

Wildlife Management Units 22, 24, 25A, 25B, 25C, 27, 28, 29 & 30

# Habitat Monitoring

**UTAH BIG GAME RANGE TREND**



## **RANGE TREND PROJECT REPORT**

Publication Number 24-08 | Report for Federal Aid Project W-82-R-68

### **2023 Annual Report**

**Prepared by:**

UTAH DIVISION OF WILDLIFE RESOURCES – GREAT BASIN RESEARCH CENTER





**Utah Big Game Range Trend Studies  
2023  
Wildlife Management Units  
22, 24, 25A, 25B, 25C, 27, 28, 29 & 30**

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Sego lily (*Calochortus nuttallii*) by Jason Cox (2023)

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



## PROGRAM NARRATIVE

State: UTAH

Project Number: W-82-R-68

Grant Name: Utah Wildlife Habitat Research and Monitoring

Project Name: Utah Wildlife Habitat Monitoring

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

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

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

## REMARKS

The work completed during the 2023 field season and reported in this publication involves the reading of interagency range trend studies in the DWR Southern Regions. Most trend studies surveyed in these management units were established in the 1980s and reread at 5-year intervals.

The following Bureau of Land Management and U.S. Forest Service offices provided information and/or assistance in completion of the trend studies, which adds to the value of this interagency report:

### Bureau of Land Management

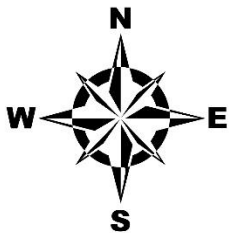
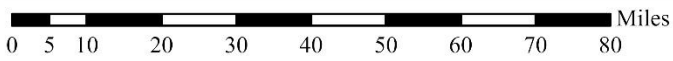
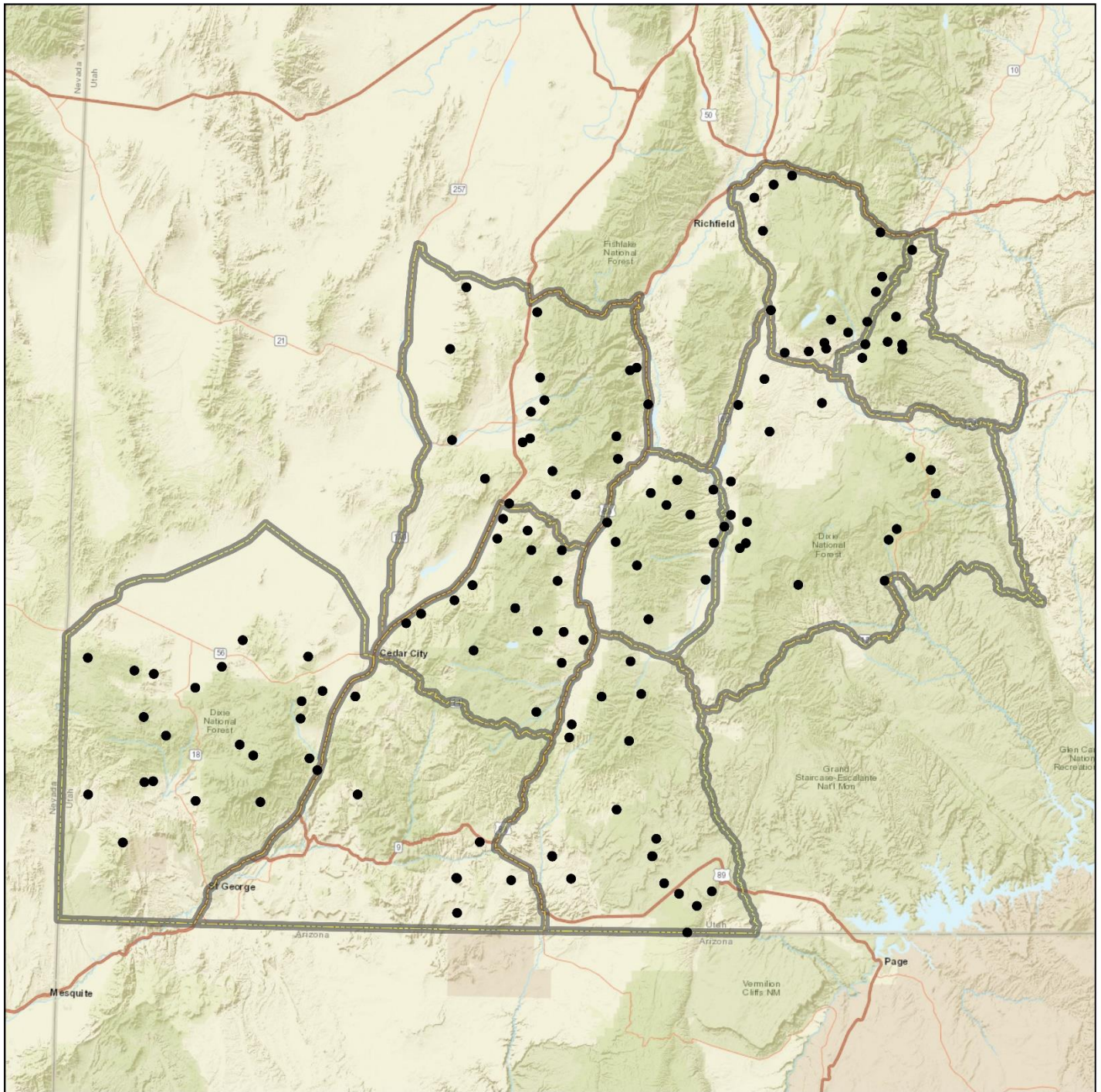
- Cedar City Field Office
- Grand Staircase-Escalante National Monument
- Kanab Field Office
- Fillmore Field Office
- Richfield Field Office
- St. George Field Office

### United States Forest Service

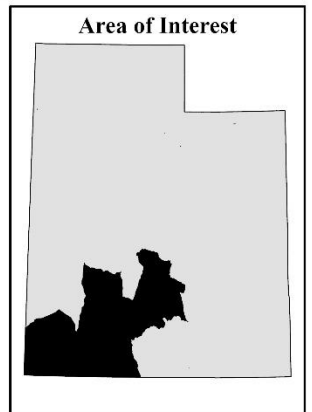
- Dixie National Forest
- Fishlake National Forest

Private landowners were cooperative in allowing access to study sites located on their land.

# RANGE TREND STUDY SITES SURVEYED IN 2023



<b>Study Locations Project, Status</b>	<b>Unit Boundary</b>
● RT, Active	▭ Southern Rotation Unit Boundaries



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

## RANGE TREND STUDY METHODS

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

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

### Vegetation Composition

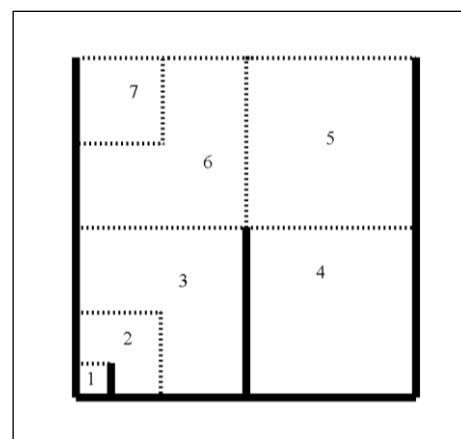
**Study Site Setup:** Study sites are setup to determine vegetation composition. The standard study site setup consists of a 500-foot baseline (five consecutive 100-foot transects) and a 100-foot belt that crosses perpendicular to each transect. Each 100-foot belt is placed at predetermined footmark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

**1/4 m<sup>2</sup> quadrat:** A 1/4 m<sup>2</sup> quadrat is centered every 5 feet along the left side of the belt, starting at the 5-foot mark. Cover and nested frequency values are determined for vegetation, litter, rock, pavement, cryptogams, and bare ground. Cover and nested frequency values are also estimated for all plant species occurring within a quadrat, including annual species. However, prior to 1992 no data was collected for annual species.

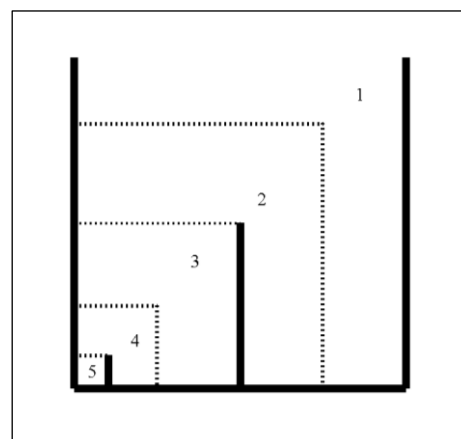
**Quadrat Cover:** Cover is determined using an ocular cover estimation procedure using seven cover classes (Bailey and Poulton 1968, Daubenmire 1959). The seven cover classes are: 1) .01-1%, 2) 1.1-5%, 3) 5.1-25%, 4) 25.1-50%, 5) 50.1-75%, 6) 75.1-95%, and 7) 95.1-100% (Figure 1). For example, to estimate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

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

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



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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

#### Height and Crown

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

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

Animal Occupancy: The pellet group transect utilizes (50) 100ft<sup>2</sup> circular plots that are placed through the study area. These are usually two parallel transects of 25 plots on each side of the vegetation transect which runs 400 feet to 500 feet in length. The number of recent pellet groups for wildlife (usually deer and elk) and pats for cattle are recorded. That number is then converted to days use per acre (hectare) (Neff, 1968). Quadrat frequency of wildlife and livestock droppings is also captured within the 1/4 m<sup>2</sup> quadrat. Rabbit pellet groups are not included in the pellet group transects but are sampled in quadrat frequency.

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

## TREND DETERMINATION

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

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

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

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

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

### *Preferred Browse (60 points)*

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

#### Preferred Browse Cover (30 pts. possible)

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

#### Percent Decadence (15 points possible)

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

#### Percent Young (15 points possible)

- 0.5 points for each 1% of young

### *Herbaceous Understory (40 points)*

#### Perennial Grass Cover (30 points possible)

- 2 points for each 1% cover

#### Perennial Forb Cover (10 points possible)

- 2 points for each 1% cover

#### Annual Grass Cover (-20 points possible)

- -0.75 points for each 1% cover

#### Noxious Weeds (State List)

- -2 points for each species present

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

Very Low potential scale (Desert Ecological Site)

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

Low potential scale (Semidesert Ecological Site)

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

Mid-level potential scale (Upland Ecological Site)

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

High potential scale (Mountain and High Mountain Ecological Site)

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

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

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

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



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

## REPORT FORMAT

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

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

### Report Description

The following tables and partial tables are examples from study sites Morris GIP (01R-14) and Scare Canyon (02-46).

#### Map Page

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

#### Site Information

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

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

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

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

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

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

### *Habitat and Vegetation Information*

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

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

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

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

The following “Vegetation History” table indicates that Wyoming big sagebrush was the dominant vegetation type on the site from 1982 to 2010, but the site transitioned to an annual grass-forb community in 2015. The table also indicates that woodland succession has remained in Phase I over the sample years until 2015 when the Taylor Mountain Fire removed all of the trees on the site. The transition from Wyoming big sagebrush to an annual grass-forb community that occurred between the 2010 and 2015 sample years indicates that a trigger mechanism has occurred and a threshold has been crossed that lead to the change in community composition, and in this case is related to the Taylor Mountain fire that occurred in 2014.

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

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

### *Site Notes*

This section contains miscellaneous information pertinent to the study site.

## Soils

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

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

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

Percent organic matter (% OM) refers to the amount of organic matter in the top 12 inches of the soil profile. Parts per million (ppm) of phosphorus (P) and potassium (K) are also included. Values for phosphorus and potassium less than 6 ppm and 60 ppm, respectively, are considered to have low availability for plant growth and development (Tiedemann and Lopez 2004).

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

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

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

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

## Site Potential

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

**State-and-Transitions:** The state-and-transitions section is prefaced by whether or not there is a defined state-and-transitions model is available for the ecological site. When state-and-transition models are available, the state and community phase is specified for each sample year. States are identified in the diagram by whole numbers. For example, the reference state is referred to by 1, the current potential state by 2, and subsequent states are labeled 3, 4 and etc. While community phases are nested within a state and are identified by rational numbers. For example, community phases in state 1 would be identified by 1.1, 1.2, 1.3 etc. Transitions are labeled alpha-numerically and are preceded by the letter “T”. It is important to note that this section of the report does not stand alone and care must be taken by the reader to reference the provided state-and-transition model in order to understand the driving factors within the community. The paragraph describes the community dynamics and changes that occur over the duration of the study

## Trend Summary Tables

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

with the 1/4m<sup>2</sup> quadrat to estimate percent quadrat cover. To more accurately estimate canopy cover of trees and shrubs, the line-intercept method is used along each 100-foot belt.

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

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

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

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

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

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

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

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

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

The data presented in the “Days Use per Acre” section of the table is reported from the pellet group transect in conjunction with the vegetation transects. Animals that do not have a defined defecation rate are recorded as pellets per acre (ha) and are indicated by (\*). Rabbit pellet groups were recorded in a few of the years close to the year 2000, but have not been sample within the transect since that time; these are also recorded as pellets per acre (ha).

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

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

\*Pellets per acre (ha)

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

**Table 01R-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**Table 02-46.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
<b>Populus tremuloides (quaking aspen)</b>								
2022	1520	29	21	7	43	0	0	2

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

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

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

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



## PRE-1992 DATA

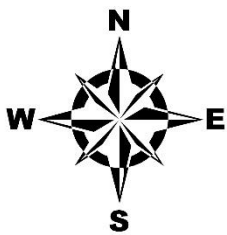
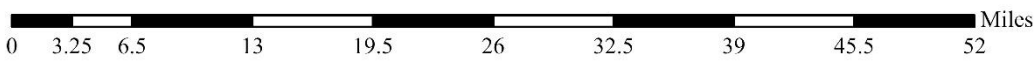
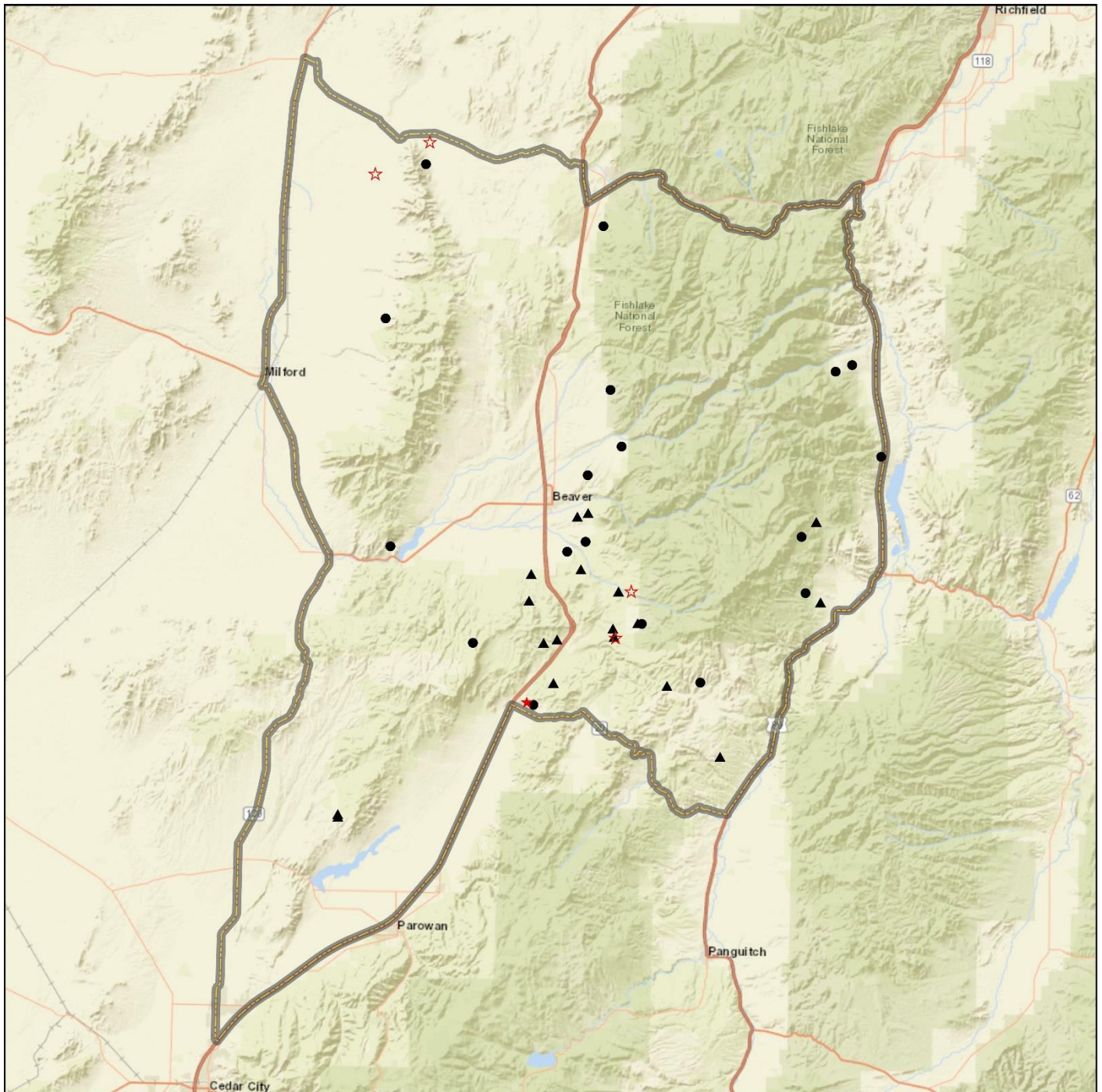
Pre-1992 Data: Data collected before July 19, 1992 has been excluded from the individual site summaries due to differences in sampling techniques and changes in sample size and area. This pre-1992 data can be found in the Utah Big Game Range Trend Studies 1982-1992 report. The following explanations address some of the major changes that occurred with data collection. Nested frequency quadrat divisions and zones were different with four divisions as compared to the five divisions and zones. In addition, nested frequency data for annual species was not collected. Shrub density was collected along a separate transect that was adjacent to the nested frequency transect within three circular plots (radius of 8.3 or 11.7 ft) centered on three permanently marked stakes. Therefore, changes in density (before and after 1992) may not necessarily indicate changes in trend, especially shrub populations that are characteristically clumped and/or have discontinuous distributions. The earlier smaller sample could easily either overestimate or underestimate shrub populations. Other characteristics like percent decadence, percent poor vigor, percent heavy hedging, young recruitment, etc., are given more weight in determining shrub population transitions when comparing survey years where sample sizes were different. For more information on earlier range trend sampling methods, see the Pre-1992 Data report methodologies (Utah Big Game Range Trend Studies 1982-1992).

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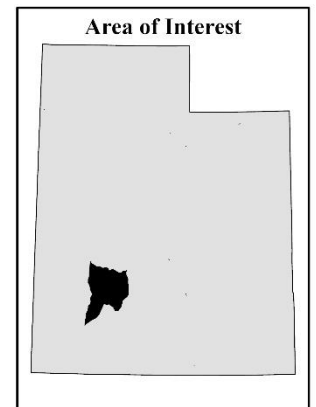
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# WILDLIFE MANAGEMENT UNIT 22 – BEAVER

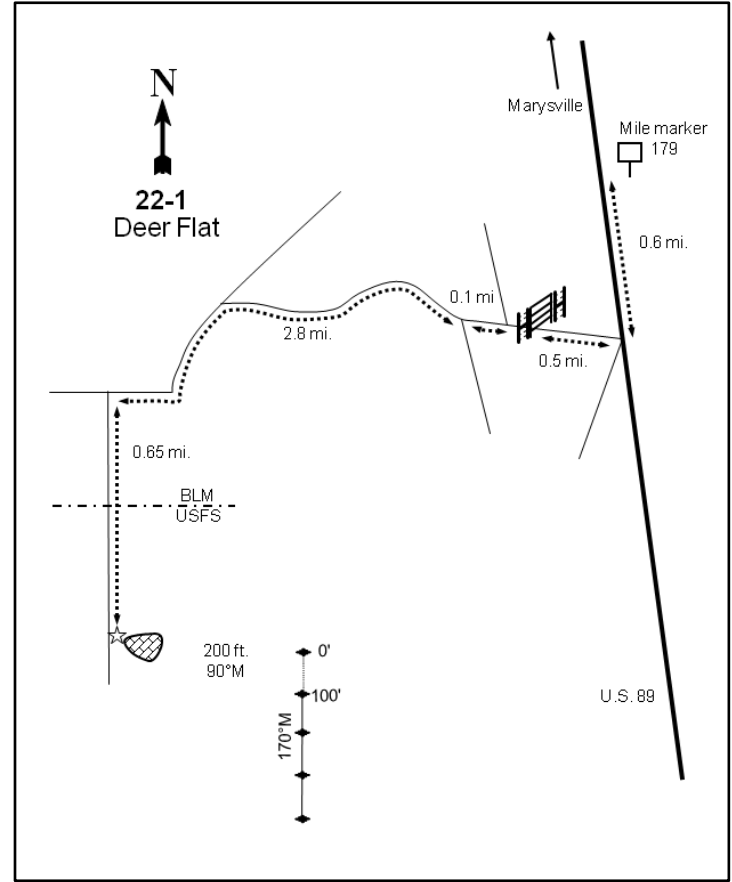
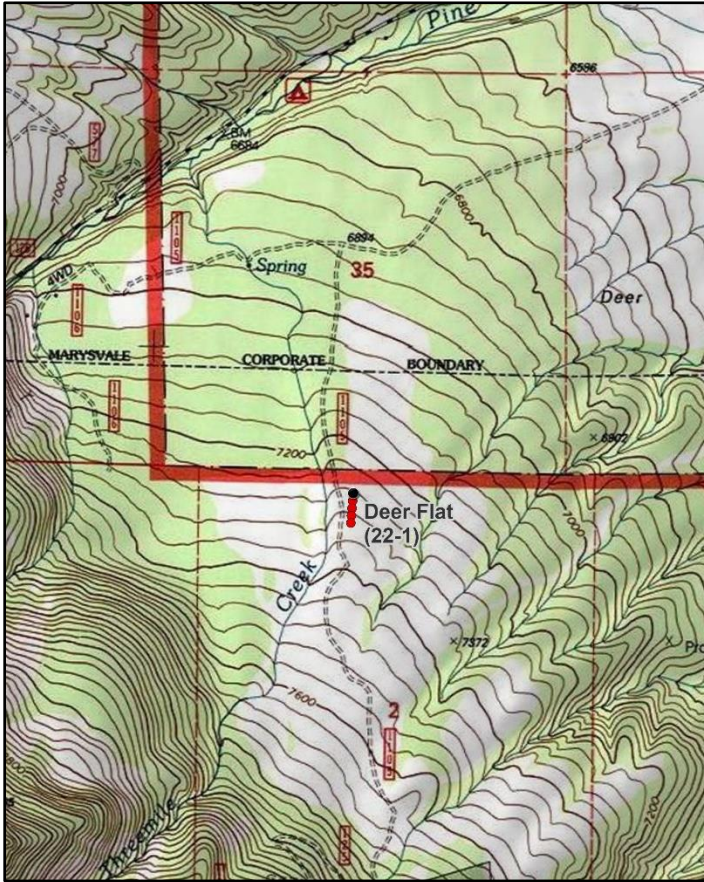


Study Locations Project, Status	Unit Boundary
● RT, Active	▭ Unit - 22
★ RT, Suspended	
▲ WRI, Active	
☆ WRI, Suspended	



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

## DEER FLAT - STUDY NO. 22-1

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Brigham SE; Township 28S, Range 4W, Section 02  
NAD 83 UTM ZONE 12, 387986 East 4252229 North

**Transect Information**

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

7106  
170° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt 1: 1ft, Belt 2: 2ft, Belt 3: 1ft, Belt 4: 5ft, Belt 5: 4ft

**Directions to Site**

From mile marker 177 south of Marysvale, proceed 0.6 miles and turn right onto a dirt road. The road forks immediately beyond a fence: stay to the right. Proceed for 0.5 miles to another fork in the road at a fence corner. Go straight through the gate, passing a road on each side. Continue for 0.1 miles and turn right. Proceed 2.8 miles up this road, following a ditch, passing two ponds, and passing through a DWR fence to another fork. Turn left, travel for 0.65 miles (passing through a gate), and park near a large rock on the left (east) side of the road. The 0-foot baseline stake is 200 feet east of the rock and is a rebar with browse tag #7106 attached.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Marysvale Allotment
Elevation	7,260ft (2,213m)
Aspect	North
Slope	15%
Sample Dates	07/06/1998, 06/27/2003, 06/10/2008, 05/30/2013, 06/20/2018, 06/21/2023

**Table 22-01.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1968	-
Seeding - Seed Unknown	-	-	1968	-
Hand Crew - Lop and Scatter	Deer Flat Lop and Scatter Project	3775	May-June 2017	724

**Wildlife Habitat and Vegetation History****Table 22-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 22-01.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

Some hybridization between mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*A. nova*) is likely occurring; sagebrush was classified based on color, growth form, leaf size, and seed-head formation. Water is available in Pine Creek, located about one-half mile to the north.

**Soils****Table 22-01.5 - 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 Clay Loam	6.2	52.0	27.4	20.6	6.5	12.1	233.6	1.0	07/06/1998
Sandy Loam	7.6	64.7	16.7	18.6	3.0	13.8	182.4	0.8	08/18/1999

**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.

Upon study establishment in 1985, the plant community on this site was a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*A. nova*) with a diverse component of other shrub species present that provided limited cover. The study site had undergone a chaining and seeding treatment in 1968, but young pinyon (*Pinus edulis*) and juniper (*Juniperus osteosperma*) trees had reestablished in the area, albeit providing limited cover (Photos, Pre-1992 Data). Mountain big sagebrush and black sagebrush have maintained dominance throughout the study years, and the densities of both species have increased each year since 2013 (Table 22-01.12, Table 22-01.13). Cover and frequency of herbaceous understory components has remained largely stable over time, with perennial grasses as the primary component. More specifically, the introduced (and possibly seeded) species crested wheatgrass (*Agropyron cristatum*) and/or smooth brome (*Bromus inermis*) have provided most of the perennial grass cover since 1998 (Table 22-01.7, Table 22-01.10, Table 22-01.11). Pinyon and juniper trees increased in size and cover with density remaining relatively stable, and the study site was classified as being within Phase I transitioning to Phase II of woodland succession in 2008 and 2013. However, a lop and scatter treatment in 2017 removed a majority of the trees, and the study site has been considered to be within Phase I since 2018 (Table 22-01.1, Table 22-01.4, Table 22-01.12, Table 22-01.13, Table 22-01.14). This study site is expected to remain in a similar state in future sample years, although the continued presence of small trees indicates that there may be the potential for future infilling.

Deer winter range condition has ranged between poor and good since 1998; condition was considered to be good as of 2023. Improving deer winter range can be accomplished through efforts that support preferred browse reproduction and control of cheatgrass (Table 22-01.15). Pellet transect data indicates that deer presence was high in 2023 and has been high in most sample years since 1998. In contrast, elk presence was low during the most recent sample year (Table 22-01.9). However, the sagebrush component of this site could provide valuable browse for elk during the winter (Table 22-01.3; Wambolt, 1996).

## Trend Summary Tables

**Table 22-01.6 - 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
1998	30.2	0.4	2.6	-	-	-
2003	23.9	0.6	3.6	27.0	0.5	6.8
2008	20.4	0.7	7.1	23.8	0.2	10.0
2013	16.5	0.6	8.7	23.7	0.3	13.6
2018	20.1	0.4	-	22.7	0.7	-
2023	19.1	0.6	-	25.3	0.5	-

**Table 22-01.7 - 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
1998	38	339	18	120	0.6	14.0	0.1	1.8
2003	16	255	117	81	0.1	7.3	1.0	1.0
2008	5	311	79	186	0.0	12.1	0.3	2.7
2013	26	311	37	110	0.5	10.1	0.1	0.8
2018	34	309	9	57	1.0	15.5	0.0	0.5
2023	16	338	109	200	0.1	20.5	0.8	3.1

**Table 22-01.8 - 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
1998	12.3	0.6	49.9	9.2	15.9	41.9
2003	14.2	0.2	40.7	5.8	18.0	37.0
2008	14.3	0.3	42.3	5.6	14.8	43.6
2013	13.5	0.4	53.3	3.2	16.8	39.2
2018	13.4	0.4	64.1	5.0	15.4	34.2
2023	7.7	0.2	44.6	2.9	14.3	39.9

**Table 22-01.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	7	52	5	34
2003	2	32	8	14
2008	3	51	4	38
2013	6	29	5	10
2018	5	7	5	7
2023	6	27	3	5
Year	Days Use Per Acre (ha)			
1998	10.9 (26.9)	58.3 (144.0)	12.1 (29.8)	-
2003	8.0 (19.7)	149.4 (369.1)	38.9 (96.0)	-
2008	20.3 (50.2)	38.2 (94.4)	4.7 (11.6)	-
2013	5.1 (12.6)	59.6 (147.3)	12.8 (31.5)	-
2018	9.4 (23.3)	22.8 (56.3)	20.1 (49.7)	-
2023	8.0 (19.7)	54.9 (135.7)	6.0 (14.9)	-

**Table 22-01.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency												
1998	-	125	11	47	38	23	23	7	63	124	49	16	-
2003	3	130	13	53	16	4	38	9	13	80	3	3	-
2008	14	112	26	112	5	-	21	5	23	75	34	-	33
2013	1	125	10	81	26	17	7	11	17	164	22	-	22
2018	10	156	17	120	34	3	27	14	2	85	6	-	-
2023	4	168	19	197	16	8	25	13	10	63	-	0	-
year	Average Cover (%)												
1998	-	5.0	0.1	1.9	0.6	0.1	0.2	0.2	1.1	3.3	1.7	0.4	-
2003	0.0	3.4	0.2	1.5	0.1	0.0	0.6	0.1	0.1	1.2	0.0	0.0	-
2008	0.1	3.1	0.5	3.1	0.0	-	0.3	0.1	0.2	2.4	0.2	-	2.0
2013	0.0	3.2	0.3	1.6	0.5	0.2	0.2	0.1	0.2	3.6	0.3	-	0.4
2018	0.1	6.8	1.1	4.3	1.0	0.0	0.7	0.5	0.1	1.8	0.1	-	-
2023	0.0	6.4	0.6	10.1	0.1	0.0	0.5	0.4	0.3	2.0	-	0.0	-

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

**Table 22-01.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria (pussytoes)	Arabis demissa (nodding rockcross)	Astragalus (milkvetch)	Astragalus purshii (woollypod milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa <sup>ai</sup> (littletop false flax)	Castilleja angustifolia (northwestern Indian paintbrush)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Delphinium nuttallianum (two-lobed larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)
year	Nested Frequency																
1998	6	-	-	3	1	9	2	-	1	1	-	-	-	-	-	-	6
2003	3	-	2	-	-	-	1	8	-	-	7	-	-	-	8	-	4
2008	89	-	-	3	2	-	3	35	-	12	4	2	-	3	11	-	-
2013	41	5	3	3	-	-	9	1	-	-	-	-	13	-	5	-	-
2018	3	-	-	-	-	-	9	-	-	3	-	2	3	-	-	-	3
2023	107	-	5	1	4	-	5	22	-	4	1	15	-	2	-	1	1
year	Average Cover (%)																
1998	0.0	-	-	0.0	0.0	0.1	0.0	-	0.0	0.0	-	-	-	-	-	-	0.1
2003	0.0	-	0.0	-	-	-	0.0	0.0	-	-	0.0	-	-	-	0.0	-	0.0
2008	0.6	-	-	0.0	0.0	-	0.0	0.2	-	0.2	0.0	0.0	-	0.0	0.0	-	-
2013	0.1	0.0	0.0	0.0	-	-	0.1	0.0	-	-	-	-	0.1	-	0.0	-	-
2018	0.0	-	-	-	-	-	0.0	-	-	0.0	-	0.0	0.0	-	-	-	0.0
2023	1.1	-	0.0	0.0	0.0	-	0.0	0.1	-	0.0	0.0	0.1	-	0.0	-	0.0	0.0

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



FORB SPECIES	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	Lesquerella intermedia (mid bladderpod)	Lithospermum ruderale (western stone seed)	Lomatium (desertparsley)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orobanche fasciculata (clustered broomrape)	Petradoria pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea coccinea (scarlet globemallow)	Tetrandeum acutis (stemless four-nerve daisy)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency																
1998	32	-	-	-	-	1	3	0	0	2	7	16	57	15	3	-	-
2003	26	3	-	-	104	4	2	7	-	11	-	9	27	6	-	-	-
2008	14	1	-	-	60	-	15	28	-	8	-	2	31	12	-	5	-
2013	15	-	-	-	30	-	3	24	-	6	-	-	26	-	-	2	1
2018	24	-	2	-	5	3	4	-	-	-	-	2	-	2	-	7	-
2023	28	1	12	2	17	-	8	16	-	66	-	3	23	46	-	11	-
year	Average Cover (%)																
1998	0.3	-	-	-	-	0.0	0.3	0.0	0.0	0.0	0.0	0.7	0.2	0.0	0.0	-	-
2003	0.4	0.0	-	-	0.9	0.0	0.1	0.0	-	0.0	-	0.1	0.1	0.0	-	-	-
2008	0.1	0.0	-	-	0.2	-	0.2	0.2	-	0.0	-	0.0	0.2	0.0	-	0.1	-
2013	0.0	-	-	-	0.1	-	0.1	0.1	-	0.0	-	-	0.1	-	-	0.0	0.0
2018	0.1	-	0.0	-	0.0	0.0	0.1	-	-	-	-	0.1	-	0.0	-	0.1	-
2023	0.4	0.1	0.1	0.0	0.1	-	0.0	0.1	-	0.3	-	0.3	0.1	0.1	-	0.1	-

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

FORB SPECIES	Trifolium gymnocarpon (hollyleaf clover)	Verbascum thapsus <sup>ai</sup> (common mullein)
year	Nested	
1998	14	-
2003	11	-
2008	35	-
2013	25	-
2018	7	-
2023	53	2
year	Average Cover (%)	
1998	0.0	-
2003	0.1	-
2008	0.8	-
2013	0.1	-
2018	0.0	-
2023	0.4	0.3

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

**Table 22-01.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)																	
	year																	
Artemisia nova <sup>p</sup> (black sagebrush)	1998	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	2003	6.4	13	-	0.5	0.1	-	-	0.3	-	2.4	0.5	-	4.4	-	6.7	-	-
Cercocarpus ledifolius <sup>p</sup> (curl-leaf mountain mahogany)	2008	5.4	15.9	0	0.2	-	-	-	0	0.1	0.3	0.1	-	9.7	-	2.3	-	-
Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	2013	4.7	15.9	-	0.2	0.1	0.1	-	0.1	-	-	0.2	-	13.6	-	2.7	-	-
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	2018	4.9	13.6	-	0.9	0.1	0.3	-	-	0.2	-	0.2	-	-	-	3.2	-	-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	2023	6	14.9	-	0.5	0.1	-	-	-	0.1	-	0.4	-	-	-	3.8	-	0
Ericameria parryi var. parryi (Parry's rabbitbrush)	year	Quadrat Cover (%)																
Eriogonum microthecum <sup>p</sup> (slender buckwheat)	1998	8.7	18.5	0.1	0.4	0.0	-	-	0.7	0.0	-	0.4	-	2.6	0.0	1.8	0.0	-
Gutierrezia sarothrae (broom snakeweed)	2003	6.3	15.8	-	0.3	0.0	-	-	0.4	0.2	1.3	0.4	-	2.3	-	1.1	-	0.0
Juniperus osteosperma <sup>i</sup> (Utah juniper)	2008	5.5	12.7	0.0	0.6	-	-	0.1	0.5	0.0	0.7	0.6	0.0	6.5	-	1.1	-	0.0
Opuntia (pricklypear)	2013	3.0	10.5	0.0	0.3	0.2	0.0	-	0.1	-	0.5	0.6	-	8.2	-	2.4	-	-
Pediocactus simpsonii (mountain ball cactus)	2018	4.3	12.8	0.0	0.2	0.0	0.0	-	0.3	0.0	-	0.3	-	-	-	2.5	-	-
Pinus edulis <sup>i</sup> (twoneedle pinyon)	2023	4.6	10.2	-	0.9	0.0	-	-	0.2	0.1	-	0.5	-	-	-	3.0	-	0.1
Purshia tridentata <sup>p</sup> (antelope bitterbrush)	year	Quadrat Cover (%)																
Quercus gambelii <sup>p</sup> (Gambel oak)	1998	8.7	18.5	0.1	0.4	0.0	-	-	0.7	0.0	-	0.4	-	2.6	0.0	1.8	0.0	-
Sclerocactus (fishhook cactus)	2003	6.3	15.8	-	0.3	0.0	-	-	0.4	0.2	1.3	0.4	-	2.3	-	1.1	-	0.0
Tetradymia canescens (spineless horsebrush)	2008	5.5	12.7	0.0	0.6	-	-	0.1	0.5	0.0	0.7	0.6	0.0	6.5	-	1.1	-	0.0
	2013	3.0	10.5	0.0	0.3	0.2	0.0	-	0.1	-	0.5	0.6	-	8.2	-	2.4	-	-
	2018	4.3	12.8	0.0	0.2	0.0	0.0	-	0.3	0.0	-	0.3	-	-	-	2.5	-	-
	2023	4.6	10.2	-	0.9	0.0	-	-	0.2	0.1	-	0.5	-	-	-	3.0	-	0.1

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

**Table 22-01.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1998	3920	20	13	71	16	17	1	2	35/58
2003	3520	-	1	49	50	7	3	4	41/52
2008	3100	340	15	37	48	48	0	14	29/53
2013	1660	20	14	69	17	37	0	22	29/61
2018	1880	80	10	86	4	4	2	0	30/53
2023	2220	2200	10	73	17	12	14	17	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	3640	-	13	68	19	39	6	5	62/87
2003	3480	-	1	55	45	32	52	9	64/73
2008	2920	120	8	47	45	35	1	23	58/82
2013	2660	40	7	79	14	46	1	12	61/88
2018	3040	180	16	63	21	18	3	9	61/73
2023	3400	2600	5	82	12	21	34	9	- / -
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
1998	120	-	83	17	0	0	0	0	40/40
2003	40	-	0	100	0	0	100	0	33/31
2008	80	20	75	0	25	0	0	0	37/38
2013	40	-	50	50	0	0	50	0	29/39
2018	60	-	33	33	33	67	33	0	43/46
2023	20	-	0	100	0	0	100	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
1998	380	60	68	32	0	32	5	0	45/48
2003	480	-	0	100	0	8	75	0	33/33
2008	320	-	25	63	13	25	31	0	32/48
2013	300	-	53	47	0	13	47	0	34/43
2018	360	20	28	72	0	22	56	0	36/44
2023	280	-	29	57	14	14	71	14	- / -
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1998	120	-	50	50	0	17	0	17	6/21
2003	280	-	0	93	7	14	86	0	17/20
2008	160	-	13	75	13	25	25	0	8/26
2013	120	-	0	100	0	17	0	0	7/23
2018	100	-	0	100	0	20	40	0	10/21
2023	300	20	0	100	0	60	27	0	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	20	-	0	100	0	0	0	0	28/33
2003	-	-	-	-	-	-	-	-	- / -
2008	80	-	0	100	0	0	0	0	19/31
2013	100	-	40	60	0	0	0	0	19/28
2018	40	-	50	50	0	0	0	0	29/44
2023	40	-	0	100	0	0	0	0	- / -
<b>Echinocereus coccineus -- (scarlet hedgehog cactus)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	0	0	- / -
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1998	400	-	5	90	5	10	0	5	14/27
2003	680	-	6	94	0	24	35	0	13/14
2008	480	-	17	75	8	8	8	0	14/21
2013	140	-	14	86	0	29	0	0	11/11
2018	200	-	20	80	0	30	20	0	14/16
2023	620	20	0	100	0	0	0	0	- / -
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	40	-	0	100	0	0	0	0	33/45
2008	60	-	0	33	67	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	20	-	0	100	0	100	0	0	30/42
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	20	-	0	100	0	0	0	0	19/13
2003	40	-	50	50	0	0	0	0	15/17
2008	60	20	33	67	0	0	0	0	15/21
2013	20	-	100	0	0	0	0	0	14/14
2018	40	-	0	100	0	0	0	0	17/19
2023	140	-	14	86	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	-/-
2008	20	-	0	100	0	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1998	720	40	25	69	6	0	0	6	13/25
2003	820	-	0	85	15	0	7	5	12/27
2008	860	-	16	72	12	0	0	7	11/30
2013	580	20	0	79	21	3	0	28	11/26
2018	740	-	8	89	3	3	0	0	11/25
2023	1100	-	7	91	2	0	0	4	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	100	-	40	60	0	0	0	0	6/7
2008	-	-	-	-	-	-	-	-	4/7
2013	60	-	0	100	0	0	0	0	4/8
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	0	100	0	0	0	0	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1998	100	-	0	100	0	0	0	0	-/-
2003	60	-	0	100	0	0	0	0	-/-
2008	160	-	13	88	0	0	0	13	-/-
2013	160	-	25	75	0	0	0	0	-/-
2018	40	40	100	0	0	0	0	0	-/-
2023	100	-	80	0	20	0	0	20	-/-
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	540	-	19	78	4	7	26	4	74/67
2003	1040	-	19	81	0	64	17	4	49/40
2008	480	-	21	67	13	33	0	0	71/50
2013	1140	-	72	28	0	25	0	0	70/46
2018	1080	220	70	30	0	11	7	0	68/60
2023	2200	-	28	72	0	59	0	0	-/-
<b>Sclerocactus -- (fishhook cactus)</b>									
1998	40	20	50	50	0	0	0	0	5/7
2003	-	-	-	-	-	-	-	-	-/-
2008	40	-	0	100	0	0	0	0	8/13
2013	20	-	0	100	0	0	0	0	17/18
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	40	-	50	50	0	0	0	0	14/25
2008	40	-	50	0	50	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	40	-	0	50	50	0	0	50	-/-

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

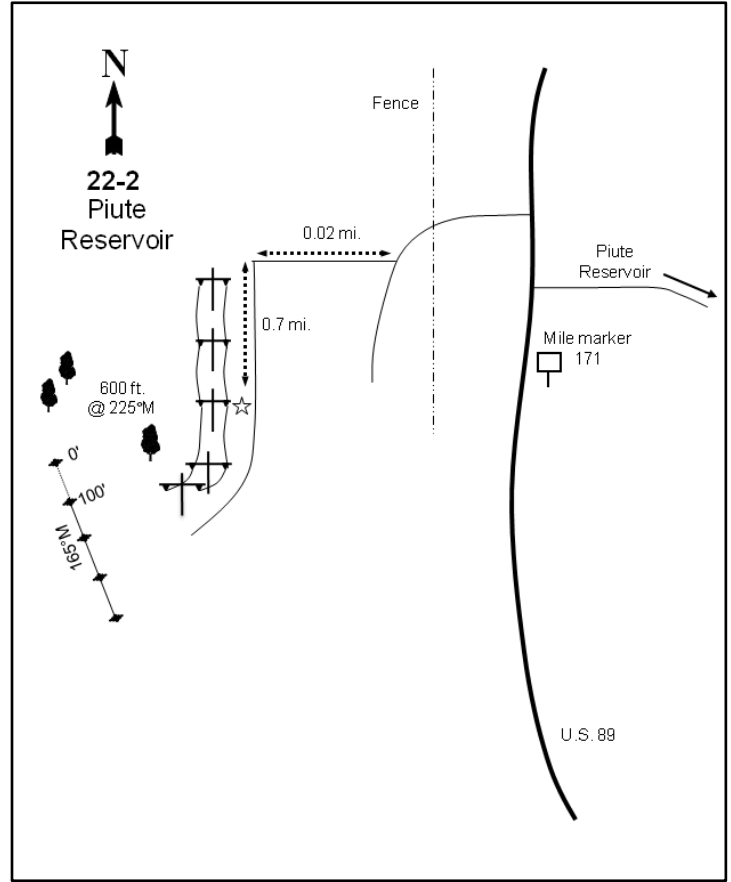
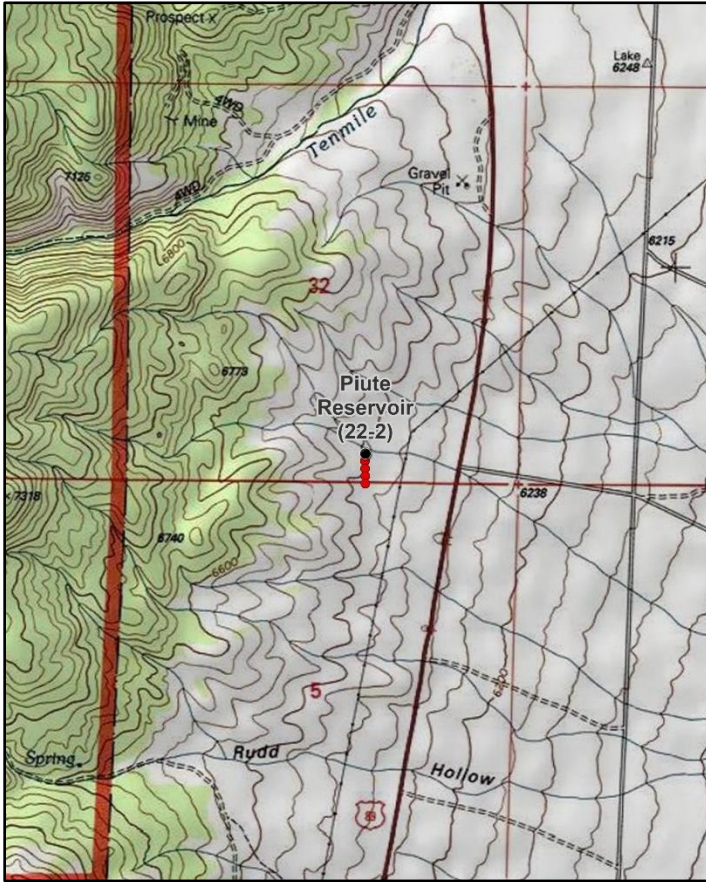
**Table 22-01.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	8	-	-	-	-	-	8.6
2003	8	-	-	71	29	-	12.4
2008	8	-	17	50	33	-	15.6
2013	8	-	17	50	33	-	8.7
2018	8	33	67	-	-	-	39.3
2023	8	33	67	-	-	-	3.2
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	20	-	-	-	-	-	10.8
2003	52	6	18	24	47	6	10.6
2008	50	-	-	47	53	-	14.8
2013	46	-	6	28	61	6	11.9
2018	16	40	60	-	-	-	2.0
2023	9	20	80	-	-	-	2.7

**Table 22-01.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	30.0	10.1	7.0	28.0	-0.4	3.7	0.0	<b>78.4</b>	Good
2003	30.0	5.0	2.6	14.7	0.0	2.0	0.0	<b>54.2</b>	Poor-Fair
2008	29.2	2.3	5.5	24.2	0.0	5.5	0.0	<b>66.7</b>	Fair
2013	29.0	11.1	8.1	20.3	-0.4	1.5	0.0	<b>69.6</b>	Fair-Good
2018	27.8	10.9	11.3	30.0	-0.8	1.1	0.0	<b>80.3</b>	Good
2023	30.0	11.5	5.1	30.0	-0.1	6.2	0.0	<b>82.7</b>	Good

## PIUTE RESERVOIR - STUDY NO. 22-2



### Location Information

USGS 7.5 min Map Info                      Piute Reservoir NW; Township 28S, Range 3W, Section 32  
 GPS (0' Stake)                                      NAD 83 UTM ZONE 12, 393072 East 4242736 North

### Transect Information

Browse Tag # (0' Stake)                      7080  
 Transect Bearing                                      165° magnetic  
 Length    400ft  
 Belt Placement                                      Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
 Belt Marker Placement                              Standard

### Directions to Site

From mile marker 171 on US-89 north of Junction, travel north for 0.3 miles and turn west (left) onto a dirt road. Turn right immediately after passing through the fence. Proceed for 0.2 miles to a fork; stay left and continue for 0.7 miles to a large steel powerpole where the powerlines turn. From the steel powerpole, walk about 600 feet at 225 degrees magnetic between two large juniper trees to another juniper. The 0-foot end of the frequency baseline is 5 yards south of the juniper. The stakes are all rebar and the 0-foot stake has a browse tag #7080 attached.

### Site Information

Land Ownership                                      State  
 Land Administrator                                      SITLA  
 Allotment    JUNCTION  
 Elevation    6,400ft (1,951m)  
 Aspect    Southeast  
 Slope    2-3%  
 Sample Dates    07/13/1998, 07/07/2003, 06/10/2008, 05/30/2013, 07/01/2018, 07/06/2023

**Wildlife Habitat and Vegetation History**

**Table 22-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 22-02.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

Deer shed antlers have been found on the site during previous samplings: one in 1991 and five in 1998.

**Soils**

**Table 22-02.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.3	68.0	17.4	14.6	0.9	3.1	131.2	0.7	07/13/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      9 inches  
 NRCS Ecological Site    Semidesert Shallow Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site #    R028AY243UT  
 States and Transitions    No state and transition model is available for this ecological site.

The plant community on this site has remained largely stable since study establishment in 1985. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has dominated the shrub component in all sample years, although other species are also present to a lesser extent (Photos, Pre-1992 Data, Table 22-02.12, Table 22-02.13). The herbaceous understory has remained depauperate in both diversity and quantity throughout the study period. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in most sample years since 1998, but with very low abundance (Table 22-02.7, Table 22-02.10, Table 22-02.11). Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) are present in low amounts, placing the study area within Phase I of woodland succession in all sample years (Photos, Table 22-02.4, Table 22-04.12, Table 22-02.13, Table 22-02.14). This sagebrush dominated plant community is expected to remain in a similar state in future sample years, although continued encroachment of pinyon and juniper may occur.

Deer winter range condition has generally remained fair since 1998. As of 2023, deer winter range condition was considered to be fair. Improvement to deer wintering range can be accomplished through efforts that support preferred browse and reproduction; diversifying native perennial forbs and grasses while reducing cheatgrass would also improve winter range conditions (Table 22-02.15). According to pellet transect data, deer presence on this site has remained low since 2003 (Table 22-02.9).

**Trend Summary Tables**

**Table 22-02.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	18.3	8.0	0.2	-	-	-
2003	21.5	5.9	0.4	17.6	6.3	0.9
2008	20.5	4.0	0.8	17.2	4.2	0.8
2013	18.9	4.6	1.4	19.9	8.1	1.0
2018	23.1	2.9	2.2	19.3	2.6	1.6
2023	20.1	4.9	2.7	28.8	5.7	2.2

**Table 22-02.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	3	77	6	25	0.0	1.7	0.0	0.3
2003	6	44	179	13	0.0	0.5	2.6	0.1
2008	8	40	21	8	0.0	0.5	0.0	0.2
2013	12	81	-	16	0.0	1.6	-	0.1
2018	-	40	-	18	-	0.5	-	0.4
2023	5	30	226	29	0.0	0.2	2.2	0.1

**Table 22-02.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	21.7	0.2	26.2	43.2	3.8	29.6
2003	27.0	0.1	17.1	31.2	6.9	29.9
2008	14.4	0.4	22.2	49.2	2.9	26.7
2013	19.5	0.2	26.6	40.5	4.5	24.6
2018	10.2	0.4	33.1	47.6	8.1	28.9
2023	33.0	0.1	25.6	14.2	15.7	29.0

**Table 22-02.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	-	6	-	10
2003	-	1	2	10
2008	-	2	-	74
2013	-	3	-	29
2018	-	3	-	15
2023	-	3	1	3
Year	Days Use Per Acre (ha)			
1998	-	20.8 (51.3)	-	-
2003	-	3.4 (8.3)	5.3 (13.2)	-
2008	8.7 (21.5)*	2.7 (6.6)	-	-
2013	8.7 (21.5)*	8.1 (19.9)	-	-
2018	-	4.7 (11.6)	-	-
2023	-	10.7 (26.5)	-	-

\*Pellets per acre (ha)



**Table 22-02.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)
year	Nested Frequency				
1998	12	3	1	40	27
2003	12	6	-	16	18
2008	6	8	-	31	6
2013	10	12	-	63	12
2018	10	-	-	22	9
2023	5	5	-	11	14
year	Average Cover (%)				
1998	0.3	0.0	0.0	0.7	0.7
2003	0.2	0.0	-	0.2	0.1
2008	0.1	0.0	-	0.3	0.1
2013	0.2	0.0	-	1.4	0.1
2018	0.1	-	-	0.3	0.1
2023	0.0	0.0	-	0.1	0.1

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

**Table 22-02.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Amsinckia <sup>a</sup> (fiddleneck)	Astragalus lentiginosus (freckled milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Collomia linearis <sup>a</sup> (tiny trumpet)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gilia inconspicua <sup>a</sup> (sly gilia)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Orobanche fasciculata (clustered broomrape)	Phlox longifolia (longleaf phlox)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested Frequency																
1998	-	-	-	15	-	1	-	-	6	-	-	6	-	-	1	3	-
2003	3	3	85	-	3	3	-	15	-	57	1	1	61	7	-	6	1
2008	-	4	-	3	-	-	-	-	-	-	-	-	17	-	-	5	-
2013	-	-	-	7	2	-	-	-	2	-	-	-	-	-	-	4	1
2018	-	-	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-
2023	-	-	-	16	-	-	3	-	-	-	-	-	226	-	-	13	-
year	Average Cover (%)																
1998	-	-	-	0.2	-	0.0	-	-	0.1	-	-	0.0	-	-	0.0	0.0	-
2003	0.0	0.0	1.9	-	0.0	0.0	-	0.0	-	0.4	0.0	0.0	0.2	0.0	-	0.0	0.0
2008	-	0.0	-	0.0	-	-	-	-	-	-	-	-	0.0	-	-	0.2	-
2013	-	-	-	0.0	0.0	-	-	-	0.0	-	-	-	-	-	-	0.0	0.0
2018	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-
2023	-	-	-	0.0	-	-	0.0	-	-	-	-	-	2.2	-	-	0.0	-

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

**Table 22-02.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)						
1998	-	-	-	-	-	-	-
2003	17.6	6.3	-	-	-	-	0.9
2008	17.2	4.2	-	-	-	-	0.8
2013	19.9	8.1	-	-	-	-	1
2018	19.3	2.6	-	-	-	-	1.6
2023	28.8	5.7	-	0.2	-	-	2
year	Quadrat Cover (%)						
1998	18.3	7.5	-	-	0.4	0.1	0.2
2003	21.5	5.9	-	0.0	-	-	0.4
2008	20.5	3.9	-	-	-	0.0	0.8
2013	18.9	4.5	0.0	0.0	-	-	1.4
2018	23.1	2.9	0.0	0.0	-	-	2.2
2023	20.1	4.7	-	0.1	-	0.1	2.6

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

**Table 22-02.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1998	20	-	0	0	100	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	100	100	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	3560	140	14	57	29	44	5	15	55/89
2003	4660	-	1	59	40	8	0	6	50/73
2008	4080	-	3	52	45	44	24	17	49/81
2013	3600	40	6	79	16	23	12	25	52/83
2018	4200	-	1	71	29	23	0	9	53/89
2023	4800	20	0	65	35	14	36	48	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1998	3400	260	7	78	15	0	2	7	32/42
2003	3920	-	2	62	37	0	0	1	30/38
2008	4280	20	3	66	31	21	7	5	19/28
2013	3760	100	7	90	2	0	0	2	27/43
2018	3040	-	3	76	22	5	3	11	19/25
2023	2960	-	3	91	6	1	0	7	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	260	-	31	69	0	0	0	0	13/12
2018	280	-	7	93	0	0	0	0	25/36
2023	80	-	0	100	0	0	0	0	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	-	20	0	0	0	0	0	0	-/-
2003	20	-	100	0	0	0	0	0	-/-
2008	20	-	100	0	0	0	0	100	-/-
2013	20	-	100	0	0	0	0	0	-/-
2018	20	20	100	0	0	0	0	0	-/-
2023	20	-	100	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
1998	20	-	0	100	0	0	0	0	-/-
2003	20	-	0	100	0	0	0	0	12/14
2008	20	-	0	0	100	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	11/37
2023	40	-	0	100	0	0	0	0	-/-
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
1998	40	-	50	50	0	0	0	0	-/-
2003	20	-	0	100	0	0	0	0	-/-
2008	40	-	50	50	0	0	0	0	-/-
2013	40	-	0	100	0	0	0	0	-/-
2018	60	-	33	67	0	0	0	0	-/-
2023	40	-	0	100	0	0	0	0	-/-

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

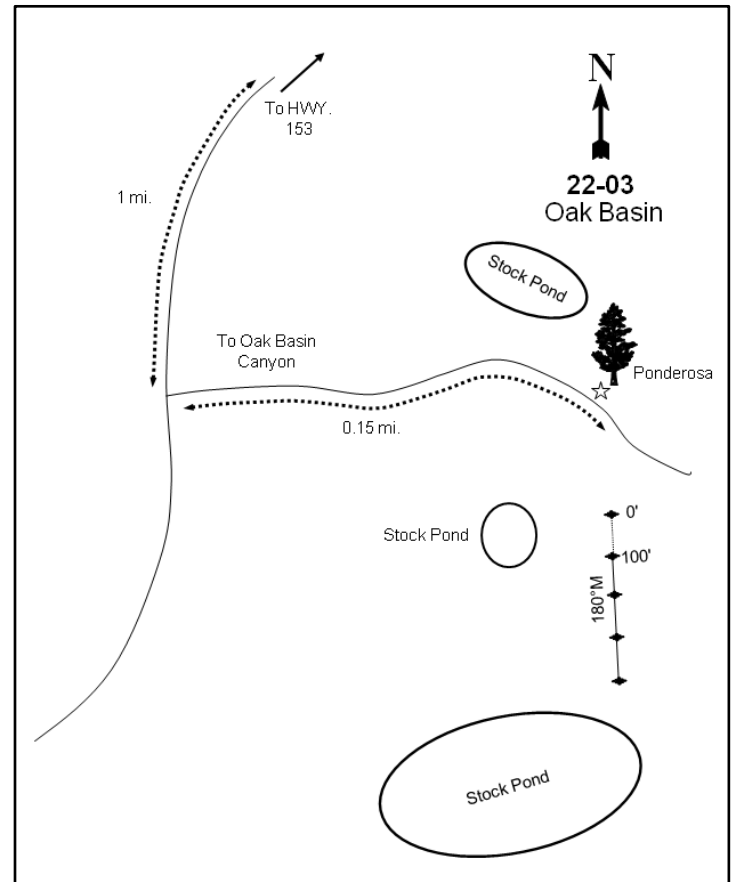
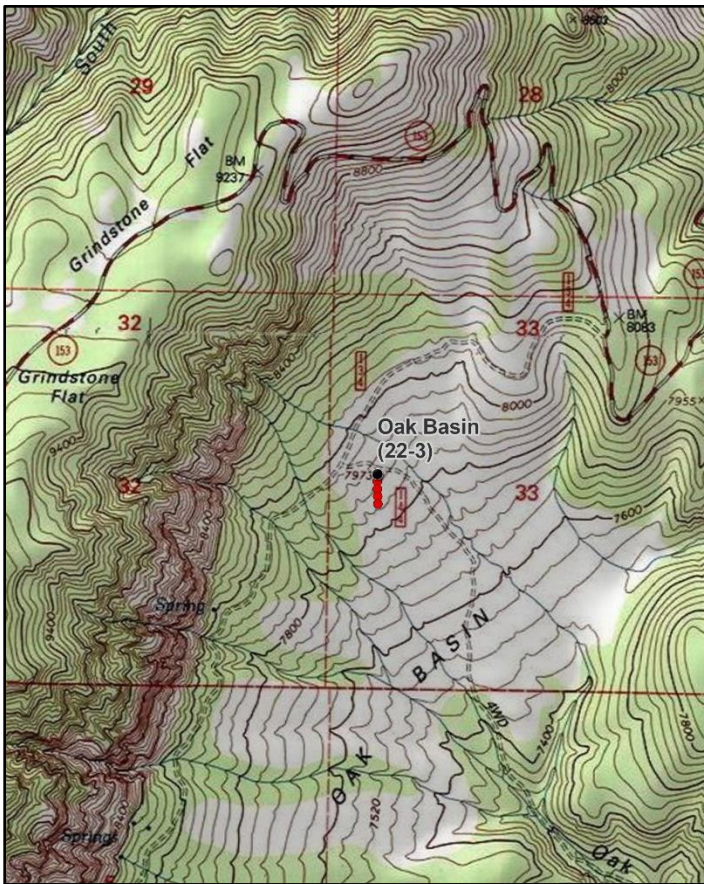
**Table 22-02.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	21	-	82	9	-	9	7.5
2023	28	8	33	50	-	8	7.7
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	25	14	14	57	14	-	9.7
2023	11	-	-	50	33	17	11.2

**Table 22-02.15 - Deer Desirable Components Index: Semidesert Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	22.9	6.4	7.0	3.3	0.0	0.6	0.0	<b>40.2</b>	Fair
2003	22.0	3.0	0.7	0.9	0.0	0.1	0.0	<b>26.7</b>	Poor-Fair
2008	21.5	1.6	1.7	1.0	0.0	0.3	0.0	<b>26.1</b>	Poor-Fair
2013	24.9	10.3	2.8	3.2	0.0	0.2	0.0	<b>41.4</b>	Fair
2018	24.1	6.4	0.5	0.9	0.0	0.7	0.0	<b>32.7</b>	Fair
2023	30.0	4.5	0.2	0.5	0.0	0.1	0.0	<b>35.3</b>	Fair

## OAK BASIN - STUDY NO. 22-3

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Circleville NW; Township 29S, Range 4W, Section 33  
NAD 83 UTM ZONE 12, 384193 East 4233814 North

**Transect Information**

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

7044  
180° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt 2: 3ft, Belt 5: No Rebar

**Directions to Site**

From the center of the town of Junction in Piute County, travel west on Highway 153 for 7.6 miles, at which point a fork will be reached. Proceed to the left (Oak Basin Cottonwood Road or Road #134) and go about 1 mile to another fork. Turn left and travel for 0.15 miles to a lone ponderosa pine 15 feet left (north) of the road. The baseline starts 100 feet south of the ponderosa pine, and the 0-foot stake is a steel rebar tagged #7044.

