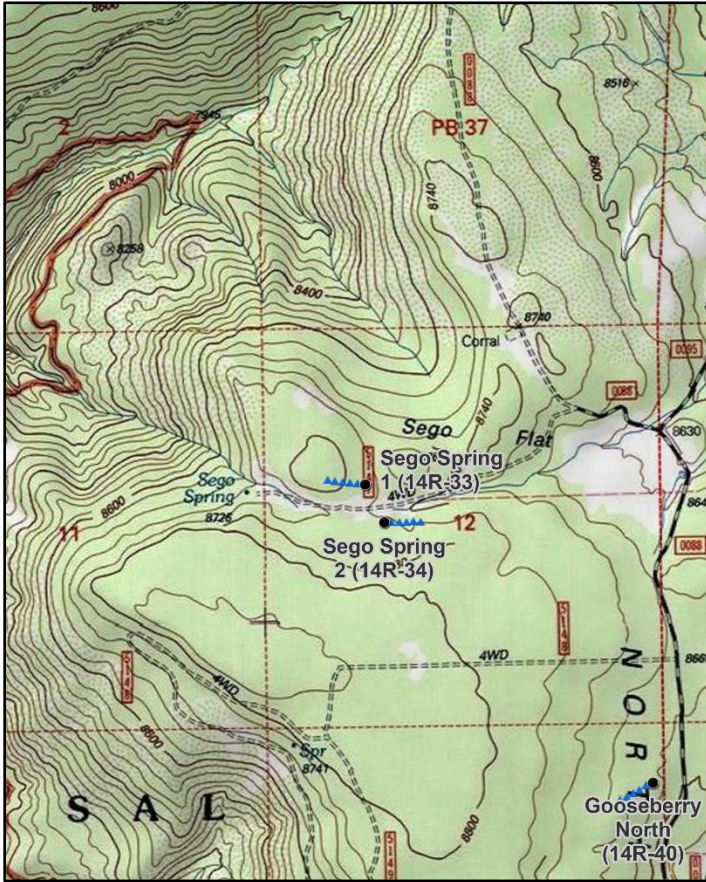
Table 10R-60.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2017	116	5	10	40	30	15	38.0
2020	13	-	100	-	-	-	8.0
Pinus edulis (twoneedle pinyon)							
2017	22	22	44	-	-	33	7.3
2020	2	-	100	-	-	-	2.0

Table 10R-60.15 – Deer Desirable Components Index: Low Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2017	0	0	0	0	0	8.3	0	8.3	Very Poor-Poor
2020	0	0	0	6.7	-0.1	10	0	16.7	Poor

SEGO SPRING 1 - STUDY NO. 14R-33



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Poison Canyon NE; Township 34S, Range 19E, Section 12
NAD 83 UTM ZONE 12, 606679 East 4188573 North

Transect Information

Browse Tag # (0' Stake)	3900
Transect Bearing	270° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (35ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From Gooseberry Guard Station, travel north for 1.2 miles to Beef Basin Road and take the left fork of the road. Drive for 0.2 miles to Forest Service Road #5147 and again take the left fork. After 0.5 miles, the site will be on the right (north) side of the road. Study 14R-34 is on the south side of the road.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	COTTONWOOD
Elevation	8,766ft (2,672m)
Aspect	Southeast
Slope	4-8%
Sample Dates	08/26/2014, 08/25/2020

Table 14R-33.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed	La Sal/Abajo Prescribed Fire FY20	4882	Summer 2019	21732
Fencing - Enclosure	North Elk Ridge Aspen Restoration Phase II	3773	Fall 2016	84

Wildlife Habitat and Vegetation History**Table 14R-33.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 14R-33.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Quaking Aspen/Gambel Oak/Snowberry	NA
2020	Quaking Aspen/Gambel Oak/Snowberry	NA

Site Notes

This site is located within an enclosure.

Site Potential

1981 - 2010 Average Annual Precipitation	26 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

The plant community on this site has been dominated by quaking aspen (*Populus tremuloides*) in the overstory with a shrub understory of Gambel oak (*Quercus gambelii*) and mountain snowberry (*Symphoricarpos oreophilus*) since study establishment in 2014 (Table 14R-33.12, Table 14R-33.13, Photos). The herbaceous understory has remained diverse and abundant. Perennial grasses, primarily the introduced species smooth brome (*Bromus inermis*), intermediate wheatgrass (*Thinopyrum intermedium*), Kentucky bluegrass (*Poa pratensis*), and orchardgrass (*Dactylis glomerata*), have provided a majority of the herbaceous cover, although perennial forbs contributed significant cover in 2014 (Table 14R-33.7, Table 14R-33.10, Table 14R-33.11). This site will likely remain in this or a similar state in future years without a major disturbance.

Trend Summary Tables**Table 14R-33.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2014	9.2	0.1	0.6	29.6	-	11.2
2020	10.2	0.4	2.2	31.4	-	10.2

Table 14R-33.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2014	-	436	27	360	-	26.6	0.3	17.1
2020	-	406	92	200	-	22.5	0.4	3.8

Table 14R-33.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2014	8.1	0.0	63.2	0.2	0.6	55.6
2020	10.0	0.0	58.1	0.1	0.7	40.0

Table 14R-33.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2014	11	5	16	-
2020	8	17	21	3
Days Use Per Acre (ha)				
2014	5.8 (14.3)	17.4 (43.0)	18.1 (44.7)	-
2020	14.5 (35.9)	67.0 (165.5)	7.4 (18.2)	-

Table 14R-33.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES												
Achnatherum lettermanii (Letterman's needlegrass)												
Bromus inermis ⁱ (smooth brome)												
Bromus porteri (Porter brome)												
Carex (sedge)												
Dactylis glomerata ⁱ (orchardgrass)												
Elymus elymoides (squirreltail)												
Elymus lanceolatus (thickspike wheatgrass)												
Koeleria macrantha (prairie Junegrass)												
Phleum pratense ⁱ (timothy)												
Poa fendleriana (muttongrass)												
Poa pratensis ⁱ (Kentucky bluegrass)												
Thinopyrum intermedium ⁱ (intermediate wheatgrass)												
year	Nested Frequency											
2014	16	193	2	-	208	18	84	7	11	2	238	3
2020	45	233	-	14	93	12	69	4	-	9	150	61
year	Average Cover (%)											
2014	0.2	4.7	0.0	-	8.3	0.3	3.1	0.2	0.2	0.0	9.7	0.0
2020	0.7	10.3	-	0.1	2.2	0.2	2.2	0.0	-	0.2	2.3	4.2

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

Table 14R-33.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Achillea millefolium (Common yarrow)																	
Arabis holboellii ^a (Holboell's rockcress)																	
Chenopodium ^a (goosefoot)																	
Cirsium (thistle)																	
Collinsia parviflora ^a (maiden blue eyed Mary)																	
Descurainia pinnata ^a (western tansymustard)																	
Dracocephalum parviflorum (American dragonhead)																	
Erigeron flagellaris (trailing fleabane)																	
Eriogonum racemosum (redroot buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Heterotheca villosa (hairy false goldenaster)																	
Lathyrus lanszwertii (Nevada pea)																	
Lupinus (lupine)																	
Packera neomexicana (New Mexico groundsel)																	
Penstemon comarrhenus (dusty beardtongue)																	
Phacelia heterophylla ^a (varileaf phacelia)																	
Phlox longifolia (longleaf phlox)																	
year	Nested Frequency																
2014	59	3	-	3	2	11	4	213	1	2	5	108	14	34	7	2	26
2020	42	10	2	-	16	-	-	76	2	-	7	46	13	7	11	-	47
year	Average Cover (%)																
2014	1.1	0.0	-	0.0	0.0	0.3	0.0	11.6	0.0	0.0	0.1	1.5	0.2	0.5	0.2	0.0	0.1
2020	0.2	0.1	0.0	-	0.1	-	-	0.7	0.0	-	0.4	0.3	0.5	0.1	0.1	-	0.5

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

FORB SPECIES								
Polygonum douglasii ^a (Douglas' knotweed)								
Pseudostellaria jamesiana (tuber starwort)								
Silene drummondii (Drummond's campion)								
Taraxacum officinale (common dandelion)								
Thermopsis montana (mountain goldenbanner)								
Trifolium (clover)								
Vicia americana (American vetch)								
Zigadenus elegans (mountain deathcamas)								
year	Nested Frequency							
2014	10	24	2	146	5	3	15	-
2020	79	16	16	72	-	-	2	1
year	Average Cover (%)							
2014	0.0	0.1	0.0	1.5	0.1	0.0	0.1	-
2020	0.2	0.1	0.1	0.7	-	-	0.0	0.0

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

Table 14R-33.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
Maltonia repens (creeping barberry)				
Populus tremuloides ⁱ (quaking aspen)				
Quercus gambelii ^p (Gambel oak)				
Symphoricarpos oreophilus ^p (mountain snowberry)				
year	Line Intercept Cover (%)			
2014	-	11.2	17.2	12.4
2020	0	10.2	20.6	10.8
year	Quadrat Cover (%)			
2014	0.1	0.6	1.2	8.0
2020	0.4	2.2	2.3	7.9

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

Table 14R-33.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Mahonia repens -- (creeping barberry)									
2014	60	-	0	100	0	0	0	0	10/13
2020	300	-	33	67	0	0	0	0	8/11
Purshia tridentata^p -- (antelope bitterbrush)									
2014	-	40	0	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	- / -
Quercus gambelii^p -- (Gambel oak)									
2014	1140	180	70	30	0	16	0	7	29/30
2020	1940	40	28	72	0	55	0	0	132/72
Symphoricarpos oreophilus^p -- (mountain snowberry)									
2014	3340	60	25	72	3	29	2	10	58/81
2020	3700	40	8	90	2	12	18	2	63/89

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

Table 14R-33.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

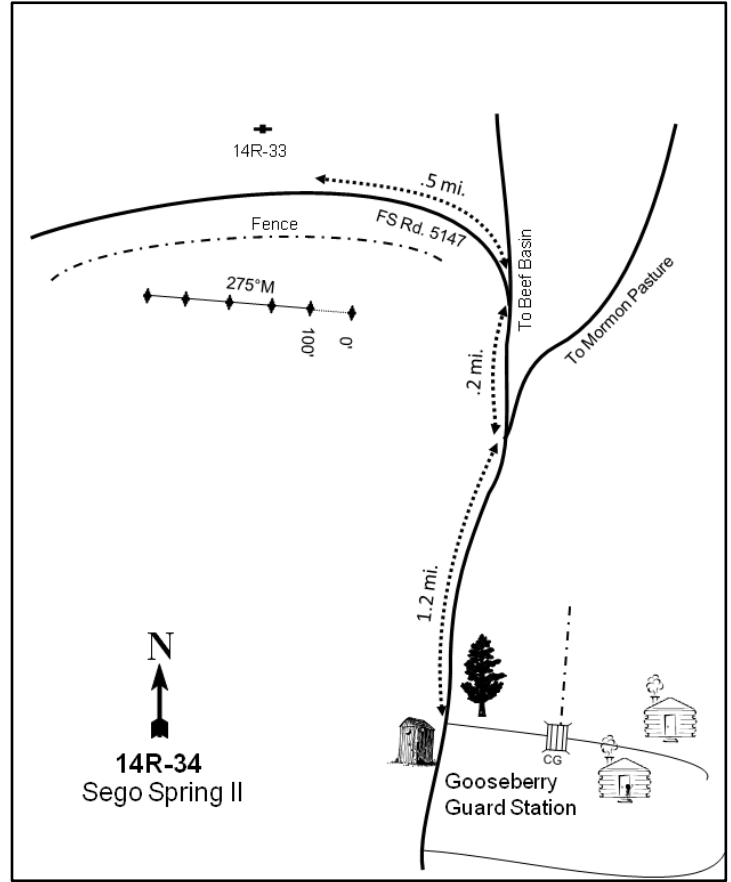
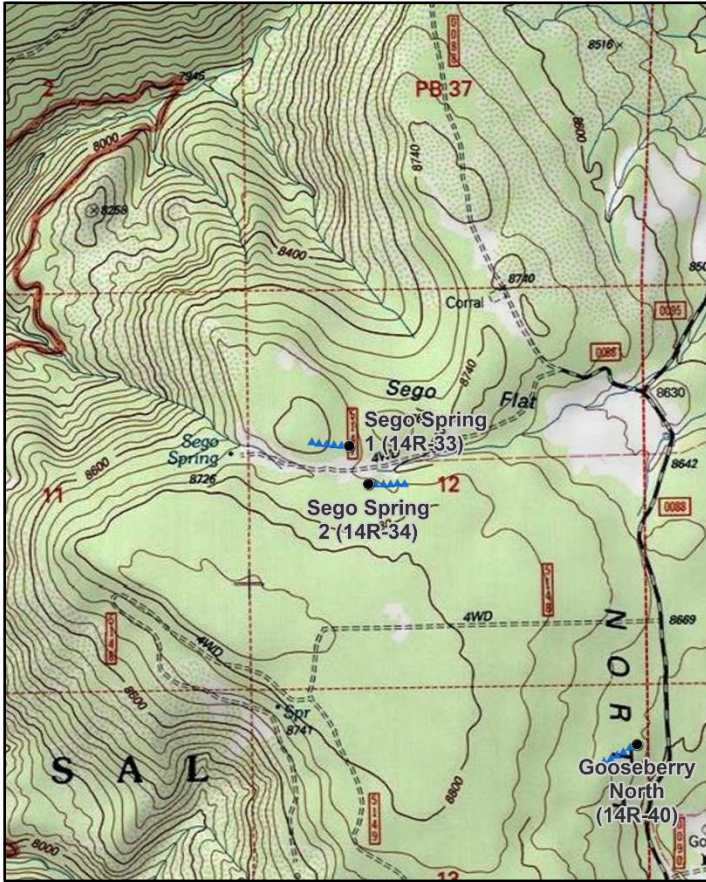
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2014	1220	38	57	-	5	45	5	11
2020	1220	48	38	13	2	34	22	13

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

Table 14R-33.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Pinus ponderosa (ponderosa pine)							
2014	3	-	-	-	-	100	32.0
2020	1	-	-	-	-	100	27.0
Populus tremuloides (quaking aspen)							
2014	222	-	63	-	-	37	17.3
2020	520	15	60	15	-	10	4.9
Quercus gambelii (Gambel oak)							
2014	141	-	-	-	100	-	14.6

SEGO SPRING 2 - STUDY NO. 14R-34



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Poison Canyon NE; Township 34S, Range 19E, Section 12
NAD 83 UTM ZONE 12, 606757 East 4188419 North

Transect Information

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

605
85° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Standard

Directions to Site

From Gooseberry Guard Station, travel north for 1.2 miles to Beef Basin Road and take the left fork of the road. Drive for 0.2 miles to Forest Service Road #5147 and again take the left fork. After 0.5 miles the site will be on the left (south) side of the road. Study 14R-33 is on the north side of the road.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	GOOSEBERRY
Elevation	8,766ft (2,672m)
Aspect	East
Slope	2-5%
Sample Dates	08/26/2014, 08/25/2020

Table 14R-34.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed	La Sal/Abajo Prescribed Fire FY20	4882	Summer 2019	21732
Fire - Prescribed	La Sal/Abajo Prescribed Fire FY21 (Proposed)	5218	Fall 2020	25812

Wildlife Habitat and Vegetation History

Table 14R-34.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 14R-34.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2014	Quaking Aspen/Snowberry	NA
2020	Quaking Aspen/Snowberry	NA

Site Notes

This site is being read in conjunction with 14R-33 which is inside an enclosure.

Site Potential

1981 - 2010 Average Annual Precipitation	26 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2014, this site has remained dominated by quaking aspen (*Populus tremuloides*) in the overstory and mountain snowberry (*Symphoricarpos oreophilus*) in the understory, although cover of both species decreased slightly following a fire in 2019. Other shrubs have been present, but have contributed much less cover (Table 14R-34.1, Table 14R-34.12, Table 14R-34.13). The perennial herbaceous understory has remained abundant with a diverse number of grasses and forbs, although cover decreased between 2014 and 2020. The introduced perennial grass species bulbous bluegrass (*Poa bulbosa*) has been observed throughout the duration of the study, but with low abundance (Table 14R-34.7, Table 14R-34.10, Table 14R-34.11). This study site will likely remain in this or a similar state in future sample years without further disturbance.

Trend Summary Tables**Table 14R-34.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2014	13.2	1.2	0.2	21.2	1.8	37.9
2020	12.6	0.9	0.6	16.1	0.9	33.3

Table 14R-34.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2014	-	396	7	394	-	24.9	0.0	22.6
2020	-	361	141	274	-	17.3	0.9	6.4

Table 14R-34.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2014	8.3	0.1	59.1	0.3	2.2	58.0
2020	15.4	0.0	60.0	0.1	2.0	38.9

Table 14R-34.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk
	Quadrat Frequency		
2014	2	5	10
2020	1	11	21
Days Use Per Acre (ha)			
2014	1.5 (3.6)	12.8 (31.5)	9.4 (23.2)
2020	-	6.0 (14.9)	40.2 (99.3)

Table 14R-34.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus inermis ⁱ (smooth brome)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex (sedge)	Carex rossii (Ross' sedge)	Dactylis glomerata ⁱ (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Festuca thurberi (Thurber's fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Phleum pratense ⁱ (timothy)	Poa bulbosa ⁱ (bulbous bluegrass)	Poa pratensis ⁱ (Kentucky bluegrass)
year	Nested Frequency																
2014	-	6	25	22	7	-	-	62	69	33	44	22	8	5	1	17	322
2020	11	34	69	-	4	5	12	69	99	30	26	18	10	3	-	29	178
year	Average Cover (%)																
2014	-	0.2	1.5	0.4	0.2	-	-	2.9	2.1	1.4	1.8	1.4	0.6	0.2	0.0	0.2	11.9
2020	0.4	1.4	2.6	-	0.0	0.0	0.2	2.8	2.7	0.5	0.8	1.1	0.6	0.0	-	0.5	3.3

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

GRASS SPECIES	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency	
2014	2	1
2020	20	2
year	Average Cover (%)	
2014	0.0	0.0
2020	0.3	0.0

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

Table 14R-34.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Allium (onion)	Androsace septentrionalis ^a (pygmyflower rockjasmine)	Castilleja linariifolia (Wyoming Indian paintbrush)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cymopterus (springparsley)	Erigeron (fleabane)	Erigeron flagellaris (trailing fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Heterotheca villosa (hairy false goldenaster)	Lathyrus brachycalyx (Bonneville pea)	Lupinus (lupine)	Machaeranthera canescens (hoary tansyaster)	Osmorhiza depauperata (bluntseed sweetroot)	Packera neomexicana (New Mexico groundsel)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2014	183	3	5	2	-	4	17	183	2	1	19	79	1	3	3	8	15
2020	51	-	-	-	19	4	-	58	-	3	8	60	-	-	1	8	34
year	Average Cover (%)																
2014	3.3	0.0	0.0	0.1	-	0.0	0.1	12.2	0.0	0.0	0.6	2.3	0.0	0.2	0.0	0.1	0.1
2020	0.5	-	-	-	0.1	0.0	-	1.1	-	0.0	0.3	0.4	-	-	0.0	0.1	0.3

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

FORB SPECIES	Polygonum douglasii ^a (Douglas' knotweed)	Pseudostellaria jamesiana (tuber starwort)	Senecio integririmus ^a (lambstongue ragwort)	Silene drummondii (Drummond's campion)	Symphytotrichum (aster)	Symphytotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Thermopsis montana (mountain goldenbanner)	Tragopogon dubius ^a (yellow salsify)	Trifolium (clover)
year	Nested Frequency									
2014	2	34	-	6	5	-	204	-	0	155
2020	132	36	1	4	21	27	84	4	-	103
year	Average Cover (%)									
2014	0.0	0.2	-	0.0	0.2	-	2.3	-	0.0	0.8
2020	0.8	0.1	0.0	0.0	0.4	0.9	1.3	0.0	-	0.7

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

Table 14R-34.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Mahonia repens (creeping barberry)	Pinus ponderosa ⁱ (ponderosa pine)	Populus tremuloides ⁱ (quaking aspen)	Pseudotsuga menziesii ^t (Douglas-fir)	Quercus gambelii ^p (Gambel oak)	Rosa woodsii ^p (Woods' rose)	Symphoricarpos oreophilus ^p (mountain snowberry)
year	Line Intercept Cover (%)							
2014	0.1	1.8	-	37.7	0.2	0.7	0.1	20.3
2020	-	0.9	-	33.3	-	0.1	-	16
year	Quadrat Cover (%)							
2014	0.0	1.2	0.0	0.0	0.1	0.1	0.0	13.1
2020	-	0.9	-	0.6	-	0.0	-	12.6

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

Table 14R-34.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis ^p -- (Utah serviceberry)									
2014	20	-	100	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	- / -
Mahonia repens -- (creeping barberry)									
2014	2000	-	7	93	0	0	0	73	11/15
2020	4180	-	0	100	0	0	0	0	10/13
Pinus ponderosa ⁱ -- (ponderosa pine)									
2014	-	40	0	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	- / -
Pseudotsuga menziesii ^t -- (Douglas-fir)									
2014	20	-	100	0	0	0	0	0	- / -
2020	-	-	-	-	-	-	-	-	- / -
Quercus gambelii ^p -- (Gambel oak)									
2014	80	80	100	0	0	0	0	0	27/19
2020	60	-	100	0	0	67	0	33	23/17
Rosa woodsii ^p -- (Woods' rose)									
2014	80	-	75	0	25	50	0	0	52/43
2020	60	-	67	33	0	33	67	0	50/29
Symphoricarpos oreophilus ^p -- (mountain snowberry)									
2014	5740	120	25	75	0	25	5	2	49/75
2020	5840	20	33	64	3	12	15	3	45/70

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

Table 14R-34.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

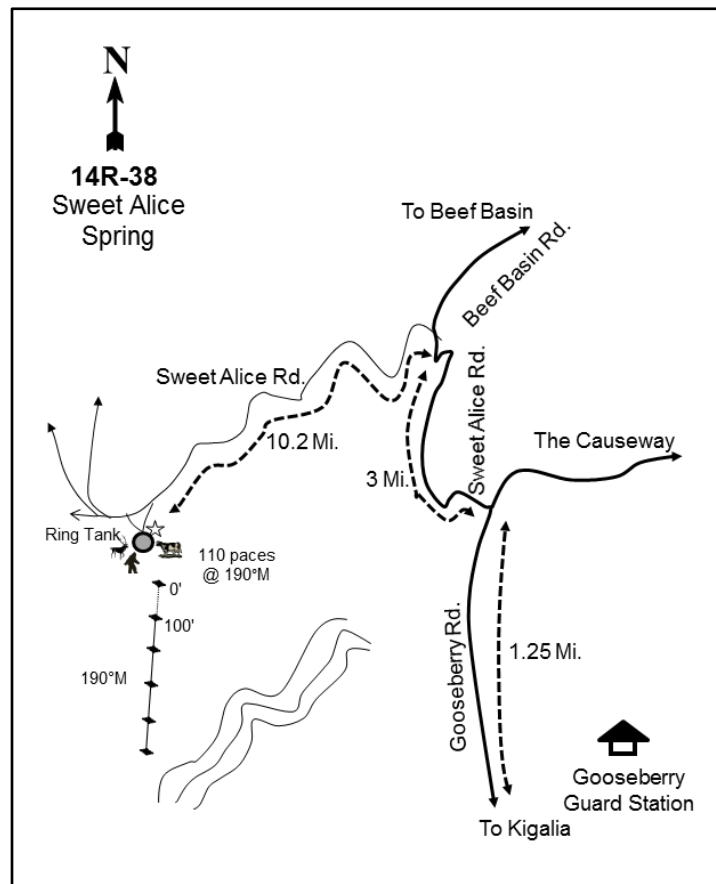
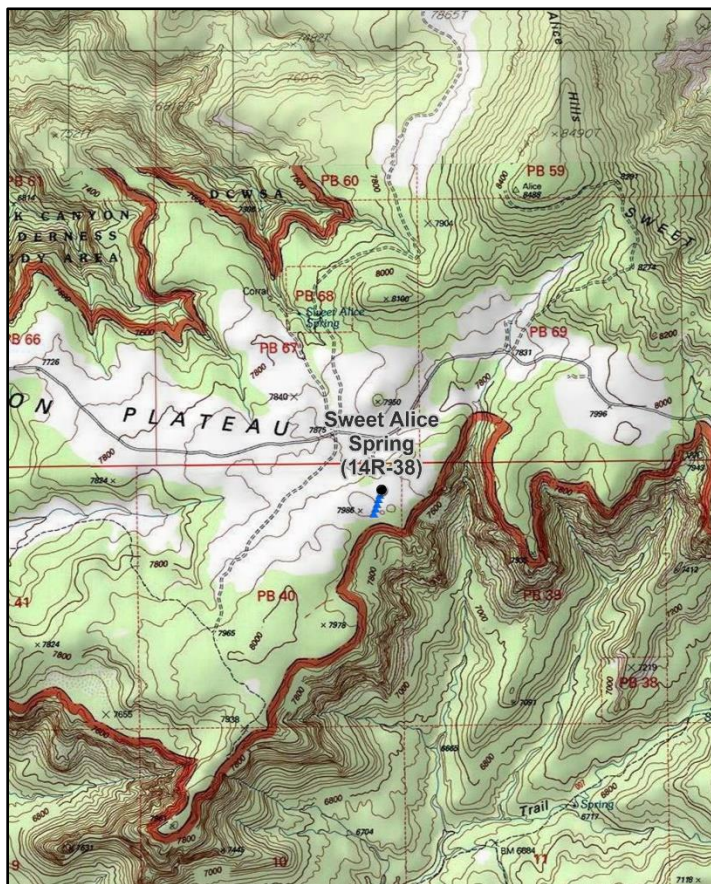
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2014	580	38	28	-	34	11	28	50
2020	860	77	9	2	12	10	30	0

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

Table 14R-34.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Pinus ponderosa (ponderosa pine)							
2014	4	-	-	-	-	100	45.3
2020	17	29	29	-	-	43	15.9
Populus tremuloides (quaking aspen)							
2014	243	30	-	-	5	65	21.9
2020	351	25	20	-	-	55	20.5
Quercus gambelii (Gambel oak)							
2014	3	-	-	-	33	67	13.9

SWEET ALICE SPRING - STUDY NO. 14R-38

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Warren Canyon NE; Township 34S, Range 18E, Section 40
NAD 83 UTM ZONE 12, 594855 East 4190505 North

Transect Information

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

Not Available
190° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Standard

Directions to Site

From the Gooseberry Guard Station on Elk Ridge, drive north for 1.3 miles on Gooseberry Road, then turn left onto Sweet Alice Road. Proceed for 3 miles, where there will be an intersection with Beef Basin Road to the right. Continue straight on Sweet Alice Road for 10.2 miles. There will be a pullout with a ring tank for cattle on the left (south) side of the road: park here. The study site is about 110 paces at an azimuth of 190 degrees magnetic from the ring tank.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	INDIAN CREEK
Elevation	7,900ft (2,408m)
Aspect	North
Slope	5-7%
Sample Dates	08/22/2017, 08/24/2020

Table 14R-38.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Dark Canyon Plateau Phase 4	4018	July 2018-June 2019	1042
Mechanical - Bullhog	Dark Canyon Plateau Phase 5	4163	November 2018-January 2019	913

Wildlife Habitat and Vegetation History**Table 14R-38.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 14R-38.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Manzanita	Phase I
2020	Manzanita	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Sand (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY307UT
States and Transitions	No state and transition model is available for this ecological site.

The vegetation component on this site has been dominated by greenleaf manzanita (*Arctostaphylos patula*) since study establishment in 2017, although preferred browse species such as Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and antelope bitterbrush (*Purshia tridentata*) have also been present to a lesser extent (Table 14R-38.12, Table 14R-38.13). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were scattered throughout the area in 2017, but many trees were removed by a 2018-2019 bullhog treatment. However, pinyon was observed in low amounts in point-quarter density in 2020, indicating that there may be potential for infilling over time (Table 14R-38.1, Table 14R-38.12, Table 14R-38.14). The herbaceous understory has been mainly composed of native perennial grasses and forbs and has remained moderately diverse. Cover of the understory has remained low following the bullhog treatment, but will likely increase as time since treatment passes (Table 14R-38.7, Table 14R-38.10, Table 14R-39.11).