**Site Information**

Land Ownership: Federal  
Land Administrator: USFS  
Allotment: Circleville Allotment  
Elevation: 7,900ft (2,408m)  
Aspect: Southeast  
Slope: 5-10%  
Sample Dates: 07/02/1998, 07/07/2003, 06/25/2008, 05/30/2013, 07/02/2018, 07/06/2023

**Table 22-03.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Dixie Harrow Unknown	-	-	1965	600
Seeding - Seed Unknown	-	-	1965	600
Fire - Wildfire	-	-	Between 1985 and 1991	-

**Wildlife Habitat and Vegetation History****Table 22-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 22-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Perennial Grass/Mountain Big Sagebrush	Phase I
1998	Perennial Grass/Mountain Big Sagebrush	Phase I
2003	Perennial Grass/Mountain Big Sagebrush	Phase I
2008	Perennial Grass/Mountain Big Sagebrush	Phase I
2013	Perennial Grass/Mountain Big Sagebrush	Phase I
2018	Perennial Grass/Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

The DWR Oak Basin pellet group transect is located 200-300 feet higher in elevation than and about one half of a mile to the north of the Range Trend study. Deer days use/acre was 13 (32 ddu/ha) in 1976-77 and 42 (104 ddu/ha) in 1984-85. Five-year averages were 16 deer days (40 ddu/ha) between 1976 and 1981 and 75 deer days (185 ddu/ha) between 1981 and 1985 (Jense et al. 1985). The trend for deer days use/acre appeared stable from 1985-86 through 1991-92 with an average of 28 (69 ddu/ha) (Jense et al. 1991). Pellet group data was not collected in 1992-93, but beginning in 1993-94, there was an obvious decrease in use patterns with days use/acre exhibiting an average of 4 (10 ddu/ha) between 1993-94 through 1996-97 (Evans et al., 1997).

**Soils****Table 22-03.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.3	70.0	9.4	20.6	3.9	16.2	332.8	0.9	07/02/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                    22 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.

The plant community on this site was a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Gambel oak (*Quercus gambelii*) upon study establishment in 1985, with introduced perennial grass species being the major components of the herbaceous understory (Pre-1992 Data). Following a fire that occurred between the 1985 and 1991 sample years (Table 22-03.1), the site transitioned to a seeded perennial grass, namely intermediate wheatgrass (*Thinopyrum intermedium*), and mountain big sagebrush state and has remained as such in subsequent study years. The introduced perennial grass species bulbous bluegrass (*Poa bulbosa*) was observed for the first time in 2023, but with low cover and abundance (Table 22-03.7, Table 22-03.10, Table 22-03.11, Table 22-03.12, Table 22-03.13). Barring a major disturbance, it is reasonable to expect this site to remain in a similar state in the future. However, Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) have been present in some sample years and seedlings were observed in 2018 and 2023 (Table 22-01.14), indicating the potential for possible encroachment over time. Due to the abundance and diversity of the shrub and herbaceous communities, this site likely serves as adequate habitat for summering mule deer, but may serve as better foraging range during very mild winters due to high sagebrush cover. In addition, the diverse and abundant herbaceous understory could provide forage for elk during the summer months (Table 22-03.3; Beck & Peek, 2005). However, pellet transect data indicates that elk presence on this site has remained low since 1998 and deer presence has been low since 2013 (Table 22-03.9).

## Trend Summary Tables

**Table 22-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	4.3	0.4	0.8	-	-	-
2003	5.5	0.2	1.0	9.0	0.2	1.4
2008	8.0	0.0	1.0	14.9	0.2	1.7
2013	11.0	0.1	0.0	16.6	-	-
2018	19.7	0.2	-	21.5	-	-
2023	16.8	0.6	-	35.0	0.2	-

**Table 22-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	-	432	54	79	-	26.3	0.2	7.1
2003	-	403	22	59	-	19.9	0.1	2.5
2008	5	404	33	69	0.0	17.3	0.1	2.9
2013	23	411	277	146	0.2	16.9	1.5	3.4
2018	5	383	13	77	0.1	23.1	0.0	0.8
2023	11	364	277	138	0.0	22.2	2.5	5.3

**Table 22-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	9.8	0.1	47.9	1.5	19.4	46.1
2003	25.9	0.0	31.4	1.7	23.2	30.5
2008	15.9	-	34.5	4.1	22.4	33.4
2013	16.6	0.0	39.5	1.0	25.4	38.3
2018	11.3	0.4	53.1	2.1	31.1	36.3
2023	15.0	0.0	33.4	0.4	25.2	43.9

**Table 22-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	17	25	1	5
2003	6	16	-	7
2008	10	14	2	75
2013	3	13	2	1
2018	3	3	3	9
2023	1	-	2	5
Year	Days Use Per Acre (ha)			
1998	74.0 (182.9)	38.9 (96.0)	1.3 (3.3)	-
2003	25.4 (62.8)	46.2 (114.2)	2.7 (6.6)	-
2008	16.0 (39.5)	30.2 (74.5)	2.7 (6.6)	-
2013	33.4 (82.5)	18.1 (44.7)	1.3 (3.3)	-
2018	16.7 (41.2)	6.0 (14.9)	-	-
2023	5.1 (12.6)	4.7 (11.6)	-	-

**Table 22-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency																
1998	3	27	194	1	15	-	26	-	2	-	-	-	28	3	-	-	397
2003	-	8	106	9	5	-	1	-	-	1	4	-	45	5	2	3	384
2008	1	4	140	3	19	5	50	-	-	4	-	-	62	-	-	-	366
2013	7	-	28	4	20	23	57	3	4	3	2	-	24	13	4	-	390
2018	2	-	23	7	31	5	33	-	7	12	-	-	9	1	6	1	373
2023	-	1	49	2	27	11	35	-	-	-	-	27	13	3	4	-	341
year	Average Cover (%)																
1998	0.0	0.5	4.7	0.0	0.2	-	0.6	-	0.0	-	-	-	0.3	0.0	-	-	20.1
2003	-	0.2	2.9	0.4	0.1	-	0.0	-	-	0.0	0.0	-	0.4	0.0	0.0	0.0	15.7
2008	0.0	0.0	2.6	0.4	0.3	0.0	0.7	-	-	0.0	-	-	0.8	-	-	-	12.6
2013	0.0	-	0.3	0.2	0.5	0.2	1.4	0.0	0.1	0.0	0.0	-	0.3	0.2	0.0	-	13.9
2018	0.0	-	0.6	0.5	0.9	0.1	1.2	-	0.1	0.1	-	-	0.3	0.0	0.0	0.0	19.4
2023	-	0.0	2.2	0.0	0.8	0.0	0.9	-	-	-	-	1.2	0.3	0.0	0.4	-	16.4

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

**Table 22-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis (rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chenopodium album <sup>a</sup> (lambsquarters)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Erigeron aphanactis <sup>ai</sup> (rayless shaggy fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hackelia patens (spotted stickseed)	Lactuca serriola <sup>ai</sup> (prickly lettuce)
year	Nested Frequency																
1998	10	-	-	-	6	3	-	-	-	-	-	-	-	2	-	2	4
2003	-	-	1	7	3	-	-	-	-	-	2	-	-	1	-	-	-
2008	8	-	-	1	7	1	2	-	3	-	4	-	-	4	8	-	-
2013	28	-	22	9	10	2	15	2	3	15	-	-	-	4	24	-	-
2018	2	-	-	7	4	-	2	-	5	-	3	-	21	-	-	-	-
2023	7	31	2	29	4	8	7	1	-	-	3	3	4	5	121	-	-
year	Average Cover (%)																
1998	0.0	-	-	-	0.2	0.0	-	-	-	-	-	-	-	0.0	-	0.0	0.0
2003	-	-	0.0	0.0	0.1	-	-	-	-	-	0.0	-	-	0.0	-	-	-
2008	0.0	-	-	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-	-	0.1	0.0	-	-
2013	0.4	-	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	-	-	-	0.0	0.1	-	-
2018	0.0	-	-	0.0	0.0	-	0.0	-	0.0	-	0.0	-	0.1	-	-	-	-
2023	0.2	0.1	0.1	0.9	0.0	0.1	0.0	0.0	-	-	0.0	0.0	0.0	0.1	0.7	-	-

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

FORB SPECIES	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lithospermum ruderale (western stoneseed)	Lomatium (desertparsley)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orobanche fasciculata (clustered broomrape)	Packera multilobata (lobeleaf groundsel)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>at</sup> (yellow salsify)	Verbascum thapsus <sup>at</sup> (common mullein)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency														
1998	-	-	-	-	57	4	-	-	-	3	50	-	-	-	-
2003	-	5	-	-	30	3	22	-	-	4	-	-	-	-	8
2008	-	-	2	1	36	-	2	1	-	3	23	-	-	-	10
2013	41	-	18	-	54	1	239	-	3	20	22	1	7	5	23
2018	2	-	2	-	34	1	4	-	-	-	5	-	-	-	2
2023	11	-	24	-	29	5	241	-	-	19	21	9	-	-	17
year	Average Cover (%)														
1998	-	-	-	-	6.8	0.1	-	-	-	0.0	0.2	-	-	-	-
2003	-	0.0	-	-	2.3	0.0	0.1	-	-	0.0	-	-	-	-	0.0
2008	-	-	0.0	0.0	2.6	-	0.0	0.0	-	0.0	0.1	-	-	-	0.1
2013	0.4	-	0.1	-	1.9	0.0	0.7	-	0.0	0.1	0.0	0.0	0.1	0.0	0.5
2018	0.0	-	0.0	-	0.6	0.0	0.0	-	-	-	0.0	-	-	-	0.0
2023	0.1	-	0.1	-	2.9	0.3	1.5	-	-	0.2	0.1	0.2	-	-	0.2

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

**Table 22-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus ledifolius <sup>p</sup> (curl-leaf mountain mahogany)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca <sup>p</sup> (rubber rabbitbrush)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus ponderosa <sup>i</sup> (ponderosa pine)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)
year	Line Intercept Cover (%)									
1998	-	-	-	-	-	-	-	-	-	-
2003	7.3	-	0.1	-	-	1.4	0.2	-	0.4	1.2
2008	13.6	-	-	-	-	1.7	0.2	-	0.4	0.9
2013	14.8	-	-	-	-	-	-	-	0.5	1.3
2018	18.2	-	-	-	0.1	-	0	-	0.8	2.4
2023	32.7	-	-	0.2	-	-	-	-	0.7	1.6
year	Quadrat Cover (%)									
1998	3.8	0.1	-	-	-	0.8	0.4	-	0.2	0.2
2003	4.2	-	0.0	-	-	1.0	0.2	-	0.9	0.3
2008	6.7	-	-	-	-	1.0	0.0	-	1.0	0.3
2013	9.9	-	-	0.0	-	-	0.0	0.0	0.8	0.3
2018	17.5	-	-	0.0	0.0	-	0.1	-	0.9	1.3
2023	15.7	-	-	0.1	-	-	0.4	-	0.5	0.6

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



**Table 22-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	1240	20	26	60	14	31	0	3	56/65
2003	1240	-	10	68	23	24	11	2	69/77
2008	1980	120	25	62	13	35	2	5	62/97
2013	5800	3280	77	21	2	2	0	1	61/94
2018	8720	80	23	76	1	33	0	1	48/71
2023	8160	680	7	84	9	28	33	10	- / -
<b>Cercocarpus ledifolius<sup>P</sup> -- (curl-leaf mountain mahogany)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	100	0	59/56
2008	20	-	0	100	0	100	0	0	54/69
2013	20	-	0	100	0	0	100	0	47/45
2018	40	-	50	50	0	0	50	0	66/60
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	17/33
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
1998	20	-	0	100	0	0	0	0	14/25
2003	20	-	0	100	0	0	0	0	22/26
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	13/21
2018	20	-	0	100	0	100	0	0	15/26
2023	40	-	0	100	0	0	0	0	- / -
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	100	0	- / -
2008	20	-	0	100	0	0	100	0	13/19
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	100	0	0	0	100	0	- / -
2023	-	-	-	-	-	-	-	-	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	40	-	0	100	0	0	0	0	- / -
2003	20	-	0	100	0	0	0	0	- / -
2008	20	-	0	100	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	20	0	0	0	0	0	0	- / -
2023	-	20	0	0	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1998	140	20	0	86	14	0	0	14	15/31
2003	120	-	0	100	0	0	0	0	12/27
2008	40	20	0	50	50	0	0	50	12/26
2013	80	-	50	50	0	0	0	0	12/23
2018	60	-	0	100	0	0	0	0	13/33
2023	60	-	0	100	0	0	0	0	- / -

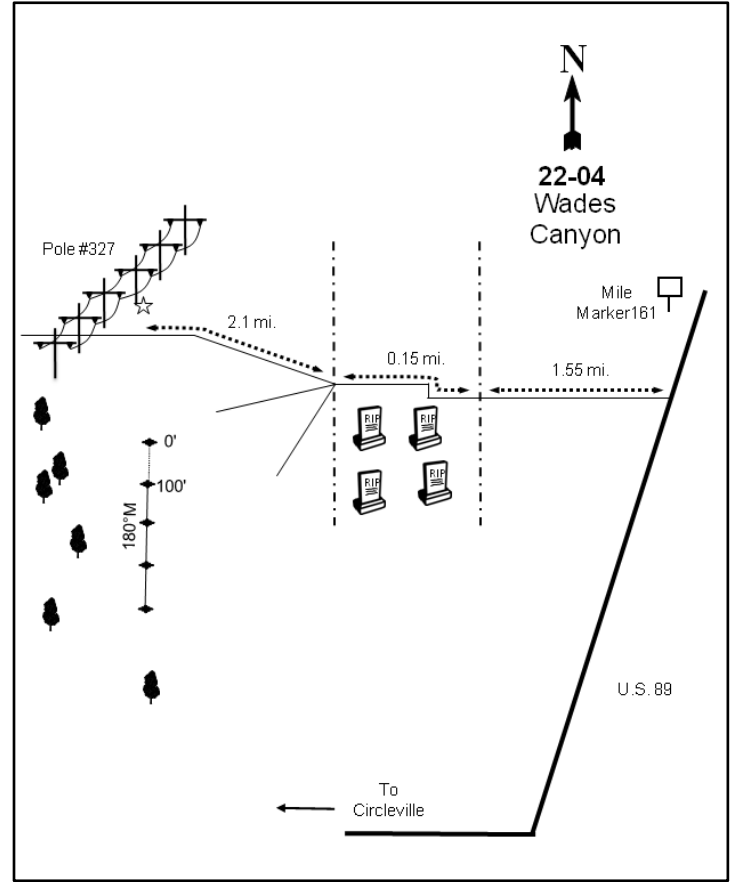
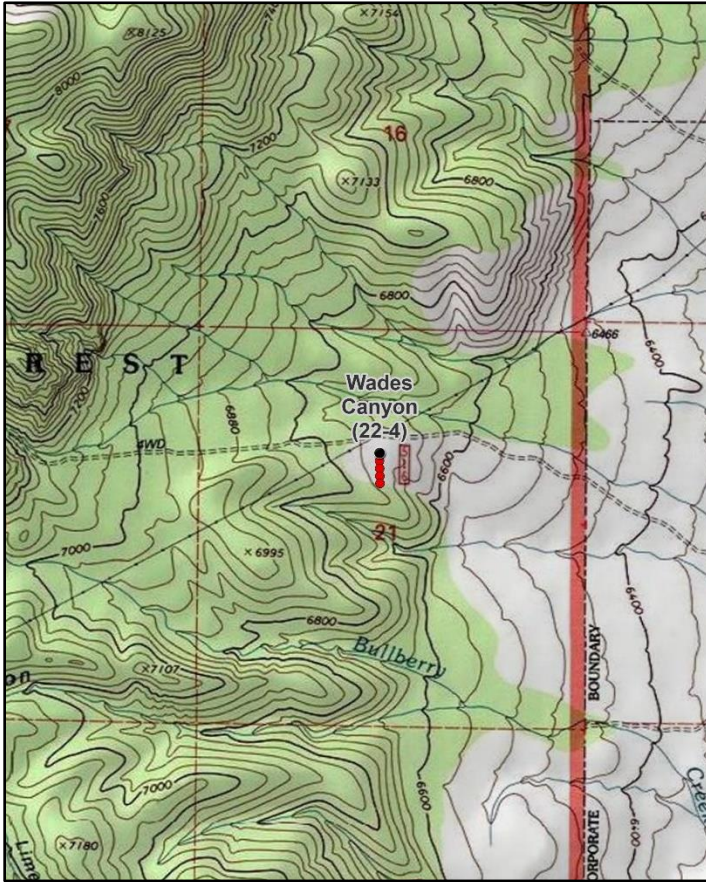
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pinus ponderosa<sup>t</sup> -- (ponderosa pine)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	20	0	0	0	0	0	0	-/-
2018	-	20	0	0	0	0	0	0	-/-
2023	20	-	100	0	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	120	-	0	100	0	0	100	0	29/65
2003	120	-	0	83	17	0	100	17	29/77
2008	120	-	0	100	0	17	83	0	26/75
2013	120	-	0	83	17	0	83	17	31/85
2018	160	-	0	88	13	13	63	13	41/89
2023	120	-	0	83	17	17	83	17	-/-
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	520	20	62	39	0	42	0	0	53/53
2003	960	-	4	96	0	0	0	0	60/54
2008	840	-	14	83	2	69	0	0	77/63
2013	620	-	13	77	10	23	16	26	84/49
2018	1160	-	10	86	3	17	0	2	88/76
2023	340	-	12	88	0	0	18	0	-/-

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

**Table 22-03.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	16	-	-	-	-	-	18.2
2018	5	100	-	-	-	-	1.0
2023	1	100	-	-	-	-	1.0
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	11	-	-	-	-	-	22.3
<b>Pinus ponderosa (ponderosa pine)</b>							
2018	24	-	33	67	-	-	4.3
2023	21	33	-	67	-	-	5.3

## WADES CANYON - STUDY NO. 22-4



### Location Information

USGS 7.5 min Map Info                      Circleville NW; Township 30S, Range 4W, Section 21  
 GPS (0' Stake)                                NAD 83 UTM ZONE 12, 384641 East 4227555 North

### Transect Information

Browse Tag # (0' Stake)                      7045  
 Transect Bearing                              168° magnetic  
 Length    400ft  
 Belt Placement                                Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
 Belt Marker Placement                      Standard

### Directions to Site

From 300 West and Main Street in Circleville, travel north on 300 West for 0.4 miles to 400 North. Turn west and go 1.55 miles through the north end of Circleville to a jog in the road. Continue west past the jog for 0.15 miles to the Circleville cemetery. Drive around the cemetery to the northeast corner of the cemetery. From the corner, a faint road begins at a 45-degree angle to the northwest. Proceed up this road 2.1 miles to the point where it crosses under a high tension powerline: stop here. The pole (#327) nearest the road has a red browse tag #7046 attached under a yellow reflector. From this powerpole, walk 300 feet due south to the first frequency baseline stake. The 0-foot stake is a 2-1/2 foot tall rebar tagged #7045. An unmarked pellet group transect is also in the vicinity.

### Site Information

Land Ownership                                Federal  
 Land Administrator                          USFS  
 Allotment                                        Circleville Allotment  
 Elevation                                        6,700ft (2,042m)  
 Aspect    East  
 Slope    4-8%  
 Sample Dates                                  07/02/1998, 07/18/2003, 06/25/2008, 05/30/2013, 07/02/2018, 07/06/2023

**Wildlife Habitat and Vegetation History**

**Table 22-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 22-04.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2018	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2023	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II

**Site Notes**

The DWR Wades Canyon pellet group transect located nearby showed that deer use increased from 3 deer days use/acre (8 ddu/ha) in 1976-77 to 17 (42 ddu/ha) in 1980-81, with a five-year average of 12 days use/acre (30 ddu/ha). Deer use had increased to 31 days use/acre (77 ddu/ha) by 1984-85, with a five-year average between 1981 and 1985 of 24 deer days use/acre (59 ddu/ha) (Jense et al. 1985). Between 1986 and 1990, the trend continued to increase with an average of 27 deer days use/acre (67 ddu/ha). It appears that 1990 was the last time the permanent pellet group transect was read.

**Soils**

**Table 22-04.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.1	42.0	31.4	26.6	3.0	8.8	96.0	0.7	07/02/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                    12 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.

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been the dominant shrub species on this study site since 1985 (Photos, Pre-1992 Data, Table 22-04.12, Table 22-04.13). The herbaceous understory has consisted of mostly native species that are moderately diverse, with Indian ricegrass (*Achnatherum hymenoides*) contributing the most cover of any single species in most sample years since 1998. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been sampled with low frequency and cover values in many years (Table 22-04.10). Both annual and perennial forbs have generally remained rare (Table 22-04.7, Table 22-04.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have gradually exhibited an overall increase in density and the site was considered to be within Phase I transitioning to Phase II of woodland succession as of the 2023 sample year (Table 22-04.4, Table 22-04.12, Table 22-04.14). Without a tree-removing disturbance, the site will likely continue to progress through the phases of woodland succession, potentially becoming a pinyon and juniper-dominated community with a significantly reduced shrub and herbaceous component.

Deer winter range condition has ranged between very poor and fair since 1998. As of 2023, deer winter range condition was considered to be poor to fair. Improvement to deer wintering range can be accomplished through efforts that reduce decadence and increase reproduction in the preferred browse community; diversifying and increasing cover of native perennial forbs and grasses while reducing cheatgrass would also improve winter range conditions (Table 22-04.15). In addition, the sagebrush component of this site could provide valuable browse for elk during the winter (Table 22-04.3; Wambolt, 1996). However, pellet group data indicates that elk presence has been low since 2013; deer presence was considered to be moderate in 2023, but does have a history of a high presence (Table 22-04.9).

**Trend Summary Tables**

**Table 22-04.6 - 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
1998	11.3	9.0	1.4	-	-	0.1
2003	8.5	8.1	2.0	6.2	8.2	3.4
2008	6.5	6.0	1.5	8.8	8.2	2.7
2013	9.0	6.1	1.8	10.7	8.1	3.3
2018	8.6	8.0	2.0	10.7	5.2	4.4
2023	8.7	7.8	2.8	14.0	8.0	5.9

**Table 22-04.7 - 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
1998	1	292	-	199	0.0	12.9	-	3.8
2003	5	199	254	53	0.0	5.3	2.3	0.6
2008	6	228	2	64	0.0	7.4	0.0	0.3
2013	43	278	2	101	0.2	9.6	0.0	1.0
2018	-	247	-	65	-	9.8	-	0.5
2023	33	218	49	28	0.3	9.4	0.2	0.1

**Table 22-04.8 - 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
1998	6.9	2.4	26.3	30.3	17.5	34.6
2003	11.2	4.2	26.3	24.4	16.0	27.0
2008	8.3	3.3	29.0	33.4	12.1	24.5
2013	7.6	4.1	29.1	28.3	13.0	28.6
2018	6.7	6.1	31.7	39.2	22.8	27.3
2023	6.5	2.3	26.5	22.7	30.1	27.9

**Table 22-04.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	-	24	-	18
2003	-	31	2	10
2008	-	63	10	92
2013	-	27	2	1
2018	-	12	1	31
2023	-	19	2	5
Year	Days Use Per Acre (ha)			
1998	0.7 (1.8)	42.2 (104.3)	-	-
2003	-	156.2 (385.7)	3.4 (8.3)	-
2008	-	119.3 (294.6)	14.7 (36.4)	-
2013	2.9 (7.2)	49.6 (122.5)	4.0 (9.9)	-
2018	-	16.8 (41.4)	-	-
2023	0.7 (1.8)	35.5 (87.7)	2.0 (5.0)	-

**Table 22-04.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)
year	Nested Frequency				
1998	169	1	196	-	-
2003	154	5	76	-	-
2008	164	6	130	3	-
2013	185	43	155	1	5
2018	163	-	71	16	29
2023	156	33	68	10	6
year	Average Cover (%)				
1998	5.3	0.0	7.7	-	-
2003	4.8	0.0	0.6	-	-
2008	5.2	0.0	2.1	0.1	-
2013	5.6	0.2	3.9	0.0	0.1
2018	6.1	-	2.2	0.7	0.8
2023	6.8	0.3	2.1	0.4	0.0

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

**Table 22-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Castilleja angustifolia (northwestern Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Delphinium ×occidentale (western larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron aphanactis <sup>a</sup> (rayless shaggy fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Mentzelia <sup>a</sup> (blazingstar)	Phlox hoodii (spiny phlox)	Physaria chambersii (Chambers' twinpod)
year	Nested Frequency														
1998	-	-	12	-	3	-	-	-	123	-	-	-	-	92	34
2003	-	-	2	-	-	1	62	-	2	-	227	13	13	49	-
2008	-	-	17	-	-	-	-	-	19	8	-	-	2	21	3
2013	4	-	2	2	-	-	2	-	43	-	-	2	-	35	31
2018	7	1	21	-	-	-	-	-	2	-	-	-	-	23	14
2023	-	-	11	-	-	-	7	2	4	-	41	-	-	10	3
year	Average Cover (%)														
1998	-	-	0.1	-	0.0	-	-	-	1.2	-	-	-	-	2.4	0.1
2003	-	-	0.0	-	-	0.0	0.3	-	0.0	-	1.8	0.1	0.1	0.5	-
2008	-	-	0.0	-	-	-	-	-	0.1	0.0	-	-	0.0	0.2	0.0
2013	0.0	-	0.0	0.0	-	-	0.0	-	0.4	-	-	0.0	-	0.4	0.2
2018	0.0	0.0	0.1	-	-	-	-	-	0.0	-	-	-	-	0.2	0.1
2023	-	-	0.1	-	-	-	0.0	0.0	0.0	-	0.1	-	-	0.1	0.0

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

**Table 22-04.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)					
1998	-	-	-	-	-	-
2003	6.2	8.1	0.1	2.2	-	1.2
2008	8.8	7.3	0.9	2.4	-	0.3
2013	10.7	7.2	0.9	2.4	-	0.9
2018	10.7	3.4	1.8	2.9	-	1.5
2023	14	7	1	4.3	-	1.6
year	Quadrat Cover (%)					
1998	11.3	8.2	0.8	0.8	0.0	0.6
2003	8.5	7.4	0.7	2.0	0.0	0.0
2008	6.5	5.5	0.4	1.5	0.1	0.0
2013	9.0	5.2	0.7	1.8	0.2	0.0
2018	8.6	5.0	2.5	2.0	0.5	0.0
2023	8.7	6.7	1.0	1.9	0.2	0.9

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

**Table 22-04.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	2920	60	8	31	61	26	4	67	49/69
2003	2920	-	5	48	47	56	11	21	47/61
2008	2940	20	4	37	59	37	22	33	42/64
2013	2560	380	5	77	19	45	33	12	44/73
2018	2620	-	7	71	22	41	7	8	49/80
2023	2840	11120	3	82	16	7	39	17	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1998	4840	-	7	88	5	1	0	3	30/42
2003	5860	-	1	97	2	0	0	0	34/42
2008	6140	-	1	55	43	40	1	7	24/33
2013	4560	80	11	89	0	16	16	3	19/37
2018	4640	-	2	91	8	33	49	8	14/27
2023	5280	-	6	91	3	0	0	3	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	1680	-	20	76	4	0	0	4	21/23
2003	6020	-	80	18	2	0	0	1	18/18
2008	2100	420	16	69	15	3	0	12	15/18
2013	3720	160	76	24	0	1	0	0	11/16
2018	3860	20	2	93	5	0	0	0	15/20
2023	3560	40	34	66	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	40	-	50	50	0	0	0	0	- / -
2003	60	-	0	100	0	0	0	0	- / -
2008	40	-	0	50	50	0	0	0	- / -
2013	60	-	0	67	33	33	0	0	- / -
2018	40	-	50	50	0	0	0	0	- / -
2023	40	-	0	100	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1998	40	-	0	100	0	0	0	0	13/27
2003	80	-	0	100	0	0	0	0	11/23
2008	60	-	0	100	0	0	0	0	12/22
2013	80	-	0	100	0	0	0	0	10/29
2018	140	-	0	100	0	0	0	0	9/35
2023	140	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	7/8
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
1998	40	-	0	100	0	0	0	0	- / -
2003	60	-	67	33	0	0	0	0	- / -
2008	80	-	75	25	0	0	0	0	- / -
2013	100	-	80	20	0	0	0	0	- / -
2018	140	20	86	14	0	0	0	0	- / -
2023	140	20	71	29	0	0	0	0	- / -

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

**Table 22-04.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

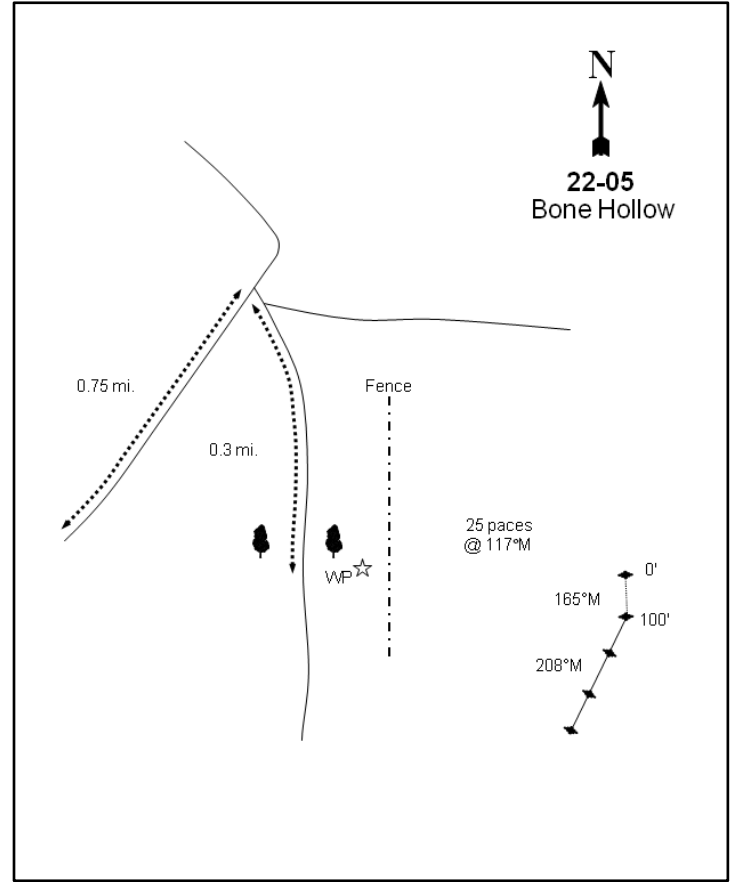
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	31	-	-	-	-	-	13.5
2003	56	-	37	32	26	5	9.7
2008	61	5	37	32	26	-	10.7
2013	59	-	37	26	26	11	11.1
2018	65	-	37	32	21	11	13.5
2023	60	-	33	39	28	-	15.8
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	33	-	-	-	-	-	11.6
2003	65	5	53	11	21	11	6.8
2008	67	25	35	25	15	-	5.6
2013	67	25	40	15	15	5	6.5
2018	89	37	26	21	5	11	5.4
2023	89	15	45	25	10	5	6.2



**Table 22-04.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	14.1	-3.3	4.1	25.8	0.0	7.7	0.0	<b>48.4</b>	Poor-Fair
2003	7.8	0.8	2.4	10.7	0.0	1.1	0.0	<b>22.7</b>	Very Poor
2008	11.0	-2.6	2.1	14.9	0.0	0.6	0.0	<b>25.9</b>	Very Poor
2013	13.4	9.4	2.4	19.3	-0.1	2.1	0.0	<b>46.3</b>	Poor
2018	13.4	8.4	3.5	19.6	0.0	0.9	0.0	<b>45.7</b>	Poor
2023	17.5	10.4	1.4	18.8	-0.2	0.3	0.0	<b>48.2</b>	Poor-Fair

## BONE HOLLOW - STUDY NO. 22-5

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Black Ridge SW; Township 29S, Range 7W, Section 12  
NAD 83 UTM ZONE 12, 360382 East 4240689 North

**Transect Information**

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

7048  
165° magnetic (Lines 2-4: 208° magnetic )  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

From the intersection of North Creek Road and SR-153 on the east side of Beaver, go north for 1.95 miles, past an irrigation pond on the left, to a gravel pit on the right. On the south side of the gravel pit a good dirt road goes northeast up the bottom of a draw (ignore the numerous other small dirt roads): drive up this road for 0.75 miles to a fork. Turn right onto another major dirt road and travel south for 0.3 miles. Look for a fencepost 50 feet to the left (east) that is not part of the fence (30 feet north of metal cross posts). The fencepost marks the start of a pellet group transect. Walk 25 paces at 117 degrees magnetic from the witness post to the 0-foot stake which is marked by a 3-foot rebar tagged #7048.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	NORTH CREEK
Elevation	6,390ft (1,948m)
Aspect	South
Slope	5%
Sample Dates	06/15/1998, 06/17/2003, 06/12/2008, 05/29/2013, 06/12/2018, 06/14/2023

**Table 22-05.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Indian Creek	3001	October 2014	3160
Chaining - Two-Way Ely	Indian Creek	3001	November 2014-February 2015	2790

**Table 22-05.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Indian Creek			Aerial	Oct 2014	3166
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	2.10	1.88
G	Agropyron cristatum	Crested Wheatgrass	Hycrest II	0.49	0.42
G	Elymus wawawaiensis	Snake River Wheatgrass	Discovery	1.01	0.91
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.81	0.76
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	0.12	0.10
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky II	0.90	0.76
F	Helianthus annuus	Annual Sunflower	Box Elder UT	0.10	0.08
F	Lactuca serriola	Prickly Lettuce		0.01	0.00
F	Linum perenne	Blue Flax	Appar	0.11	0.09
F	Medicago sativa	Alfalfa	Ladak	0.51	0.48
F	Melilotus officinalis	Yellow Sweetclover		0.39	0.37
F	Onobrychis viciifolia	Sainfoin	Eski	0.51	0.49
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery UT	0.01	0.01
F	Penstemon palmeri	Palmer Penstemon	Washington UT	0.01	0.01
F	Penstemon palmeri	Palmer Penstemon	Lincoln NV	0.03	0.01
F	Sanguisorba minor	Small Burnet		2.01	1.66
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.30	0.13

Mix Name			Application Type	Application Date	Acres
Indian Creek Dribbler			Dribbler	Dec 2014	3166
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.10	0.09
S	Purshia tridentata	Bitterbrush	Rocky Mountain	0.11	0.07

Mix Name			Application Type	Application Date	Acres
Indian Creek Kochia			Aerial	Feb 2015	3155
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak +	0.51	0.47
S	Bassia prostrata	Forage Kochia	Millard UT	0.16	0.12
S	Bassia prostrata	Forage Kochia	Millard UT	0.24	0.18

**Wildlife Habitat and Vegetation History****Table 22-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 22-05.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
1991	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
1998	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Mountain Big Sagebrush/Pinyon-Juniper	Phase II
2013	Mountain Big Sagebrush/Pinyon-Juniper	Phase II
2018	Perennial Grass/Mountain Big Sagebrush	Phase I
2023	Perennial Grass/Mountain Big Sagebrush	Phase I

**Site Notes**

There are numerous tall rebar posts in the vicinity of the transect. Use the GPS to locate the actual stakes; the 0 and 100-foot stakes are tall rebar posts, while the 200, 300, and 400-foot stakes are quarter-high stakes.

**Soils****Table 22-05.5 - 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 Clay Loam	6.7	52.4	23.1	24.5	2.6	8.5	96.0	0.7	06/15/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

From study establishment in 1985 through the 2013 sample year, this site existed as a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), twoneedle pinyon (*Pinus edulis*), and Utah juniper (*Juniperus osteosperma*) (Photos, Pre-1992 Data, Table 22-05.12, Table 22-05.13). The herbaceous understory was comparatively sparse, with annual grasses -- namely the introduced species cheatgrass (*Bromus tectorum*) -- or perennial grasses as the dominant component (Table 22-05.7, Table 22-05.10). As twoneedle pinyon and Utah juniper increased in size and density over this sample period, sagebrush decreased in density and cover. The plant community would have likely continued to follow this trend, progressing in woodland succession and exhibiting a gradual loss of the shrub and herbaceous understory. However, a chaining and seeding treatment in late 2014/early 2015 removed most of the trees (Table 22-05.1). This disturbance allowed the community to transition into one dominated by mainly native perennial grasses, such as Indian ricegrass (*Achnatherum hymenoides*) and needle and thread (*Hesperostipa comata*), and mountain big sagebrush. This study site will likely remain in a similar state in the future with the possibility of sagebrush increasing over time. However, one should note that smaller trees do remain in the area, indicating the potential for infilling, and with the gradual decrease in sagebrush density a future ecological transition could take place (Photos, Table 22-05.14). In addition, cheatgrass has increased in cover each sample year following treatment (Table 22-05.10), and may pose a threat to the ecological resiliency of this site if it continues to increase in the future.

Deer winter range condition has ranged between very poor and fair since 1998. In 2023, deer winter range condition was considered to be fair. Improvement to deer wintering range can be accomplished through efforts that support preferred browse reproduction and increase cover while reducing cheatgrass (Table 22-05.15). Pellet transect data indicates that deer presence was high in 2023 (Table 22-05.9).

**Trend Summary Tables****Table 22-05.6 - 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
1998	17.3	0.1	6.9	-	-	1.0
2003	15.3	0.1	11.5	11.9	0.2	17.6
2008	12.3	0.0	9.3	9.9	-	19.3
2013	10.1	0.0	12.5	10.8	-	25.5
2018	2.5	0.2	1.2	3.6	-	2.1
2023	9.3	0.2	2.4	8.1	-	2.6

**Table 22-05.7 - 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
1998	475	160	45	90	20.1	4.5	0.2	0.8
2003	214	151	202	48	2.8	5.0	2.3	0.3
2008	10	142	229	36	0.0	6.2	0.4	0.4
2013	367	217	329	62	4.0	7.8	2.9	0.9
2018	309	228	242	71	8.3	14.4	1.9	1.8
2023	310	214	354	92	10.2	16.9	4.9	2.3

**Table 22-05.8 - 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
1998	14.2	0.3	48.2	27.1	6.0	40.8
2003	12.2	0.1	34.6	31.1	3.4	35.0
2008	9.2	0.0	45.0	33.2	2.3	28.7
2013	7.2	-	48.2	24.8	2.8	42.1
2018	15.9	-	57.4	13.2	5.1	28.2
2023	22.0	-	42.0	13.7	4.7	38.2

**Table 22-05.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	1	62	-	33
2003	-	27	-	4
2008	-	34	5	81
2013	-	44	4	14
2018	1	14	2	41
2023	5	18	1	23
Year	Days Use Per Acre (ha)			
1998	-	93.2 (230.1)	-	-
2003	-	132.0 (326.1)	-	-
2008	-	150.1 (370.8)	2.7 (6.6)	-
2013	-	28.1 (69.5)	-	-
2018	5.8 (14.3)	17.4 (43.0)	-	-
2023	-	56.3 (139.0)	-	-

**Table 22-05.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency											
1998	37	-	13	475	111	12	-	2	-	1	-	-
2003	37	-	13	213	94	14	-	10	-	0	1	1
2008	43	-	13	10	74	15	-	1	-	2	-	-
2013	62	-	19	367	61	64	5	29	-	3	16	1
2018	82	6	24	309	87	78	2	15	1	3	7	-
2023	67	38	1	310	67	69	-	12	3	7	20	-
year	Average Cover (%)											
1998	1.5	-	0.1	20.1	2.2	0.6	-	0.0	-	0.0	-	-
2003	1.9	-	0.4	2.8	2.4	0.3	-	0.1	-	0.0	0.0	0.0
2008	2.9	-	0.4	0.0	1.7	0.8	-	0.0	-	0.4	-	-
2013	3.3	-	0.9	4.0	1.0	1.8	0.0	0.5	-	0.4	0.1	0.0
2018	4.5	0.3	1.5	8.3	2.8	4.6	0.0	0.4	0.0	0.2	0.2	-
2023	6.6	1.5	0.0	10.2	2.8	4.7	-	0.2	0.1	0.3	0.7	-

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

**Table 22-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria dimorpha (low pussytoes)	Arabis demissa (nodding rockcross)	Astragalus (milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Camelina microcarpa <sup>ai</sup> (littletop false flax)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)
year	Nested Frequency																
1998	17	9	4	5	18	-	-	37	5	5	-	-	-	3	-	3	-
2003	-	-	-	5	-	-	3	88	-	12	-	8	9	9	10	-	8
2008	1	-	3	-	9	-	-	225	-	3	-	6	-	-	-	-	2
2013	7	70	6	-	-	-	6	322	-	10	-	-	1	2	6	-	-
2018	1	179	-	1	1	-	-	146	-	9	5	-	9	-	-	-	-
2023	22	302	2	-	-	1	1	258	-	8	-	-	4	1	-	-	-
year	Average Cover (%)																
1998	0.1	0.0	0.0	0.0	0.1	-	-	0.2	0.0	0.0	-	-	-	0.0	-	0.0	-
2003	-	-	-	0.0	-	-	0.0	0.8	-	0.0	-	0.0	0.1	0.0	0.0	-	0.0
2008	0.0	-	0.0	-	0.0	-	-	0.4	-	0.0	-	0.0	-	-	-	-	0.0
2013	0.0	0.2	0.0	-	-	-	0.0	2.7	-	0.2	-	-	0.0	0.0	0.0	-	-
2018	0.0	1.2	-	0.0	0.0	-	-	0.4	-	0.5	0.1	-	0.0	-	-	-	-
2023	0.1	3.7	0.0	-	-	0.0	0.0	1.0	-	0.1	-	-	0.0	0.0	-	-	-

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

FORB SPECIES										
<i>Gilia inconspicua</i> <sup>a</sup> (shy gilia)										
<i>Lappula occidentalis</i> <sup>a</sup> (flatspine stickseed)										
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)										
<i>Packera multilobata</i> (lobeleaf groundsel)										
<i>Phlox austromontana</i> (mountain phlox)										
<i>Polygonum douglasii</i> <sup>a</sup> (Douglas' knotweed)										
<i>Sanguisorba minor</i> <sup>a</sup> (small burnet)										
<i>Schoenocrambe linifolia</i> (flaxleaf plainsmustard)										
<i>Silene antirrhina</i> <sup>a</sup> (sleepy silene)										
<i>Sphaeralcea coccinea</i> (scarlet globemallow)										
year	Nested Frequency									
1998	-	-	1	-	28	-	-	-	-	18
2003	145	6	5	-	5	-	-	3	1	20
2008	-	3	-	1	7	-	-	-	-	15
2013	-	4	7	3	6	1	-	-	2	30
2018	-	9	-	-	8	-	3	-	5	43
2023	8	12	-	-	1	-	-	-	6	61
year	Average Cover (%)									
1998	-	-	0.0	-	0.2	-	-	-	-	0.2
2003	1.3	0.0	0.0	-	0.0	-	-	0.0	0.0	0.1
2008	-	0.0	-	0.1	0.0	-	-	-	-	0.2
2013	-	0.0	0.0	0.0	0.2	0.0	-	-	0.0	0.4
2018	-	0.2	-	-	0.1	-	0.0	-	0.1	0.9
2023	0.1	0.0	-	-	0.0	-	-	-	0.0	2.0

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

**Table 22-05.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES										
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)										
<i>Atriplex canescens</i> <sup>p</sup> (fourwing saltbush)										
<i>Brickellia californica</i> (California brickellbush)										
<i>Ericameria nauseosa</i> (rubber rabbitbrush)										
<i>Gutierrezia sarothrae</i> (broom snakeweed)										
<i>Juniperus osteosperma</i> <sup>a</sup> (Utah juniper)										
<i>Opuntia</i> (pricklypear)										
<i>Pediocactus simpsonii</i> (mountain ball cactus)										
<i>Pinus edulis</i> <sup>t</sup> (twoneedle pinyon)										
<i>Sclerocactus</i> (fishhook cactus)										
year	Line Intercept Cover (%)									
1998	-	-	-	-	-	-	-	-	-	-
2003	11.9	-	-	-	-	12.4	0.2	-	5.2	-
2008	9.9	-	-	-	-	15.3	-	-	4	-
2013	10.8	-	-	-	-	19.3	-	-	6.2	-
2018	3.6	-	-	-	0	0.9	-	-	1.2	-
2023	8.1	-	-	-	-	1.5	-	-	1.1	-
year	Quadrat Cover (%)									
1998	17.3	-	-	0.0	0.1	4.3	0.0	-	2.6	0.0
2003	15.1	0.1	-	-	-	7.5	0.1	-	4.0	-
2008	12.3	-	-	-	-	5.6	-	0.0	3.8	-
2013	10.1	-	-	-	0.0	7.3	-	-	5.2	0.0
2018	2.5	-	-	-	0.2	1.1	-	0.0	0.1	-
2023	9.3	-	0.0	-	0.2	2.1	-	0.0	0.3	-

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

**Table 22-05.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	4680	80	4	61	35	59	18	8	44/70
2003	3920	-	0	54	46	32	37	12	48/68
2008	3140	320	3	38	59	33	19	20	57/76
2013	3040	80	9	68	23	57	26	16	49/79
2018	1960	20	35	60	5	3	1	4	40/51
2023	1660	-	5	93	2	30	16	5	- / -
<b>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	20	-	100	0	0	0	100	0	- / -
2023	20	-	0	100	0	0	100	0	- / -
<b>Bassia prostrata<sup>Pi</sup> -- (forage kochia)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	40	-	50	50	0	0	100	0	8/12
2023	-	-	-	-	-	-	-	-	- / -
<b>Brickellia californica -- (California brickellbush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	100	0	0	0	0	0	- / -
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1998	20	-	0	100	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	27/30
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	0	0	14/15
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	15/42
2023	-	-	-	-	-	-	-	-	- / -



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	100	80	0	100	0	0	0	0	18/22
2003	20	-	100	0	0	0	0	0	21/20
2008	60	-	0	100	0	0	0	0	13/13
2013	320	-	13	88	0	0	0	0	16/19
2018	320	-	19	81	0	0	0	0	20/28
2023	80	-	50	50	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	240	180	67	33	0	0	0	0	- / -
2003	280	20	57	43	0	0	0	0	- / -
2008	280	20	71	29	0	0	0	0	- / -
2013	300	20	67	33	0	0	0	0	- / -
2018	200	-	50	50	0	0	0	0	- / -
2023	260	-	62	39	0	8	8	8	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Opuntia -- (pricklypear)</b>									
1998	80	-	0	100	0	0	0	0	11/22
2003	60	-	0	100	0	0	0	0	11/21
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	10/28
2018	-	-	-	-	-	-	-	-	12/26
2023	-	-	-	-	-	-	-	-	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	20	0	0	0	0	0	0	3/6
2013	20	-	0	100	0	0	0	0	3/9
2018	20	-	0	100	0	0	0	0	3/7
2023	20	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
1998	40	-	100	0	0	0	0	0	- / -
2003	140	-	86	14	0	0	0	0	- / -
2008	120	-	83	17	0	0	0	17	- / -
2013	100	-	60	40	0	0	0	0	- / -
2018	80	-	50	50	0	0	0	0	- / -
2023	80	-	100	0	0	0	0	0	- / -
<b>Sclerocactus -- (fishhook cactus)</b>									
1998	20	-	0	100	0	0	0	0	5/11
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	4/6

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

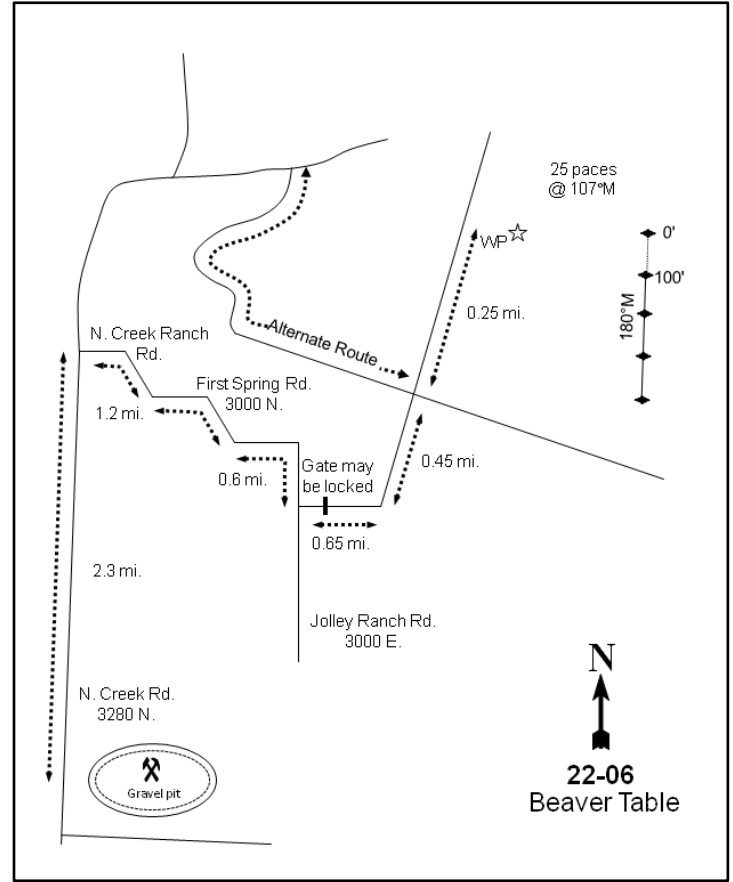
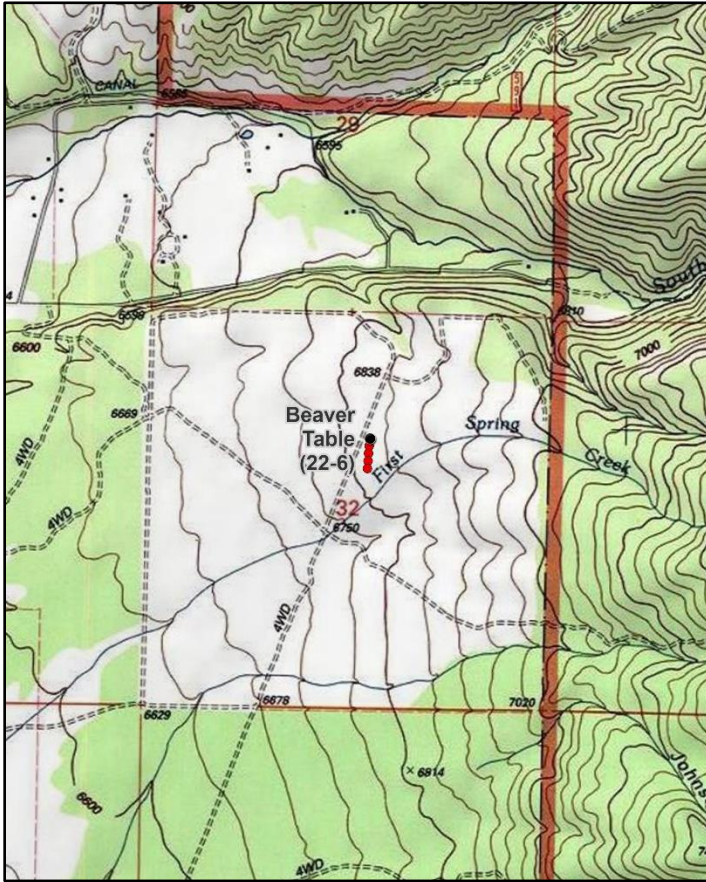
**Table 22-05.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	152	-	-	-	-	-	11.5
2003	196	-	65	15	10	10	8.0
2008	221	10	50	10	15	15	13.6
2013	132	-	75	19	6	-	6.3
2018	73	-	94	6	-	-	3.9
2023	81	-	65	35	-	-	5.1
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	41	-	-	-	-	-	7.6
2003	61	11	39	28	6	17	7.7
2008	58	5	47	21	21	5	10.3
2013	47	-	27	33	27	13	12.1
2018	19	-	67	33	-	-	4.3
2023	20	-	75	25	-	-	4.4

**Table 22-05.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	21.6	4.6	2.2	9.0	-15.1	1.6	0.0	<b>23.9</b>	Very Poor
2003	14.9	1.1	0.0	10.0	-2.1	0.6	0.0	<b>24.5</b>	Very Poor
2008	12.4	-2.6	1.6	12.4	0.0	0.8	0.0	<b>24.5</b>	Very Poor
2013	13.5	8.1	4.6	15.7	-3.0	1.7	0.0	<b>40.6</b>	Poor
2018	4.5	0.0	0.0	28.9	-6.2	3.6	0.0	<b>30.8</b>	Very Poor
2023	10.1	14.3	2.4	30.0	-7.6	4.5	0.0	<b>53.7</b>	Fair

## BEAVER TABLE - STUDY NO. 22-6



### Location Information

USGS 7.5 min Map Info Black Ridge NE; Township 28S, Range 6W, Section 32  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 364158 East 4243887 North

### Transect Information

Browse Tag # (0' Stake) 7049  
 Transect Bearing 180° magnetic  
 Length 400ft  
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
 Belt Marker Placement Belt 5: 2ft

### Directions to Site

From the corner of North Creek Road and SR-153 in Beaver, travel north for 1.95 miles to a gravel pit on the right. From the gravel pit, continue on North Creek Road for 2.3 miles. Turn onto North Creek Ranch Road and continue for 1.2 miles, then turn onto First Spring Road (3000 North) and proceed for 0.6 miles. Turn onto Jolley Ranch Road (3000 North) and take the first left. Continue for 0.35 miles and go through the gate (if it is locked, use an alternate route); there should be a WMA boundary to the south. Continue east past the boundary fence for 0.25 miles to another fenceline with a fork just beyond it. Proceed straight (east) for another 0.25 miles to a junction with a road going north-south, then turn left (north). Drive for 0.45 miles to a junction with a road going from east to west. Travel north past this junction for 0.2 miles to a witness post on the right (east) side of the road. From the witness post, walk 22 paces at 107 degrees magnetic to the 0-foot stake which is a rebar tagged #7049.

### Site Information

Land Ownership State  
 Land Administrator UDWR  
 Allotment NORTH CREEK  
 Elevation 6,870ft (2,094m)  
 Aspect West  
 Slope 3-5%  
 Sample Dates 06/29/1998, 06/18/2003, 06/12/2008, 06/03/2013, 06/11/2018, 06/14/2023

**Table 22-06.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Cable - Cable Unknown	-	-	1957	-
Seeding - Seed Unknown	-	-	1957	-
Hand Crew - Lop and Scatter	-	-	Between 2003 and 2008	-

**Wildlife Habitat and Vegetation History****Table 22-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 22-06.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2018	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2023	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II

**Site Notes**

Historic pellet group data from 1981-1997 is available from a DWR pellet group transect that is located near the study site (Jense, et al., 1985; Jense, et al., 1991; Evans, et al., 1997). A buck and a doe were bedded down on the site in 2003. The lop and scatter treatment was primarily on the west side of the road and only removed a few trees near the south end of the transect.

**Soils****Table 22-06.5 - 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	6.6	36.7	22.7	40.6	2.2	10.6	73.6	0.6	06/29/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      16 inches  
 NRCS Ecological Site    Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)  
 NRCS Ecological Site #    R047XB308UT  
 States and Transitions    No state and transition model is available for this ecological site.

When established in 1985, this study site was dominated by a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and broom snakeweed (*Gutierrezia sarothrae*); broom snakeweed decreased in subsequent sample years, but sagebrush has remained a dominant component of the plant community (Photos, Pre-1992 Data, Table 22-06.12, Table 22-06.13). Herbaceous understory vegetation has remained diverse and relatively stable over the study period with perennial grasses contributing a majority of the cover in most sample years. The introduced annual grass species cheatgrass (*Bromus tectorum*) has fluctuated in cover and frequency from year to year, but has remained rare in most study years since 2003 (Table 22-06.7, Table 22-06.10, Table 22-06.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have increased in size since study establishment. Some of the trees were lop and scattered between 2003 and 2008 (Table 22-06.1), but pinyon and juniper have been codominant vegetation components since 2003: the site has been considered to be within Phase I transitioning to Phase II of woodland succession since that time (Table 22-06.4, Table 22-06.12, Table 22-06.13, Table 22-06.14). This study will likely continue to progress in the phases of woodland succession without a tree-removing disturbance. In addition, cheatgrass may pose a risk to the resilience of the plant community should amounts increase following a major disturbance.

Deer winter range condition has ranged between poor and fair since 1998. Deer winter range condition was considered to be poor to fair in 2023. Improvement to deer wintering range can be accomplished through efforts that support preferred browse reproduction; diversifying and increasing cover of native perennial forbs and grasses while reducing cheatgrass would also improve winter range conditions (Table 22-06.15). In addition, the sagebrush component of this site could provide valuable browse for elk during the winter (Table 22-06.3; Wambolt, 1996). However, pellet group data indicates that elk pellet groups were not observed or that presence was low in all years since 1998. In contrast, deer presence has remained high over the same time period (Table 22-06.9).

## Trend Summary Tables

**Table 22-06.6 - 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
1998	16.9	4.1	0.8	-	-	0.1
2003	21.8	0.4	1.4	21.7	0.1	1.4
2008	17.6	0.5	0.1	24.6	0.4	1.0
2013	19.5	1.0	1.1	33.8	0.5	2.3
2018	23.0	1.0	2.0	23.3	0.2	3.7
2023	19.0	0.4	0.8	20.5	0.6	2.7

**Table 22-06.7 - 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
1998	414	181	47	111	11.1	7.4	0.1	1.1
2003	87	135	48	127	0.6	3.0	0.2	0.8
2008	28	124	211	47	0.1	3.3	0.7	0.2
2013	101	152	395	141	0.2	4.2	2.2	1.6
2018	13	168	179	52	0.1	4.2	0.8	0.6
2023	87	144	405	119	1.5	8.3	7.3	2.0

**Table 22-06.8 - 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
1998	18.0	0.0	46.8	11.9	9.7	41.5
2003	37.7	0.8	33.4	6.8	8.7	27.8
2008	21.9	0.3	41.5	19.4	7.0	24.6
2013	28.4	0.9	30.4	13.5	14.3	30.1
2018	35.6	1.2	36.3	13.2	11.8	27.6
2023	30.5	1.7	32.4	10.7	15.6	32.3

**Table 22-06.9 - 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				
1998	-	-	41	-	38
2003	-	-	31	-	6
2008	1	-	45	6	68
2013	-	-	25	-	24
2018	-	-	37	-	29
2023	-	-	45	7	18
Year	Days Use Per Acre (ha)				
1998	-	-	46.9 (115.9)	-	-
2003	2.9 (7.2)	-	71.1 (175.5)	-	-
2008	-	-	124.7 (307.9)	14.7 (36.4)	-
2013	-	-	52.3 (129.1)	3.4 (8.3)	-
2018	-	-	58.3 (144.0)	-	-
2023	-	17.4 (43.0)*	103.2 (254.9)	2.7 (6.6)	-

\*Pellets per acre (ha)

**Table 22-06.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus arvensis <sup>ai</sup> (field brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency										
1998	54	-	1	5	414	121	20	1	-	16	-
2003	35	-	3	5	84	63	43	2	-	6	-
2008	50	4	12	5	23	57	18	14	-	5	1
2013	37	-	3	-	101	47	39	-	43	1	-
2018	41	8	5	-	13	47	55	-	46	3	3
2023	27	-	4	2	85	57	51	3	18	18	-
year	Average Cover (%)										
1998	2.6	-	0.0	0.0	11.1	3.6	0.7	0.0	-	0.4	-
2003	1.1	-	0.0	0.0	0.6	1.3	0.6	0.0	-	0.0	-
2008	1.5	0.2	0.1	0.0	0.1	0.7	0.4	0.1	-	0.2	0.1
2013	0.6	-	0.0	-	0.2	1.0	1.2	-	1.2	0.1	-
2018	0.6	0.1	0.2	-	0.1	1.0	1.3	-	0.9	0.0	0.1
2023	2.0	-	0.3	0.0	1.5	2.4	2.3	0.1	0.4	0.7	-

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

**Table 22-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria dimorpha (low pussytoes)	Arabis demissa (nodding rockcross)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis occidentalis (largeflower hawkbeard)	Cymopterus purpureus (purple springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron (fleabane)	Eriogonum caespitosum (matted buckwheat)
year	Nested Frequency																
1998	7	5	6	6	8	4	-	0	-	6	-	-	-	-	34	-	-
2003	4	9	1	3	4	-	15	-	2	1	-	-	7	1	10	1	7
2008	7	199	1	-	-	-	8	1	4	-	-	-	2	-	-	-	-
2013	11	394	13	3	3	-	5	-	38	9	2	-	6	3	1	2	5
2018	-	169	9	-	2	-	-	3	12	5	-	-	-	-	-	-	10
2023	5	394	3	-	5	3	10	1	45	1	-	4	6	-	2	-	16
year	Average Cover (%)																
1998	0.0	0.0	0.0	0.0	0.2	0.0	-	0.0	-	0.0	-	-	-	-	0.1	-	-
2003	0.0	0.0	0.0	0.0	0.1	-	0.1	-	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0
2008	0.0	0.5	0.0	-	-	-	0.1	0.0	0.0	-	-	-	0.0	-	-	-	-
2013	0.0	2.1	0.1	0.0	0.0	-	0.0	-	0.1	0.1	0.0	-	0.0	0.0	0.0	0.0	0.2
2018	-	0.8	0.1	-	0.0	-	-	0.0	0.0	0.0	-	-	-	-	-	-	0.2
2023	0.0	7.1	0.2	-	0.0	0.1	0.0	0.0	0.1	0.0	-	0.2	0.1	-	0.0	-	0.3

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

FORB SPECIES	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	Lomatium nevadense (Nevada biscuitroot)	Lotus utahensis (Utah bird's-foot trefoil)	Machaeranthera canescens (hoary tansyaster)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon comarrhenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Trifolium gymnocarpon (hollyleaf clover)
year	Nested Frequency																
1998	-	6	-	-	2	-	-	1	10	12	1	-	47	9	23	-	-
2003	-	3	7	6	-	1	-	2	-	21	-	-	58	26	25	-	9
2008	-	-	7	-	-	10	-	-	-	-	-	-	16	2	18	2	-
2013	1	2	4	-	-	2	6	-	0	43	-	-	58	11	22	1	2
2018	-	1	-	1	-	-	-	-	-	1	-	-	19	1	8	-	3
2023	5	0	1	1	-	2	6	-	-	12	-	0	57	4	12	-	8
year	Average Cover (%)																
1998	-	0.1	-	-	0.0	-	-	0.0	0.2	0.1	0.0	-	0.2	0.0	0.3	-	-
2003	-	0.0	0.1	0.0	-	0.0	-	0.0	-	0.1	-	-	0.2	0.1	0.3	-	0.1
2008	-	-	0.1	-	-	0.0	-	-	-	-	-	-	0.0	0.0	0.1	0.0	-
2013	0.0	0.0	0.0	-	-	0.0	0.0	-	0.0	0.9	-	-	0.2	0.0	0.0	0.0	0.0
2018	-	0.1	-	0.0	-	-	-	-	-	0.0	-	-	0.1	0.0	0.0	-	0.0
2023	0.1	0.0	0.0	0.0	-	0.0	0.0	-	-	0.1	-	0.0	0.5	0.0	0.1	-	0.2

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

FORB SPECIES	Zigadenus paniculatus (foothill deathcamas)
year	Nested
1998	-
2003	-
2008	1
2013	3
2018	-
2023	-
year	Average Cover (%)
1998	-
2003	-
2008	0.0
2013	0.0
2018	-
2023	-

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

**Table 22-06.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)					
1998	-	-	-	-	-	-
2003	18.9	0.1	1.4	-	-	2.8
2008	23.1	0.4	0.9	-	0.1	1.5
2013	30.8	0.5	2.1	-	0.2	3
2018	19.8	0.2	3.5	-	0.2	3.5
2023	17.7	0.6	2.3	-	0.4	2.8
year	Quadrat Cover (%)					
1998	13.7	4.1	0.8	-	-	3.1
2003	17.7	0.4	1.4	-	-	4.0
2008	16.5	0.5	0.0	-	0.1	1.1
2013	16.8	1.0	1.0	-	0.1	2.7
2018	17.9	0.8	1.6	0.1	0.4	5.1
2023	16.3	0.4	0.4	-	0.4	2.7

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

**Table 22-06.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	5420	20	2	51	48	43	8	13	48/67
2003	5740	-	0	69	31	49	8	9	51/67
2008	4720	60	3	53	45	39	29	13	74/77
2013	4000	180	6	76	19	53	22	10	52/81
2018	4740	20	3	72	25	11	6	16	50/77
2023	3940	200	0	64	36	34	52	34	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	7640	360	31	69	0	0	0	0	32/29
2003	1600	60	26	68	6	0	0	0	19/16
2008	2880	60	4	94	1	0	0	0	15/14
2013	2280	40	53	47	0	0	0	0	18/19
2018	2600	-	12	87	1	0	0	1	15/15
2023	1220	300	28	72	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
1998	60	20	33	67	0	0	0	0	- / -
2003	60	-	0	100	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	40	-	0	100	0	0	0	0	- / -
2018	60	-	33	67	0	0	0	0	- / -
2023	60	-	33	33	33	33	0	33	- / -



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	13/7
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	11/27
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1998	-	-	-	-	-	-	-	-	18/48
2003	-	-	-	-	-	-	-	-	17/24
2008	-	-	-	-	-	-	-	-	16/34
2013	-	-	-	-	-	-	-	-	17/36
2018	-	-	-	-	-	-	-	-	14/32
2023	80	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	100	0	0	0	0	0	2/3
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	100	0	0	0	0	0	- / -
2023	20	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1998	20	20	100	0	0	0	0	0	- / -
2003	40	-	100	0	0	0	0	0	- / -
2008	60	-	33	67	0	0	0	0	- / -
2013	20	20	100	0	0	0	0	0	- / -
2018	20	20	100	0	0	0	0	0	- / -
2023	20	-	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	780	40	39	62	0	36	18	0	66/111
2003	600	-	0	73	27	10	83	13	63/87
2008	740	-	8	8	84	11	51	24	28/38
2013	540	100	22	63	15	33	48	11	49/79
2018	800	-	18	80	3	23	57	3	61/97
2023	640	-	6	44	50	13	81	53	- / -
<b>Ribes cereum var. cereum<sup>p</sup> -- (wax currant)</b>									
1998	100	-	0	100	0	0	0	0	31/41
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Yucca harrimaniae -- (Spanish bayonet)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	38/47

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

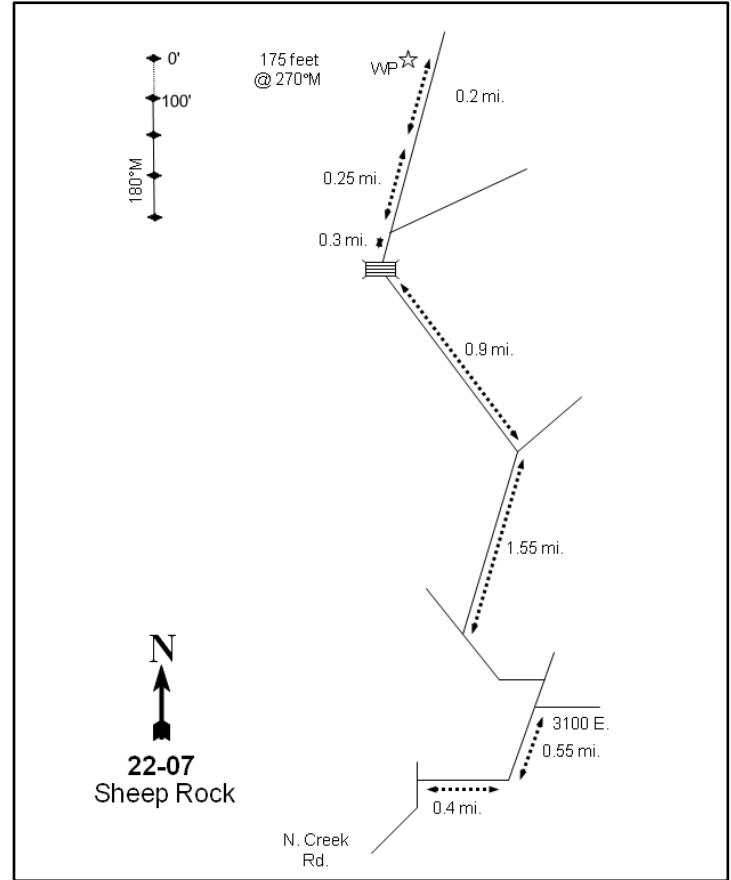
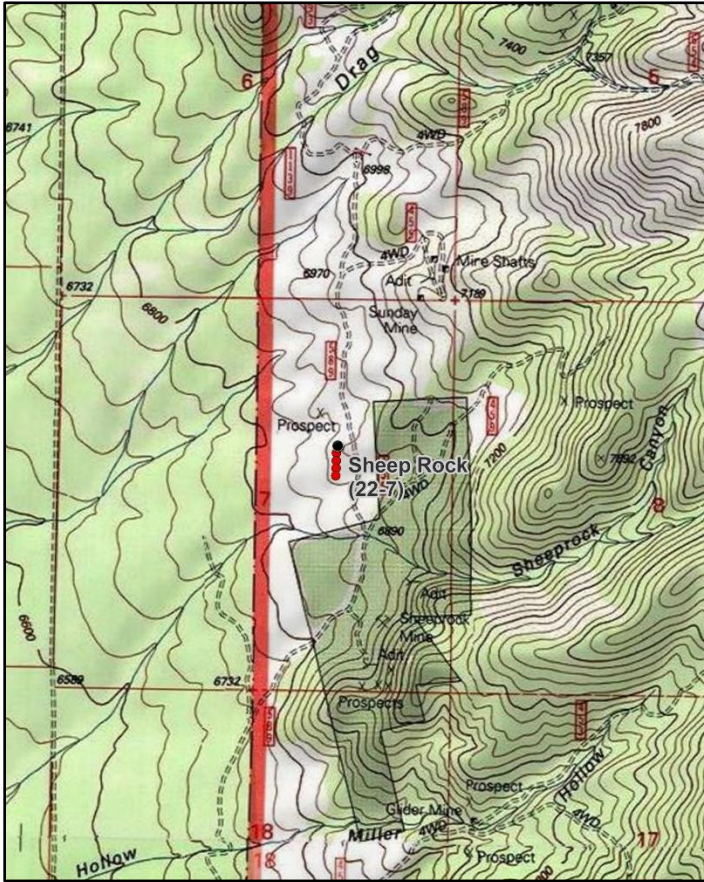
**Table 22-06.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	106	-	-	-	-	-	12.8
2003	95	-	-	30	45	25	11.7
2008	89	-	21	32	42	5	16.3
2013	90	-	16	37	32	16	17.4
2018	79	-	22	11	50	17	22.2
2023	60	-	11	16	32	42	24.5
<b>Pinus edulis (twoneedle pinyon)</b>							
2013	26	20	70	10	-	-	4.3
2018	22	8	38	54	-	-	5.4
2023	7	25	-	75	-	-	5.0

**Table 22-06.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	21.9	3.4	4.3	14.8	-8.4	2.2	0.0	<b>38.2</b>	Poor
2003	27.8	5.9	0.1	6.0	-0.5	1.6	0.0	<b>41.0</b>	Poor
2008	30.0	0.9	1.4	6.7	-0.1	0.5	0.0	<b>39.4</b>	Poor
2013	30.0	9.5	3.5	8.3	-0.2	3.3	0.0	<b>54.5</b>	Fair
2018	30.0	8.5	2.8	8.3	-0.1	1.3	0.0	<b>50.8</b>	Poor-Fair
2023	26.3	3.6	0.4	16.7	-1.1	3.9	0.0	<b>49.9</b>	Poor-Fair

## SHEEP ROCK - STUDY NO. 22-7

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Pole Mountain SW; Township 28S, Range 6W, Section 07  
NAD 83 UTM ZONE 12, 362916 East 4250193 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
Transect Bearing	180° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (35ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

**Directions to Site**

From the junction of SR-153 and North Creek Road (1200 East) east of Beaver, proceed north on North Creek Road for 5.0 miles to a fork (3800 North). Keep to the right on the pavement and continue 0.4 miles to another fork. Turn left onto 3100 East and drive for 0.55 miles, crossing a bridge, to a fork in the road with a "Sheep Rock" sign. Turn left and after 100 yards take a sharp bend to the left to stay on the good road. Drive about 200 yards and keep to the right at another fork. Continue for 0.175 miles and again keep right at a fork. Go 1.55 miles to a cattle guard and 0.15 miles beyond it to yet another fork. Turn to the left instead of crossing a cattle guard into a chained area. Drive 0.9 miles further to cross a cattle guard and enter the chained area (road #589). Go 0.3 miles to a fork and stay left. After 0.25 miles you will again enter directly into the chained area. Continue 0.2 miles into the chaining to a witness post on the left (west) side of the road. The frequency baseline starts 195 feet west of the witness post; the 0-foot baseline stake is a short rebar.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	North-Indian Allotment
Elevation	6,910ft (2,106m)
Aspect	West
Slope	5-10%
Sample Dates	06/15/1998, 06/18/2003, 06/03/2008, 06/03/2013, 06/12/2018, 06/13/2023

**Table 22-07.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Chain Unknown	-	-	Fall 1981	-
Seeding - Seed Unknown	-	-	Fall 1981	-
Fire - Wildfire	-	-	Between 1981 and 1984	-
Mechanical - Bullhog	-	-	Between 2009 and 2011	-

**Wildlife Habitat and Vegetation History****Table 22-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 22-07.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Perennial Grass	Phase I
1991	Perennial Grass	Phase I
1998	Perennial Grass	Phase I
2003	Perennial Grass	Phase I
2008	Perennial Grass/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Perennial Grass	Phase I
2018	Perennial Grass	Phase I
2023	Perennial Grass	Phase I

**Site Notes**

The 0 and 100-foot stakes were replaced in 2023; rebar is present on the 0 and 50-foot marks for all belts. After replacing the stakes, placement of belt 2 was shifted to 35 feet and 4 inches to align with the existing rebar. Belts should be placed based on the center and 0-foot rebar in future sample years. An elk shed antler was found on the site in 2013.

**Soils****Table 22-07.5 - 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	6.5	54.0	28.4	17.6	3.0	10.0	172.8	0.9	06/15/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

This study site has remained dominated by introduced perennial grass species such as crested wheatgrass (*Agropyron cristatum*), smooth brome (*Bromus inermis*), and intermediate wheatgrass (*Thinopyrum intermedium*) since establishment in 1985. In addition, the introduced perennial grass species bulbous bluegrass (*Poa bulbosa*) was observed for the first time in 2023, but in very low amounts. The introduced annual grass species cheatgrass (*Bromus tectorum*) is present in the community, but has contributed little cover since 2003. Abundance of annual/biennial forbs has fluctuated over time, while perennial forbs remained comparatively rare. In 2023, however, perennial forbs contributed nearly as much cover as their annual counterparts (Photos, Pre-1992 Data, Table 22-07.7, Table 22-07.10, Table 22-07.11). Young twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) had reestablished on the site following a chaining treatment completed in 1981, and both size and density of trees increased over the study years (Photos, Table 22-07.13, Table 22-07.14). However, a bullhog treatment that occurred between 2009 and 2011 removed most of the trees, and the site was considered to fall within Phase I of woodland succession as of the 2023 sample year (Table 22-07.1, Table 22-07.4).

Deer winter range condition has ranged between poor and good since study establishment. As of 2023, deer winter range condition was considered to be fair. Improvement to deer winter range can be accomplished through efforts that support preferred browse reproduction and an increase in cover; diversifying and increasing cover of native perennial forbs while reducing cheatgrass would also improve winter range conditions (Table 22-07.15). Pellet transect data indicates that deer presence on this site has been low since 1998. Elk presence has also remained low, and no elk pellet groups were observed in 2023 (Table 22-07.9). However, the limited sagebrush component of this site could provide browse for elk during the winter (Table 22-07.3; Wambolt, 1996).

### Trend Summary Tables

**Table 22-07.6 - 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
1998	2.4	-	1.8	-	-	-
2003	1.8	0.1	1.7	2.4	-	2.3
2008	1.1	0.0	3.1	2.2	0.1	4.1
2013	0.4	0.4	0.6	2.9	0.4	0.3
2018	4.1	0.9	0.4	3.7	1.3	1.3
2023	6.3	0.4	0.9	5.0	-	1.8

**Table 22-07.7 - 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
1998	366	434	188	126	11.4	29.8	0.7	2.6
2003	106	323	377	94	1.3	13.1	13.0	2.1
2008	175	374	368	149	0.9	19.1	4.6	2.6
2013	153	399	455	150	2.0	26.2	5.8	1.3
2018	51	398	226	58	1.0	29.0	1.0	0.5
2023	213	345	384	145	3.1	27.4	7.5	7.4

**Table 22-07.8 - 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
1998	7.1	0.1	50.2	20.9	3.1	47.7
2003	17.7	0.0	32.0	25.3	3.2	36.4
2008	13.7	0.1	33.5	32.8	3.4	32.4
2013	14.6	-	37.1	12.7	4.8	42.0
2018	20.0	0.0	48.5	12.2	3.6	35.3
2023	14.6	0.0	26.0	28.7	3.7	46.0

**Table 22-07.9 - 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			
1998	26	4	-	6
2003	17	4	-	14
2008	22	12	3	91
2013	7	10	14	3
2018	10	9	8	20
2023	10	2	-	8
Year	Days Use Per Acre (ha)			
1998	51.5 (127.3)	12.1 (29.8)	-	-
2003	84.9 (209.8)	5.3 (13.2)	-	-
2008	12.3 (30.5)	4.7 (11.6)	8.1 (19.9)	-
2013	-	10.7 (26.5)	9.4 (23.2)	-
2018	33.4 (82.5)	2.7 (6.6)	17.4 (43.0)	-
2023	5.8 (14.3)	6.7 (16.6)	-	-

**Table 22-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency								
1998	192	252	366	4	-	45	4	2	210
2003	147	123	106	-	-	97	1	-	127
2008	185	117	175	8	-	69	24	-	191
2013	162	181	153	3	-	131	3	-	169
2018	161	162	51	-	-	115	20	15	189
2023	135	166	213	2	6	78	2	2	160
year	Average Cover (%)								
1998	8.9	9.8	11.4	0.0	-	0.9	0.3	0.0	9.8
2003	4.8	2.6	1.3	-	-	2.8	0.0	-	2.8
2008	6.5	4.7	0.9	0.0	-	0.8	0.3	-	6.7
2013	5.9	8.7	2.0	0.0	-	3.5	0.0	-	8.0
2018	6.5	8.1	1.0	-	-	3.7	0.8	0.8	9.1
2023	6.4	11.0	3.1	0.0	0.1	2.5	0.1	0.0	7.2

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

**Table 22-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis (rockcress)	Arenaria (sandwort)	Astragalus cibirius (browse milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Calochortus nuttallii (sego lily)	Camelina microcarpa <sup>ai</sup> (littlupod false flax)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chaetopappa ericoides (rose heath)	Cirsium wheeleri (Wheeler's thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis occidentalis (largeflower hawkbeard)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)
year	Nested Frequency																
1998	4	67	5	-	2	1	-	2	18	5	1	5	-	57	1	1	-
2003	4	125	-	1	10	-	-	4	2	69	-	-	-	246	3	1	7
2008	1	246	7	-	16	3	5	9	-	189	-	-	-	205	6	1	-
2013	9	446	-	-	15	-	-	5	-	32	-	-	3	75	2	15	-
2018	8	220	-	-	-	-	-	-	-	16	-	-	1	15	-	-	-
2023	18	353	2	-	28	1	11	2	-	70	-	-	10	53	6	-	-
year	Average Cover (%)																
1998	0.0	0.2	0.0	-	0.0	0.0	-	0.0	0.0	0.1	0.0	0.2	-	0.1	0.0	0.0	-
2003	0.0	1.6	-	0.0	0.4	-	-	0.0	0.0	1.3	-	-	-	4.7	0.0	0.0	0.0
2008	0.0	0.8	0.0	-	0.2	0.0	0.0	0.0	-	1.7	-	-	-	0.8	0.0	0.0	-
2013	0.1	4.1	-	-	0.1	-	-	0.0	-	0.2	-	-	0.0	0.2	0.0	0.0	-
2018	0.0	0.8	-	-	-	-	-	-	-	0.1	-	-	0.0	0.0	-	-	-
2023	0.3	4.0	0.0	-	1.9	0.0	0.2	0.0	-	0.4	-	-	0.2	0.2	0.4	-	-

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

FORB SPECIES	Draba <sup>a</sup> (draba)	Eriogonum caespitosum (matted buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Eriogonum racemosum (redroot buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lewisia rediviva (bitter root)	Lomatium nevadense (Nevada biscuitroot)	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orobanche fasciculata (clustered broomrape)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Silene antirrhina <sup>a</sup> (sleepy silene)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency																
1998	14	-	-	4	-	-	33	-	-	-	21	2	2	6	3	-	-
2003	13	-	-	3	3	59	83	-	-	1	192	-	11	-	15	-	5
2008	-	-	4	-	8	1	110	-	-	-	2	-	5	13	-	3	6
2013	2	3	-	3	62	-	2	-	-	-	2	-	11	-	11	-	6
2018	-	5	-	-	4	-	-	-	-	-	-	-	4	-	-	-	-
2023	-	7	-	-	114	-	60	1	14	-	3	-	17	5	-	3	-
year	Average Cover (%)																
1998	0.0	-	-	0.0	-	-	0.1	-	-	-	0.2	0.0	0.0	0.0	0.0	-	-
2003	0.0	-	-	0.0	0.0	0.6	2.7	-	-	0.0	1.9	-	0.1	-	0.1	-	0.1
2008	-	-	0.0	-	0.2	0.0	1.0	-	-	-	0.0	-	0.0	0.0	-	0.0	0.0
2013	0.0	0.1	-	0.0	1.2	-	0.0	-	-	-	0.0	-	0.0	-	0.0	-	0.0
2018	-	0.2	-	-	0.0	-	-	-	-	-	-	-	0.0	-	-	-	-
2023	-	0.5	-	-	2.6	-	0.3	0.0	0.1	-	0.0	-	0.1	0.0	-	0.0	-

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

FORB SPECIES	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Vicia americana (American vetch)	Zizadenus paniculatus (foothill deathcamas)
year	Nested Frequency		
1998	2	114	-
2003	-	69	-
2008	-	127	-
2013	0	116	-
2018	1	47	-
2023	3	77	1
year	Average Cover (%)		
1998	0.0	2.3	-
2003	-	1.4	-
2008	-	2.2	-
2013	0.0	0.8	-
2018	0.0	0.2	-
2023	0.0	3.6	0.0

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

**Table 22-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Echinocereus coccineus (scarlet hedgehog cactus)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Quercus gambelii <sup>p</sup> (Gambel oak)
year	Line Intercept Cover (%)						
1998	-	-	-	-	-	-	-
2003	0.6	-	-	2.3	-	-	1.8
2008	0.7	-	0.1	4	-	0.1	1.5
2013	0.8	-	0.4	0.3	-	-	2.1
2018	2.1	-	1.3	1.3	-	-	1.6
2023	3.7	-	-	1.8	-	-	1.3
year	Quadrat Cover (%)						
1998	0.6	-	-	1.8	-	-	1.8
2003	0.1	-	0.1	1.7	-	-	1.8
2008	0.1	-	0.0	3.1	-	0.0	0.9
2013	0.2	-	0.4	0.6	0.0	-	0.1
2018	2.3	-	0.9	0.4	-	-	1.8
2023	4.7	0.0	0.4	0.9	-	-	1.6

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

**Table 22-07.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1998	-	-	-	-	-	-	-	-	89/48
2003	-	-	-	-	-	-	-	-	64/72
2008	-	-	-	-	-	-	-	-	73/89
2013	-	-	-	-	-	-	-	-	50/58
2018	-	-	-	-	-	-	-	-	74/91
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	20	-	0	100	0	0	0	0	61/87
2003	100	-	20	80	0	20	0	0	62/99
2008	60	-	0	67	33	67	0	0	70/95
2013	240	40	50	50	0	0	0	0	42/59
2018	320	20	19	75	6	0	0	6	47/83
2023	280	580	7	79	14	21	0	14	-/-
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	95/123
2008	-	-	-	-	-	-	-	-	145/138
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	322/187
2023	60	-	0	100	0	100	0	0	-/-



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
1998	-	-	-	-	-	-	-	-	68/76
2003	-	-	-	-	-	-	-	-	62/81
2008	-	-	-	-	-	-	-	-	94/85
2013	-	-	-	-	-	-	-	-	60/76
2018	-	-	-	-	-	-	-	-	50/112
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	34/39
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	89/167
2003	-	-	-	-	-	-	-	-	99/163
2008	-	-	-	-	-	-	-	-	37/66
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	52/56
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	-	-	-	-	-	-	-	-	32/31
2003	20	-	0	100	0	0	0	0	27/31
2008	60	200	0	100	0	0	0	0	12/16
2013	340	-	12	88	0	0	0	0	35/41
2018	1760	-	3	94	2	0	0	1	20/25
2023	940	900	83	15	2	0	0	2	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	40	-	0	100	0	0	0	0	-/-
2003	80	-	0	100	0	0	0	0	-/-
2008	100	-	0	100	0	0	0	0	-/-
2013	20	20	0	100	0	0	0	0	-/-
2018	40	-	50	50	0	0	0	0	-/-
2023	40	-	50	50	0	0	0	0	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	20	0	0	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	2/7
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	50/125
2008	-	-	-	-	-	-	-	-	59/143
2013	-	-	-	-	-	-	-	-	47/129
2018	-	-	-	-	-	-	-	-	77/174
2023	-	-	-	-	-	-	-	-	-/-
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	380	-	26	68	5	0	0	0	117/76
2003	260	-	0	100	0	0	0	0	130/80
2008	320	-	0	88	13	0	0	6	129/86
2013	340	-	100	0	0	0	0	0	37/38
2018	160	-	13	88	0	0	0	0	120/101
2023	360	-	6	94	0	50	0	0	- / -

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

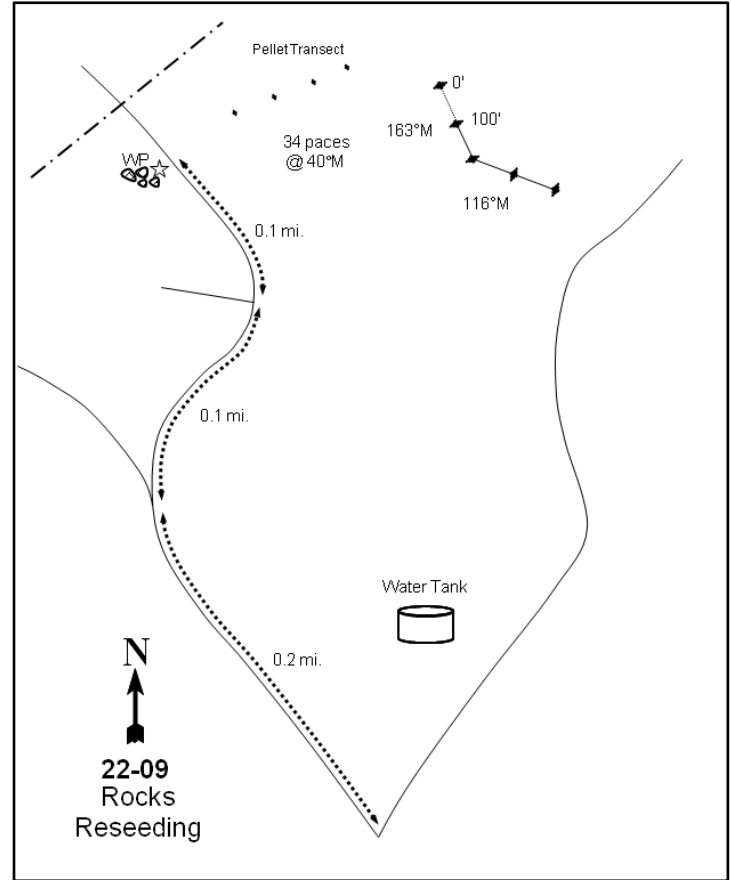
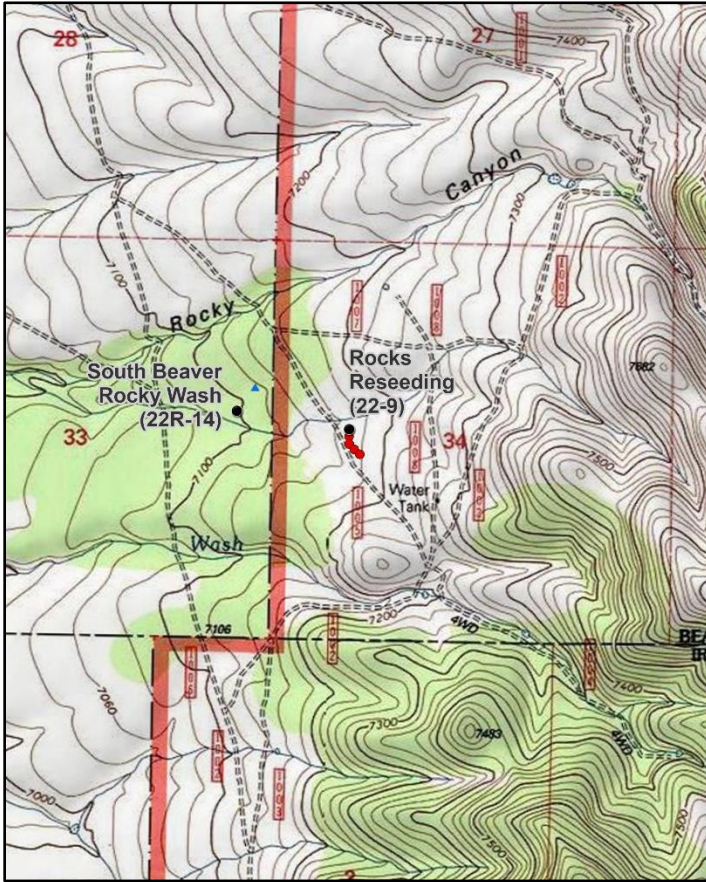
**Table 22-07.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	48	-	-	-	-	-	13.2
2003	42	-	35	29	35	-	10.5
2008	45	-	-	71	24	6	14.1
2018	14	-	33	67	-	-	12.3
2023	15	-	-	67	33	-	19.3
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	16	-	-	-	-	-	9.4
2003	19	-	38	15	38	8	8.6
2008	19	-	8	54	31	8	11.3
<b>Quercus gambelii (Gambel oak)</b>							
1998	37	-	-	-	-	-	3.7

**Table 22-07.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	2.6	0.0	0.0	30.0	-8.6	5.2	0.0	<b>29.2</b>	Very Poor
2003	2.6	0.0	0.0	26.1	-1.0	4.1	0.0	<b>31.8</b>	Very Poor
2008	2.4	0.0	0.0	30.0	-0.7	5.2	0.0	<b>36.9</b>	Very Poor-Poor
2013	3.1	0.0	0.0	30.0	-1.5	2.6	0.0	<b>34.2</b>	Very Poor-Poor
2018	4.2	0.0	0.0	30.0	-0.7	0.9	0.0	<b>34.4</b>	Very Poor-Poor
2023	5.9	0.0	0.0	30.0	-2.4	10.0	0.0	<b>43.6</b>	Poor

## ROCKS RESEEDING - STUDY NO. 22-9

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Kane Canyon SE; Township 30S, Range 6W, Section 34  
NAD 83 UTM ZONE 12, 366401 East 4224123 North

**Transect Information**

Browse Tag # (0' Stake)	7050
Transect Bearing	175° magnetic (Lines 3-4: 116° 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**

Begin on I-15 at exit #100, 9 miles south of Beaver. On the east side of the freeway there is a frontage road and a road going east. Travel east for 6.3 miles up Fremont Wash to a faint road on the left. Turn left and proceed for 0.6 miles up the road (there will be several switchbacks) to the top to a gate. Pass through the gate and continue straight for 0.7 miles to a four-way intersection. Go straight for 0.65 miles to a fork. Take the middle fork and drive for 0.8 miles to a fork with roads #1002 and #1003. Go right for 1 mile on #1002 to a stock pond. Proceed up a steep hill for 0.1 miles to a fork, turn left (road #1005), and go 0.2 miles to another fork. Stay right and travel for another 0.1 mile to a witness post on the left (west) side of the road; the witness post marks the start of a pellet group transect. From the witness post, walk 34 paces at 41 degrees magnetic along the transect. There are small rebar posts every 30 feet. The baseline starts 10 feet south of the fifth small rebar (150 feet from the fencepost). The frequency baseline is marked by 2-3 foot rebar stakes and the 0-foot stake is tagged #7050. The 200, 300 and 400-foot stakes are half-high fenceposts.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	South Beaver Allotment
Elevation	7,150ft (2,179m)
Aspect	West
Slope	4-6%
Sample Dates	06/19/1998, 06/17/2003, 06/11/2008, 06/03/2013, 06/12/2018, 06/12/2023

**Table 22-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Dixie Harrow Unknown	-	-	1962	-
Seeding - Seed Unknown	-	-	1962	-
Hand Crew - Lop and Scatter	South Beaver and Little Dog Valley Watershed Imp, Phase I	5219	May 2021-August 2022	2358

**Wildlife Habitat and Vegetation History****Table 22-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 22-09.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush/Bitterbrush	Phase I
1991	Mountain Big Sagebrush/Bitterbrush	Phase I
1998	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2018	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2023	Mountain Big Sagebrush/Bitterbrush	Phase I

**Site Notes**

A water trough is located about one third of a mile from the site.

**Soils****Table 22-09.5 - 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
Clay Loam	6.6	38.0	31.4	30.6	2.5	9.0	185.6	0.7	06/19/1998
Clay Loam	6.6	38.0	29.4	32.6	2.6	9.8	185.6	0.6	06/19/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

The browse component of this site has been dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) since study establishment in 1985 (Photos, Pre-1992 Data, Table 22-09.12, Table 22-09.13). The herbaceous understory has remained abundant through the sample years, with the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) contributing a vast majority of the cover; native forb and grass species have remained sparse in comparison (Table 22-09.7, Table 22-09.10, Table 22-09.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) increased in cover and density through the 2018 sample year (Photos, Table 22-09.12, Table 22-09.13, Table 22-09.14). Trees were co-dominant components of the plant community between 1998 and 2018, and the site was considered to be within Phase I transitioning to Phase II of woodland succession during that time period. A 2021-2022 lop and scatter project (Table 22-09.1) removed many of the trees, and the site was considered to be within Phase I as of 2023 (Table 22-09.4). The remaining tree component (Photos, Table 22-09.14), however, indicates that this site may be infilled over time without continued maintenance when appropriate.

Deer winter range condition has ranged between fair and excellent since 1998. As of 2023, deer winter range condition was considered to be good. Improvement to deer wintering range can be accomplished through diversifying and increasing cover of native perennial forbs while reducing cheatgrass (Table 22-09.15). In addition, the sagebrush component of this site could provide valuable browse to wintering elk (Table 22-09.3; Wambolt, 1996). However, pellet transect data shows that elk presence on this site has remained low since 1998, and no elk pellet groups were sampled in 2008 or 2023. Deer presence has also been low in most sample years (Table 22-09.9).

### Trend Summary Tables

**Table 22-09.6 - 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
1998	26.7	-	0.1	-	-	0.1
2003	22.4	-	0.6	24.5	-	2.3
2008	13.1	-	1.5	20.3	-	3.9
2013	11.7	-	1.4	32.5	-	4.9
2018	18.6	-	3.9	24.5	-	8.6
2023	11.4	-	0.1	15.9	-	0.4

**Table 22-09.7 - 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
1998	-	368	14	55	-	22.8	0.0	0.8
2003	1	317	200	60	0.0	15.1	1.7	0.3
2008	1	304	40	64	0.0	18.5	0.1	0.3
2013	3	336	172	62	0.0	23.5	0.6	0.7
2018	-	331	102	26	-	32.2	0.4	0.2
2023	25	315	228	68	0.2	20.6	1.3	0.9

**Table 22-09.8 - 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
1998	21.1	0.5	42.6	11.1	11.5	39.7
2003	30.2	0.2	26.9	9.0	10.5	40.2
2008	21.0	0.4	35.8	14.3	9.9	36.9
2013	16.0	0.1	47.1	8.6	8.6	38.2
2018	23.7	0.3	46.2	12.8	15.0	42.3
2023	14.9	0.3	39.7	8.5	10.8	33.0

**Table 22-09.9 - 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				
1998	18	-	21	2	21
2003	9	-	7	-	4
2008	7	-	16	2	80
2013	1	-	6	2	1
2018	3	-	11	1	55
2023	10	-	8	-	9
Year	Days Use Per Acre (ha)				
1998	20.3 (50.2)	8.7 (21.5)*	18.1 (44.7)	1.3 (3.3)	-
2003	18.9 (46.6)	-	22.8 (56.3)	6.0 (14.9)	-
2008	31.9 (78.9)	-	19.4 (48.0)	-	-
2013	28.3 (69.9)	-	14.7 (36.4)	4.7 (11.6)	-
2018	4.4 (10.8)	8.7 (21.5)*	10.7 (26.5)	2.7 (6.6)	-
2023	50.8 (125.5)	-	3.4 (8.3)	-	-

Pellets per acre (ha)

**Table 22-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achmatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Pleuraphis jamesii (James' galleta)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency										
1998	1	365	2	-	-	-	-	3	3	-	11
2003	1	314	1	-	1	-	4	-	1	3	3
2008	3	302	-	-	1	-	-	3	-	5	-
2013	-	334	-	4	3	-	-	-	1	11	2
2018	0	326	-	12	-	1	1	1	1	4	-
2023	1	306	1	-	25	-	-	8	2	5	7
year	Average Cover (%)										
1998	0.0	22.0	0.0	-	-	-	-	0.0	0.1	-	0.6
2003	0.0	14.9	0.0	-	0.0	-	0.0	-	0.0	0.1	0.0
2008	0.0	18.3	-	-	0.0	-	-	0.1	-	0.0	-
2013	-	23.2	-	0.2	0.0	-	-	-	0.0	0.1	0.0
2018	0.0	31.1	-	0.7	-	0.0	0.0	0.0	0.0	0.3	-
2023	0.0	19.7	0.0	-	0.2	-	-	0.4	0.0	0.0	0.4

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

**Table 22-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis demissa (nodding rockcross)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Delphinium nuttallianum (twolobe larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron eatonii (Eaton's fleabane)	Eriogonum racemosum (redroot buckwheat)
year	Nested Frequency																
1998	1	-	3	6	3	-	-	-	1	-	-	2	5	2	2	-	2
2003	1	2	3	6	-	4	9	1	19	1	1	12	6	-	2	-	-
2008	-	6	-	5	-	-	7	-	26	3	-	10	0	-	-	4	1
2013	3	125	-	7	-	-	34	-	28	1	-	26	-	-	-	-	1
2018	-	71	-	2	-	1	20	-	35	0	4	-	-	-	-	-	-
2023	4	202	9	4	-	4	12	-	20	-	-	-	-	-	-	-	1
year	Average Cover (%)																
1998	0.0	-	0.0	0.3	0.1	-	-	-	0.0	-	-	0.0	0.0	0.0	0.0	-	0.0
2003	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	-	-
2008	-	0.0	-	0.0	-	-	0.0	-	0.1	0.0	-	0.0	0.0	-	-	0.0	0.0
2013	0.0	0.4	-	0.2	-	-	0.1	-	0.1	0.2	-	0.1	-	-	-	-	0.0
2018	-	0.2	-	0.0	-	0.0	0.0	-	0.1	0.0	0.0	-	-	-	-	-	-
2023	0.0	0.9	0.0	0.3	-	0.0	0.0	-	0.1	-	-	-	-	-	-	-	0.0

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

FORB SPECIES	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lomatium (desertparsley)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	Phlox longifolia (longleaf phlox)	Trifolium (clover)	Vicia americana (American vetch)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency								
1998	-	1	4	9	-	33	-	3	3
2003	5	-	-	184	1	31	1	-	-
2008	3	-	8	4	-	38	-	-	1
2013	-	-	2	26	-	28	-	-	-
2018	3	-	6	8	-	14	-	-	-
2023	77	-	25	11	-	28	1	-	-
year	Average Cover (%)								
1998	-	0.0	0.0	0.0	-	0.2	-	0.0	0.0
2003	0.0	-	-	1.6	0.0	0.1	0.0	-	-
2008	0.0	-	0.1	0.0	-	0.1	-	-	0.0
2013	-	-	0.0	0.1	-	0.1	-	-	-
2018	0.0	-	0.0	0.0	-	0.1	-	-	-
2023	0.3	-	0.3	0.0	-	0.2	0.0	-	-

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

**Table 22-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)			
1998	-	-	-	-
2003	13.7	2.1	0.2	10.8
2008	9.5	3.9	-	10.8
2013	14.5	4.9	-	18
2018	10.1	8.6	-	14.4
2023	8	0.3	0.1	7.9
year	Quadrat Cover (%)			
1998	14.5	0.1	-	12.2
2003	12.7	0.5	0.1	9.7
2008	6.4	1.5	-	6.7
2013	4.8	1.4	-	7.0
2018	7.1	3.8	0.1	11.5
2023	5.2	0.1	0.0	6.2

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

**Table 22-09.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	3420	340	26	66	8	18	1	3	67/93
2003	2880	20	12	71	17	21	8	3	64/78
2008	3140	60	13	41	46	37	14	31	49/74
2013	2540	60	11	72	17	35	9	17	63/90
2018	2460	-	3	64	33	0	2	20	56/70
2023	1800	26040	28	56	17	10	3	17	- / -
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
1998	-	-	-	-	-	-	-	-	15/20
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
1998	100	20	60	40	0	0	0	0	- / -
2003	100	-	40	60	0	0	0	0	- / -
2008	100	20	60	40	0	0	20	20	- / -
2013	120	-	33	67	0	0	0	0	- / -
2018	120	-	50	50	0	0	0	0	- / -
2023	100	-	60	0	40	0	0	20	- / -
<b>Opuntia -- (pricklypear)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	11/4
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	40	-	50	50	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1998	20	-	100	0	0	0	0	0	- / -
2003	20	-	100	0	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	0	- / -
2023	40	-	50	50	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	1440	100	7	83	10	57	3	0	104/134
2003	1080	20	6	35	59	22	76	13	97/125
2008	1140	100	5	42	53	42	37	26	106/129
2013	1240	80	18	74	8	45	2	5	116/149
2018	1220	-	2	79	20	10	18	10	120/132
2023	1120	740	13	66	21	36	41	23	- / -
<b>Ribes<sup>p</sup> -- (currant)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	67/100

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



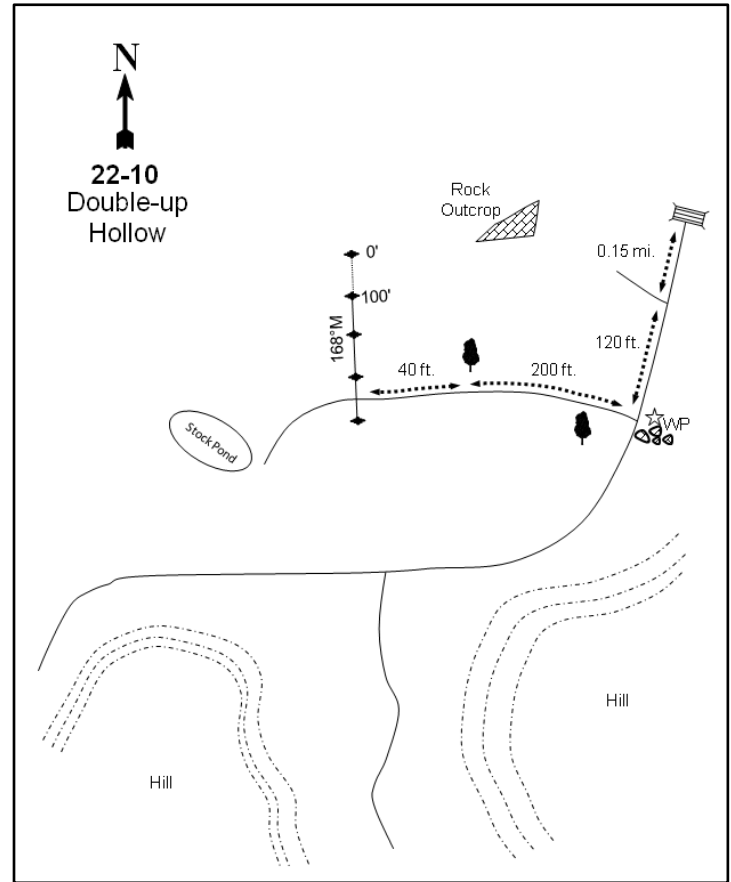
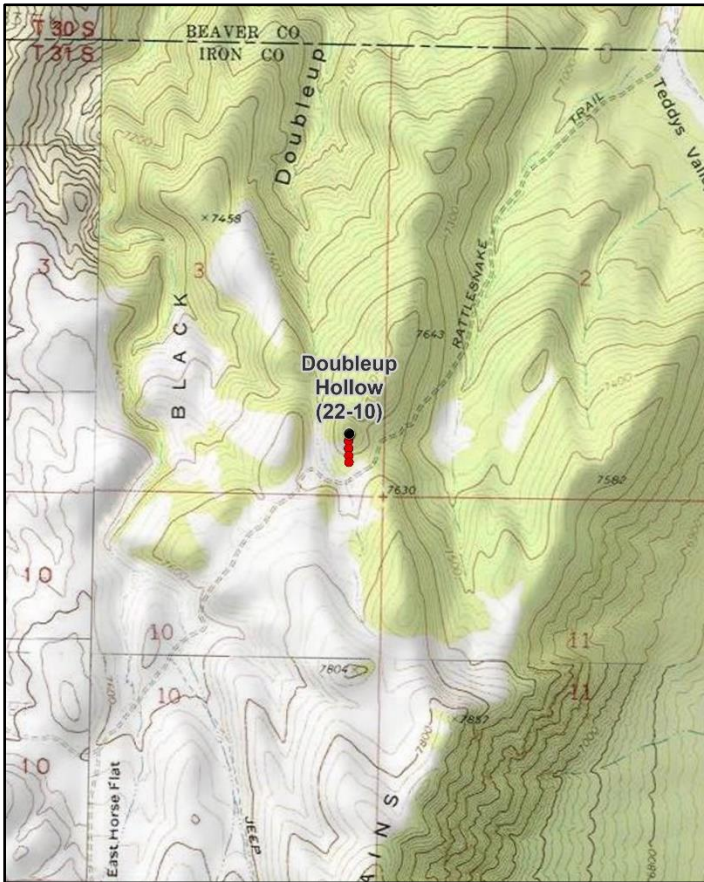
**Table 22-09.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	52	-	-	-	-	-	12.6
2003	59	-	24	29	35	12	11.9
2008	63	5	16	42	37	-	14.0
2013	67	6	11	28	22	33	18.3
2018	83	-	21	26	11	42	15.5
2023	43	50	50	-	-	-	2.6
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	13	-	50	50	-	-	3.5
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	2	-	-	-	-	-	8.0
2018	19	-	50	50	-	-	4.7
2023	8	50	50	-	-	-	2.0

**Table 22-09.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	30.0	12.3	8.7	30.0	0.0	1.7	0.0	<b>82.7</b>	Excellent
2003	30.0	4.2	4.5	30.0	0.0	0.6	0.0	<b>69.3</b>	Good
2008	28.1	0.2	4.5	30.0	0.0	0.6	0.0	<b>63.3</b>	Fair-Good
2013	30.0	11.4	7.4	30.0	0.0	1.3	0.0	<b>80.1</b>	Good-Excellent
2018	30.0	7.5	1.2	30.0	0.0	0.4	0.0	<b>69.0</b>	Good
2023	21.9	9.3	10.1	30.0	-0.1	1.9	0.0	<b>73.0</b>	Good

## DOUBLEUP HOLLOW - STUDY NO. 22-10

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Greenville Bench SW; Township 31S, Range 8W, Section 03  
NAD 83 UTM ZONE 12, 347594 East 4222016 North

**Transect Information**

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

7075  
168° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

Start from the cattle guard in front of the Chevron station on the west side of the I-15 interchange at the south end of Beaver. Turn left onto the frontage road (2550 South) and go 0.7 miles south, then proceed west for 1.6 miles. Go past the turnoff to the Beaver International Airport for 0.2 miles to a corner and then continue another 0.2 miles south to an intersection. Turn right, driving parallel to a fenceline, and proceed 1.7 miles west to an intersection. At the intersection, turn left onto a major dirt road and follow this main road (also known as the Rattlesnake Trail) for 6.7 miles, keeping to the right at all forks, to a junction. From the junction, drive 1.65 miles to a cattle guard. Continue for 0.15 miles to a half-high fencepost marked by a rock pile. From the half-high post, go 72 paces at 310 degrees to the 0-foot stake. The 300-foot stake is rebar and tagged #7075.

**Site Information**

Land Ownership  
Land Administrator  
Allotment  
Elevation  
Aspect  
Slope  
Sample Dates

Federal  
BLM  
BALD HILLS  
7,620ft (2,323m)  
South  
10-15%  
06/25/1998, 06/16/2003, 06/04/2008, 05/29/2013, 06/12/2018, 06/13/2023

**Table 22-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Greenville Fire	-	May-July 2007	14716
Seeding - Aerial	Greenville Bench Aerial Seeding	993	December 2007-January 2008	11048

**Table 22-10.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Greenville Bench Mix #2			Aerial	Dec 2007	4030
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		SITLA MIX**		0.13	0.00
G	Achnatherum hymenoides	Indian Ricegrass		0.19	0.00
G	Achnatherum hymenoides	Indian Ricegrass		0.12	0.00
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.00	0.93
G	Dactylis glomerata	Orchardgrass	Paiute	0.22	0.19
G	Dactylis glomerata	Orchardgrass	Paiute	0.74	0.63
G	Elymus elymoides	Bottlebrush Squirreltail	Toe Jam	0.31	0.29
G	Elymus elymoides	Bottlebrush Squirreltail		0.01	0.00
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	0.21	0.00
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.24	0.00
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.06	0.00
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.66	0.53
G	Poa secunda	Canby Bluegrass	Canbar	0.43	0.32
G	Psathyrostachys juncea	Russian Wildrye		0.04	0.00
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	P-7	0.81	0.75
G	Sporobolus cryptandrus	Sand Dropseed		0.04	0.00
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	0.26	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.60	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.66	0.58
F	Achillea millefolium	Western Yarrow		0.02	0.00
F	Linum perenne	Blue Flax		0.02	0.00
F	Linum perenne	Blue Flax	Maple Grove	0.20	0.19
F	Medicago sativa	Alfalfa	Ladak	0.81	0.77
F	Medicago sativa	Alfalfa	Ladak	0.10	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.37	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.62	0.51
F	Onobrychis viciifolia	Sainfoin	Eski	2.01	1.77
F	Penstemon palmeri	Palmer Penstemon		0.02	0.00
F	Penstemon palmeri	Palmer Penstemon	Carbon/Washington/Iron	0.05	0.04
F	Sanguisorba minor	Small Burnet	Delar	2.01	1.86
F	Sanguisorba minor	Small Burnet		0.60	0.00
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow		0.01	0.00
S	Atriplex canescens	Fourwing Saltbush		0.04	0.00

**Wildlife Habitat and Vegetation History****Table 22-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	summer
Greater Sage-Grouse		

**Table 22-10.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
1991	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
1998	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Mountain Big Sagebrush/Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Barren	No Encroachment
2013	Perennial Grass	No Encroachment
2018	Perennial Grass	No Encroachment
2023	Perennial Grass	No Encroachment

**Site Notes**

No Notes

**Soils****Table 22-10.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	6.5	44.0	27.4	28.6	2.7	7.1	204.8	0.8	06/24/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation 16 inches  
 NRCS Ecological Site Upland Loam (Bonneville Big Sagebrush)  
 NRCS Ecological Site # R028AY310UT  
 1985-2003 - Utah Juniper/Invasive Annuals State: Community Phase 3.1  
 States and Transitions 2008 - State Undefined: Community Phase Undefined  
 2013-2023 - Seeded Range State: Community Phase 5.1

When the study was established in 1985, the plant community on this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) with a limited herbaceous understory (Photos, Pre-1992 Data). Bitterbrush and sagebrush remained relatively stable until a 2007 wildfire (Table 22-10.1) removed nearly all of the shrubs (Table 22-10.12, Table 22-10.13). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were codominant site components, but were also removed from the site by the wildfire (Photos, Table 22-10.12, Table 22-10.13, Table 22-10.14). As part of fire rehabilitation efforts, this site was seeded with a diverse seed mix of native and introduced plant species (Table 22-10.1). As such, this study site has transitioned to one dominated by introduced perennial grass with intermediate wheatgrass (*Thinopyrum intermedium*) contributing much of the cover. The introduced annual grass species cheatgrass (*Bromus tectorum*) has varied in nested frequency since 1998 and was considered to be abundant in 2013, but has generally remained rare overall (Table 22-10.10). Densities of mountain big sagebrush and black sagebrush (*A. nova*) have gradually increased following the burn, but remained low in 2023 (Table 22-10.13). This study site is expected to remain in a similar state in the future with the potential for sagebrush to increase in abundance.

Due to the abundance and diversity of the herbaceous community, this site likely serves as adequate habitat for summering mule deer. However, average pellet transect data indicates that deer presence has been low in most sample years (Table 22-10.9).

**Trend Summary Tables****Table 22-10.6 - 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
1998	32.7	0.0	7.8	-	-	0.9
2003	29.1	0.0	11.4	27.6	-	13.4
2008	0.0	0.2	-	-	-	-
2013	0.2	0.6	-	0.9	0.6	-
2018	0.7	0.7	-	1.1	1.5	-
2023	1.9	0.3	-	2.0	0.2	-

**Table 22-10.7 - 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
1998	105	134	19	73	1.8	2.3	0.1	2.2
2003	70	99	45	24	0.7	1.5	0.3	0.4
2008	6	4	7	9	0.1	0.1	0.0	0.1
2013	355	313	65	215	6.0	21.0	0.7	12.7
2018	11	426	6	49	0.1	50.0	0.0	1.2
2023	14	405	29	43	0.0	34.9	0.1	1.0

**Table 22-10.8 - 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
1998	6.0	0.2	48.8	20.0	12.2	45.4
2003	7.1	0.4	51.5	13.5	10.6	40.3
2008	20.4	0.9	6.2	60.7	19.9	0.4
2013	5.5	-	40.6	13.1	15.4	44.0
2018	13.5	0.1	57.6	7.5	9.6	52.5
2023	3.2	0.0	38.6	13.1	13.9	38.8

**Table 22-10.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
1998	-	-	34	2	-	25
2003	-	-	8	-	-	20
2008	1	-	-	-	-	9
2013	3	-	1	-	-	5
2018	1	-	5	-	-	3
2023	2	-	14	-	-	6
Days Use Per Acre (ha)						
1998	-	8.7 (21.5)*	18.1 (44.7)	-	8.7 (21.5)*	-
2003	-	-	28.8 (71.2)	-	-	-
2008	-	-	-	-	-	-
2013	7.2 (17.9)	-	6.0 (14.9)	-	-	-
2018	1.5 (3.6)	-	19.4 (48.0)	0.7 (1.7)	17.4 (43.0)*	-
2023	13.1 (32.3)	-	17.4 (43.0)	-	-	-

\*Pellets per acre (ha)

**Table 22-10.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus porteri (Porter brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency																
1998	10	-	7	-	105	19	-	84	-	-	3	6	-	20	-	-	-
2003	-	-	-	-	70	14	-	70	-	-	11	4	0	9	-	-	-
2008	-	-	1	-	6	-	-	-	-	-	1	2	-	-	-	-	-
2013	35	28	2	3	355	10	35	85	29	-	-	3	2	59	1	172	2
2018	33	45	2	7	11	6	2	65	9	-	2	-	-	80	3	334	-
2023	7	53	-	-	14	3	-	24	-	1	4	5	2	44	4	356	-
year	Average Cover (%)																
1998	0.0	-	0.0	-	1.8	0.3	-	1.5	-	-	0.0	0.2	-	0.4	-	-	-
2003	-	-	-	-	0.7	0.2	-	1.0	-	-	0.1	0.1	0.0	0.2	-	-	-
2008	-	-	0.0	-	0.1	-	-	-	-	-	0.0	0.0	-	-	-	-	-
2013	0.6	1.0	0.1	0.4	6.0	0.3	0.9	3.8	0.7	-	-	0.0	0.0	2.6	0.0	10.6	0.0
2018	1.4	3.3	0.1	0.0	0.1	0.2	0.1	3.1	0.9	-	0.1	-	-	6.3	0.0	34.3	-
2023	0.8	3.0	-	-	0.0	0.0	-	0.4	-	0.1	0.0	0.0	0.0	3.8	0.4	26.3	-

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

**Table 22-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Arabis demissa (nodding rockcress)	Astragalus newberryi (Newberry's milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album <sup>a</sup> (lambsquarters)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Dracocephalum parviflorum (American dragonhead)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron pumilus (shaggy fleabane)
year	Nested Frequency																
1998	-	14	1	-	-	-	6	-	-	-	-	12	7	3	-	9	3
2003	-	3	1	-	-	-	-	-	-	-	-	1	4	10	-	-	-
2008	-	-	-	3	-	-	-	1	-	6	-	-	0	-	-	-	-
2013	8	-	-	-	-	2	3	-	10	-	-	1	1	-	3	-	2
2018	-	-	-	2	3	-	-	-	5	-	-	1	-	-	-	-	-
2023	-	-	-	-	-	-	0	-	3	-	1	5	-	-	-	-	-
year	Average Cover (%)																
1998	-	0.1	0.0	-	-	-	0.1	-	-	-	-	0.1	0.0	0.0	-	0.1	0.0
2003	-	0.0	0.0	-	-	-	-	-	-	-	-	0.0	0.0	0.2	-	-	-
2008	-	-	-	0.0	-	-	-	0.0	-	0.0	-	-	0.0	-	-	-	-
2013	0.4	-	-	-	-	0.0	0.0	-	0.1	-	-	0.0	0.0	-	0.0	-	0.0
2018	-	-	-	0.0	0.0	-	-	-	0.1	-	-	0.0	-	-	-	-	-
2023	-	-	-	-	-	-	0.0	-	0.0	-	0.0	0.1	-	-	-	-	-

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

FORB SPECIES	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	Linum perenne <sup>i</sup> (blue flax)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Melilotus officinalis <sup>i</sup> (sweetclover)	Microsteris gracilis <sup>ai</sup> (slender phlox)	Oenothera caespitosa (tufted evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Petroradia pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Physalis (groundcherry)	Pleiocanthus spinosus (thorn skeletonweed)
year	Nested Frequency																
1998	-	-	-	-	-	25	4	-	-	7	-	-	4	4	2	-	-
2003	3	36	-	-	-	-	-	-	-	-	-	-	6	1	3	-	2
2008	-	-	-	-	-	0	-	-	-	-	-	1	4	-	1	-	-
2013	-	-	7	13	14	25	121	37	1	3	1	52	-	2	-	-	6
2018	-	-	-	-	-	10	3	13	-	3	-	-	-	-	-	5	15
2023	-	13	-	16	-	9	2	0	-	-	-	-	-	-	4	-	20
year	Average Cover (%)																
1998	-	-	-	-	-	1.4	0.0	-	-	0.0	-	-	0.0	0.4	0.0	-	-
2003	0.0	0.1	-	-	-	-	-	-	-	-	-	-	0.2	0.0	0.0	-	0.0
2008	-	-	-	-	-	0.0	-	-	-	-	-	0.0	0.0	-	0.0	-	-
2013	-	-	0.0	0.0	0.1	0.6	5.3	4.6	0.0	0.0	0.1	1.1	-	0.0	-	-	0.2
2018	-	-	-	-	-	0.3	0.0	0.2	-	0.0	-	-	-	-	-	0.0	0.5
2023	-	0.0	-	0.0	-	0.1	0.0	0.0	-	-	-	-	-	-	0.0	-	0.5

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

FORB SPECIES	Sanguisorba minor <sup>i</sup> (small burnet)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea grossulariifolia (gooseberry/leaf globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency				
1998	-	-	-	-	-
2003	-	-	-	-	-
2008	-	-	-	-	-
2013	7	9	4	5	34
2018	-	-	0	-	3
2023	3	-	1	-	-
year	Average Cover (%)				
1998	-	-	-	-	-
2003	-	-	-	-	-
2008	-	-	-	-	-
2013	0.1	0.0	0.0	0.0	0.6
2018	-	-	0.0	-	0.0
2023	0.0	-	0.0	-	-

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

**Table 22-10.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus ledifolius <sup>p</sup> (curl-leaf mountain mahogany)	Ericameria parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Mahonia repens (creeping barberry)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)										
1998	-	-	-	-	-	-	-	-	-	-	-
2003	-	13.9	0.4	-	-	2.1	-	-	11.3	12	1.3
2008	-	-	-	-	-	-	-	-	-	-	-
2013	-	-	-	-	0.2	-	0.1	0.3	-	-	0.9
2018	0.1	-	-	-	1.3	-	0.1	0.1	-	0.4	0.6
2023	-	1	-	-	0.1	-	-	0.1	-	1	-
year	Quadrat Cover (%)										
1998	0.0	20.4	0.4	-	-	1.7	0.0	-	6.1	10.6	1.3
2003	-	16.6	0.4	-	0.0	0.4	0.0	-	11.0	11.0	1.1
2008	-	-	-	-	0.0	-	-	0.1	-	-	0.0
2013	-	0.2	-	-	0.6	-	0.0	0.1	-	-	0.1
2018	0.4	-	-	-	0.6	-	0.1	0.0	-	0.0	0.3
2023	-	1.2	-	0.0	0.2	-	0.0	0.0	-	0.6	0.2

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

**Table 22-10.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1998	120	-	0	50	50	0	0	33	24/32
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	40	-	0	100	0	0	0	0	17/32
2023	20	-	0	100	0	0	0	0	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	3900	220	3	72	25	22	0	11	57/77
2003	4100	-	1	59	41	22	3	14	61/71
2008	-	-	-	-	-	-	-	-	-/-
2013	40	20	50	50	0	50	0	0	39/71
2018	80	-	0	100	0	0	0	0	38/61
2023	160	-	0	100	0	25	0	0	-/-
<b>Cercocarpus ledifolius<sup>P</sup> -- (curl-leaf mountain mahogany)</b>									
1998	20	-	0	100	0	0	0	0	121/134
2003	40	-	50	50	0	0	0	0	146/130
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	82/124
2023	20	-	0	100	0	0	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	20	-	100	0	0	0	0	0	-/-
2003	100	-	0	100	0	0	0	0	21/25
2008	-	20	0	0	0	0	0	0	-/-
2013	140	220	14	86	0	0	0	0	20/29
2018	1080	-	4	91	6	0	0	0	22/34
2023	1300	120	72	25	3	0	0	3	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	40	-	50	50	0	0	0	0	-/-
2003	40	-	50	50	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Mahonia repens -- (creeping barberry)</b>									
1998	120	-	17	83	0	0	0	0	-/-
2003	140	-	0	100	0	0	0	0	7/14
2008	120	-	67	0	33	0	0	0	-/-
2013	100	-	20	80	0	0	0	0	7/10
2018	260	-	100	0	0	0	0	0	-/-
2023	420	-	0	100	0	0	0	0	-/-



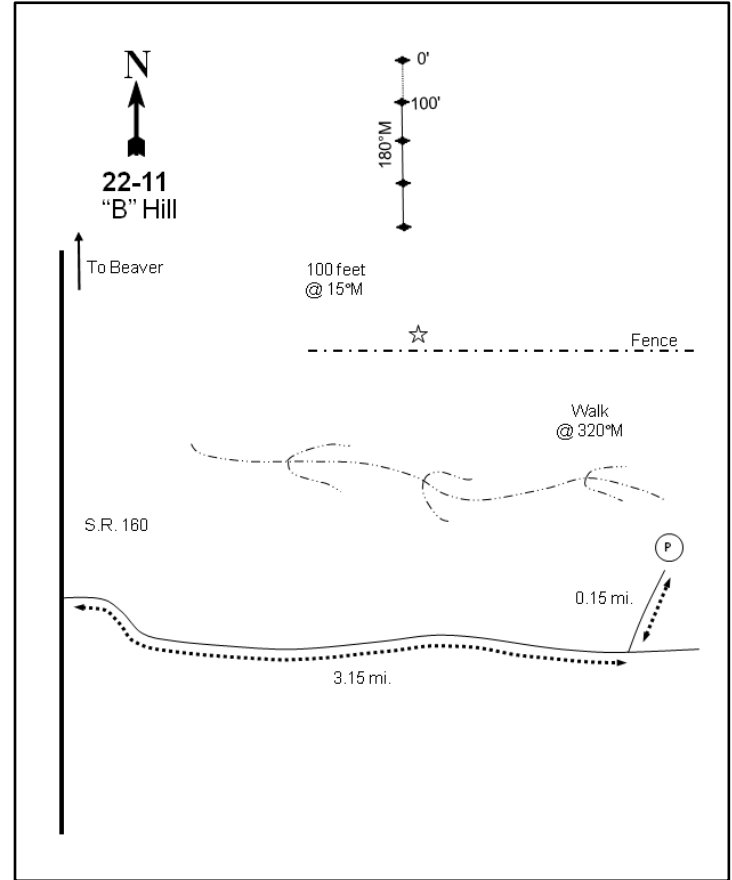
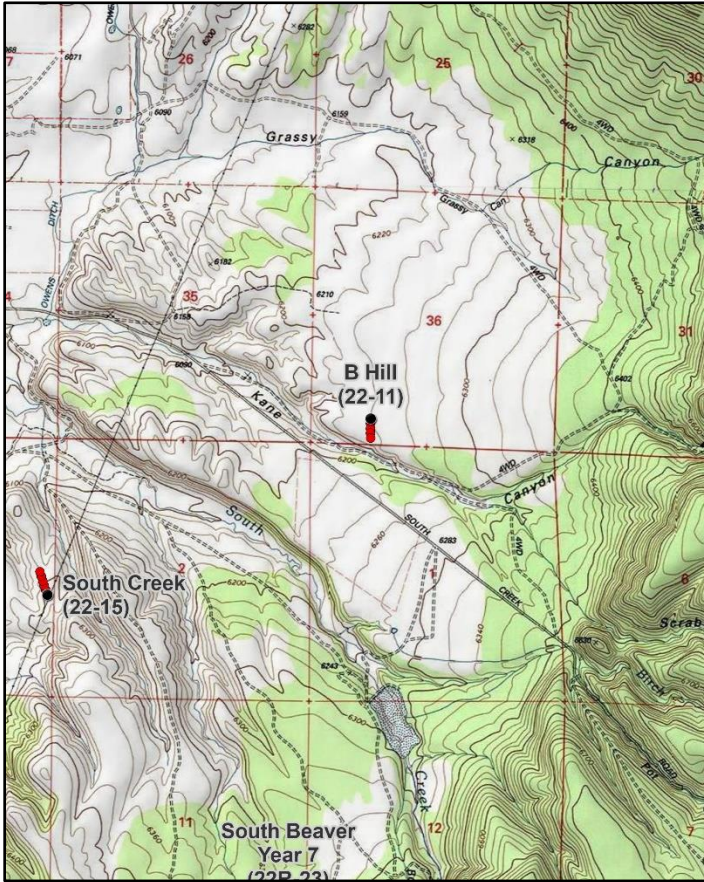
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1998	80	-	25	75	0	0	0	0	14/35
2003	140	-	0	57	43	0	0	43	18/32
2008	160	-	38	63	0	0	0	0	12/23
2013	60	-	0	100	0	0	0	0	11/31
2018	40	-	0	100	0	0	0	0	18/55
2023	80	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	9/11
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1998	60	-	100	0	0	0	0	0	- / -
2003	100	-	60	40	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	1540	180	13	82	5	33	1	1	85/117
2003	1360	-	9	75	16	28	3	6	87/127
2008	-	20	0	0	0	0	0	0	- / -
2013	20	-	0	100	0	100	0	0	46/82
2018	20	-	0	100	0	0	0	0	54/103
2023	20	-	0	100	0	0	100	0	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	81/66
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	61/61
2018	-	-	-	-	-	-	-	-	100/104
2023	-	-	-	-	-	-	-	-	-/-
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1998	160	-	0	100	0	13	0	0	30/64
2003	260	-	46	54	0	39	0	0	53/103
2008	100	-	100	0	0	60	0	0	- / -
2013	120	-	50	50	0	0	0	0	37/72
2018	240	40	25	75	0	0	0	0	36/72
2023	100	-	0	20	80	40	60	100	- / -

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

**Table 22-10.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	16	-	-	-	-	-	13.5
2003	19	-	33	33	11	22	14.4
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	125	-	-	-	-	-	10.9
2003	132	-	15	30	15	40	13.8

## B HILL - STUDY NO. 22-11



### Location Information

USGS 7.5 min Map Info Kane Canyon NW; Township 29S, Range 7W, Section 36  
GPS (0' Stake) NAD 83 UTM ZONE 12, 360145 East 4233275 North

### Transect Information

Browse Tag # (0' Stake) 7059  
Transect Bearing 180° 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

Starting from Beaver High School on Main Street, travel south for 1.6 miles. On the east side of the road there is a rock monument commemorating the "Lee's Ranch Indian Raid;" turn east at the monument onto South Creek Road. Proceed for 3.15 miles on South Creek Road and stay on the main road. Turn left and follow the road down to the bottom of the wash where it meets another road. From this intersection, walk up the hill to the north at 320 degrees magnetic to the wooden cross braces. From the left-most wooden post, walk 100 feet at 15 degrees magnetic to the 400-foot stake. The study is marked by 2 ½-foot tall rebar posts that are 100 feet apart. The 0-foot baseline stake is marked by a short rebar tagged #7059.