Trend Summary Tables**Table 14R-38.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2017	13.0	40.0	8.1	15.8	48.6	12.2
2020	9.6	27.5	0.0	13.4	34.0	-

Table 14R-38.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2017	-	118	1	93	-	3.8	0.0	3.3
2020	-	122	28	99	-	4.4	0.3	2.5

Table 14R-38.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2017	14.1	1.2	77.8	0.1	0.3	58.1
2020	10.9	0.8	63.8	0.1	1.2	42.7

Table 14R-38.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2017	-	3	-	4
2020	1	7	2	17
Year	Days Use Per Acre (ha)			
2017	-	40.9 (101.0)	4.7 (11.6)	-
2020	1.5 (3.6)	18.1 (44.7)	1.3 (3.3)	-

Table 14R-38.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency					
Agropyron cristatum ⁱ (crested wheatgrass)	4	-	2	6	-	110
Bouteloua gracilis (blue grama)	8	5	4	10	5	104
Carex geyeri (Geyer's sedge)	Average Cover (%)					
Elymus elymoides (squirreltail)	0.0	-	0.2	0.0	-	3.6
Hesperostipa comata (needle and thread)	0.2	0.4	0.1	0.1	0.2	3.5
Poa fendleriana (muttongrass)						

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

Table 14R-38.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Antennaria (pussytoes)	2	-	1	-	6	3	10	3	-	-	-	7	1	-	0	4	21	
Chaenactis douglasii (Douglas' dusty maiden)	-	3	6	8	1	-	8	10	7	2	1	1	6	4	-	3	31	
Cordylanthus ^a (bird's-beak)	Average Cover (%)																	
Cryptantha (cryptantha)	0.0	-	0.0	-	0.1	0.1	0.1	0.0	-	-	-	0.0	0.0	-	0.0	0.0	0.3	
Erigeron pumilus (shaggy fleabane)	-	0.0	0.2	0.1	0.0	-	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.2	-	0.4	0.5	
Erigeron alatum (winged buckwheat)																		
Erigeron racemosus (redroot buckwheat)																		
Erigeron umbellatum (sulphur-flower buckwheat)																		
Fraxea albomarginata (desert fraxea)																		
Galium ^a (bedstraw)																		
Ipomopsis aggregata (scarlet gilia)																		
Lesquerella (bladderpod)																		
Lithospermum ruderale (western stoneseed)																		
Lomatium (desertparsley)																		
Lupinus argenteus (silvery lupine)																		
Machaeranthera canescens (hoary tansyaster)																		
Packera multilobata (lobeleaf groundsel)																		

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

FORB SPECIES				
Petradoria pumila (rock goldenrod)				
Phacelia heterophylla ^a (varileaf phacelia)				
Phlox austromontana (mountain phlox)				
Polygonum douglasii ^a (Douglas' knotweed)				
year	Nested Frequency			
2017	29	-	37	-
2020	16	5	20	17
year	Average Cover (%)			
2017	1.5	-	1.1	-
2020	0.6	0.0	0.5	0.0

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

Table 14R-38.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES									
Amelanchier utahensis ^p (Utah serviceberry)									
Arctostaphylos patula (greenleaf manzanita)									
Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)									
Gutierrezia sarothrae (broom snakeweed)									
Mahonia repens (creeping barberry)									
Opuntia fragilis (brittle pricklypear)									
Pinus edulis ⁱ (twoneedle pinyon)									
Purshia tridentata ^p (antelope bitterbrush)									
Symphoricarpos oreophilus ^p (mountain snowberry)									
year	Line Intercept Cover (%)								
2017	7	48.1	3.7	0.5	0	-	12.2	2	3.1
2020	7.9	33.6	1.9	0.4	-	-	-	2.7	0.9
year	Quadrat Cover (%)								
2017	6.1	39.1	2.4	0.4	0.0	0.5	8.1	2.2	2.3
2020	4.8	27.1	2.0	0.1	0.0	0.3	0.0	2.1	0.7

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

Table 14R-38.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2017	480	-	8	83	8	8	8	0	176/186
2020	360	-	17	72	11	39	6	11	136/123
Arctostaphylos patula -- (greenleaf manzanita)									
2017	9600	-	2	97	1	0	0	0	50/79
2020	5320	-	4	93	3	2	0	4	45/92
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2017	620	-	7	74	19	0	7	19	57/90
2020	460	-	26	52	22	0	0	17	63/93
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	13/27
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2017	20	-	100	0	0	0	0	0	-/-
2020	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2017	1440	20	0	100	0	0	0	0	17/26
2020	460	-	0	100	0	0	0	0	28/35
Mahonia repens -- (creeping barberry)									
2017	40	-	0	100	0	0	0	0	5/8
2020	40	-	0	100	0	0	0	0	3/6
Opuntia fragilis -- (brittle pricklypear)									
2017	220	-	0	100	0	0	0	0	9/37
2020	320	-	6	94	0	0	0	19	9/41
Paxistima myrsinites -- (Oregon boxleaf)									
2017	-	-	-	-	-	-	-	-	15/5
2020	20	-	0	100	0	0	0	0	-/-
Pinus edulis^t -- (twoneedle pinyon)									
2017	40	20	0	100	0	0	0	0	-/-
2020	-	40	0	0	0	0	0	0	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
2017	260	-	0	100	0	15	39	0	78/123
2020	280	-	0	86	14	36	7	21	71/114
Quercus gambelii^p -- (Gambel oak)									
2017	-	-	-	-	-	-	-	-	71/94
2020	-	-	-	-	-	-	-	-	88/86
Symphoricarpos oreophilus^p -- (mountain snowberry)									
2017	720	-	0	100	0	0	0	0	50/64
2020	380	-	11	79	11	0	0	37	42/63
Yucca baccata -- (banana yucca)									
2017	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	21/29

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

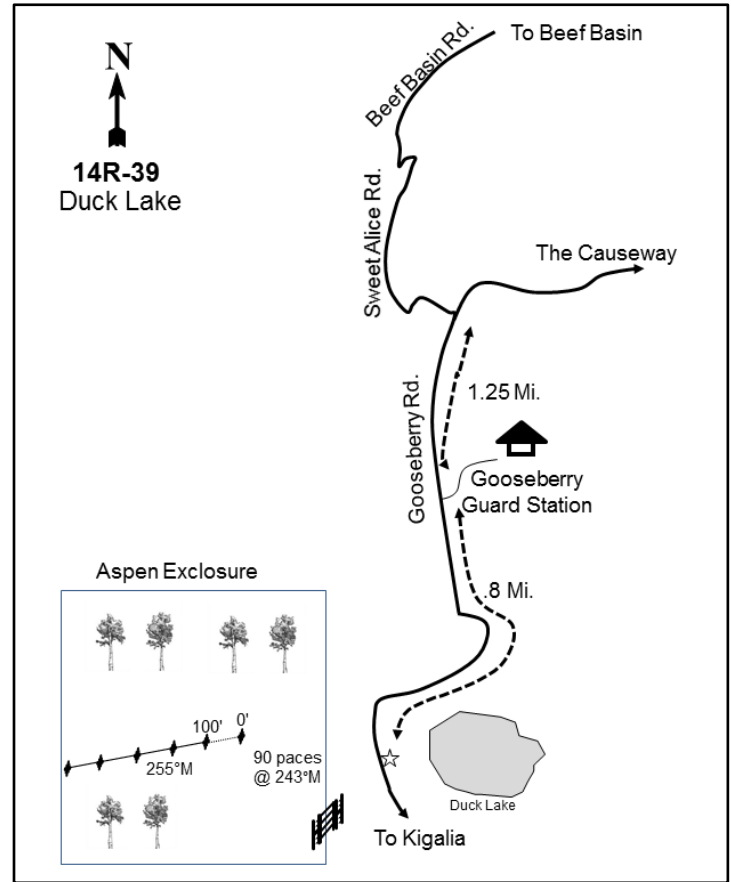
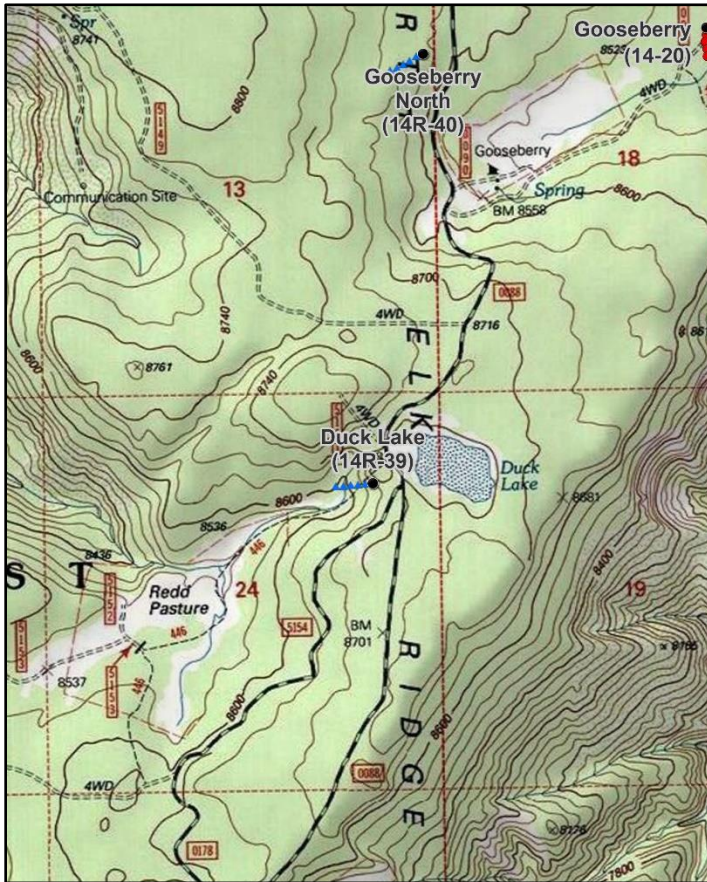
Table 14R-38.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2017	1	-	-	-	-	100	45.0
Pinus edulis (twoneedle pinyon)							
2017	48	-	-	24	35	41	21.3
2020	2	50	50	-	-	-	9.5

Table 14R-38.15 – Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2017	21.2	12.5	2.6	7.7	0	6.5	0	50.5	Poor-Fair
2020	19.2	11	7.1	8.9	0	5.1	0	51.3	Poor-Fair

DUCK LAKE - STUDY NO. 14R-39

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Poison Canyon SE; Township 34S, Range 19E, Section 24
NAD 83 UTM ZONE 12, 607642 East 4185622 North

Transect Information

Browse Tag # (0' Stake)	533
Transect Bearing	248° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the Gooseberry Guard Station on Elk Ridge, proceed south for approximately 0.8 miles to Duck Lake (there will be a sign): park here. The study is approximately 90 paces from the road at an azimuth of 243 degrees magnetic, inside an exclosure and slightly downhill.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	GOOSEBERRY
Elevation	No data
Aspect	Southwest
Slope	10-30%
Sample Dates	08/23/2017, 08/25/2020

Table 14R-39.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Selective	North Elk Ridge Aspen Restoration Phase II	3773	June 2016-June 2017	84
Fire - Prescribed	La Sal/Abajo Prescribed Fire FY21 (Proposed)	5218	Fall 2020	25812
Fire - Prescribed	La Sal/Abajo Prescribed Fire FY20	4882	Summer 2019	21732

Wildlife Habitat and Vegetation History**Table 14R-39.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 14R-39.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Quaking Aspen/Perennial Grass	Phase I
2020	Quaking Aspen/Perennial Grass	Phase I

Site Notes

This study site is located inside a total enclosure which was constructed in 2015 to exclude big game and livestock (WRI Project #3004).

Site Potential

1981 - 2010 Average Annual Precipitation	25 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

Quaking aspen (*Populus tremuloides*) and mountain snowberry (*Symphoricarpos oreophilus*) have been the dominant tree and shrub species since study establishment in 2017; lesser amounts of other browse species including Utah serviceberry (*Amelanchier utahensis*) and Gambel oak (*Quercus gambelii*) have also been present (Table 14R-39.12, Table 14R-39.13). The herbaceous understory has been abundant (Table 14R-39.7), with a majority of the cover being contributed by the introduced perennial grasses orchardgrass (*Dactylis glomerata*) and Kentucky bluegrass (*Poa pratensis*) (Table 14R-39.10). Forbs have contributed much less cover in comparison, with the native perennial forb Nevada pea (*Lathyrus lanszwertii*) as the most abundant species (Table 14R-39.11). Although a majority of the ponderosa pine (*Pinus ponderosa*) trees were removed by a logging treatment (Table 14R-39.1), point-quarter data reveals that they were still present in low density during the sample period. Rocky Mountain juniper (*Juniperus osteosperma*) has also been observed: this indicates that there may be potential for conifer infilling in the future (Table 14R-39.14).

Trend Summary Tables**Table 14R-39.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2017	12.0	1.7	0.5	28.8	1.4	23.8
2020	17.1	2.0	0.3	27.8	1.2	26.4

Table 14R-39.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2017	-	444	-	211	-	63.1	-	6.5
2020	-	372	10	207	-	35.7	0.1	7.5

Table 14R-39.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2017	2.3	0.1	72.0	0.0	4.6	70.8
2020	5.3	-	52.3	0.1	3.8	54.0

Table 14R-39.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk
	Quadrat Frequency		
2017	-	2	-
2020	-	7	10
Year	Days Use Per Acre (ha)		
2017	-	0.7 (1.7)	-
2020	0.7 (1.8)	22.1 (54.6)	19.4 (48.0)

Table 14R-39.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES											
Achnatherum nelsonii (Columbia needlegrass)											
Bromus inermis ⁱ (smooth brome)											
Bromus porteri (Porter brome)											
Carex rossii (Ross' sedge)											
Dactylis glomerata ⁱ (orchardgrass)											
Elymus elymoides (squirreltail)											
Festuca thurberi (Thurber's fescue)											
Hesperostipa comata (needle and thread)											
Muhlenbergia montana (mountain muhly)											
Poa fendleriana (muttongrass)											
Poa pratensis ⁱ (Kentucky bluegrass)											
year	Nested Frequency										
2017	12	33	2	4	306	1	6	-	-	-	355
2020	62	16	-	9	250	8	2	23	8	1	233
year	Average Cover (%)										
2017	1.2	2.5	0.0	0.0	31.8	0.0	0.1	-	-	-	27.4
2020	3.4	1.4	-	0.1	19.6	0.1	0.0	1.8	0.2	0.0	9.2

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

Table 14R-39.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Achillea millefolium (Common yarrow)																	
Agoseris glauca (pale agoseris)																	
Arenaria (sandwort)																	
Collinsia parviflora ^a (maiden blue eyed Mary)																	
Erigeron flagellaris (trailing fleabane)																	
Frasera speciosa (elkweed)																	
Heterotheca villosa (hairy false goldenaster)																	
Lathyrus lanszwertii (Nevada pea)																	
Phlox longifolia (longleaf phlox)																	
Polygonum douglasii ^a (Douglas' knotweed)																	
Pseudostellaria jamesiana (tuber starwort)																	
Solidago multiradiata (Rocky Mountain goldenrod)																	
Symphoricarum ascendens (western aster)																	
Taraxacum officinale (common dandelion)																	
Thalictrum fendleri (Fendler's meadow-rue)																	
Tragopogon dubius ^{am} (yellow salsify)																	
Trifolium longipes (longstalk clover)																	
year	Nested Frequency																
2017	31	14	-	-	22	2	1	114	-	-	9	22	8	73	3	-	23
2020	6	7	1	2	-	-	2	142	14	6	18	25	7	11	-	2	10
year	Average Cover (%)																
2017	1.1	0.1	-	-	0.1	0.0	0.1	2.9	-	-	0.1	0.8	0.1	0.6	0.1	-	0.1
2020	0.1	0.0	0.0	0.0	-	-	0.1	5.2	0.1	0.0	0.0	1.7	0.1	0.1	-	0.0	0.0

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

FORB SPECIES	Vicia americana (American vetch)
year	Nested Frequency
2017	49
2020	17
year	Average Cover (%)
2017	0.5
2020	0.2

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

Table 14R-39.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis ^p (Utah serviceberry)	Maltonia repens (creeping barberry)	Populus tremuloides ^t (quaking aspen)	Quercus gambelii ^p (Gambel oak)	Rosa woodsii ^p (Woods' rose)	Symphoricarpos oreophilus ^p (mountain snowberry)
year	Line Intercept Cover (%)					
2017	0.1	1.4	23.8	2.3	-	26.4
2020	0.1	1.2	26.4	1.6	-	26.1
year	Quadrat Cover (%)					
2017	0.0	1.7	0.5	0.8	0.1	11.0
2020	0.0	2.0	0.3	0.6	0.1	16.4

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

Table 14R-39.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2017	20	-	100	0	0	0	0	0	278/396
2020	80	-	100	0	0	25	0	25	118/107
Mahonia repens -- (creeping barberry)									
2017	3780	-	1	100	0	0	0	0	12/15
2020	5600	-	13	86	1	0	0	1	14/15
Prunus virginiana^p -- (chokecherry)									
2017	-	-	-	-	-	-	-	-	66/69
2020	-	-	-	-	-	-	-	-	94/100
Quercus gambelii^p -- (Gambel oak)									
2017	600	60	70	30	0	0	3	0	128/86
2020	580	-	76	24	0	31	3	0	126/98
Rosa woodsii^p -- (Woods' rose)									
2017	20	-	0	100	0	0	0	0	83/59
2020	120	-	0	100	0	67	0	0	34/51
Symphoricarpos oreophilus^p -- (mountain snowberry)									
2017	5100	-	9	90	1	19	6	2	67/80
2020	4500	20	28	72	0	23	12	0	64/83

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

Table 14R-39.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

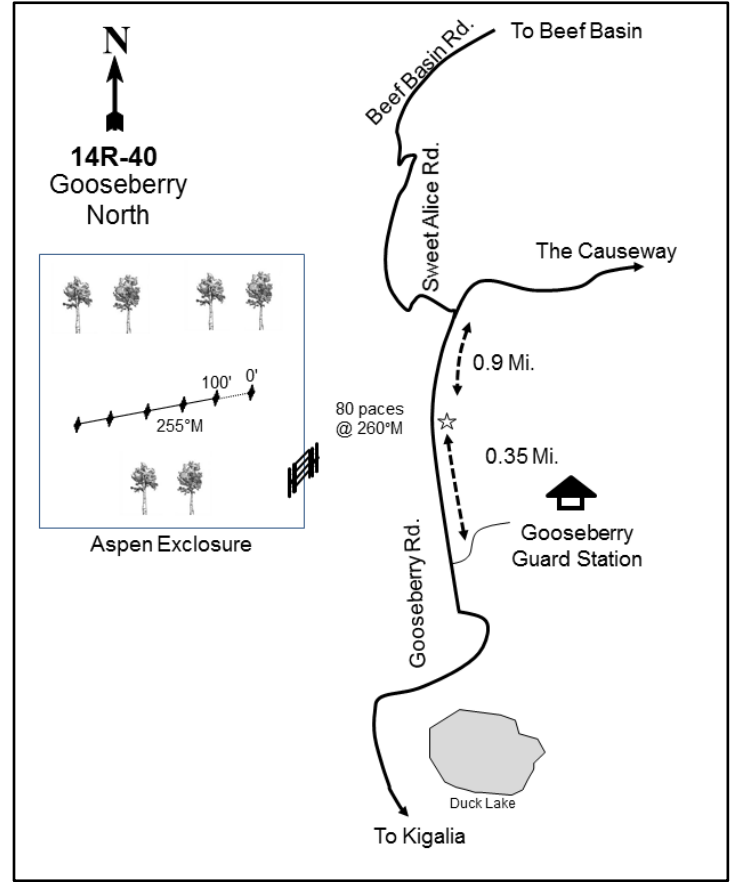
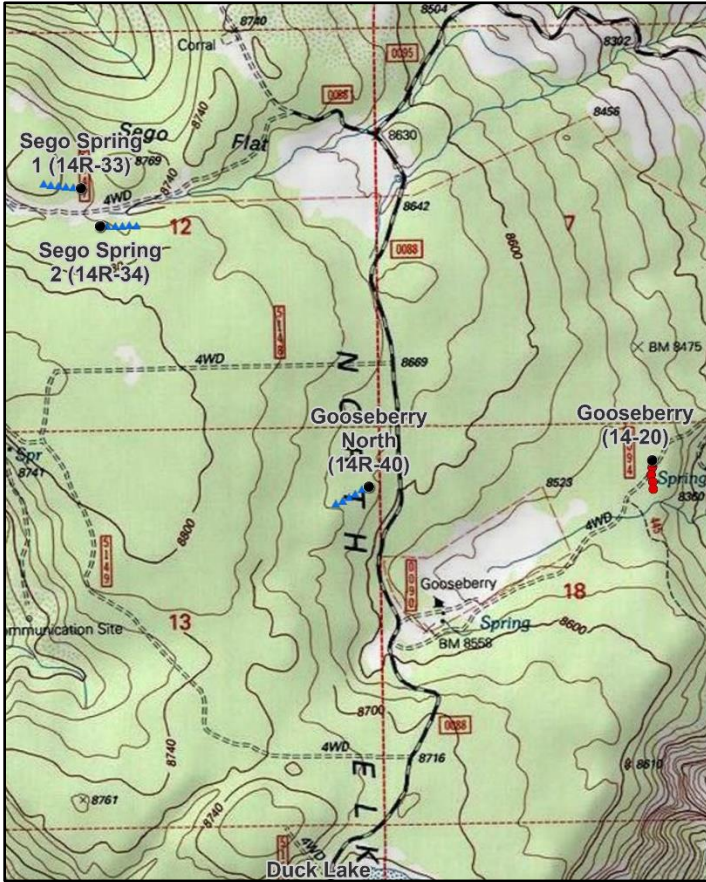
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2017	180	56	-	-	44	0	0	0
2020	200	40	10	-	50	17	0	17

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

Table 14R-39.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2017	6	-	-	100	-	-	6.0
2020	5	-	50	50	-	-	5.0
Pinus ponderosa (ponderosa pine)							
2017	1	-	-	-	-	100	58.0
2020	9	33	33	33	-	-	2.3
Populus tremuloides (quaking aspen)							
2017	127	-	-	-	-	100	38.6
2020	193	15	15	-	-	70	30.4

GOOSEBERRY NORTH - STUDY NO. 14R-40



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Poison Canyon NE; Township 34S, Range 19E, Section 13
NAD 83 UTM ZONE 12, 607846 East 4187363 North

Transect Information

Browse Tag # (0' Stake)	154
Transect Bearing	236° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the Gooseberry Guard Station on Elk Ridge, drive north for 0.35 miles and park on the side of the road; there is no witness post. The study site is on the left-hand (west) side of the road inside of an exclosure and is about 80 paces at 260 degrees magnetic away from the road.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	GOOSEBERRY
Elevation	8,680ft (2,646m)
Aspect	Northeast
Slope	13%
Sample Dates	08/23/2017, 08/26/2020

Table 14R-40.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Logging - Selective	North Elk Ridge Aspen Restoration Phase II	3773	June 2016-June 2017	84
Fire - Prescribed	La Sal/Abajo Prescribed Fire FY20	4882	Summer 2019	21732
Fire - Prescribed	La Sal/Abajo Prescribed Fire FY21 (Proposed)	5218	Fall 2020	25812

Wildlife Habitat and Vegetation History**Table 14R-40.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 14R-40.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2017	Ponderosa Pine/Mountain Snowberry	NA
2020	Ponderosa Pine/Mountain Snowberry	NA

Site Notes

This study site is located inside a total enclosure which was constructed in 2015 to exclude big game and livestock (WRI Project #3004). A buck mule deer and deer beds were seen on site in 2017.

Site Potential

1981 - 2010 Average Annual Precipitation	26 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R048AY506UT
States and Transitions	No state and transition model is available for this ecological site.

Ponderosa pine (*Pinus ponderosa*) and mountain snowberry (*Symphoricarpos oreophilus*) have dominated this site since study establishment in 2017 with other shrub species as minor components (Table 14R-40.12, Table 14R-40.13). Many younger quaking aspen (*Populus tremuloides*) plants are present as of 2020, and cover may increase over time as the stand matures (Table 14R-40.13a). The herbaceous understory has remained diverse and abundant. Perennial grasses including Columbia needlegrass (*Achnatherum nelsonii*) and Thurber's fescue (*Festuca thurberi*) have provided a majority of the herbaceous cover in both sample years (Table 14R-40.7, Table 14R-40.10). Most forb cover has been contributed by native perennial species, namely common yarrow (*Achillea millefolium*) and Nevada pea (*Lathyrus lanszwertii*) (Table 14R-40.11). Although a selective logging treatment prior to study establishment (Table 14R-40.1) removed some of the ponderosa pine trees, their presence post-treatment (Table 14R-40.14) indicates that this site may become conifer-encroached in the future.

Trend Summary Tables**Table 14R-40.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2017	17.1	3.8	0.3	21.5	2.4	15.6
2020	20.3	5.1	0.8	26.8	3.0	16.8

Table 14R-40.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2017	-	421	3	308	-	34.2	0.1	12.6
2020	-	356	-	303	-	31.3	-	11.5

Table 14R-40.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2017	0.5	1.3	84.9	0.0	-	55.7
2020	0.4	0.9	62.5	-	0.4	55.9

Table 14R-40.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk
	Quadrat Frequency	
2017	-	1
2020	6	1
Year	Days Use Per Acre (ha)	
	2017	1.3 (3.3)
2020	5.3 (13.2)	9.4 (23.2)

Table 14R-40.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES											
Achnatherum nelsonii (Columbia needlegrass)											
Bromus marginatus (mountain brome)											
Bromus porteri (Porter brome)											
Carex (sedge)											
Carex rossii (Ross' sedge)											
Dactylis glomerata ⁱ (orchardgrass)											
Elymus elymoides (squirreltail)											
Festuca thurberi (Thurber's fescue)											
Hesperostipa comata (needle and thread)											
Pascopyrum smithii (western wheatgrass)											
Poa pratensis ⁱ (Kentucky bluegrass)											
year	Nested Frequency										
2017	236	53	69	10	23	12	17	56	10	27	187
2020	188	57	55	34	22	3	13	73	-	43	121
year	Average Cover (%)										
2017	11.0	1.9	4.5	0.4	0.5	0.4	0.2	7.0	0.7	0.9	6.7
2020	12.1	2.3	1.1	1.0	1.0	0.0	0.4	8.9	-	1.6	2.8

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

Table 14R-40.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Achillea millefolium (Common yarrow)																		
Agoseris glauca (pale agoseris)																		
Antennaria parvifolia (small-leaf pussytoes)																		
Arenaria (sandwort)																		
Erigeron flagellaris (trailing fleabane)																		
Gayophytum racemosum ^a (blackfoot groundsmoke)																		
Gentiana (gentian)																		
Lathyrus lanszwertii (Nevada pea)																		
Lesquerella (bladderpod)																		
Ligusticum porteri (Porter's licorice-root)																		
Osmorhiza occidentalis (western sweetroot)																		
Packera cana (woolly groundsel)																		
Phlox longifolia (longleaf phlox)																		
Pseudocymopterus montanus (alpine false springparsley)																		
Pseudostellaria jamesiana (tuber starwort)																		
Silene (catchfly)																		
Symphotrichum ascendens (western aster)																		
year	Nested Frequency																	
2017	156	13	7	3	6	3	1	79	-	1	-	33	6	26	30	-	8	
2020	85	-	4	3	10	-	-	164	1	1	0	29	52	11	68	2	3	
year	Average Cover (%)																	
2017	3.0	0.1	0.8	0.0	0.2	0.1	0.0	2.5	-	0.2	-	0.3	0.1	0.3	0.4	-	0.2	
2020	2.3	-	0.6	0.0	0.3	-	-	4.3	0.0	0.1	0.0	0.4	0.3	0.4	0.4	0.0	0.0	

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

FORB SPECIES					
Taraxacum officinale (common dandelion)					
Thalictrum fendleri (Fendler's meadow-rue)					
Thermopsis montana (mountain goldenbanner)					
Trifolium longipes (longstalk clover)					
Vicia americana (American vetch)					
year	Nested Frequency				
2017	112	22	-	39	25
2020	44	24	7	50	27
year	Average Cover (%)				
2017	3.1	0.7	-	0.3	0.4
2020	0.7	0.5	0.2	0.3	0.6

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

Table 14R-40.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
Amelanchier utahensis ^p (Utah serviceberry)						
Maltonia repens (creeping barberry)						
Pinus ponderosa ^t (ponderosa pine)						
Populus tremulooides ^t (quaking aspen)						
Quercus gambelii ^p (Gambel oak)						
Symphoricarpos oreophilus ^p (mountain snowberry)						
year	Line Intercept Cover (%)					
2017	0	2.4	15.6	-	0.7	20.8
2020	-	3	15.1	1.7	1.5	25.3
year	Quadrat Cover (%)					
2017	0.0	3.8	0.3	-	1.0	16.1
2020	-	5.1	0.3	0.5	0.3	20.0

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

Table 14R-40.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis^p -- (Utah serviceberry)									
2017	20	-	100	0	0	0	0	0	40/47
2020	20	20	100	0	0	0	0	0	- / -
Mahonia repens -- (creeping barberry)									
2017	14000	-	0	100	0	0	0	0	12/12
2020	13640	-	1	99	0	0	0	0	8/13
Pinus ponderosa^t -- (ponderosa pine)									
2017	140	560	71	29	0	0	0	0	- / -
2020	500	100	96	4	0	0	0	0	- / -
Quercus gambelii^p -- (Gambel oak)									
2017	300	460	93	7	0	0	0	0	57/64
2020	340	60	59	41	0	6	53	0	104/71
Rosa woodsii^p -- (Woods' rose)									
2017	60	-	33	67	0	0	0	0	34/17
2020	-	-	-	-	-	-	-	-	- / -
Symphoricarpos oreophilus^p -- (mountain snowberry)									
2017	8580	-	7	93	0	1	0	1	53/57
2020	6860	-	18	82	1	4	0	1	55/72

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

Table 14R-40.13a - Aspen Characteristics. Characteristics of aspen populations including density, size class distribution, and vigor of plants.