### Site Information

Land Ownership State  
Land Administrator UDWR  
Allotment No data  
Elevation 6,220ft (1,896m)  
Aspect West  
Slope 1%  
Sample Dates 06/12/1998, 06/17/2003, 06/02/2008, 05/29/2013, 06/12/2018, 06/14/2023

**Table 22-11.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1959	-
Seeding - Aerial	-	-	1959	-
Hand Crew - Lop and Scatter	Project Maintenance - South Beaver Phase II	4831	May-June 2019	6241

**Wildlife Habitat and Vegetation History****Table 22-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 22-11.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Perennial Grass	Phase I
1991	Perennial Grass	Phase I
1998	Wyoming Big Sagebrush/Perennial Grass	Phase I
2003	Wyoming Big Sagebrush/Perennial Grass	Phase I
2008	Wyoming Big Sagebrush/Perennial Grass	Phase I
2013	Wyoming Big Sagebrush/Perennial Grass	Phase I
2018	Wyoming Big Sagebrush/Perennial Grass	Phase I
2023	Wyoming Big Sagebrush/Perennial Grass	No Encroachment

**Site Notes**

The wash just to the south of the study area contains an open stand of Utah juniper (*Juniperus osteosperma*) that provides the only cover near the flat. The site is nearly level with only a slight slope. Historic pellet group data from 1976-1997 is available from the "B" Hill pellet group transect that samples a slightly higher elevation area near the study site (Jense, et al., 1985; Jense, et al., 1991; Evans, et al., 1997). In 2018, it was noted that sagebrush near the road was infested with spider mites.

**Soils****Table 22-11.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.0	52.0	23.4	24.6	1.9	4.6	211.2	0.8	06/12/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation      13 inches  
 NRCS Ecological Site      Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)  
 NRCS Ecological Site #      R047XB308UT  
 States and Transitions      No state and transition model is available for this ecological site.

Upon study establishment in 1985, the major vegetation component of this site was introduced perennial grass species, mainly crested wheatgrass (*Agropyron cristatum*) and Russian wildrye (*Psathrostachys junceus*), with a scattered population of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) (Photos, Pre-1992 Data). Although the herbaceous understory has remained abundant over the sample years, native species have been rare (Table 22-11.7, Table 22-11.10, Table 22-11.11). Wyoming big sagebrush increased and has been a codominant site component since 1998: cover has remained similar each sample year, but density has exhibited a slight overall decrease (Table 22-11.12, Table 22-11.13). Barring a major disturbance, this site will likely continue to exist in a similar state in future sample years.

Deer winter range condition has generally remained very poor since 1998. As of 2023, however, deer winter range condition was considered to be poor. Improvement to deer wintering range can be accomplished by increasing preferred browse cover and reproduction; diversifying and increasing cover of native perennial forbs while reducing cheatgrass would also improve winter range conditions (Table 22-11.15). According to pellet group data, deer presence has been low in all sample years since 1998 (Table 22-11.9).

## Trend Summary Tables

**Table 22-11.6 - 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
1998	3.0	0.0	-	-	-	-
2003	3.1	-	-	2.3	-	-
2008	3.4	0.0	-	2.4	0.1	-
2013	3.5	0.0	-	3.2	0.3	-
2018	3.5	0.0	-	2.8	-	-
2023	3.4	0.0	-	3.4	-	-

**Table 22-11.7 - 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
1998	18	306	20	92	0.4	23.7	0.1	0.9
2003	2	336	10	60	0.0	18.9	0.1	0.5
2008	-	344	28	59	-	21.6	0.0	0.6
2013	-	361	266	95	-	23.7	1.1	0.9
2018	-	362	20	98	-	21.9	0.1	1.3
2023	4	349	199	87	0.0	26.2	0.9	1.8

**Table 22-11.8 - 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
1998	29.1	7.9	22.2	12.0	6.6	36.2
2003	26.9	2.0	18.0	32.2	5.1	23.6
2008	23.7	2.2	23.1	31.9	3.9	27.5
2013	26.6	6.5	18.4	22.0	6.4	30.3
2018	41.5	5.1	17.3	19.9	6.0	28.1
2023	44.2	2.3	8.4	18.3	5.0	30.4

**Table 22-11.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
1998	2	19	16
2003	1	8	10
2008	2	11	94
2013	4	5	34
2018	-	3	83
2023	2	1	6
Year	Days Use Per Acre (ha)		
1998	13.8 (34.1)	5.3 (13.2)	-
2003	3.6 (9.0)	14.1 (34.8)	-
2008	-	13.4 (33.1)	-
2013	15.3 (37.7)	5.3 (13.2)	-
2018	6.5 (16.1)	2.7 (6.6)	-
2023	0.7 (1.8)	2.0 (5.0)	-

**Table 22-11.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency								
1998	15	245	18	2	4	44	4	107	39
2003	11	238	2	-	6	42	-	140	4
2008	12	227	-	4	5	14	14	167	23
2013	20	213	-	1	44	23	-	218	6
2018	10	184	-	-	33	30	4	205	12
2023	11	219	4	1	26	55	4	150	-
year	Average Cover (%)								
1998	0.6	18.4	0.4	0.0	0.2	0.5	0.0	3.6	0.4
2003	0.5	11.0	0.0	-	0.3	0.3	-	6.7	0.1
2008	1.0	11.2	-	0.0	0.1	0.0	0.1	8.9	0.3
2013	0.6	10.6	-	0.0	1.5	0.3	-	10.7	0.1
2018	0.3	6.2	-	-	1.2	0.6	0.1	13.4	0.1
2023	1.1	11.5	0.0	0.0	0.9	2.1	0.4	10.2	-

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

**Table 22-11.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis (rockcress)	Astragalus cibaricus (browse milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaetopappa ericoides (rose heath)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Gilia inconspicua <sup>a</sup> (shy gilia)	Orobanche fasciculata (clustered broomrape)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Schoenocrambe linifolia (flaxleaf plainsmustard)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
1998	-	-	8	-	-	-	18	33	1	-	-	1	-	3	2	2	60
2003	-	-	-	-	-	-	2	14	-	5	1	-	-	-	-	2	50
2008	-	-	-	-	-	-	28	3	-	-	-	-	-	10	1	-	45
2013	16	-	-	5	-	2	260	11	3	-	4	1	2	23	-	-	60
2018	17	-	-	21	1	-	3	10	-	-	-	3	-	12	-	-	62
2023	104	1	-	-	-	1	152	4	5	-	-	-	8	10	-	-	59
year	Average Cover (%)																
1998	-	-	0.1	-	-	-	0.0	0.3	0.0	-	-	0.0	-	0.0	0.0	0.0	0.4
2003	-	-	-	-	-	-	0.0	0.1	-	0.0	0.0	-	-	-	-	0.0	0.3
2008	-	-	-	-	-	-	0.0	0.0	-	-	-	-	-	0.0	0.0	-	0.5
2013	0.0	-	-	0.0	-	0.0	1.1	0.1	0.0	-	0.0	0.0	0.1	0.1	-	-	0.6
2018	0.1	-	-	0.5	0.0	-	0.0	0.1	-	-	-	0.0	-	0.0	-	-	0.7
2023	0.3	0.0	-	-	-	0.0	0.6	0.0	0.0	-	-	-	0.3	0.1	-	-	1.4

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

**Table 22-11.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Ephedra nevadensis <sup>p</sup> (Nevada jointfir)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)
year	Line Intercept Cover (%)				
1998	-	-	-	-	-
2003	2.3	-	-	0	-
2008	2.4	-	0.1	0	-
2013	3.2	-	0.2	0.1	-
2018	2.8	-	-	0	-
2023	3.4	-	-	-	-
year	Quadrat Cover (%)				
1998	3.0	-	0.0	-	-
2003	3.0	0.0	-	0.0	-
2008	3.2	0.1	0.0	0.0	-
2013	3.4	0.1	0.0	0.0	-
2018	3.3	0.1	-	0.0	0.0
2023	3.2	0.1	-	0.0	-

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

**Table 22-11.13 - 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 (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
1998	1200	20	20	58	22	13	18	13	47/80
2003	1040	-	4	56	40	31	35	15	52/74
2008	860	100	2	67	30	40	9	12	55/78
2013	1040	20	4	79	17	48	10	10	53/79
2018	920	-	2	78	20	20	24	44	54/80
2023	840	-	5	88	7	24	21	12	- / -
<b>Ephedra nevadensis<sup>p</sup> -- (Nevada jointfir)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	0	0	29/20
2008	20	-	0	100	0	100	0	0	32/21
2013	20	-	0	100	0	100	0	0	35/30
2018	20	-	0	0	100	0	100	100	26/19
2023	20	-	0	100	0	100	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	120	-	17	83	0	0	0	0	21/24
2003	-	-	-	-	-	-	-	-	- / -
2008	20	20	0	100	0	0	0	0	12/16
2013	20	-	0	100	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	18/19
2023	20	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	8/6
2008	60	20	33	67	0	0	0	0	10/15
2013	20	-	0	100	0	0	0	0	9/25
2018	20	-	0	100	0	0	0	0	12/25
2023	-	-	-	-	-	-	-	-	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	40	-	0	100	0	0	0	0	4/6
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	71/146
2008	-	-	-	-	-	-	-	-	58/128
2013	-	-	-	-	-	-	-	-	132/255
2018	-	-	-	-	-	-	-	-	99/109
2023	-	-	-	-	-	-	-	-	-/-
<b>Rhus trilobata<sup>p</sup> -- (skunkbush sumac)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	70/130

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

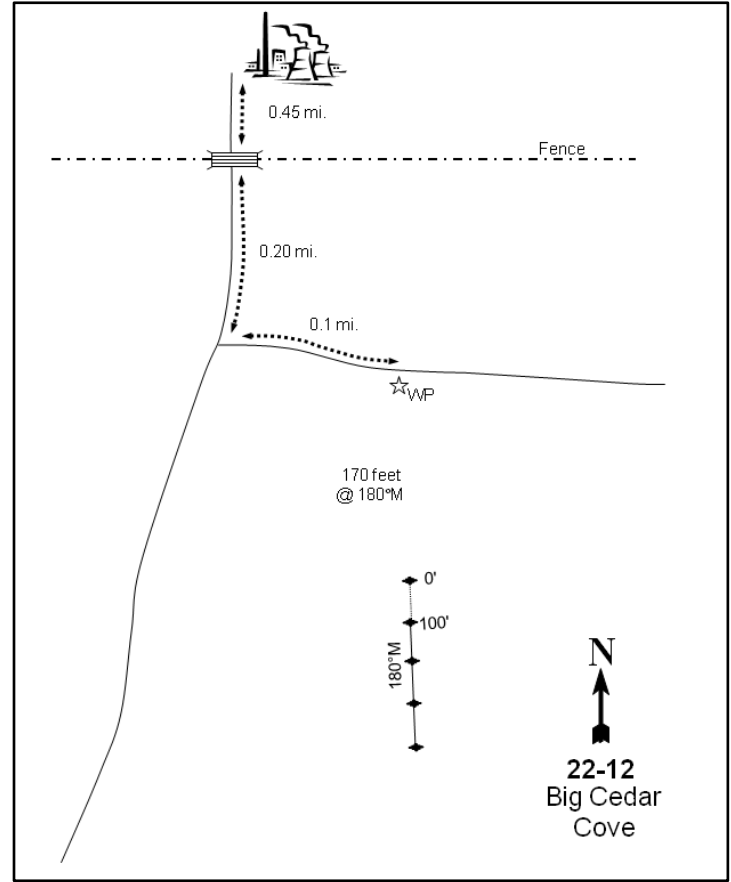
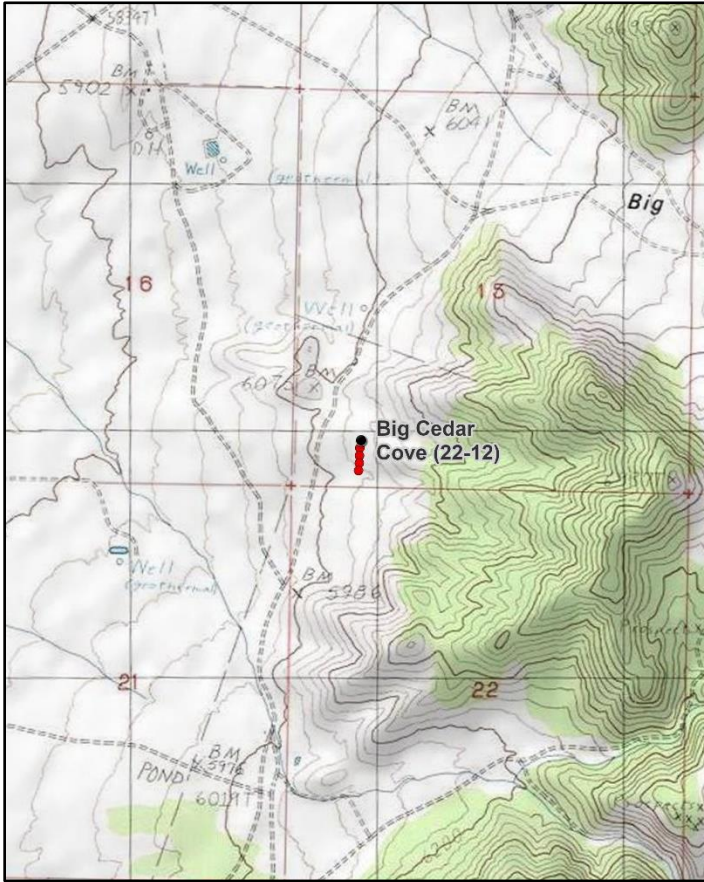
**Table 22-11.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	4	-	100	-	-	-	3.0

**Table 22-11.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	3.8	0.0	0.0	30.0	-0.3	1.7	0.0	<b>35.2</b>	Very Poor-Poor
2003	2.9	0.0	0.0	30.0	0.0	0.9	0.0	<b>33.8</b>	Very Poor-Poor
2008	3.0	0.0	0.0	30.0	0.0	1.2	0.0	<b>34.2</b>	Very Poor-Poor
2013	4.0	0.0	0.0	30.0	0.0	1.7	0.0	<b>35.7</b>	Very Poor-Poor
2018	3.5	0.0	0.0	30.0	0.0	2.6	0.0	<b>36.1</b>	Very Poor-Poor
2023	4.3	0.0	0.0	30.0	0.0	3.6	0.0	<b>37.9</b>	Poor

## BIG CEDAR COVE - STUDY NO. 22-12

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Bearskin Mountain NW; Township 27S, Range 9W, Section 15  
NAD 83 UTM ZONE 12, 337870 East 4258163 North

**Transect Information**

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

661  
180° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

From mile marker 4 on SR-257 north of Milford, drive 0.4 miles north. Turn right at Roosevelt Hot Springs Road (Blundell Geothermal Plant) and drive for 2.65 miles to a major fork. Continue straight and proceed for 5.0 miles. Just past the cattle guards, turn right and travel 1.0 miles to a four-way fork. Turn right and continue 0.45 miles (past a Phillips Oil well-head on the right) to another cattle guard. Go another 0.20 miles to a junction, then turn left and drive 0.1 miles to a witness post on the right (south) side of the road; the transect starts 170 feet south of the road. The 0-foot baseline stake is a steel rebar three feet tall with a browse tag #661 attached.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	MINERAL RANGE
Elevation	6,050ft (1,844m)
Aspect	Southwest
Slope	9%
Sample Dates	06/17/1998, 06/24/2003, 06/09/2008, 06/05/2013, 06/13/2018, 06/12/2023



**Table 22-12.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Milford Flat	-	July 2007	356665
Chaining - One-Way Ely	Milford Flat Fire Rehabilitation and Contracting	1218	Fall 2007	76454
Seeding - Aerial Before	Milford Flat Fire Rehabilitation and Contracting	1218	Fall 2007	76454
Seeding - Aerial After	Milford Flat Fire Rehabilitation and Contracting	1218	Fall 2007	76454

**Table 22-12.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Milford BLM Mix 2			Aerial	Oct 2007	12917
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.84	0.00
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest	2.05	0.00
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	Vavilov	0.12	0.00
G	<i>Agropyron fragile</i>	Siberian Wheatgrass	P-27	0.09	0.00
G	<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Bannock	1.27	0.00
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	1.34	0.00
G	<i>Pascopyrum smithii</i>	Western Wheatgrass	Arriba	0.24	0.00
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass	Rush	0.09	0.00
G	<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass	Rush	0.70	0.00
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	1.25	0.00
F	<i>Linum perenne</i>	Blue Flax	Appar	0.28	0.00
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.55	0.00
F	<i>Onobrychis viciifolia</i>	Eski Sainfoin	Eski	0.17	0.00
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.51	0.00

Mix Name			Application Type	Application Date	Acres
Milford Mix 2 Wyo Sage (Lot A)			Aerial	Oct 2007	7100
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.24	0.23
F	<i>Medicago sativa</i>	Alfalfa	Ladak	0.26	0.24
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Beaver UT	0.50	0.08

**Wildlife Habitat and Vegetation History****Table 22-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Desert Bighorn	DBS	
Pronghorn	crucial	year-long

**Table 22-12.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Wyoming Big Sagebrush	Phase I
1991	Wyoming Big Sagebrush	Phase I
1998	Wyoming Big Sagebrush	Phase I
2003	Wyoming Big Sagebrush	Phase I
2008	Annual-Perennial Grass	Phase I
2013	Annual-Perennial Grass	Phase I
2018	Annual Grass	No Encroachment
2023	Annual Grass	No Encroachment

**Site Notes**

Fire rehabilitation efforts in the fall of 2007 included aerial seeding with a mixture of grasses and forbs, followed by a chaining with an Ely chain to cover the seed. After chaining was completed, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) was aerially seeded. This study site was close to the border of the mid elevation mix 2 and the low elevation mix 3. Forage kochia (*Bassia prostrata*) was flown onto the low elevation area. There was likely some overlap of seeding in this area as kochia was sampled in 2008. Only shrub data and pictures were taken in 2011 to monitor the effects of the Milford Flat Fire, and herbaceous data and basic ground cover were not collected.

**Soils****Table 22-12.5 - 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	6.7	62.7	20.7	16.6	1.8	7.5	96.0	0.6	06/17/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Gravelly Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY306UT
States and Transitions	1985-2003 - Current Potential State: Community Phase 2.2 2008-2023 - Yellow Rabbitbrush/Invasive Annuals State: Community Phase 5.2

The plant community on this site was a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with scattered twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees from study establishment in 1985 through the 2003 sample year (Photos, Pre-1992 Data, Table 22-12.12, Table 22-12.13). The herbaceous understory fluctuated during this time period, but the introduced annual grass species cheatgrass (*Bromus tectorum*) was a major component in most sample years (Photos, Pre-1992 Data, Table 22-12.7, Table 22-12.10). Following a wildfire that removed the browse and tree component and a seeding treatment in 2007 (Table 22-12.1), the site transitioned to an introduced perennial grass dominated state with cheatgrass persisting as a codominant species through the 2013 year; cheatgrass was the sole dominant species in 2018 and 2023. Sagebrush and other shrub species have begun to reestablish, albeit contributing low (but gradually increasing) cover; density, however, has decreased over the post-fire sample years. Without further disturbance, it is possible that sagebrush will become a codominant component of this site. However, decreasing sagebrush density and no recruitment of young (Table 22-12.12, Table 22-12.13) suggests that persistent herbaceous dominance may be more likely if these trends continue.

Deer winter range condition has ranged between very poor and poor since 1998. As of 2023, deer winter range condition was considered to be very poor. Improvement to deer wintering range can be accomplished through efforts to reduce cheatgrass; diversifying age classes within the preferred browse community while increasing perennial forbs would also improve deer winter range conditions (Table 22-12.15). According to pellet transect data, deer presence has remained low in all sample years following the burn, and no deer pellet groups were observed in 2023 (Table 22-12.9).

**Trend Summary Tables****Table 22-12.6 - 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
1998	17.1	4.4	0.6	-	-	-
2003	15.9	5.1	1.6	18.1	5.8	0.7
2008	1.3	0.3	-	0.1	-	-
2013	1.4	1.1	-	2.4	2.6	-
2018	3.2	3.1	-	2.7	1.4	-
2023	5.0	2.7	-	4.6	1.7	-

**Table 22-12.7 - 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
1998	369	248	14	51	4.6	7.2	0.1	0.8
2003	329	254	70	107	4.5	5.5	0.2	0.5
2008	88	211	59	60	3.4	4.1	1.5	0.5
2013	391	299	46	40	7.9	15.1	0.8	0.9
2018	411	242	170	6	19.0	9.9	2.6	0.1
2023	447	191	206	16	29.7	7.9	5.4	0.3

**Table 22-12.8 - 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
1998	13.1	1.4	36.2	43.4	5.4	31.2
2003	8.2	0.3	22.1	42.2	2.8	34.1
2008	27.7	-	7.6	59.4	6.6	11.6
2013	21.2	-	40.2	11.8	6.5	33.5
2018	19.3	-	52.1	13.5	6.4	32.9
2023	22.7	0.0	32.7	17.3	6.2	44.8

**Table 22-12.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer/Pronghorn	Horse	Rabbit
	Quadrat Frequency				
1998	1	-	20	-	27
2003	2	-	9	-	21
2008	-	-	-	-	5
2013	2	-	3	-	-
2018	5	-	1	-	8
2023	3	-	1	-	6
Year	Days Use Per Acre (ha)				
1998	5.8 (14.3)	-	12.1 (29.8)	-	-
2003	4.4 (10.8)	-	26.8 (66.2)	1.2 (2.9)	-
2008	-	-	-	-	-
2013	5.1 (12.6)	8.7 (21.5)*	5.3 (13.2)	-	-
2018	1.5 (3.6)	-	1.3 (3.3)	-	-
2023	2.2 (5.4)	-	-	-	-

Pellets per acre (ha)

**Table 22-12.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency											
1998	5	-	22	369	72	15	-	71	-	150	-	-
2003	3	-	17	329	84	9	-	47	-	159	-	-
2008	16	84	-	88	13	7	-	30	3	32	-	109
2013	26	138	6	391	14	10	41	51	5	27	6	113
2018	2	131	2	411	3	7	9	92	4	66	8	24
2023	2	62	18	447	-	4	16	92	1	36	-	8
year	Average Cover (%)											
1998	0.2	-	0.7	4.6	1.9	0.2	-	1.2	-	3.1	-	-
2003	0.1	-	0.3	4.5	2.4	0.2	-	0.3	-	2.2	-	-
2008	0.1	1.4	-	3.4	0.1	0.1	-	0.3	0.0	0.3	-	1.9
2013	1.0	6.5	0.0	7.9	0.1	0.5	1.4	1.3	0.0	0.5	0.2	3.7
2018	0.2	5.4	0.0	19.0	0.0	0.1	0.2	2.0	0.0	1.0	0.2	0.7
2023	0.1	2.2	0.4	29.7	-	0.2	0.3	3.4	0.0	0.9	-	0.4

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

**Table 22-12.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis demissa (nodding rockcross)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chenopodium album <sup>a</sup> (lambsquarters)	Cryptantha (cryptantha)	Cymopterus purpureus (purple springparsley)	Draba <sup>a</sup> (draba)	Erigeron pumilus (shaggy fleabane)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Helianthus annuus <sup>a</sup> (common sunflower)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)
year	Nested Frequency																
1998	-	-	2	8	1	3	-	-	-	-	-	11	-	-	-	-	-
2003	4	6	-	-	-	-	3	-	-	-	11	-	-	-	26	-	-
2008	7	4	-	1	1	-	-	3	-	-	4	2	0	0	35	5	2
2013	-	21	-	-	-	-	-	-	1	-	-	-	16	-	9	-	-
2018	-	82	-	3	-	-	-	-	-	-	3	-	110	-	-	-	-
2023	3	97	-	-	2	-	-	-	-	3	-	3	143	-	-	-	4
year	Average Cover (%)																
1998	-	-	0.0	0.1	0.0	0.0	-	-	-	-	-	0.6	-	-	-	-	-
2003	0.0	0.0	-	-	-	-	0.0	-	-	-	0.0	-	-	-	0.1	-	-
2008	0.1	0.0	-	0.0	0.0	-	-	0.0	-	-	0.0	0.0	0.0	0.0	1.2	0.2	0.0
2013	-	0.1	-	-	-	-	-	-	0.0	-	-	-	0.6	-	0.0	-	-
2018	-	0.2	-	0.0	-	-	-	-	-	-	0.1	-	2.3	-	-	-	-
2023	0.0	0.5	-	-	0.0	-	-	-	-	0.0	-	0.1	4.9	-	-	-	0.0

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

FORB SPECIES	Linum perenne <sup>i</sup> (blue flax)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Medicago sativa <sup>i</sup> (alfalfa)	Mentzelia <sup>a</sup> (blazingstar)	Microsteris gracilis <sup>ai</sup> (slender phlox)	Navaretia intertexta <sup>a</sup> (needleleaf navaretia)	Onobrychis viciifolia <sup>i</sup> (sainfoin)	Phlox hoodii (spiny phlox)	Phlox longifolia (long/leaf phlox)	Sanguisorba minor <sup>a</sup> (small burnet)	Sisymbrium altissimum <sup>ai</sup> (tall tumbledmustard)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested Frequency													
1998	-	2	1	-	-	1	13	-	-	24	-	-	0	-
2003	-	-	-	-	-	-	28	-	94	9	-	-	-	-
2008	3	-	-	24	0	-	7	1	6	14	7	-	-	-
2013	-	3	-	17	-	-	-	-	-	13	10	5	-	-
2018	-	-	-	-	-	-	-	-	-	-	-	-	3	-
2023	-	-	-	-	-	-	-	-	-	2	-	5	-	3
year	Average Cover (%)													
1998	-	0.0	0.0	-	-	0.0	0.1	-	-	0.1	-	-	0.0	-
2003	-	-	-	-	-	-	0.1	-	0.5	0.0	-	-	-	-
2008	0.0	-	-	0.1	0.0	-	0.0	0.0	0.0	0.1	0.1	-	-	-
2013	-	0.0	-	0.5	-	-	-	-	-	0.0	0.4	0.2	-	-
2018	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-
2023	-	-	-	-	-	-	-	-	-	0.0	-	0.0	-	0.0

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

**Table 22-12.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ephedra nevadensis <sup>p</sup> (Nevada jojoba)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)									
1998	-	-	-	-	-	-	-	-	-	-
2003	16.8	-	1.2	1.3	-	-	4.5	0	0.1	0.7
2008	-	0.1	-	-	-	-	-	-	-	-
2013	1.6	-	-	0.8	0.5	-	2.1	-	-	-
2018	2.3	-	-	0.4	0.8	-	0.6	-	-	-
2023	3.7	-	-	0.9	0.8	-	0.9	-	-	-
year	Quadrat Cover (%)									
1998	16.4	-	1.0	0.7	-	-	3.4	-	-	0.6
2003	14.2	-	1.8	1.7	-	-	3.4	0.0	0.0	1.6
2008	1.1	0.1	-	0.1	-	-	0.3	-	-	-
2013	0.9	-	-	0.4	0.0	-	1.1	-	-	-
2018	2.6	-	-	0.5	0.8	0.0	2.3	-	-	-
2023	3.7	-	-	1.3	0.9	-	1.8	-	-	-

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

**Table 22-12.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1998	20	-	0	100	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	3480	100	1	62	37	31	2	13	56/86
2003	3420	-	0	48	52	18	1	25	54/86
2008	40	60	100	0	0	0	0	0	- / -
2013	260	-	23	77	0	8	0	8	39/56
2018	240	-	8	83	8	0	0	17	56/95
2023	200	-	0	100	0	0	0	0	- / -
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	540	100	82	19	0	0	0	0	17/17
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1998	900	-	0	89	11	0	0	7	28/40
2003	900	-	0	82	18	0	0	7	29/44
2008	60	-	100	0	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	44/56
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ephedra nevadensis<sup>p</sup> -- (Nevada jointfir)</b>									
1998	320	40	50	44	6	44	25	25	49/62
2003	200	20	10	80	10	50	20	10	55/86
2008	-	-	-	-	-	-	-	-	31/47
2013	40	-	0	100	0	0	0	0	54/108
2018	80	-	0	100	0	25	25	0	51/113
2023	220	-	55	46	0	27	27	18	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	0	0	0	58/93
2018	100	-	0	100	0	0	0	0	71/105
2023	120	-	0	100	0	0	0	0	- / -
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	38/53
2018	20	-	0	100	0	0	0	0	5/12
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	10080	160	20	79	1	0	0	0	19/22
2003	5040	20	0	86	14	0	0	21	23/33
2008	20	20	100	0	0	100	0	0	- / -
2013	300	40	27	73	0	0	0	0	27/49
2018	1840	-	1	90	9	0	0	3	18/29
2023	2620	-	2	89	9	0	0	9	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	20	-	100	0	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1998	20	-	100	0	0	0	0	0	22/25
2003	160	-	0	100	0	25	0	0	17/13
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Mahonia repens -- (creeping barberry)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	15/29
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1998	140	-	0	100	0	0	0	0	14/26
2003	140	-	0	100	0	0	0	0	16/45
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	19/71
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1998	60	-	67	33	0	0	0	0	- / -
2003	80	-	100	0	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	20	0	0	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Ribes cereum var. cereum<sup>p</sup> -- (wax currant)</b>									
1998	120	-	0	100	0	0	0	0	- / -

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

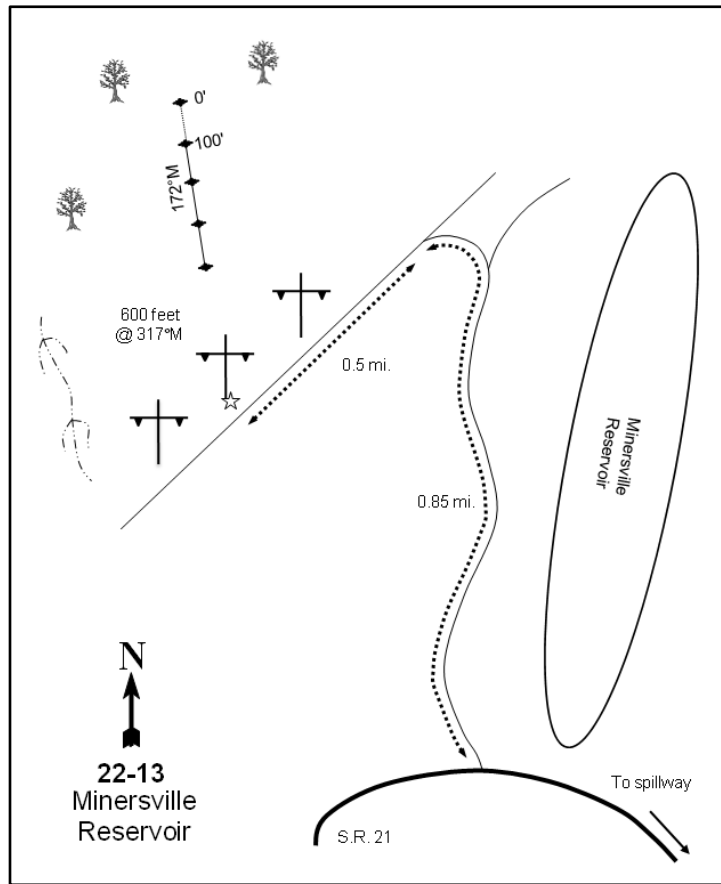
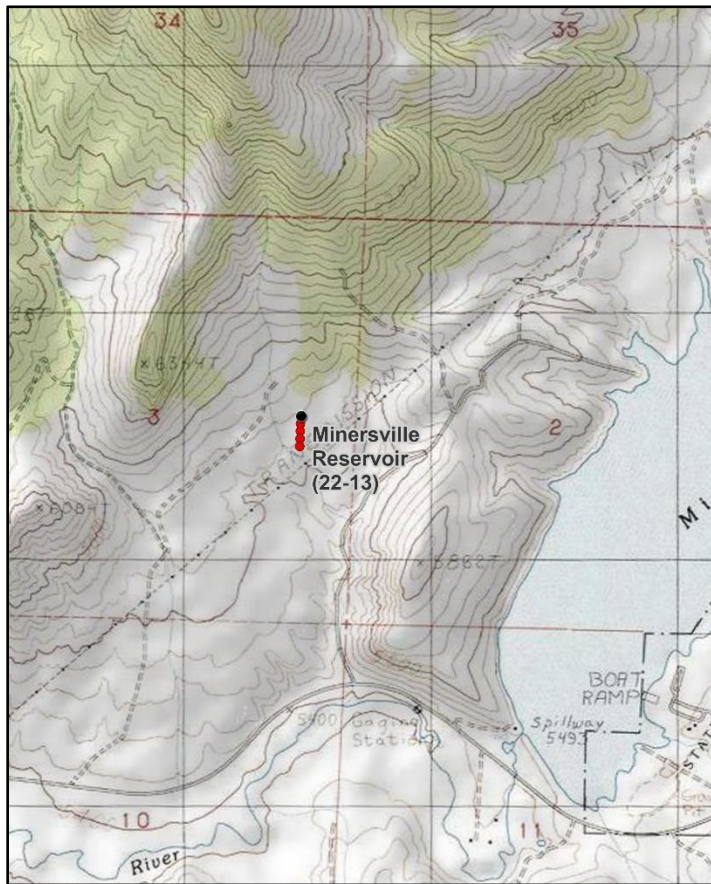
**Table 22-12.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	19	-	-	-	-	-	12.4
2003	30	-	8	33	8	50	15.7
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	37	-	-	-	-	-	7.0
2003	72	42	37	11	5	5	4.4

**Table 22-12.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	21.4	4.2	1.6	14.4	-3.4	1.7	0.0	<b>39.8</b>	Poor
2003	22.6	0.3	0.4	11.0	-3.4	1.0	0.0	<b>31.9</b>	Very Poor
2008	0.2	0.0	0.0	8.2	-2.6	1.0	0.0	<b>6.8</b>	Very Poor
2013	3.0	0.0	0.0	30.0	-6.0	1.8	0.0	<b>28.9</b>	Very Poor
2018	3.4	0.0	0.0	19.9	-14.2	0.1	0.0	<b>9.1</b>	Very Poor
2023	5.8	0.0	0.0	15.8	-20.0	0.5	0.0	<b>2.1</b>	Very Poor

## MINERSVILLE RESERVOIR - STUDY NO. 22-13



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Minersville Reservoir; Township 30S, Range 9W, Section 03  
NAD 83 UTM ZONE 12, 338410 East 4232776 North

### Transect Information

Browse Tag # (0' Stake) 7185  
Transect Bearing 172° magnetic  
Length 400ft  
Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt Marker Placement Standard

### Directions to Site

Travel west on SR-21 from Beaver to Minersville Reservoir. From the Minersville Reservoir sign (south of the reservoir), drive 1.35 miles farther west on SR-21 to an intersection with a dirt road: turn right and proceed for 0.85 miles. Turn left onto a road that leads under the powerlines, then continue for 0.4 miles down across a wash and up a small hill to powerpole #74 (single pole). From the pole, the 0-foot stake is approximately 600 feet away at 317 degrees magnetic and is marked by browse tag #7185. The 0-foot, 100-foot, and 200-foot stakes are rebar; the 300-foot and 400-foot stakes are green, half-high fenceposts.

### Site Information

Land Ownership Federal  
Land Administrator BLM  
Allotment MINERSVILLE NO. 2  
Elevation 5,670ft (1,728m)  
Aspect South  
Slope 6-8%  
Sample Dates 06/25/1998, 06/24/2003, 06/09/2008, 06/05/2013, 06/12/2018, 06/13/2023



**Table 22-13.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Minersville	-	July 1998	4052
Chaining - One-Way Smooth	Minersville Fire Rehabilitation	-	October 1998	1522
Seeding - Aerial Before	Minersville Aerial Seeding	-	October 1998	2626

**Table 22-13.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Minersville Aerial Seeding			Aerial	Oct 1998	2600
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass		1.00	0.00
G	Agropyron desertorum	Crested Wheatgrass	Hycrest	2.00	0.00
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.00
G	Pseudoroegneria spicata	Bluebunch Wheatgrass		2.00	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		2.00	0.00
F	Linum lewisii	Lewis Flax		0.50	0.00
F	Medicago sativa	Alfalfa	Ladak	0.50	0.00
F	Penstemon palmeri	Palmer Penstemon		0.25	0.00
F	Sanguisorba minor	Small Burnet		0.50	0.00
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush		1.00	0.00
S	Atriplex canescens	Fourwing Saltbush		1.00	0.00
S	Bassia prostrata	Forage Kochia		0.50	0.00

**Wildlife Habitat and Vegetation History****Table 22-13.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Desert Bighorn	DBS	

**Table 22-13.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Wyoming Big Sagebrush	Phase I
1991	Wyoming Big Sagebrush	Phase I
1998	Wyoming Big Sagebrush	Phase I
2003	Perennial Grass	No Encroachment
2008	Perennial Grass	No Encroachment
2011	Annual-Perennial Grass	No Encroachment
2013	Annual-Perennial Grass	No Encroachment
2018	Annual-Perennial Grass	No Encroachment
2023	Annual-Perennial Grass	No Encroachment

**Site Notes**

Prior to the burn, thermal and escape cover for deer were provided by dense junipers on the hillside north of the study site, but only a few pockets of live trees remain in the area.

**Soils****Table 22-13.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.3	54.0	21.4	24.6	1.0	7.1	121.6	0.5	06/25/1998
Sandy Clay Loam	6.2	54.0	21.4	24.6	1.0	6.9	128.0	0.4	06/25/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY220UT
States and Transitions	1985-1998 - Shrub State: Community Phase 3.1 2003-2008 - State Undefined: Community Phase Undefined 2013-2023 - Annual State: Community Phase 4.1

The plant community on this site was a stand of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) with twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees scattered throughout from study establishment in 1985 through the 1998 sample year; a 1998 wildfire (Table 22-13.1) removed most of the shrubs and trees (Photos, Pre-1992 Data, Table 22-13.12, Table 22-13.13, Table 22-13.14). The site transitioned to a perennial and annual grass community following the burn and has remained in this state since the 2003 sample year with annual grasses fluctuating in dominance. Perennial grass cover has mainly been contributed by the native species James' galleta (*Pleuraphis jamesii*) and the seeded introduced species crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Thinopyrum intermedium*), and Russian wildrye (*Psathyrostachys junceus*). The introduced grass species cheatgrass (*Bromus tectorum*) has contributed a majority of the annual grass cover and has been moderately to highly abundant since 2008. In addition, nested frequency of cheatgrass was high when first sampled in 1998, indicating that cheatgrass was likely a prominent component of the understory prior to that year (Table 22-13.7, Table 22-13.10). Annual and perennial forbs have generally remained rare (Table 22-13.11). Sagebrush has been slow to reestablish, and forage kochia (*Bassia prostrata*) was the most abundant preferred browse species in 2023 (Table 22-13.12, Table 22-13.13). This study will likely remain in a similar state in future sample years, although high amounts of cheatgrass may affect the resiliency of the community and contribute to altered wildfire regimes.

In 2023, deer winter range condition was considered to be poor. Improvement to deer wintering range can be accomplished through efforts that support preferred browse reproduction while reducing cheatgrass (Table 22-13.15). Pellet group data indicates that although deer presence was moderate in 2013 and high in 1998, it has been low in all other sample years (Table 22-13.9).

**Trend Summary Tables****Table 22-13.6 - 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
1998	8.8	0.0	0.4	-	-	0.1
2003	0.1	-	-	0.2	-	-
2008	0.2	-	-	0.1	-	-
2013	1.2	0.0	-	1.0	0.2	-
2018	1.4	0.4	-	1.7	0.1	-
2023	3.0	-	-	2.9	-	-

**Table 22-13.7 - 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
1998	445	174	1	8	15.1	7.1	0.0	0.0
2003	67	228	126	59	0.5	13.7	4.9	1.3
2008	258	320	44	16	2.7	22.6	0.3	0.2
2013	418	339	57	35	12.9	17.3	0.6	0.3
2018	353	347	72	10	13.7	20.9	0.5	0.1
2023	401	295	193	73	18.5	14.4	2.4	0.8

**Table 22-13.8 - 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
1998	18.3	0.0	34.6	25.3	11.0	30.3
2003	35.9	-	14.2	17.8	17.4	20.0
2008	7.3	0.0	34.4	25.9	15.7	26.3
2013	12.3	0.0	31.0	15.0	15.6	38.1
2018	15.3	0.0	36.5	20.7	21.6	38.3
2023	7.8	0.0	20.1	23.8	16.0	40.5

**Table 22-13.9 - 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				
1998	1	36	-	-	13
2003	7	6	1	3	5
2008	13	4	-	-	35
2013	8	19	2	-	2
2018	5	13	-	-	24
2023	5	4	-	1	1
Year	Days Use Per Acre (ha)				
1998	2.9 (7.2)	61.7 (152.3)	-	-	-
2003	20.3 (50.2)	9.4 (23.2)	-	5.2 (12.9)	-
2008	20.3 (50.2)	14.7 (36.4)	-	-	-
2013	8.7 (21.5)	32.8 (81.1)	-	-	-
2018	32.7 (80.7)	14.7 (36.4)	-	-	-
2023	11.6 (28.7)	4.0 (9.9)	-	-	-

**Table 22-13.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency													
1998	12	-	36	22	-	445	68	-	79	-	-	-	-	-
2003	2	34	40	15	1	66	11	-	123	7	0	18	35	8
2008	4	78	73	-	8	257	14	-	184	15	0	7	62	10
2013	10	131	40	4	7	418	10	1	129	21	0	15	112	11
2018	9	37	82	-	-	353	-	10	174	78	6	36	72	-
2023	2	69	74	-	23	401	2	4	147	19	-	27	66	-
year	Average Cover (%)													
1998	0.3	-	1.6	0.3	-	15.1	1.9	-	2.9	-	-	-	-	-
2003	0.1	1.1	1.2	0.2	0.0	0.4	0.5	-	8.5	0.4	0.0	0.7	1.1	0.1
2008	0.2	3.5	2.0	-	0.3	2.7	0.3	-	12.4	0.4	0.0	0.0	3.3	0.0
2013	0.3	4.8	1.3	0.0	0.3	12.8	0.4	0.0	4.5	1.2	0.0	0.3	4.0	0.0
2018	0.3	1.1	1.9	-	-	13.7	-	0.0	9.7	3.8	0.2	1.1	2.8	-
2023	0.1	2.6	2.1	-	0.6	18.5	0.0	0.1	5.2	0.4	-	0.6	2.6	-

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

**Table 22-13.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum alyssoides <sup>ai</sup> (pale madwort)	Astragalus newberryi (Newberry's milkvetch)	Calochortus flexuosus (winding mariposa lily)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaetopappa ericoides (rose heath)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)
year	Nested Frequency																
1998	1	-	-	6	-	-	-	-	-	-	-	-	-	-	-	2	-
2003	-	-	-	18	-	18	-	-	-	2	-	120	-	-	7	2	-
2008	-	-	-	2	-	8	-	-	-	-	-	4	1	-	-	-	-
2013	-	3	-	12	1	5	3	6	2	-	2	17	33	1	-	7	-
2018	70	-	-	-	-	5	-	2	3	-	2	-	-	-	-	-	-
2023	103	-	29	23	4	5	7	-	-	15	46	-	53	2	-	3	1
year	Average Cover (%)																
1998	0.0	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	0.0	-
2003	-	-	-	0.1	-	0.6	-	-	-	0.1	-	4.8	-	-	0.1	0.0	-
2008	-	-	-	0.0	-	0.0	-	-	-	-	-	0.0	0.0	-	-	-	-
2013	-	0.0	-	0.0	0.0	0.2	0.0	0.0	0.0	-	0.0	0.0	0.1	0.0	-	0.0	-
2018	0.4	-	-	-	-	0.1	-	0.0	0.0	-	0.1	-	-	-	-	-	-
2023	0.8	-	0.2	0.1	0.0	0.1	0.0	-	-	0.3	0.8	-	0.5	0.2	-	0.0	0.0

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

FORB SPECIES	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	unknown perennial forb (unknown forb)
year	Nested Frequency				
1998	-	-	-	-	-
2003	4	2	6	-	8
2008	37	2	6	0	-
2013	-	2	-	5	-
2018	-	-	-	-	-
2023	-	2	11	-	2
year	Average Cover (%)				
1998	-	-	-	-	-
2003	0.0	0.0	0.3	-	0.3
2008	0.3	0.0	0.2	0.0	-
2013	-	0.0	-	0.3	-
2018	-	-	-	-	-
2023	-	0.0	0.2	-	0.0

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

**Table 22-13.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ephedra nevadensis <sup>p</sup> (Nevada jointfir)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)							
1998	-	-	-	-	-	-	-	-
2003	-	-	-	0.2	-	-	-	-
2008	-	-	-	0.1	-	-	-	-
2013	-	0.6	0.2	0.4	-	-	-	-
2018	-	1.2	-	0.5	0.1	-	-	-
2023	-	2.6	-	0.3	-	-	-	-
year	Quadrat Cover (%)							
1998	8.8	-	-	0.0	-	0.1	0.0	0.4
2003	-	-	-	0.1	-	-	-	-
2008	-	0.0	-	0.1	-	-	-	-
2013	-	0.5	0.0	0.7	0.0	-	-	-
2018	-	0.9	-	0.6	0.4	-	-	-
2023	-	2.5	-	0.4	-	-	-	-

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

**Table 22-13.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
1998	2780	20	5	44	51	17	0	14	61/79
2003	40	-	0	100	0	0	50	0	24/21
2008	40	-	0	100	0	0	50	0	28/30
2013	40	-	100	0	0	50	50	0	39/45
2018	60	-	33	67	0	67	0	0	35/52
2023	20	-	0	100	0	0	0	0	- / -
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	71/88
2008	-	-	-	-	-	-	-	-	109/186
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	91/208
2023	-	-	-	-	-	-	-	-	- / -
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	20	0	0	0	0	0	0	25/54
2013	420	6200	48	52	0	0	0	0	30/56
2018	3080	-	10	90	0	8	0	0	15/32
2023	2340	14740	2	98	0	5	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1998	40	-	0	100	0	0	0	0	33/49
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	54/127
2013	60	-	100	0	0	0	0	0	27/33
2018	-	-	-	-	-	-	-	-	102/125
2023	-	-	-	-	-	-	-	-	-/-
<b>Echinocereus engelmannii -- (Engelmann's hedgehog cactus)</b>									
1998	-	-	-	-	-	-	-	-	12/17
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Ephedra nevadensis<sup>P</sup> -- (Nevada jointfir)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	33/43
2008	20	-	0	0	100	0	0	0	44/83
2013	40	-	50	50	0	0	0	0	68/125
2018	280	-	57	43	0	0	79	86	53/106
2023	780	-	67	33	0	72	28	0	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	55/94
2013	-	-	-	-	-	-	-	-	64/101
2018	-	-	-	-	-	-	-	-	103/162
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	32/57
2008	-	-	-	-	-	-	-	-	15/16
2013	60	20	0	100	0	0	0	0	11/23
2018	140	-	0	100	0	0	0	43	18/28
2023	40	-	0	100	0	0	0	0	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	20	-	100	0	0	0	0	0	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	400	0	0	0	0	0	0	-/-
2018	40	-	0	100	0	0	0	0	1/12
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1998	40	-	0	100	0	0	0	0	14/24
2003	-	-	-	-	-	-	-	-	19/44
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	16/36
2023	-	-	-	-	-	-	-	-	-/-
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	54/260

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

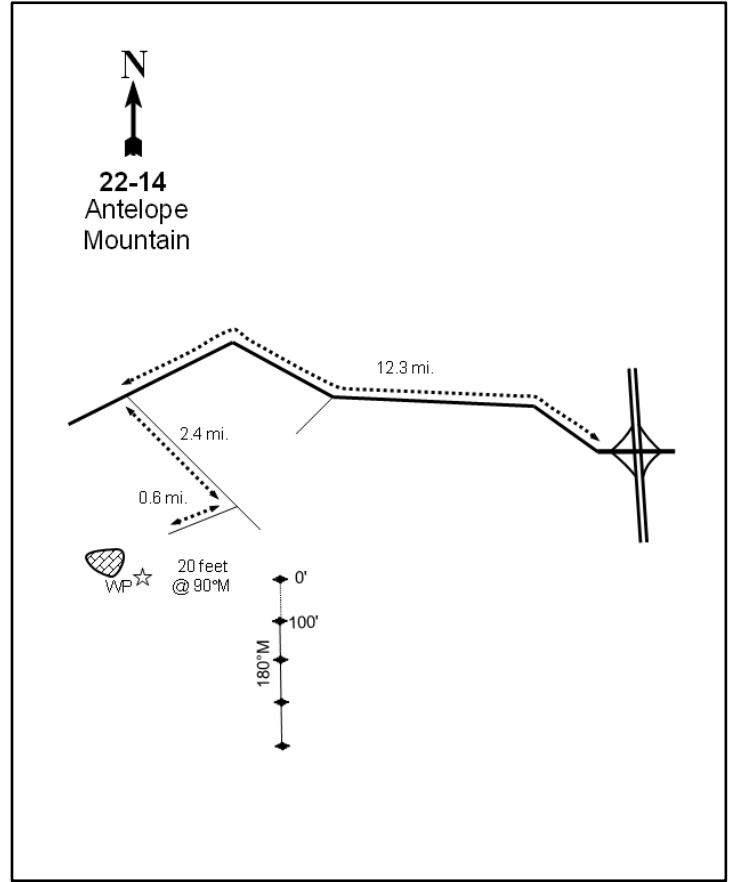
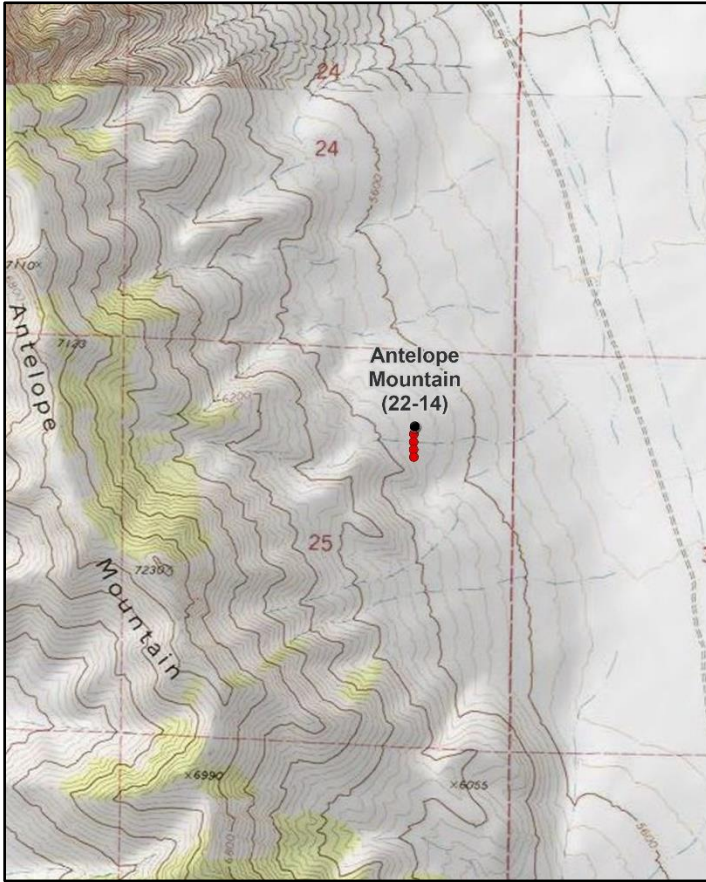
**Table 22-13.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	12	-	-	-	-	-	9.0
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	7	-	-	-	-	-	7.7

**Table 22-13.15 - Deer Desirable Components Index:** Semidesert Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	11.0	-0.3	2.5	14.2	-11.3	0.0	0.0	<b>16.1</b>	Poor
2003	0.3	0.0	0.0	27.4	-0.4	2.7	0.0	<b>30.0</b>	Fair
2008	0.1	0.0	0.0	30.0	-2.0	0.5	0.0	<b>28.6</b>	Fair
2013	1.4	0.0	0.0	30.0	-9.6	0.5	0.0	<b>22.3</b>	Poor
2018	2.4	0.0	0.0	30.0	-10.2	0.2	0.0	<b>22.4</b>	Poor
2023	4.3	0.0	0.0	28.9	-13.9	1.7	0.0	<b>20.9</b>	Poor

## ANTELOPE MOUNTAIN - STUDY NO. 22-14



### Location Information

USGS 7.5 min Map Info Pinnacle Pass NE; Township 25S, Range 9W, Section 25  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 342372 East 4275355 North

### Transect Information

Browse Tag # (0' Stake) Not Available  
 Transect Bearing 170° magnetic  
 Length 400ft  
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
 Belt Marker Placement Standard

### Directions to Site

From the Cove Fort exit on I-15 (a few miles north of the Junction with I-70), proceed 12.3 miles west on a gravel road, staying right at one major fork. Turn left at the intersection and continue for 2.4 miles to the southwest corner of a fence. Turn right and follow this faint road for 0.6 miles (this road may no longer exist), then walk or drive (very faint two-track) to a witness post near a large rock. The 0-foot frequency baseline stake is 20 feet east of this rock. The baseline is marked by steel rebar posts.

### Site Information

Land Ownership Federal  
 Land Administrator BLM  
 Allotment TWIN PEAKS  
 Elevation 5,700ft (1,737m)  
 Aspect East  
 Slope 10-20%  
 Sample Dates 06/17/1998, 06/24/2003, 08/08/2008, 06/05/2013, 06/12/2018, 06/13/2023



**Table 22-14.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	-	-	1996	-
Chaining - Chain Unknown	-	-	1996	-
Seeding - Seed Unknown	-	-	1996	-
Fire - Wildfire	Milford Flat	-	July 2007	356665

**Wildlife Habitat and Vegetation History**

**Table 22-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Desert Bighorn	DBS	
Pronghorn	crucial	year-long

**Table 22-14.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1998	Perennial Grass	No Encroachment
2003	Perennial Grass	No Encroachment
2008	Perennial Grass	No Encroachment
2013	Perennial Grass	No Encroachment
2018	Annual-Perennial Grass	No Encroachment
2023	Annual-Perennial Grass	No Encroachment

**Site Notes**

No Notes

**Soils**

**Table 22-14.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.1	36.0	37.4	26.6	2.2	6.0	201.6	0.6	06/17/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation            14 inches  
 NRCS Ecological Site                                    Upland Gravelly Loam (Bonneville Big Sagebrush)  
 NRCS Ecological Site #                                 R028AY306UT  
    1985-1991 - Current Potential State: Community Phase 2.2  
    1998-2013 - Seeded Range State: Community Phase 6.1  
 States and Transitions                                   2018-2023 - Rabbitbrush/Invasive Annuals State: Community Phase 5.2

When established in 1985, this study site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a limited herbaceous understory of native forb and grass species; twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were scattered in low abundance across the area (Photos, Pre-1992 Data). A fire in 1996 (Table 22-14.1) removed much of the browse and tree components, and the site has had seeded introduced perennial grasses as a dominant vegetation component since that time. The introduced annual grass cheatgrass (*Bromus tectorum*) has increased in abundance following the fire and has been considered to be a codominant vegetation component since 2018 (Table 22-14.7, Table 22-14.10). Data indicates that sagebrush has not reestablished, and the only other preferred browse species recorded in 2023 was Nevada jointfir (*Ephedra nevadensis*) (Table 22-14.12, Table 22-14.13).

Deer winter range condition has ranged between very poor and poor since 1998. As of 2023, deer winter range condition was considered to be very poor. Improvement to deer wintering range can be accomplished through efforts that reestablish preferred browse and perennial forbs, and reducing cheatgrass (Table 22-14.15). No deer pellet groups were observed in 2018 or 2023 according to pellet transect data (Table 22-14.9).

**Trend Summary Tables**

**Table 22-14.6 - 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
1998	-	1.6	-	-	-	-
2003	0.4	0.2	-	0.3	0.9	-
2008	0.1	0.0	-	0.1	-	-
2013	0.1	1.5	-	-	2.5	-
2018	0.0	-	-	0.3	-	-
2023	0.0	-	-	-	-	-

**Table 22-14.7 - 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
1998	49	311	57	86	0.4	15.6	1.0	6.2
2003	406	315	175	23	11.9	11.9	4.3	0.7
2008	212	327	226	38	0.9	17.7	6.4	0.7
2013	396	354	257	80	7.9	20.1	4.9	6.5
2018	467	325	326	19	24.0	17.8	6.7	0.4
2023	460	320	286	33	30.4	16.3	3.4	0.6

**Table 22-14.8 - 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
1998	18.9	0.7	39.1	39.2	20.9	24.8
2003	2.7	0.1	32.8	15.5	23.9	33.0
2008	7.8	0.0	20.1	30.7	23.1	24.8
2013	1.8	-	33.5	12.5	23.8	44.4
2018	2.1	-	40.0	22.5	17.2	44.7
2023	5.3	0.2	46.3	9.2	18.1	47.5

**Table 22-14.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	1	14	-	4
2003	3	6	12	17
2008	-	18	2	21
2013	2	-	-	-
2018	4	1	-	2
2023	2	-	-	-
Year	Days Use Per Acre (ha)			
1998	6.5 (16.1)	13.4 (33.1)	-	-
2003	24.7 (61.0)	43.6 (107.6)	-	-
2008	-	50.2 (124.1)	2.0 (5.0)	-
2013	12.3 (30.5)	2.0 (5.0)	-	-
2018	12.3 (30.5)	-	1.3 (3.3)	-
2023	-	-	-	-

**Table 22-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
1998	-	174	2	49	62	10	61	102	-
2003	-	123	-	406	64	201	56	53	17
2008	-	104	43	212	98	142	57	66	-
2013	2	84	55	396	104	168	56	110	-
2018	-	60	80	467	116	68	62	75	-
2023	-	11	26	460	67	208	76	75	-
year	Average Cover (%)								
1998	-	6.8	0.0	0.4	2.1	0.0	3.5	3.2	-
2003	-	3.0	-	11.8	1.7	3.2	3.2	0.8	0.0
2008	-	4.1	1.0	0.9	5.7	1.3	2.4	3.2	-
2013	0.0	3.3	1.9	7.9	4.5	3.5	2.6	4.5	-
2018	-	1.9	2.6	24.0	5.2	1.0	3.7	3.5	-
2023	-	0.5	0.7	30.4	1.3	6.2	3.8	3.9	-

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

**Table 22-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaetopappa ericoides (rose heath)	Cirsium clavatum (Fish Lake thistle)	Comandra umbellata (bastard toadflax)	Draba cuneifolia <sup>a</sup> (wedgeleaf draba)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Medicago sativa <sup>a</sup> (alfalfa)	Phlox longifolia (longleaf phlox)	Sanguisorba minor <sup>a</sup> (small burnet)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency														
1998	39	29	-	-	1	-	-	1	26	-	-	49	3	5	5
2003	1	0	-	-	-	-	-	-	174	-	-	18	-	-	5
2008	11	21	2	-	-	-	-	3	223	-	-	13	-	-	4
2013	10	36	3	12	-	1	1	-	250	4	2	20	14	-	8
2018	122	13	-	23	-	-	-	9	264	-	-	5	1	-	-
2023	152	12	6	49	-	2	-	23	195	-	-	-	13	-	-
year	Average Cover (%)														
1998	0.1	1.0	-	-	0.0	-	-	0.0	0.9	-	-	4.8	0.0	0.1	0.2
2003	0.0	0.0	-	-	-	-	-	-	4.3	-	-	0.6	-	-	0.1
2008	0.0	0.2	0.0	-	-	-	-	0.0	6.4	-	-	0.5	-	-	0.0
2013	0.0	1.4	0.0	0.1	-	0.0	0.0	-	4.8	0.0	0.0	4.6	0.2	-	0.2
2018	0.3	0.1	-	0.0	-	-	-	0.0	6.3	-	-	0.3	0.0	-	-
2023	0.3	0.6	0.0	0.2	-	0.0	-	0.0	2.8	-	-	-	0.1	-	-

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

**Table 22-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover		
<i>Ephedra nevadensis</i> <sup>p</sup> (Nevada jointfir)	-	-	-
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>speciosa</i> <sup>p</sup> (rubber rabbitbrush)	0.3	-	0.9
<i>Gutierrezia sarothrae</i> (broom snakeweed)	-	-	2.5

year	Quadrat Cover (%)		
1998	-	-	1.6
2003	-	0.4	0.2
2008	0.0	0.0	0.0
2013	0.1	-	1.5
2018	0.0	-	-
2023	0.0	-	-

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

**Table 22-14.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata</b> ssp. <i>vaseyana</i> <sup>p</sup> -- (mountain big sagebrush)									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ephedra nevadensis</b> <sup>p</sup> -- (Nevada jointfir)									
1998	20	-	0	100	0	100	0	0	46/35
2003	60	-	0	100	0	0	100	0	48/65
2008	280	-	64	21	14	7	7	14	13/22
2013	20	-	100	0	0	0	0	0	36/67
2018	60	-	67	33	0	0	100	100	16/84
2023	60	-	0	100	0	0	100	100	- / -
<b>Ericameria nauseosa</b> ssp. <i>nauseosa</i> var. <i>speciosa</i> <sup>p</sup> -- (rubber rabbitbrush)									
1998	20	-	0	100	0	0	0	0	44/66
2003	40	-	0	100	0	0	0	0	61/102
2008	20	-	100	0	0	0	100	100	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	42/70
2023	-	-	-	-	-	-	-	-	- / -

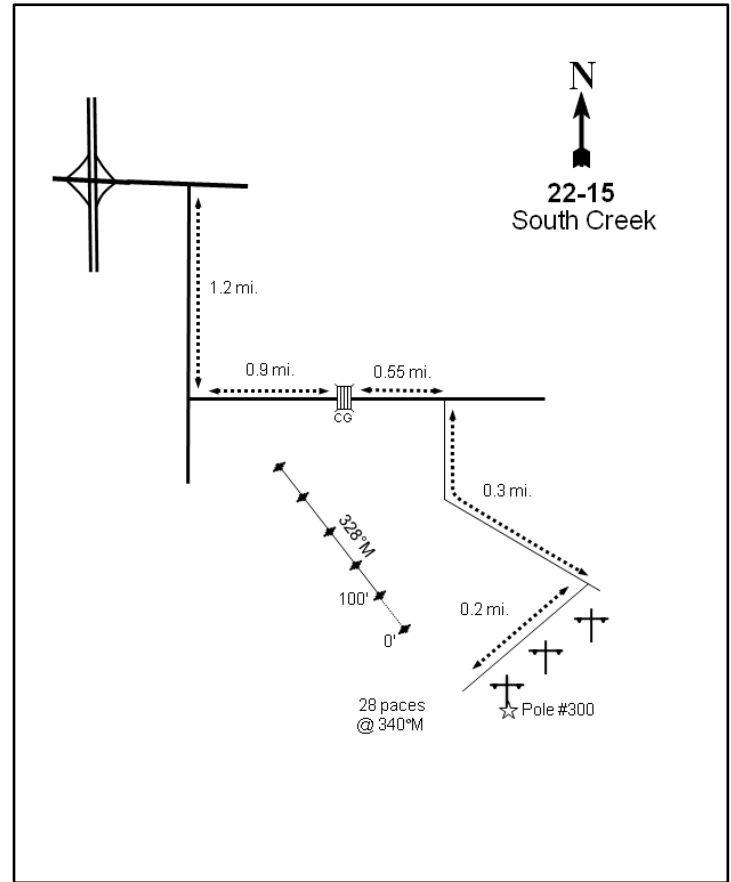
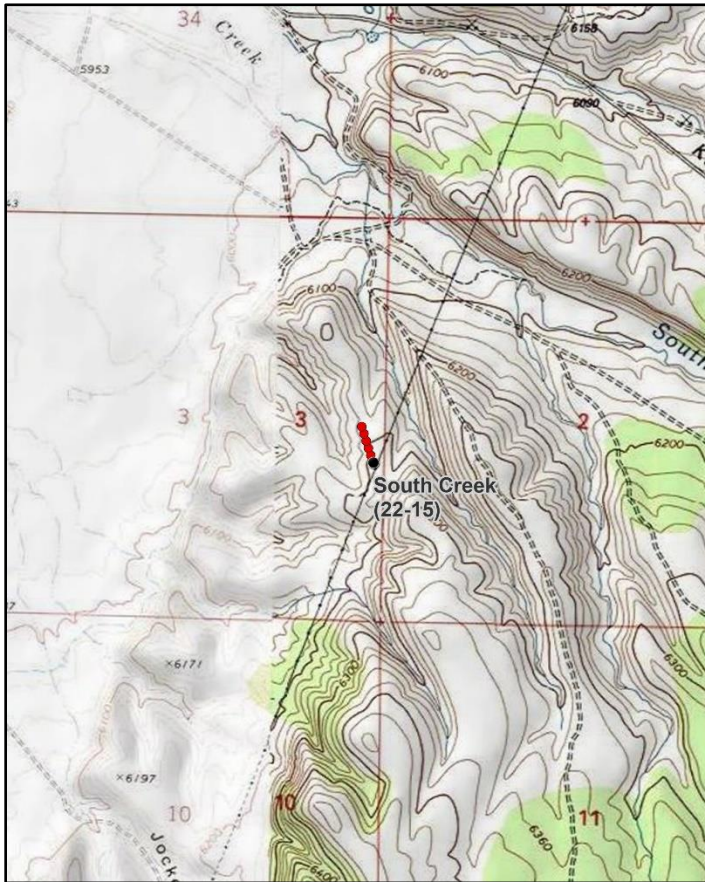
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	1000	-	8	90	2	0	0	0	24/40
2003	980	-	2	94	4	0	0	0	19/23
2008	-	20	0	0	0	0	0	0	- / -
2013	1100	-	6	93	2	0	0	0	21/36
2018	-	-	-	-	-	-	-	-	15/30
2023	-	-	-	-	-	-	-	-	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1998	20	-	0	100	0	0	0	0	8/21
2003	-	-	-	-	-	-	-	-	21/46
2008	-	-	-	-	-	-	-	-	15/40
2013	20	-	0	100	0	0	0	0	20/66
2018	-	-	-	-	-	-	-	-	16/65
2023	-	-	-	-	-	-	-	-	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	20	-	0	100	0	0	0	0	5/4
2013	20	-	0	100	0	0	0	0	4/9
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	0	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	20	-	0	100	0	0	0	0	24/30
2003	-	-	-	-	-	-	-	-	70/83

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

**Table 22-14.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	0.0	0.0	0.0	30.0	-0.3	10.0	0.0	<b>39.7</b>	Poor
2003	0.4	0.0	0.0	23.9	-8.9	1.5	0.0	<b>16.8</b>	Very Poor
2008	0.1	0.0	0.0	30.0	-0.7	1.4	0.0	<b>30.9</b>	Very Poor
2013	0.0	0.0	0.0	30.0	-5.9	10.0	0.0	<b>34.1</b>	Very Poor-Poor
2018	0.4	0.0	0.0	30.0	-18.0	0.8	0.0	<b>13.1</b>	Very Poor
2023	0.0	0.0	0.0	30.0	-20.0	1.3	0.0	<b>11.3</b>	Very Poor

## SOUTH CREEK - STUDY No. 22-15

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Kane Canyon NW; Township 30S, Range 7W, Section 03  
NAD 83 UTM ZONE 12, 358097 East 4232159 North

**Transect Information**

Browse Tag # (0' Stake)	474
Transect Bearing	328° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belts 2, 5: 2ft

**Directions to Site**

From I-15 take exit #109, proceed past the Texaco station, and turn right (south) onto campground road. Drive for 1.2 miles to where the pavement ends and a road takes off at an angle to the southeast. Follow this road and go 0.9 miles to a cattle guard, then continue straight for another 0.55 miles. Turn right onto a faint road and proceed down a draw for 0.3 miles. At this point there is another faint road on the right along the powerlines. Turn onto this road and travel for 0.2 miles to powerpole #300 (the second set of powerpoles). From powerpole #300, the 0-foot stake is 28 paces away at 340 degrees magnetic and is marked with browse tag #474.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	LEE SPRINGS
Elevation	6,170ft (1,881m)
Aspect	West
Slope	3-5%
Sample Dates	08/10/1998, 06/17/2003, 06/02/2008, 05/29/2013, 06/13/2018, 06/14/2023

**Wildlife Habitat and Vegetation History****Table 22-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 22-15.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1998	Wyoming Big Sagebrush	Phase I
2003	Wyoming Big Sagebrush	Phase I
2008	Wyoming Big Sagebrush	Phase I
2013	Wyoming Big Sagebrush	Phase I
2018	Wyoming Big Sagebrush	Phase I
2023	Wyoming Big Sagebrush	Phase I

**Site Notes**

The general area consists of Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and grass species with scattered Utah junipers (*Juniperus osteosperma*) on the perimeters. Limited escape and thermal cover is located in juniper-covered draws to the east and west.

**Soils****Table 22-15.5 - 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	7.0	53.4	22.0	24.6	1.8	7.1	134.4	0.6	08/10/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Semidesert Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY220UT
States and Transitions	1998-2023 - Current Potential State: Community Phase 2.3

This study site has remained in a stable state with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) as the dominant vegetation component in all sample years; cover and density of sagebrush increased between 2018 and 2023 (Photos, Table 22-15.12, Table 22-15.13). The herbaceous understory has consisted of native and introduced species with perennial and/or annual grasses contributing a majority of the herbaceous cover throughout the study period; annual and perennial forbs have generally remained rare. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been present in moderate to high amounts in most study years since 1998 (Table 22-15.7, Table 22-15.10, Table 22-15.11), and may threaten the resiliency of the community should it persist in the future. Although not observed in cover, density, or point-quarter data in 2023 (Table 22-15.12, Table 22-15.13, Table 22-15.14), twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) are scattered throughout the area (Photos), indicating the potential for further encroachment in future sample years.

Deer winter range condition has ranged between fair and good since 1998; condition was considered to be good in 2023. Improvements to deer wintering range can be accomplished through efforts that increase preferred browse cover and reproduction while decreasing decadence; increasing the cover of native perennial forbs and grasses and reducing cheatgrass would also be beneficial for deer winter range (Table 22-15.15). Pellet group data shows that deer presence has been high in most sample years including 2023 (Table 22-15.9).

## Trend Summary Tables

**Table 22-15.6 - 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
1998	8.9	0.0	-	-	-	-
2003	13.5	0.0	-	10.8	-	-
2008	12.2	0.0	0.0	14.5	-	-
2013	13.5	0.2	-	17.0	-	-
2018	9.6	0.1	-	13.9	-	-
2023	13.7	-	-	17.9	-	-

**Table 22-15.7 - 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
1998	466	288	2	45	12.8	10.5	0.0	0.4
2003	-	281	174	36	-	7.5	6.7	0.4
2008	335	244	317	76	3.6	5.1	1.9	1.1
2013	472	235	278	74	15.2	8.0	1.0	0.7
2018	359	297	44	45	10.8	12.9	0.1	1.1
2023	280	269	250	53	7.7	9.8	1.3	1.0

**Table 22-15.8 - 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
1998	8.1	0.0	50.3	22.7	4.0	42.4
2003	20.1	0.0	29.3	28.3	5.5	28.3
2008	21.2	0.0	36.4	22.9	6.2	23.6
2013	11.0	0.4	44.7	15.6	8.7	37.5
2018	21.0	0.6	45.2	15.3	8.6	35.0
2023	19.1	0.2	28.3	24.1	5.0	31.9

**Table 22-15.9 - 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	Rabbit
	Quadrat Frequency				
1998	10	-	45	1	7
2003	6	-	8	-	3
2008	12	-	59	-	72
2013	2	-	33	3	14
2018	4	-	25	2	53
2023	1	-	24	1	7
Year	Days Use Per Acre (ha)				
1998	40.6 (100.4)	-	68.3 (168.8)	1.3 (3.3)	-
2003	18.9 (46.6)	-	28.8 (71.2)	-	-
2008	8.7 (21.5)	-	99.2 (245.0)	-	-
2013	17.4 (43.0)	-	59.6 (147.3)	-	-
2018	19.6 (48.4)	8.7 (21.5)*	42.2 (104.3)	-	-
2023	16.7 (41.2)	-	46.9 (115.9)	-	-

\*Pellets per acre (ha)



**Table 22-15.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
1998	26	88	61	466	13	55	116	102	8
2003	10	20	108	-	30	32	99	60	-
2008	43	23	61	335	49	8	123	-	6
2013	25	4	104	471	61	39	50	15	42
2018	26	14	126	359	27	67	61	88	-
2023	10	-	-	280	35	20	79	175	7
year	Average Cover (%)								
1998	0.3	2.0	1.9	12.8	0.2	0.8	2.6	2.8	0.0
2003	0.5	0.4	3.0	-	0.2	0.5	1.2	1.6	-
2008	0.4	0.5	1.1	3.6	0.4	0.0	2.8	-	0.0
2013	0.8	0.0	3.8	15.1	1.3	0.6	1.3	0.3	0.1
2018	1.0	0.4	4.8	10.8	0.4	1.6	1.7	3.1	-
2023	0.4	-	-	7.5	0.9	0.7	2.9	4.9	0.2

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

**Table 22-15.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cymopterus (springparsley)	Delphinium nuttallianum (two-lobed larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (sty gilia)	Helianthella uniflora (oneflower helianthella)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)	Microsteris gracilis <sup>a</sup> (slender phlox)
year	Nested Frequency																
1998	-	6	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
2003	-	-	3	-	-	-	-	5	-	-	-	147	-	4	44	-	-
2008	23	22	2	241	-	6	-	-	-	-	-	29	4	-	171	12	-
2013	73	12	-	229	-	6	-	-	2	0	-	20	-	-	75	-	3
2018	25	1	-	19	-	-	-	-	5	-	-	-	-	-	-	-	-
2023	101	3	-	187	1	-	1	-	-	-	4	37	-	-	13	8	23
year	Average Cover (%)																
1998	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	0.0
2003	-	-	0.0	-	-	-	-	0.0	-	-	-	5.5	-	0.1	1.0	-	-
2008	0.1	0.1	0.0	0.9	-	0.0	-	-	-	-	-	0.1	0.0	-	0.7	0.1	-
2013	0.2	0.0	-	0.6	-	0.0	-	-	0.0	0.0	-	0.1	-	-	0.2	-	0.0
2018	0.1	0.0	-	0.1	-	-	-	-	0.0	-	-	-	-	-	-	-	-
2023	0.4	0.0	-	0.6	0.0	-	0.0	-	-	-	0.0	0.2	-	-	0.1	0.1	0.1

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

FORB SPECIES				
Phlox longifolia (longleaf phlox)				
Plantago patagonica <sup>a</sup> (woolly plantain)				
Sphaeralcea coccinea (scarlet globemallow)				
Tragopogon dubius <sup>ai</sup> (yellow salsify)				
year	Nested Frequency			
1998	-	-	39	-
2003	-	-	33	-
2008	7	-	37	-
2013	7	-	51	1
2018	-	-	44	-
2023	7	4	42	-
year	Average Cover (%)			
1998	-	-	0.4	-
2003	-	-	0.4	-
2008	0.0	-	1.0	-
2013	0.0	-	0.6	0.0
2018	-	-	1.1	-
2023	0.0	0.0	0.9	-

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

**Table 22-15.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES					
Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)					
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)					
Opuntia polyacantha (plains pricklypear)					
Pediocactus simpsonii (mountain ball cactus)					
Pinus edulis <sup>t</sup> (twoneedle pinyon)					
year	Line Intercept Cover (%)				
1998	-	-	-	-	-
2003	10.8	-	-	-	-
2008	14.5	-	-	-	-
2013	17	-	0	-	-
2018	13.9	-	0	-	-
2023	17.9	-	-	-	-
year	Quadrat Cover (%)				
1998	8.9	0.0	-	-	-
2003	13.5	-	-	0.0	-
2008	12.2	0.0	-	0.0	0.0
2013	13.5	-	0.2	0.0	-
2018	9.6	-	0.1	-	-
2023	13.7	-	-	-	-

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

**Table 22-15.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1998	20	-	100	0	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	40	-	0	100	0	100	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Artemisia tridentata ssp. wyomingensis<sup>P</sup> -- (Wyoming big sagebrush)</b>									
1998	3620	120	14	54	33	45	25	11	53/74
2003	3040	-	6	51	43	27	67	9	48/68
2008	7020	4160	50	30	19	37	21	9	49/77
2013	5320	240	29	60	11	34	36	9	48/77
2018	4140	-	14	60	27	24	8	27	47/75
2023	4540	2000	4	85	12	16	23	11	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	20	0	0	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	55/90
2018	-	-	-	-	-	-	-	-	21/40
2023	20	-	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	-	-	-	-	-	-	-	-	16/19
2003	-	-	-	-	-	-	-	-	16/21
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	20	-	0	100	0	0	0	0	26/25
2023	-	-	-	-	-	-	-	-	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1998	40	-	0	100	0	0	0	0	9/11
2003	-	-	-	-	-	-	-	-	- / -
2008	20	-	0	100	0	0	0	0	16/15
2013	60	-	0	100	0	0	0	0	13/21
2018	60	-	0	100	0	0	0	0	13/28
2023	-	-	-	-	-	-	-	-	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	40	-	0	100	0	0	0	0	1/4
2008	60	-	0	100	0	0	0	0	2/6
2013	40	-	0	100	0	0	0	0	7/17
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

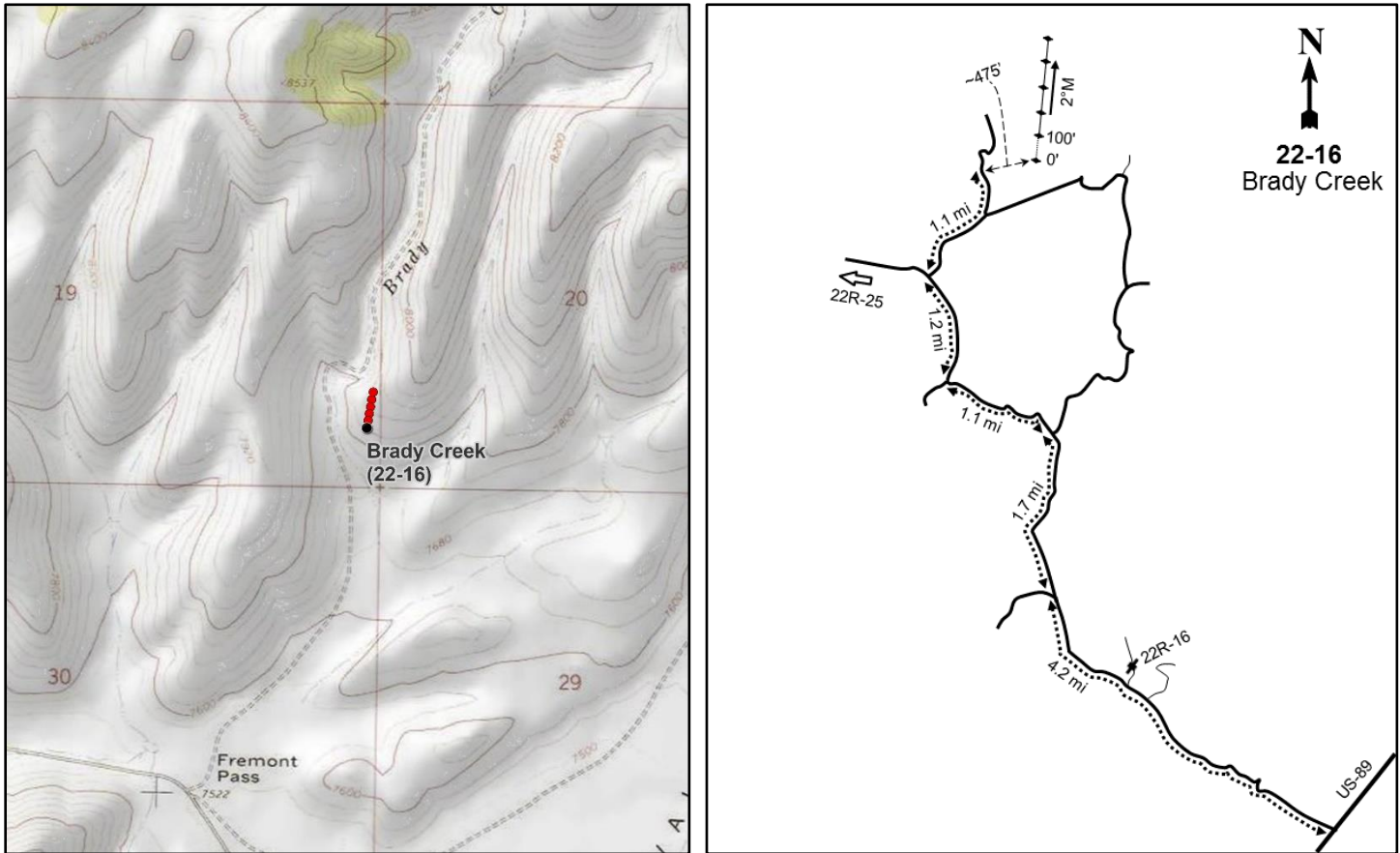
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pinus edulis <sup>t</sup> -- (twoneedle pinyon)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	20	0	0	0	0	0	0	- / -

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

**Table 22-15.15 - Deer Desirable Components Index: Semidesert Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	11.1	5.2	6.9	21.0	-9.6	0.7	0.0	<b>35.4</b>	Fair
2003	13.5	2.2	3.0	15.1	0.0	0.9	0.0	<b>34.6</b>	Fair
2008	18.1	9.2	15.0	10.3	-2.7	2.2	0.0	<b>52.1</b>	Good
2013	21.3	11.7	14.7	16.0	-11.4	1.3	0.0	<b>53.5</b>	Good
2018	17.4	7.0	6.8	25.9	-8.1	2.3	0.0	<b>51.2</b>	Good
2023	22.4	11.6	2.0	19.5	-5.8	2.0	0.0	<b>51.7</b>	Good

## BRADY CREEK - STUDY NO. 22-16

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Fremont Pass NW; Township 31S, Range 5W, Section 19  
NAD 83 UTM ZONE 12, 372923 East 4217581 North

**Transect Information**

Browse Tag # (0' Stake) 519  
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 Belt 1: 4ft

**Directions to Site**

From US-89 just south of Spry, turn right (northwest) onto Dog Valley Road. Travel for 4.2 miles, passing a few minor roads (one leads to the 22R-16 study), to a fork: stay right (the road to the left leads to Red Cedar Spring). Travel 1.7 miles until another fork is reached. Proceed to the left and drive for 1.1 miles to yet another fork. Stay left again and proceed for 1.2 miles to a four-way intersection (the road going to the west leads to study 22R-25). Turn right onto the road with the most northerly azimuth, travel for 1.1 miles, and park; there is no witness post. The 0-foot stake is approximately 475 feet from the road and is marked by browse tag #519.

**Site Information**

Land Ownership Federal  
Land Administrator BLM  
Allotment FREMONT  
Elevation 7,800ft (2,377m)  
Aspect South-Southwest  
Slope 15%  
Sample Dates 06/13/2018, 06/13/2023

**Table 22-16.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Dog Valley Hand Thinning	3265	September-November 2015	9768

**Wildlife Habitat and Vegetation History****Table 22-16.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	summer
Rocky Mountain Elk	substantial	summer
Greater Sage-Grouse		

**Table 22-16.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Soils****Table 22-16.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.6	48.2	31.4	20.4	4.5	22.0	309.0	0.5	06/13/2018

**Site Potential**

1981 - 2010 Average Annual Precipitation 19 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.

Since study establishment in 2018, the plant community on this site has been dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with other preferred browse species such as antelope bitterbrush (*Purshia tridentata*) and curl-leaf mountain mahogany (*Cercocarpus ledifolius* var. *ledifolius*) also present, albeit with less cover (Table 22-16.12, Table 22-16.13). The herbaceous understory has remained abundant. In 2023, most of the herbaceous cover was contributed by native perennial graminoids -- namely Geyer's sedge (*Carex geyeri*) and bluebunch wheatgrass (*Pseudoroegneria spicata*), among others -- and annual forbs, primarily maiden blue eyed Mary (*Collinsia parviflora*) (Table 22-16.7, Table 22-16.10, Table 22-16.11). The introduced annual grass species cheatgrass (*Bromus tectorum*) has been present in both sample years and contributed moderate amounts of cover in 2023 (Table 22-16.10). Cheatgrass could pose a threat to the resiliency of the community should it increase in future sample years. Perennial forb species are moderately diverse, but provided less cover than their annual counterparts as of the most recent sampling (Table 22-16.11). Rocky Mountain juniper (*Juniperus scopulorum*) and/or twoneedle pinyon (*Pinus edulis*) were present in both sample years, placing this site in Phase I of woodland succession (Table 22-16.4, Table 22-16.13, Table 22-16.14).

Due to the abundance and diversity of the shrub and herbaceous communities, this site likely serves as adequate habitat for summering mule deer. The diverse herbaceous understory could also provide forage for elk during the summer months (Table 22-16.3; Beck & Peek, 2005). However, pellet transect data indicates that elk presence was low in 2018 and that no elk pellet groups were observed in 2023. In contrast, mule deer presence was high in 2018 and moderate during the most recent sample year (Table 22-16.9).

## Trend Summary Tables

**Table 22-16.6 - 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
2018	33.8	2.9	0.0	48.5	1.3	-
2023	35.4	1.4	0.1	37.0	1.3	0.1

**Table 22-16.7 - 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
2018	167	271	310	160	2.2	11.9	3.3	3.5
2023	297	239	355	129	5.8	9.1	9.4	3.1

**Table 22-16.8 - 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
2018	10.3	1.8	60.3	1.4	28.0	51.2
2023	2.2	0.0	41.3	1.4	24.8	52.4

**Table 22-16.9 - 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			
2018	1	25	-	54
2023	9	26	-	4
Year	Days Use Per Acre (ha)			
2018	6.5 (16.1)	91.1 (225.1)	3.4 (8.3)	-
2023	5.8 (14.3)	28.8 (71.2)	-	-

**Table 22-16.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>1</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>aa</sup> (cheatgrass)	Carex geyeri (Geyer's sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>1</sup> (intermediate wheatgrass)
year	Nested Frequency													
2018	-	36	167	70	20	-	36	18	37	-	52	-	78	7
2023	7	4	297	45	18	7	22	33	63	9	52	1	27	-
year	Average Cover (%)													
2018	-	0.7	2.2	3.5	0.7	-	1.3	0.8	0.6	-	1.6	-	2.6	0.1
2023	0.0	0.1	5.8	1.0	0.4	0.1	1.1	0.9	2.5	0.2	1.2	0.0	1.4	-

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

**Table 22-16.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Agoseris grandiflora (bigflower agoseris)	Artemisia carruthii (Carruth's sagewort)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Cymopterus (springparsley)	Erigeron aphanactis <sup>a</sup> (rayless shaggy fleabane)	Erigeron divergens <sup>a</sup> (spreading fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)
year	Nested Frequency																
2018	13	3	115	-	4	-	-	-	287	5	3	-	-	-	1	4	0
2023	6	-	57	7	-	2	4	5	345	2	-	5	9	45	-	3	-
year	Average Cover (%)																
2018	0.1	0.0	2.8	-	0.0	-	-	-	2.6	0.0	0.0	-	-	-	0.0	0.2	0.0
2023	0.1	-	1.4	0.1	-	0.0	0.0	0.2	7.3	0.0	-	0.0	0.1	1.2	-	0.0	-

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

FORB SPECIES	Erysimum capitatum <sup>a</sup> (sanddune wallflower)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hymenopappus filifolius (fineleaf hymenopappus)	Lomatium (desertparsley)	Microsteris gracilis <sup>a</sup> (slender phlox)	Packera multilobata (lobeleaf groundsel)	Petroradia pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency										
2018	-	31	3	10	109	2	6	-	-	9	11
2023	1	64	-	35	11	-	3	7	4	15	16
year	Average Cover (%)										
2018	-	0.2	0.0	0.0	0.5	0.0	0.1	-	-	0.1	0.2
2023	0.0	0.7	-	0.4	0.1	-	0.1	0.2	0.0	0.2	0.3

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



**Table 22-16.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus ledifolius var. ledifolius <sup>p</sup> (curl-leaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus scopulorum <sup>t</sup> (Rocky Mountain juniper)	Mahonia repens (creeping barberry)	Opuntia polyacantha (plains pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)									
2018	28	4.3	0.4	0.4	-	0.4	0.1	11.7	0.4	4.1
2023	18.9	1.5	0.5	0.3	0.1	0.3	0.2	10.2	0.5	5.9
year	Quadrat Cover (%)									
2018	19.3	1.1	1.7	0.5	0.0	0.7	0.1	10.4	0.0	2.9
2023	18.8	2.6	0.8	0.1	0.1	0.3	0.1	9.3	0.4	4.3

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

**Table 22-16.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	2860	-	1	83	16	3	1	9	74/93
2023	2580	20	2	78	20	36	7	18	- / -
<b>Cercocarpus ledifolius var. ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
2018	160	-	0	100	0	0	0	0	164/118
2023	140	-	0	100	0	43	43	0	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2018	1280	-	0	98	2	2	20	5	27/33
2023	500	-	8	92	0	0	0	0	- / -
<b>Ericameria parryi -- (Parry's rabbitbrush)</b>									
2018	20	-	100	0	0	0	0	0	14/13
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	960	-	2	98	0	0	0	0	20/20
2023	780	160	44	56	0	8	0	0	- / -
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2018	20	-	100	0	0	0	0	0	- / -
2023	20	20	100	0	0	0	0	0	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
2018	3980	-	2	99	0	0	0	0	13/14
2023	2860	-	0	100	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	160	-	25	75	0	25	0	0	12/31
2023	120	-	0	100	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	3380	-	9	88	3	21	40	2	53/75
2023	2620	-	1	91	8	10	89	6	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2018	220	-	36	64	0	0	0	0	65/60
2023	60	-	0	100	0	33	67	0	- / -

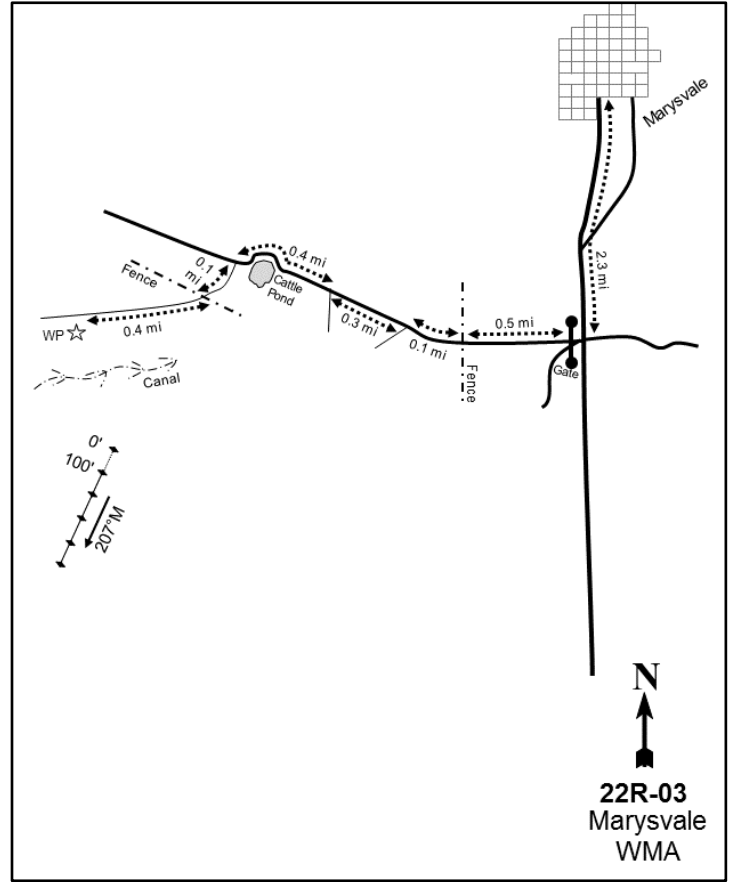
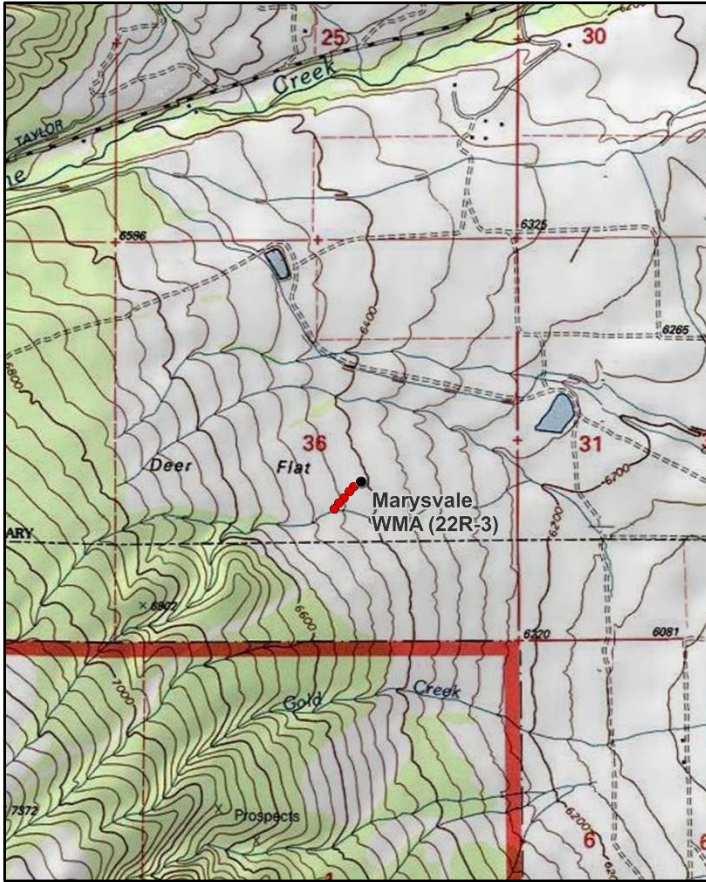
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Symphoricarpos oreophilus <sup>p</sup> -- (mountain snowberry)									
2018	1320	-	5	96	0	12	14	0	37/76
2023	1080	-	0	100	0	2	6	0	- / -

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

**Table 22-16.14 - 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 scopulorum (Rocky Mountain juniper)							
2023	5	33	67	-	-	-	2.0
Pinus edulis (twoneedle pinyon)							
2023	8	-	100	-	-	-	2.0

## MARYSVALE WMA - STUDY NO. 22R-3



### Location Information

USGS 7.5 min Map Info      Mount Brigham SE; Township 27S, Range 4W, Section 36  
 GPS (0' Stake)              NAD 83 UTM ZONE 12, 389844 East 4252957 North

### Transect Information

Browse Tag # (0' Stake)      614  
 Transect Bearing              207° 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 Center Street and Main Street in Marysville, travel south on Highway 89 for 2.3 miles to a gate on the west side of the road. Turn right and continue for 0.5 miles to a fence, then proceed for 0.1 miles to a fork and stay right. Continue for 0.3 miles to another fork and stay right again. Drive for 0.4 miles to a fork and stay left, then proceed for 0.1 miles to a fence. Travel for another 0.4 miles to the witness post on the left (south) side of the road by a canal. The site is 170 degrees magnetic from the witness post, and the 0-foot stake is marked by browse tag #614.

### Site Information

Land Ownership                State  
 Land Administrator          UDWR  
 Allotment                      No data  
 Elevation                      6,500ft (1,981m)  
 Aspect                         West  
 Slope                          7-12%  
 Sample Dates                 07/22/1998, 06/21/2018, 06/22/2023

**Table 22R-03.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Deer Flat Lop and Scatter Project	3775	May-June 2017	724

**Wildlife Habitat and Vegetation History**

**Table 22R-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 22R-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1998	Wyoming Big Sagebrush/Perennial Grass	Phase I
2018	Wyoming Big Sagebrush/Perennial Grass	Phase I
2023	Wyoming Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

All stakes except the 0-foot stake are rebar.

**Soils**

**Table 22R-03.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.3	64.7	20.7	14.6	2.7	17.1	105.6	0.7	07/22/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      11 inches  
 NRCS Ecological Site    Upland Stony Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site #    R028AY334UT  
 States and Transitions    1998-2023 - State Undefined: Community Phase Undefined

This site has been dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) since study establishment in 1998 (Table 22R-03.12, Table 22R-03.13). The herbaceous understory has remained abundant in all sample years, with perennial grasses such as the introduced species crested wheatgrass (*Agropyron cristatum*) as a codominant vegetation component (Table 22R-03.7, Table 22R-03.10). Density and cover data indicate that Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) were present in 1998 (Table 22R-03.12, Table 22R-03.13); a lop and scatter project in 2017 (Table 22R-03.1) likely removed a majority of these trees. However, seedlings were present during the 2018 and 2023 readings and may infill on the site in future sample years (Table 22R-03.14).

Deer winter range condition has ranged between poor and fair since study establishment. As of 2023, deer winter range condition was considered to be fair. Improvement to deer wintering range can be accomplished through efforts that increase preferred browse cover and reproduction; diversifying and increasing cover of native perennial forbs while reducing cheatgrass would also improve winter range condition (Table 22R-03.15). According to pellet transect data, deer presence was high in 2023 (Table 22R-03.9).

**Trend Summary Tables**

**Table 22R-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	6.5	1.4	3.8	-	-	0.1
2018	9.6	1.6	-	9.3	0.9	-
2023	12.2	1.7	-	11.4	0.4	-

**Table 22R-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	210	312	3	33	2.1	13.1	0.0	0.2
2018	205	268	2	52	3.1	15.9	0.0	0.6
2023	203	321	29	60	4.5	19.5	0.1	1.9

**Table 22R-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	7.3	1.4	34.9	7.6	26.8	27.0
2018	13.9	0.1	51.6	9.4	34.5	30.0
2023	9.7	0.0	36.6	7.5	26.8	35.1

**Table 22R-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Other	Rabbit
	Quadrat Frequency				
1998	3	56	-	-	46
2018	1	23	-	-	37
2023	2	36	1	2	9
Days Use Per Acre (ha)					
1998	-	-	-	-	-
2018	0.7 (1.8)	21.5 (53.0)	-	-	-
2023	3.6 (9.0)	66.4 (163.9)	4.7 (11.6)	-	-

**Table 22R-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency																						
	year	1998	2018	2023	1998	2018	2023	1998	2018	2023	1998	2018	2023	1998	2018	2023							
Achnatherum hymenoides (Indian ricegrass)	8	6	-	209	165	193	6	1	11	207	205	203	20	29	5	30	8	88	9	2	-	8	9
Agropyron cristatum <sup>i</sup> (crested wheatgrass)	6	1	-	165	1	193	35	29	47	205	205	203	20	29	5	30	8	80	7	2	11	17	-
Aristida purpurea (purple threeawn)	-	11	-	193	11	193	6	1	11	207	205	203	20	29	5	30	8	80	7	2	11	17	-
Bouteloua gracilis (blue grama)	-	47	-	193	47	193	35	29	47	207	205	203	20	29	5	30	8	80	7	2	11	17	-
Bromus tectorum <sup>ai</sup> (cheatgrass)	-	207	-	193	207	193	35	29	47	207	205	203	20	29	5	30	8	80	7	2	11	17	-
Elymus elymoides (squirreltail)	-	20	-	193	20	193	35	29	47	207	205	203	20	29	5	30	8	80	7	2	11	17	-
Festuca idahoensis (Idaho fescue)	-	30	-	193	30	193	35	29	47	207	205	203	20	29	5	30	8	80	7	2	11	17	-
Hesperostipa comata (needle and thread)	-	88	-	193	88	193	35	29	47	207	205	203	20	29	5	30	8	80	7	2	11	17	-
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	-	9	-	193	9	193	35	29	47	207	205	203	20	29	5	30	8	80	7	2	11	17	-
Pseudoroegneria spicata (bluebunch wheatgrass)	-	2	-	193	2	193	35	29	47	207	205	203	20	29	5	30	8	80	7	2	11	17	-
Sporobolus cryptandrus (sand dropseed)	-	-	-	193	-	193	35	29	47	207	205	203	20	29	5	30	8	80	7	2	11	17	-
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	-	8	-	193	8	193	35	29	47	207	205	203	20	29	5	30	8	80	7	2	11	17	-
Vulpia octiflora <sup>a</sup> (sixweeks fescue)	-	9	-	193	9	193	35	29	47	207	205	203	20	29	5	30	8	80	7	2	11	17	-
year	Average Cover (%)																						
1998	0.1	0.1	-	9.1	9.1	9.4	0.1	0.0	0.3	2.0	0.2	0.8	2.2	0.2	0.0	-	0.2	0.0	0.0	0.0	-	0.2	0.2
2018	0.1	0.1	-	9.1	9.1	9.4	0.0	0.0	1.7	3.1	0.8	0.3	3.0	0.2	0.0	0.1	0.5	0.0	0.0	0.1	0.5	-	-
2023	-	-	-	9.4	9.4	9.4	0.3	0.3	1.5	4.5	0.3	-	5.5	1.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	-	-

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

**Table 22R-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Erigeron pumilus (shaggy fleabane)	Gilia inconspicua <sup>a</sup> (shy gilia)	Heterotheca villosa (hairy false goldenaster)	Hymenopappus filifolius (fineleaf hymenopappus)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Phlox hoodii (spiny phlox)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency								
1998	3	-	-	-	-	-	-	3	30
2018	2	-	5	-	7	8	-	-	32
2023	15	5	-	9	8	1	1	-	51
year	Average Cover (%)								
1998	0.0	-	-	-	-	-	-	0.0	0.2
2018	0.0	-	0.0	-	0.2	0.1	-	-	0.3
2023	0.0	0.0	-	0.0	0.5	0.1	0.0	-	1.3

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

**Table 22R-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. tridentata <sup>p</sup> (basin big sagebrush)	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. spectiosa <sup>p</sup> (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Sclerocactus (fishhook cactus)
year	Line Intercept Cover (%)									
1998	-	-	-	-	-	-	-	-	-	-
2018	-	9.1	0.3	0.2	0.6	-	-	-	-	-
2023	-	10.6	-	0.8	0.4	-	-	-	-	-
year	Quadrat Cover (%)									
1998	0.4	5.9	0.0	0.1	1.3	1.7	-	-	2.1	0.0
2018	-	9.5	0.2	0.1	1.3	-	0.0	-	-	-
2023	-	11.7	0.8	0.5	0.8	-	0.0	0.0	-	-

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

**Table 22R-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Amelanchier utahensis <sup>p</sup> -- (Utah serviceberry)									
1998	20	-	0	100	0	100	0	0	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. tridentata<sup>P</sup> -- (basin big sagebrush)</b>									
1998	20	-	100	0	0	0	0	0	141/184
2018	40	-	0	0	100	0	0	100	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Artemisia tridentata ssp. wyomingensis<sup>P</sup> -- (Wyoming big sagebrush)</b>									
1998	2120	-	36	55	9	8	3	9	56/85
2018	1340	20	2	61	37	27	5	18	49/73
2023	2140	100	7	73	21	39	9	20	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	15/20
2018	160	-	0	100	0	0	0	0	17/23
2023	40	-	0	100	0	0	0	0	- / -
<b>Echinocereus coccineus -- (scarlet hedgehog cactus)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2018	20	-	0	100	0	0	0	0	7/15
2023	20	-	0	100	0	0	0	0	- / -
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	24/43
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2018	20	-	0	100	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa ssp. nauseosa var. speciosa<sup>P</sup> -- (rubber rabbitbrush)</b>									
1998	40	-	0	100	0	0	0	0	80/120
2018	220	-	0	100	0	0	0	18	59/100
2023	40	-	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	2660	-	20	76	5	0	0	4	16/20
2018	1560	20	6	46	47	0	0	90	12/15
2023	980	-	18	74	8	0	0	10	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	100	-	80	20	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1998	40	-	0	100	0	0	0	0	7/21
2018	40	-	0	100	0	0	0	0	14/33
2023	40	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	60	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>1</sup> -- (two-needle pinyon)</b>									
1998	100	-	60	40	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	13/67
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Sclerocactus -- (fishhook cactus)</b>									
1998	40	-	50	50	0	0	0	0	12/34
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Yucca -- (yucca)</b>									
1998	-	-	-	-	-	-	-	-	59/60
2018	-	-	-	-	-	-	-	-	37/43

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

**Table 22R-03.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

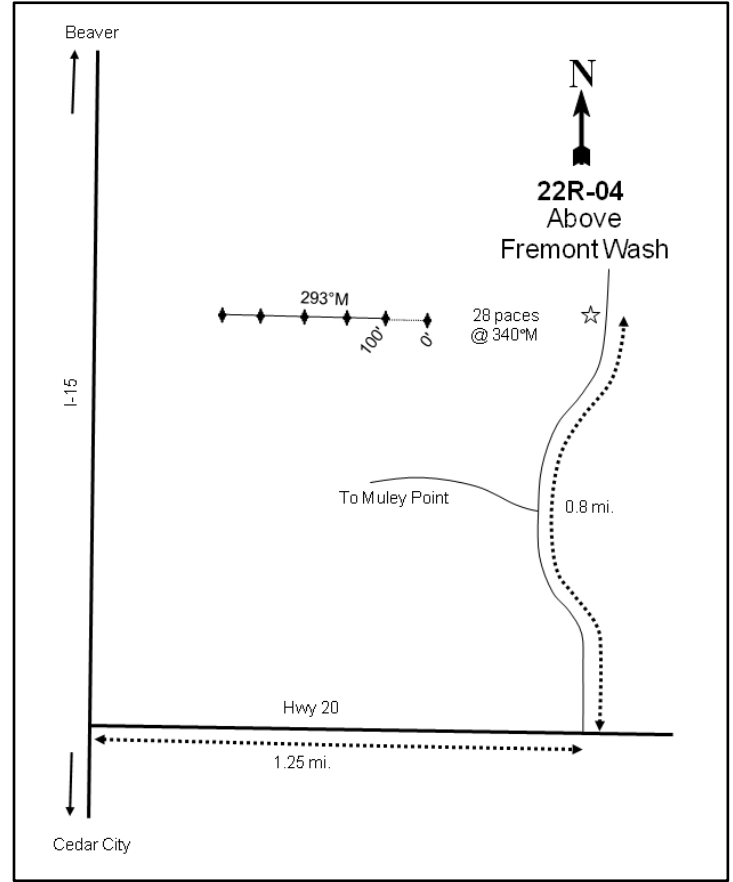
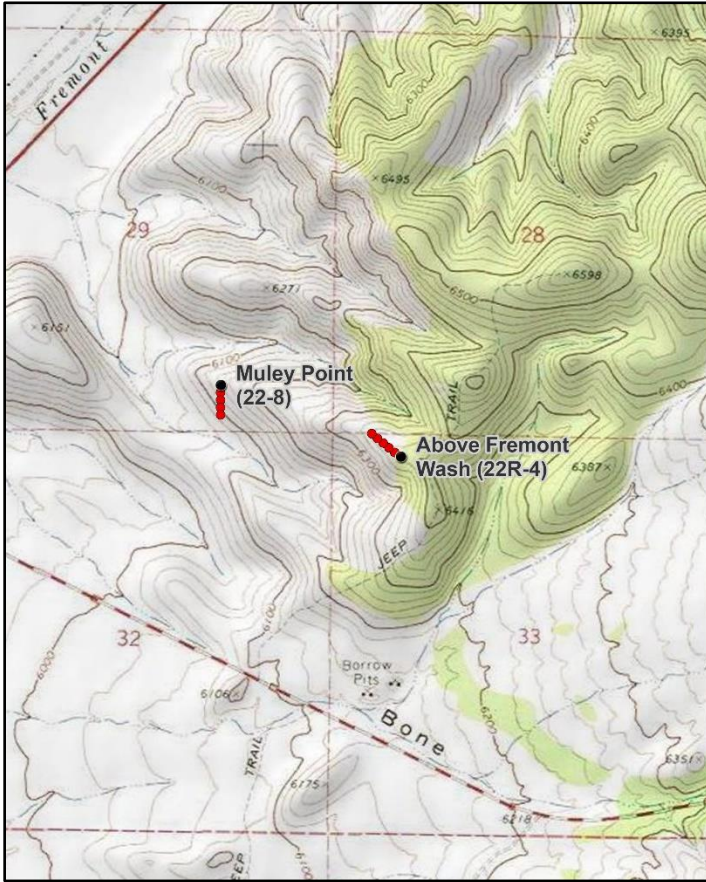
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	4	100	-	-	-	-	17.0
2023	1	100	-	-	-	-	1.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	3	100	-	-	-	-	1.0

**Table 22R-03.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	8.1	12.3	15.0	26.3	-1.6	0.4	0.0	<b>60.4</b>	Fair
2018	11.6	4.1	0.7	30.0	-2.3	1.1	0.0	<b>45.2</b>	Poor
2023	14.3	9.3	3.0	30.0	-3.4	3.9	0.0	<b>57.0</b>	Fair



## ABOVE FREMONT WASH - STUDY NO. 22R-4



### Location Information

USGS 7.5 min Map Info      Buckhorn Flat NE; Township 31S, Range 7W, Section 33  
 GPS (0' Stake)              NAD 83 UTM ZONE 12, 354328 East 4215100 North

### Transect Information

Browse Tag # (0' Stake)      406  
 Transect Bearing              293° magnetic  
 Length                          500ft  
 Belt Placement                Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
 Belt Marker Placement      Standard

### Directions to Site

On I-15 south of Beaver, take exit 95. Drive 1.25 miles east on SR-20 to a road going north (left side of SR-20). Turn onto this road (which is very rocky) and drive 0.8 miles to the witness post (the road to the Muley Point site will be passed on the way). From the witness post, walk 300 feet at 267 degrees magnetic to the 0-foot stake. The 0-foot stake is marked by browse tag #406.

**NOTE:** A UTV is recommended to access this site.

### Site Information

Land Ownership                Federal  
 Land Administrator          BLM  
 Allotment                      BONE HOLLOW  
 Elevation                      6,390ft (1,948m)  
 Aspect                          South-Southwest  
 Slope                            20-25%  
 Sample Dates                 08/19/1999, 06/18/2003, 06/11/2008, 06/04/2013, 06/11/2018, 06/05/2023

**Table 22R-04.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	-	-	Between 2008 and 2013	-

**Wildlife Habitat and Vegetation History**

**Table 22R-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 22R-04.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1999	Wyoming Big Sagebrush/Annual Grass	Phase I
2003	Wyoming Big Sagebrush/Annual Grass	Phase I
2008	Wyoming Big Sagebrush/Annual Grass	Phase I
2013	Wyoming Big Sagebrush/Annual Grass	Phase I
2018	Wyoming Big Sagebrush/Annual Grass	Phase I
2023	Annual Grass/Wyoming Big Sagebrush	Phase I

**Site Notes**

Part of the transect underwent a lop and scatter treatment between 2008 and 2013. A deer shed antler was found on site in 2023.

**Soils**

**Table 22R-04.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.8	42.0	34.7	23.3	1.7	7.1	147.2	0.5	08/19/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation      13 inches  
 NRCS Ecological Site                                Semidesert Gravelly Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site #                              R028AF214UT  
 States and Transitions                                1999-2023 - Sagebrush and/or Juniper/Annuals State: Community Phase 3.1

This site has remained in a generally stable state since 1999 with Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and Whipple cholla (*Opuntia whipplei*) as the dominant shrubs; the cover and density of sagebrush, however, have decreased over time (Table 22R-04.12, Table 22R-04.13). The herbaceous understory has been in poor condition since study establishment with the introduced annual grass species cheatgrass (*Bromus tectorum*) as the dominant component. Perennial grasses, such as blue grama (*Bouteloua gracilis*) and Indian ricegrass (*Achnatherum hymenoides*), have contributed less cover over the sample years, and annual and perennial forbs have remained rare in comparison with cheatgrass (Table 22R-04.7, Table 22R-04.10, Table 22R-04.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been observed in all sample years in low amounts, but may have the potential to become dominant over time and without disturbance (Table 22R-04.14). With the decrease of sagebrush and the high abundance of cheatgrass, the plant community on this site is at risk of transitioning from a sagebrush-dominated state to an annual grass state; high amounts of annual grasses may pose a risk to the resiliency of the community.

Deer winter range condition has generally remained very poor since study establishment. In 2023, deer winter range condition was considered to be very poor to poor. Improvement to deer wintering range can be accomplished through efforts that increase preferred browse cover and reproduction; diversifying and increasing cover of native perennial forbs and grasses while reducing cheatgrass would also improve winter range conditions (Table 22R-04.15). Pellet group data shows that deer presence has been high in all sample years since 2003 (Table 22R-04.9).

**Trend Summary Tables**

**Table 22R-04.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1999	3.7	1.4	0.2	-	-	0.1
2003	8.2	1.8	0.1	8.2	1.7	0.8
2008	4.4	1.7	-	4.7	1.9	1.1
2013	3.8	2.5	-	3.9	2.2	-
2018	3.0	2.5	-	3.0	3.0	-
2023	2.5	2.1	-	3.4	1.9	-

**Table 22R-04.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1999	453	178	2	20	13.0	8.4	0.0	0.1
2003	412	178	73	20	23.0	4.9	0.3	0.2
2008	417	181	82	27	11.6	4.4	0.3	0.4
2013	479	181	62	23	20.9	6.9	0.4	0.3
2018	456	236	28	-	28.5	6.1	0.1	-
2023	444	162	231	36	26.7	6.8	4.8	0.9

**Table 22R-04.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1999	9.3	0.5	30.6	13.8	18.9	32.2
2003	10.5	0.0	24.3	19.5	15.7	40.6
2008	9.1	0.1	46.6	13.8	15.7	25.1
2013	3.4	0.0	60.1	5.8	12.4	40.3
2018	10.0	0.4	53.1	8.2	17.3	35.9
2023	10.2	0.0	34.8	9.2	16.2	43.3

**Table 22R-04.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1999	-	21	-	27
2003	1	27	-	17
2008	1	43	1	90
2013	-	32	-	9
2018	3	39	1	31
2023	1	41	-	8
Year	Days Use Per Acre (ha)			
1999	-	-	-	-
2003	1.5 (3.6)	61.7 (152.3)	-	-
2008	3.6 (9.0)	117.3 (289.7)	-	-
2013	9.4 (23.3)	50.2 (124.1)	-	-
2018	5.8 (14.3)	48.9 (120.8)	-	-
2023	3.6 (9.0)	59.6 (147.3)	2.7 (6.6)	-

**Table 22R-04.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency											
1999	50	-	46	453	1	6	-	-	-	-	99	-
2003	47	4	70	410	34	3	5	-	-	0	38	22
2008	19	1	48	417	34	11	73	-	8	0	-	4
2013	49	1	71	479	26	4	34	2	20	1	10	17
2018	40	5	134	456	14	22	55	3	12	-	1	7
2023	73	3	5	444	31	4	26	-	11	-	28	4
year	Average Cover (%)											
1999	2.1	-	1.5	13.0	0.0	0.1	-	-	-	-	4.7	-
2003	1.2	0.1	2.1	22.9	0.4	0.0	0.1	-	-	0.0	1.0	0.1
2008	0.8	0.0	1.2	11.5	0.5	0.2	1.7	-	0.0	0.0	-	0.0
2013	1.8	0.0	2.5	20.8	0.5	0.2	1.5	0.0	0.2	0.2	0.1	0.1
2018	1.5	0.1	2.7	28.4	0.2	0.5	0.9	0.0	0.2	-	0.0	0.0
2023	5.0	0.0	0.0	26.7	0.3	0.3	0.7	-	0.2	-	0.2	0.0

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

**Table 22R-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Calochortus flexuosus (winding mariposa lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaetopappa ericoides (rose heath)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gilia inconspicua <sup>a</sup> (sly gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Microsteris gracilis <sup>a</sup> (slender phlox)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
1999	-	-	-	-	-	-	-	3	-	2	-	-	-	-	-	-	-
2003	-	-	-	4	11	8	3	1	-	1	-	49	-	1	12	5	-
2008	-	-	25	5	12	13	-	-	-	3	4	25	-	2	-	2	-
2013	-	3	8	1	3	20	-	-	5	3	10	-	5	9	4	-	4
2018	11	-	14	-	4	-	-	-	-	1	5	-	-	-	-	-	-
2023	88	6	52	-	-	2	2	-	-	32	107	8	-	5	5	-	4
year	Average Cover (%)																
1999	-	-	-	-	-	-	-	0.0	-	0.0	-	-	-	-	-	-	-
2003	-	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	-	0.2	-	0.0	0.0	0.0	-
2008	-	-	0.1	0.0	0.0	0.1	-	-	-	0.0	0.0	0.0	-	0.0	-	0.0	-
2013	-	0.0	0.0	0.0	0.0	0.1	-	-	0.1	0.0	0.2	-	0.0	0.0	0.0	-	0.0
2018	0.0	-	0.0	-	0.0	-	-	-	-	0.0	0.0	-	-	-	-	-	-
2023	0.4	0.0	0.1	-	-	0.0	0.0	-	-	1.5	2.5	0.0	-	0.0	0.0	-	0.0

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

FORB SPECIES			
	Silene antirrhina <sup>a</sup> (sleepy silene)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea grossulariifolia (gooseberry/leaf globemallow)
year	Nested Frequency		
1999	-	-	17
2003	-	-	10
2008	-	10	20
2013	3	5	11
2018	-	-	-
2023	-	5	26
year	Average Cover (%)		
1999	-	-	0.1
2003	-	-	0.1
2008	-	0.1	0.4
2013	0.0	0.0	0.2
2018	-	-	-
2023	-	0.2	0.8

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

**Table 22R-04.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES							
	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Cylindropuntia whipplei (Whipple cholla)	Echinocereus coccineus (scarlet hedgehog cactus)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)						
1999	-	-	-	-	-	-	-
2003	8.2	-	1.5	0.2	0.8	-	-
2008	4.7	-	1.7	0.2	0.8	-	0.3
2013	3.9	-	2	0.2	-	-	-
2018	3	-	2.8	0.2	-	-	-
2023	3.4	-	1.9	-	-	-	-
year	Quadrat Cover (%)						
1999	3.7	-	1.4	-	0.1	-	0.0
2003	8.2	-	1.8	0.0	0.1	-	-
2008	4.4	-	1.7	0.0	0.0	0.0	0.0
2013	3.8	-	2.3	0.1	-	0.0	-
2018	3.0	-	2.3	0.0	-	0.2	-
2023	2.5	0.4	1.7	-	-	-	-

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

**Table 22R-04.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
1999	2680	20	3	74	23	31	53	19	42/65
2003	2800	-	1	69	30	41	58	6	46/67
2008	2060	1920	0	24	76	21	13	43	50/70
2013	1540	-	7	51	43	33	56	39	49/65
2018	1440	-	4	50	46	14	76	38	42/64
2023	1080	60	4	70	26	4	91	28	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	26/33
2018	80	-	0	100	0	0	0	0	20/26
2023	40	-	0	100	0	0	0	0	- / -
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
1999	240	-	0	100	0	0	0	0	37/84
2003	280	-	7	93	0	0	0	0	46/93
2008	320	-	13	69	19	0	0	13	35/82
2013	340	-	6	88	6	0	0	6	37/85
2018	360	-	0	94	6	0	0	17	38/108
2023	380	-	0	74	26	0	0	26	- / -
<b>Echinocereus coccineus -- (scarlet hedgehog cactus)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	0	0	12/35
2008	20	-	0	100	0	0	0	0	11/29
2013	40	-	0	100	0	0	0	0	23/58
2018	20	-	0	100	0	0	0	0	14/36
2023	40	-	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2003	40	-	0	100	0	0	0	0	15/12
2008	20	-	0	100	0	0	0	0	21/16
2013	40	-	0	100	0	0	0	0	16/21
2018	20	-	0	100	0	0	0	0	14/11
2023	-	-	-	-	-	-	-	-	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	14/55
2008	40	-	0	100	0	0	0	0	14/28
2013	60	-	0	67	33	0	0	33	13/41
2018	40	-	0	100	0	0	0	0	12/46
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pediocactus simpsonii -- (mountain ball cactus)									
1999	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	5/6

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

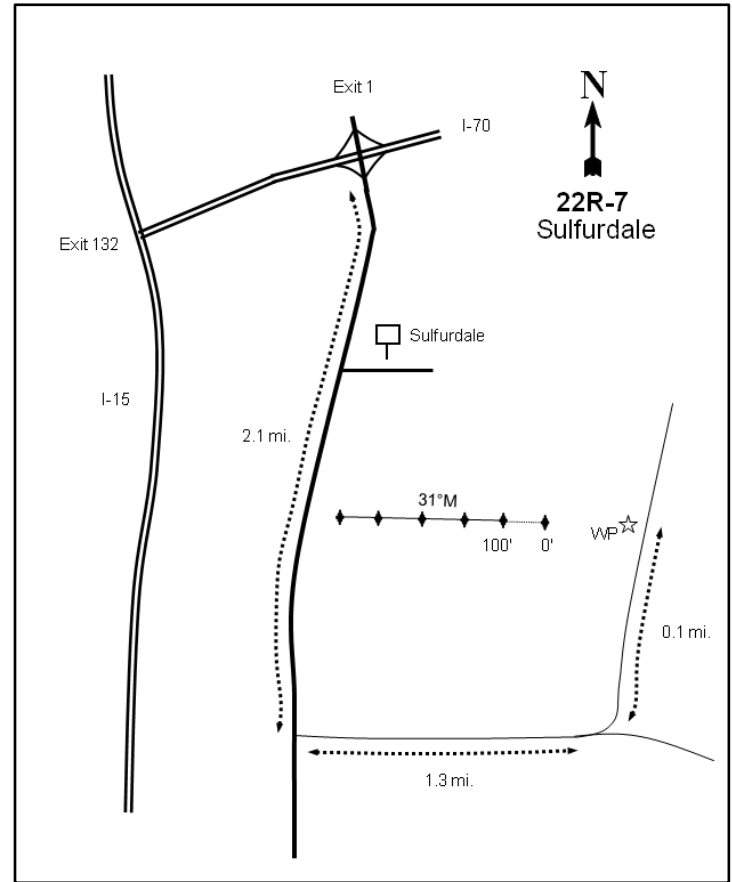
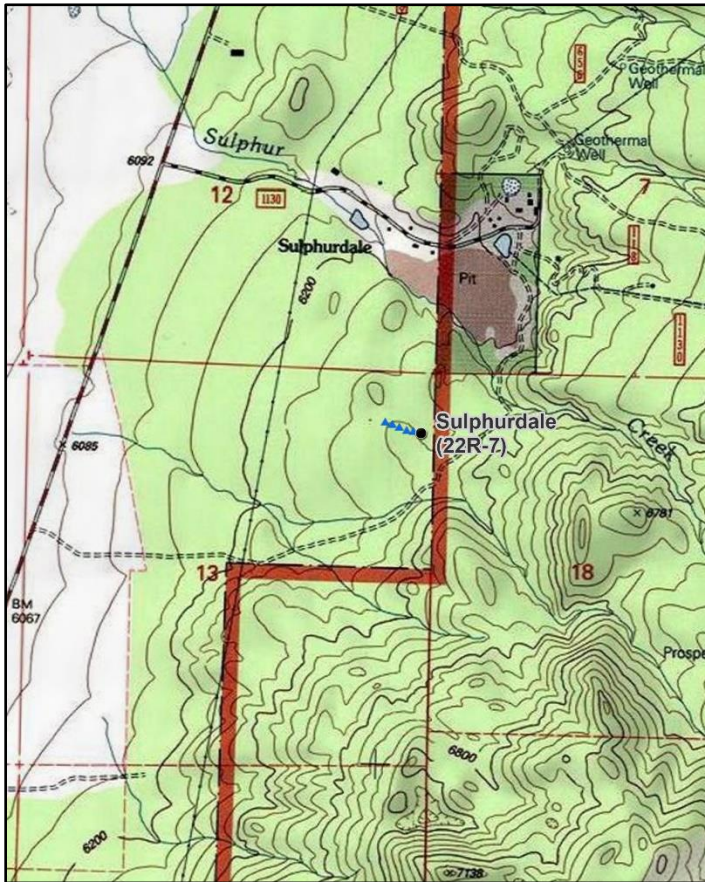
**Table 22R-04.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2003	15	-	13	25	38	25	29.8
2008	24	-	11	67	22	-	28.4
2013	12	-	60	20	-	20	12.8
2018	13	-	-	67	33	-	17.3
2023	14	-	17	50	-	33	19.5
Pinus edulis (twoneedle pinyon)							
2003	21	-	46	38	8	8	10.2
2013	8	-	75	25	-	-	3.1
2018	11	-	50	50	-	-	5.4
2023	10	-	44	56	-	-	7.0

**Table 22R-04.15 - Deer Desirable Components Index: Semidesert Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	14.1	-3.3	4.1	25.8	0.0	7.7	0.0	<b>48.4</b>	Poor-Fair
2003	7.8	0.8	2.4	10.7	0.0	1.1	0.0	<b>22.7</b>	Very Poor
2008	11.0	-2.6	2.1	14.9	0.0	0.6	0.0	<b>25.9</b>	Very Poor
2013	13.4	9.4	2.4	19.3	-0.1	2.1	0.0	<b>46.3</b>	Poor
2018	13.4	8.4	3.5	19.6	0.0	0.9	0.0	<b>45.7</b>	Poor
2023	17.5	10.4	1.4	18.8	-0.2	0.3	0.0	<b>48.2</b>	Poor-Fair

## SULPHURDALE - STUDY NO. 22R-7

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Cove Fort SW; Township 26S, Range 7W, Section 13  
NAD 83 UTM ZONE 12, 362125 East 4268439 North

**Transect Information**

Browse Tag # (0' Stake)	71
Transect Bearing	274° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

From Exit 1 off of I-70, proceed south on Highway 161 for 2.1 miles to a road on the left (east). Turn left and drive 1.3 miles to a fork. Take the left fork and drive for 0.1 miles to the witness post on the left (west) side of the road. From the witness post, walk 15 paces at 233 degrees magnetic to the 0-foot stake which is marked with browse tag #71.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	PINE CREEK/INDIAN CREEK
Elevation	6,300ft (1,920m)
Aspect	West
Slope	10-15%
Sample Dates	07/11/2005, 06/26/2008, 06/03/2013, 08/02/2017, 08/10/2021, 06/13/2023



**Table 22R-07.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	Pine Creek Chaining	-	1983-1984	2800
Seeding - Seed Unknown	Pine Creek Chaining	-	1983-1984	2800
Hand Crew - Lop and Scatter	Sulphurdale	-	Fall 2005	-

**Table 22R-07.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Pine Creek Chaining			Aerial	Sep 1983	2800
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Nordan	2.30	0.00
G	Bromus inermis	Smooth Brome		0.77	0.00
G	Psathyrostachys juncea	Russian Wildrye		0.77	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.09	0.00
G	Thinopyrum intermedium	Intermediate Wheatgrass		0.77	0.00
F	Medicago sativa	Alfalfa		1.18	0.00
F	Melilotus officinalis	Yellow Sweetclover		0.07	0.00
F	Sanguisorba minor	Small Burnett		0.25	0.00

**Wildlife Habitat and Vegetation History****Table 22R-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 22R-07.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2005	Juniper/Antelope Bitterbrush	Phase I transitioning to Phase II
2008	Antelope Bitterbrush/Mountain Big Sagebrush	Phase I
2013	Antelope Bitterbrush/Mountain Big Sagebrush	Phase I
2017	Antelope Bitterbrush/Mountain Big Sagebrush	Phase I
2021	Mountain Big Sagebrush/Antelope Bitterbrush	Phase I
2023	Mountain Big Sagebrush/Antelope Bitterbrush	Phase I

**Site Notes**

The project area was chained in the 1950s and 60s. Over time, pinyon and juniper encroached back into the area, reducing the forage available to the wintering mule deer and elk. Originally this area was part of the Sulphurdale PJ Thin and Seed WRI project #105, but the project was cancelled and the BLM completed the project without WRI funding. In 2008, 2013, and 2021 high pellet group abundance was estimated for deer (Table 22R-07.9).