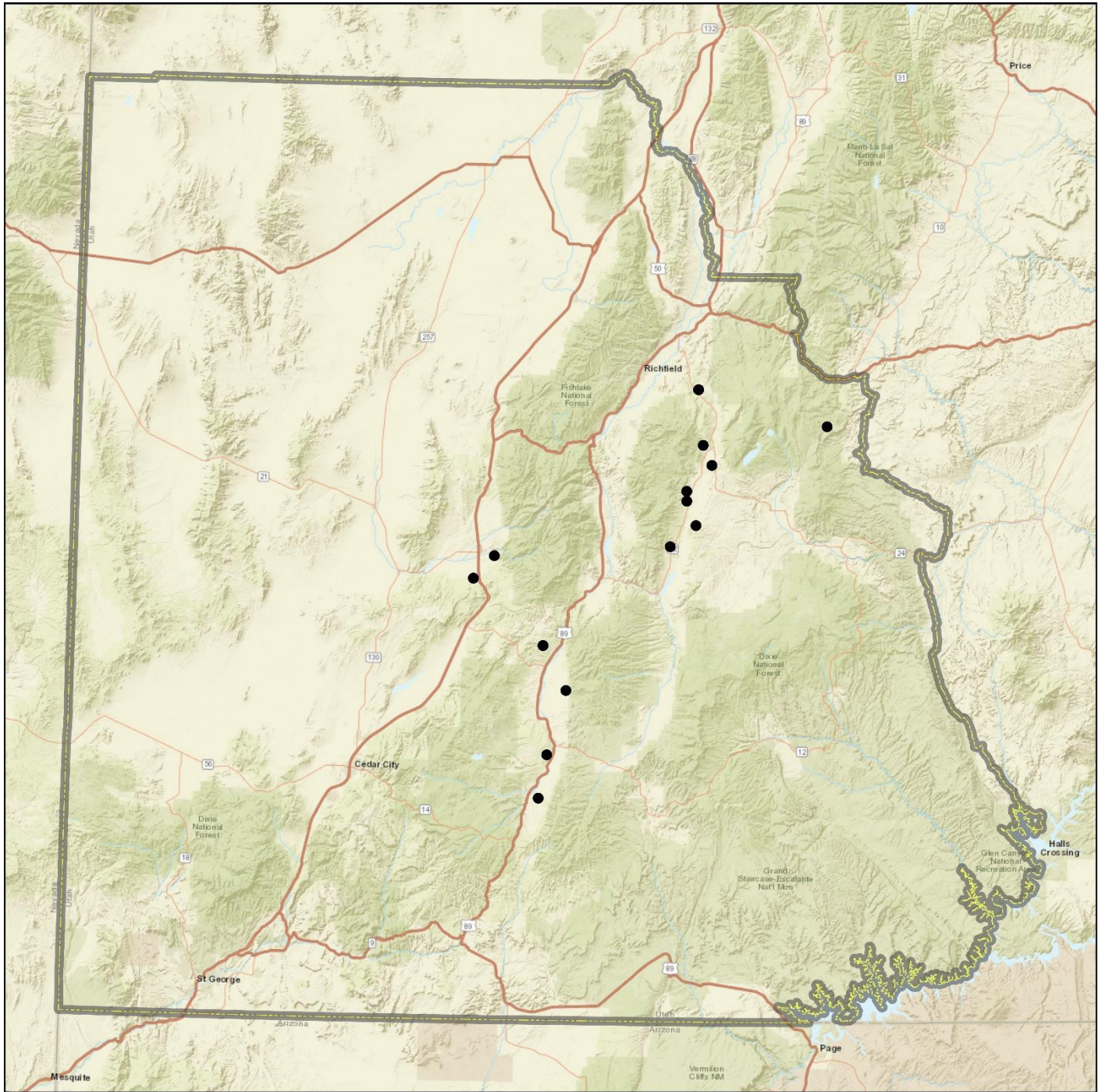
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2017	120	50	50	-	-	33	33	0
2020	640	16	66	19	-	44	4	4

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

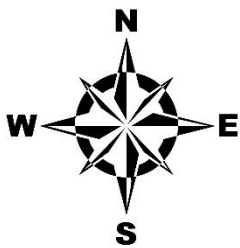
Table 14R-40.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2017	1	-	100	-	-	-	5.0
Pinus ponderosa (ponderosa pine)							
2017	59	55	18	-	9	18	13.5
2020	285	53	40	7	-	-	1.3
Populus tremuloides (quaking aspen)							
2017	50	14	79	-	-	7	3.2
2020	173	-	47	53	-	-	2.1

SOUTHERN REGION

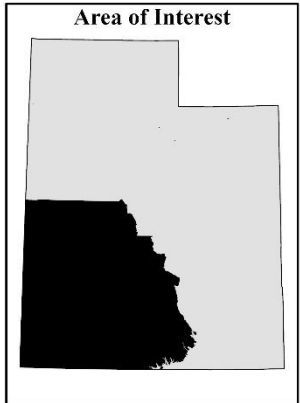


0 5 10 20 30 40 50 60 70 80 Miles



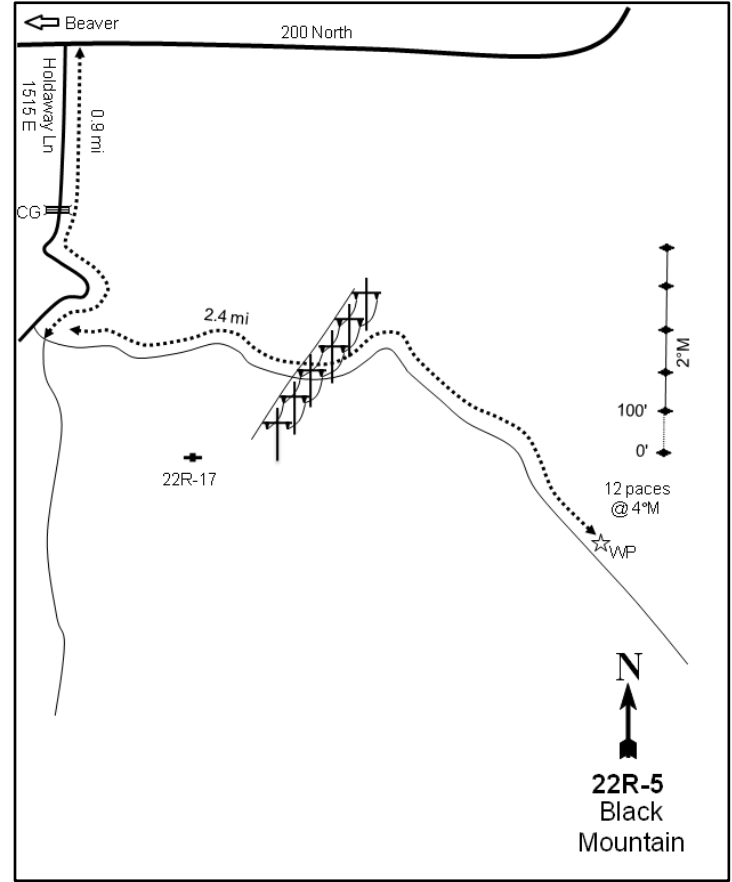
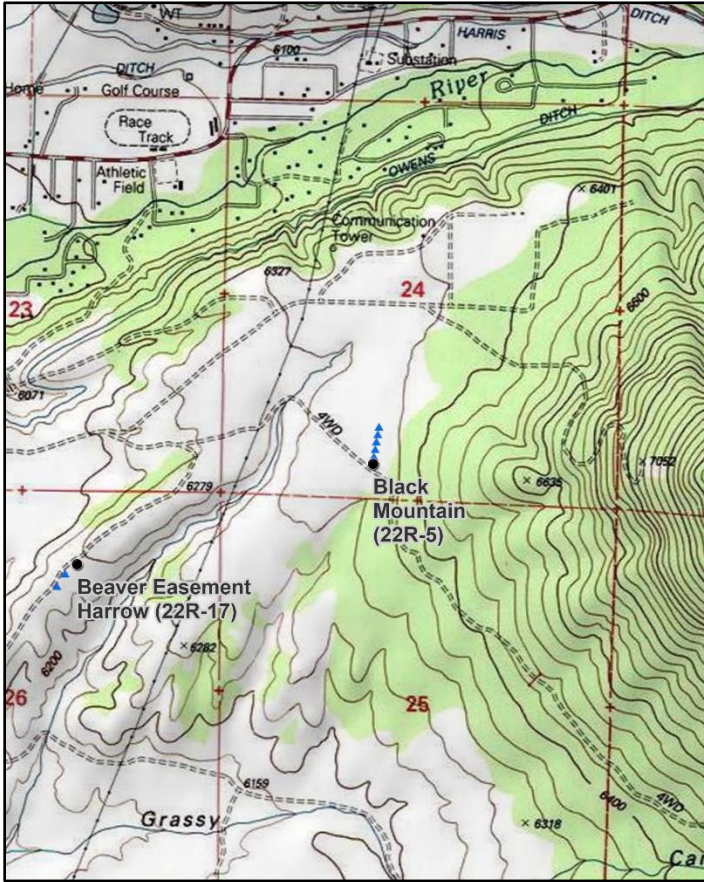
Study Location

- WRI
- ▭ Region Boundaries



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

BLACK MOUNTAIN - STUDY NO. 22R-5

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Black Ridge SW; Township 29S, Range 7W, Section 24
NAD 83 UTM ZONE 12, 360424 East 4236501 North

Transect Information

Browse Tag # (0' Stake)	42
Transect Bearing	2° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From Beaver, drive east on 200 North. Holdaway Lane (1515 East) comes in from the south: turn onto this road, drive for 0.9 miles, and turn left. Travel 1 mile to the power lines. At the power lines, turn south and travel 0.1 miles to a fork. Go left at the fork and proceed 0.4 miles to a witness post on the left (north) side of the road. The 0-foot stake is 12 paces from the witness post at 4 degrees magnetic and is marked with browse tag #42.

Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	LEE SPRINGS
Elevation	6,350ft (1,935m)
Aspect	Southwest
Slope	3%
Sample Dates	07/20/2004, 06/21/2007, 06/25/2012, 08/09/2016, 08/10/2020

Table 22R-05.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial	Black Mountain	PDB	September-December 2004	-
Hand Crew - Lop and Scatter	-	-	Between 2004 and 2007	-
Harrow - Two-Way Dixie	Beaver Easement Property Treatment	1294	September-December 2008	205
Seeding - Broadcast Before	Beaver Easement Property Treatment	1294	November 2008	205
Seeding - Aerial After	Beaver Easement Property Treatment	1294	January 2009	205
Seeding - Transplant	SR Shrub Seedlings	81	January-June 2006	238
Seeding - Transplant	SR Shrub Seedlings Year 2	469	January-June 2007	238

Table 22R-05.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Beaver Easement			Broadcast	Nov 2008	210
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	2.14	1.97
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.43	1.17
G	Thinopyrum intermedium	Intermediate Wheatgrass	Oahe	2.14	1.94
F	Cleome serrulata	Rocky Mountain Beeplant	Iron UT	0.48	0.43
F	Medicago sativa	Alfalfa	Ladak	1.43	1.30
F	Melilotus officinalis	Yellow Sweetclover		0.48	0.43
F	Onobrychis viciifolia	Sainfoin	Eski	3.10	2.72
F	Sanguisorba minor	Small Burnet	Delar	1.90	1.80
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Lincoln NV	0.12	0.09

Mix Name			Application Type	Application Date	Acres
Beaver Easement - Kochia			Aerial	Jan 2009	200
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak 65	1.00	0.89
S	Bassia prostrata	Forage Kochia	Lander NV	1.00	0.66

Wildlife Habitat and Vegetation History**Table 22R-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

Table 22R-05.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Wyoming Big Sagebrush	Phase I
2007	Wyoming Big Sagebrush	Phase I
2012	Wyoming Big Sagebrush/Perennial Grass	Phase I
2016	Wyoming Big Sagebrush/Perennial Grass	Phase I
2020	Wyoming Big Sagebrush/Perennial Grass	Phase I

Site Notes

The study is located approximately one mile southeast of Beaver within a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat.

Soils**Table 22R-05.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.4	41.0	31.5	27.5	2.2	5.6	163.2	0.7	07/20/2004

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY309UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2004, the dominant browse species on this site has been Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Table 22R-05.12). The seeding success of forage kochia (*Bassia prostrata*) appears to be brief with a flush of mature plants appearing in 2007, but density of forage kochia significantly decreased with very few plants being sampled in 2020 (Table 22R-05.13). The herbaceous understory was initially lacking in cover, but perennial grasses increased and became a co-dominant vegetation component in 2012 (Table 22R-05.7, Table 22R-05.10). Although twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were sparsely scattered throughout the site in 2004, cover decreased after a lop and scatter treatment between 2004 and 2007 (Table 22R-05.1, Table 22R-05.12). However, density data indicates that trees have been present in all sample years, suggesting that there may be the potential for infilling in the future (Table 22R-05.14).

Trend Summary Tables**Table 22R-05.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	14.7	-	2.2	17.7	-	4.7
2007	12.5	0.0	0.0	17.3	-	-
2012	11.8	-	0.0	17.8	-	-
2016	13.8	-	-	16.4	-	-
2020	13.1	0.0	-	18.6	-	-

Table 22R-05.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	16	208	219	142	0.0	4.0	1.1	1.2
2007	260	221	413	146	2.2	5.1	3.5	1.1
2012	210	256	310	163	4.5	12.9	1.8	3.1
2016	90	272	297	203	0.8	13.5	1.4	4.1
2020	160	247	344	96	1.6	9.8	2.5	0.7

Table 22R-05.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	39.0	0.4	28.6	20.4	2.9	23.0
2007	34.1	0.4	26.1	16.3	3.8	27.2
2012	22.3	0.0	51.9	5.5	4.4	38.2
2016	42.0	0.0	31.4	7.0	2.1	31.9
2020	22.1	0.1	44.6	8.8	3.3	31.0

Table 22R-05.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2004	3	11	4
2007	1	7	58
2012	-	2	8
2016	1	6	26
2020	3	14	29
Year	Days Use Per Acre (ha)		
2004	5.1 (12.6)	27.5 (67.9)	-
2007	11.6 (28.7)	22.1 (54.6)	-
2012	-	0.7 (1.7)	-
2016	7.2 (17.9)	1.3 (3.3)	-
2020	3.6 (9.0)	4.7 (11.6)	-

Table 22R-05.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency							
Achnatherum hymenoides (Indian ricegrass)	148	16	4	52	24	9	-	6
Bromus tectorum ^{ai} (cheatgrass)	168	260	26	35	27	-	5	15
Elymus elymoides (squirreltail)	176	210	54	29	44	5	5	4
Hesperostipa comata (needle and thread)	147	90	69	133	41	5	1	3
Pascopyrum smithii (western wheatgrass)	164	160	28	66	35	8	-	9
Pleurophis jamesii (James' galleta)	Average Cover (%)							
Poa secunda (Sandberg bluegrass)	2.8	0.0	0.1	0.9	0.1	0.0	-	0.0
Pseudoroegneria spicata (bluebunch wheatgrass)	3.6	2.2	0.2	1.0	0.2	-	0.0	0.1
	9.7	4.5	0.7	0.6	1.5	0.2	0.0	0.2
	6.5	0.8	1.0	5.3	0.4	0.1	0.0	0.1
	6.6	1.6	0.4	2.4	0.3	0.0	-	0.1

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

Table 22R-05.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency															
Alyssum desertorum ^{ai} (desert madwort)	-	-	-	193	52	0	-	10	5	56	-	-	11	23	-	75
Astragalus calycosus (Torrey's milkvetch)	96	2	2	404	44	8	-	-	-	12	-	-	16	35	2	77
Astragalus lentiginosus (freckled milkvetch)	173	6	5	228	70	3	5	-	-	-	5	3	10	29	-	84
Ceratocephala testiculata ^{ai} (curvseed butterwort)	242	3	10	9	116	-	1	-	-	152	-	3	7	26	-	100
Chaetopappa ericooides (rose heath)	233	-	5	168	42	4	-	68	-	-	-	-	-	13	-	55
Collinsia parviflora ^a (maiden blue eyed Mary)	Average Cover (%)															
Cryptantha (cryptantha)	-	-	-	0.9	0.5	0.0	-	0.0	0.0	0.2	-	-	0.1	0.1	-	0.6
Descurainia pinnata ^a (western tansymustard)	0.2	0.0	0.0	3.2	0.4	0.0	-	-	-	0.0	-	-	0.1	0.1	0.0	0.6
Draba ^a (draba)	0.8	0.0	0.0	1.0	1.8	0.0	0.0	-	-	-	0.0	0.0	0.2	0.1	-	0.9
Gilia inconspicua ^a (shy gilia)	0.8	0.0	0.0	0.0	2.4	-	0.0	-	-	0.6	-	0.0	0.2	0.1	-	1.3
Orobancha fasciculata (clustered broomrape)	2020	1.6	-	0.0	0.6	0.2	0.0	-	0.3	-	-	-	-	0.0	-	0.5
Penstemon comarrhenus (dusty beardtongue)																
Phlox hoodii (spiny phlox)																
Phlox longifolia (longleaf phlox)																
Sanguisorba minor ^r (small burnet)																
Sphaeralcea coccinea (scarlet globemallow)																

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

Table 22R-05.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Bassia prostrata ^{pi} (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Juniperus osteosperma ⁱ (Utah juniper)	Pinus edulis ⁱ (twoneedle pinyon)
year	Line Intercept Cover (%)				
2004	17.7	-	-	1.4	3.3
2007	17.3	-	-	-	-
2012	17.5	0.3	-	-	-
2016	15.9	0.5	-	-	-
2020	18.6	-	-	-	-
year	Quadrat Cover (%)				
2004	14.7	-	-	1.0	1.2
2007	12.4	0.0	0.0	0.0	-
2012	11.4	0.4	-	0.0	-
2016	13.1	0.7	-	-	-
2020	13.1	0.0	0.0	-	-

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

Table 22R-05.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	3860	60	1	62	38	32	11	17	50/75
2007	3160	-	0	66	34	25	31	44	51/83
2012	3680	160	38	50	13	15	0	40	46/78
2016	4820	-	14	74	12	31	3	7	42/76
2020	4380	-	7	57	36	42	2	37	48/72
Atriplex canescens^p -- (fourwing saltbush)									
2004	-	-	-	-	-	-	-	-	69/95
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Bassia prostrata^{pi} -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	40	0	0	0	0	0	0	-/-
2012	2120	640	40	60	0	5	59	12	9/17
2016	1200	-	7	93	0	13	28	5	14/22
2020	40	-	0	50	50	50	0	50	10/22
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	33/39
2007	-	40	0	0	0	0	0	0	-/-
2012	60	-	0	100	0	0	0	0	24/36
2016	-	-	-	-	-	-	-	-	33/59
2020	60	-	0	67	33	0	0	33	26/49

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	20	-	100	0	0	0	0	0	16/10
2016	40	-	0	100	0	0	0	0	23/27
2020	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma¹ -- (Utah juniper)									
2004	60	-	67	33	0	0	0	0	- / -
2007	40	-	50	50	0	0	0	0	- / -
2012	20	-	0	100	0	0	0	0	- / -
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Linanthus pungens -- (granite prickly phlox)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	16/43
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	13/15
Pinus edulis^t -- (twoneedle pinyon)									
2004	20	-	0	100	0	0	0	0	- / -
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	20	0	0	0	0	0	0	- / -
2020	20	-	100	0	0	0	0	0	- / -

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

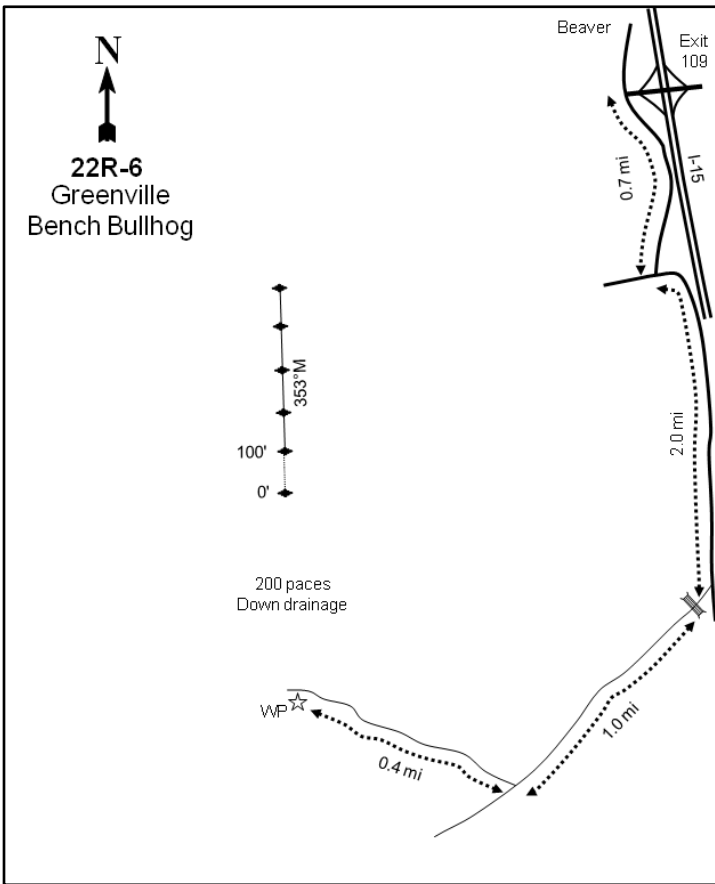
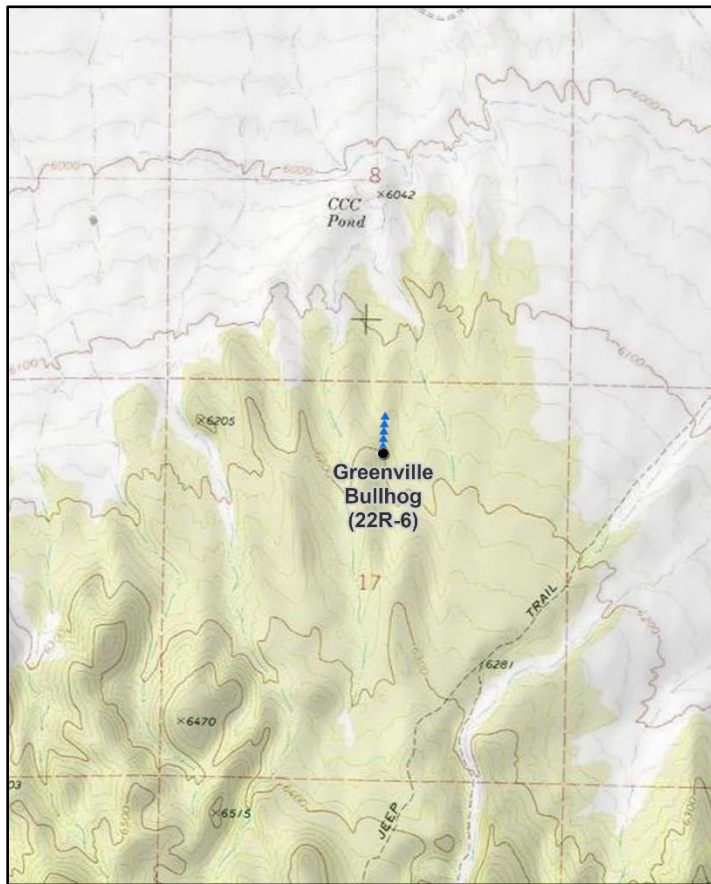
Table 22R-05.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2004	29	7	71	14	7	-	6.6
2007	25	7	86	7	-	-	5.0
2012	16	-	100	-	-	-	3.0
2016	11	-	100	-	-	-	3.3
2020	6	-	100	-	-	-	3.5
Pinus edulis (twoneedle pinyon)							
2004	12	-	75	25	-	-	5.6
2007	4	-	100	-	-	-	3.3
2012	4	25	75	-	-	-	3.0
2016	3	-	100	-	-	-	2.7
2020	3	-	67	33	-	-	3.7

Table 22R-05.15 – Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2004	22.1	3.7	0.3	8.1	0	2.5	0	36.6	Very Poor-Poor
2007	21.6	4.7	0	10.2	-1.7	2.3	0	37.2	Poor
2012	22.3	11.2	15	25.9	-3.3	6.2	0	77.2	Good
2016	20.6	11.6	7.1	27.1	-0.6	8.2	0	74.1	Good
2020	23.3	4.2	3.4	19.7	-1.2	1.4	0	50.7	Poor-Fair

GREENVILLE BULLHOG - STUDY NO. 22R-6



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Greenville Bench NE; Township 30S, Range 7W, Section 17
NAD 83 UTM ZONE 12, 354091 East 4229693 North

Transect Information

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

Directions to Site

From exit 109 off of I-15, go west on the overpass toward a Chevron Station. From the Chevron Station, travel south on 600 West for 0.7 miles to the motocross track and turn left. Stay to the left and travel south for 2 miles. Turn right and drive 1 mile to another road that comes in from the right. Turn right (west) here and travel 0.4 miles to a drainage. Stop here and walk 200 paces north, down the drainage, to the baseline off to the left. The 0-foot stake is marked with browse tag #188.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SAND HOLLOW
Elevation	6,000ft (1,829m)
Aspect	Northeast
Slope	5-10%
Sample Dates	07/20/2004, 06/21/2007, 06/26/2012, 08/09/2016, 08/11/2020

Table 22R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Greenville Bench	PDB	August-December 2004	1500
Seeding - Truax Drill	Greenville Bench	PDB	November 2004	1500
Seeding - Aerial After	Greenville Bench	PDB	November 2004	1500
Hand Crew - Lop and Scatter	Bone Hollow and Greenville Bench Project Maintenance	4513	September-December 2018	3368

Table 22R-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Greenville Bench			Drill	Sep 2004	1500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.07	1.00
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.13	1.02
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	2.00	1.77
G	Poa secunda	Sandberg Bluegrass	SID MT	0.25	0.20
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.99	1.76
F	Achillea millefolium	Western Yarrow		0.10	0.09
F	Linum perenne	Blue Flax	Appar	0.80	0.67
F	Medicago sativa	Alfalfa	Ladak+	1.00	0.95
F	Melilotus officinalis	Yellow Sweetclover		0.07	0.06
F	Sanguisorba minor	Small Burnet	Delar	0.97	0.92
S	Purshia tridentata	Bitterbrush	Ada/Boise ID	0.25	0.21

Mix Name			Application Type	Application Date	Acres
Greenville Bench Sagebrush			Aerial	Oct 2004	1500
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		0.27	0.03

Wildlife Habitat and Vegetation History

Table 22R-06.3 - Wildlife Seasonal Habitat. UDWR wildlife habitat and seasonality.

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

Table 22R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Pinyon-Juniper	Phase III
2007	Annual-Perennial Grass	Phase I
2012	Perennial Grass	Phase I
2016	Mixed Shrub/Perennial Grass	Phase I
2020	Annual-Perennial Grass/Mixed Shrub	Phase I

Site Notes

This study is located approximately five miles south of Beaver within a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community invaded by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*).

Soils

Table 22R-06.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.3	61.7	20.5	17.8	2.5	6.8	99.2	0.6	07/20/2004

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY309UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2004, 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 (Table 22R-06.4, Table 22R-06.12). When sampled in 2007 after the bullhog and seeding treatment (Table 22R-06.1), tree cover decreased significantly and the site transitioned to an annual-perennial grassland. Cover of annual grass decreased in 2012 and the understory remained dominated by perennial grasses until 2020 when the understory was dominated by the introduced annual grass species cheatgrass (*Bromus tectorum*) (Table 22R-06.7, Table 22R-06.10). Total preferred browse cover in this community has increased each sample year since treatment, and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) has steadily increased in cover and density over the duration of the study. Cover and density of juniper has increased each year between treatments in 2004 and 2018. In 2020 however, density for juniper decreased significantly while cover increased from the previous sample year (Table 22R-06.12, Table 22R-06.13). This may indicate that woodland succession remains dynamic and the community may be infilled in the future.

Trend Summary Tables

Table 22R-06.6 - Shrub/Tree Summary. Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	0.2	1.3	19.3	-	1.1	32.3
2007	0.4	6.5	1.7	0.5	5.7	2.9
2012	2.9	1.5	1.1	4.3	1.2	4.1
2016	4.1	6.7	1.4	8.0	7.3	4.9
2020	4.2	0.5	2.5	9.1	-	5.4

Table 22R-06.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	10	6	25	13	0.0	0.0	0.2	0.1
2007	372	172	34	60	9.5	6.6	0.3	1.5
2012	270	265	25	35	6.2	15.3	0.2	0.7
2016	234	235	16	47	3.6	8.0	0.3	0.4
2020	372	183	8	11	15.3	9.0	0.1	0.2

Table 22R-06.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	24.1	1.0	39.6	31.8	7.4	21.3
2007	22.9	0.3	45.9	6.4	5.4	29.4
2012	19.6	0.0	62.8	2.1	3.3	30.7
2016	23.3	0.4	45.2	15.1	5.4	22.7
2020	16.4	0.0	52.3	7.1	4.2	34.2

Table 22R-06.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2004	-	-	4	-	10
2007	-	-	7	1	75
2012	1	-	4	-	9
2016	2	-	5	-	60
2020	4	-	22	-	72
Year	Days Use Per Acre (ha)				
2004	-	-	8.1 (19.9)	-	-
2007	-	-	15.4 (38.1)	-	-
2012	1.5 (3.6)	-	23.4 (57.9)	-	-
2016	4.4 (10.8)	-	4.0 (9.9)	-	-
2020	2.9 (7.2)	8.7 (21.5)*	21.5 (53.0)	-	-

*Pellets per acre (ha)

Table 22R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2004	-	-	-	10	6	-	-	-	-	-
2007	5	15	-	372	66	75	-	-	10	54
2012	4	76	-	270	89	126	-	-	10	49
2016	9	44	10	234	70	60	3	3	13	99
2020	12	17	12	372	45	67	4	1	1	67
year	Average Cover (%)									
2004	-	-	-	0.0	0.0	-	-	-	-	-
2007	0.0	0.3	-	9.5	1.9	2.6	-	-	0.7	1.2
2012	0.1	4.1	-	6.2	2.2	7.5	-	-	0.5	0.9
2016	0.2	0.8	0.2	3.6	1.5	2.7	0.0	0.0	0.5	1.9
2020	0.3	0.5	0.6	15.3	0.6	5.0	0.0	0.0	0.0	2.0

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

Table 22R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Chaenactis douglasii (Douglas' dusty-aiden)	Chamaesyce (sandmat)	Chenopodium fremontii ^a (Fremont's goosefoot)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Gilia inconspicua ^a (shy gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)
year	Nested Frequency																
2004	-	8	-	1	-	-	-	-	24	1	-	1	1	-	0	-	-
2007	-	6	10	4	-	-	-	8	-	-	-	-	4	12	2	19	5
2012	-	12	3	-	-	2	2	1	6	1	-	-	-	4	6	-	-
2016	4	8	-	9	2	-	17	2	4	-	7	-	1	-	8	-	-
2020	-	-	-	2	-	-	5	4	-	-	4	-	-	-	-	-	-
year	Average Cover (%)																
2004	-	0.0	-	0.0	-	-	-	-	0.2	0.0	-	0.0	0.0	-	0.0	-	-
2007	-	0.0	0.2	0.0	-	-	-	0.0	-	-	-	-	0.0	0.1	0.0	0.6	0.1
2012	-	0.2	0.0	-	-	0.0	0.0	0.0	0.0	0.1	-	-	-	0.0	0.1	-	-
2016	0.0	0.0	-	0.1	0.0	-	0.1	0.0	0.0	-	0.1	-	0.0	-	0.1	-	-
2020	-	-	-	0.0	-	-	0.1	0.0	-	-	0.1	-	-	-	-	-	-

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

FORB SPECIES	Penstemon leiophyllus (smoothleaf beardtongue)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Streptanthus cordatus (heartleaf twistflower)	Symphotrichum (aster)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency						
2004	-	-	-	-	4	-	-
2007	2	4	22	10	0	-	4
2012	2	0	16	-	-	-	6
2016	1	6	2	-	-	2	-
2020	-	3	-	1	-	-	-
year	Average Cover (%)						
2004	-	-	-	-	0.0	-	-
2007	0.2	0.0	0.5	0.1	0.0	-	0.0
2012	0.0	0.0	0.3	-	-	-	0.0
2016	0.0	0.2	0.0	-	-	0.0	-
2020	-	0.0	-	0.0	-	-	-

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

Table 22R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Ericameria nauseosa ssp. nauseosa var. speciosa ^p (rubber rabbitbrush)	Eriogonum microthecum ^p (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ⁱ (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)	Polygala subspinosa (spiny milkwort)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)								
2004	-	-	-	1.1	18.8	-	13.5	-	-
2007	0.3	-	-	5.7	2.9	-	-	-	0.2
2012	2	0.5	0	1.2	3.9	-	0.2	-	1.8
2016	2.8	0.6	-	7.2	4.9	-	-	0.1	4.6
2020	5.3	0.9	-	-	5.4	-	-	-	2.9
year	Quadrat Cover (%)								
2004	0.2	-	0.0	1.3	11.5	-	7.8	0.0	-
2007	0.0	-	0.0	6.5	1.5	-	0.1	-	0.3
2012	0.4	0.1	0.2	1.5	0.7	-	0.4	0.0	2.1
2016	1.4	0.6	0.1	6.7	1.0	-	0.4	0.0	2.1
2020	2.3	0.4	0.0	0.4	2.5	0.0	-	0.0	1.5

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

Table 22R-06.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	180	20	0	11	89	33	22	78	51/57
2007	500	60	76	24	0	4	4	4	34/34
2012	700	40	43	57	0	23	0	37	54/66
2016	880	80	21	73	7	14	18	7	60/94
2020	1060	-	32	64	4	32	6	6	71/107
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	23/19
2016	-	-	-	-	-	-	-	-	-/-
2020	20	-	100	0	0	0	0	0	36/55
Eriogonum microthecum^p -- (slender buckwheat)									
2004	360	-	0	100	0	39	28	0	10/12
2007	40	-	50	50	0	50	50	0	14/15
2012	280	20	7	93	0	7	21	0	19/31
2016	200	-	0	100	0	0	0	0	21/32
2020	80	-	0	100	0	75	0	0	16/18
Ericameria nauseosa ssp. nauseosa var. speciosa^p -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	20	-	0	100	0	0	0	0	55/91
2016	20	-	0	100	0	0	0	0	64/83
2020	20	-	0	0	100	0	0	100	85/135
Gutierrezia sarothrae -- (broom snakeweed)									
2004	2600	20	25	75	0	0	0	0	17/20
2007	2840	440	4	94	1	0	0	1	29/39
2012	3720	640	24	73	4	0	0	38	17/22
2016	11960	-	0	100	0	0	0	0	24/32
2020	2020	-	15	81	4	0	1	5	12/12
Juniperus osteosperma¹ -- (Utah juniper)									
2004	180	-	56	44	0	0	0	0	-/-
2007	-	40	0	0	0	0	0	0	-/-
2012	20	80	100	0	0	0	0	0	-/-
2016	60	20	100	0	0	0	0	0	-/-
2020	20	-	100	0	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2004	20	-	0	100	0	0	0	0	12/26
2007	-	-	-	-	-	-	-	-	11/34
2012	20	-	0	100	0	0	0	0	10/28
2016	20	-	0	100	0	0	0	0	11/20
2020	40	-	0	50	50	0	0	50	11/33
Pinus edulis¹ -- (two-needle pinyon)									
2004	80	-	25	75	0	0	0	0	-/-
2007	20	-	100	0	0	0	0	0	-/-
2012	20	20	100	0	0	0	0	0	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-