**Soils****Table 22R-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	7.0	49.4	28.4	22.2	3.6	15.2	374.4	0.7	07/11/2005

**Site Potential**

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY310UT
States and Transitions	2005 - Utah Juniper/Invasive Annuals State: Community Phase 3.1 2008-Present - Seeded Range State: Community Phase 5.2

When this study site was established in 2005, the shrub and tree component was composed mainly of Utah juniper (*Juniperus osteosperma*) and antelope bitterbrush (*Purshia tridentata*) with a number of other shrubs contributing small amounts of cover (Table 22R-07.12). Annual grasses and forbs were a major part of the herbaceous component, of which cheatgrass (*Bromus tectorum*) was a substantial part (Table 22R-07.10, Table 22R-07.11). After a lop and scatter treatment (Table 22R-07.1), antelope bitterbrush and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) were the main browse species, with sagebrush increasing in both cover and density over the duration of the study. Other shrub species contributed little cover over the same period (Table 22R-07.12, Table 22R-07.13). Perennial grasses have increased in post-treatment sample years while annual grasses have decreased, although they are still prevalent in the understory (Table 22R-07.7). Tree cover decreased significantly and the remaining Utah juniper trees have become more mature following treatment (22R-07.14). The site is at a high risk for tree infilling in the future, which would likely reduce the potential for increased shrub growth and understory productivity.

Deer winter range condition has generally remained good since study establishment. As of 2023, deer winter range condition was considered to be good. Improvement to deer wintering range can be accomplished through efforts that support preferred browse reproduction; diversifying native perennial forbs while reducing cheatgrass would also improve winter range conditions (Table 22R-07.15). Mule deer presence has ranged between moderated to high, and was considered moderate in 2023. Elk pellet groups have been low in each period sampled (Table 22R-07.9).

**Trend Summary Tables****Table 22R-07.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2005	5.2	1.3	9.7	8.4	0.6	15.3
2008	8.2	1.9	0.0	9.5	2.2	-
2013	11.6	1.8	0.4	15.6	1.8	0.6
2017	11.4	1.5	0.3	17.4	1.1	-
2021	14.7	1.6	1.1	20.0	0.4	1.0
2023	13.4	1.8	0.2	18.7	1.3	1.0

**Table 22R-07.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2005	283	239	371	118	7.9	7.5	5.7	3.3
2008	299	266	213	99	6.8	13.6	2.0	4.0
2013	308	302	358	133	4.2	11.8	4.3	3.4
2017	265	316	343	97	9.5	16.4	9.1	3.2
2021	237	294	110	93	3.6	10.9	0.4	1.9
2023	152	278	301	129	2.2	12.9	4.6	4.2

**Table 22R-07.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2005	19.8	0.1	34.0	16.9	4.9	34.7
2008	11.8	0.1	51.5	12.5	4.4	32.2
2013	9.9	-	50.8	10.4	4.7	39.4
2017	9.7	0.1	50.0	15.7	7.6	44.5
2021	10.4	0.7	42.9	21.7	6.3	30.7
2023	28.4	0.0	41.6	11.6	6.6	33.3

**Table 22R-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			
2005	2	19	12	59
2008	6	24	8	59
2013	-	33	7	28
2017	4	18	1	26
2021	2	28	2	19
2023	2	20	4	10
Year	Days Use Per Acre (ha)			
2005	8.0 (19.7)	21.5 (53.0)	6.0 (14.9)	-
2008	6.5 (16.1)	57.0 (140.7)	16.8 (41.4)	-
2013	1.5 (3.6)	53.0 (130.8)	12.1 (29.8)	-
2017	5.1 (12.6)	30.8 (76.1)	12.8 (31.5)	-
2021	0.7 (1.8)	54.9 (135.7)	7.4 (18.2)	-
2023	7.2 (17.9)	32.2 (79.5)	11.4 (28.1)	-

**Table 22R-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus arvensis <sup>ai</sup> (field brome)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency												
2005	5	93	3	147	282	53	9	-	-	49	-	3	24
2008	0	62	-	160	299	67	-	2	-	62	2	0	42
2013	2	55	-	216	308	46	-	4	-	70	10	-	48
2017	1	62	-	244	265	9	-	5	-	113	10	-	16
2021	1	86	5	213	232	3	-	4	2	125	6	-	30
2023	-	35	-	195	152	13	-	-	-	50	36	4	59
year	Average Cover (%)												
2005	0.0	1.7	0.0	3.9	7.9	0.6	0.1	-	-	0.7	-	0.0	0.4
2008	0.0	1.3	-	7.8	6.8	1.9	-	0.1	-	1.3	0.2	0.0	0.9
2013	0.0	1.6	-	6.6	4.2	1.0	-	0.0	-	1.1	0.4	-	1.0
2017	0.0	1.7	-	10.4	9.5	0.1	-	0.0	-	3.3	0.4	-	0.4
2021	0.0	2.3	0.0	5.7	3.6	0.2	-	0.1	0.0	2.2	0.2	-	0.3
2023	-	1.4	-	7.4	2.2	0.3	-	-	-	0.8	1.3	0.0	1.6

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

**Table 22R-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium acuminatum (tapertip onion)	Alyssum alyssoides <sup>ai</sup> (pale madwort)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Amaranthus retroflexus <sup>ai</sup> (redroot amaranth)	Antennaria dimorpha (low pussytoes)	Arabis (rockcress)	Astragalus cibirarius (browse milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha humilis (roundspike cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Eriogonum caespitosum (matted buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	
year	Nested Frequency																	
2005	-	-	-	359	-	1	-	-	10	-	69	8	33	18	-	31	4	
2008	1	-	-	195	-	-	-	-	8	3	60	-	24	-	-	11	-	
2013	16	7	-	342	-	-	5	27	5	15	60	13	33	16	2	5	-	
2017	2	-	21	328	-	-	-	-	-	-	20	7	26	9	-	10	-	
2021	-	-	36	61	1	9	-	-	6	-	8	8	5	-	-	-	-	
2023	10	2	68	284	-	6	2	48	6	-	58	18	7	-	-	2	-	
year	Average Cover (%)																	
2005	-	-	-	4.4	-	0.0	-	-	0.4	-	0.6	0.0	0.3	0.4	-	0.3	0.0	
2008	0.0	-	-	1.1	-	-	-	-	0.3	0.0	0.8	-	0.7	-	-	0.1	-	
2013	0.1	0.0	-	3.5	-	-	0.0	0.4	0.0	0.2	0.2	0.0	0.7	0.1	0.0	0.2	-	
2017	0.0	-	0.1	7.8	-	-	-	-	-	-	0.1	0.0	0.4	0.0	-	0.5	-	
2021	-	-	0.1	0.3	0.0	0.0	-	-	0.0	-	0.0	0.0	0.0	-	-	-	-	
2023	0.0	0.0	0.4	3.2	-	0.0	0.0	1.7	0.1	-	0.1	0.1	0.1	-	-	0.0	-	

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

FORB SPECIES	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Galium aparine <sup>a</sup> (stickywilly)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hedysarum boreale (Utah sweetveich)	Holosteum umbellatum <sup>ai</sup> (jagged chickweed)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lomatium (desertparsley)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Packera multilobata (lobeleaf groundsel)	Petroradia pumila (rock goldenrod)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	
year	Nested Frequency																	
2005	-	-	4	37	8	-	2	-	3	41	2	11	83	1	3	4	-	
2008	6	-	1	-	32	-	1	1	1	-	4	4	58	-	-	1	-	
2013	7	5	-	-	8	-	10	9	-	50	-	1	60	-	-	-	3	
2017	12	6	-	-	4	-	4	-	-	4	7	2	60	3	-	2	-	
2021	1	-	-	-	-	5	-	-	-	3	-	-	73	5	1	6	1	
2023	43	9	-	9	-	-	-	5	-	24	-	-	71	1	-	7	5	
year	Average Cover (%)																	
2005	-	-	0.0	0.1	0.1	-	0.0	-	0.0	0.1	0.0	0.6	1.6	0.0	0.0	0.0	-	
2008	0.0	-	0.0	-	0.7	-	0.0	0.0	0.0	-	0.0	0.5	1.6	-	-	0.0	-	
2013	0.0	0.3	-	-	0.2	-	0.0	0.0	-	0.1	-	0.0	1.5	-	-	-	0.0	
2017	0.4	0.5	-	-	0.0	-	0.1	-	-	0.0	0.1	0.2	2.0	0.0	-	0.0	-	
2021	0.0	-	-	-	-	0.0	-	-	-	0.0	-	-	1.6	0.0	0.0	0.2	0.0	
2023	0.6	0.3	-	0.0	-	-	-	0.0	-	0.1	-	-	2.0	0.0	-	0.2	0.0	

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

FORB SPECIES	
Tragopogon dubius <sup>ai</sup> (yellow salsify)	
year	Nested
2005	-
2008	2
2013	2
2017	-
2021	-
2023	-
year	Average Cover (%)
2005	-
2008	0.0
2013	0.0
2017	-
2021	-
2023	-

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

**Table 22R-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES													
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)													
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)													
Chrysothamnus viscidiflorus (yellow rabbitbrush)													
Ericameria nauseosa (rubber rabbitbrush)													
Ericameria nauseosa ssp. nauseosa var. hololeuca <sup>p</sup> (rubber rabbitbrush)													
Ericameria parryi (Parry's rabbitbrush)													
Eriogonum microthecum <sup>p</sup> (slender buckwheat)													
Gutierrezia sarothrae (broom snakeweed)													
Juniperus osteosperma <sup>i</sup> (Utah juniper)													
Opuntia (pricklypear)													
Pinus edulis <sup>i</sup> (twoneedle pinyon)													
Purshia tridentata <sup>p</sup> (antelope bitterbrush)													
year	Line Intercept Cover (%)												
2005	2.5	-	-	0.5	0.3	-	-	0.1	15.2	-	0.1	5.6	
2008	3.3	-	1.6	-	0.7	-	-	0.6	-	-	-	5.5	
2013	6.8	-	0.4	-	0.6	-	-	1.3	0.6	0.1	-	8.2	
2017	8.3	-	-	-	0.3	-	-	1.1	-	-	-	8.8	
2021	10.3	-	-	0.3	0.5	-	-	0.1	1	-	-	9.2	
2023	13.5	-	-	0.2	0.4	-	-	1.1	1	-	-	4.8	
year	Quadrat Cover (%)												
2005	2.1	-	-	0.8	0.0	-	-	0.5	9.7	-	0.0	3.1	
2008	3.2	-	1.5	-	0.9	-	-	0.4	0.0	0.0	-	4.1	
2013	6.9	0.0	0.8	-	1.0	-	0.0	0.9	0.4	0.0	-	3.7	
2017	5.4	0.2	0.2	-	0.1	-	-	1.3	0.3	-	-	5.8	
2021	8.1	-	-	0.9	0.2	0.1	-	0.5	1.1	-	-	6.4	
2023	8.7	-	-	0.8	1.1	-	-	1.0	0.2	-	-	3.7	

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

**Table 22R-07.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2005	860	100	30	65	5	40	0	2	73/100
2008	740	160	35	62	3	24	8	5	62/91
2013	940	20	32	66	2	6	0	0	55/90
2017	940	40	15	83	2	40	6	9	58/95
2021	1180	-	20	75	5	10	31	3	- / -
2023	1280	120	9	81	9	20	8	9	- / -
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	25/49
2017	120	-	0	100	0	0	0	0	13/27
2021	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	200	-	0	100	0	40	40	0	43/77
2013	40	-	0	100	0	0	0	0	47/87
2017	120	-	0	100	0	0	0	0	66/105
2021	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	4/13
2017	140	-	0	100	0	0	0	0	22/45
2021	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2005	140	-	0	100	0	0	0	0	67/89
2008	20	-	100	0	0	100	0	0	100/88
2013	20	-	0	100	0	0	0	0	49/78
2017	-	-	-	-	-	-	-	-	70/91
2021	220	-	9	82	9	46	0	9	- / -
2023	220	-	0	100	0	64	9	0	- / -
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
2005	40	20	0	100	0	0	0	0	62/84
2008	60	40	0	100	0	33	33	0	67/91
2013	20	-	0	100	0	0	0	0	62/81
2017	40	-	0	50	50	50	0	0	66/86
2021	280	-	57	36	7	0	71	7	- / -
2023	60	-	33	33	33	0	33	33	- / -
<b>Ericameria parryi -- (Parry's rabbitbrush)</b>									
2005	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2017	-	-	-	-	-	-	-	-	-/-
2021	40	-	0	100	0	0	100	0	- / -
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2005	620	-	7	94	0	0	0	0	25/25
2008	720	20	8	89	3	0	0	3	32/41
2013	1120	-	34	66	0	0	0	0	22/30
2017	1700	-	29	71	0	0	0	0	21/27
2021	240	-	8	58	33	0	0	33	- / -
2023	1260	-	2	98	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2005	400	-	30	70	0	0	0	0	- / -
2008	20	40	100	0	0	0	0	0	- / -
2013	40	-	100	0	0	0	0	0	- / -
2017	20	-	0	100	0	0	0	0	- / -
2021	40	-	100	0	0	0	0	0	- / -
2023	60	-	33	67	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2005	-	-	-	-	-	-	-	-	19/17
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
2021	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Opuntia -- (pricklypear)</b>									
2005	80	-	0	100	0	0	0	0	13/28
2008	60	-	0	100	0	0	0	0	19/28
2013	20	-	0	100	0	0	0	0	11/18
2017	-	-	-	-	-	-	-	-	11/26
2021	-	-	-	-	-	-	-	-	- / -
2023	80	-	25	75	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2005	40	20	100	0	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2017	-	-	-	-	-	-	-	-	- / -
2021	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2005	400	-	15	80	5	20	65	0	75/148
2008	360	-	17	78	6	6	50	6	93/175
2013	360	60	28	72	0	28	11	6	84/150
2017	620	-	19	77	3	26	52	7	84/164
2021	540	-	11	59	30	15	33	37	- / -
2023	560	-	11	68	21	14	82	25	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2005	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	74/45
2013	-	-	-	-	-	-	-	-	104/107
2017	-	-	-	-	-	-	-	-	63/57

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

**Table 22R-07.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

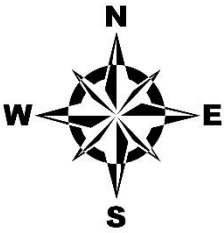
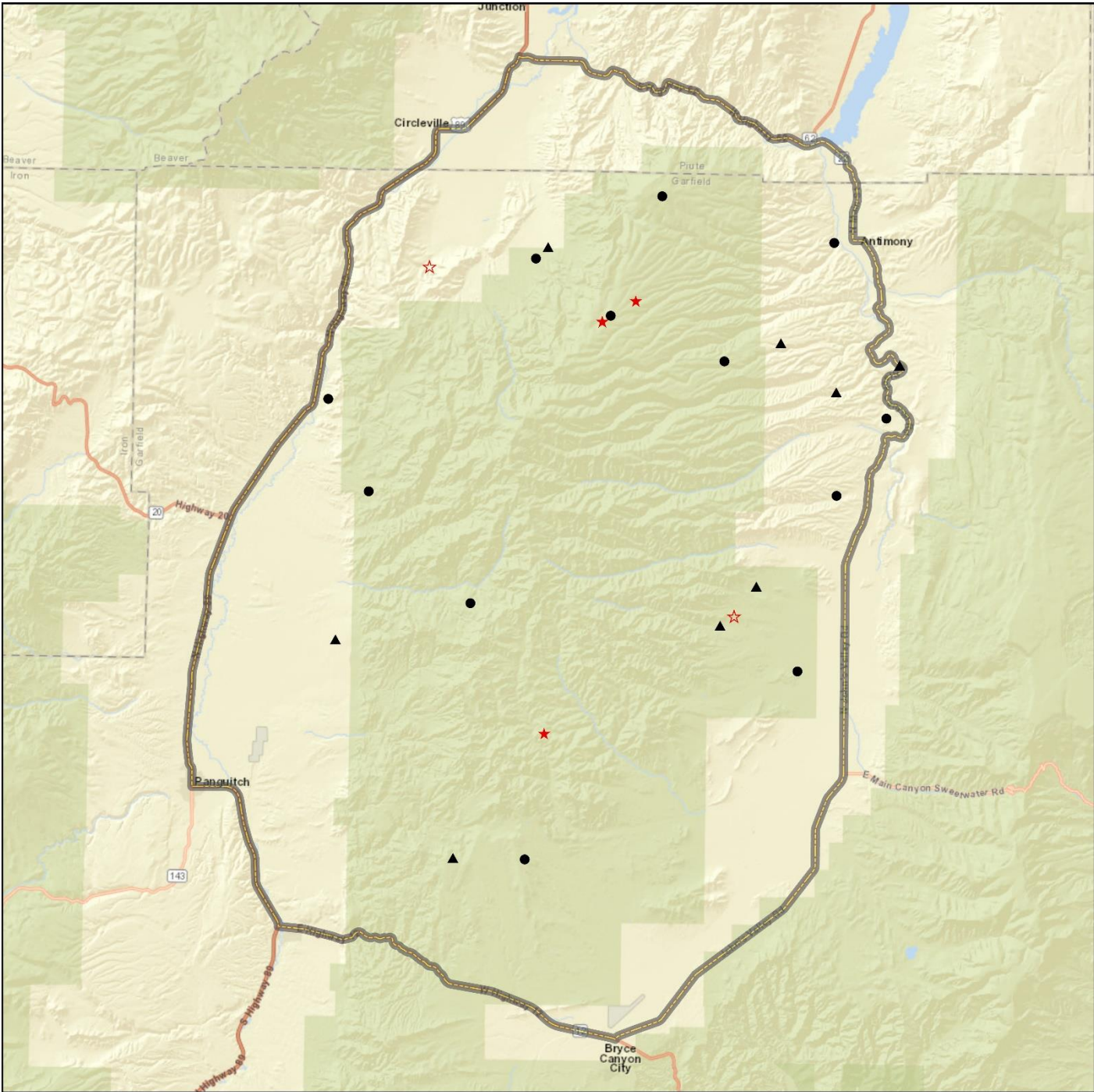
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2008	20	33	67	-	-	-	4.2
2013	24	-	64	36	-	-	3.5
2017	24	8	83	8	-	-	5.2
2021	28	14	36	50	-	-	6.1
2023	30	14	14	71	-	-	5.9
<b>Pinus edulis (twoneedle pinyon)</b>							
2017	1	100	-	-	-	-	2.0
2021	2	-	100	-	-	-	3.5
2023	2	-	100	-	-	-	1.0

**Table 22R-07.15 - Deer Desirable Components Index: Upland Potential Scale.**

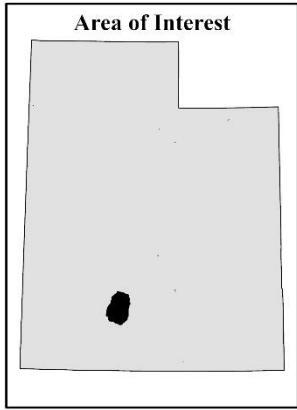
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2005	11.9	13.6	9.5	15.0	-6.0	6.6	0.0	<b>50.6</b>	Poor-Fair
2008	13.3	13.7	10.9	26.9	-5.1	8.1	0.0	<b>67.8</b>	Good
2013	21.6	14.7	14.3	23.5	-3.2	6.9	0.0	<b>77.7</b>	Good
2017	24.0	14.0	8.5	30.0	-7.1	6.5	0.0	<b>75.7</b>	Good
2021	27.3	10.1	8.5	21.7	-2.7	3.8	0.0	<b>68.7</b>	Good
2023	24.6	11.1	5.1	25.9	-1.6	8.4	0.0	<b>73.4</b>	Good



# WILDLIFE MANAGEMENT UNIT 24 – MT DUTTON

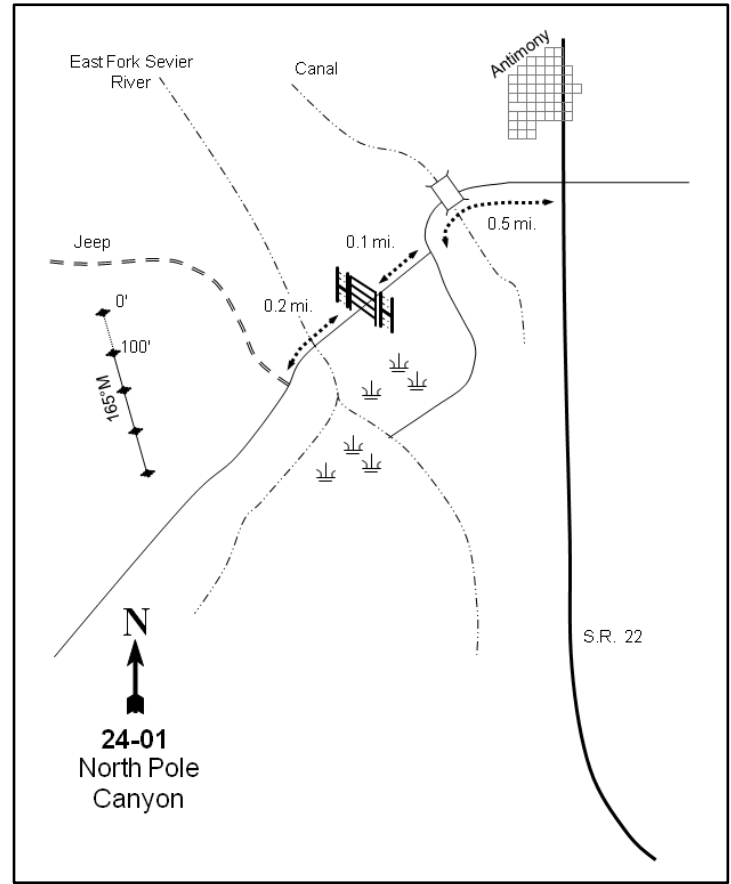
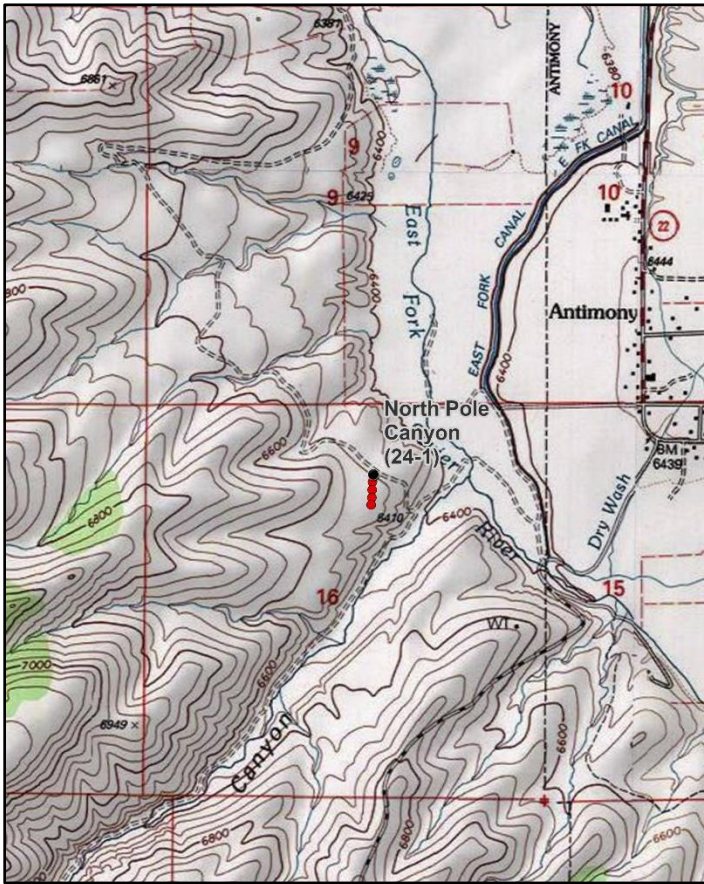


Study Locations Project, Status	Unit Boundary
● RT, Active	▭ Unit - 24
★ RT, Suspended	
▲ WRI, Active	
★ WRI, Suspended	



Credits: Bureau of Land Management, Utah AGRC, Esri, HERE, Garmin, NGA, USGS, NPS

## NORTH POLE CANYON - STUDY NO. 24-1



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Grass Valley NW; Township 31S, Range 2W, Section 16  
NAD 83 UTM ZONE 12, 411215 East 4218943 North

### Transect Information

Browse Tag # (0' Stake)	7149
Transect Bearing	170° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Belt 2: 3ft

### Directions to Site

Drive west on the Mt. Dutton road from the town of Antimony for approximately 0.5 miles to a canal and bridge. Just past the canal bridge, turn right, go through a gate, and bear left towards the Sevier River. Proceed for 0.1 mile to another gate, then go through the gate and continue 0.2 miles across a field to the river. The old road may be inaccessible; if so, cross the river on foot and hike up the hill to the southwest along an old jeep trail. The transect is on top of the hill and starts 20 feet south of the old road. The study is marked by short, green fence posts, and the 0-foot stake is marked by browse tag #7149.

### Site Information

Land Ownership	Private
Land Administrator	Private
Allotment	POLE CANYON
Elevation	6,530ft (1,990m)
Aspect	East
Slope	0-5%
Sample Dates	08/08/1997, 08/07/2003, 08/11/2008, 07/17/2013, 07/01/2018, 06/29/2023

**Wildlife Habitat and Vegetation History****Table 24-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24-01.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush/Perennial Grass	No Encroachment
1991	Mountain Big Sagebrush/Perennial Grass	No Encroachment
1997	Mountain Big Sagebrush	No Encroachment
2003	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2008	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2013	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2018	Mountain Big Sagebrush/Perennial Grass	No Encroachment
2023	Mountain Big Sagebrush/Perennial Grass	No Encroachment

**Site Notes**

In order to access the site the East Fork of the Sevier River needs to be crossed; seasonal water levels may limit site access.

**Soils****Table 24-01.5 - 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 Clay Loam	6.8	52.7	22.7	24.6	1.3	12.3	188.8	1.2	08/08/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation	7 inches
NRCS Ecological Site	Semidesert Gravelly Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R047XB214UT
States and Transitions	No state and transition model is available for this ecological site.

This study site has remained in a stable state since establishment in 1987. The site has maintained a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 24-01.12, Table 24-01.13) with a herbaceous understory dominated by blue grama (*Bouteloua gracilis*), both of which have remained the dominant cover types throughout the duration of the study. Annual and perennial forbs and annual grass species have been limited in most sample years (Pre-1992 Data, Photos, Table 24-01.7, Table 24-01.10, Table 24-01.11). Without disturbance, this site will likely remain in a sagebrush-dominated state in future sample years.

This site has ranged between fair and excellent for deer wintering range since 1997. As of 2023, deer winter range condition was considered to be good. Improvements to deer winter habitat could be accomplished through efforts that increase cover of and recruitment of young in the preferred browse population while reducing decadence; diversifying and increasing cover of native perennial forbs would also improve deer winter range (Table 24-01.15). According to pellet group data, deer presence was moderate in 2023 (Table 24-01.9).

**Trend Summary Tables**

**Table 24-01.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1997	6.4	-	-	-	-	-
2003	6.0	0.0	-	5.0	-	-
2008	6.7	0.0	-	10.7	-	-
2013	9.8	0.0	-	13.5	-	-
2018	6.6	-	-	9.1	-	-
2023	6.7	0.0	-	9.2	-	-

**Table 24-01.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1997	-	237	284	2	-	7.0	8.3	0.0
2003	-	290	13	2	-	18.6	0.1	0.0
2008	-	334	-	-	-	28.6	-	-
2013	-	327	12	2	-	15.4	0.1	0.0
2018	-	380	5	4	-	30.0	0.0	0.0
2023	-	366	251	5	-	21.2	3.9	0.1

**Table 24-01.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1997	29.2	0.2	16.2	20.2	7.2	21.4
2003	31.2	0.2	17.2	21.7	9.1	25.4
2008	26.6	0.1	21.7	15.6	7.3	37.3
2013	42.4	0.0	20.5	12.1	5.5	24.2
2018	24.0	0.1	28.2	21.4	9.7	37.3
2023	47.9	0.1	19.7	10.8	8.5	29.7

**Table 24-01.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1997	5	20	1	7
2003	5	15	-	19
2008	10	36	-	57
2013	2	13	-	7
2018	4	17	-	27
2023	7	11	1	8
Year	Days Use Per Acre (ha)			
1997	-	-	-	-
2003	19.6 (48.4)	42.2 (104.3)	-	-
2008	38.5 (95.0)	20.8 (51.3)	5.3 (13.2)	-
2013	9.4 (23.3)	4.7 (11.6)	-	-
2018	1.5 (3.6)	15.4 (38.1)	-	-
2023	4.4 (10.8)	34.2 (84.4)	-	-

**Table 24-01.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Hesperostipa comata (needle and thread)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency			
1997	0	235	1	1
2003	-	279	-	14
2008	0	324	9	21
2013	-	325	0	5
2018	2	369	7	24
2023	4	347	7	62
year	Average Cover (%)			
1997	0.0	7.0	0.0	0.0
2003	-	18.2	-	0.4
2008	0.0	28.0	0.1	0.5
2013	-	15.3	0.0	0.1
2018	0.0	29.6	0.2	0.2
2023	0.2	19.8	0.1	1.1

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

**Table 24-01.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus utahensis (Utah milkvetch)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gilia <sup>a</sup> (gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Townsendia incana (hoary Townsend daisy)
year	Nested Frequency								
1997	2	213	121	86	-	26	-	-	-
2003	-	-	1	2	-	10	-	2	-
2008	-	-	-	-	-	-	-	-	-
2013	-	7	6	-	-	-	-	2	-
2018	-	-	-	2	3	-	-	4	-
2023	-	182	62	6	-	86	84	3	2
year	Average Cover (%)								
1997	0.0	6.0	1.2	1.1	-	0.1	-	-	-
2003	-	-	0.0	0.0	-	0.0	-	0.0	-
2008	-	-	-	-	-	-	-	-	-
2013	-	0.0	0.1	-	-	-	-	0.0	-
2018	-	-	-	0.0	0.0	-	-	0.0	-
2023	-	1.2	0.5	0.0	-	0.3	1.8	0.1	0.0

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

**Table 24-01.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Escobaria vivipara (spiny star)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover (%)			
1997	-	-	-	-
2003	5	-	-	-
2008	10.7	-	-	-
2013	13.5	-	-	-
2018	9.1	-	-	-
2023	9.2	-	-	-
year	Quadrat Cover (%)			
1997	6.4	-	-	-
2003	6.0	0.0	-	-
2008	6.7	0.0	-	-
2013	9.8	-	0.0	0.0
2018	6.6	-	-	-
2023	6.7	-	0.0	-

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

**Table 24-01.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1997	4420	360	39	49	12	8	1	8	45/66
2003	3020	-	8	12	80	28	5	45	39/52
2008	3380	60	8	43	49	52	6	15	38/57
2013	2620	6660	8	76	17	25	26	19	49/78
2018	4160	60	40	37	23	58	5	14	43/75
2023	3260	80	17	63	20	19	41	16	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	0	0	15/10
2008	20	-	0	100	0	0	0	0	14/19
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1997	80	-	0	100	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

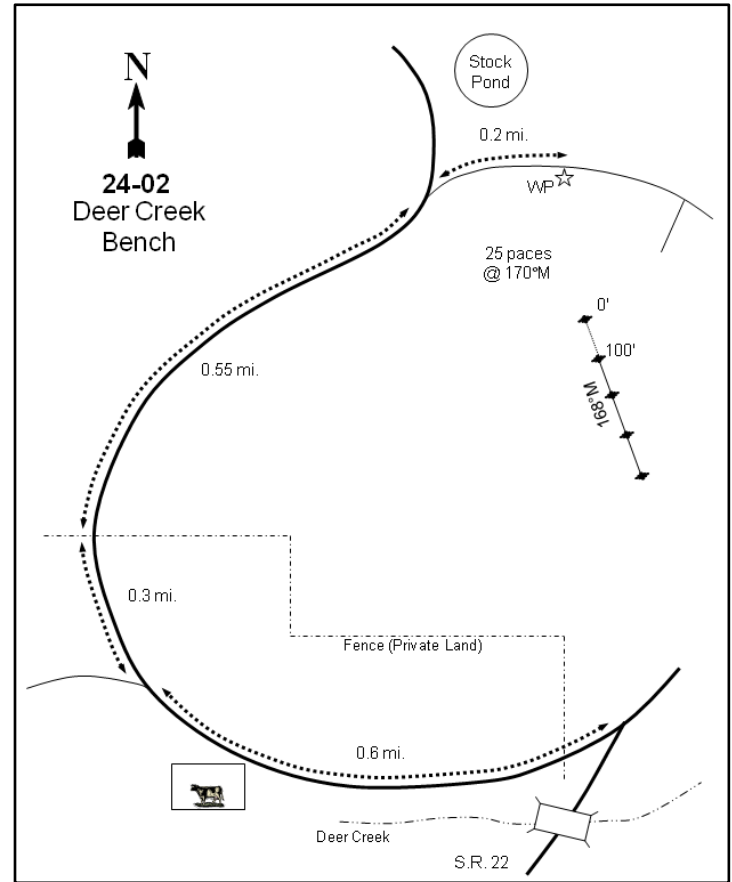
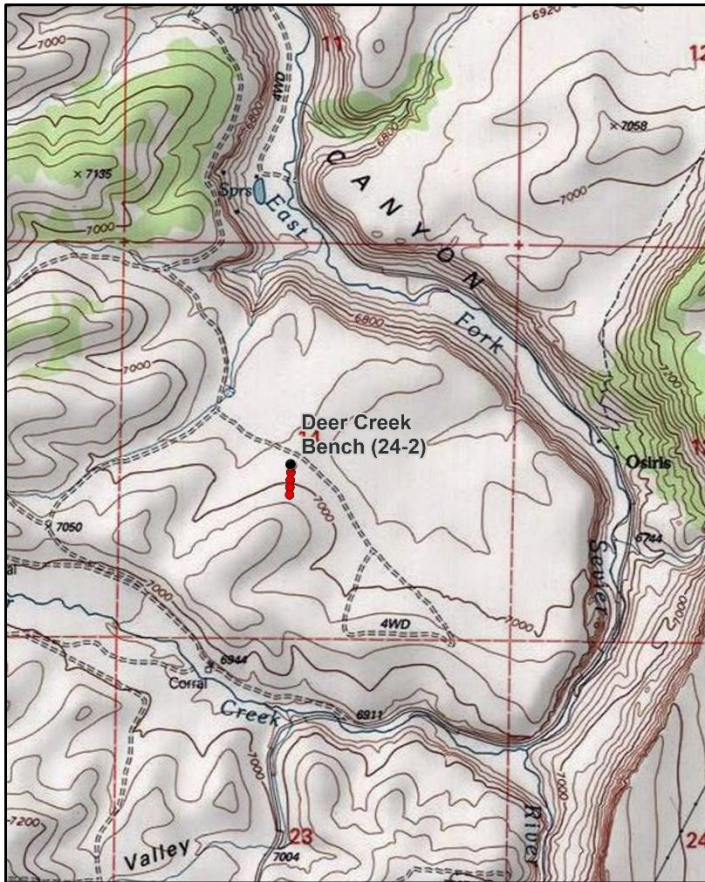
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Escobaria vivipara -- (spynstar)</b>									
1997	60	-	67	33	0	0	0	0	29/28
2003	-	-	-	-	-	-	-	-	2/6
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	3/6
2018	-	-	-	-	-	-	-	-	-/-
2023	40	-	50	50	0	0	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	40	-	0	50	50	0	100	0	31/27
2008	40	-	0	50	50	0	100	0	18/21
2013	20	-	0	100	0	100	0	0	18/22
2018	40	-	0	50	50	0	100	50	8/11
2023	40	-	0	100	0	50	50	0	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	13/26
2013	-	-	-	-	-	-	-	-	10/26
2018	-	-	-	-	-	-	-	-	9/23

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

**Table 24-01.15 - Deer Desirable Components Index: Semidesert Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	8.0	11.5	15.0	14.0	0.0	0.0	0.0	<b>48.6</b>	Good
2003	6.3	0.0	0.0	30.0	0.0	0.1	0.0	<b>36.3</b>	Fair
2008	13.4	0.3	3.9	30.0	0.0	0.0	0.0	<b>47.5</b>	Good
2013	16.9	10.0	3.8	30.0	0.0	0.0	0.0	<b>60.6</b>	Good
2018	11.4	8.1	15.0	30.0	0.0	0.0	0.0	<b>64.5</b>	Good-Excellent
2023	11.5	8.9	8.6	30.0	0.0	0.1	0.0	<b>59.2</b>	Good

## DEER CREEK BENCH - STUDY NO. 24-2

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Antimony SW; Township 32S, Range 2W, Section 14  
NAD 83 UTM ZONE 12, 414267 East 4208657 North

**Transect Information**

Browse Tag # (0' Stake) 9100  
Transect Bearing 168° magnetic  
Length 400ft  
Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt Marker Placement Standard

**Directions to Site**

From SR-22 in the southern end of Black Canyon, follow the highway up Deer Creek to a bridge. Immediately north of the bridge, make a hard left. Travel on the road that crosses private land and continue northwest for 0.6 miles, passing a corral at a fork. Bear right at the fork and go 0.3 miles to a fence. Continue 0.55 miles to a fork by a stockpond. Turn right onto a jeep trail and proceed 0.2 miles to the study area. There is a witness post located on the right (south) side of the road. From the witness post, walk approximately 25 paces at a bearing of 170 degrees magnetic to the 0-foot baseline stake, which is marked with browse tag #9100. The study is marked by 2-foot tall fence posts and the transect runs south up the hill.

**Site Information**

Land Ownership Federal  
Land Administrator BLM  
Allotment PINE CREEK ANTIMONY  
Elevation 6,980ft (2,128m)  
Aspect East  
Slope 11-13%  
Sample Dates 08/14/1997, 07/31/2003, 08/07/2008, 07/16/2013, 07/01/2018, 07/06/2023



**Wildlife Habitat and Vegetation History****Table 24-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24-02.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Black Sagebrush	No Encroachment
1991	Black Sagebrush	No Encroachment
1997	Black Sagebrush	No Encroachment
2003	Black Sagebrush	No Encroachment
2008	Black Sagebrush	No Encroachment
2013	Black Sagebrush	No Encroachment
2018	Black Sagebrush/Perennial Grass	No Encroachment
2023	Black Sagebrush/Perennial Grass	No Encroachment

**Site Notes**

A few antler sheds have been found on the site. Escape and thermal cover are not present on the site itself, but are located a quarter of a mile to the west. Water sources near the study transect include a stock pond a quarter of a mile to the north and Deer Creek three-quarters of a mile to the south.

**Soils****Table 24-02.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.1	61.0	23.1	15.9	1.8	13.6	92.8	0.5	08/11/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation 9 inches  
 NRCS Ecological Site Semidesert Loam (Black Sagebrush)  
 NRCS Ecological Site # R047XB221UT  
 States and Transitions No state and transition model is available for this ecological site.

The plant community on this site has been dominated by black sagebrush (*Artemisia nova*) since study establishment in 1987. However, densities of black sagebrush and pygmy sagebrush (*A. pygmaea*) decreased significantly between 2018 and 2023 (Photos, Pre-1992 Data, Table 24-02.12, Table 24-02.13). The herbaceous understory has lacked diversity, but the perennial grass species squirreltail (*Elymus elymoides*) and Indian ricegrass (*Achnatherum hymenoides*) have remained common and have maintained stable populations. In addition, the perennial grass species needle and thread (*Hesperostipa comata*) has increased in frequency and cover over the duration of the study, and it contributed the most cover of any grass species during the two most recent sample years. Perennial grasses have been a codominant site component since 2018. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in all sample years since 1997, but in limited quantities (Table 24-02.7, Table 24-02.10). The perennial and annual forb communities have remained sparse (Table 24-02.11). Barring a major disturbance, this site will likely remain in this or a similar state in future sample years, but may transition to one dominated by perennial grasses if sagebrush continues to decrease.

This site has been classified as ranging between fair and excellent condition for deer winter range since 1997. In 2023, winter range was considered to be in good condition. Improvements to deer winter range could be achieved through efforts that increase cover of and recruitment of young in the preferred browse population while decreasing decadence; diversifying and increasing cover of native forbs and decreasing cheatgrass would also improve deer winter range (Table 24-02.15). According to pellet transect data, deer presence was high between 2003 and 2013, but has remained low during the past two sample years (Table 24-02.9).

**Trend Summary Tables****Table 24-02.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1997	17.7	3.0	-	-	-	-
2003	18.1	4.4	-	18.1	3.9	-
2008	17.1	3.1	-	20.4	3.3	-
2013	17.0	3.5	-	19.2	5.6	-
2018	15.4	4.3	-	11.6	3.3	-
2023	9.5	4.8	-	9.3	5.5	-

**Table 24-02.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1997	3	170	53	91	0.0	4.0	0.1	0.6
2003	2	221	26	65	0.0	6.9	0.1	0.4
2008	20	259	8	99	0.0	8.8	0.0	0.7
2013	9	292	6	145	0.0	11.3	0.0	1.2
2018	21	307	-	92	0.1	11.9	-	0.7
2023	39	305	15	92	1.8	25.3	0.1	1.1

**Table 24-02.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1997	13.2	0.3	16.6	27.3	11.8	25.5
2003	14.3	0.7	18.0	27.2	17.6	28.6
2008	11.9	0.7	19.2	30.5	16.3	29.4
2013	16.3	0.5	21.6	20.3	21.9	30.2
2018	23.0	0.2	26.2	27.1	13.6	28.1
2023	11.1	0.1	11.4	33.3	15.1	33.7

**Table 24-02.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
1997	3	46	3	-	2
2003	6	34	3	2	11
2008	4	47	4	2	48
2013	-	30	-	10	3
2018	4	22	-	4	33
2023	6	12	-	-	1
Year	Days Use Per Acre (ha)				
1997	-	-	-	-	-
2003	8.0 (19.7)	64.3 (158.9)	-	78.4 (193.7)*	-
2008	5.1 (12.6)	59.6 (147.3)	0.7 (1.7)	52.3 (129.1)*	-
2013	4.4 (10.8)	74.4 (183.7)	-	26.2 (64.6)*	-
2018	8.0 (19.7)	6.7 (16.6)	-	17.4 (43.0)*	-
2023	1.5 (3.6)	2.7 (6.6)	0.7 (1.7)	-	-

\*Pellets per acre (ha)

**Table 24-02.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency					
1997	79	-	3	104	15	-
2003	103	-	2	146	29	-
2008	123	-	20	99	132	-
2013	103	-	9	160	114	-
2018	107	4	21	91	184	-
2023	179	-	39	84	180	12
year	Average Cover (%)					
1997	2.0	-	0.0	1.7	0.3	-
2003	4.5	-	0.0	1.9	0.5	-
2008	4.2	-	0.0	1.5	3.0	-
2013	4.3	-	0.0	3.2	3.7	-
2018	3.7	0.0	0.1	2.3	5.9	-
2023	7.6	-	1.8	2.1	15.2	0.4

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

**Table 24-02.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Arabis demissa (nodding rockcress)	Astragalus calycosus (Torrey's milkvetch)	Astragalus purshii (woollypod milkvetch)	Castilleja (Indian paintbrush)	Chenopodium <sup>a</sup> (goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Sphaeralcea coccinea (scarlet globemallow)	Trifolium (clover)
year	Nested Frequency														
1997	2	5	4	7	-	19	-	-	-	43	37	-	6	34	-
2003	-	-	-	-	-	-	-	-	15	8	11	13	13	37	-
2008	6	4	-	-	3	-	3	-	6	40	-	17	5	34	4
2013	-	15	8	12	-	-	3	3	-	69	3	26	28	26	-
2018	-	-	9	10	-	-	-	-	-	37	-	20	20	18	-
2023	-	0	6	3	-	-	5	3	10	39	-	8	8	33	-
year	Average Cover (%)														
1997	0.0	0.0	0.0	0.0	-	0.0	-	-	-	0.3	0.1	-	0.0	0.2	-
2003	-	-	-	-	-	-	-	-	0.1	0.1	0.0	0.1	0.1	0.3	-
2008	0.0	0.0	-	-	0.0	-	0.0	-	0.0	0.2	-	0.3	0.0	0.1	0.0
2013	-	0.0	0.0	0.1	-	-	0.0	0.0	-	0.4	0.0	0.5	0.1	0.1	-
2018	-	-	0.1	0.0	-	-	-	-	-	0.2	-	0.3	0.0	0.1	-
2023	-	0.0	0.0	0.0	-	-	0.0	0.0	0.1	0.5	-	0.1	0.0	0.4	-

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

**Table 24-02.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia pygmaea (pygmy sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata <sup>p</sup> (winterfat)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)
year	Line Intercept Cover (%)							
1997	-	-	-	-	-	-	-	-
2003	17.9	0.7	2.6	0.2	0.6	-	-	-
2008	19.4	0.8	2.4	1	0.1	-	-	-
2013	17.8	1.7	3.6	1.4	0.3	-	-	-
2018	11.2	0.8	2.4	0.4	0.1	-	-	-
2023	9.1	1.2	3.7	0.2	0.6	-	-	-
year	Quadrat Cover (%)							
1997	16.5	0.8	2.2	1.1	-	-	-	-
2003	17.3	0.9	3.0	0.8	0.5	0.0	-	0.0
2008	16.3	0.7	2.3	0.8	0.1	0.0	-	-
2013	15.6	0.7	2.7	1.2	0.1	0.2	0.0	-
2018	14.0	1.0	3.1	1.4	0.1	0.0	0.0	-
2023	8.6	0.4	2.8	0.8	1.4	0.1	0.2	-

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

**Table 24-02.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1997	5980	220	13	72	15	31	5	7	29/58
2003	8760	-	1	74	24	19	0	4	27/55
2008	6760	280	4	57	39	38	12	11	24/60
2013	6180	180	7	78	15	41	35	21	22/50
2018	6340	40	7	69	24	6	6	20	23/48
2023	3760	80	10	63	27	32	21	29	- / -
<b>Artemisia pygmaea -- (pygmy sagebrush)</b>									
1997	2500	100	6	94	0	24	0	0	5/17
2003	3220	-	3	94	4	1	0	0	6/16
2008	3280	-	1	67	32	0	0	0	4/16
2013	3200	40	4	96	0	54	0	0	3/13
2018	4760	-	4	89	7	13	53	0	5/17
2023	1380	-	3	97	0	0	0	0	- / -
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	11/9
2023	-	-	-	-	-	-	-	-	- / -

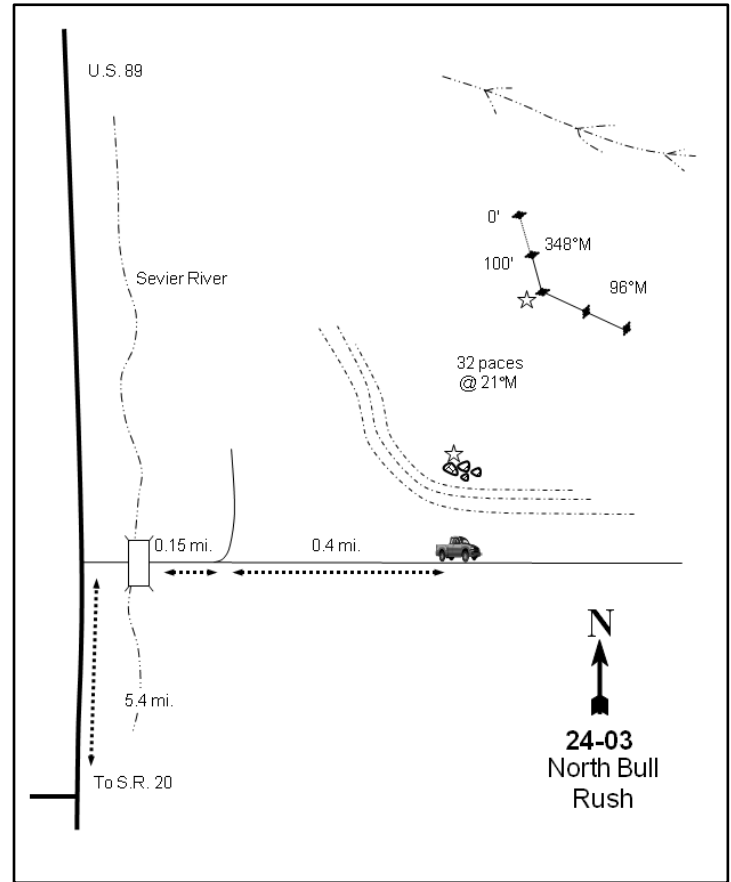
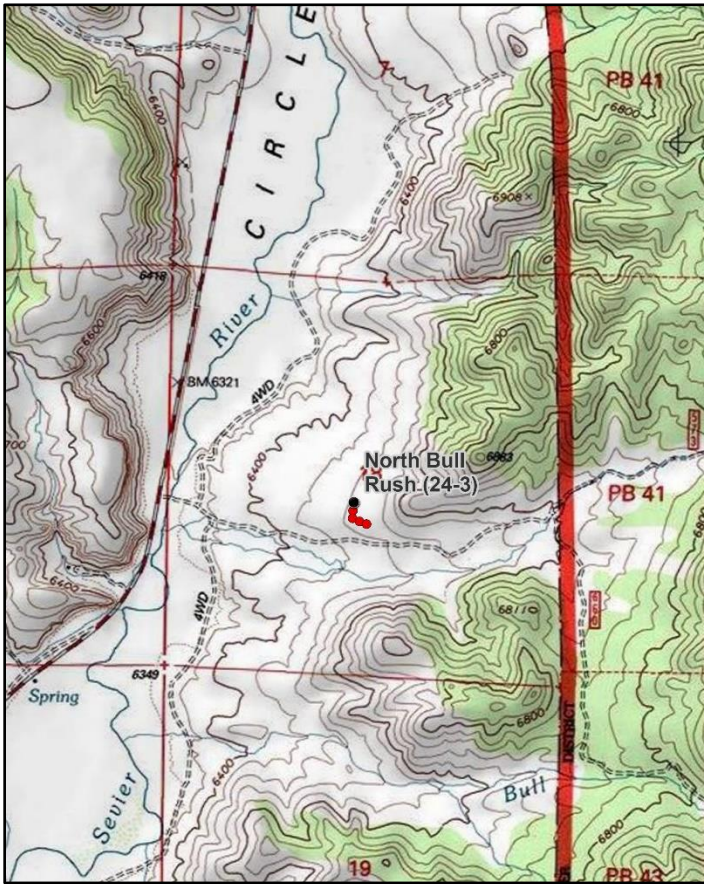
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1997	3060	-	5	94	1	1	0	1	16/33
2003	3360	-	1	89	11	0	0	3	15/30
2008	2940	80	0	72	28	8	0	8	14/28
2013	2360	-	2	98	1	26	4	31	13/33
2018	2960	-	0	94	6	16	1	5	13/30
2023	2420	20	34	66	0	0	0	7	- / -
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
1997	5600	180	11	89	0	4	0	0	7/13
2003	7620	-	3	97	0	11	2	0	6/9
2008	6280	40	0	100	0	5	1	0	5/9
2013	6100	20	4	96	0	0	2	0	6/10
2018	5920	20	0	100	0	25	14	0	5/8
2023	2020	-	65	35	0	0	3	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	80	-	0	100	0	0	0	0	21/17
2003	1920	20	10	90	0	0	0	0	15/12
2008	500	-	0	96	4	0	0	4	15/19
2013	700	40	51	49	0	0	0	0	13/16
2018	840	280	19	81	0	0	0	0	9/10
2023	3260	-	4	95	1	0	0	1	- / -
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
1997	20	-	0	100	0	100	0	0	11/20
2003	60	-	0	100	0	0	100	0	9/13
2008	20	-	0	100	0	0	100	0	10/16
2013	60	-	0	100	0	0	33	0	10/21
2018	40	-	0	100	0	0	50	0	10/12
2023	300	-	87	13	0	0	0	47	- / -
<b>Opuntia -- (pricklypear)</b>									
1997	80	-	0	100	0	0	0	0	10/12
2003	100	-	0	100	0	0	0	0	11/24
2008	40	-	0	50	50	0	0	50	12/30
2013	60	-	0	100	0	0	0	0	14/27
2018	80	-	0	100	0	0	0	0	12/33
2023	140	-	14	86	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	0	0	1/3

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

**Table 24-02.15 - Deer Desirable Components Index: Semidesert Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	22.1	10.7	6.4	7.9	0.0	1.1	0.0	<b>48.3</b>	Good
2003	22.6	7.8	0.6	13.8	0.0	0.9	0.0	<b>45.6</b>	Fair-Good
2008	25.5	3.9	1.8	17.6	0.0	1.4	0.0	<b>50.2</b>	Good
2013	24.0	10.9	3.4	22.5	0.0	2.4	0.0	<b>63.3</b>	Good-Excellent
2018	14.5	8.0	3.5	23.9	-0.1	1.4	0.0	<b>51.2</b>	Good
2023	11.6	7.0	5.6	30.0	-1.4	2.1	0.0	<b>55.0</b>	Good

## NORTH BULL RUSH - STUDY NO. 24-3

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Bull Rush Peak SW; Township 32S, Range 4W, Section 18  
NAD 83 UTM ZONE 12, 381623 East 4209809 North

**Transect Information**

Browse Tag # (0' Stake)	168
Transect Bearing	168° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

**Directions to Site**

From the US-89 and SR-20 Junction, proceed north on US-89 for 5.4 miles. At the beginning of Circleville Canyon, turn right off of the highway onto a dirt road. Cross the Sevier River and drive for 0.15 miles to a gate and intersection (if there is a problem with the bridge, it is still possible to walk in). Travel straight (east) for another 0.4 miles: stop here. Walk 18 paces up on the edge of a low bench on the north side of the road at 356 degrees magnetic to a rock monument with a fencepost. Walk approximately 60 paces at 9 degrees magnetic to the 200-foot baseline stake. The 0-foot stake is located at 348 degrees magnetic from the 200-foot stake and is marked by browse tag #168.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	HAWKINS WASH
Elevation	6,480ft (1,975m)
Aspect	Northwest
Slope	3-5%
Sample Dates	08/13/1997, 07/10/2003, 07/10/2008, 07/16/2013, 06/19/2018, 06/20/2023

**Wildlife Habitat and Vegetation History****Table 24-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush	No Encroachment
1991	Mountain Big Sagebrush	No Encroachment
1997	Mountain Big Sagebrush	No Encroachment
2003	Mountain Big Sagebrush	No Encroachment
2008	Mountain Big Sagebrush	No Encroachment
2013	Mountain Big Sagebrush	No Encroachment
2018	Mountain Big Sagebrush	No Encroachment
2023	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

The bridge to cross the Sevier River was washed out, but has since been replaced with a new steel bridge. If there is a problem crossing the bridge, the site can still be accessed by walking in. Antler drops were found on the site in 1991. The closest water sources are Bull Rush Creek and Sevier River which are approximately one-half mile to the south and west of the site, respectively.

**Soils****Table 24-03.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.7	60.4	20.0	19.6	1.4	7.1	208.0	0.6	08/11/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 1987, this site has maintained a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Density of the mature population of sagebrush plants exhibited a notable decrease in 2008, increased through 2018, and decreased again in 2023. However, line intercept cover has increased overall since 2003 (Photos, Pre-1992 Data, Table 24-03.12, Table 24-03.13). The perennial grass species needle and thread (*Hesperostipa comata*) and blue grama (*Bouteloua gracilis*) have been the most abundant components of the herbaceous understory throughout the duration of the study. In addition, perennial grass cover nearly doubled between 2018 and 2023 (mainly due to needle and thread), and they were considered to be a codominant site component in 2023. The introduced annual grass species cheatgrass (*Bromus tectorum*) was observed in 1997, 2018, and 2023, but in low amounts (Table 24-03.10). Annual and perennial forb communities have lacked diversity and have remained sparse (Table 24-03.7, Table 24-03.11). This site will likely remain in this or a similar state in future sample years unless a major disturbance occurs.

Deer winter range condition on this site has ranged between very poor and good since 1997. As of 2023, deer winter range condition was considered to be fair. Improvements to deer winter habitat could be accomplished through efforts that increase cover of and recruitment of young in the preferred browse population while decreasing decadence; diversifying and increasing cover of native perennial forbs would also be beneficial for winter range (Table 24-03.15). Pellet transect data indicates that since 2003, deer presence has been moderate in most sample years including 2023 (Table 24-03.9).