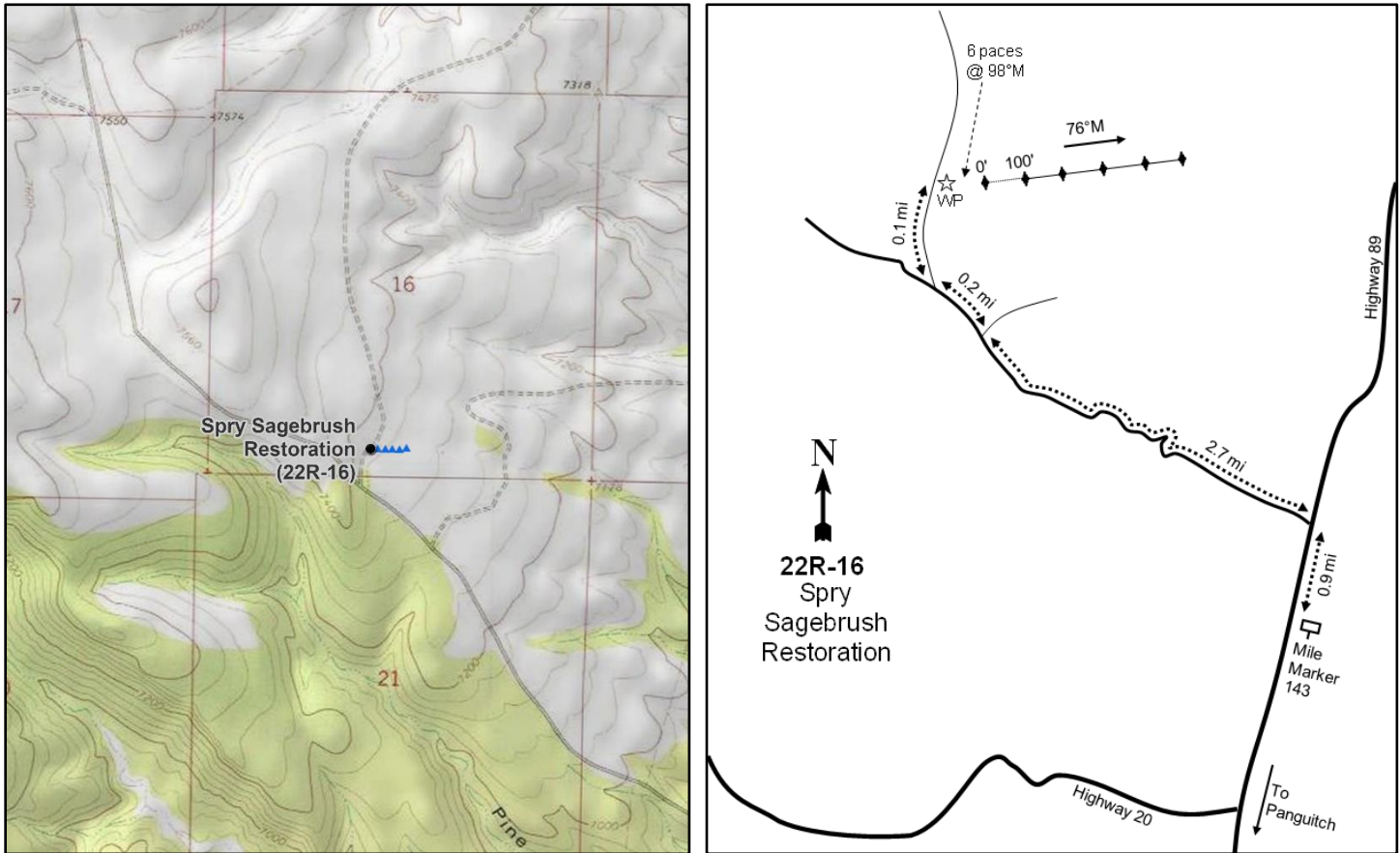
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Polygala subspinososa -- (spiny milkwort)									
2004	260	-	0	100	0	8	0	0	5/8
2007	-	-	-	-	-	-	-	-	-/-
2012	120	-	17	67	17	17	0	0	9/15
2016	120	-	0	100	0	17	0	0	6/11
2020	100	-	20	80	0	20	0	0	7/10
Purshia tridentata^p -- (antelope bitterbrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	1320	100	100	0	0	42	49	0	9/13
2012	1520	-	33	67	0	63	7	0	32/40
2016	1160	20	10	83	7	41	43	9	43/59
2020	1100	-	0	84	16	24	75	16	40/61

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

Table 22R-06.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2004	132	5	10	20	35	30	22.3
2007	44	38	38	-	-	25	20.8
2012	50	6	81	-	6	6	9.9
2016	89	53	35	-	-	12	13.6
2020	13	33	33	-	-	33	13.5
Pinus edulis (twoneedle pinyon)							
2004	104	11	16	21	47	5	13.3
2007	18	71	29	-	-	-	4.6
2012	17	-	89	11	-	-	4.2
2016	16	17	67	17	-	-	7.7
2020	3	-	-	-	100	-	20.0

SPRY SAGEBRUSH RESTORATION - STUDY NO. 22R-16

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Fremont Pass SE; Township 32S, Range 5W, Section 16
NAD 83 UTM ZONE 12, 375116 East 4209324 North

Transect Information

Browse Tag # (0' Stake)	107
Transect Bearing	76° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From the junction of State Route 20 and US-89 north of Panguitch, proceed north to mile marker 143 and drive 0.9 miles to a road on the left. From the cattle guard, drive 2.7 miles (past a second cattle guard) to a fork and stay left. From the fork, go 0.2 miles to another fork, go right, and proceed 0.1 miles to the witness post on the right (east) side of the road. From the witness post, walk 6 paces to the 0-foot stake at 98 degrees magnetic. The 0-foot stake is marked with browse tag #107.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	HAWKINS WASH
Elevation	7,356ft (2,242m)
Aspect	East
Slope	2-5%
Sample Dates	06/10/2008, 06/30/2011, 07/30/2015, 08/11/2020

Table 22R-16.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	Hawkins Wash Seeding	-	Fall 1966	-
Seeding - Seed Unknown	Hawkins Wash Seeding	-	Fall 1966	-
Hand Crew - Lop and Scatter	Spry Sagebrush Restoration	1173	April-June 2009	1745
Herbicide - Tebuthiuron	Hawkins Wash Seeding Maintenance	LTDL	1992	640

Wildlife Habitat and Vegetation History**Table 22R-16.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 22R-16.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Mountain Big Sagebrush/Pinyon-Juniper/Perennial Grass	Phase II
2011	Mountain Big Sagebrush/Perennial Grass	Phase I
2015	Mountain Big Sagebrush/Perennial Grass	Phase I
2020	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB336UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2008, this study site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees scattered throughout the area (Table 22R-16.12, Photos). A lop and scatter treatment (Table 22R-16.1) removed much of the pinyon and juniper, and both density and cover of mountain big sagebrush have increased steadily in each subsequent sample year (Table 22R-16.12, Table 22R-16.13). The herbaceous understory has generally remained stable over the sample period (Table 22R-16.7) and has been dominated by the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) (Table 22R-16.10). Forbs have remained fairly diverse overall, yet have not been very abundant (Table 22R-16.11). Barring infilling by pinyon and juniper or a major disturbance, it is likely that this site will continue to remain in this or a similar state in future sample years.

Trend Summary Tables**Table 22R-16.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	7.3	0.4	3.1	9.7	0.2	1.9
2011	15.1	0.2	0.5	16.3	0.2	0.7
2015	13.9	5.0	1.3	18.2	5.6	1.5
2020	12.5	0.3	1.2	18.4	0.1	1.5

Table 22R-16.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	2	337	4	46	0.0	13.7	0.0	0.5
2011	6	318	91	45	0.0	20.6	0.4	1.0
2015	-	315	5	78	-	17.9	0.0	0.9
2020	2	288	5	22	0.0	16.1	0.0	0.1

Table 22R-16.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	27.4	0.9	30.7	19.7	9.9	23.4
2011	22.6	0.2	24.7	17.5	6.3	34.0
2015	18.9	0.6	37.6	14.2	9.2	36.5
2020	16.7	0.2	40.1	7.9	13.0	30.7

Table 22R-16.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2008	11	18	-	95
2011	3	3	1	16
2015	2	5	-	36
2020	2	16	2	50
Year	Days Use Per Acre (ha)			
2008	13.8 (34.1)	4.7 (11.6)	1.3 (3.3)	-
2011	5.8 (14.3)	14.7 (36.4)	2.0 (5.0)	-
2015	1.5 (3.6)	0.7 (1.7)	-	-
2020	9.4 (23.3)	17.4 (43.0)	0.7 (1.7)	-

Table 22R-16.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2008	3	332	10	2	7	3	9	6	-	-
2011	9	309	-	6	5	3	7	8	-	1
2015	-	307	1	-	18	-	4	-	6	-
2020	0	277	-	2	19	-	-	-	-	-
year	Average Cover (%)									
2008	0.0	12.9	0.6	0.0	0.0	0.0	0.1	0.1	-	-
2011	0.0	20.3	-	0.0	0.1	0.0	0.2	0.0	-	0.0
2015	-	17.5	0.0	-	0.3	-	0.1	-	0.1	-
2020	0.0	15.7	-	0.0	0.4	-	-	-	-	-

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

Table 22R-16.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron (fleabane)	Erigeron aphanactis ^a (rayless shaggy fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lomatium (desertparsley)	Microsteris gracilis ^a (slender phlox)
year	Nested Frequency																
2008	9	-	4	7	1	-	8	-	2	-	-	-	2	-	2	2	-
2011	2	1	10	9	5	2	2	38	-	7	3	3	48	3	2	-	2
2015	-	2	-	4	-	-	25	5	-	-	1	39	-	-	-	-	-
2020	-	-	-	-	-	-	7	3	-	-	-	3	2	-	-	-	-
year	Average Cover (%)																
2008	0.1	-	0.0	0.1	0.0	-	0.0	-	0.0	-	-	-	0.0	-	0.0	0.0	-
2011	0.0	0.0	0.2	0.3	0.0	0.0	0.1	0.1	-	0.0	0.0	0.0	0.3	0.0	0.0	-	0.0
2015	-	0.0	-	0.0	-	-	0.2	0.0	-	-	0.0	0.5	-	-	-	-	-
2020	-	-	-	-	-	-	0.0	0.0	-	-	-	0.0	0.0	-	-	-	-

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

FORB SPECIES	Oenothera (evening primrose)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Pleiactanthus spinosus (thorn skeletonweed)	Sphaeralcea coccinea (scarlet globemallow)	Trifolium (clover)	Zizadenus paniculatus (foothill deathcarnas)
year	Nested Frequency						
2008	-	1	4	2	2	10	7
2011	-	1	4	4	-	7	2
2015	2	1	9	-	1	3	3
2020	-	1	6	-	4	2	-
year	Average Cover (%)						
2008	-	0.0	0.0	0.0	0.0	0.2	0.0
2011	-	0.0	0.1	0.1	-	0.0	0.0
2015	0.0	0.0	0.0	-	0.0	0.0	0.0
2020	-	0.0	0.0	-	0.0	0.0	-

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

Table 22R-16.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma ^t (Utah juniper)	Opuntia (pricklypear)	Pinus edulis ^t (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)						
2008	9.1	-	0.2	1.2	-	0.7	0.6
2011	15.1	-	0.2	0.7	-	-	1.2
2015	15.8	-	5.6	0.9	-	0.6	2.4
2020	16.5	-	0	0.7	0.1	0.8	1.9
year	Quadrat Cover (%)						
2008	6.4	-	0.3	1.5	0.0	1.6	0.9
2011	13.8	-	0.2	0.3	0.0	0.2	1.3
2015	12.0	-	4.9	1.0	0.0	0.3	1.9
2020	10.6	0.0	0.1	0.5	0.2	0.7	1.9

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

Table 22R-16.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2008	1640	300	1	62	37	16	13	16	71/85
2011	2000	2380	36	62	2	9	0	4	75/91
2015	2440	40	20	66	15	48	30	28	72/90
2020	2520	-	10	67	23	12	0	21	79/107
Chrysothamnus viscidiflorus -- (yellow rabbitbrush)									
2008	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	-	-	-	-	-	-	-	-	-/-
2020	20	-	0	100	0	0	0	0	46/58
Gutierrezia sarothrae -- (broom snakeweed)									
2008	1660	280	2	87	11	8	0	5	15/14
2011	840	80	57	43	0	0	0	2	23/26
2015	13280	480	30	70	0	0	0	0	23/25
2020	320	-	19	69	13	0	0	13	18/12
Juniperus osteospermaⁱ -- (Utah juniper)									
2008	20	-	0	100	0	0	0	0	-/-
2011	-	-	-	-	-	-	-	-	-/-
2015	20	-	0	100	0	0	0	0	-/-
2020	20	-	0	100	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2008	40	40	0	100	0	0	0	0	13/34
2011	40	-	0	100	0	0	0	0	13/32
2015	80	-	25	75	0	0	0	0	14/32
2020	60	-	0	100	0	0	0	0	13/29
Pinus edulis^t -- (twoneedle pinyon)									
2008	60	40	100	0	0	0	0	0	-/-
2011	60	-	67	33	0	0	0	33	-/-
2015	180	-	78	11	11	0	0	11	-/-
2020	200	-	90	10	0	0	10	30	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
2008	120	-	0	67	33	0	100	33	44/97
2011	100	-	0	100	0	60	40	0	62/126
2015	140	-	14	86	0	57	43	0	78/160
2020	160	-	0	50	50	50	50	50	88/160

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

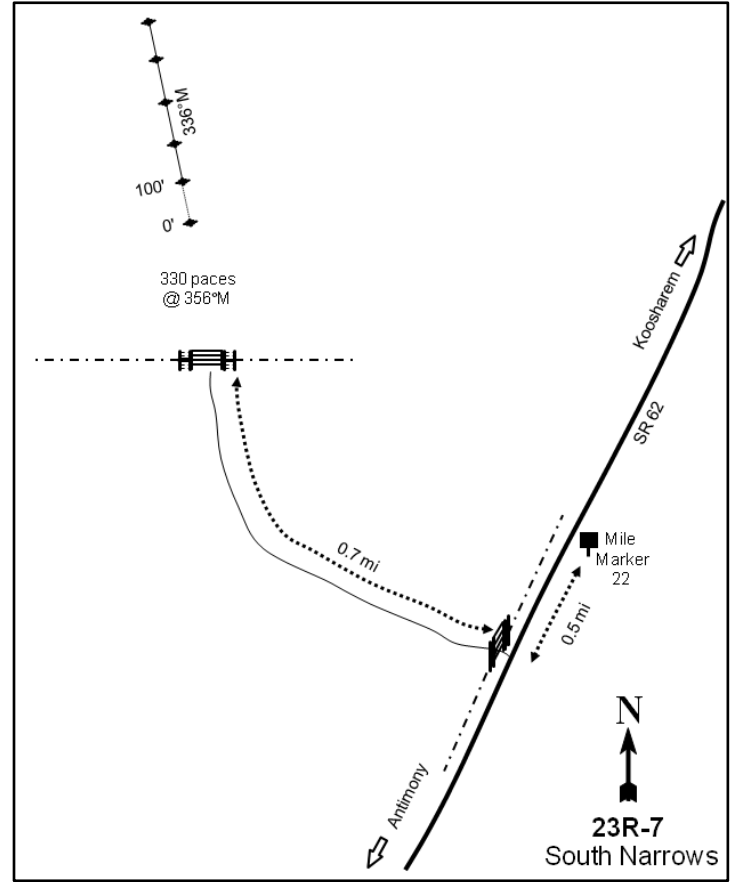
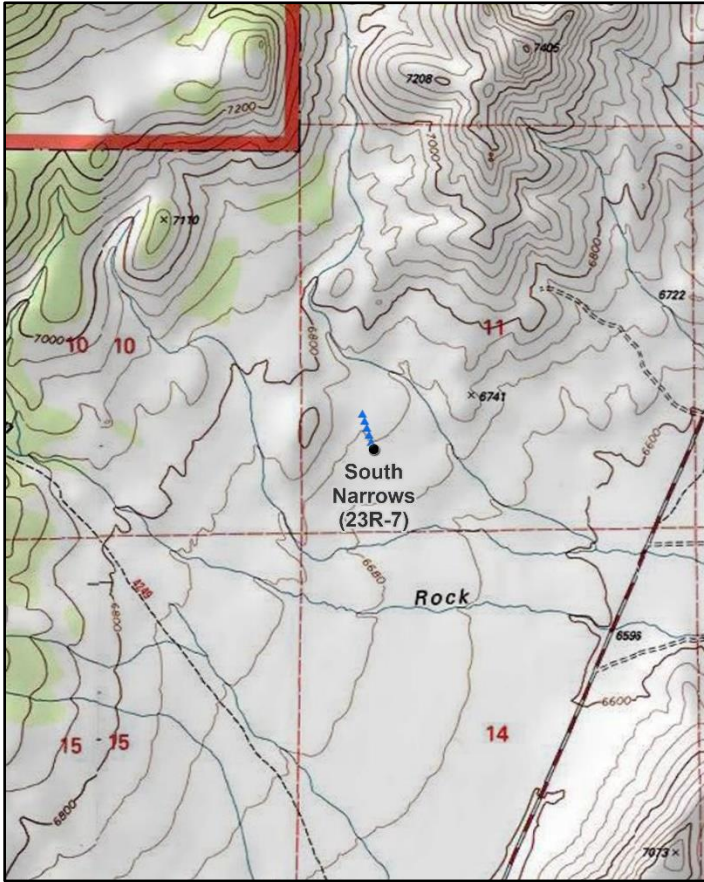
Table 22R-16.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	15	-	11	44	44	-	17.6
2011	3	-	67	33	-	-	5.3
2015	2	-	67	33	-	-	3.3
2020	3	-	75	25	-	-	5.8
Pinus edulis (twoneedle pinyon)							
2008	82	-	47	6	35	12	13.5
2011	31	-	100	-	-	-	2.8
2015	39	36	21	43	-	-	2.6
2020	40	7	60	33	-	-	3.6

Table 22R-16.15 – Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2008	12.3	4.1	0.6	27.4	0	1	0	45.3	Poor
2011	20.7	14.4	15	30	0	1.9	0	82	Excellent
2015	23.4	11.1	9.5	30	0	1.8	0	75.7	Good
2020	23.5	7.3	4.6	30	0	0.3	0	65.6	Fair-Good

SOUTH NARROWS - STUDY NO. 23R-7

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Parker Knoll SW; Township 29S, Range 2W, Section 11
NAD 83 UTM ZONE 12, 413604 East 4239187 North

Transect Information

Browse Tag # (0' Stake)	191
Transect Bearing	336° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From State Route 62 south of Koosharem, there will be a road coming in from the west 0.5 miles south of mile marker 22. Turn onto this road, pass through a gate, and travel 0.7 to another fence with a gate. From here, walk about 1,000 feet at 356 degrees magnetic to the 0-foot stake that is marked with browse tag #191.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SOUTH NARROWS
Elevation	6,700ft (2,042m)
Aspect	South
Slope	4-5%
Sample Dates	08/05/2004, 06/25/2007, 08/07/2012, 08/16/2016, 08/05/2020

Table 23R-07.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	-	PDB	1996	-
Seeding - Unknown	-	PDB	1996	-
Harrow - Two-Way Dixie	South Narrows Dixie Harrow - West Side	210	September-November 2005	1740
Seeding - Broadcast Before	South Narrows Dixie Harrow - West Side	210	November 2005	1740
Seeding - Aerial Unkown	South Narrows Dixie Harrow - West Side	210	December 2005	2300

Table 23R-07.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Narrows			Broadcast	Nov 2005	2300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.50	0.40
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.50	0.45
G	Festuca ovina	Sheep Fescue	Covar	1.00	0.95
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.76	0.62
G	Poa secunda	Sandberg Bluegrass	SID OR	0.40	0.32
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.85
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.00	1.67
F	Helianthus annuus	Annual Sunflower		0.33	0.20
F	Linum perenne	Blue Flax		0.24	0.21
F	Linum perenne	Blue Flax		0.22	0.20
F	Medicago sativa	Alfalfa	Ladak +	1.00	0.95
F	Melilotus officinalis	Yellow Sweetclover		0.57	0.40
F	Onobrychis viciifolia	Sainfoin	Eski	1.50	1.41
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.88
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.32	0.15
S	Atriplex canescens	Fourwing Saltbush	Juab UT	0.24	0.11

Mix Name			Application Type	Application Date	Acres
South Narrows- Kochia			Aerial	Dec 2005	2300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Bassia prostrata	Forage Kochia	Beaver UT	1.00	0.64

Wildlife Habitat and Vegetation History**Table 23R-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 23R-07.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Annual Forb	NA
2007	Annual Forb	NA
2012	Annual Forb	NA
2016	Annual Forb	NA
2020	Annual Forb	NA

Site Notes

This study is located approximately three and a half miles north of Otter Creek Reservoir within a treated Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat.

Soils

Table 23R-07.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.5	55.0	27.5	17.5	1.1	12.5	604.8	0.7	08/05/2004

Site Potential

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY220UT
States and Transitions	A defined state and transition model is available.

This study site has remained in poor condition and has been dominated by annual forbs since establishment in 2004. Cover of perennial grasses and forbs has remained low and could be related to rabbit grazing, as quadrat frequency of pellets indicates high use (Table 23R-07.7, Table 23R-07.9, Table 23R-07.10, Table 23R-07.11). Browse is extremely limited and all line-intercept cover has been contributed by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Table 23R-07.12). This site is expected to remain in a degraded state if current conditions persist. The vegetation on this study site is not described by the current state and transition model, but the site is likely in a phase similar to the Annual non-native species Community Phase within the Annual State (Jornada, 2020).

Trend Summary Tables**Table 23R-07.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	0.1	-	-	-	-	-
2007	0.0	-	-	-	-	-
2012	0.2	-	-	0.2	-	-
2016	0.0	-	-	0.1	-	-
2020	-	-	-	-	-	-

Table 23R-07.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	-	16	53	38	-	0.1	8.2	4.7
2007	-	8	335	19	-	0.0	14.6	0.0
2012	3	25	431	98	0.0	0.5	15.8	0.8
2016	-	9	206	37	-	0.0	6.4	1.5
2020	-	6	85	14	-	0.2	3.9	1.5

Table 23R-07.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	43.7	0.3	22.4	21.4	7.8	14.0
2007	34.8	0.2	45.3	8.0	5.4	14.3
2012	15.2	0.0	55.3	11.4	4.6	18.1
2016	47.0	0.0	33.6	16.9	7.4	7.9
2020	37.2	0.9	35.9	19.7	10.8	5.5

Table 23R-07.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2004	1	1	1	70
2007	2	-	-	97
2012	-	4	-	29
2016	-	-	-	93
2020	2	-	1	41
Year	Days Use Per Acre (ha)			
2004	1.5 (3.6)	4.7 (11.6)	3.4 (8.3)	-
2007	-	-	-	-
2012	-	2.0 (5.0)	-	-
2016	-	-	-	-
2020	3.6 (9.0)	-	-	-

Table 23R-07.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus tectorum ^{ai} (cheatgrass)	Elymus elymoides (squirreltail)	Leymus cinereus (basin wildrye)	Psathyrostachys juncea ⁱ (Russian wildrye)
year	Nested Frequency					
2004	-	-	-	16	-	-
2007	-	-	-	8	-	-
2012	3	10	3	13	-	3
2016	1	1	-	5	-	2
2020	-	-	-	-	0	6
year	Average Cover (%)					
2004	-	-	-	0.1	-	-
2007	-	-	-	0.0	-	-
2012	0.0	0.4	0.0	0.1	-	0.0
2016	0.0	0.0	-	0.0	-	0.0
2020	-	-	-	-	0.0	0.2

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

Table 23R-07.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Astragalus lentiginosus (freckled milkvetch)	Chamaesyce (sandmat)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Helianthus annuus ^{ai} (common sunflower)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Nicotiana attenuata ^a (coyote tobacco)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Solanum triflorum ^a (cutleaf nightshade)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency															
2004	-	38	-	11	4	3	-	-	5	-	0	22	-	14	0	-
2007	-	13	-	-	115	45	-	3	230	6	-	262	3	4	-	-
2012	0	1	2	2	72	-	12	146	367	-	-	276	95	-	97	3
2016	-	17	-	-	10	5	-	10	-	-	27	96	130	-	20	-
2020	-	9	5	-	-	9	-	-	-	-	-	3	67	6	-	-
year	Average Cover (%)															
2004	-	4.0	-	2.5	0.1	0.1	-	-	0.5	-	0.2	3.6	-	1.3	0.8	-
2007	-	0.0	-	-	4.2	0.2	-	0.0	9.0	0.0	-	0.9	0.1	0.0	-	-
2012	0.0	0.1	0.0	0.0	1.5	-	0.1	1.1	8.2	-	-	3.0	2.0	-	0.7	0.0
2016	-	0.8	-	-	0.1	0.1	-	0.1	-	-	1.1	3.0	2.1	-	0.6	-
2020	-	1.5	0.0	-	-	1.7	-	-	-	-	-	1.2	0.6	0.4	-	-

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

Table 23R-07.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)		Bassia prostrata ^{pi} (forage kochia)			
	year	Line Intercept Cover (%)		year	Quadrat Cover (%)	
	2004	-	-	2004	0.1	-
	2007	-	-	2007	-	0.0
	2012	0.2	-	2012	0.2	-
	2016	0.1	-	2016	0.0	-
	2020	-	-	2020	-	-

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

Table 23R-07.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

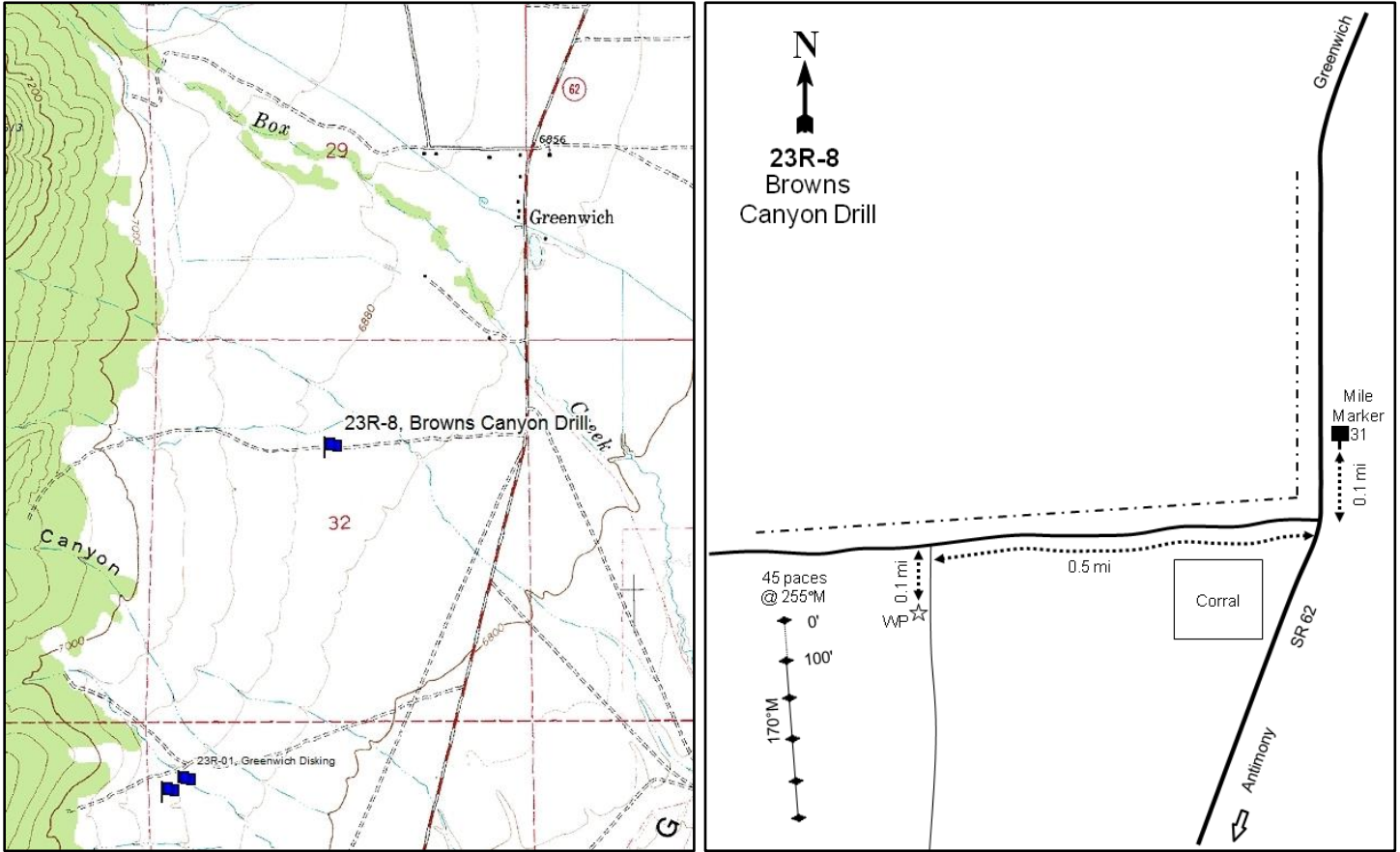
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	40	-	0	50	50	0	0	50	45/66
2007	20	-	0	0	100	0	0	100	- / -
2012	80	-	75	25	0	25	0	0	24/32
2016	20	-	0	100	0	0	100	0	32/49
2020	-	-	-	-	-	-	-	-	- / -
Bassia prostrata^{pi} -- (forage kochia)									
2004	-	-	-	-	-	-	-	-	- / -
2007	20	200	0	100	0	0	0	0	- / -
2012	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	- / -
2020	-	-	-	-	-	-	-	-	- / -
Ericameria nauseosa -- (rubber rabbitbrush)									
2004	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	60/76
2016	-	-	-	-	-	-	-	-	89/127
2020	20	-	0	100	0	100	0	0	56/69
Opuntia -- (pricklypear)									
2004	-	-	-	-	-	-	-	-	- / -
2007	-	-	-	-	-	-	-	-	- / -
2012	-	-	-	-	-	-	-	-	15/38
2016	-	-	-	-	-	-	-	-	15/50

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

Table 23R-07.15 – Deer Desirable Components Index: Low Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2004	0	0	0	0.2	0	9.5	0	9.7	Very Poor-Poor
2007	0	0	0	0	0	0.1	0	0.1	Very Poor
2012	0.3	0	0	1.1	0	1.6	0	3	Very Poor
2016	0.1	0	0	0.1	0	2.9	0	3.1	Very Poor
2020	0	0	0	0.5	0	3	0	3.5	Very Poor

BROWNS CANYON DRILL - STUDY NO. 23R-8



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Greenwich SE; Township 27S, Range 1W, Section 32
NAD 83 UTM ZONE 12, 418604 East 4253004 North

Transect Information

Browse Tag # (0' Stake)	54
Transect Bearing	170° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

Travel south of Greenwich on State Route 62. From mile marker 31, travel 0.1 miles north to a road that comes in from the west. Turn onto this road and travel 0.5 miles to a road that comes in from the left (south). Turn left onto this road and drive 100 feet to a witness post on the right-hand (west) side of the road. From the witness post, walk 45 paces at 255 degrees magnetic to the 0-foot stake that is marked with browse tag #54.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	6,870ft (2,094m)
Aspect	East
Slope	2%
Sample Dates	08/05/2004, 06/27/2007, 08/07/2012, 08/18/2016, 08/03/2020

Table 23R-08.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial After	Greenwich Disking	PDB	December 2003	275
Disc - Unknown	-	PDB	Fall 1996	-
Seeding - Unknown	-	PDB	Fall 1996	-
Seeding - Truax Drill	Greenwich Disking	PDB	October 2003	275
Seeding - Rangeland Drill	Grass Valley/Rocky Knoll Phase II	2256	November 2013	172

Table 23R-08.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Greenwich Discing			Drill	Oct 2003	275
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Douglas	2.00	1.81
G	Dactylis glomerata	Orchardgrass	Paiute	0.55	0.47
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.09	0.92
G	Leymus cinereus	Great Basin Wildrye	Trailhead	1.09	0.94
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.45	1.28
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	2.00	1.80
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.00	1.81
F	Linum perenne	Blue Flax	Appar	0.36	0.33
F	Medicago sativa	Alfalfa	Ladak+	1.09	1.03
F	Melilotus officinalis	Yellow Sweetclover		0.36	0.32

Mix Name			Application Type	Application Date	Acres
Greenwich Discing Shrubs			Aerial	Dec 2003	275
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		1.00	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		1.16	0.12
S	Bassia prostrata	Forage Kochia		1.82	0.55

Mix Name			Application Type	Application Date	Acres
Grass Valley Rocky Knoll 2			Drill	Nov 2013	170
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.03	0.98
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.15	0.14
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.47	1.28
G	Elymus elymoides	Bottlebrush Squirreltail	Juab UT	0.50	0.46
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	1.76	1.60
G	Leymus cinereus	Great Basin Wildrye	Magnar	0.59	0.51
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.88	0.79
F	Linum perenne	Blue Flax	Appar	0.29	0.26
F	Medicago sativa	Alfalfa	Ranger (NC)	1.47	1.36
F	Onobrychis viciifolia	Sainfoin	Eski	2.06	1.77
F	Sanguisorba minor	Small Burnet	Delar	2.06	1.81

Wildlife Habitat and Vegetation History**Table 23R-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 23R-08.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Forage Kochia/Annual Forb	NA
2007	Forage Kochia	NA
2012	Forage Kochia	NA
2016	Forage Kochia	NA
2020	Forage Kochia	NA

Site Notes

This study is located approximately one-half mile southwest of Greenwich within a treated Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat.

Soils

Table 23R-08.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.4	51.0	26.8	22.2	1.1	15.7	249.6	0.7	08/05/2004

Site Potential

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY220UT
States and Transitions	A defined state and transition model is available.

Since establishment in 2004, this study site has remained dominated by forage kochia (*Bassia prostrata*) with few other shrub species present (Table 23R-08.12, Table 23R-08.13). Annual forbs, mainly prickly Russian thistle (*Salsola tragus*), were a co-dominant component in 2004, but cover has since decreased. Perennial grasses and forbs have remained rare (Table 23R-08.7, Table 23R-08.10, Table 23R-08.11). Without a major disturbance, this site is expected to remain in this or a similar state in future sample years.

Trend Summary Tables**Table 23R-08.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	21.0	0.0	-	30.9	-	-
2007	18.7	-	-	16.5	-	-
2012	22.1	0.0	-	26.2	-	-
2016	17.2	-	-	27.0	-	-
2020	11.1	-	-	16.1	-	-

Table 23R-08.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	-	3	213	80	-	0.0	13.9	1.3
2007	-	7	283	7	-	0.0	2.0	0.2
2012	-	20	58	-	-	0.9	0.6	-
2016	-	16	116	40	-	0.9	1.7	0.6
2020	-	31	-	1	-	1.5	-	0.0

Table 23R-08.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	44.9	0.1	21.5	3.9	4.7	38.0
2007	50.9	0.0	28.7	5.4	5.8	19.3
2012	51.5	0.1	27.2	3.3	4.8	23.4
2016	48.7	0.0	32.2	4.6	7.1	18.8
2020	40.9	0.1	34.8	14.4	6.7	12.6

Table 23R-08.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2004	-	-	3	55
2007	3	-	-	98
2012	6	2	-	68
2016	5	-	-	98
2020	5	-	1	72
Year	Days Use Per Acre (ha)			
2004	-	3.4 (8.3)	6.7 (16.6)	-
2007	15.3 (37.7)	-	-	-
2012	12.3 (30.5)	19.4 (48.0)	-	-
2016	7.2 (17.9)	-	0.7 (1.7)	-
2020	16.0 (39.5)	-	-	-

Table 23R-08.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency			
Dactylis glomerata ⁱ (orchardgrass)				
Elymus elymoides (squirreltail)				
Koeleria macrantha (prairie Junegrass)				
Psathyrostachys juncea ⁱ (Russian wildrye)				
year	Nested Frequency			
2004	2	1	-	-
2007	-	7	-	-
2012	3	1	-	16
2016	-	-	3	13
2020	-	-	-	31
year	Average Cover (%)			
2004	0.0	0.0	-	-
2007	-	0.0	-	-
2012	0.3	0.0	-	0.6
2016	-	-	0.0	0.8
2020	-	-	-	1.5

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

Table 23R-08.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency													
Astragalus lentiginosus (freckled milkvetch)														
Cirsium (thistle)														
Cleome serrulata ^a (Rocky Mountain beeplant)														
Descurainia pinnata ^a (western tansymustard)														
Lactuca serriola ^{ai} (prickly lettuce)														
Lappula occidentalis ^{ai} (flatspine stickseed)														
Marrubium vulgare ⁱ (horehound)														
Nicotiana attenuata ^a (coyote tobacco)														
Salsola tragus ^{ai} (prickly Russian thistle)														
Sisymbrium altissimum ^{ai} (tall tumblemustard)														
Solanum triflorum ^a (cutleaf nightshade)														
Sphaeralcea grossularifolia (gooseberry/leaf globemallow)														
unknown perennial forb (unknown forb)														
year	Nested Frequency													
2004	57	-	4	0	-	5	15	16	90	-	157	-	21	
2007	2	1	-	74	4	270	1	-	11	21	-	3	-	
2012	-	-	-	3	-	28	-	-	-	29	-	-	-	
2016	40	-	-	79	-	49	-	-	-	12	-	-	-	
2020	1	-	-	-	-	-	-	-	-	-	-	-	-	
year	Average Cover (%)													
2004	0.9	-	0.8	0.0	-	0.1	0.3	0.1	9.0	-	3.9	-	0.2	
2007	0.0	0.0	-	0.2	0.0	1.5	0.1	-	0.0	0.2	-	0.0	-	
2012	-	-	-	0.0	-	0.1	-	-	-	0.5	-	-	-	
2016	0.6	-	-	1.1	-	0.2	-	-	-	0.4	-	-	-	
2020	0.0	-	-	-	-	-	-	-	-	-	-	-	-	

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

Table 23R-08.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Atriplex canescens ^p (fourwing saltbush)	Bassia prostrata ^{pi} (forage kochia)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
2004	-	-	30.9	0
2007	-	-	16.5	-
2012	-	-	26.2	-
2016	-	-	27	-
2020	-	-	16.1	-
year	Quadrat Cover (%)			
2004	-	0.1	20.9	0.0
2007	-	-	18.7	-
2012	-	-	22.1	0.0
2016	-	-	17.2	-
2020	0.4	-	10.7	-

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

Table 23R-08.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

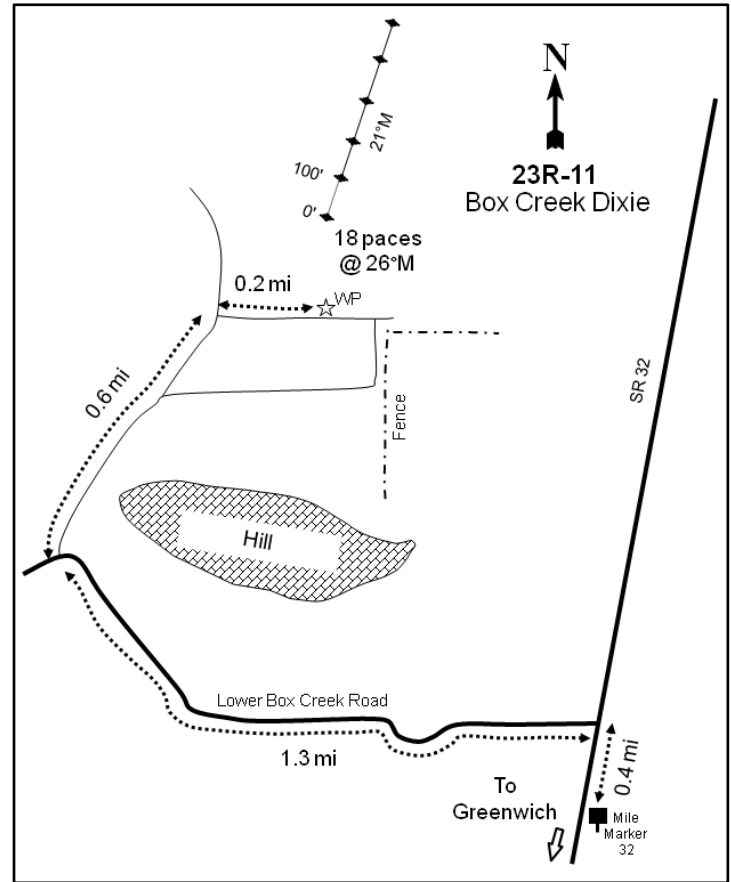
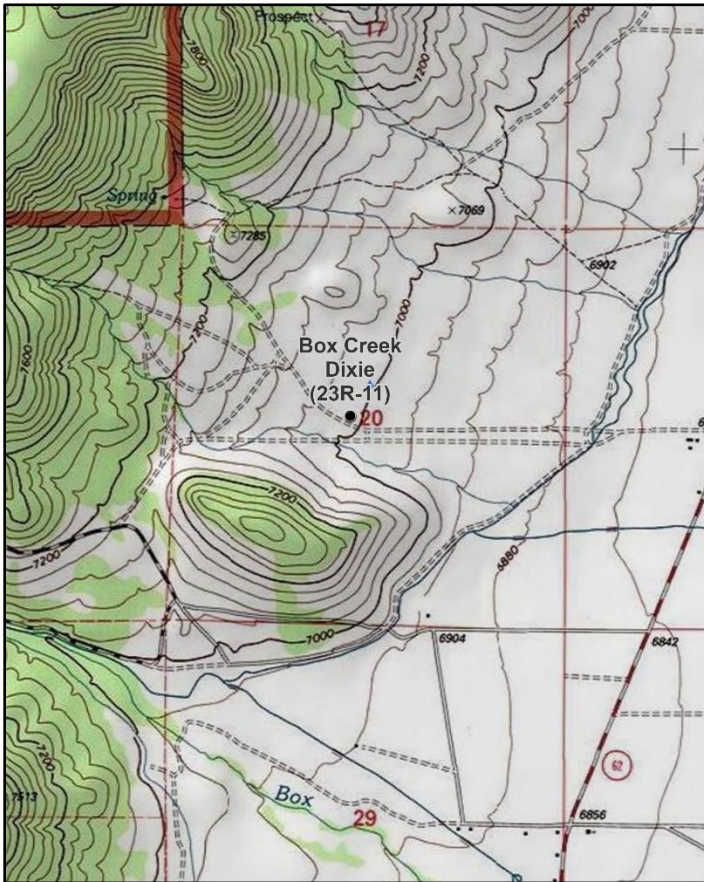
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	63/56
2016	-	-	-	-	-	-	-	-	38/37
2020	-	-	-	-	-	-	-	-	41/50
Atriplex canescens^p -- (fourwing saltbush)									
2004	20	-	100	0	0	0	0	0	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	140	-	0	100	0	0	0	0	29/51
Bassia prostrata^{pi} -- (forage kochia)									
2004	5360	-	1	99	0	9	0	0	34/39
2007	53720	-	31	69	0	1	98	0	10/22
2012	35700	94940	43	57	0	30	37	0	14/32
2016	18960	-	1	99	0	19	63	4	21/35
2020	12800	20	5	94	1	22	11	1	28/37
Opuntia -- (pricklypear)									
2004	80	-	0	75	25	0	0	0	11/35
2007	20	-	0	0	100	0	0	100	12/46
2012	40	-	0	100	0	0	0	0	13/47
2016	-	-	-	-	-	-	-	-	7/23
2020	-	-	-	-	-	-	-	-	11/44

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

Table 23R-08.15 – Deer Desirable Components Index: Low Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2004	30	15	0.4	0	0	2.7	0	48	Good
2007	24.8	15	15	0	0	0.3	0	55.1	Good
2012	30	14.9	15	1.8	0	0	0	61.6	Good
2016	30	15	0.4	1.7	0	1.1	0	48.2	Good
2020	24.2	14.7	2.7	3	0	0	0	44.6	Fair-Good

BOX CREEK DIXIE - STUDY NO. 23R-11

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Greenwich NE; Township 27S, Range 1W, Section 20
NAD 83 UTM ZONE 12, 418610 East 4255979 North

Transect Information

Browse Tag # (0' Stake)	169
Transect Bearing	21° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From mile marker 32 on State Route 62, drive north for 0.4 miles to a turnoff on the left with a sign that reads "To Box Creek." Turn left here and drive 0.6 miles to a crossroads: continue straight for 0.5 miles to a fork. Turn right, travel 0.2 miles to another fork, and turn right again. Drive 0.2 miles to a witness post on the left-hand (north) side of the road. From the witness post, walk 18 paces at 26 degrees magnetic to the 0-foot stake that is marked with browse tag #169.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	BOX CREEK
Elevation	6,940ft (2,115m)
Aspect	East
Slope	6%
Sample Dates	07/26/2006, 06/23/2011, 08/18/2016, 08/03/2020

Table 23R-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	BLM Project	BLM	Fall 2006	-
Seeding - Broadcast Before	BLM Project	BLM	Fall 2006	-
Seeding - Aerial After	BLM Project	BLM	Fall 2006	-

Table 23R-11.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
			Broadcast	Oct 2006	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	NaN	NaN
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	NaN	NaN
G	<i>Festuca ovina</i>	Sheep Fescue	Covar	NaN	NaN
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Magnar	NaN	NaN
G	<i>Poa secunda</i>	Big Bluegrass	Sherman	NaN	NaN
G	<i>Poa secunda</i>	Sandberg Bluegrass		NaN	NaN
G	<i>Psathyrostachys juncea</i>	Russian Wildrye	Bozoisky	NaN	NaN
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	NaN	NaN
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	NaN	NaN
F	<i>Linum perenne</i>	Blue Flax	Appar	NaN	NaN
F	<i>Medicago sativa</i>	Alfalfa	Ladak	NaN	NaN
F	<i>Melilotus officinalis</i>	Yellow Sweetclover	Madrid	NaN	NaN
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	NaN	NaN
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	NaN	NaN
S	<i>Atriplex canescens</i>	Fourwing Saltbush		NaN	NaN

Mix Name			Application Type	Application Date	Acres
			Aerial	Nov 2006	
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Bassia prostrata</i>	Forage Kochia		NaN	NaN

Wildlife Habitat and Vegetation History**Table 23R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 23R-11.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2006	Wyoming Big Sagebrush	No Encroachment
2011	Annual Forb/Wyoming Big Sagebrush	No Encroachment
2016	Wyoming Big Sagebrush	No Encroachment
2020	Wyoming Big Sagebrush	No Encroachment

Site Notes

This study is located approximately one mile northwest of Greenwich within a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat that is north of Box Creek.

Soils**Table 23R-11.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.4	46.0	29.1	24.9	1.6	15.7	163.2	0.6	07/26/2006

Site Potential

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY220UT
States and Transitions	A defined state and transition model is available.

The vegetation on this site has existed as a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) dominated community type since study establishment in 2006; other shrubs are present in much lower amounts (Table 23R-11.12, Table 23R-11.13). In 2011, the introduced annual forbs tall tumbled mustard (*Sisymbrium altissimum*) and prickly Russian thistle (*Salsola tragus*) contributed 15% cover and were a co-dominant site component, but have not been abundant in other sample years. Perennial forbs and grasses, while somewhat diverse, have remained rare (Table 23R-11.7, Table 23R-11.10, Table 23R-11.11).

Trend Summary Tables**Table 23R-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
2006	19.1	0.0	-	21.7	0.2	-
2011	8.3	-	-	11.2	-	-
2016	12.8	0.2	-	17.3	0.1	-
2020	16.3	0.0	-	20.1	0.5	-

Table 23R-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
2006	-	29	38	6	-	0.4	0.5	0.1
2011	3	41	434	54	0.0	1.1	19.9	1.1
2016	1	49	67	42	0.0	1.5	0.7	1.5
2020	5	52	15	20	0.0	2.3	0.1	0.1

Table 23R-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
2006	34.2	1.2	23.6	26.8	6.0	19.5
2011	33.9	0.2	26.8	7.1	6.5	28.9
2016	30.7	0.0	35.9	26.2	6.4	15.0
2020	24.8	0.2	36.4	29.5	7.5	18.1

Table 23R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2006	-	-	12	-	65
2011	-	-	5	-	2
2016	-	-	4	-	81
2020	-	-	7	1	49
Year	Days Use Per Acre (ha)				
2006	-	-	12.1 (29.8)	-	-
2011	-	-	8.7 (21.5)	0.7 (1.7)	-
2016	0.7 (1.8)	8.7 (21.5)*	1.3 (3.3)	-	-
2020	-	-	46.2 (114.2)	-	-

Pellets per acre (ha)

Table 23R-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)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pleuraphis jamesii (James' galleta)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency									
2006	7	-	-	22	-	-	-	-	-	-
2011	4	2	3	17	5	0	2	3	12	1
2016	18	1	1	15	7	-	-	-	15	1
2020	13	13	5	2	1	4	-	-	19	3
year	Average Cover (%)									
2006	0.0	-	-	0.3	-	-	-	-	-	-
2011	0.1	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.5	0.0
2016	0.7	0.0	0.0	0.4	0.1	-	-	-	0.3	0.0
2020	0.8	0.3	0.0	0.0	0.0	0.2	-	-	0.9	0.2

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

Table 23R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Caulanthus crassicaulis ^a (thickstem wild cabbage)	Ceratocephala testiculata ^{ai} (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Collinsia parviflora ^a (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Erodium cicutarium ^{ai} (redstem stork's bill)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Helianthus annuus ^a (common sunflower)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Lupinus brevicaulis ^a (shortstem lupine)
year	Nested Frequency																
2006	-	3	2	-	-	-	-	-	36	-	-	-	-	3	-	-	-
2011	13	6	0	3	-	-	10	2	119	21	5	25	2	4	69	142	1
2016	2	4	0	-	-	4	-	-	14	1	-	-	-	-	-	8	-
2020	-	-	-	1	3	-	-	3	8	-	-	-	-	-	-	11	-
year	Average Cover (%)																
2006	-	0.0	0.0	-	-	-	-	-	0.5	-	-	-	-	0.0	-	-	-
2011	0.1	0.0	0.0	0.0	-	-	0.0	0.0	1.2	0.1	0.0	0.1	0.0	0.3	0.5	2.6	0.0
2016	0.0	0.0	0.0	-	-	0.0	-	-	0.1	0.0	-	-	-	-	-	0.0	-
2020	-	-	-	0.0	0.0	-	-	0.0	0.0	-	-	-	-	-	-	0.1	-

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

FORB SPECIES							
Marrubium vulgare ⁱ (horehound)							
Mentzelia albicaulis ^{ai} (whitestem blazingstar)							
Phlox longifolia (longleaf phlox)							
Salsola tragus ^{ai} (prickly Russian thistle)							
Sisymbrium altissimum ^{ai} (tall tumblemustard)							
Sphaeralcea coccinea (scarlet globemallow)							
Tragopogon dubius ^{ai} (yellow salsify)							
year	Nested Frequency						
2006	-	-	-	-	-	-	-
2011	28	10	2	341	331	4	3
2016	29	-	-	21	39	3	-
2020	-	-	-	-	-	14	-
year	Average Cover (%)						
2006	-	-	-	-	-	-	-
2011	0.4	0.0	0.0	4.3	11.0	0.2	0.0
2016	1.4	-	-	0.1	0.6	0.0	-
2020	-	-	-	-	-	0.1	-

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

Table 23R-11.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)				
Bassia prostrata ^{pi} (forage kochia)				
Gutierrezia sarothrae (broom snakeweed)				
Opuntia polyacantha (plains pricklypear)				
year	Line Intercept Cover (%)			
2006	21.7	-	-	0.2
2011	11.2	-	-	-
2016	17.2	0.1	-	0.1
2020	19.9	0.2	0.1	0.4
year	Quadrat Cover (%)			
2006	19.1	-	-	0.0
2011	8.3	-	-	-
2016	12.8	0.0	0.2	0.0
2020	16.1	0.2	0.0	0.0

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

Table 23R-11.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

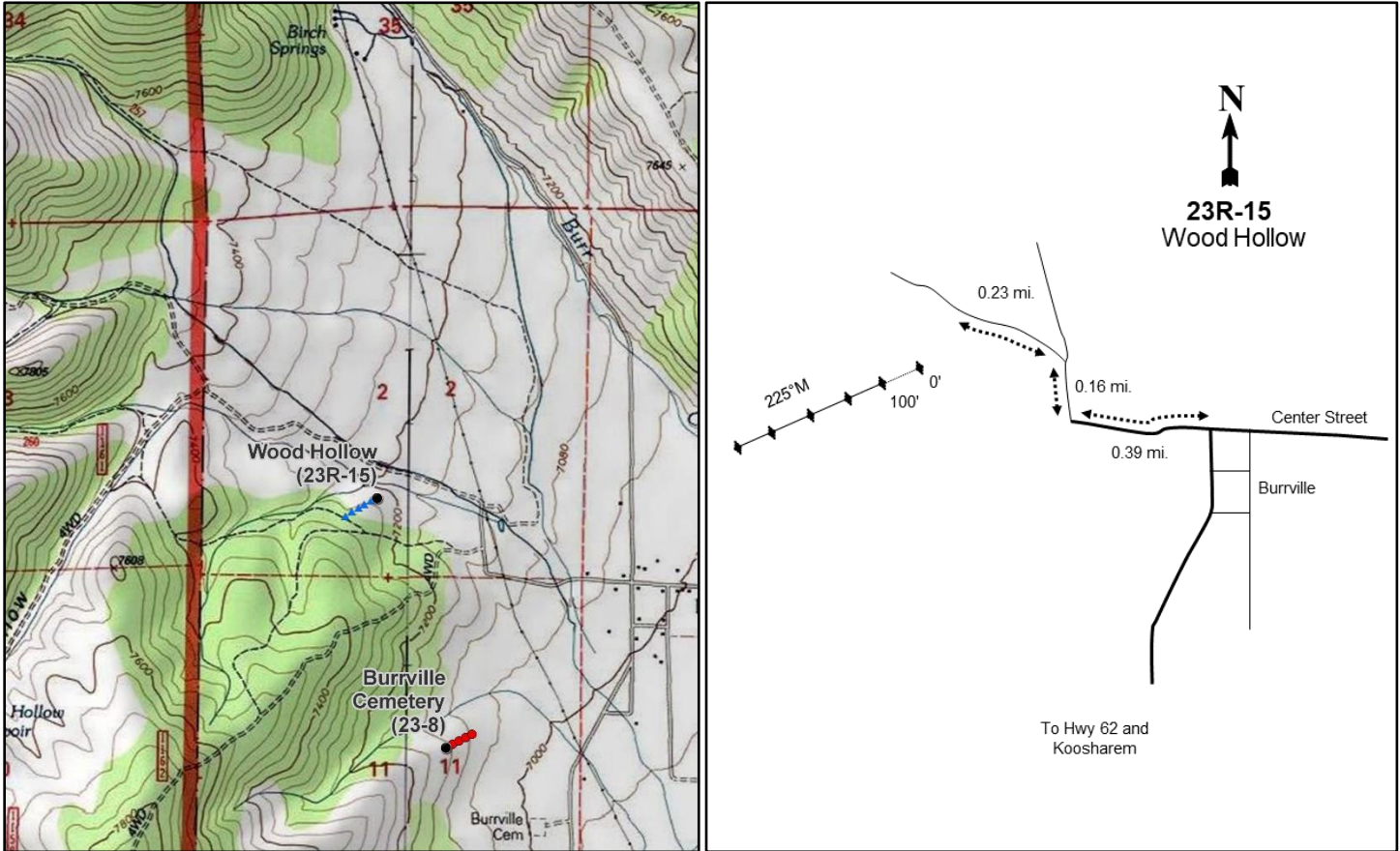
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2006	3440	800	24	43	33	4	2	19	64/97
2011	6900	23380	75	25	0	2	0	1	53/72
2016	8520	400	48	51	1	37	24	1	37/57
2020	8420	40	50	47	3	34	5	26	47/75
Bassia prostrata^{pi} -- (forage kochia)									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	20	-	0	100	0	0	0	0	23/32
2020	260	40	31	69	0	0	0	0	14/21
Ericameria nauseosa -- (rubber rabbitbrush)									
2006	-	-	-	-	-	-	-	-	-/-
2011	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	66/65
2020	-	-	-	-	-	-	-	-	34/41
Gutierrezia sarothrae -- (broom snakeweed)									
2006	-	-	-	-	-	-	-	-	12/22
2011	-	-	-	-	-	-	-	-	-/-
2016	160	-	0	100	0	0	0	0	24/28
2020	100	-	20	40	40	0	0	60	13/17
Opuntia polyacantha -- (plains pricklypear)									
2006	-	20	0	0	0	0	0	0	9/24
2011	-	-	-	-	-	-	-	-	-/-
2016	80	-	25	75	0	0	0	0	9/29
2020	80	-	0	100	0	0	0	0	9/26

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

Table 23R-11.15 – Deer Desirable Components Index: Low Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2006	27.1	5.2	12.2	0.7	0	0.1	0	45.4	Fair-Good
2011	14	15	15	2.3	0	2.1	0	48.4	Good
2016	21.7	14.7	15	3	0	2.9	0	57.3	Good
2020	25.2	14	15	4.7	0	0.1	0	59	Good

WOOD HOLLOW - STUDY NO. 23R-15

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Koosharem NE; Township 26S, Range 1W, Section 02
NAD 83 UTM ZONE 12, 423584 East 4269895 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	225° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar or Stakes

Directions to Site

From the intersection of Main Street and Center Street in Burrville, turn west on Center Street and travel 0.39 miles to a right turn in the road. Follow the road right (north) and travel 0.16 miles to a fork in the road. Stay to the left that turns to the northwest and travel 0.23 miles to the study site.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	BURRVILLE
Elevation	7,200ft (2,195m)
Aspect	Northeast
Slope	25%
Sample Dates	08/13/2020

Table 23R-15.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Burrville Collaboration Ecosystem Restoration Project (Proposed)	5232	Fall 2020	312
Seeding - Aerial Before	Burrville Collaboration Ecosystem Restoration Project (Proposed)	5232	Fall 2020	312

Wildlife Habitat and Vegetation History**Table 23R-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	winter
Greater Sage-Grouse		

Table 23R-15.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2020	Wyoming Big Sagebrush	Phase I transitioning to Phase II

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R034XY306UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2020, the vegetation on this site was a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community type with Utah juniper (*Juniperus osteosperma*) actively encroaching (Table 23R-15.6, Table 23R-15.12, Table 23R-15.14, Photos). As is characteristic of Phase II of woodland succession (Table 23R-15.4), the sagebrush population was decadent with few young and mature plants contributing to the population (Table 23R-15.13). The herbaceous understory was low in diversity with the introduced annual grass species cheatgrass (*Bromus tectorum*) as the dominant understory species (Table 23R-15.7, Table 23R-15.10). With the removal or reduction of juniper, it is likely that the age structure for sagebrush will diversify and cover and density will also increase. Furthermore, it is expected that the vegetative understory will also respond with an increase in abundance and diversity.