**Trend Summary Tables****Table 24-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1997	13.6	0.3	-	-	-	-
2003	8.9	0.3	-	9.8	0.2	-
2008	7.7	0.0	-	9.5	-	-
2013	9.7	0.0	-	13.7	-	-
2018	10.9	0.0	-	12.0	-	-
2023	7.5	0.0	-	11.6	-	-

**Table 24-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1997	0	318	14	14	0.0	10.2	0.0	0.0
2003	-	327	10	-	-	12.1	0.1	-
2008	-	390	-	1	-	18.4	-	0.0
2013	-	386	-	3	-	15.3	-	0.0
2018	4	385	-	2	0.0	23.6	-	0.0
2023	4	375	21	5	0.0	42.7	0.1	0.1

**Table 24-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1997	17.5	0.7	28.5	35.2	1.4	25.5
2003	19.5	0.3	22.1	39.5	3.1	22.1
2008	7.5	0.2	33.4	35.5	3.9	27.3
2013	22.8	0.2	27.0	28.6	1.3	26.4
2018	29.1	0.5	28.7	27.0	1.7	31.6
2023	11.2	0.3	17.5	31.9	1.5	46.8

**Table 24-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
1997	3	41	4	-	8
2003	13	16	2	-	53
2008	10	9	-	-	96
2013	12	6	1	-	-
2018	13	19	-	-	26
2023	10	9	1	-	20
Year	Days Use Per Acre (ha)				
1997	-	-	-	-	-
2003	25.4 (62.8)	26.8 (66.2)	-	-	-
2008	51.5 (127.3)	42.2 (104.3)	-	0.6 (1.4)	-
2013	9.4 (23.3)	11.4 (28.1)	0.7 (1.7)	-	-
2018	0.7 (1.8)	30.2 (74.5)	1.3 (3.3)	-	-
2023	26.8 (66.3)	24.8 (61.2)	-	-	-



**Table 24-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency					
<i>Bouteloua gracilis</i> (blue grama)	123	0	38	273	10	-
<i>Bromus tectorum</i> <sup>ai</sup> (cheatgrass)	-	-	4	254	-	-
<i>Elymus elymoides</i> (squirreltail)	168	-	7	329	-	-
<i>Hesperostipa comata</i> (needle and thread)	128	-	7	368	2	5
<i>Sporobolus cryptandrus</i> (sand dropseed)	138	4	13	358	-	2
<i>Thinopyrum intermedium</i> <sup>i</sup> (intermediate wheatgrass)	157	4	37	319	3	5
year	Average Cover (%)					
1997	1.9	0.0	0.7	7.5	0.1	-
2003	5.1	-	0.1	6.9	-	-
2008	8.5	-	0.1	9.8	-	-
2013	1.8	-	0.1	13.3	0.0	0.1
2018	6.1	0.0	0.2	17.3	-	0.0
2023	9.0	0.0	1.0	32.0	0.1	0.6

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

**Table 24-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency										
<i>Astragalus</i> (milkvetch)	7	11	-	-	-	-	7	-	3	-	-
<i>Chenopodium</i> <sup>a</sup> (goosefoot)	-	-	-	-	9	1	-	-	-	-	-
<i>Cryptantha</i> <sup>a</sup> (annual cryptantha)	1	-	-	-	-	-	-	-	-	-	-
<i>Cymopterus</i> (springparsley)	-	-	-	-	-	-	3	-	-	-	-
<i>Descurainia pinnata</i> <sup>a</sup> (western tansymustard)	-	-	-	2	-	-	-	-	-	-	-
<i>Draba</i> <sup>a</sup> (draba)	-	-	7	-	-	-	2	10	8	5	3
<i>Erigeron pumilus</i> (shaggy fleabane)	-	-	-	-	-	-	-	-	-	-	-
<i>Gayophytum ramosissimum</i> <sup>a</sup> (pinyon groundsmoke)	-	-	-	-	-	-	-	-	-	-	-
<i>Gilia inconspicua</i> <sup>a</sup> (shy gilia)	-	-	-	-	-	-	-	-	-	-	-
<i>Lappula occidentalis</i> <sup>a</sup> (flatspine stickseed)	-	-	-	0.0	-	-	-	-	-	-	-
<i>Sphaeralcea grossularifolia</i> (gooseberryleaf globemallow)	-	-	0.0	-	-	-	0.0	0.1	0.0	0.0	0.0
year	Average Cover (%)										
1997	0.0	0.0	-	-	-	-	0.0	-	0.0	-	-
2003	-	-	-	-	0.1	0.0	-	-	-	-	-
2008	0.0	-	-	-	-	-	-	-	-	-	-
2013	-	-	-	-	-	-	0.0	-	-	-	-
2018	-	-	-	0.0	-	-	-	-	-	-	-
2023	-	-	0.0	-	-	-	0.0	0.1	0.0	0.0	0.0

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

**Table 24-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)			
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)
year	Line Intercept Cover (%)			
1997	-	-	-	-
2003	9.8	0.2	-	-
2008	9.5	0	-	-
2013	13.7	-	-	-
2018	12	-	-	-
2023	11.6	-	-	-
year	Quadrat Cover (%)			
1997	13.6	0.2	0.2	-
2003	8.9	0.1	0.1	-
2008	7.7	0.0	-	0.0
2013	9.7	-	-	0.0
2018	10.9	-	-	0.0
2023	7.5	-	-	0.0

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

**Table 24-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1997	5800	200	3	49	48	60	7	16	38/67
2003	5440	-	0	46	54	23	0	18	41/62
2008	3540	60	1	31	69	37	25	38	45/77
2013	4620	1380	20	64	17	20	19	14	45/70
2018	4460	20	18	58	23	36	13	18	41/65
2023	3860	3580	9	62	28	19	76	28	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1997	100	-	0	100	0	0	0	0	20/26
2003	80	-	0	75	25	0	0	25	22/23
2008	20	-	0	0	100	0	0	100	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
1997	20	-	0	100	0	0	0	0	- / -
2003	20	-	0	100	0	0	100	0	17/11
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1997	60	-	0	100	0	0	0	0	14/34
2003	40	-	0	100	0	0	0	50	11/39
2008	-	-	-	-	-	-	-	-	10/31
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	10/13
2023	60	-	33	67	0	0	0	33	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	3/7
2008	20	-	100	0	0	0	0	0	-/-
2013	40	20	0	100	0	0	0	0	2/4
2018	40	-	0	100	0	0	0	0	2/5
2023	60	-	0	100	0	0	0	0	-/-

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

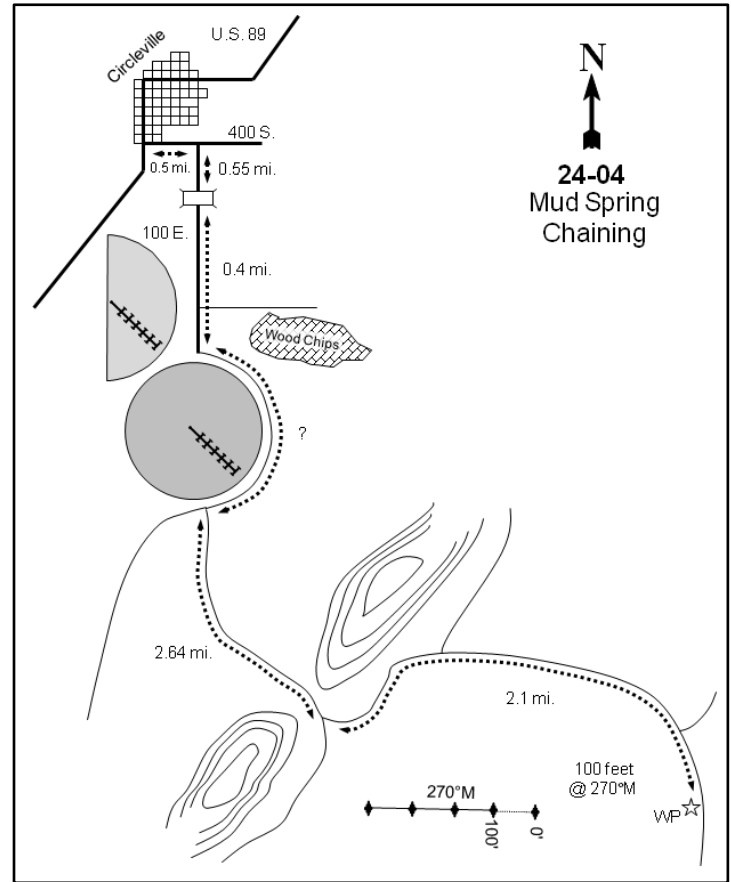
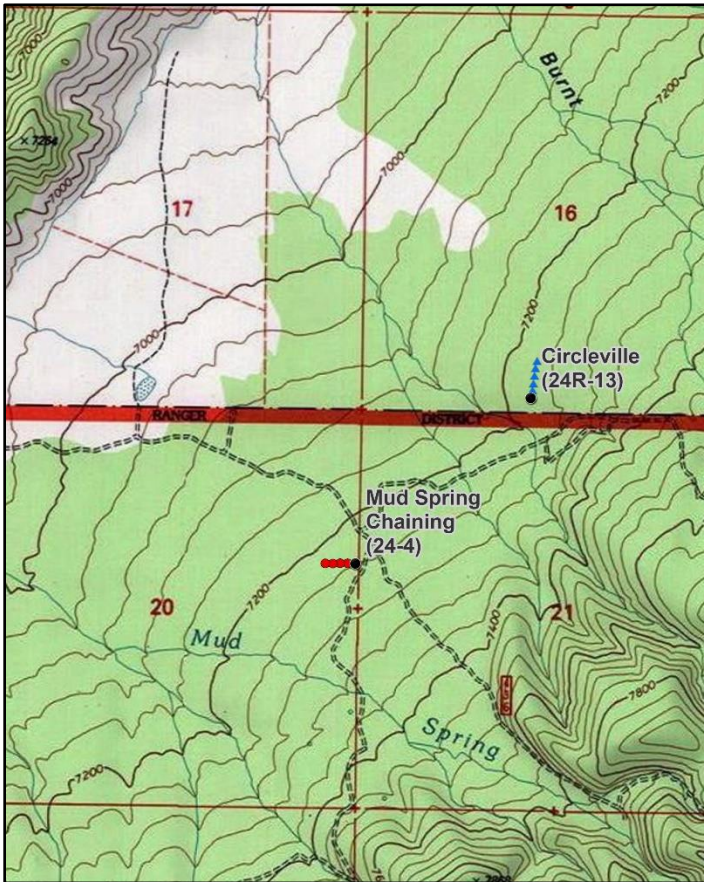
**Table 24-03.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Pinus edulis (twoneedle pinyon)</b>							
2023	1	100	-	-	-	-	2.0

**Table 24-03.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	17.0	0.6	1.5	20.4	0.0	0.1	0.0	<b>39.6</b>	Poor
2003	12.3	-1.2	0.0	24.3	0.0	0.0	0.0	<b>35.3</b>	Very Poor-Poor
2008	11.9	-5.7	0.3	30.0	0.0	0.0	0.0	<b>36.5</b>	Very Poor-Poor
2013	17.1	9.9	9.8	30.0	0.0	0.0	0.0	<b>66.8</b>	Fair-Good
2018	15.0	8.0	9.2	30.0	0.0	0.0	0.0	<b>62.2</b>	Fair
2023	14.5	6.5	4.7	30.0	0.0	0.1	0.0	<b>55.7</b>	Fair

## MUD SPRING CHAINING - STUDY NO. 24-4

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Dutton NW; Township 31S, Range 3W, Section 20  
NAD 83 UTM ZONE 12, 393774 East 4218030 North

**Transect Information**

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

Not Available  
260° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt 1: 5ft

**Directions to Site**

Traveling south on US-89 in Circleville, turn left (east) onto 400 South. Drive for 0.5 miles and turn right (south) onto 100 East. After 0.55 miles there will be a bridge; cross the bridge and continue for another 0.4 miles. At this point the road will curve around a pivot (crop circle); about halfway around the circle there will be a road that leads south. Proceed onto this road and drive for 2.64 miles at which point the road will fork. Continue on the left fork for 2.1 miles at which point the road will cross under a high tension powerline: stop here. The pole (#327) nearest to the road has a red browse tag #7046 attached under a yellow reflector. Walk 300 feet due west from the powerline to the first frequency baseline stake. The 0-foot stake is a 2-1/2 foot tall rebar and has no browse tag. There is an unmarked pellet group transect nearby.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Jones Corral C&H
Elevation	7,230ft (2,204m)
Aspect	North-Northwest
Slope	5%
Sample Dates	08/13/1997, 07/11/2003, 08/06/2008, 07/16/2013, 06/18/2018, 06/21/2023

**Table 24-04.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Historic	-
Seeding - Seed Unknown	-	-	Historic	-
Hand Crew - Lop and Scatter	-	-	Between 2003 and 2008	-

**Wildlife Habitat and Vegetation History****Table 24-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24-04.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1997	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

Sign of wildlife within the study area has been minimal over the duration of the study. Escape and thermal cover for wildlife is found nearby in the untreated pinyon-juniper woodlands which surround the treatment area.

**Soils****Table 24-04.5 - 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	6.9	67.0	18.4	14.6	3.6	38.4	608.0	0.5	08/13/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation                      13 inches  
 NRCS Ecological Site    Upland Stony Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site #    R047XB336UT  
 States and Transitions    No state and transition model is available for this ecological site.

When the study was established in 1987, the plant community on this site was a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) scattered throughout the area. Pinyon and juniper continued to encroach from 1987 to 2003, at which point the study was considered to be within Phase I transitioning to Phase II of woodland succession (Photos, Table 24-04.4, Table 24-04.12, Table 24-04.14). A majority of the pinyon and juniper trees were removed by a lop and scatter treatment between 2003 and 2008 (Table 24-04.1), and the site has been classified as being in Phase I since 2008 (Table 24-04.4). Sagebrush has been the main component of the shrub layer over the sample years (Table 24-04.12, Table 24-04.13). The introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) has dominated the herbaceous understory throughout the duration of the study, and forbs have remained rare (Pre-1992 Data, Table 24-04.7, Table 24-04.10, Table 24-04.11). Although the site has remained within Phase I of woodland succession since 2008, the extant tree component indicates that there may be potential for infilling over time.

Deer winter range condition on this site has ranged between poor and good since 1997. Condition of deer wintering range was considered to be fair as of 2023. Improvements to deer winter habitat could be accomplished by increasing cover of and recruitment of young within the preferred browse population while decreasing decadence; diversifying and increasing cover of perennial forbs would also be beneficial for deer winter range (Table 24-04.15). The sagebrush component of this site could provide valuable browse for elk during the winter months, while the perennial grass component could provide forage during the summer; increasing cover and diversity of native perennial forbs would be beneficial for elk summer habitat (Table 24-04.3; Beck and Peek, 2005; Wambolt 1996). However, pellet transect data indicates that elk presence has remained low since 2003, and no pellet groups were observed in 2023. Deer presence has also been low since 2003 (Table 24-04.9).

**Trend Summary Tables****Table 24-04.6 - 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
1997	6.2	0.1	5.2	-	-	-
2003	7.3	0.6	13.1	5.1	0.2	17.8
2008	7.6	0.8	0.6	9.2	0.7	1.1
2013	11.7	0.5	1.2	10.0	0.3	2.2
2018	11.0	1.4	1.8	13.7	0.6	2.1
2023	11.0	0.4	2.8	11.0	-	3.3

**Table 24-04.7 - 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
1997	-	316	-	37	-	11.3	-	0.3
2003	-	266	3	14	-	8.3	0.0	0.1
2008	-	270	-	14	-	12.8	-	0.1
2013	-	297	-	21	-	13.5	-	0.2
2018	-	324	-	19	-	17.6	-	0.3
2023	-	299	6	17	-	15.1	0.0	0.2

**Table 24-04.8 - 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
1997	14.4	0.1	37.4	13.4	18.7	26.7
2003	16.4	0.4	34.6	12.8	23.8	28.7
2008	12.2	0.1	45.4	13.5	17.8	21.3
2013	9.8	0.1	46.4	5.9	20.7	26.5
2018	20.3	0.1	37.6	9.8	23.9	33.6
2023	14.5	0.0	32.2	20.0	24.7	27.0

**Table 24-04.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1997	3	8	-	9
2003	2	5	1	16
2008	5	20	1	51
2013	1	2	1	1
2018	-	7	1	28
2023	2	2	-	4
Year	Days Use Per Acre (ha)			
1997	-	-	-	-
2003	9.4 (23.3)	7.4 (18.2)	-	-
2008	4.4 (10.8)	4.7 (11.6)	2.0 (5.0)	-
2013	5.8 (14.3)	2.7 (6.6)	4.0 (9.9)	-
2018	5.8 (14.3)	-	0.7 (1.7)	-
2023	8.7 (21.5)	2.0 (5.0)	-	-

**Table 24-04.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)
year	Nested Frequency						
1997	3	305	-	11	9	10	2
2003	-	263	4	10	-	5	0
2008	-	256	6	15	-	19	-
2013	7	281	-	12	4	5	1
2018	7	312	9	18	1	1	-
2023	-	292	2	18	1	2	-
year	Average Cover (%)						
1997	0.0	11.1	-	0.1	0.0	0.1	0.0
2003	-	8.1	0.0	0.1	-	0.0	0.0
2008	-	12.2	0.1	0.2	-	0.3	-
2013	0.1	13.1	-	0.2	0.0	0.1	0.0
2018	0.1	16.9	0.4	0.2	0.0	0.0	-
2023	-	14.6	0.0	0.4	0.0	0.0	-

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

**Table 24-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus (milkvetch)	Chaenactis douglasii (Douglas' dusty-aiden)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Ipomopsis aggregata (scarlet gilia)	Lotus utahensis (Utah bird's-foot trefoil)	Machaeranthera canescens (hoary tansyaster)	Packera multilobata (lobeleaf groundsel)	Phlox hoodii (spiny phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency																
1997	7	-	-	4	-	-	2	-	-	24	-	-	2	-	-	-	-
2003	-	3	-	-	1	3	-	-	-	9	-	-	1	-	-	-	1
2008	-	4	4	-	-	-	4	-	-	1	-	-	-	-	-	-	1
2013	-	-	-	-	-	-	6	-	-	9	-	3	-	-	1	-	2
2018	-	-	-	2	-	-	4	-	-	7	-	-	-	1	3	-	3
2023	-	-	2	3	-	-	6	3	1	-	3	-	-	-	-	2	3
year	Average Cover (%)																
1997	0.0	-	-	0.0	-	-	0.0	-	-	0.2	-	-	0.0	-	-	-	-
2003	-	0.0	-	-	0.0	0.0	-	-	-	0.0	-	-	0.0	-	-	-	0.0
2008	-	0.0	0.0	-	-	-	0.0	-	-	0.0	-	-	-	-	-	-	0.0
2013	-	-	-	-	-	-	0.0	-	-	0.1	-	0.0	-	-	0.0	-	0.0
2018	-	-	-	0.0	-	-	0.0	-	-	0.1	-	-	-	0.0	0.1	-	0.0
2023	-	-	0.1	0.0	-	-	0.0	0.0	0.0	-	0.0	-	-	-	-	0.0	0.0

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

**Table 24-04.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Yucca (yucca)
year	Line Intercept Cover (%)									
1997	-	-	-	-	-	-	-	-	-	-
2003	5.1	-	-	0.2	5	-	-	12.8	-	-
2008	9.2	0.3	-	0.4	0.6	-	-	0.5	-	-
2013	10	0.1	-	0.2	2.2	-	-	-	-	-
2018	13.7	0.2	-	0.4	1.2	-	-	0.9	-	-
2023	11	-	-	-	2.3	-	-	1	0	-
year	Quadrat Cover (%)									
1997	6.2	-	0.0	0.1	0.0	0.0	-	5.2	-	0.0
2003	7.3	-	0.0	0.3	4.4	0.1	-	8.6	-	0.1
2008	7.6	0.0	-	0.4	0.6	0.0	-	0.0	-	0.4
2013	11.7	0.0	-	0.1	1.0	0.0	-	0.1	-	0.4
2018	11.0	0.0	-	1.0	1.5	0.0	0.0	0.3	0.0	0.4
2023	11.0	0.0	-	0.2	2.1	0.1	-	0.6	0.0	0.1

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

**Table 24-04.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1997	1040	180	27	65	8	23	2	8	56/92
2003	1220	-	16	54	30	15	8	18	49/72
2008	1320	20	0	85	15	41	29	8	58/92
2013	1380	60	14	81	4	28	1	0	62/105
2018	1620	40	14	77	10	3	0	20	63/96
2023	1820	360	1	90	9	10	10	10	- / -
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	48/69
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	34/46
2008	-	-	-	-	-	-	-	-	38/53
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	18/20
2023	20	-	100	0	0	0	0	0	- / -



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1997	20	-	100	0	0	0	0	0	- / -
2003	40	-	0	100	0	0	0	100	10/11
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	60/53
2008	40	-	0	100	0	0	0	0	35/40
2013	40	-	0	100	0	50	0	50	54/83
2018	40	-	0	100	0	0	50	0	68/99
2023	40	-	50	50	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	260	-	8	85	8	0	0	0	19/24
2003	760	20	0	71	29	0	0	13	18/23
2008	800	120	3	83	15	0	0	13	16/21
2013	660	60	18	79	3	0	0	3	16/24
2018	1420	-	16	82	3	0	0	3	16/20
2023	800	200	65	35	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1997	100	20	20	80	0	0	0	20	- / -
2003	220	-	27	73	0	0	0	0	- / -
2008	80	-	25	75	0	0	0	25	- / -
2013	100	-	40	60	0	0	0	0	- / -
2018	80	-	25	75	0	0	0	0	- / -
2023	100	-	0	100	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	20/28
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1997	60	-	67	33	0	0	0	0	14/21
2003	120	-	0	100	0	0	0	0	11/25
2008	60	20	0	100	0	0	0	0	9/9
2013	40	-	0	100	0	0	0	0	8/21
2018	20	20	0	100	0	0	0	0	12/28
2023	40	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	4/4
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	5/6
2018	40	-	0	100	0	0	0	0	2/6
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1997	280	-	21	79	0	0	0	0	- / -
2003	240	-	8	92	0	0	0	0	- / -
2008	20	-	0	100	0	0	0	0	- / -
2013	20	-	0	100	0	0	0	0	- / -
2018	40	-	100	0	0	0	0	0	- / -
2023	60	-	0	100	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1997	20	-	0	100	0	100	0	0	60/131
2003	20	-	0	100	0	0	100	0	64/101
2008	40	-	0	100	0	50	50	0	38/90
2013	40	-	50	50	0	100	0	0	67/118
2018	20	-	0	100	0	100	0	0	39/76
2023	20	-	0	100	0	0	100	0	- / -
<b>Sclerocactus -- (fishhook cactus)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	9/31
2013	-	-	-	-	-	-	-	-	12/37
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Yucca -- (yucca)</b>									
1997	20	-	0	100	0	0	0	0	19/37
2003	40	-	0	100	0	0	0	0	55/57
2008	20	-	0	100	0	0	0	0	31/59
2013	20	-	0	100	0	0	0	0	57/101
2018	40	-	0	100	0	0	0	0	39/43
2023	20	-	0	100	0	0	0	0	- / -

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

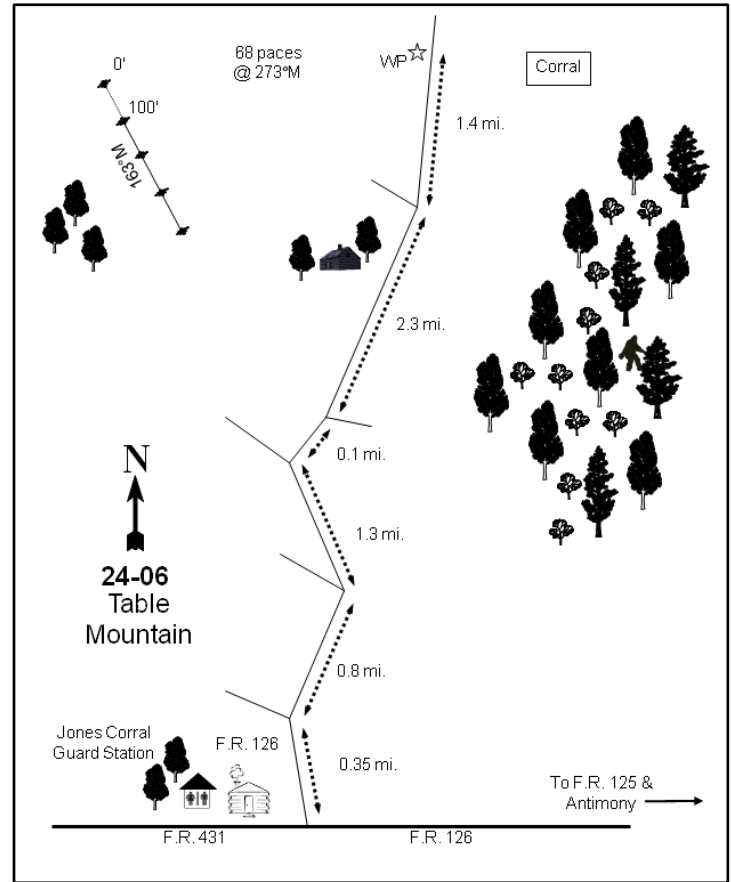
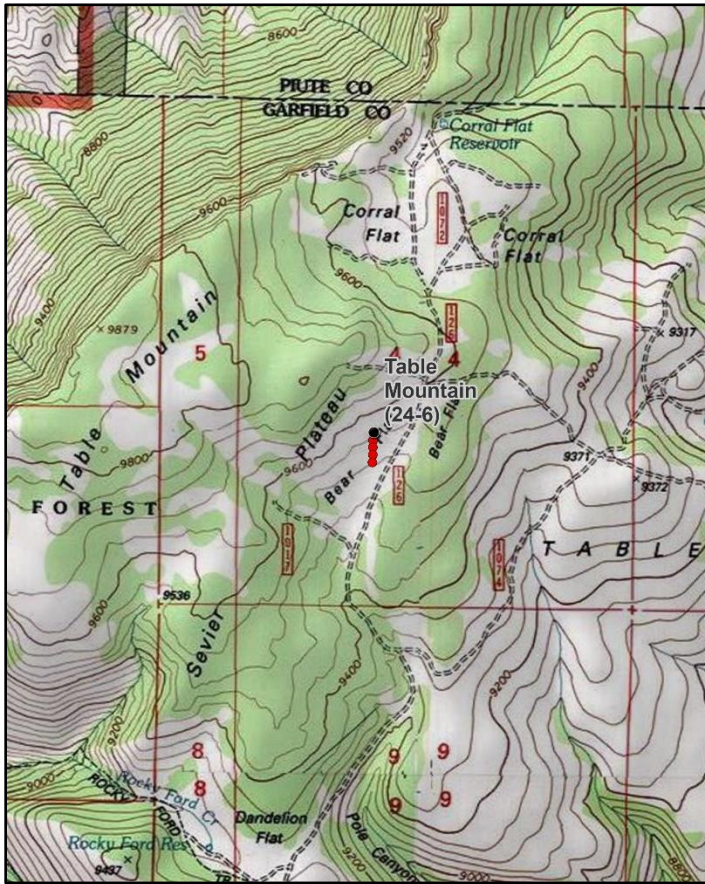
**Table 24-04.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2003	104	-	25	50	20	5	11.2
2008	56	5	63	26	-	5	7.4
2013	65	10	60	25	-	5	5.3
2018	57	5	37	47	11	-	6.9
2023	62	5	15	60	15	5	9.7
<b>Pinus edulis (twoneedle pinyon)</b>							
2003	123	-	55	35	10	-	6.7
2008	29	10	80	-	-	10	5.2
2013	29	18	64	9	-	9	4.5
2018	31	-	67	25	-	8	5.8
2023	34	7	50	36	-	7	6.6

**Table 24-04.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	7.7	12.6	13.4	22.6	0.0	0.5	0.0	<b>56.9</b>	Fair
2003	6.4	6.2	8.2	16.6	0.0	0.1	0.0	<b>37.4</b>	Poor
2008	11.5	10.4	0.0	25.6	0.0	0.2	0.0	<b>47.7</b>	Poor
2013	12.5	13.7	7.3	27.0	0.0	0.4	0.0	<b>60.9</b>	Fair
2018	17.1	12.0	6.8	30.0	0.0	0.6	0.0	<b>66.5</b>	Fair-Good
2023	13.8	12.4	0.6	30.0	0.0	0.4	0.0	<b>57.0</b>	Fair

## TABLE MOUNTAIN - STUDY NO. 24-6

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Junction SE; Township 31S, Range 2W, Section 04  
NAD 83 UTM ZONE 12, 401158 East 4221670 North

**Transect Information**

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

9004  
180° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

Starting from the Jones Corral Guard Station, travel north on Road #126 for 0.35 miles (towards Table Mountain). At the fork, stay right and continue 0.8 miles to another fork. Stay right again and proceed for 1.3 miles to a fork and cattle guard. Keep right and go 0.1 miles to another fork. Bear left and continue for 2.3 miles to a fork. Stay right and continue north for 1.4 miles to a burned flat surrounded by aspen trees. Look for a 4-foot tall witness post on the left (west) side of the road. From the witness post walk 68 paces at 277 degrees magnetic to the 0-foot stake which is marked by a red browse tag #9004.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Deer Creek S&G
Elevation	9,560ft (2,914m)
Aspect	South
Slope	13%
Sample Dates	08/15/1997, 08/07/2003, 08/07/2008, 07/17/2013, 06/28/2018, 07/06/2023

**Table 24-06.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed Fire	-	-	Prior to 1987	-

**Wildlife Habitat and Vegetation History****Table 24-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24-06.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Perennial Grass-Forb	No Encroachment
1991	Perennial Grass-Forb	No Encroachment
1997	Perennial Grass-Forb	No Encroachment
2003	Mountain Big Sagebrush/Snowberry	No Encroachment
2008	Mountain Big Sagebrush/Snowberry	No Encroachment
2013	Mountain Big Sagebrush/Snowberry	No Encroachment
2018	Mountain Big Sagebrush/Snowberry	No Encroachment
2023	Mountain Big Sagebrush/Snowberry	No Encroachment

**Site Notes**

Stands of quaking aspen (*Populus tremuloides*) are found near the site and provide escape cover for wildlife. This area is part of a sheep allotment that was rested for a time, but sheep were seen on site in 2003. Bare ground cover has been consistently low with a high amount of vegetation and litter providing protective ground cover.

**Soils****Table 24-06.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.1	38.4	35.1	26.5	5.0	47.0	454.4	0.6	08/15/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation	24 inches
NRCS Ecological Site	High Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB516UT
States and Transitions	No state and transition model is available for this ecological site.

Photographs show that this area likely burned during a prescribed fire before study establishment in 1987 (Table 24-06.1). As a result, the site transitioned from a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community to a perennial grass community dominated by Letterman's needlegrass (*Achnatherum lettermanii*) (Photos, Pre-1992 Data). The perennial grass and forb community has remained abundant over the duration of the study, with needle and thread (*Hesperostipa comata*) providing the most cover of any single perennial grass species in recent sample years (Table 24-06.7, Table 24-06.10, Table 24-06.11). Mountain big sagebrush and mountain snowberry (*Symphoricarpos oreophilus*) increased in cover and density over time (Table 24-06.12, Table 24-06.13), becoming the dominant vegetation components in 2023. Without a disturbance, this site is likely to continue to exist as a sagebrush and snowberry dominated plant community.

This site likely serves as adequate habitat for summering deer due to the abundant and diverse shrub and herbaceous components. In addition, the herbaceous understory could provide valuable forage for elk during the summer months (Table 24-06.3; Beck & Peek, 2005). However, pellet transect data shows that presences for both elk and deer have generally remained low since 2013 (Table 24-06.9).

## Trend Summary Tables

**Table 24-06.6 - 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
1997	8.9	0.3	-	-	-	-
2003	11.5	0.3	-	16.0	0.1	-
2008	19.3	0.5	-	33.7	0.6	-
2013	24.1	0.2	-	29.6	0.5	-
2018	34.3	0.7	-	44.9	0.3	-
2023	37.6	0.4	-	40.8	0.3	-

**Table 24-06.7 - 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
1997	-	387	25	267	-	20.8	0.1	16.1
2003	-	382	18	214	-	18.1	0.1	10.0
2008	-	398	70	292	-	21.7	0.5	13.6
2013	-	396	43	224	-	22.4	0.9	16.1
2018	-	364	102	270	-	25.6	1.4	10.7
2023	-	356	50	284	-	18.7	0.8	14.2

**Table 24-06.8 - 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
1997	5.7	0.4	33.0	10.8	7.3	51.9
2003	14.6	-	15.7	9.5	23.1	41.7
2008	4.2	-	23.2	3.8	16.9	62.6
2013	7.6	0.0	26.6	4.5	13.1	63.5
2018	16.4	-	46.8	7.2	12.4	59.0
2023	6.4	0.6	28.2	9.9	8.0	59.9

**Table 24-06.9 - 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/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1997	2	-	18	15	4
2003	4	-	26	8	-
2008	5	-	14	15	18
2013	5	-	1	4	-
2018	4	-	8	14	11
2023	2	1	1	-	-
Year	Days Use Per Acre (ha)				
1997	-	-	-	-	-
2003	13.1 (32.3)	-	99.8 (246.6)	2.7 (6.6)	-
2008	20.3 (50.2)	-	53.6 (132.4)	42.2 (104.3)	-
2013	10.2 (25.1)	-	9.4 (23.2)	13.4 (33.1)	-
2018	16.0 (39.5)	-	4.7 (11.6)	10.0 (24.8)	-
2023	11.6 (28.7)	-	12.8 (31.5)	5.3 (13.2)	-

**Table 24-06.10 - 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)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency													
1997	208	15	3	36	49	15	3	20	100	30	94	4	-	117
2003	286	28	-	-	-	-	4	-	103	18	45	12	5	7
2008	214	10	19	4	55	16	65	-	188	19	118	10	2	41
2013	201	11	11	11	63	49	36	22	173	16	103	35	2	14
2018	185	15	15	5	40	66	57	3	162	47	132	27	-	4
2023	98	5	4	6	18	10	7	4	182	44	140	5	32	19
year	Average Cover (%)													
1997	9.9	0.8	0.0	0.6	1.0	0.2	0.0	0.2	2.9	0.2	1.7	0.1	-	3.3
2003	13.3	0.7	-	-	-	-	0.0	-	2.8	0.1	0.6	0.2	0.2	0.2
2008	6.2	0.3	0.2	0.0	1.1	0.2	1.2	-	8.0	0.3	3.1	0.1	0.0	0.7
2013	7.7	0.2	0.2	0.1	0.9	1.5	0.6	0.4	7.1	0.2	2.8	0.5	0.0	0.2
2018	6.1	0.3	0.1	0.2	0.5	1.0	1.1	0.1	9.1	0.6	5.4	0.6	-	0.3
2023	2.2	0.1	0.0	0.2	0.5	0.1	0.1	0.1	8.1	0.7	4.2	0.2	1.4	0.7

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

**Table 24-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Androsace septentrionalis <sup>a,i</sup> (pygmyflower rockjasmine)	Arabis pulchra (beautiful rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chenopodium album <sup>a</sup> (lambsquarters)	Crepis acuminata (tapertip hawksbeard)	Dracocephalum parviflorum (American dragonhead)	Erigeron eatonii (Eaton's fleabane)	Eriogonum racemosum (redroot buckwheat)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lupinus argenteus (silvery lupine)	Packera multilobata (lobeleaf groundsel)	Penstemon rydbergii (Rydberg's penstemon)
year	Nested Frequency																
1997	3	40	-	1	1	24	4	-	15	5	-	7	14	-	110	16	7
2003	0	-	-	1	-	1	-	-	17	-	-	6	4	-	80	-	8
2008	5	72	9	1	5	37	14	-	39	2	5	23	18	1	132	-	0
2013	4	2	1	-	-	38	13	-	21	17	27	5	22	4	109	-	9
2018	7	56	26	4	3	41	22	-	21	9	3	12	15	3	101	-	-
2023	5	136	19	-	-	25	49	1	7	4	2	10	14	4	124	-	-
year	Average Cover (%)																
1997	0.0	0.1	-	0.0	0.0	0.2	0.0	-	0.0	0.1	-	0.0	0.1	-	8.7	0.1	0.1
2003	0.0	-	-	0.0	-	0.0	-	-	0.1	-	-	0.0	0.0	-	7.7	-	0.0
2008	0.2	0.4	0.1	0.0	0.0	1.0	0.0	-	0.1	0.0	0.0	0.1	0.2	0.0	6.8	-	0.0
2013	0.0	0.0	0.0	-	-	0.6	0.1	-	0.4	0.3	0.3	0.0	0.3	0.1	11.5	-	0.1
2018	0.2	0.3	0.2	0.0	0.1	0.7	0.2	-	0.2	0.1	0.0	0.1	0.1	0.0	4.0	-	-
2023	0.1	1.6	0.2	-	-	0.3	0.3	0.0	0.0	0.1	0.0	0.4	0.3	0.0	8.1	-	-

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Phlox pulvinata (cushion phlox)	Pleianthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla diversifolia (varileaf cinquefoil)	Potentilla hippiana (woolly cinquefoil)	Pseudostellaria jamesiana (tuber starwort)	Silene drummondii (Drummond's campion)	Symphotrichum (aster)	Taraxacum officinale (common dandelion)	Thermopsis montana (mountain goldenbanner)	Tragopogon dubius <sup>a,t</sup> (yellow salsify)
year	Nested Frequency											
1997	-	76	4	-	12	6	-	-	-	149	2	10
2003	-	52	-	-	-	4	-	-	1	123	-	1
2008	3	73	-	-	2	-	3	26	-	158	-	33
2013	2	46	-	4	1	-	-	-	-	105	-	18
2018	1	80	-	6	4	4	-	19	3	149	-	63
2023	3	65	-	1	6	7	-	-	20	46	-	25
year	Average Cover (%)											
1997	-	4.3	0.0	-	0.1	0.1	-	-	-	2.3	0.0	0.1
2003	-	0.5	-	-	-	0.1	-	-	0.0	1.7	-	0.0
2008	0.0	2.4	-	-	0.0	-	0.0	0.1	-	2.2	-	0.3
2013	0.0	1.3	-	0.0	0.0	-	-	-	-	1.6	-	0.4
2018	0.0	2.2	-	0.1	0.0	0.1	-	0.1	0.0	2.7	-	0.9
2023	0.1	1.9	-	0.0	0.1	0.3	-	-	0.2	0.4	-	0.5

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

**Table 24-06.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Mahonia repens (creeping barberry)	Ribes cereum var. pedicellare <sup>p</sup> (whisky currant)	Rosa woodsii <sup>p</sup> (Woods' rose)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)						
1997	-	-	-	-	-	-	-
2003	-	10.1	-	0.1	0.4	0	5.5
2008	-	17.7	0.3	0.3	1.4	0.1	14.5
2013	-	14.5	0.3	0.2	2.1	0.1	12.9
2018	-	22.8	0.1	0.2	2.5	-	19.6
2023	0.2	19.6	0.1	0.2	2.9	0.7	17.4
year	Quadrat Cover (%)						
1997	-	3.1	-	0.3	0.1	0.0	5.7
2003	-	6.4	-	0.3	0.0	0.0	5.1
2008	-	9.0	0.0	0.5	0.7	0.4	9.2
2013	0.1	10.1	0.0	0.2	1.0	0.1	12.7
2018	-	18.3	0.0	0.7	1.8	0.2	14.0
2023	0.0	18.8	0.1	0.3	2.3	0.0	16.5

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

**Table 24-06.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

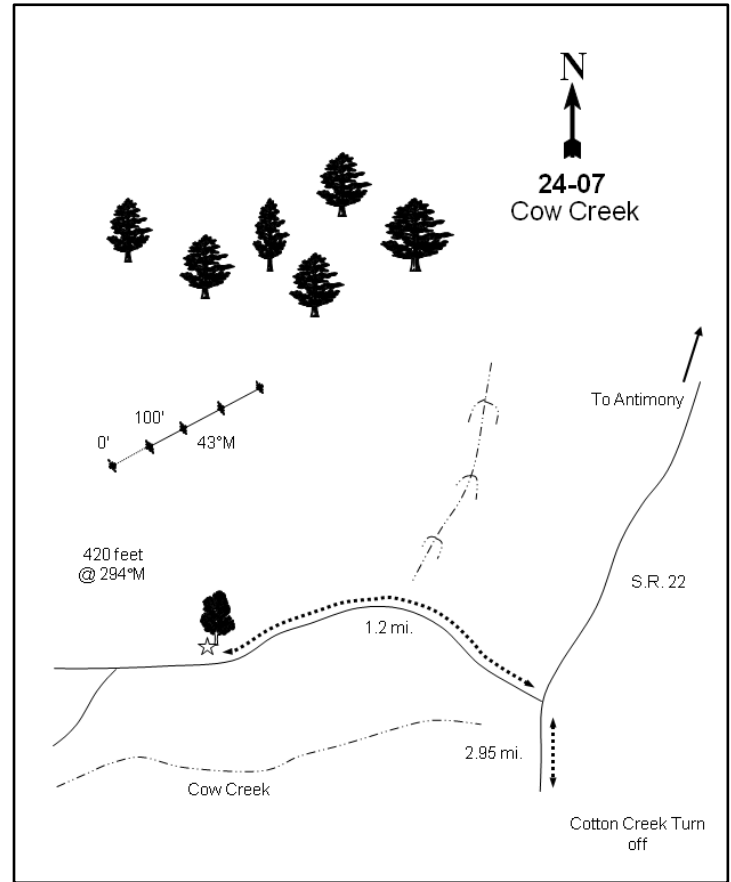
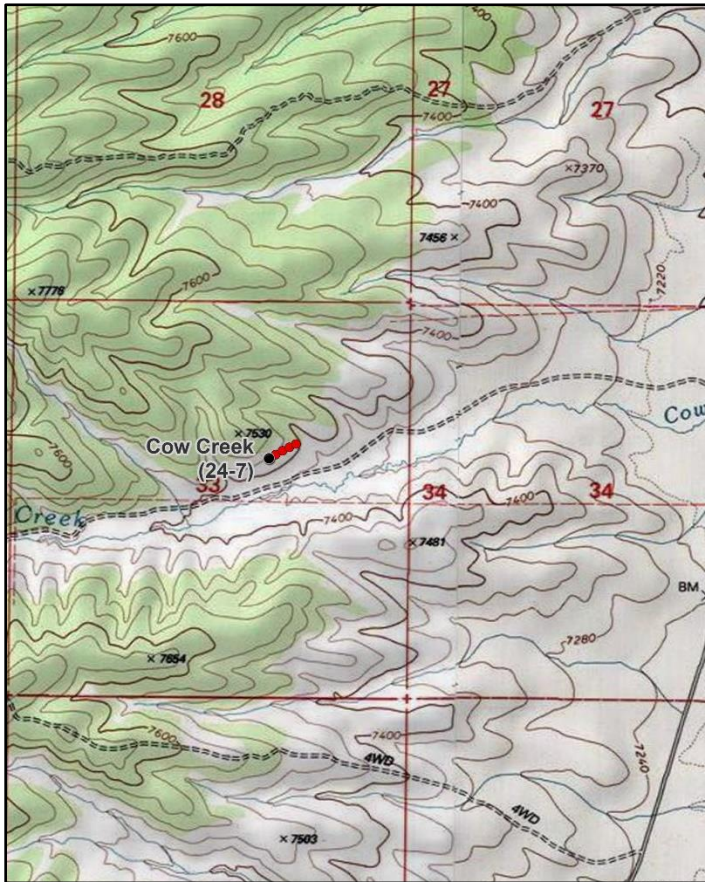
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	100	- / -
2018	-	-	-	-	-	-	-	-	-/-
2023	120	-	0	100	0	0	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1997	1620	760	62	38	0	6	0	4	52/98
2003	1760	60	17	80	3	3	0	1	69/95
2008	9180	2780	48	50	2	7	1	1	50/72
2013	3440	-	20	75	5	6	0	1	47/75
2018	4460	180	21	79	0	1	0	1	65/92
2023	4580	40	6	64	30	7	3	30	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1997	20	-	0	100	0	0	0	0	32/36
2003	-	-	-	-	-	-	-	-	40/89
2008	40	-	0	100	0	0	50	0	36/71
2013	40	-	0	100	0	0	0	0	43/78
2018	40	-	0	100	0	0	0	0	45/70
2023	20	140	0	100	0	0	0	0	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
1997	1940	-	5	95	0	0	0	0	9/13
2003	1840	-	0	100	0	0	0	0	6/11
2008	2440	-	12	89	0	0	0	3	7/10
2013	1780	-	1	91	8	0	0	0	5/10
2018	1820	-	0	100	0	0	0	0	7/10
2023	1760	-	0	100	0	0	0	0	- / -
<b>Pseudotsuga menziesii<sup>I</sup> -- (Douglas-fir)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Ribes cereum var. pedicellare<sup>P</sup> -- (whisky currant)</b>									
1997	40	-	0	100	0	0	0	0	107/140
2003	40	-	0	100	0	50	0	0	121/153
2008	40	-	0	0	100	0	0	50	117/157
2013	60	-	0	100	0	0	0	0	110/149
2018	80	-	0	100	0	0	0	0	134/183
2023	60	-	0	100	0	33	0	0	- / -
<b>Rosa woodsii<sup>P</sup> -- (Woods' rose)</b>									
1997	220	-	46	55	0	0	0	0	21/24
2003	160	-	25	63	13	75	0	13	28/24
2008	280	-	7	93	0	0	0	0	26/35
2013	240	-	25	75	0	0	0	0	22/31
2018	320	-	0	100	0	0	0	0	28/25
2023	20	-	0	100	0	0	0	0	- / -



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Symphoricarpos oreophilus <sup>p</sup> -- (mountain snowberry)									
1997	1260	40	10	79	11	14	5	5	42/84
2003	1740	-	8	89	3	38	43	1	47/92
2008	1360	40	2	87	12	4	6	2	47/103
2013	1460	40	7	93	0	8	1	0	57/128
2018	2820	-	16	84	1	11	4	2	58/125
2023	2880	-	6	94	0	18	4	0	- / -

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

## COW CREEK - STUDY NO. 24-7

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Cow Creek NE; Township 32S, Range 2W, Section 33  
NAD 83 UTM ZONE 12, 411352 East 4204129 North

**Transect Information**

Browse Tag # (0' Stake)	9002
Transect Bearing	43° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Belt 5: 1ft

**Directions to Site**

From the Cottonwood Creek turnoff of SR-22 south of Antimony, proceed north on the highway for 2.95 miles to a gate by Cow Creek. Turn west and drive through the seeded pasture up Cow Creek for 1.2 miles to a lone, mature juniper tree near the road (if you go too far [0.2 more miles] you will come to a fork by a fence). Stop by the lone juniper and walk up the hill about 140 yards at a bearing of 294 degrees magnetic to the start of the baseline and the 0-foot stake, a short fencepost with browse tag #9002 attached. The transect runs east-northeast along the top edge of the seeding.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	7,450ft (2,271m)
Aspect	South
Slope	12-20%
Sample Dates	08/14/1997, 07/22/2003, 08/12/2008, 08/01/2013, 07/02/2018, 07/06/2023

**Table 24-07.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Disk - Disk Unknown	-	-	Prior to 1987	-
Seeding - Rangeland Drill	-	-	Prior to 1987	-
Hand Crew - Lop and Scatter	Cow and Cottonwood Creek Lop and Scatter	1794	November 2011	2100

**Wildlife Habitat and Vegetation History****Table 24-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24-07.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush/Perennial Grass	Phase I
1991	Mountain Big Sagebrush/Perennial Grass	Phase I
1997	Mountain Big Sagebrush/Perennial Grass	Phase I
2003	Mountain Big Sagebrush/Perennial Grass	Phase I
2008	Mountain Big Sagebrush/Perennial Grass	Phase I
2013	Mountain Big Sagebrush/Perennial Grass	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I
2023	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

Pronghorn may be present in the area year-round. Due to the difficulties in distinguishing between pronghorn and deer pellet groups, pronghorn pellet groups have been included in deer pellet group counts.

**Soils****Table 24-07.5 - 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	7.4	65.0	20.1	14.9	2.7	19.1	54.4	0.5	08/11/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation                      12 inches  
 NRCS Ecological Site    Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)  
 NRCS Ecological Site #    R047XB308UT  
 States and Transitions    No state and transition model is available for this ecological site.

This site has featured a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since study establishment in 1987 (Photos, Pre-1992 Data, Table 24-07.12, Table 24-07.13). Perennial grasses have dominated the herbaceous understory throughout the study period, with needle and thread (*Hesperostipa comata*), blue grama (*Bouteloua gracilis*), and crested wheatgrass (*Agropyron cristatum*) as the most abundant species in 2023. The introduced annual grass species cheatgrass (*Bromus tectorum*) was observed in 2008 and again in 2023, but in trace amounts. Perennial and annual forbs have remained rare in comparison with perennial grasses (Table 24-07.7, Table 24-07.10, Table 24-07.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been observed and the site has been considered to be within Phase I of woodland succession in all sample years (Photos, Table 24-07.12, Table 24-07.13, Table 24-07.14). A lop and scatter treatment in 2011 removed some of the trees (Table 24-07.1), but the remaining tree component and close proximity of the transect to mature stands of pinyon and juniper indicate that this site has the potential for future infilling.

Deer winter range condition on this site has ranged between very poor and good since 1997. Condition of deer wintering range was considered to be poor to fair in 2023. Improvement to winter habitat could be accomplished through efforts that increase preferred browse cover and recruitment of young while decreasing decadence. Diversifying and increasing cover of perennial forbs would also be beneficial for deer winter range (Table 24-07.15). In addition, the sagebrush component of this site could provide valuable browse for elk during the winter months (Table 24-07.3; Wambolt, 1996). However, pellet transect data indicates that both deer and elk presence were low in 2023 (Table 24-07.9).

## Trend Summary Tables

**Table 24-07.6 - 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
1997	6.5	0.1	6.0	-	-	-
2003	7.1	0.6	5.2	6.3	0.6	9.3
2008	3.2	0.1	4.1	10.9	-	10.5
2013	5.3	0.2	0.6	8.2	0.2	6.2
2018	5.9	0.6	3.3	8.0	0.3	6.7
2023	9.1	1.7	1.9	7.8	2.1	8.6

**Table 24-07.7 - 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
1997	-	343	29	67	-	11.5	0.3	0.7
2003	-	314	41	11	-	12.4	0.2	0.0
2008	1	326	60	42	0.0	12.4	0.3	0.6
2013	-	327	6	25	-	18.2	0.0	0.3
2018	-	330	2	28	-	17.9	0.0	0.5
2023	3	335	101	31	0.0	30.4	0.7	0.6

**Table 24-07.8 - 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
1997	9.9	-	33.5	27.5	3.9	26.6
2003	11.8	-	36.2	36.0	5.7	24.7
2008	10.4	-	32.7	35.8	6.1	25.0
2013	6.2	-	32.2	29.9	7.0	27.8
2018	15.0	-	33.5	34.7	5.5	28.4
2023	5.2	0.0	26.9	33.4	8.4	40.0

**Table 24-07.9 - 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			
1997	4	17	31	13
2003	1	6	32	39
2008	2	10	4	97
2013	2	11	14	31
2018	5	5	6	44
2023	2	4	7	6
Year	Days Use Per Acre (ha)			
1997	-	-	-	-
2003	1.5 (3.6)	24.1 (59.6)	34.9 (86.1)	-
2008	0.7 (1.8)	8.1 (19.9)	0.7 (1.7)	-
2013	-	15.4 (38.1)	25.5 (62.9)	-
2018	5.8 (14.3)	5.3 (13.2)	11.4 (28.1)	-
2023	3.6 (9.0)	3.4 (8.3)	6.0 (14.9)	-

**Table 24-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency									
1997	7	220	171	-	-	58	21	-	2	10
2003	3	166	169	-	-	70	34	18	-	-
2008	26	93	214	-	1	63	88	2	5	-
2013	12	176	180	1	-	54	94	4	3	-
2018	32	90	236	-	-	17	139	2	-	-
2023	19	141	200	-	3	37	181	-	-	-
year	Average Cover (%)									
1997	0.1	6.1	4.4	-	-	0.7	0.2	-	0.0	0.0
2003	0.0	4.8	6.2	-	-	0.5	0.7	0.1	-	-
2008	0.5	1.5	8.4	-	0.0	0.8	1.3	0.0	0.0	-
2013	0.4	6.4	5.6	0.0	-	1.1	4.6	0.0	0.0	-
2018	0.9	2.3	9.8	-	-	0.5	4.2	0.0	-	-
2023	0.3	5.9	7.7	-	0.0	1.4	15.2	-	-	-

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

**Table 24-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Astragalus lentiginosus (freckled milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Chamaesyce (sandmat)	Chenopodium <sup>a</sup> (goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency												
1997	-	-	27	-	4	42	-	-	25	-	-	7	2
2003	4	-	-	-	-	1	23	-	-	14	5	7	-
2008	2	12	14	-	3	10	30	1	3	-	39	4	4
2013	-	-	-	2	6	12	-	-	-	-	-	11	-
2018	-	6	6	-	-	10	2	-	-	-	-	9	-
2023	-	2	1	-	4	12	25	4	7	72	5	14	-
year	Average Cover (%)												
1997	-	-	0.1	-	0.0	0.6	-	-	0.3	-	-	0.0	0.0
2003	0.0	-	-	-	-	0.0	0.1	-	-	0.1	0.0	0.0	-
2008	0.0	0.3	0.1	-	0.0	0.1	0.1	0.0	0.0	-	0.2	0.0	0.0
2013	-	-	-	0.0	0.0	0.1	-	-	-	-	-	0.2	-
2018	-	0.1	0.4	-	-	0.0	0.0	-	-	-	-	0.0	-
2023	-	0.0	0.0	-	0.0	0.5	0.5	0.0	0.0	0.2	0.0	0.1	-

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

**Table 24-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)					
1997	-	-	-	-	-	-
2003	6.3	0.4	-	0.2	-	9.3
2008	10.9	0	-	-	-	10.5
2013	8.2	0.2	-	-	-	6.2
2018	8	0.3	-	-	-	6.7
2023	7.8	2	-	0.1	-	8.6
year	Quadrat Cover (%)					
1997	6.5	0.0	-	0.0	-	6.0
2003	7.1	0.6	-	0.0	-	5.2
2008	3.2	0.1	-	-	0.0	4.1
2013	5.3	0.2	-	0.0	0.0	0.6
2018	5.9	0.4	-	0.1	-	3.3
2023	9.1	1.5	0.0	0.1	0.0	1.9

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

**Table 24-07.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1997	2280	40	8	58	34	28	3	21	58/78
2003	1920	-	1	40	59	35	5	32	58/78
2008	1420	80	3	28	69	37	11	42	53/78
2013	1800	340	32	58	10	30	21	16	61/91
2018	2100	-	17	72	11	10	6	8	54/76
2023	1680	-	0	82	18	13	1	18	- / -
<b>Echinocereus -- (hedgehog cactus)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	23/42
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	220	-	9	91	0	0	0	0	21/21
2003	1800	-	43	57	0	0	0	0	19/19
2008	940	140	21	79	0	0	2	0	15/14
2013	700	-	14	86	0	0	0	3	15/20
2018	980	-	4	67	29	0	0	22	9/10
2023	2100	20	0	99	1	0	0	1	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1997	20	-	100	0	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	20	-	100	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1997	40	-	0	100	0	0	0	0	13/26
2003	80	-	0	100	0	0	0	0	9/30
2008	-	-	-	-	-	-	-	-	12/31
2013	40	-	50	50	0	0	0	0	10/31
2018	80	-	0	100	0	0	0	0	9/24
2023	120	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	7/32
2008	20	-	0	100	0	0	0	0	- / -
2013	80	-	50	50	0	0	0	0	2/5
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
1997	60	-	33	67	0	0	0	0	- / -
2003	80	20	75	25	0	0	0	0	- / -
2008	40	20	50	50	0	0	0	0	- / -
2013	80	-	75	25	0	0	25	25	- / -
2018	40	-	100	0	0	0	0	0	- / -
2023	60	-	33	67	0	0	0	0	- / -
<b>Sclerocactus -- (fishhook cactus)</b>									
1997	-	-	-	-	-	-	-	-	7/27
2003	-	-	-	-	-	-	-	-	- / -
2008	-	20	0	0	0	0	0	0	10/31

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

**Table 24-07.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

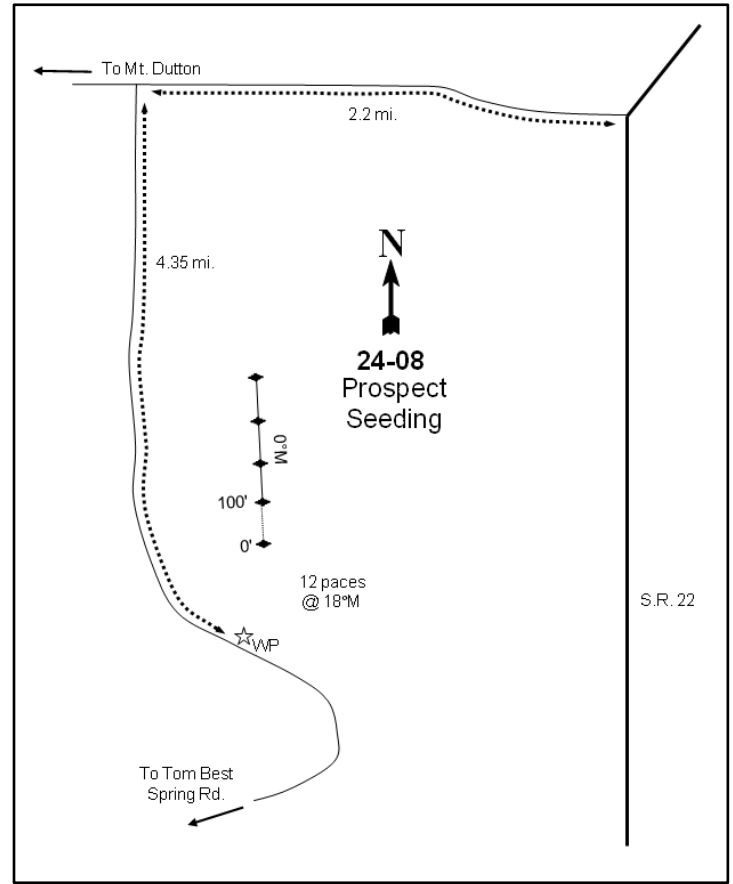
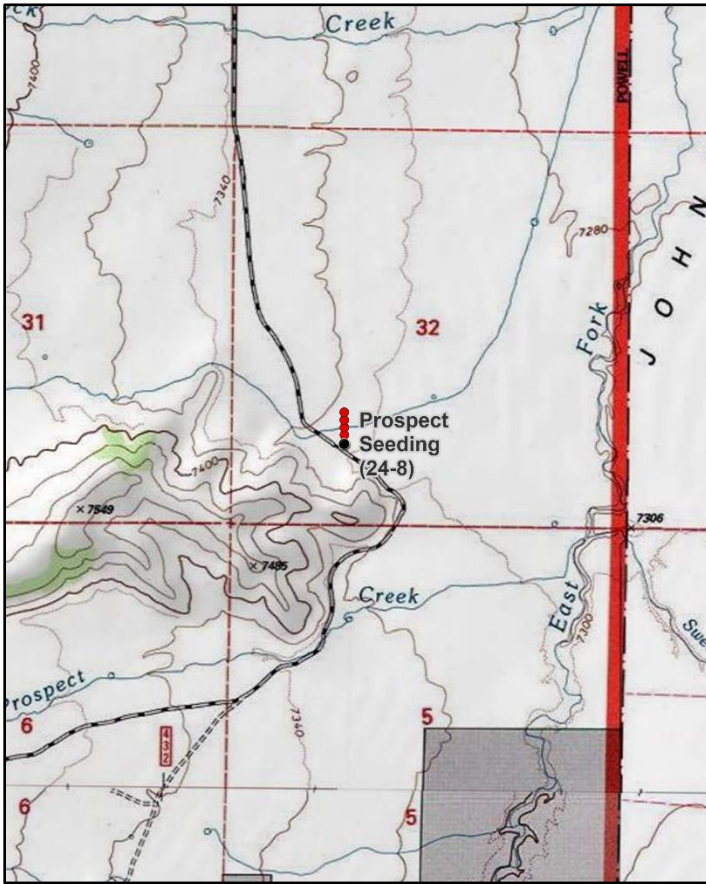
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2003	38	20	67	7	-	7	8.3
2008	46	7	57	21	-	14	8.8
2013	16	-	100	-	-	-	2.3
2018	16	22	78	-	-	-	3.9
2023	10	13	38	50	-	-	3.3
<b>Pinus edulis (twoneedle pinyon)</b>							
2003	23	-	40	20	7	33	16.1
2008	25	-	47	13	7	33	13.7
2013	12	-	75	13	-	13	8.8
2018	32	36	55	9	-	-	2.5
2023	19	30	40	30	-	-	2.5

**Table 24-07.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	8.2	4.8	4.0	22.9	0.0	1.4	0.0	<b>41.2</b>	Poor
2003	7.9	-2.8	0.5	24.7	0.0	0.1	0.0	<b>30.4</b>	Very Poor
2008	13.6	-5.7	1.4	24.8	0.0	1.2	0.0	<b>35.3</b>	Very Poor-Poor
2013	10.3	12.0	15.0	30.0	0.0	0.6	0.0	<b>67.9</b>	Good
2018	10.0	11.9	8.6	30.0	0.0	1.0	0.0	<b>61.4</b>	Fair
2023	9.8	9.6	0.0	30.0	0.0	1.3	0.0	<b>50.6</b>	Poor-Fair



## PROSPECT SEEDING - STUDY NO. 24-8



### Location Information

USGS 7.5 min Map Info      Cow Creek SE; Township 33S, Range 2W, Section 32  
 GPS (0' Stake)              NAD 83 UTM ZONE 12, 409060 East 4193851 North

### Transect Information

Browse Tag # (0' Stake)      617  
 Transect Bearing              348° magnetic  
 Length                          400ft  
 Belt Placement                Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
 Belt Marker Placement      Standard

### Directions to Site

From SR-22, turn towards Cottonwood Creek (west onto the Mt. Dutton Loop road) and travel about 2.2 miles to a major fork. Turn south towards Tom Best Spring (Cottonwood AS is to the right/north) and drive 0.3 miles to the U.S. Forest Service boundary fence. Cross the cattle guard and continue on the main road for 4.35 miles. The study area here is marked by a 4-foot tall green fencepost, and is north of the road in a sagebrush-grass flat. The transect is marked by 1-foot tall fence posts, and the 0-foot stake has browse tag #617 attached.

### Site Information

Land Ownership                Federal  
 Land Administrator          USFS  
 Allotment                      Widtsoe C&H  
 Elevation                      7,310ft (2,228m)  
 Aspect                          Flat  
 Slope                            0-3%  
 Sample Dates                 08/14/1997, 07/22/2003, 08/11/2008, 07/18/2013, 07/02/2018, 06/27/2023

**Table 24-08.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Disc - Disc Unknown	-	-	1968	-
Seeding - Seed Unknown	-	-	1968	-

**Wildlife Habitat and Vegetation History****Table 24-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24-08.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Wyoming Big Sagebrush/Perennial Grass	No Encroachment
1991	Wyoming Big Sagebrush/Perennial Grass	No Encroachment
1997	Wyoming Big Sagebrush/Perennial Grass	No Encroachment
2003	Perennial Grass	No Encroachment
2008	Perennial Grass	No Encroachment
2013	Perennial Grass	No Encroachment
2018	Perennial Grass	No Encroachment
2023	Perennial Grass	No Encroachment

**Site Notes**

The nearest water sources for wildlife are Prospect Creek at one-quarter mile and the East Fork of the Sevier River at three-quarters of a mile away. Pronghorn can be found year-long on the site. Due to the difficulty of distinguishing pronghorn pellets from deer pellets, pronghorn pellet groups have been added to the deer pellet group count.

**Soils****Table 24-08.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.2	54.4	30.1	15.6	1.8	0.7	921.6	0.6	08/14/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation                      11 inches  
 NRCS Ecological Site    Semidesert Gravelly Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site #    R047XB214UT  
 States and Transitions    No state and transition model is available for this ecological site.

Since the establishment of the study in 1987, the dominant browse species has been Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and the herbaceous understory has been mainly composed of the introduced perennial grass crested wheatgrass (*Agropyron cristatum*). In 2003, however, mortality of sagebrush plants increased and crested wheatgrass decreased significantly in cover and frequency, likely due to drought. The decrease in sagebrush caused the site to transition to a perennial grass community in 2003. Sagebrush has remained a minor vegetation component even though cover has increased since 2003. However, demographic data indicates an increase in total sagebrush density occurred between 2018 and 2023 with a significant increase in the recruitment of young plants (Photos, Pre-1992 Data, Table 24-08.12, Table 24-08.13). Perennial grasses -- particularly crested wheatgrass -- have exhibited an overall increase in cover and abundance since 2003, and forbs have remained rare (Table 24-08.7, Table 24-08.10, Table 24-08.11).