Trend Summary Tables**Table 23R-15.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2020	11.9	0.2	3.0	13.1	0.1	6.9

Table 23R-15.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2020	275	75	18	29	6.4	0.8	0.1	0.1

Table 23R-15.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2020	6.5	0.7	40.6	31.5	9.0	22.1

Table 23R-15.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rocky Mountain Elk	Rabbit
	2020	20	-
Year	Days Use Per Acre (ha)		
2020	28.8 (71.2)	2.0 (5.0)	-

Table 23R-15.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES					
	Achnatherum hymenoides (Indian ricegrass)		Achnatherum lettermanii (Letterman's needlegrass)		Bromus tectorum ^{ai} (cheatgrass)
	Elymus elymoides (squirreltail)		Poa secunda (Sandberg bluegrass)		
year	Nested Frequency				
2020	2	13	275	53	11
year	Average Cover (%)				
2020	0.0	0.1	6.4	0.6	0.0

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

Table 23R-15.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES				
	Alyssum desertorum ^{ai} (desert madwort)		Cryptantha (cryptantha)	
	Erigeron pumilus (shaggy fleabane)		Gayophytum ramosissimum ^a (pinyon groundsmoke)	
year	Nested Frequency			
2020	4	10	19	14
year	Average Cover (%)			
2020	0.0	0.1	0.1	0.1

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

Table 23R-15.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)		Juniperus osteosperma ^t (Utah juniper)		Opuntia polyacantha (plains pricklypear)
	Pinus edulis ^t (twoneedle pinyon)		Purshia tridentata ^p (antelope bitterbrush)		
year	Line Intercept Cover (%)				
2020	13	6.1	0.1	0.8	0.1
year	Quadrat Cover (%)				
2020	11.9	2.6	0.2	0.4	0.0

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

Table 23R-15.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis ^p -- (Wyoming big sagebrush)									
2020	3920	40	3	5	92	37	2	99	67/78
Juniperus osteosperma ⁱ -- (Utah juniper)									
2020	120	-	83	17	0	0	0	33	- / -
Opuntia polyacantha -- (plains pricklypear)									
2020	340	-	18	59	24	0	0	35	11/26
Purshia tridentata ^p -- (antelope bitterbrush)									
2020	20	-	0	0	100	0	100	100	21/51

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

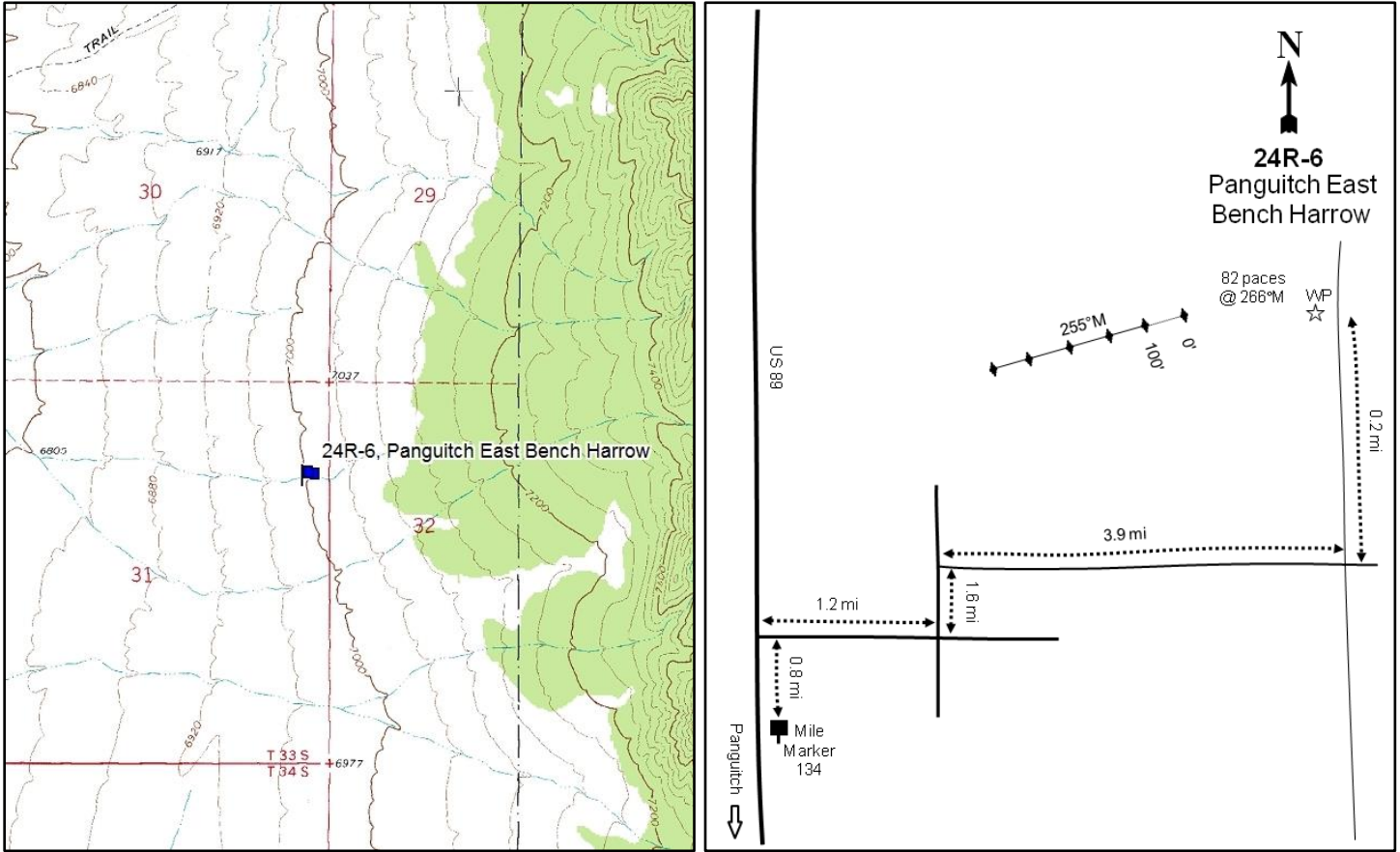
Table 23R-15.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2020	128	5	16	26	26	26	15.9
Pinus edulis (twoneedle pinyon)							
2020	4	-	-	67	-	33	14.7

Table 23R-15.15 – Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2020	16.4	-12.7	1.5	1.5	-4.8	0.3	0.0	2.3	Very Poor

PANGUITCH EAST BENCH HARROW - STUDY NO. 24R-6



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Blind Spring Mountain; Township 33S, Range 4W, Section 31
NAD 83 UTM ZONE 12, 382044 East 4195732 North

Transect Information

Browse Tag # (0' Stake)	41
Transect Bearing	255° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

Travel north of Panguitch on US-89 to mile marker 134. Continue 0.8 miles north of the mile marker to a road that comes in from the right (east). Turn onto this road and travel 1.2 miles to an intersection. Turn left and drive 1.6 miles to a 90 degree turn. Continue 3.9 miles to a road that comes in from the left (north). Turn left here and travel 0.2 miles to two witness posts on the left (west) side of the road that are right next to each other. From the witness posts, walk 82 paces at 266 degrees magnetic to the 0-foot stake that is marked with browse tag #41.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SANFORD BENCH
Elevation	7,000ft (2,134m)
Aspect	West
Slope	3-7%
Sample Dates	07/19/2004, 06/19/2007, 08/22/2012, 08/17/2016, 08/11/2020

Table 24R-06.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - One-Way Dixie	Panguitch East Bench	PDB	October 2004	300
Seeding - Broadcast Before	Panguitch East Bench	PDB	October 2004	300
Seeding - Aerial After	Panguitch East Bench	PDB	December 2004	300

Table 24R-06.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Panguitch East Bench			Broadcast	Oct 2004	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.50	0.48
G	Agropyron cristatum	Crested Wheatgrass	Douglas	0.50	0.47
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.50	0.45
G	Elymus elymoides	Bottlebrush Squirreltail		0.13	0.10
G	Elymus hoffmannii	Newhy Wheatgrass		0.50	0.44
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.17	1.03
G	Festuca brevipila	Hard Fescue		0.50	0.45
G	Hesperostipa comata	Needle and Threadgrass		0.12	0.10
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.50	0.47
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.50	0.45
F	Achillea millefolium	Western Yarrow		0.07	0.06
F	Cleome serrulata	Rocky Mountain Beeplant	Sanpete UT	0.50	0.49
F	Linum perenne	Blue Flax	Appar	0.17	0.14
F	Medicago sativa	Alfalfa	Ladak+	1.00	0.95
F	Melilotus officinalis	Yellow Sweetclover		0.04	0.04
F	Onobrychis viciifolia	Sainfoin		2.67	2.55
F	Sanguisorba minor	Small Burnet	Delar	1.67	1.60

Mix Name			Application Type	Application Date	Acres
Panguitch East Bench Forage Kochia			Aerial	Dec 2004	300
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Bassia prostrata	Forage Kochia	Immigrant	1.00	0.67

Wildlife Habitat and Vegetation History**Table 24R-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 24R-06.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2004	Wyoming Big Sagebrush	Phase I
2007	Wyoming Big Sagebrush	Phase I
2012	Wyoming Big Sagebrush/Perennial Grass	Phase I
2016	Wyoming Big Sagebrush/Perennial Grass	Phase I
2020	Wyoming Big Sagebrush	Phase I

Site Notes

This study is located approximately eight miles northwest of Panguitch within a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) flat.

Soils

Table 24R-06.5 - Soil Analysis Data. List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.6	55.0	23.4	21.6	1.4	7.8	611.2	0.7	07/19/2004

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R047XB222UT
States and Transitions	No state and transition model is available for this ecological site.

This study site has existed as a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) dominated plant community since establishment in 2004. Decadence was high in the 2004 sample year and the site was dixie harrowed and seeded that fall (Table 24R-06.1). Sagebrush cover exhibited an initial decrease, but has since surpassed pre-treatment levels. In addition, decadence has remained low following treatment (Table 24R-06.12, Table 24R-06.13). Perennial grasses, mainly blue grama (*Bouteloua gracilis*), increased in cover and became a co-dominant component in 2012. However, blue grama cover decreased significantly in 2020 (Table 24R-06.7, Table 24R-06.10). Although no trees have been recorded in the data, photos reveal that there is at least one on the site and a woodland on one side, indicating that this site has the potential for future encroachment (Table 24R-06.12, Table 24R-06.13, Photos).

Trend Summary Tables**Table 24R-06.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2004	18.1	0.1	-	19.5	-	-
2007	7.7	0.2	-	4.7	-	-
2012	18.3	-	-	15.9	-	-
2016	19.8	0.3	-	22.8	0.2	-
2020	19.2	-	-	24.6	0.1	-

Table 24R-06.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2004	-	185	16	3	-	5.3	0.1	0.0
2007	-	162	89	12	-	6.4	1.1	0.0
2012	-	208	94	22	-	10.7	0.6	0.1
2016	-	297	3	4	-	20.6	0.0	0.0
2020	-	280	24	3	-	8.1	0.1	0.0

Table 24R-06.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2004	36.6	3.4	23.8	22.8	4.1	23.1
2007	49.7	0.1	28.2	9.1	5.0	15.9
2012	38.0	0.6	25.9	11.1	3.3	30.2
2016	32.7	0.6	26.4	13.1	4.2	39.1
2020	22.1	0.4	39.4	13.8	5.8	28.0

Table 24R-06.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Rabbit
	Quadrat Frequency		
2004	-	1	26
2007	-	1	91
2012	2	-	32
2016	-	2	41
2020	-	8	60
Days Use Per Acre (ha)			
2004	-	1.3 (3.3)	-
2007	-	4.0 (9.9)	-
2012	8.0 (19.7)	2.0 (5.0)	-
2016	2.9 (7.2)	7.4 (18.2)	-
2020	5.1 (12.6)	7.4 (18.2)	-

Table 24R-06.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Festuca brevipila ⁱ (hard fescue)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency										
2004	-	-	148	38	-	-	-	-	5	-	-
2007	3	7	148	8	-	-	2	-	3	2	1
2012	15	8	154	14	1	18	4	-	3	17	-
2016	20	-	254	62	-	-	-	1	-	4	-
2020	1	10	221	84	-	-	-	-	-	-	1
year	Average Cover (%)										
2004	-	-	4.3	1.0	-	-	-	-	0.0	-	-
2007	0.0	0.0	6.2	0.1	-	-	0.0	-	0.0	0.0	0.0
2012	0.5	0.4	8.6	0.2	0.0	0.5	0.0	-	0.0	0.4	-
2016	0.6	-	18.4	1.1	-	-	-	0.0	-	0.4	-
2020	0.0	0.4	5.9	1.8	-	-	-	-	-	-	0.0

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

Table 24R-06.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus lentiginosus (freckled milkvetch)	Chamaesyce (sandmat)	Chenopodium fremontii ^a (Fremont's goosefoot)	Cleome serrulata ^a (Rocky Mountain beplant)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Gilia inconspicua ^a (shy gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^a (flatspine stickseed)	Salsola tragus ^{ai} (prickly Russian thistle)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested Frequency														
2004	-	3	-	-	-	-	16	-	-	-	-	-	-	-	-
2007	4	7	-	4	9	-	60	22	1	4	2	-	1	-	-
2012	11	-	8	-	-	-	33	44	-	1	4	29	1	-	2
2016	-	-	-	-	-	3	3	-	-	-	-	-	-	1	-
2020	-	3	-	-	-	-	9	4	-	-	13	-	-	-	-
year	Average Cover (%)														
2004	-	0.0	-	-	-	-	0.1	-	-	-	-	-	-	-	-
2007	0.0	0.0	-	0.0	0.2	-	0.9	0.0	0.0	0.0	0.0	-	0.0	-	-
2012	0.0	-	0.0	-	-	-	0.1	0.2	-	0.0	0.0	0.3	0.0	-	0.0
2016	-	-	-	-	-	0.0	0.0	-	-	-	-	-	-	0.0	-
2020	-	0.0	-	-	-	-	0.1	0.0	-	-	0.0	-	-	-	-

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

Table 24R-06.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
2004	19.5	-	-	-
2007	4.7	-	-	-
2012	15.9	-	-	-
2016	22.8	-	0.1	0.1
2020	24.6	-	-	0.1
year	Quadrat Cover (%)			
2004	18.1	-	0.1	-
2007	7.7	0.1	-	0.0
2012	18.3	-	-	-
2016	19.8	-	0.3	0.0
2020	19.2	-	-	0.0

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

Table 24R-06.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

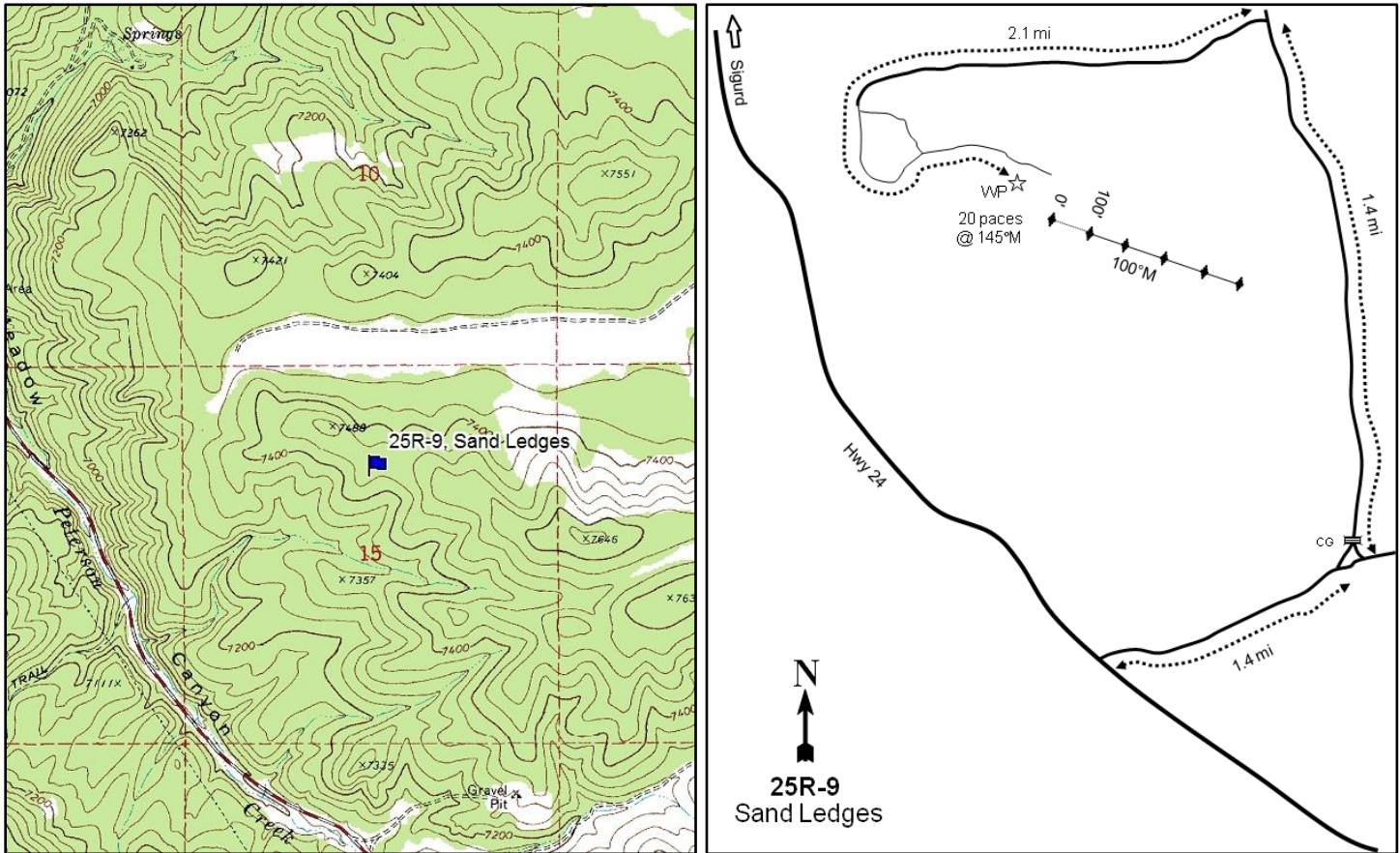
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2004	6960	60	7	48	45	3	0	26	42/65
2007	2460	80	10	68	23	22	7	59	37/55
2012	15400	9160	82	18	1	8	0	1	47/71
2016	15680	80	57	42	1	23	2	1	40/62
2020	16340	-	29	65	6	54	7	5	39/59
Gutierrezia sarothrae -- (broom snakeweed)									
2004	140	-	71	29	0	0	0	0	12/18
2007	-	-	-	-	-	-	-	-	-/-
2012	-	-	-	-	-	-	-	-	10/12
2016	180	-	11	89	0	0	0	0	18/24
2020	40	-	50	50	0	0	0	0	12/9
Opuntia -- (pricklypear)									
2004	40	-	0	100	0	0	0	0	11/24
2007	20	-	0	100	0	0	0	0	3/4
2012	20	-	0	100	0	0	0	0	10/16
2016	20	-	0	100	0	0	0	0	10/18
2020	60	-	67	33	0	0	0	0	12/24
Pediocactus simpsonii -- (mountain ball cactus)									
2004	-	-	-	-	-	-	-	-	-/-
2007	-	-	-	-	-	-	-	-	-/-
2012	20	-	100	0	0	0	0	0	2/3

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

Table 24R-06.15 – Deer Desirable Components Index: Low Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2004	24.4	1.5	3.6	10.7	0	0.1	0	40.2	Fair
2007	5.9	0	0	12.8	0	0.1	0	18.7	Poor
2012	19.9	14.8	15	21.5	0	0.2	0	71.3	Excellent
2016	28.5	14.8	15	30	0	0	0	88.3	Excellent
2020	30	13.4	14.6	16.3	0	0	0	74.2	Excellent

SAND LEDGES - STUDY NO. 25R-9

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Water Creek Canyon N; Township 24S, Range 1W, Section 15
NAD 83 UTM ZONE 12, 422207 East 4286724 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	100° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

Directions to Site

From Highway 24, drive 1.4 miles to a junction. Turn left, travel 1.4 miles, then turn right. Drive for 2.1 miles to a witness post on the right-hand (south) side of the road (there are two roads that climb to the top of the hill and both roads reach the site). From the witness post, walk 20 paces at 145 degrees magnetic to the 0-foot stake.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	GYP SUM
Elevation	7,458ft (2,273m)
Aspect	Southeast
Slope	16%
Sample Dates	08/09/2012, 08/15/2016, 08/03/2020

Table 25R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Unknown	Sand Ledges Chaining 1983	LTDL	July-November 1983	1980
Seeding - Aerial Unknown	Sand Ledges Chaining 1983	LTDL	July-November 1983	1980
Hand Crew - Lop and Scatter	Sandledges Lop and Scatter Project Phase II	2334	June 2013	2275
Seeding - Aerial After	Willow Patch Fire Rehabilitation Project (Proposed)	4739	Fall 2018	4583
Fire - Wildfire	Willow Patch Fire	-	June-July 2018	4583
Seeding - Aerial After	Willow Patch Fire Rehabilitation Project (Proposed)	4739	Winter 2018	4583

Table 25R-09.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Sand Ledges Aerial Seeding Mix			Aerial	Jul 1983	1980
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Desert Wheatgrass		1.84	0.00
G	Psathyrostachys juncea	Russian Wildrye		1.08	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.91	0.00
F	Medicago sativa	Alfalfa		1.13	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.15	0.00

Wildlife Habitat and Vegetation History**Table 25R-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 25R-09.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2012	Pinyon-Juniper/Mountain Big Sagebrush-Bitterbrush	Phase II
2016	Mountain Big Sagebrush-Bitterbrush/Annual Grass	Phase I
2020	Perennial Grass	Phase I

Site Notes

This study is located approximately five miles east of Glenwood within an old twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) chaining.

Site Potential

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB462UT
States and Transitions	No state and transition model is available for this ecological site.

In 2012, this study site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) in the shrub understory. A lop and scatter project later that year removed many of the trees, and cover of sagebrush and bitterbrush had increased as of 2016. However, a wildfire in 2018 removed much of the shrub and remaining tree components from the community (Table 25R-09.1, Table 25R-09.12, Table 25R-09.13). Although initially sparse, the herbaceous understory was abundant in 2016, but much of the cover was contributed by the introduced annual grass species cheatgrass (*Bromus tectorum*). In 2020 following the wildfire, the introduced perennial grass intermediate wheatgrass (*Thinopyrum intermedium*) was the dominant species (Table 25R-09.7, Table 25R-09.10).

Trend Summary Tables**Table 25R-09.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2012	6.4	0.2	20.1	10.5	0.5	20.5
2016	11.9	0.1	1.6	16.1	0.2	2.9
2020	0.3	-	-	0.4	-	-

Table 25R-09.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2012	195	216	18	38	0.9	5.6	0.0	0.1
2016	405	250	37	19	22.2	10.6	0.3	0.1
2020	18	284	8	25	0.0	19.8	0.2	1.9

Table 25R-09.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2012	5.2	0.6	34.6	37.9	16.1	31.3
2016	6.3	-	54.3	9.7	8.7	45.3
2020	24.1	-	16.2	25.3	31.0	24.1

Table 25R-09.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2012	-	-	2	1	5
2016	-	-	8	2	51
2020	-	-	5	16	1
Days Use Per Acre (ha)					
2012	1.5 (3.6)	8.7 (21.5)*	5.3 (13.2)	7.4 (18.2)	-
2016	2.9 (7.2)	-	24.1 (59.6)	14.7 (36.4)	-
2020	-	-	5.3 (13.2)	22.8 (56.3)	-

*Pellets per acre (ha)

Table 25R-09.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Bromus inermis ⁱ (smooth brome)	Bromus tectorum ^{ai} (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency										
2012	5	28	6	195	-	-	-	40	6	92	96
2016	12	34	3	405	6	1	-	4	11	77	150
2020	12	88	4	18	-	-	0	6	-	23	203
year	Average Cover (%)										
2012	0.0	0.5	0.0	0.9	-	-	-	0.2	0.0	2.9	1.8
2016	0.1	1.1	0.0	22.2	0.0	0.0	-	0.0	0.3	2.8	6.1
2020	0.9	3.6	0.2	0.0	-	-	0.0	0.1	-	0.8	14.3

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

Table 25R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcross)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Descurainia pinnata ^a (western tansymustard)	Lactuca serriola ^{ai} (prickly lettuce)	Medicago sativa ⁱ (alfalfa)	Microsteris gracilis ^a (slender phlox)	Onobrychis vicifolia ⁱ (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii ^a (Douglas' knotweed)	Streptanthus cordatus (heartleaf twistflower)	Symphoricarichum (aster)
year	Nested Frequency																
2012	-	11	11	-	4	1	1	2	-	-	-	1	4	-	15	1	8
2016	10	-	3	7	-	1	-	1	-	25	-	1	-	3	5	6	-
2020	-	-	11	-	-	-	-	2	11	3	3	-	-	-	3	1	-
year	Average Cover (%)																
2012	-	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	-	0.0	0.0	-	0.0	0.0	0.0
2016	0.1	-	0.0	0.0	-	0.0	-	0.0	-	0.1	-	0.0	-	0.0	0.0	0.0	-
2020	-	-	0.6	-	-	-	-	0.2	1.1	0.0	0.2	-	-	-	0.0	0.0	-

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

FORB SPECIES	Tragopogon dubius ^{ai} (yellow salsify)
year	Nested Frequency
2012	-
2016	1
2020	-
year	Average Cover (%)
2012	-
2016	0.1
2020	-

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

Table 25R-09.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana ^p (mountain big sagebrush)	Bassia prostrata ^{pi} (forage kochia)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma ^t (Utah juniper)	Pinus edulis ^t (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)					
2012	6.4	-	0.5	14.2	6.3	4.1
2016	9.6	-	0.2	2.6	0.3	6.5
2020	0.2	0.2	-	-	-	-
year	Quadrat Cover (%)					
2012	4.0	-	0.2	14.4	5.7	2.4
2016	6.8	-	0.1	1.6	0.0	5.1
2020	0.2	0.1	-	-	-	0.0

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

Table 25R-09.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana ^p -- (mountain big sagebrush)									
2012	840	40	33	57	10	26	0	5	53/84
2016	1180	-	24	76	0	17	12	0	54/89
2020	140	-	86	14	0	0	0	0	31/29
Bassia prostrata ^{pi} -- (forage kochia)									
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	200	-	80	20	0	0	0	0	42/54

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria nauseosa -- (rubber rabbitbrush)									
2012	40	-	0	100	0	0	0	50	96/123
2016	20	-	0	100	0	0	0	0	82/100
2020	-	-	-	-	-	-	-	-	-/-
Gutierrezia sarothrae -- (broom snakeweed)									
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	38/56
2020	-	-	-	-	-	-	-	-	-/-
Juniperus osteosperma¹ -- (Utah juniper)									
2012	380	-	21	79	0	5	0	0	-/-
2016	220	-	55	36	9	0	0	0	-/-
2020	-	-	-	-	-	-	-	-	-/-
Krascheninnikovia lanata^p -- (winterfat)									
2012	20	-	0	100	0	100	0	0	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	26/38
Opuntia -- (pricklypear)									
2012	-	-	-	-	-	-	-	-	17/37
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Pediocactus simpsonii -- (mountain ball cactus)									
2012	-	-	-	-	-	-	-	-	15/27
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Pinus edulis^t -- (twoneedle pinyon)									
2012	120	-	50	50	0	0	0	0	-/-
2016	80	-	100	0	0	0	0	0	-/-
2020	-	-	-	-	-	-	-	-	-/-
Purshia tridentata^p -- (antelope bitterbrush)									
2012	140	-	0	71	29	0	43	14	72/165
2016	380	40	11	90	0	58	0	0	77/176
2020	20	-	100	0	0	0	0	0	14/25

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

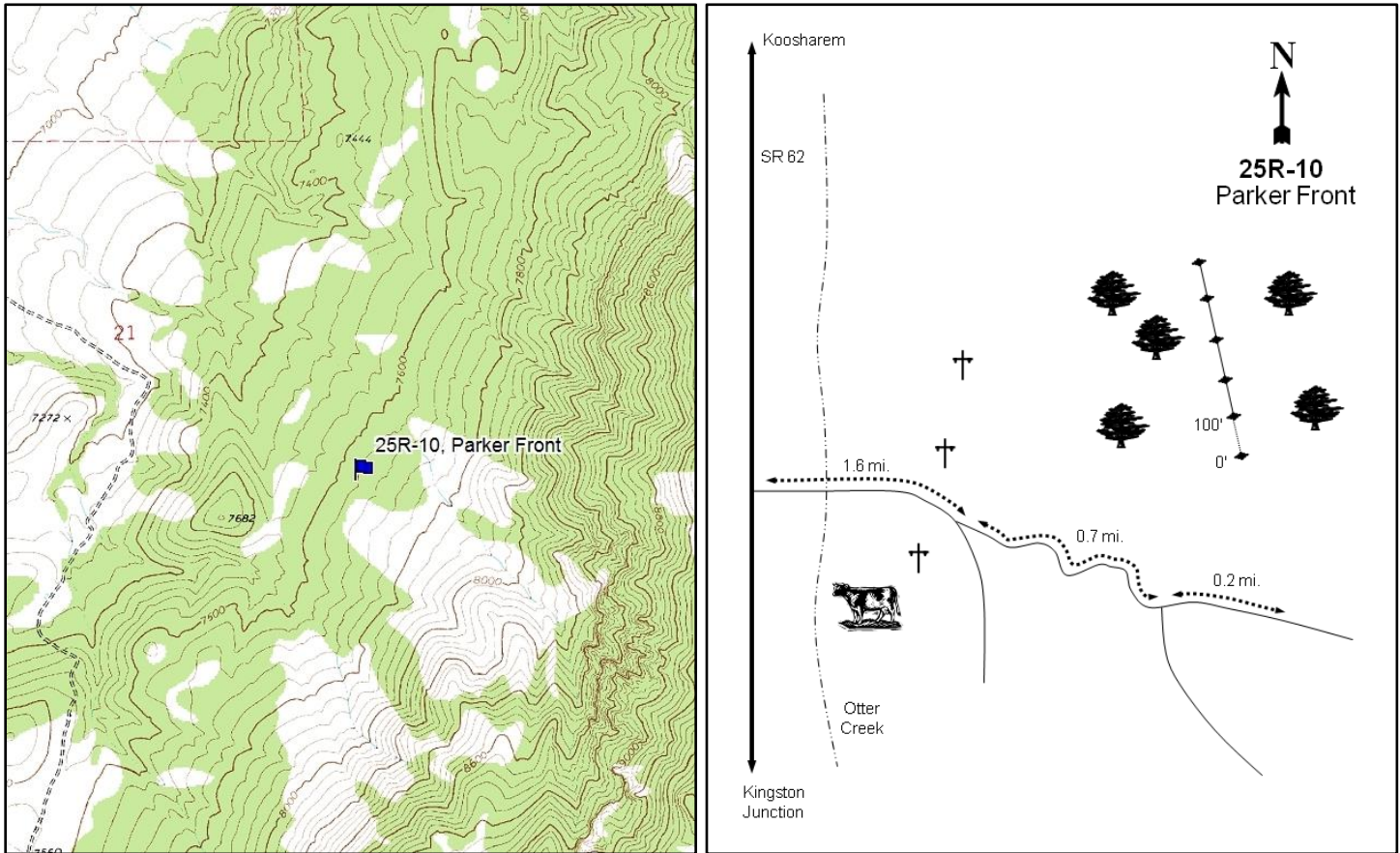
Table 25R-09.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2012	240	-	-	20	80	-	19.1
2016	73	-	78	22	-	-	4.1
Pinus edulis (twoneedle pinyon)							
2012	65	-	18	35	29	18	12.6
2016	29	-	100	-	-	-	2.6

Table 25R-09.15 – Deer Desirable Components Index: High Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2012	14.2	9.9	10.1	11.1	-0.7	0.3	0	44.9	Poor
2016	21.8	15	9.2	21.2	-16.6	0.1	0	50.6	Poor
2020	0.6	0	0	30	0	3.9	0	34.4	Very Poor

PARKER FRONT - STUDY NO. 25R-10



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Parker Knoll NE; Township 28S, Range 1W, Section 41
NAD 83 UTM ZONE 12, 421398 East 4245609 North

Transect Information

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

597
356° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft), Line 5 (71ft)
Belt 3: 5ft

Directions to Site

Travel south on State Route 62 from Greenwich for 4.2 miles. Turn east and drive for 1.6 miles, crossing Otter Creek. The road will fork: stay to the left and drive for another 0.7 miles. The road will fork again: keep left and continue for 0.2 miles. The transect will be on the north side of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	NORTH NARROWS
Elevation	7,618ft (2,322m)
Aspect	Northwest
Slope	12%
Sample Dates	08/01/2013, 08/16/2016, 08/05/2020

Table 25R-10.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	East Grass Valley P/J Maintenance (Proposed)	5294	Fall 2020	5317
Chaining - Two-Way Smooth	Parker Front PJ Removal	2547	October-November 2013	496
Seeding - Aerial Before	Parker Front PJ Removal	2547	November 2013	1230
Seeding - Aerial After	Parker Front PJ Removal	2547	January 2014	1230

Table 25R-10.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Parker Front PJ Removal			Aerial	Nov 2013	1230
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Festuca ovina	Sheep Fescue	Covar	0.08	0.07
G	Festuca ovina	Sheep Fescue	Covar	0.28	0.26
G	Festuca ovina	Sheep Fescue	Covar	0.16	0.15
G	Poa fendleriana	Muttongrass		0.05	0.05
G	Poa fendleriana	Muttongrass	Montezuma CO	0.12	0.09
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.50	1.36
F	Helianthus annuus	Annual Sunflower	Box Elder UT	0.57	0.54
F	Linum perenne	Blue Flax	Appar	0.73	0.64
F	Medicago sativa	Alfalfa	Big Sky Ladak	0.77	0.72
F	Melilotus officinalis	Yellow Sweetclover		0.49	0.43
F	Penstemon palmeri	Palmer Penstemon	Sevier UT	0.08	0.07
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.16	0.13
F	Sanguisorba minor	Small Burnet		2.44	2.24

Wildlife Habitat and Vegetation History**Table 25R-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 25R-10.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Pinyon-Juniper	Phase II
2016	Mountain Big Sagebrush/Perennial Grass	Phase I
2020	Mountain Big Sagebrush/Perennial Grass	Phase I

Site Notes

A small number of old deer shed antlers were found near the site in 2013.

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Mountain Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB462UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2013, this site was dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) with moderately robust populations of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) in the understory. Tree and bitterbrush cover decreased following a chaining and seeding treatment (Table 25R-10.1), and the dominant browse species was mountain big sagebrush in 2016 and 2020 (Table 25R-10.12). Herbaceous cover increased following the treatment; perennial grasses were a co-dominant site component in 2016 and 2020, with squirreltail (*Elymus elymoides*) and Indian ricegrass (*Achnatherum hymenoides*) providing much of the cover (Table 25R-10.7, Table 25R-10.10). Although juniper trees were not initially a major component of the tree community, juniper have reestablished with density returning to pretreatment levels. This likely indicates that woodland succession remains dynamic on the site, and future infilling could pose a treat to understory diversity and abundance (Table 25R-10.12, Table 25R-10.14).

Trend Summary Tables**Table 25R-10.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	5.4	0.0	6.3	11.1	-	33.9
2016	13.4	0.6	1.9	18.3	0.2	2.1
2020	15.1	0.8	3.6	21.9	-	3.6

Table 25R-10.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	151	-	40	-	5.0	-	0.3
2016	7	238	38	52	0.1	11.6	1.4	0.8
2020	13	230	-	20	0.1	10.6	-	0.2

Table 25R-10.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	5.7	0.8	48.2	3.0	33.0	17.1
2016	2.5	0.0	56.4	1.6	26.3	29.8
2020	1.0	-	62.9	2.6	25.3	31.7

Table 25R-10.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2013	-	7	2	9
2016	-	6	2	27
2020	-	6	7	7
Year	Days Use Per Acre (ha)			
2013	-	3.4 (8.3)	2.7 (6.6)	-
2016	-	19.4 (48.0)	2.0 (5.0)	-
2020	0.7 (1.8)	14.7 (36.4)	31.5 (77.8)	-

Table 25R-10.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum ^{ai} (cheatgrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency									
2013	21	-	49	-	33	12	29	45	-	-
2016	27	0	14	7	86	88	59	49	4	2
2020	68	23	6	13	42	99	24	34	8	-
year	Average Cover (%)									
2013	0.3	-	1.4	-	1.1	0.1	0.8	1.2	-	-
2016	1.5	0.0	0.7	0.1	2.6	2.6	2.5	1.7	0.0	0.0
2020	2.8	0.6	0.1	0.1	0.7	3.8	1.0	1.7	0.0	-

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

Table 25R-10.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus utahensis (Utah milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Corydalis aurea ^{ai} (scrambled eggs)	Cryptantha (cryptantha)	Eriogonum eatonii (Eaton's fleabane)	Eriogonum pumilus (shaggy fleabane)	Eriogonum cernuum ^a (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^{ai} (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa ⁱ (alfalfa)	Melilotus officinalis ⁱ (sweetclover)	Packera multilobata (lobeleaf groundsel)	Salsola tragus ^{ai} (prickly Russian thistle)
year	Nested Frequency																
2013	3	1	2	-	3	2	8	-	-	-	-	-	2	-	-	27	-
2016	7	-	3	4	8	6	9	3	17	11	16	9	2	1	2	12	1
2020	-	-	-	-	3	-	4	-	7	-	-	-	0	-	-	3	-
year	Average Cover (%)																
2013	0.0	0.0	0.0	-	0.0	0.0	0.1	-	-	-	-	-	0.0	-	-	0.2	-
2016	0.1	-	0.0	0.1	0.1	0.0	0.2	0.0	0.2	0.1	0.5	0.8	0.0	0.0	0.0	0.1	0.0
2020	-	-	-	-	0.0	-	0.0	-	0.1	-	-	-	0.0	-	-	0.0	-

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

FORB SPECIES	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency
2013	-
2016	2
2020	3
year	Average Cover (%)
2013	-
2016	0.0
2020	0.0

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

Table 25R-10.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES									
year	Line Intercept Cover (%)								
2013	7.6	-	0	7	-	-	26.9	3.5	-
2016	16.5	0.2	-	0.4	-	-	1.7	1.8	-
2020	19.6	-	-	0.8	-	-	2.8	2.3	-
year	Quadrat Cover (%)								
2013	4.3	0.0	0.0	1.1	-	-	5.3	1.1	-
2016	11.8	0.3	-	1.0	-	0.3	1.0	1.6	-
2020	13.4	0.8	-	1.3	0.0	0.0	2.3	1.5	0.1

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

Table 25R-10.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana^p -- (mountain big sagebrush)									
2013	2540	40	30	37	33	21	13	36	49/74
2016	2860	60	26	73	1	1	0	1	48/78
2020	3400	40	26	72	2	7	0	7	61/83
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2013	60	-	0	100	0	0	100	0	5/28
2016	300	-	13	87	0	0	13	13	35/44
2020	100	-	0	100	0	0	0	0	43/65

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Gutierrezia sarothrae -- (broom snakeweed)									
2013	40	-	0	100	0	0	0	0	24/33
2016	-	-	-	-	-	-	-	-	40/71
2020	-	-	-	-	-	-	-	-	26/26
Juniperus osteosperma¹ -- (Utah juniper)									
2013	120	40	17	83	0	0	0	0	- / -
2016	120	20	83	0	17	0	0	0	- / -
2020	220	-	91	9	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2013	40	-	0	100	0	0	0	0	10/15
2016	20	-	0	100	0	0	0	0	22/32
2020	20	-	0	100	0	0	0	0	26/42
Opuntia -- (pricklypear)									
2013	60	-	0	100	0	0	0	0	14/27
2016	60	-	0	100	0	0	0	0	15/35
2020	40	-	0	100	0	0	0	0	11/27
Pinus edulis¹ -- (twoneedle pinyon)									
2013	320	20	38	63	0	0	0	0	- / -
2016	140	-	71	14	14	0	0	29	- / -
2020	380	40	95	0	5	0	0	5	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2013	380	-	5	79	16	42	42	32	67/106
2016	300	-	0	100	0	33	13	0	51/80
2020	340	-	12	82	6	35	35	6	61/97
Rubus idaeus -- (American red raspberry)									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	71/53
2020	20	-	0	100	0	0	100	0	34/49
Sambucus racemosa^p -- (red elderberry)									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	94/104
2020	-	-	-	-	-	-	-	-	134/179

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

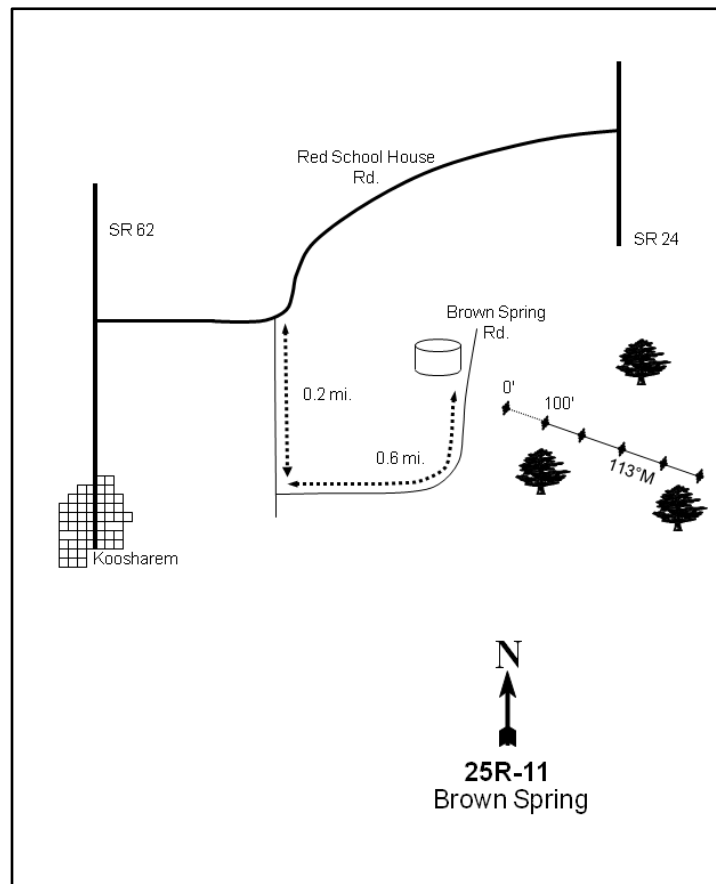
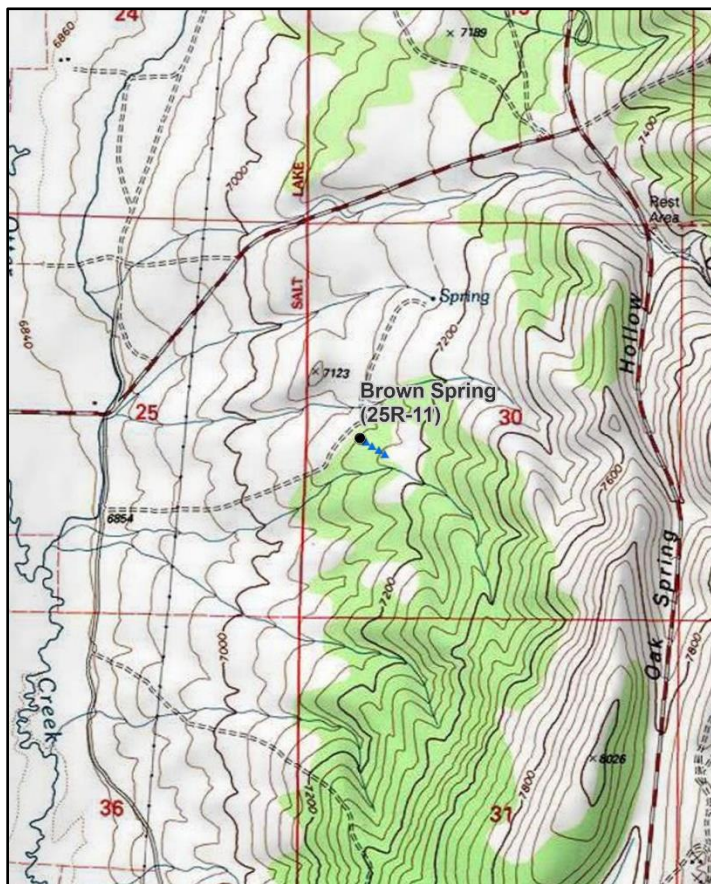
Table 25R-10.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	85	5	26	11	26	32	17.1
2016	45	17	50	33	-	-	6.2
2020	84	39	50	11	-	-	3.1
Pinus edulis (twoneedle pinyon)							
2013	261	5	15	30	30	20	15.1
2016	74	21	68	5	5	-	4.5
2020	71	17	72	11	-	-	3.7

Table 25R-10.15 – Deer Desirable Components Index: High Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	14.8	6.7	11.1	10	0	0.7	0	43.2	Poor
2016	23.3	14.6	11.7	23.2	-0.1	1.6	0	74.4	Good
2020	28	14.2	12.2	21.3	-0.1	0.5	0	76	Good

BROWN SPRING - STUDY NO. 25R-11

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Burrville SW; Township 26S, Range 1E, Section 30
NAD 83 UTM ZONE 12, 426233 East 4263793 North

Transect Information

Browse Tag # (0' Stake)	118
Transect Bearing	113° magnetic
Length	400ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95)
Belt Marker Placement	Standard

Directions to Site

Drive north out of Koosharem on State Route 62 for 0.7 miles and turn right (east) onto Red School House Road. Drive about 1.3 miles, turn right (south), and proceed for 0.2 miles. Turn left (east) and continue for 0.6 miles; the study will be on the right (east) side of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	OAK SPRINGS
Elevation	7,139ft (2,176m)
Aspect	West
Slope	9%
Sample Dates	08/01/2013, 08/16/2016, 08/04/2020

Table 25R-11.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	East Grass Valley P/J Maintenance (Proposed)	5294	Fall 2020	5317
Mechanical - Bullhog	Parker Front PJ Removal	2547	November 2013-January 2014	404
Seeding - Aerial Before	Parker Front PJ Removal	2547	November 2013	1230

Table 25R-11.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Parker Front PJ Removal			Aerial	Nov 2013	1230
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Festuca ovina	Sheep Fescue	Covar	0.08	0.07
G	Festuca ovina	Sheep Fescue	Covar	0.28	0.26
G	Festuca ovina	Sheep Fescue	Covar	0.16	0.15
G	Poa fendleriana	Muttongrass		0.05	0.05
G	Poa fendleriana	Muttongrass	Montezuma CO	0.12	0.09
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	1.50	1.36
F	Helianthus annuus	Annual Sunflower	Box Elder UT	0.57	0.54
F	Linum perenne	Blue Flax	Appar	0.73	0.64
F	Medicago sativa	Alfalfa	Big Sky Ladak	0.77	0.72
F	Melilotus officinalis	Yellow Sweetclover		0.49	0.43
F	Penstemon palmeri	Palmer Penstemon	Sevier UT	0.08	0.07
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.16	0.13
F	Sanguisorba minor	Small Burnet		2.44	2.24

Wildlife Habitat and Vegetation History**Table 25R-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 25R-11.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Pinyon-Juniper	Phase III
2016	Wyoming Big Sagebrush/Annual-Perennial Forb	Phase I
2020	Wyoming Big Sagebrush	Phase I

Site Notes

No Notes

Site Potential

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R047XA312UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2013, this site was a Phase III twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland with a mostly depauperate understory (Table 25R-11.4). Most of the tree cover was removed by a bullhog treatment the following winter (Table 25R-11.1), and in 2016 and 2020 the main browse component was Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). In 2020, sagebrush density increased nearly three-fold from 2016. In addition, sagebrush cover has had a marked increase each sample year (Table 25R-11.12, Table 25R-11.13). Grass cover has remained low throughout the duration of the study. In 2016 annual and perennial forbs filled the interspaces and were co-dominant site components, but they were a minor component in the 2020 sample year (Table 25R-11.7, Table 25R-11.11). Pinyon and juniper were observed in 2016 in low amounts, but in 2020 juniper density increased and surpassed pretreatment measurements. However, juniper cover has remained low which indicates that trees remain small (Table 25R-11.12, Table 25R-11.13). Woodland succession remains dynamic in this community, and future infilling will need continued inputs for maintenance of this sagebrush community.

Trend Summary Tables**Table 25R-11.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	1.1	-	6.2	2.4	-	41.7
2016	4.7	-	0.1	3.0	-	-
2020	6.5	0.0	0.1	8.5	-	0.4

Table 25R-11.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	4	-	1	-	0.0	-	0.0
2016	-	51	148	177	-	0.4	6.4	5.7
2020	-	83	76	20	-	3.8	1.8	0.3

Table 25R-11.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	11.7	1.7	39.0	31.7	11.2	7.6
2016	11.4	0.0	63.6	13.0	3.8	17.0
2020	7.6	0.0	67.7	17.4	3.4	12.3

Table 25R-11.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
2013	17	-	29
2016	21	-	44
2020	31	5	43
Year	Days Use Per Acre (ha)		
2013	45.6 (112.6)	-	-
2016	36.2 (89.4)	-	-
2020	7.4 (18.2)	0.7 (1.7)	-

Table 25R-11.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency						
2013	-	-	4	-	-	-	-
2016	0	1	28	14	3	3	4
2020	6	0	30	17	19	14	7
year	Average Cover (%)						
2013	-	-	0.0	-	-	-	-
2016	0.0	0.0	0.1	0.1	0.1	0.0	0.0
2020	0.2	0.0	0.6	1.4	1.1	0.1	0.3

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

Table 25R-11.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum ^{ai} (desert madwort)	Arabis (rockcross)	Astragalus lentiginosus (freckled milkvetch)	Cirsium (thistle)	Descurainia pinnata ^a (western tansymustard)	Eriogonum cernuum ^a (nodding buckwheat)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola ^{ai} (prickly lettuce)	Lappula occidentalis ^{ai} (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Medicago sativa ⁱ (alfalfa)	Melilotus officinalis ⁱ (sweetclover)	Nicotiana attenuata ^a (coyote tobacco)	Salsola tragus ^{ai} (prickly Russian thistle)	Sisymbrium altissimum ^{ai} (tall tumblemustard)	Solanum triflorum ^a (cutleaf nightshade)
year	Nested Frequency																
2013	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2016	-	-	5	7	8	3	8	1	2	2	174	2	1	73	77	6	14
2020	4	-	13	-	1	-	8	-	29	2	6	1	-	1	12	42	-
year	Average Cover (%)																
2013	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2016	-	-	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.0	5.5	0.0	0.0	1.5	3.8	0.3	0.5
2020	0.0	-	0.2	-	0.0	-	0.0	-	0.3	0.0	0.0	0.0	-	0.0	0.1	1.4	-

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

Table 25R-11.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis ^p (Wyoming big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma ⁱ (Utah juniper)	Pinus edulis ^t (twoneedle pinyon)	Sambucus racemosa ^p (red elderberry)
year	Line Intercept Cover (%)				
2013	2.4	-	4.7	37	-
2016	3	-	-	0	0
2020	8.2	-	0.2	0.2	0.3
year	Quadrat Cover (%)				
2013	1.1	-	0.5	5.7	-
2016	4.7	-	0.1	0.0	0.0
2020	6.5	0.0	0.1	0.0	0.0

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

Table 25R-11.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. wyomingensis^p -- (Wyoming big sagebrush)									
2013	1140	500	5	30	65	49	28	61	49/58
2016	1180	200	20	75	5	2	3	0	48/71
2020	4480	1940	69	31	0	1	0	1	54/77
Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	14/12
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	27/10
2020	140	140	71	29	0	29	14	0	58/62
Gutierrezia sarothrae -- (broom snakeweed)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	20	-	100	0	0	0	0	0	20/24
Juniperus osteospermaⁱ -- (Utah juniper)									
2013	100	20	20	80	0	0	0	20	-/-
2016	-	120	0	0	0	0	0	0	-/-
2020	280	-	93	7	0	0	0	0	-/-
Opuntia -- (pricklypear)									
2013	-	-	-	-	-	-	-	-	-/-
2016	80	-	25	75	0	0	0	0	12/29
2020	40	-	0	100	0	0	0	0	9/23
Pinus edulis^t -- (twoneedle pinyon)									
2013	300	100	47	53	0	0	0	0	-/-
2016	80	60	100	0	0	0	0	0	-/-
2020	100	-	100	0	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Sambucus racemosa ^p -- (red elderberry)									
2013	-	-	-	-	-	-	-	-	-/-
2016	20	-	0	100	0	0	0	0	56/80
2020	20	-	0	100	0	0	100	0	106/107

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

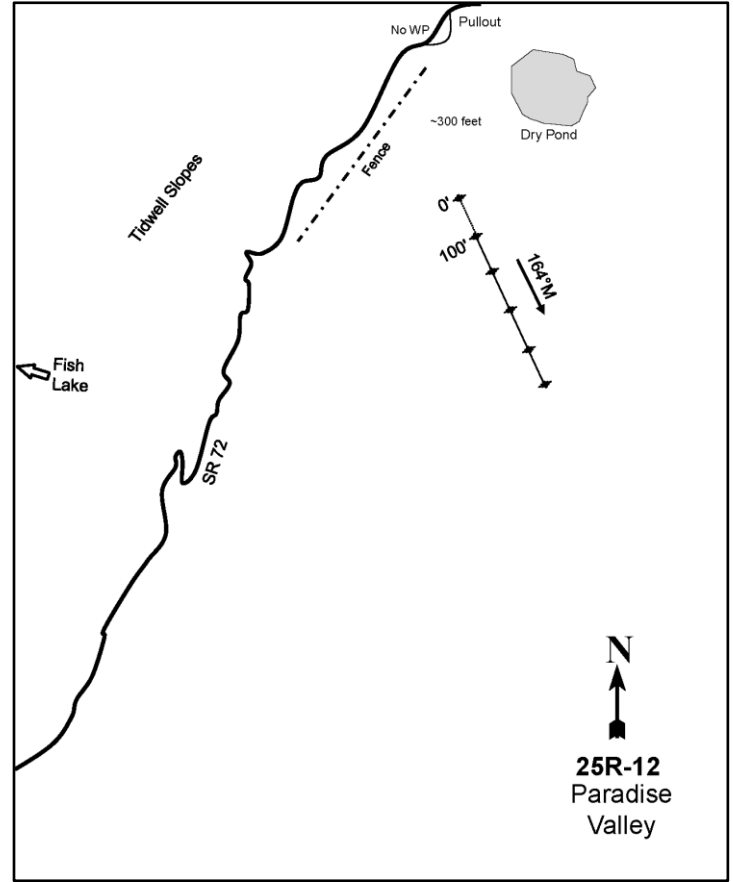
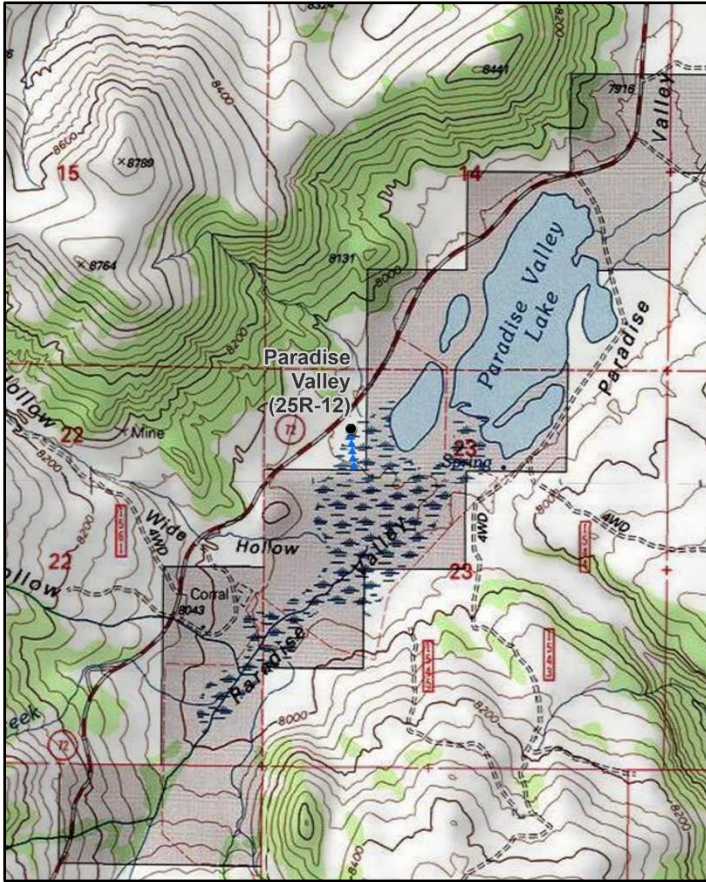
Table 25R-11.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2013	56	5	-	5	32	58	17.4
2016	142	100	-	-	-	-	1.0
2020	52	33	58	-	8	-	1.8
Pinus edulis (twoneedle pinyon)							
2013	358	20	15	10	15	40	11.1
2016	37	50	50	-	-	-	2.1
2020	45	38	63	-	-	-	3.4

Table 25R-11.15 – Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	3	0	0	0	0	0	0	3	Very Poor
2016	3.8	0	0	0.8	0	10	0	14.6	Very Poor
2020	10.7	14.9	15	7.6	0	0.6	0	48.7	Poor-Fair

PARADISE VALLEY - STUDY NO. 25R-12



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

Johns Peak SW; Township 25S, Range 4E, Section 23
NAD 83 UTM ZONE 12, 461092 East 4275472 North

Transect Information

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

Not Available
164° magnetic
500ft
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Standard

Directions to Site

Go east from Salina on I-70 for approximately 37.5 miles to the rest area. From the exit, go 2.4 miles east on the frontage road to the junction with State Route (SR) 72. Travel south on SR-72 for approximately 12.8 miles to a pullout on the east side of the highway. The study site is approximately 300 feet east of the highway.

Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Last Chance Allotment
Elevation	7,927ft (2,416m)
Aspect	Northeast
Slope	3%
Sample Dates	08/31/2016, 08/04/2020

Table 25R-12.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Herbicide - Tordon 22K	Paradise Valley Restoration Project	3794	October-December 2017	112
Mechanical - Mower	Paradise Valley Restoration Project	3794	October-December 2017	112

Wildlife Habitat and Vegetation History**Table 25R-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 25R-12.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2016	Rubber Rabbitbrush	No Encroachment
2020	Perennial Grass	No Encroachment

Site Notes

The herbaceous understory was observed to have been heavily grazed in 2016.

Site Potential

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Semiwet (Fresh Meadow)
NRCS Ecological Site #	R047XB004UT
States and Transitions	No state and transition model is available for this ecological site.

When established in 2016, this study site was dominated by rubber rabbitbrush (*Ericameria nauseosa*) with no other browse species present (Table 25R-12.12, Table 25R-12.13). The understory was plentiful, but not diverse; a majority of the cover was contributed by the perennial grass Kentucky bluegrass (*Poa pratensis*), sedges (*Carex sp.*), and rushes (*Juncus sp.*) (Table 25R-12.7, Table 25R-12.10). Following the mower and herbicide treatment (Table 25R-12.1), cover and density of rubber rabbitbrush decreased substantially. Despite the removal of rabbitbrush, however, more desirable browse and herbaceous species have remained depreciated as of 2020 (Table 25R-12.10, Table 25R-11.12, Table 25R-12.13).

Trend Summary Tables**Table 25R-12.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2016	-	39.3	-	-	63.0	-
2020	-	5.5	-	-	7.8	-

Table 25R-12.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2016	-	395	27	200	-	26.5	0.2	2.2
2020	-	309	-	1	-	17.2	-	0.0

Table 25R-12.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2016	10.5	0.1	41.6	-	0.0	67.0
2020	15.5	0.0	70.8	-	0.0	23.3

Table 25R-12.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2016	12	-	-	2	60
2020	13	1	1	1	25
Year	Days Use Per Acre (ha)				
2016	26.2 (64.6)	-	-	-	-
2020	28.3 (69.9)	-	0.7 (1.7)	-	-

Table 25R-12.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES								
Carex (sedge)								
Distichlis spicata (saltgrass)								
Elymus elymoides (squirreltail)								
Hesperostipa comata (needle and thread)								
Juncus arcticus (arctic rush)								
Koeleria macrantha (prairie Junegrass)								
Pascopyrum smithii (western wheatgrass)								
Poa pratensis ⁱ (Kentucky bluegrass)								
year	Nested Frequency							
2016	277	9	9	-	189	3	4	207
2020	196	94	5	1	143	3	10	155
year	Average Cover (%)							
2016	13.8	0.0	0.2	-	4.5	0.0	0.0	8.0
2020	6.8	1.2	0.2	0.0	3.4	0.0	0.1	5.5

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

Table 25R-12.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES								
Achillea millefolium (Common yarrow)								
Chenopodium fremontii ^a (Fremont's goosefoot)								
Comandra umbellata (bastard toadflax)								
Crepis acuminata (tapertip hawkbeard)								
Descurainia pinnata ^a (western tansymustard)								
Equisetum laevigatum (smooth horsetail)								
Symphyotrichum ascendens (western aster)								
Taraxacum officinale (common dandelion)								
year	Nested Frequency							
2016	3	5	3	19	23	-	70	136
2020	-	-	-	-	-	1	-	-
year	Average Cover (%)							
2016	0.0	0.1	0.0	0.1	0.1	-	0.9	1.2
2020	-	-	-	-	-	0.0	-	-

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

Table 25R-12.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Ericameria nauseosa (rubber rabbitbrush)	
	year	Line Intercept Cover (%)
	2016	63
	2020	7.8
	year	Quadrat Cover (%)
	2016	39.3
	2020	5.5

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

Table 25R-12.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

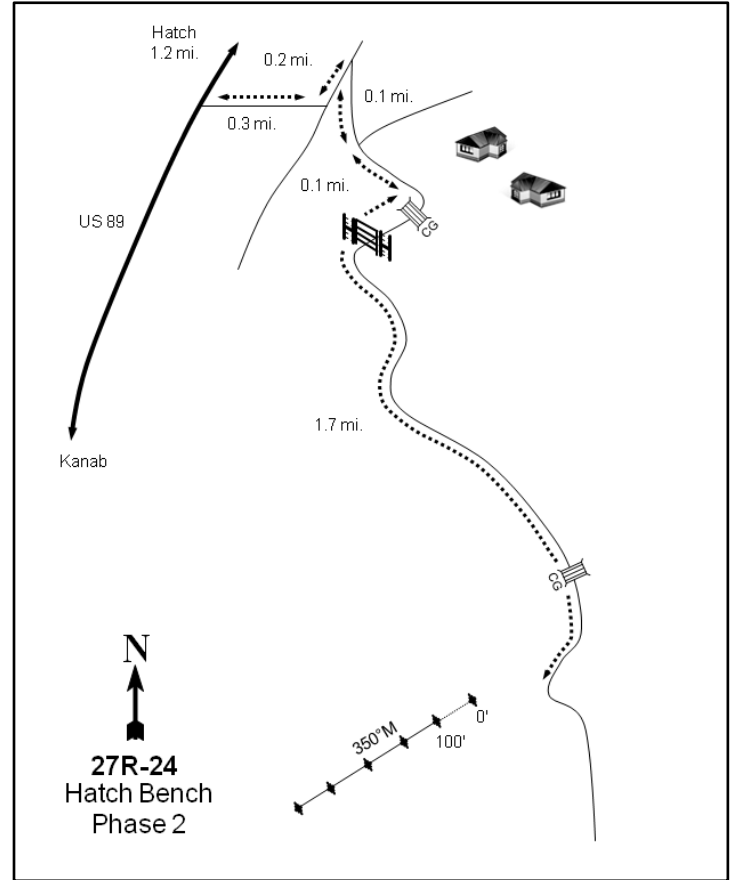
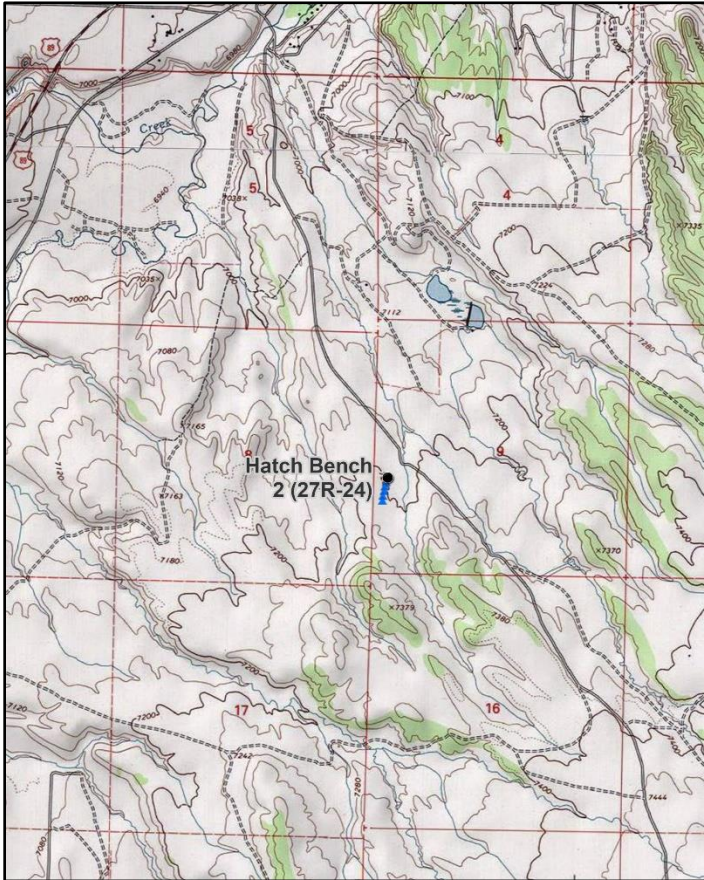
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Ericameria nauseosa -- (rubber rabbitbrush)									
2016	6680	60	6	90	4	0	1	3	102/115
2020	1160	-	3	74	22	0	0	33	60/74

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

Table 25R-12.15 – Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2016	0.0	0.0	0.0	30.0	0.0	4.3	0.0	34.3	Very Poor-Poor
2020	0.0	0.0	0.0	30.0	0.0	0.0	0.0	30.0	Very Poor

HATCH BENCH 2 - STUDY NO. 27R-24



Location Information

USGS 7.5 min Map Info
GPS (0' Stake)

George Mountain NE; Township 37S, Range 5W, Section 09
NAD 83 UTM ZONE 12, 373680 East 4163111 North

Transect Information

Browse Tag # (0' Stake)	Not Available
Transect Bearing	190° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From the town of Hatch, drive south for 1.2 miles on US 89. Turn left (east) and drive for 0.3 miles at which point there will be a "T" in the road. Take the road to the left and proceed for 0.2 miles, where there will be a road that cuts back to the right. Take this road and drive for 0.1 miles to where the road forks. Stay right and continue for another 0.1 miles, arriving at a cattle guard. Cross the cattle guard, pass through the gate, and drive for 1.7 miles (there will be another cattle guard toward the end). The study will be on the right side of the road and to the southwest.

Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	7,181ft (2,189m)
Aspect	Northeast
Slope	6%
Sample Dates	07/31/2013, 08/23/2016, 08/12/2020

Table 27R-24.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Hatch Bench Vegetation Enhancement Phase II	2690	Fall 2014	2989

Wildlife Habitat and Vegetation History**Table 27R-24.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 27R-24.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Pinyon-Juniper/Black Sagebrush	Phase II
2016	Black Sagebrush	Phase I
2020	Black Sagebrush	Phase I

Site Notes

There is a fence that runs along the 100-foot side of the belts parallel to the lines.

Site Potential

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB309UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2013, the vegetation on this site was a mixed stand of two-needle pinyon (*Pinus edulis*), Rocky Mountain juniper (*Juniperus scopulorum*), and black sagebrush (*Artemisia nova*). Tree cover was reduced by a lop and scatter treatment in 2014 (Table 27R-24.1), and the main browse species in 2016 and 2020 was black sagebrush (Table 27R-24.12). Although the herbaceous understory remains diverse with cover increasing slightly in 2020, much of the understory cover is contributed by the perennial grass species Indian ricegrass (*Achnatherum hymenoides*) and squirreltail (*Elymus elymoides*). Forbs have been diverse, but with the exception of the 2016 sample year, have remained scarce (Table 27R-24.7, Table 27R-24.10, Table 27R-24.11). Both pinyon and juniper were observed in small amounts in 2020 and could infill the site in future (Table 27R-24.12, Table 27R-24.13, Table 27R-24.14).

Trend Summary Tables**Table 27R-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
2013	10.0	0.6	16.1	12.5	1.1	47.6
2016	13.8	3.4	0.8	12.1	5.2	1.7
2020	13.9	0.1	1.9	15.0	0.7	2.9

Table 27R-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
2013	-	69	7	130	-	1.5	0.0	1.0
2016	-	107	10	162	-	3.0	0.3	5.5
2020	-	176	2	94	-	7.0	0.0	1.6

Table 27R-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
2013	14.9	8.3	46.5	16.7	2.4	30.5
2016	15.7	2.6	55.9	7.4	0.1	24.3
2020	14.6	0.8	63.8	6.3	1.2	25.1

Table 27R-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/Pronghorn	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2013	-	1	-	-	3
2016	-	2	-	-	3
2020	1	7	2	-	16
Days Use Per Acre (ha)					
2013	0.7 (1.8)	1.3 (3.3)	-	-	-
2016	0.7 (1.8)	6.7 (16.6)	0.7 (1.7)	-	-
2020	1.5 (3.6)	9.4 (23.2)	5.3 (13.2)	17.4 (43.0)*	-

*Pellets per acre (ha)

Table 27R-24.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Piptatheropsis micrantha (littelseed ricegrass)	Poa fendleriana (muttongrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency								
2013	16	17	14	1	0	8	-	19	-
2016	17	26	40	16	8	-	3	1	5
2020	42	12	88	31	0	9	10	-	-
year	Average Cover (%)								
2013	0.2	0.6	0.3	0.1	0.0	0.1	-	0.2	-
2016	0.9	0.3	0.8	0.4	0.2	-	0.2	0.0	0.1
2020	1.8	0.6	2.8	1.0	0.0	0.4	0.5	-	-

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

Table 27R-24.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus humistratus (groundcover milkvetch)	Calochortus nuttallii (sego lily)	Calylophus lavandulifolius (lavenderleaf sundrops)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericooides (rose heath)	Chamaesyce (sandmat)	Comandra umbellata (bastard toadflax)	Cordylanthus kingii ^a (King's bird's-beak)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron (fleabane)	Eriogonum (buckwheat)
year	Nested Frequency																
2013	5	2	-	1	-	-	-	-	-	71	1	-	-	7	7	2	2
2016	1	-	1	1	10	-	6	6	-	71	-	-	-	8	10	4	-
2020	-	-	-	-	-	2	-	5	9	40	-	2	4	-	-	-	-
year	Average Cover (%)																
2013	0.0	0.0	-	0.0	-	-	-	-	-	0.4	0.0	-	-	0.0	0.0	0.0	0.0
2016	0.0	-	0.0	0.0	0.1	-	0.1	0.2	-	1.5	-	-	-	0.5	0.3	0.1	-
2020	-	-	-	-	-	0.0	-	0.0	0.2	0.5	-	0.0	0.0	-	-	-	-

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

FORB SPECIES	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Euphorbia (spurge)	Hedeoma drummondii (Drummond's false pennyroyal)	Hymenoxys richardsonii (pingue rubberweed)	Lesquerella wardii (Ward's bladderpod)	Linum kingii (King's flax)	Lithospermum incisum (narrowleaf stone seed)	Lotus utahensis (Utah bird's-foot trefoil)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon strictus (Rocky Mountain penstemon)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Senecio spartioides (broom-like ragwort)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
2013	-	7	-	-	-	6	38	-	-	7	19	1	-	2	-	-	-
2016	9	0	3	-	2	-	44	2	1	6	26	-	1	-	8	10	2
2020	8	3	1	2	1	1	34	-	1	9	2	-	-	5	8	-	-
year	Average Cover (%)																
2013	-	0.0	-	-	-	0.0	0.4	-	-	0.0	0.1	0.0	-	0.0	-	-	-
2016	0.2	0.0	0.0	-	0.2	-	0.4	0.2	0.0	0.5	0.5	-	0.0	-	0.2	1.0	0.0
2020	0.0	0.0	0.1	0.0	0.0	0.0	0.2	-	0.0	0.0	0.0	-	-	0.0	0.2	-	-

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

FORB SPECIES	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency
2013	-
2016	0
2020	-
year	Average Cover (%)
2013	-
2016	0.0
2020	-

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

Table 27R-24.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Chrysothamnus depressus ^p (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus scopulorum ^t (Rocky Mountain juniper)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis ^t (twoneedle pinyon)	Purshia tridentata ^p (antelope bitterbrush)
year	Line Intercept Cover (%)									
2013	12.5	-	0.1	0.5	0.5	25.6	-	-	22	-
2016	12.1	-	0.4	0.1	4.7	1.6	-	-	0.1	-
2020	14.1	0.3	-	0.6	0.1	2.9	0	-	-	0.6
year	Quadrat Cover (%)									
2013	10.0	-	0.0	0.0	0.6	8.9	-	-	7.2	-
2016	13.8	-	0.3	0.1	2.9	0.8	0.0	-	0.0	-
2020	13.3	0.3	-	0.0	0.1	1.7	0.0	0.0	0.2	0.3

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

Table 27R-24.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia frigida^p -- (prairie sagewort)									
2013	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	23/41
Artemisia nova^p -- (black sagebrush)									
2013	2180	20	2	61	38	30	23	51	35/71
2016	2400	-	1	90	9	18	0	6	36/67
2020	2760	80	9	65	26	30	0	28	50/81
Chrysothamnus depressus^p -- (longflower rabbitbrush)									
2013	-	-	-	-	-	-	-	-	-/-
2016	40	-	0	100	0	0	0	0	19/30
2020	200	-	10	80	10	10	0	10	17/34
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2013	260	-	0	100	0	0	0	0	14/24
2016	200	-	0	100	0	0	0	0	27/43
2020	-	-	-	-	-	-	-	-	47/51
Eriogonum microthecum^p -- (slender buckwheat)									
2013	40	-	0	100	0	0	0	50	7/6
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2013	20	-	0	100	0	0	0	100	-/-
2016	40	-	0	100	0	0	0	0	65/72
2020	40	-	0	50	50	0	0	50	95/120
Gutierrezia sarothrae -- (broom snakeweed)									
2013	1200	220	20	80	0	0	0	0	18/18
2016	2260	-	4	96	0	0	0	1	31/42
2020	420	-	5	57	38	0	0	43	18/18

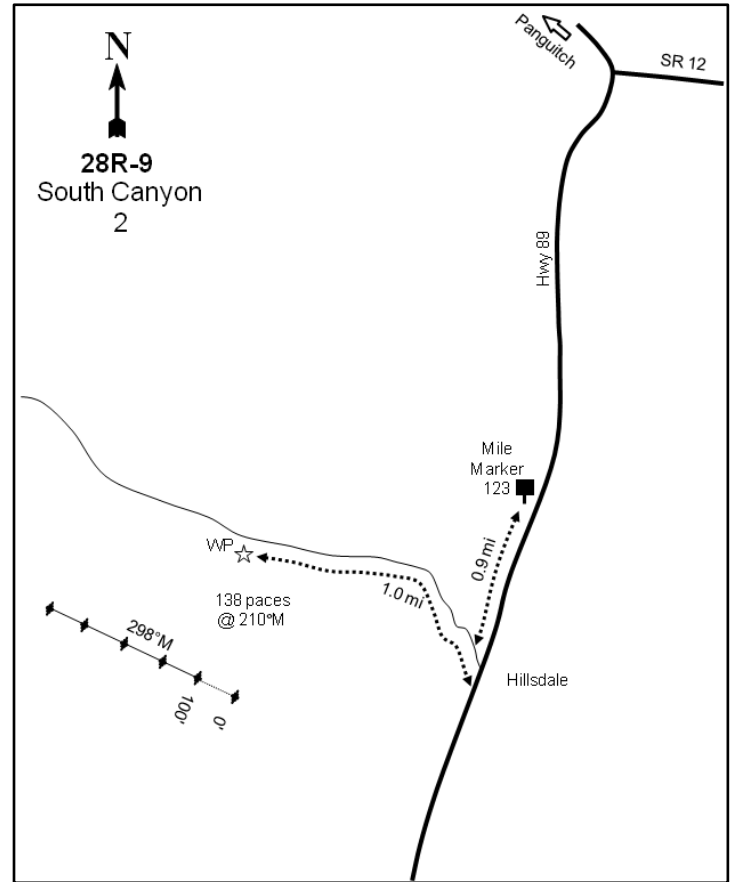
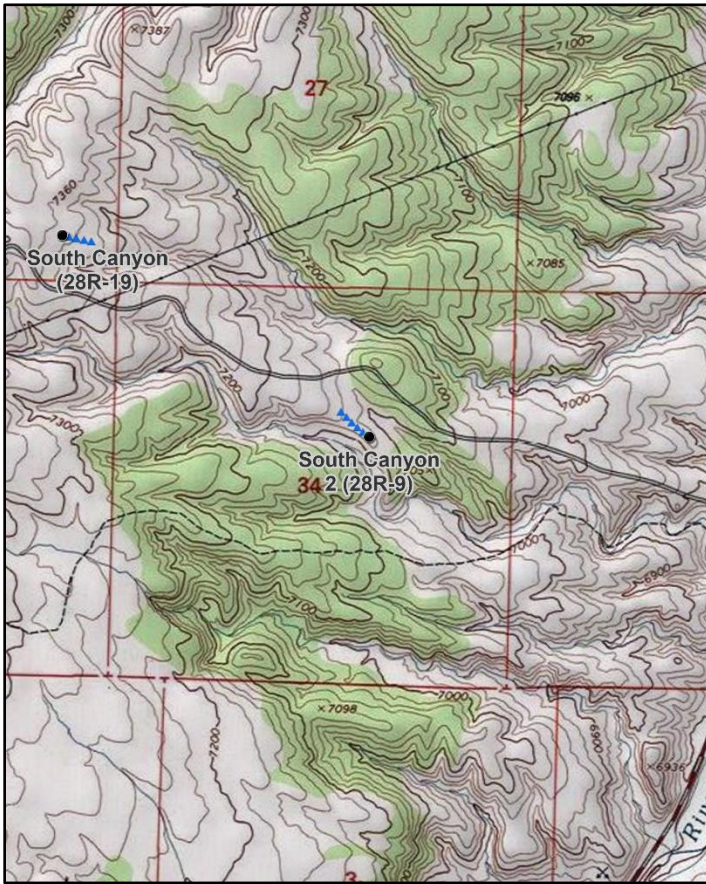
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Juniperus scopulorum^t -- (Rocky Mountain juniper)									
2013	200	40	50	50	0	0	0	0	- / -
2016	120	40	67	33	0	0	0	0	- / -
2020	280	-	64	36	0	0	0	0	- / -
Linanthus pungens -- (granite prickly phlox)									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	- / -
2020	-	-	-	-	-	-	-	-	23/38
Opuntia -- (pricklypear)									
2013	20	-	0	100	0	0	0	100	7/38
2016	60	-	0	100	0	0	0	0	9/43
2020	40	-	0	100	0	0	0	100	8/24
Pediocactus simpsonii -- (mountain ball cactus)									
2013	20	-	0	100	0	0	0	0	3/4
2016	20	-	0	100	0	0	0	0	2/7
2020	60	-	67	33	0	0	0	0	5/5
Pinus edulis^t -- (twoneedle pinyon)									
2013	200	40	40	60	0	10	0	0	- / -
2016	20	40	100	0	0	0	0	0	- / -
2020	100	-	100	0	0	0	0	0	- / -
Purshia tridentata^p -- (antelope bitterbrush)									
2013	-	-	-	-	-	-	-	-	25/92
2016	-	-	-	-	-	-	-	-	45/143
2020	20	-	0	100	0	0	100	0	70/230

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

Table 27R-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 scopulorum (Rocky Mountain juniper)							
2013	106	37	21	11	21	11	8.7
2016	123	18	76	6	-	-	2.5
2020	11	-	50	50	-	-	8.0
Pinus edulis (twoneedle pinyon)							
2013	237	25	15	5	15	40	16.4
2016	51	53	40	7	-	-	2.4
2020	23	50	50	-	-	-	2.8

SOUTH CANYON 2 - STUDY NO. 28R-9

**Location Information**

USGS 7.5 min Map Info
GPS (0' Stake)

Hatch NE; Township 35S, Range 5W, Section 34
NAD 83 UTM ZONE 12, 376288 East 4176250 North

Transect Information

Browse Tag # (0' Stake)	70
Transect Bearing	298° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	No Rebar

Directions to Site

From Panguitch, drive west on US-89 to mile marker 123. Continue 0.9 miles to a dirt road on the left (west) with a cattle guard. Turn left and drive 1 mile to the witness post on the left (south) side of the road. From the witness post, walk 138 paces at 210 degrees magnetic to the 0-foot stake which is marked with browse tag #70; the site is across a drainage and on top of a ridge located south of the road.

Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SOUTH CANYON
Elevation	7,143ft (2,177m)
Aspect	Northeast
Slope	3%
Sample Dates	07/07/2005, 08/13/2012, 08/23/2016, 08/12/2020

Table 28R-09.1 Disturbance History. Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Canyon (Hillsdale)	2311	October 2012-February 2013	2279
Seeding - Aerial Before	South Canyon (Hillsdale)	2311	September 2012	2279

Table 28R-09.2 Seed Mix. List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Canyon - Hillsdale			Aerial	Sep 2012	2000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.35	0.33
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.55	1.47
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.10	0.09
G	Agropyron cristatum	Crested Wheatgrass	Nordan	0.50	0.44
G	Agropyron cristatum	Crested Wheatgrass	CDII	1.00	0.95
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.50	1.38
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.50	0.37
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.75
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	1.50	1.22
F	Linum perenne	Blue Flax	Appar	1.00	0.89
F	Medicago sativa	Alfalfa	Nomad	0.50	0.45
F	Medicago sativa	Alfalfa	Ladak DL	0.50	0.46
F	Onobrychis viciifolia	Sainfoin	Eski	0.56	0.49
F	Onobrychis viciifolia	Sainfoin	Eski	0.45	0.35
F	Penstemon palmeri	Palmer Penstemon	Lincoln NV	0.05	0.05
F	Penstemon palmeri	Palmer Penstemon	Iron UT	0.00	0.00
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.23	0.18
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.89

Wildlife Habitat and Vegetation History**Table 28R-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

Table 28R-09.4 - Vegetation History. The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Pinyon	Phase III
2012	Pinyon	Phase III
2016	Perennial Grass	Phase I
2020	Perennial Grass	Phase I

Site Notes

This study is located approximately one mile west of Hillsdale within a treated twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland.

Soils**Table 28R-09.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.5	45.1	33.1	21.8	2.4	15.2	150.4	0.5	07/07/2005

Site Potential

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Gravelly Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB306UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 2005, the plant community was dominated by two-needle pinyon (*Pinus edulis*) and was considered to be in Phase III of woodland succession (Table 28R-09.4, Table 28R-09.12); shrubs were rare (Table 28R-09.6). After a bullhog and seeding treatment in the fall of 2012 (Table 28R-09.1), pinyon decreased and became a minor vegetation component (Table 28R-09.14). Shrubs have remained scarce in the post-treatment sample period, with black sagebrush (*Artemisia nova*) as the dominant species (Table 28R-09.12). The herbaceous understory was sparse prior to the bullhog and seeding treatment. Following treatment, however, the perennial grass species blue grama (*Bouteloua gracilis*) and squirreltail (*Elymus elymoides*) became the dominant vegetation component (Table 28R-09.7, Table 28R-09.10). Shrubs will likely increase as treatment matures.

Trend Summary Tables**Table 28R-09.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	3.3	0.2	27.7	2.5	-	49.0
2012	2.6	0.2	25.5	2.2	-	42.0
2016	3.4	1.0	-	3.1	0.3	-
2020	3.0	0.0	-	3.6	0.1	-

Table 28R-09.7 - Herbaceous Summary. Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	-	147	66	12	-	2.7	0.3	0.1
2012	-	136	11	44	-	3.4	0.0	0.2
2016	-	351	30	143	-	22.1	0.2	1.7
2020	-	369	43	38	-	22.4	0.5	0.5

Table 28R-09.8 - Basic Ground Cover. Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	15.1	1.6	54.5	17.0	9.0	35.2
2012	14.1	3.6	53.1	22.0	5.7	33.3
2016	10.7	0.0	57.4	6.0	4.9	27.5
2020	5.1	0.0	60.8	11.1	6.9	30.1

Table 28R-09.9 - Pellet Group Data. Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2005	1	2	-	36
2012	-	-	-	4
2016	-	7	-	43
2020	9	11	-	63
Days Use Per Acre (ha)				
2005	1.5 (3.6)	3.4 (8.3)	0.7 (1.7)	-
2012	0.7 (1.8)	2.7 (6.6)	0.7 (1.7)	-
2016	13.1 (32.3)	3.4 (8.3)	0.7 (1.7)	-
2020	12.3 (30.5)	14.1 (34.8)	-	-

Table 28R-09.10 - Grass Species. Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum ⁱ (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea ⁱ (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium ⁱ (intermediate wheatgrass)
year	Nested Frequency										
2005	20	-	-	104	3	32	1	3	-	-	-
2012	3	-	-	122	-	21	-	-	-	-	-
2016	13	43	-	163	2	203	8	13	14	-	56
2020	4	26	2	157	9	220	17	2	24	0	123
year	Average Cover (%)										
2005	0.2	-	-	2.2	0.0	0.2	0.0	0.0	-	-	-
2012	0.0	-	-	3.2	-	0.2	-	-	-	-	-
2016	0.8	1.7	-	8.9	0.0	8.9	0.2	0.1	0.1	-	1.3
2020	0.5	1.4	0.0	5.5	0.0	8.7	0.5	0.0	1.1	0.0	4.5

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

Table 28R-09.11 - Forb Species. Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Arabis holboellii ^a (Holboell's rockcress)	Astragalus (milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Chamaesyce albomarginata (whitemargin sandmat)	Chenopodium leptophyllum ^a (narrowleaf goosefoot)	Cryptantha (cryptantha)	Cryptantha ^a (annual cryptantha)	Descurainia pinnata ^a (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum ^a (pinyon groundsmoke)	Lappula occidentalis ^a (flatspine stickseed)	Linum perenne ⁱ (blue flax)	Lithospermum incisum (narrowleaf stoneseed)	Lotus utahensis (Utah bird's-foot trefoil)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2005	-	2	-	-	-	-	1	9	-	7	-	61	-	-	-	1	2
2012	-	5	3	-	-	37	-	3	-	6	-	-	-	-	-	-	3
2016	8	-	1	4	-	24	-	6	5	11	1	-	14	114	1	0	-
2020	3	2	-	1	3	-	-	8	38	-	-	6	-	4	2	14	1
year	Average Cover (%)																
2005	-	0.0	-	-	-	-	0.0	0.1	-	0.0	-	0.3	-	-	-	0.0	0.0
2012	-	0.0	0.0	-	-	0.1	-	0.1	-	0.0	-	-	-	-	-	-	0.0
2016	0.2	-	0.0	0.0	-	0.0	-	0.2	0.1	0.1	0.0	-	0.1	1.1	0.0	0.0	-
2020	0.0	0.0	-	0.0	0.0	-	-	0.1	0.5	-	-	0.0	-	0.0	0.2	0.2	0.0

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

FORB SPECIES	Pleiocanthus spinosus (thorn skeletonweed)	Sanguisorba minor ⁱ (small burnet)	Sphaeralcea grossulariifolia (gooseberry/leaf globemallow)	Trifolium gymnocarpon (hollyleaf clover)
year	Nested Frequency			
2005	-	-	-	-
2012	-	-	-	2
2016	-	1	2	-
2020	0	-	4	-
year	Average Cover (%)			
2005	-	-	-	-
2012	-	-	-	0.0
2016	-	0.0	0.0	-
2020	0.0	-	0.0	-

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

Table 28R-09.12 - Shrub and Tree Species. Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova ^p (black sagebrush)	Chrysothamnus viscidiflorus sp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis ^t (twoneedle pinyon)
year	Line Intercept Cover (%)						
2005	2.5	-	-	-	-	-	49
2012	2.2	-	-	-	-	-	42
2016	3.1	-	-	0.3	-	-	-
2020	3.6	-	0.1	-	-	-	-
year	Quadrat Cover (%)						
2005	3.3	-	-	0.0	0.2	-	27.7
2012	2.6	0.1	-	0.0	-	0.0	25.5
2016	3.4	-	-	1.0	-	-	-
2020	3.0	-	0.0	0.0	-	-	-

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

Table 28R-09.13 - Shrub/Tree Characteristics. Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia nova^P -- (black sagebrush)									
2005	1940	40	4	54	42	2	0	29	34/52
2012	1860	120	17	65	18	14	0	34	28/44
2016	1340	-	21	79	0	12	5	5	25/50
2020	1220	80	15	74	12	13	0	12	31/54
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)									
2005	-	-	-	-	-	-	-	-	-/-
2012	60	-	0	100	0	0	0	0	26/25
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Ericameria nauseosa -- (rubber rabbitbrush)									
2005	-	-	-	-	-	-	-	-	44/53
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	59/107
2020	20	-	100	0	0	0	0	0	78/111
Gutierrezia sarothrae -- (broom snakeweed)									
2005	60	60	67	33	0	0	0	0	27/23
2012	60	-	33	67	0	0	0	0	30/16
2016	620	-	10	90	0	0	0	0	30/41
2020	360	-	11	28	61	50	0	61	13/9
Juniperus scopulorum^t -- (Rocky Mountain juniper)									
2005	-	20	0	0	0	0	0	0	-/-
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Krascheninnikovia lanata^P -- (winterfat)									
2005	-	-	-	-	-	-	-	-	18/25
2012	-	-	-	-	-	-	-	-	-/-
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Opuntia -- (pricklypear)									
2005	80	-	0	100	0	25	0	0	15/32
2012	40	-	0	100	0	0	0	0	14/28
2016	20	-	0	100	0	0	0	0	13/34
2020	40	-	50	50	0	0	0	50	8/14
Pediocactus simpsonii -- (mountain ball cactus)									
2005	20	-	0	100	0	0	0	0	3/5
2012	40	-	0	100	0	0	0	0	5/7
2016	-	-	-	-	-	-	-	-	-/-
2020	-	-	-	-	-	-	-	-	-/-
Pinus edulis^t -- (twoneedle pinyon)									
2005	960	40	21	77	2	0	2	0	-/-
2012	580	40	31	69	0	0	0	0	-/-
2016	-	20	0	0	0	0	0	0	-/-
2020	-	-	-	-	-	-	-	-	-/-
Purshia tridentata^P -- (antelope bitterbrush)									
2005	-	-	-	-	-	-	-	-	130/274
2012	-	-	-	-	-	-	-	-	139/193

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

Table 28R-09.14 - Tree Characteristics. Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2012	8	33	-	33	33	-	7.0
2020	12	-	100	-	-	-	2.0
Pinus edulis (twoneedle pinyon)							
2012	315	-	10	20	35	35	14.9
2016	6	25	75	-	-	-	3.0
2020	2	33	67	-	-	-	3.0

Table 28R-09.15 – Deer Desirable Components Index: Mid Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2005	3.1	0	0	5.3	0	0.2	0	8.6	Very Poor
2012	2.8	0	0	6.7	0	0.4	0	9.9	Very Poor
2016	3.9	0	0	30	0	3.4	0	37.3	Poor
2020	4.5	0	0	30	0	1.1	0	35.6	Very Poor-Poor

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APPENDIX A - VEGETATION TYPE

VEGETATION COMMUNITY TYPE CLASSIFICATION--

Vegetation Type Code	Vegetation Community Type Name*	Description
ANN GRASS	Annual Grass	Annual grasses provide the dominant vegetation cover.
PER GRASS	Perennial Grass	Perennial grasses provide the dominant vegetation cover.
ANN-PER GRASS	Annual-Perennial Grass	Mixture of Annual and Perennial grass species provide the dominant vegetation cover.
ANN GRASS-FORB	Annual Grass-Forb	Mixture of Annual grass and forb species provide the dominant vegetation cover.
PER GRASS-FORB	Perennial Grass-Forb	Mixture of Perennial grass and forb species provide the dominant vegetation cover.
ANN FORB	Annual Forb	Annual forbs provide the dominant vegetation cover
PER FORB	Perennial Forb	Perennial forbs provide the dominant vegetation cover
ANN-PER FORB	Annual-Perennial Forb	Mixture of Annual and Perennial forb species provide the dominant vegetation cover.
WEED	Annual-Perennial Weed	Annual and/or Perennial weedy species provide the dominant vegetation cover.
WET MEADOW	Wet Meadow	Riparian vegetation species provide the dominant vegetation cover
DRY MEADOW	Dry Meadow	High elevation subalpine meadow
RIPAR	Riparian	Riparian vegetation species provide the dominant vegetation cover.
ALP GRASS	Alpine Grass	Grass or grass-like species provide the dominant vegetation cover
ALP FORB	Alpine Forb	Forb species provide the dominant vegetation cover
ALP SHRUB	Alpine Shrub	Alpine shrub species provide the dominant vegetation cover
ALP MIX	Alpine-Mixed	Mixture of grass, forb, or shrub species provide the dominant vegetation cover
ARTRT	Basin Big Sagebrush	Major component of the site (typically >5% cover).
ARTRV	Mountain Big Sagebrush	Major component of the site (typically > 5% cover).
ARTRW	Wyoming Big Sagebrush	Major component of the site (typically >5% cover).
ARAR	Low Sagebrush	Major component of the site (typically >5% cover).
ARCA	Silver Sagebrush	Major component of the site (typically >5% cover).
ARNO	Black Sagebrush	Major component of the site (typically >5% cover).
ARSP	Bud Sagebrush	Major component of the site (typically >5% cover).
ARFR	Fringed Sagebrush	Major component of the site (typically >5% cover).
CHNA	Rubber Rabbitbrush	Major component of the site (typically >5% cover).
CHPA	Parry Rabbitbrush	Major component of the site (typically >5% cover).
CHVI	Low Rabbitbrush	Major component of the site (typically >5% cover).
GUSA	Broom Snakeweed	Major component of the site (typically >5% cover).
SAVE	Black Greasewood	Major component of the site (typically >5% cover).
CELA	Winterfat	Major component of the site (typically >5% cover).
ATCO	Shadscale	Major component of the site (typically >5% cover).
ATCA	Fourwing Saltbush	Major component of the site (typically >5% cover).
GRSP	Spiny Hopsage	Major component of the site (typically >5% cover).
MSDS	Mixed Salt Desert Shrub	Mixture of one or more Salt Desert species (ATCO, ATCA, GRSP, etc.) with no one species expressing dominance.
LARRE	Creosote Bush	Major component of the site (typically >5% cover).
CORA	Blackbrush	Major component of the site (typically >5% cover).
PRFA	Desert Almond	Major component of the site (typically >5% cover).
EPHED	Ephedra	Major component of the site (typically >5% cover).
QUGA	Gambel Oak	Major component of the site (typically >5% cover).

Vegetation Type Code	Vegetation Community Type Name*	Description
QUTU	Live Oak	Major component of the site (typically >5% cover).
SYOR	Snowberry	Major component of the site (typically >5% cover).
AMAL	Serviceberry	Major component of the site (typically >5% cover).
PUTR	Bitterbrush	Major component of the site (typically >5% cover).
PUGL	Desert Bitterbrush	Major component of the site (typically >5% cover).
ARCT2	Manzanita	Major component of the site (typically >5% cover).
CEMOM	True Mountain Mahogany	Major component of the site (typically >5% cover).
CELEL	Curlleaf Mountain Mahogany	Major component of the site (typically >5% cover).
COMES	Stansbury Cliffrose	Major component of the site (typically >5% cover).
KOPR	Forage Kochia	Major component of the site (typically >5% cover).
TAMARIX	Tamarix	Major component of the site (typically >5% cover).
MMB	Mixed Mountain Brush	Mixture of one or more Mountain brush species (ARTRV, AMAL, CEMOM, etc.) with no one species expressing dominance.
MB	Mixed Shrub	Mixture of various shrub species with none expressing dominance.
CHAPARRAL	Chaparral	Mixture of fire tolerant shrub species.
JUNIPER	Juniper	Major component of the site (Phase III 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		