Deer winter range conditions on this site have ranged between very poor and fair since 1997; condition of deer wintering range was considered to be fair in 2023. Improvements to winter habitat could be achieved through efforts that increase preferred browse cover and reproduction while decreasing decadence. Diversifying and increasing cover of the perennial forb component would also be beneficial for deer winter range (Table 24-08.15). However, pellet transect data shows that deer presence has remained low since 1997, and no pellet groups were observed in 2023 (Table 24-08.9).

**Trend Summary Tables****Table 24-08.6 - 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
1997	2.8	-	-	-	-	-
2003	0.9	-	-	0.1	-	-
2008	1.7	0.3	-	1.8	0.5	-
2013	1.5	0.7	-	2.6	0.9	-
2018	1.3	0.7	-	2.5	0.8	-
2023	1.6	0.1	-	3.6	-	-

**Table 24-08.7 - 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
1997	-	295	37	1	-	12.2	0.3	0.0
2003	-	175	5	1	-	3.5	0.2	0.0
2008	-	289	53	4	-	16.2	0.4	0.0
2013	-	300	9	-	-	11.6	0.0	-
2018	-	334	-	-	-	17.2	-	-
2023	-	316	15	-	-	22.3	0.3	-

**Table 24-08.8 - 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
1997	46.6	0.5	13.5	11.4	0.1	15.6
2003	62.8	0.0	22.1	15.1	0.1	4.5
2008	50.9	-	24.3	13.4	0.1	19.8
2013	60.9	0.0	12.9	10.4	0.6	14.7
2018	58.7	0.0	24.3	11.6	0.3	18.1
2023	51.8	0.0	16.5	21.1	0.7	24.6

**Table 24-08.9 - 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	Greater Sage-Grouse	Rabbit	Domestic Sheep
	Quadrat Frequency					
1997	8	12	21	-	37	1
2003	15	3	9	-	52	-
2008	7	1	-	-	98	-
2013	8	7	-	1	18	-
2018	7	1	-	-	66	-
2023	10	-	3	-	9	-
Year	Days Use Per Acre (ha)					
1997	-	-	-	-	-	-
2003	26.8 (66.3)	4.7 (11.6)	13.4 (33.1)	-	-	-
2008	41.4 (102.2)	1.3 (3.3)	2.7 (6.6)	-	-	-
2013	23.2 (57.4)	6.0 (14.9)	-	-	-	-
2018	7.2 (17.9)	-	0.7 (1.7)	-	-	-
2023	21.8 (53.8)	0.7 (1.7)	-	-	-	-

**Table 24-08.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)
year	Nested Frequency		
1997	295	-	-
2003	163	-	20
2008	246	10	48
2013	300	5	3
2018	328	-	13
2023	289	3	40
year	Average Cover (%)		
1997	12.2	-	-
2003	2.7	-	0.7
2008	12.4	0.0	3.8
2013	11.4	0.0	0.2
2018	17.0	-	0.2
2023	18.2	0.0	4.2

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

**Table 24-08.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Chamaesyce (sandmat)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Packera multilobata (lobeleaf groundsel)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)
year	Nested Frequency					
1997	-	37	1	-	-	-
2003	-	3	-	2	1	-
2008	4	25	-	8	-	22
2013	-	9	-	-	-	-
2018	-	-	-	-	-	-
2023	-	15	-	-	-	-
year	Average Cover (%)					
1997	-	0.3	0.0	-	-	-
2003	-	0.2	-	0.0	0.0	-
2008	0.0	0.1	-	0.0	-	0.3
2013	-	0.0	-	-	-	-
2018	-	-	-	-	-	-
2023	-	0.3	-	-	-	-

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

**Table 24-08.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover		
	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Ericameria nauseosa ssp. consimilis (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover		
1997	-	-	-
2003	0.1	-	-
2008	1.8	0.5	-
2013	2.6	0.9	-
2018	2.5	0.8	-
2023	3.6	-	-
year	Quadrat Cover (%)		
1997	2.8	-	-
2003	0.9	-	-
2008	1.7	0.3	-
2013	1.5	0.7	-
2018	1.3	0.7	-
2023	1.6	-	0.1

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

**Table 24-08.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

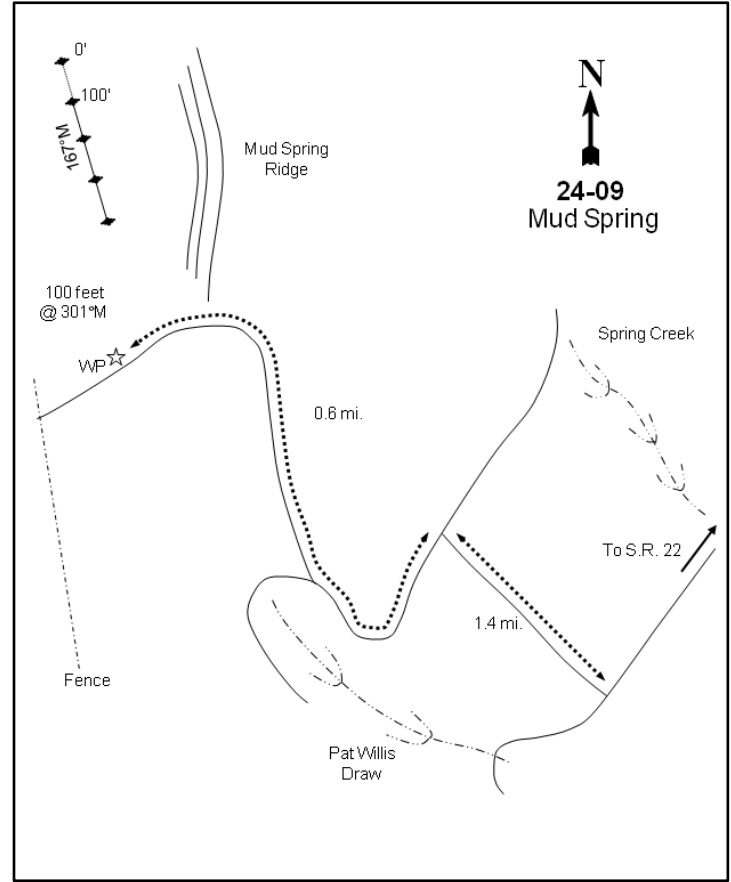
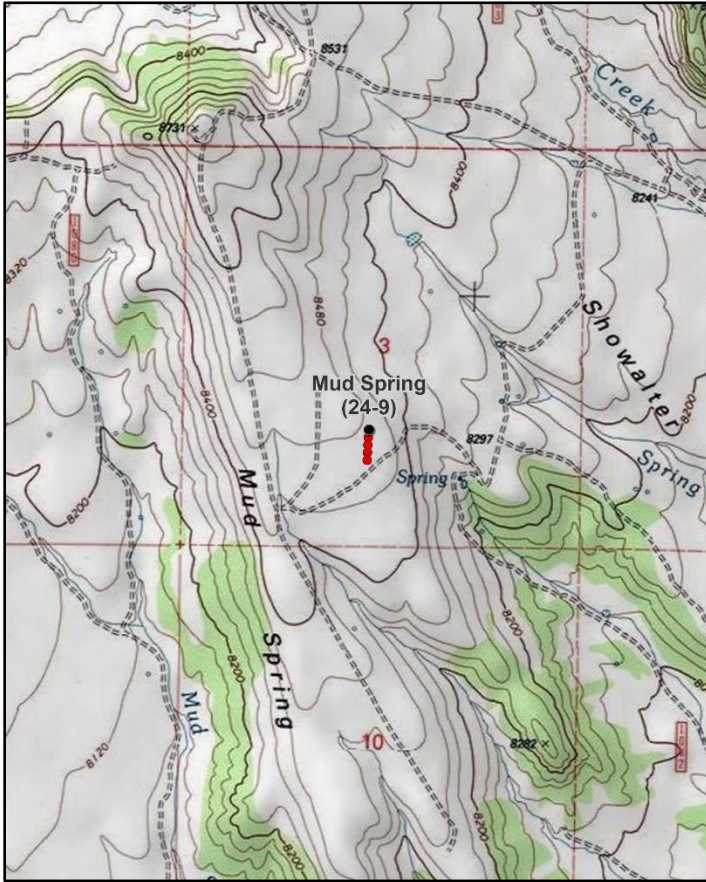
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
1997	2280	40	8	57	35	40	4	22	35/45
2003	480	-	4	4	92	50	0	88	39/61
2008	1200	120	17	55	28	7	0	18	32/42
2013	860	140	2	98	0	44	33	2	35/50
2018	620	-	3	65	32	29	23	29	38/58
2023	3460	520	37	62	1	4	3	1	- / -
<b>Ericameria nauseosa ssp. consimilis -- (rubber rabbitbrush)</b>									
1997	20	-	0	100	0	100	0	0	- / -
2003	40	-	0	50	50	50	50	0	27/28
2008	80	-	0	100	0	50	0	0	37/40
2013	60	-	0	100	0	33	0	0	51/73
2018	40	-	0	100	0	0	0	0	44/66

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

**Table 24-08.15 - Deer Desirable Components Index: Semidesert Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	3.5	0.0	0.0	24.4	0.0	0.0	0.0	<b>27.9</b>	Fair
2003	0.1	0.0	0.0	7.0	0.0	0.0	0.0	<b>7.1</b>	Very Poor
2008	2.3	0.0	0.0	30.0	0.0	0.0	0.0	<b>32.3</b>	Fair
2013	3.3	0.0	0.0	23.2	0.0	0.0	0.0	<b>26.5</b>	Poor-Fair
2018	3.1	0.0	0.0	30.0	0.0	0.0	0.0	<b>33.1</b>	Fair
2023	4.5	0.0	0.0	30.0	0.0	0.0	0.0	<b>34.5</b>	Fair

## MUD SPRING - STUDY NO. 24-9



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Flake Mountain West ; Township 35S, Range 4W, Section 03  
NAD 83 UTM ZONE 12, 393113 East 4182844 North

### Transect Information

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

Not Available  
167° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt 2: 1ft

### Directions to Site

From SR-22 about 1.5 miles south of Widtsoe Junction, turn west onto the road leading to Tom Best Spring and Highway 12. Proceed 4.2 miles to the U.S. Forest Service boundary, then continue on the main road for 5.3 miles to an intersection at Showalter Creek. Continue on the main road for 1 mile to a faint road on the right. Turn right and go up towards Mud Spring Ridge 1.4 miles to a T-intersection. Turn left and travel 0.6 miles up a faint, rough road to the top of the ridge and a witness post on the right (north) side of the road identifying the study area. The 400-foot stake is 100 feet northwest of the witness post. The start of the transect is 400 feet north and runs back south towards the road. Study markers are 1-foot tall fence posts; there is no browse tag.

### Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	East Pines C&H
Elevation	8,470ft (2,582m)
Aspect	Southeast
Slope	3-5%
Sample Dates	08/07/1997, 07/22/2003, 07/07/2008, 07/18/2013, 07/09/2018, 07/05/2023

**Table 24-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Lop and Scatter - Hand Crew	Powell - Mud Springs Phase I	4635	May-July 2019	7161
Harrow - One-Way Dixie	Sevier Plateau Dixie Harrow	461	Fall 2006	500
Seeding - Seed Unknown	Sevier Plateau Dixie Harrow	461	Fall 2006	500

**Table 24-09.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Sevier Plateau Sagebrush			Broadcast	Jul 2006	4118
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Wheatgrass	Rimrock	0.13	0.12
G	Elymus trachycaulus	Slender Wheatgrass	San Luis	0.21	0.20
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	0.21	0.18
F	Achillea millefolium	Western Yarrow		0.03	0.03
F	Achillea millefolium	Western Yarrow	SID Columbia	0.04	0.04
F	Heliomeris multiflora	Showy Goldeneye	Sanpete UT	0.01	0.01
F	Sanguisorba minor	Small Burnet	Delar	0.26	0.24
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Iron UT	0.01	0.00
S	Krascheninnikovia lanata	Winterfat	Bevaver UT	0.10	0.04

**Wildlife Habitat and Vegetation History****Table 24-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24-09.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Black Sagebrush	No Encroachment
1991	Black Sagebrush	No Encroachment
1997	Black Sagebrush	No Encroachment
2003	Black Sagebrush	No Encroachment
2008	Black Sagebrush	No Encroachment
2013	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I
2023	Black Sagebrush	No Encroachment

**Site Notes**

Pronghorn may be present in the area year-round. Due to the difficulties in distinguishing between pronghorn and deer pellet groups, pronghorn pellet groups have been included in the deer pellet group counts. Sage-grouse feathers were observed on the site in 2013.

**Soils****Table 24-09.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.1	48.7	25.4	25.8	2.7	1.9	275.2	0.5	08/07/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Upland Gravelly Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB306UT
States and Transitions	No state and transition model is available for this ecological site.

This site has remained in a stable state since study establishment in 1987 with black sagebrush (*Artemisia nova*) as the dominant shrub species (Photos, Pre-1992 Data, Table 24-09.12, Table 24-09.13). The herbaceous understory has been diverse and abundant, with the perennial grass muttongrass (*Poa fendleriana*) contributing the most cover of any single herbaceous species in 2018 and 2023. Perennial forbs have remained moderately abundant, introduced annual grasses have been absent, and annual forb cover has been limited throughout the duration of the study (Table 24-09.7, Table 24-09.10, Table 24-09.11). Rocky Mountain juniper (*Juniperus scopulorum*) was observed in 2013 and 2018, placing the site within Phase I of woodland succession (Photos, Table 24-09.4). However, a 2019 lop and scatter treatment removed all of the trees (Table 24-09.1), and no encroachment was occurring during the 2023 sample year.

Due to the diverse and abundant shrub and herbaceous components, this site likely serves as adequate summering habitat for deer. However, this site may also serve as foraging range for deer during mild winters due to the substantial cover of preferred browse. In addition, the sagebrush component of this site could provide valuable browse for elk during the winter months, while the herbaceous understory could provide forage during the summer (Table 24-09.3; Beck and Peek, 2005; Wambolt 1996). Pellet transect data indicates, however, that elk presence has remained low since 2008; mule deer presence was moderate in 2023 (Table 24-09.9).

**Trend Summary Tables****Table 24-09.6 - 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
1997	17.1	2.0	-	-	-	-
2003	26.3	3.0	-	22.1	1.2	-
2008	13.7	4.7	-	15.3	4.4	-
2013	19.3	2.3	-	27.1	3.2	-
2018	22.7	7.0	-	24.5	5.6	-
2023	24.6	6.8	-	27.6	7.9	-

**Table 24-09.7 - 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
1997	-	358	28	308	-	13.5	0.1	6.8
2003	-	367	26	276	-	13.6	0.1	5.3
2008	-	333	34	300	-	16.9	0.2	10.4
2013	-	353	36	295	-	14.7	0.3	11.4
2018	-	373	10	238	-	27.2	0.0	6.2
2023	-	299	119	248	-	11.3	0.8	5.5

**Table 24-09.8 - 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
1997	22.7	0.1	30.5	6.8	8.1	28.8
2003	24.9	0.1	28.1	5.7	10.6	46.4
2008	24.4	-	27.7	5.3	10.4	43.3
2013	23.9	0.0	26.8	1.2	13.9	48.1
2018	31.1	0.0	36.3	5.1	13.2	48.5
2023	20.9	0.0	21.1	12.7	10.2	42.0



**Table 24-09.9 - 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	Greater Sage-Grouse	Horse	Rabbit
	Quadrat Frequency					
1997	8	22	34	-	-	8
2003	5	10	14	2	-	20
2008	3	7	2	7	-	92
2013	5	2	3	1	-	3
2018	2	23	11	9	-	31
2023	2	9	4	2	-	1
Year	Days Use Per Acre (ha)					
1997	-	-	-	-	-	-
2003	15.3 (37.7)	32.8 (81.1)	32.2 (79.5)	-	-	-
2008	0.7 (1.8)	6.7 (16.6)	8.1 (19.9)	104.5 (258.2)*	1.2 (2.9)	-
2013	16.0 (39.5)	3.4 (8.3)	15.4 (38.1)	26.2 (64.6)*	-	-
2018	2.2 (5.4)	36.2 (89.4)	16.1 (39.7)	26.2 (64.6)*	-	-
2023	8.7 (21.5)	28.8 (71.2)	10.7 (26.5)	43.6 (107.6)*	-	-

\*Pellets per acre (ha)

**Table 24-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bouteloua gracilis (blue grama)	Carex geyeri (Geyer's sedge)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency										
1997	242	-	22	89	34	8	44	6	174	49	-
2003	199	5	24	64	34	-	30	8	282	-	-
2008	121	7	28	72	39	-	76	36	227	24	-
2013	179	11	18	68	65	-	40	19	204	21	-
2018	89	11	22	86	42	-	12	8	322	-	0
2023	59	-	15	37	53	-	44	9	222	-	-
year	Average Cover (%)										
1997	5.2	-	0.1	2.2	0.2	0.2	0.9	0.2	3.3	1.3	-
2003	3.7	0.0	0.3	1.2	0.2	-	0.3	0.0	7.8	-	-
2008	2.2	0.1	0.8	1.1	0.6	-	3.1	0.4	8.6	0.2	-
2013	4.1	0.2	0.5	1.8	1.1	-	0.5	0.4	5.8	0.4	-
2018	2.3	0.5	1.2	3.1	1.1	-	0.1	0.1	18.8	-	0.0
2023	0.8	-	0.3	1.3	1.1	-	0.4	0.1	7.3	-	-

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

**Table 24-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis <sup>a</sup> (pygmy/flower rockjasmine)	Antennaria microphylla (littleaf pussytoes)	Arabis (rockcress)	Astragalus humistratus (groundcover milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Balsamorhiza hookeri (Hooker's balsamroot)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Cordylanthus <sup>a</sup> (bird's-beak)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	
year	Nested Frequency																	
1997	-	-	47	1	103	-	-	3	5	26	-	-	1	33	16	197	58	
2003	-	-	49	-	3	-	-	9	-	19	-	9	-	32	31	180	49	
2008	10	5	43	12	57	-	-	1	-	28	-	16	7	32	-	214	47	
2013	16	1	42	-	68	4	1	7	1	44	21	1	2	22	13	180	75	
2018	19	4	51	3	46	-	-	7	-	25	-	12	-	39	2	145	58	
2023	20	-	17	2	4	1	-	8	6	34	41	11	1	47	10	138	14	
year	Average Cover (%)																	
1997	-	-	1.3	0.0	0.7	-	-	0.0	0.0	0.4	-	-	0.0	0.2	0.1	1.4	0.6	
2003	-	-	0.7	-	0.0	-	-	0.0	-	0.3	-	0.1	-	0.2	0.3	1.7	0.7	
2008	0.2	0.0	0.8	0.0	0.5	-	-	0.0	-	1.3	-	0.0	0.0	0.2	-	3.1	0.5	
2013	0.5	0.0	1.5	-	1.8	0.0	0.0	0.1	0.0	1.0	0.2	0.0	0.0	0.1	0.1	3.1	0.9	
2018	0.3	0.0	2.9	0.0	0.7	-	-	0.0	-	0.2	-	0.0	-	0.3	0.0	0.9	0.5	
2023	0.1	-	0.1	0.0	0.0	0.0	-	0.0	0.1	0.9	0.6	0.1	0.0	0.6	0.3	1.8	0.2	

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

FORB SPECIES	Galium boreale (northern bedstraw)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hymenopappus filifolius (fineleaf hymenopappus)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus pusillus <sup>a</sup> (rusty lupine)	Lupinus sericeus (silky lupine)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orthocarpus <sup>a</sup> (owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla diversifolia (varleaf cinquefoil)	Sphaeralcea coccinea (scarlet globemallow)	Symphyotrichum (aster)	
year	Nested Frequency																	
1997	5	-	-	1	1	-	54	2	2	21	5	20	16	24	10	12	3	
2003	-	7	2	-	22	-	29	-	19	53	-	11	5	-	9	4	1	
2008	-	6	-	-	80	15	18	-	11	42	9	55	8	2	4	7	-	
2013	-	2	2	6	65	10	16	-	-	23	13	23	4	3	8	5	3	
2018	-	3	-	-	11	3	3	-	-	10	6	9	1	-	-	6	-	
2023	-	45	-	-	33	3	2	-	-	29	7	27	11	43	3	3	-	
year	Average Cover (%)																	
1997	0.0	-	-	0.0	0.0	-	1.3	0.0	0.0	0.2	0.0	0.0	0.1	0.1	0.2	0.0	0.0	
2003	-	0.0	0.0	-	0.1	-	0.3	-	0.1	0.4	-	0.0	0.2	-	0.1	0.0	0.0	
2008	-	0.0	-	-	1.8	0.1	0.9	-	0.1	0.2	0.2	0.1	0.0	0.0	0.3	0.0	-	
2013	-	0.0	0.2	0.0	1.1	0.1	0.4	-	-	0.1	0.0	0.1	0.0	0.0	0.2	0.0	0.2	
2018	-	0.0	-	-	0.1	0.0	0.1	-	-	0.0	0.0	0.0	0.1	-	-	0.0	-	
2023	-	0.1	-	-	0.4	0.0	0.1	-	-	0.3	0.1	0.1	0.2	0.1	0.0	0.0	-	

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

FORB SPECIES		
	Taraxacum officinale (common dandelion)	Tetranervis acaulis (stemless four-nerve daisy)
year	Nested	
1997	3	6
2003	-	-
2008	-	7
2013	-	2
2018	-	2
2023	-	-
year	Average Cover (%)	
1997	0.0	0.0
2003	-	-
2008	-	0.0
2013	-	0.0
2018	-	0.0
2023	-	-

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

**Table 24-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES											
Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca <sup>p</sup> (rubber rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Linanthus pungens (granite prickly phlox)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)	
year	Line Intercept Cover (%)										
1997	-	-	-	-	-	-	-	-	-	-	-
2003	18	1.5	1.1	1	1.1	0.1	-	0.1	0.1	0.3	-
2008	14.2	0.9	-	3.9	-	0.3	-	0.2	0.2	-	0
2013	20.4	2	3.9	0.3	-	1.9	-	1	0.6	0.2	0
2018	20.9	2.3	-	4.3	-	0.5	0.2	0.6	0.9	0.4	0
2023	23.8	2.3	-	6.1	-	0.9	0.1	0.8	1.5	-	-
year	Quadrat Cover (%)										
1997	12.1	1.6	3.4	1.9	0.0	0.0	-	0.0	-	0.0	-
2003	20.9	1.7	2.6	2.0	0.9	0.4	-	0.4	0.0	0.0	0.1
2008	12.9	0.4	-	3.5	-	0.6	-	0.6	0.4	0.0	0.0
2013	13.8	2.6	2.5	0.1	-	1.3	-	0.8	0.4	0.0	0.0
2018	19.6	2.0	0.2	5.3	-	0.7	0.0	1.0	0.8	0.1	0.0
2023	21.9	2.5	-	5.5	-	0.5	0.3	0.6	0.1	0.1	-

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

**Table 24-09.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1997	9920	480	14	69	17	4	0	12	32/50
2003	18820	80	12	75	13	3	0	4	32/45
2008	13780	4440	11	59	30	40	1	19	27/39
2013	10220	620	5	93	2	49	7	5	24/42
2018	12800	80	8	89	3	19	0	16	25/40
2023	10060	-	6	91	3	28	1	4	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1997	340	80	0	65	35	18	0	6	55/80
2003	460	-	4	78	17	61	0	4	60/81
2008	420	80	10	71	19	5	14	19	38/49
2013	860	20	9	91	0	49	14	2	29/46
2018	780	20	36	62	3	21	3	15	42/61
2023	280	-	7	86	7	36	7	7	- / -
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1997	3040	20	19	81	0	0	0	0	14/25
2003	3980	-	0	100	0	0	0	0	11/22
2008	440	20	18	59	23	9	5	0	10/20
2013	4000	120	4	97	0	1	0	0	13/27
2018	120	-	17	83	0	50	33	0	12/18
2023	20	-	0	100	0	0	0	0	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1997	1880	-	0	99	1	2	0	1	22/37
2003	2960	-	3	94	3	0	0	1	16/29
2008	7700	140	9	89	2	13	4	3	13/22
2013	200	-	40	60	0	0	0	0	26/35
2018	7680	40	7	93	0	29	4	13	13/25
2023	6540	-	12	88	0	1	0	0	- / -
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1997	180	-	56	44	0	0	0	0	18/25
2003	1280	-	0	95	5	8	0	2	12/25
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	40	-	0	100	0	0	100	0	- / -
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1997	80	-	25	75	0	0	0	0	22/25
2003	1480	-	1	99	0	18	26	0	14/20
2008	1360	-	6	91	3	10	3	2	15/21
2013	2840	-	1	99	0	1	0	0	18/26
2018	1680	20	1	99	0	46	21	0	13/17
2023	980	-	16	84	0	0	29	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	20	-	0	100	0	0	0	0	16/16
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	11/19
2018	120	-	0	100	0	0	0	0	12/14
2023	320	-	38	63	0	0	0	0	- / -

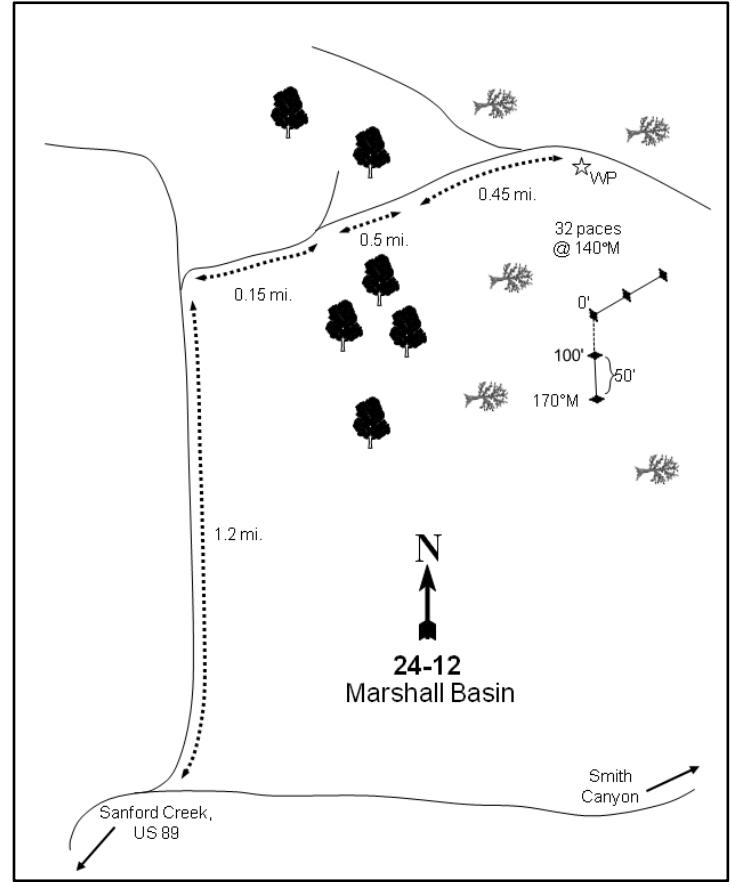
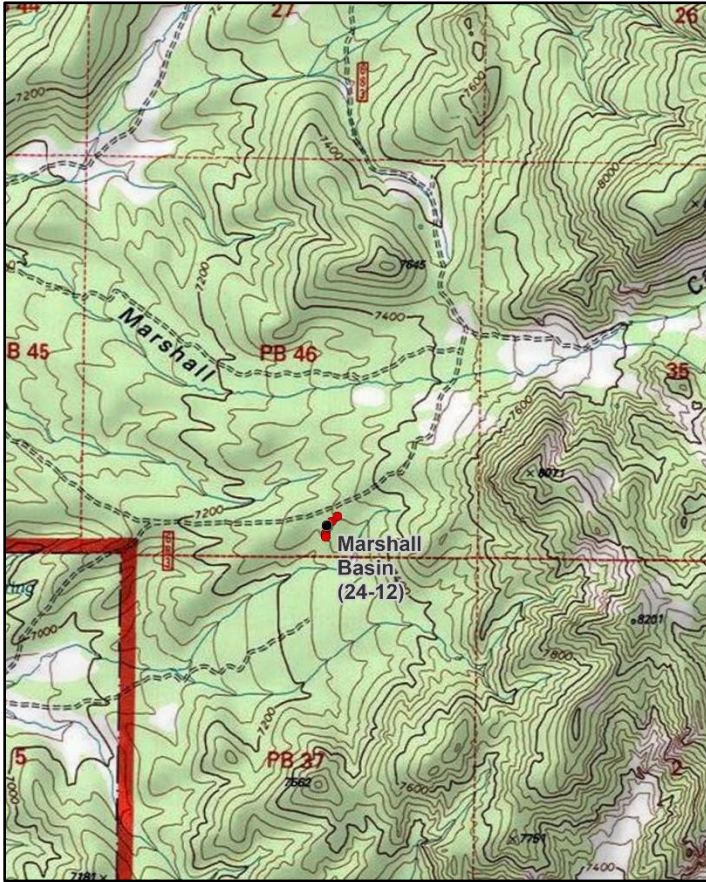
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1997	460	20	0	96	4	0	0	4	15/19
2003	880	-	0	89	11	0	0	5	15/18
2008	1120	180	5	88	7	7	0	2	10/14
2013	740	-	8	92	0	8	0	8	18/23
2018	700	-	9	91	0	3	17	29	15/19
2023	760	-	3	79	18	0	0	3	- / -
<b>Opuntia -- (pricklypear)</b>									
1997	-	-	-	-	-	-	-	-	4/13
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	9/16
2023	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	100	-	0	80	20	0	100	20	25/55
2008	60	20	33	67	0	0	0	0	29/41
2013	60	20	0	100	0	33	67	0	51/83
2018	160	-	0	100	0	13	88	0	40/107
2023	160	-	50	50	0	0	100	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1997	20	-	0	100	0	100	0	0	31/75
2003	40	-	0	100	0	0	0	0	25/60
2008	-	-	-	-	-	-	-	-	34/87
2013	40	-	0	100	0	0	0	0	43/65
2018	100	-	20	60	20	20	20	40	28/39
2023	40	-	0	100	0	100	0	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1997	20	-	100	0	0	0	0	0	- / -
2003	80	-	0	100	0	0	0	0	18/24
2008	20	-	0	0	100	0	0	100	23/15
2013	20	-	0	100	0	100	0	0	28/35
2018	20	-	0	100	0	0	0	0	27/30
2023	20	-	0	100	0	0	0	0	- / -

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

**Table 24-09.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	7	-	-	100	-	-	7.0

## MARSHALL BASIN - STUDY NO. 24-12

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Blind Spring Mountain; Township 32S, Range 4W, Section 34  
NAD 83 UTM ZONE 12, 383992 East 4204402 North

**Transect Information**

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

9003  
170° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

About 8 miles north of Panguitch on Highway 89 (or 1.7 miles south of the SR-20 and Highway 89 junction), turn east onto Sanford Creek Road. Travel 4 miles east on the main road to a fork, then bear left towards Smith Canyon. Proceed for 1.5 miles to a fork just below the mouth of Smith Canyon and turn left. Continue 1.2 miles to a fork. Stay left, continue onto a jeep trail, and go 0.15 miles to another fork. Stay right and continue 0.5 miles to the edge of a chaining. Drive east for 0.45 miles into the chaining to the study area; the witness post is on the right (south) side of road. From the witness post walk 32 paces at 140 degrees magnetic to the 0-foot stake which is marked by browse tag #9003.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Deer Creek S&G
Elevation	7,290ft (2,222m)
Aspect	Southwest
Slope	8-13%
Sample Dates	08/13/1997, 07/10/2003, 07/09/2008, 07/15/2013, 06/19/2018, 06/20/2023

**Table 24-12.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Fall 1984	900
Seeding - Seed Unknown	-	-	Fall 1984	900
Fire - Wildfire	-	-	1996	-

**Wildlife Habitat and Vegetation History****Table 24-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24-12.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Perennial Grass	Phase I
1991	Perennial Grass	Phase I
1997	Perennial Grass	Phase I
2003	Perennial Grass/Rubber Rabbitbrush	Phase I
2008	Perennial Grass/Rubber Rabbitbrush	Phase I
2013	Perennial Grass/Rubber Rabbitbrush	Phase I
2018	Perennial Grass/Rubber Rabbitbrush	Phase I
2023	Perennial Grass/Rubber Rabbitbrush	Phase I

**Site Notes**

Cover for wildlife is provided by nearby wooded slopes located above the chaining and in draws that traverse the area. The site partially burned in 1996, but the fire only affected belt four.

**Soils****Table 24-12.5 - 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	4.6	57.3	24.1	18.6	2.0	24.6	188.8	0.5	08/11/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation                      13 inches  
 NRCS Ecological Site    Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)  
 NRCS Ecological Site #    R047XB308UT  
 States and Transitions    No state and transition model is available for this ecological site.

Upon study establishment in 1987, this site was dominated by a mixed perennial grass community of squirreltail (*Elymus elymoides*), blue grama (*Bouteloua gracilis*), and crested wheatgrass (*Agropyron cristatum*). In 1997, the community transitioned from a heterogeneous perennial grass community to a more homogeneous structure composed mainly of crested wheatgrass. Introduced annual grass and forb species have had a limited presence in the understory, as have perennial forbs (Pre-1992 Data, Table 24-12.7, Table 24-12.10, Table 24-12.11). Rubber rabbitbrush (*Ericameria nauseosa* ssp. *nauseosa* var. *hololeuca*) has increased overall in density since 1997. Cover of rubber rabbitbrush has also increased marginally between the two most recent samplings, but remained low in 2023 (Table 24-12.12, Table 24-12.13); rubber rabbitbrush has been a codominant site component since 2003. Without further disturbance, it is possible that rabbitbrush will increase and become the dominant vegetation component. Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been observed in the area (Photos, Table 24-12.14). Although the study site was in Phase I of woodland succession as of 2023 (Table 24-12.4), the presence of trees indicates that there may be potential for further encroachment over time.

Deer winter range condition on this site has ranged between very poor and poor since 1997. As of 2023, condition of deer winter range was considered to be very poor to poor. Improvements to wintering habitat could be achieved through efforts that increase preferred browse cover and reproduction while decreasing decadence within the population. Diversifying and increasing cover of perennial forbs while removing cheatgrass would also be beneficial for deer winter range (Table 24-12.15). Pellet transect data shows that mule deer presence has remained low since 1997, while elk presence was high in 2018 and 2023 (Table 24-12.9). The perennial grass component of this site could provide forage for elk during the summer. Improvements to elk range could be accomplished by increasing sagebrush for use during the winter and increasing cover of perennial forbs to provide additional summer forage (Table 24-12.3; Beck and Peek, 2005; Wambolt 1996).

## Trend Summary Tables

**Table 24-12.6 - 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
1997	0.3	0.6	1.0	-	-	-
2003	2.1	0.3	-	3.4	-	0.1
2008	1.8	1.1	-	2.1	1.4	-
2013	2.4	0.1	-	2.3	0.2	-
2018	1.3	0.3	-	2.0	0.1	-
2023	3.2	0.2	-	4.3	0.1	-

**Table 24-12.7 - 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
1997	95	265	4	12	1.5	11.7	0.0	0.1
2003	4	192	59	2	0.0	8.1	1.9	0.0
2008	7	240	39	14	0.0	8.6	0.7	0.2
2013	6	342	11	11	0.0	18.0	0.0	0.1
2018	-	345	4	-	-	26.3	0.0	-
2023	12	327	74	14	0.1	29.4	0.7	0.0

**Table 24-12.8 - 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
1997	21.3	0.1	40.9	18.1	2.7	16.1
2003	30.2	-	39.1	18.8	6.1	12.9
2008	20.4	-	36.7	32.3	6.0	11.7
2013	28.2	0.0	33.5	18.5	10.1	19.7
2018	31.6	0.2	41.1	18.6	5.0	27.7
2023	9.9	0.1	28.5	28.2	6.5	32.3

**Table 24-12.9 - 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			
1997	-	21	20	8
2003	-	9	15	42
2008	-	6	8	96
2013	5	18	19	33
2018	1	13	33	56
2023	-	14	17	6
Year	Days Use Per Acre (ha)			
1997	-	-	-	-
2003	2.2 (5.4)	1.3 (3.3)	16.1 (39.7)	-
2008	2.2 (5.4)	1.3 (3.3)	7.4 (18.2)	-
2013	11.6 (28.7)	7.4 (18.2)	32.2 (79.5)	-
2018	-	8.1 (19.9)	51.6 (127.5)	-
2023	1.5 (3.6)	13.4 (33.1)	45.6 (112.6)	-



**Table 24-12.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency									
1997	1	252	18	95	3	-	-	-	-	8
2003	-	182	10	4	2	-	-	-	-	3
2008	10	225	7	7	11	6	-	4	-	12
2013	7	331	16	6	1	1	-	-	-	4
2018	26	330	18	-	1	-	0	-	-	1
2023	8	321	26	12	-	-	5	-	5	8
year	Average Cover (%)									
1997	0.0	11.4	0.2	1.5	0.0	-	-	-	-	0.1
2003	-	7.8	0.2	0.0	0.0	-	-	-	-	0.0
2008	0.3	7.4	0.3	0.0	0.3	0.0	-	0.0	-	0.2
2013	0.6	17.0	0.3	0.0	0.0	0.0	-	-	-	0.0
2018	1.1	24.4	0.8	-	0.0	-	0.0	-	-	0.0
2023	0.7	28.1	0.2	0.1	-	-	0.3	-	0.0	0.0

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

**Table 24-12.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Chenopodium fremontii <sup>ai</sup> (Fremont's goosefoot)	Cryptantha fulvocanescens (tawny cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>ai</sup> (flatspine stickseed)	Nicotiana attenuata <sup>a</sup> (coyote tobacco)	Phlox longifolia (longleaf phlox)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)
year	Nested Frequency									
1997	-	2	11	2	1	-	-	-	1	-
2003	-	12	2	-	-	-	-	55	-	-
2008	7	9	7	2	-	1	16	0	-	20
2013	-	5	10	3	-	-	3	-	1	-
2018	-	-	-	-	-	-	1	-	-	3
2023	10	-	4	11	-	-	66	-	-	-
year	Average Cover (%)									
1997	-	0.0	0.1	0.0	0.0	-	-	-	0.0	-
2003	-	0.1	0.0	-	-	-	-	1.8	-	-
2008	0.1	0.1	0.2	0.0	-	0.1	0.2	0.0	-	0.2
2013	-	0.0	0.1	0.0	-	-	0.0	-	0.0	-
2018	-	-	-	-	-	-	0.0	-	-	0.0
2023	0.0	-	0.0	0.0	-	-	0.6	-	-	-

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

**Table 24-12.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia pygmaea (pygmy sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca <sup>p</sup> (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)									
1997	-	-	-	-	-	-	-	-	-	-
2003	-	-	0.5	-	-	2.9	-	-	-	0.1
2008	-	-	-	-	0.5	2.1	0.9	-	-	-
2013	-	-	-	-	0.1	2.3	0.1	-	0	-
2018	-	-	-	-	-	2	0.1	-	-	-
2023	0.3	-	-	0.1	-	4	-	-	-	-
year	Quadrat Cover (%)									
1997	-	0.2	-	-	-	0.3	0.2	0.8	0.2	0.1
2003	-	-	0.1	-	-	1.9	0.2	-	0.1	0.0
2008	-	-	-	0.0	0.4	1.8	0.6	-	0.0	-
2013	-	-	-	-	0.0	2.4	0.1	-	0.0	-
2018	-	-	0.0	-	-	1.2	0.1	-	0.2	-
2023	0.0	-	-	0.2	-	3.2	0.0	-	-	-

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

**Table 24-12.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	44/107
2018	-	-	-	-	-	-	-	-	36/78
2023	20	-	0	100	0	100	0	0	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1997	20	-	0	100	0	0	0	0	-/-
2003	20	-	0	0	100	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	80/95
2013	-	-	-	-	-	-	-	-	29/36
2018	40	-	0	100	0	0	0	0	36/51
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1997	-	-	-	-	-	-	-	-	32/50
2003	-	-	-	-	-	-	-	-	-/-
2008	20	40	0	100	0	0	0	0	41/41
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	61/88
2023	60	-	0	67	33	0	0	33	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	60	200	0	100	0	0	0	0	89/131
2013	20	-	0	0	100	0	100	0	100/155
2018	-	-	-	-	-	-	-	-	61/131
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
1997	220	-	46	46	9	0	0	9	75/108
2003	340	-	0	94	6	6	0	0	75/116
2008	480	1560	58	38	4	0	0	4	89/131
2013	700	20	20	63	17	17	14	14	76/114
2018	400	-	10	70	20	20	0	0	79/111
2023	320	-	0	19	81	19	19	81	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	200	-	0	100	0	0	0	0	21/34
2003	160	280	75	25	0	0	0	0	15/13
2008	1080	60	0	98	2	0	0	2	19/23
2013	280	-	71	29	0	0	0	0	24/35
2018	460	-	35	56	9	0	0	13	13/16
2023	620	140	94	7	0	0	0	0	-/-
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
1997	20	-	100	0	0	0	0	0	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1997	120	-	17	83	0	0	0	0	9/32
2003	40	-	0	100	0	0	0	0	12/31
2008	80	20	0	100	0	0	0	0	11/23
2013	60	-	0	100	0	0	0	0	14/54
2018	140	-	14	86	0	0	0	14	11/17
2023	40	-	0	100	0	0	0	0	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1997	60	20	100	0	0	0	0	0	-/-
2003	20	-	100	0	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1997	20	-	100	0	0	100	0	0	46/101
2003	20	-	0	0	100	0	0	100	57/153
2008	20	-	0	100	0	100	0	0	48/90
2013	20	-	100	0	0	0	0	0	69/153
2018	-	-	-	-	-	-	-	-	82/174

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

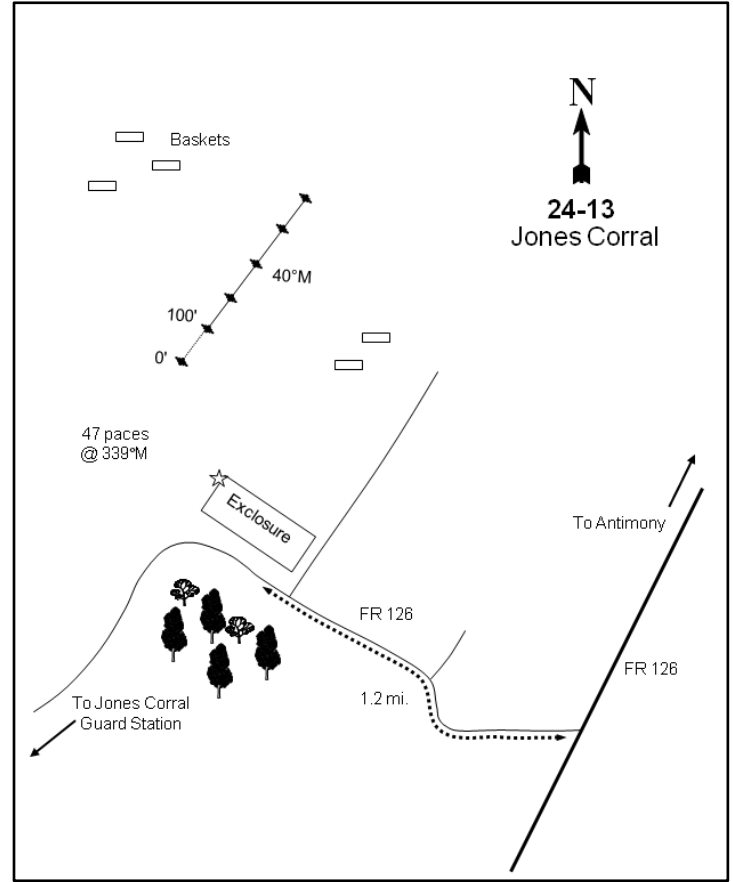
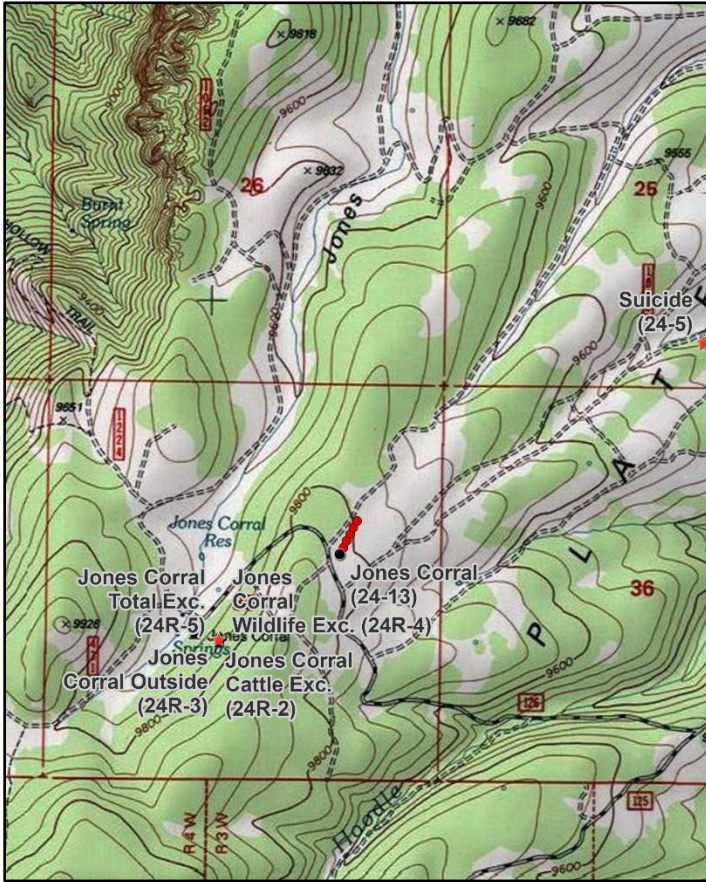
**Table 24-12.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Pinus edulis (twoneedle pinyon)							
2023	4	-	100	-	-	-	3.0

**Table 24-12.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	0.4	0.0	0.0	23.5	-1.1	0.1	0.0	<b>22.9</b>	Very Poor
2003	4.3	0.0	0.0	16.1	0.0	0.0	0.0	<b>20.3</b>	Very Poor
2008	2.6	0.0	0.0	17.1	0.0	0.5	0.0	<b>20.2</b>	Very Poor
2013	2.9	0.0	0.0	30.0	0.0	0.2	0.0	<b>33.0</b>	Very Poor-Poor
2018	2.5	0.0	0.0	30.0	0.0	0.0	0.0	<b>32.5</b>	Very Poor
2023	5.4	0.0	0.0	30.0	-0.1	0.1	0.0	<b>35.4</b>	Very Poor-Poor

## JONES CORRAL - STUDY NO. 24-13



### Location Information

USGS 7.5 min Map Info Mount Dutton NE; Township 31S, Range 3W, Section 35  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 398143 East 4214679 North

### Transect Information

Browse Tag # (0' Stake) 162  
 Transect Bearing 40° magnetic  
 Length 500ft  
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
 Belt Marker Placement Standard

### Directions to Site

From the town of Antimony, drive on Mt. Dutton Road for approximately 10 miles towards the Jones Corral Guard Station. At the fork, turn right (west) and drive 1.2 miles towards the guard station. Stop at the enclosure on the right (north) side of the road. From the northwest corner of the enclosure, walk 47 paces at 339 degrees magnetic to the 0-foot stake which is marked by browse tag #162.

### Site Information

Land Ownership Federal  
 Land Administrator USFS  
 Allotment Jones Corral C&H  
 Elevation 9,800ft (2,987m)  
 Aspect North  
 Slope 5%  
 Sample Dates 08/07/2003, 08/07/2008, 07/17/2013, 06/27/2018, 06/26/2023

**Wildlife Habitat and Vegetation History**

**Table 24-13.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24-13.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2003	Perennial Grass-Forb	NA
2008	Perennial Grass-Forb	NA
2013	Perennial Grass-Forb	NA
2018	Perennial Grass-Forb	NA
2023	Perennial Grass-Forb	NA

**Site Notes**

Cover for wildlife is provided by large, old stands of quaking aspen (*Populus tremuloides*) surrounding the study site. The Jones Corral study site replaced the Suicide trend study (24-05) that was suspended in 2003. Cattle were seen on site in 2018.

**Site Potential**

1981 - 2010 Average Annual Precipitation                      25 inches  
 NRCS Ecological Site    High Mountain Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site #    R047XB516UT  
 States and Transitions    No state and transition model is available for this ecological site.

Since the establishment of the study in 2003, the plant community on this site has existed as a stable community of perennial grasses and forbs (Table 24-13.7, Table 24-13.10, Table 24-13.11). Shifts in frequency and cover within the *Poa* genus (*Poa spp.*) may be due to misidentification from year to year. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was recorded in density in 2008, but few sagebrush plants have been observed on or near the transect (Photos, Table 24-13.12, Table 24-13.13). This site will likely remain in a perennial grass and forb state for some time due to the lack of sagebrush plants on or near the study site.

This site may serve as adequate summer range for deer due to the abundant and diverse herbaceous understory. However, pellet transect data shows that deer presence has remained low since 2003 (Table 24-13.9). In addition, the abundant grass and forb communities could provide valuable forage for summering elk (Table 24-13.3; Beck & Peek, 2005). Although elk presence has remained low since 2013 and no pellet groups were observed in 2023, presence was considered to be high in 2003 and 2008 (Table 24-13.9).

**Trend Summary Tables**

**Table 24-13.6 - 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
2003	-	-	-	-	-	-
2008	0.0	-	-	-	-	-
2013	-	-	-	-	-	-
2018	-	-	-	-	-	-
2023	-	-	-	-	-	-

**Table 24-13.7 - 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
2003	-	396	37	380	-	20.9	0.1	16.4
2008	-	374	134	440	-	16.9	0.4	25.7
2013	-	416	233	440	-	20.2	1.2	23.4
2018	-	414	9	450	-	17.7	0.0	37.1
2023	-	403	300	446	-	32.5	3.2	50.8

**Table 24-13.8 - 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
2003	23.7	1.0	12.7	13.6	8.2	43.7
2008	21.3	0.0	13.5	8.8	10.0	52.8
2013	31.4	0.1	21.6	3.5	6.1	50.4
2018	24.7	0.1	25.7	6.2	7.1	55.9
2023	29.9	-	4.5	8.2	5.9	63.9

**Table 24-13.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2003	5	6	30	1
2008	18	10	25	1
2013	16	1	23	-
2018	8	3	20	4
2023	6	2	-	-
Year	Days Use Per Acre (ha)			
2003	23.2 (57.4)	2.7 (6.6)	58.3 (144.0)	-
2008	34.1 (84.3)	12.8 (31.5)	51.6 (127.5)	-
2013	26.2 (64.6)	2.7 (6.6)	18.1 (44.7)	-
2018	9.4 (23.3)	0.7 (1.7)	14.7 (36.4)	-
2023	6.5 (16.1)	2.0 (5.0)	-	-

**Table 24-13.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES											
Achnatherum lettermanii (Letterman's needlegrass)											
Achnatherum nelsonii (Columbia needlegrass)											
Bromus inermis <sup>i</sup> (smooth brome)											
Carex (sedge)											
Elymus elymoides (squirreltail)											
Hesperostipa comata (needle and thread)											
Koeleria macrantha (prairie Junegrass)											
Phleum pratense <sup>i</sup> (timothy)											
Poa pratensis <sup>i</sup> (Kentucky bluegrass)											
Poa secunda (Sandberg bluegrass)											
Trisetum spicatum (spike trisetum)											
year	Nested Frequency										
2003	100	53	113	7	24	-	-	-	72	299	26
2008	167	-	201	1	10	2	13	15	142	161	-
2013	221	-	214	13	18	-	11	50	227	77	-
2018	214	-	204	-	2	-	4	43	144	214	-
2023	198	-	126	-	-	-	3	127	179	129	-
year	Average Cover (%)										
2003	2.4	2.4	3.1	0.1	0.6	-	-	-	2.7	9.4	0.3
2008	5.2	-	4.9	0.0	0.1	0.0	0.1	0.2	3.3	3.1	-
2013	6.3	-	4.4	0.5	0.1	-	0.1	1.0	6.8	0.9	-
2018	4.6	-	4.3	-	0.0	-	0.1	0.7	3.5	4.4	-
2023	8.1	-	6.4	-	-	-	0.4	7.0	6.8	3.8	-

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

**Table 24-13.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Achillea millefolium (Common yarrow)																		
Agoseris glauca (pale agoseris)																		
Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)																		
Antennaria (pussytoes)																		
Antennaria dimorpha (low pussytoes)																		
Arabis (rockcress)																		
Astragalus (milkvetch)																		
Calochortus nuttallii (sego lily)																		
Chenopodium <sup>a</sup> (goosefoot)																		
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Collomia linearis <sup>a</sup> (tiny trumpet)																		
Erigeron eatonii (Eaton's fleabane)																		
Erigeron flagellaris (trailing fleabane)																		
Erigeron pumilus (shaggy fleabane)																		
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																		
Lewisia pygmaea (alpine lewisia)																		
Lithophragma tenellum (slender woodland-star)																		
year	Nested Frequency																	
2003	-	4	-	88	-	-	92	-	-	16	-	27	-	2	-	-	-	
2008	22	12	1	138	-	4	-	-	-	9	-	155	-	-	-	-	-	
2013	28	29	1	150	-	26	-	-	-	54	5	138	12	6	-	-	-	
2018	47	14	1	191	25	-	-	1	-	6	-	94	15	81	-	-	-	
2023	44	8	21	99	35	-	-	-	2	6	-	14	24	-	39	244	2	
year	Average Cover (%)																	
2003	-	0.0	-	2.3	-	-	3.1	-	-	0.1	-	0.3	-	0.0	-	-	-	
2008	0.2	0.1	0.0	4.8	-	0.0	-	-	-	0.0	-	3.7	-	-	-	-	-	
2013	0.7	0.1	0.0	3.1	-	0.1	-	-	-	0.2	0.1	2.6	0.1	0.1	-	-	-	
2018	1.2	0.1	0.0	8.0	1.1	-	-	0.0	-	0.0	-	2.1	0.1	1.7	-	-	-	
2023	1.4	0.1	0.1	4.2	0.7	-	-	-	0.0	0.0	-	0.1	0.5	-	0.1	6.1	0.1	

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



FORB SPECIES	Lomatium (desertparsley)	Oenothera (evening primrose)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla (cinquefoil)	Potentilla gracilis (slender cinquefoil)	Symphoricarum ascendens (western aster)	Taraxacum officinale (common dandelion)	Trifolium gymnocarpon (hollyleaf clover)
year	Nested Frequency								
2003	-	-	-	21	-	70	100	3	248
2008	10	-	-	133	27	72	163	191	372
2013	10	11	-	211	-	88	155	177	373
2018	5	-	3	2	4	85	116	216	370
2023	6	-	-	285	7	77	162	213	347
year	Average Cover (%)								
2003	-	-	-	0.1	-	1.6	1.4	0.0	7.7
2008	0.0	-	-	0.4	1.1	2.1	3.8	4.5	5.4
2013	0.1	0.1	-	0.8	-	2.7	3.8	4.4	5.7
2018	0.0	-	0.0	0.0	0.1	2.2	1.0	6.3	13.2
2023	0.1	-	-	3.0	0.1	4.7	6.0	11.7	15.1

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

**Table 24-13.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)
year	Line
2003	-
2008	-
2013	-
2018	-
2023	-
year	Quadrat Cover (%)
2003	-
2008	0.0
2013	-
2018	-
2023	-

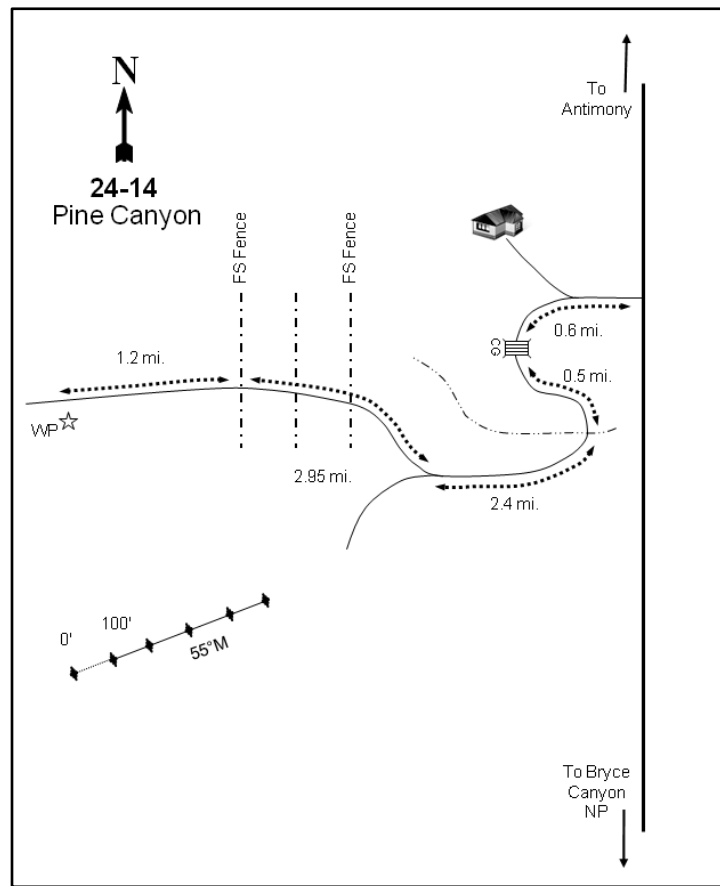
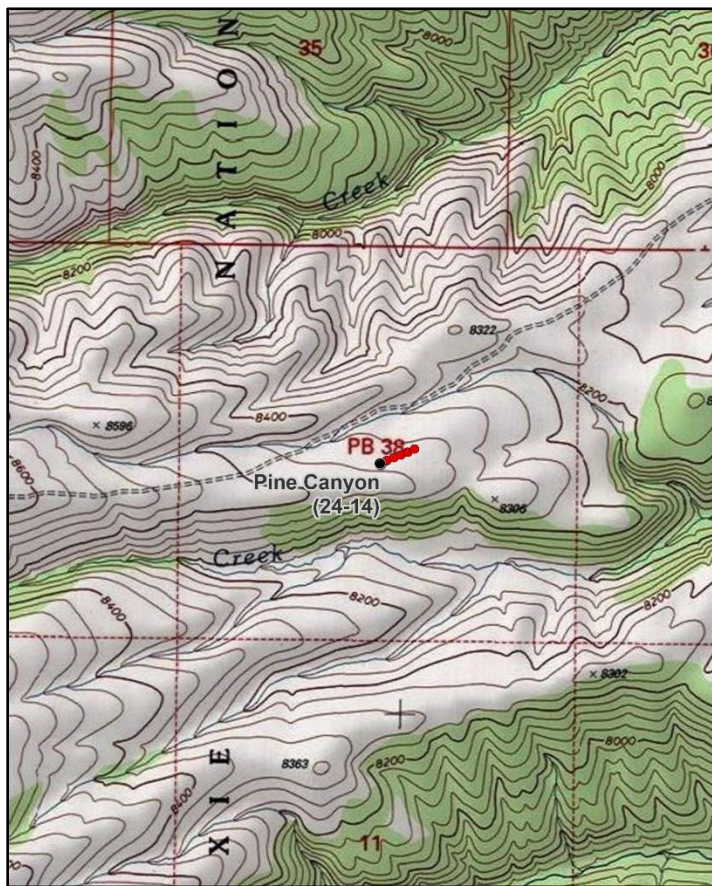
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 24-13.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2003	-	-	-	-	-	-	-	-	26/47
2008	20	-	100	0	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	36/49
2018	-	-	-	-	-	-	-	-	35/51
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	27/58
2013	-	-	-	-	-	-	-	-	33/51
2018	-	-	-	-	-	-	-	-	19/30

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

## PINE CANYON - STUDY NO. 24-14



### Location Information

USGS 7.5 min Map Info                      Deep Creek SW; Township 32S, Range 3W, Section 38  
 GPS (0' Stake)                                      NAD 83 UTM ZONE 12, 404794 East 4212004 North

### Transect Information

Browse Tag # (0' Stake)                      284  
 Transect Bearing                                      55° magnetic  
 Length    500ft  
 Belt Placement                                      Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
 Belt Marker Placement                      Standard

### Directions to Site

Turning from SR-22 onto Duncan Road, travel 0.6 miles (while passing the WMA to the west) to a cattle guard. Travel another 0.5 miles to the East Fork of the Sevier River and cross the river. Travel 2.4 miles to a fork and stay right. Travel another 2.95 miles while passing through USFS boundary fences. From the last fence, travel another 1.2 miles and park; the study site is south of the road. The 0-foot stake is identified by browse tag #284.

### Site Information

Land Ownership                                      Federal  
 Land Administrator                                      USFS  
 Allotment    Willow Spring C&H  
 Elevation    8,346ft (2,544m)  
 Aspect    North  
 Slope    7-10%  
 Sample Dates    08/01/2013, 06/21/2018, 06/29/2023

**Table 24-14.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed Fire	Sanford	-	2002	60740

**Wildlife Habitat and Vegetation History****Table 24-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 24-14.4 - 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
2018	Perennial Grass	No Encroachment
2023	Perennial Grass	No Encroachment

**Site Notes**

A soil sample should be collected the next time the site is read. Many of the plant species on the site are low-growing. Islands of mountain snowberry (*Symphoricarpos oreophilus*) and rubber rabbitbrush (*Ericameria nauseosa*) were observed at site establishment. Some grazing of muttongrass (*Poa fendleriana*) and needle and thread (*Hesperostipa comata*) was observed in 2013. Cattle were seen on the site in 2013, but few cattle pats were sampled.

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Windswept Ridge (Black Sagebrush)
NRCS Ecological Site #	R047XB475UT
States and Transitions	No state and transition model is available for this ecological site.

After the Sanford fire in 2002 (Table 24-14.1), the site likely experienced a major compositional change from a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated community to a perennial grass community. Medium-sized skeletal juniper (*Juniperus osteosperma*) remains were observed near the study site (Photos). Since study establishment in 2013, the site has remained mainly comprised of the perennial grass species blue grama (*Bouteloua gracilis*), muttongrass (*Poa fendleriana*), and/or needle and thread (*Hesperostipa comata*). The introduced annual grass species cheatgrass (*Bromus tectorum*) was sampled for the first time in 2023, but in very low amounts (Table 24-14.10). Broom snakeweed (*Gutierrezia sarothrae*) has dominated the shrub component in all sample years. Reestablishment of sagebrush in the area appears to be slow with only a few plants being sampled on site 21 years post-fire (Table 24-14.12, Table 24-14.13).

The diverse understory grass component of this site may provide valuable forage for summering deer. However, deer presence has remained low since 2013. Elk presence was also low in 2023 (Table 24-14.9), but the limited sagebrush component of the study site could provide browse during the winter months (Table 24-14.3; Wambolt, 1996).

**Trend Summary Tables**

**Table 24-14.6 - 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
2013	0.2	8.7	-	-	11.0	-
2018	0.2	15.8	-	0.1	12.7	-
2023	0.2	12.3	-	0.5	14.9	-

**Table 24-14.7 - 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
2013	-	389	37	145	-	16.3	0.1	1.2
2018	-	397	74	118	-	26.1	0.2	0.9
2023	4	354	168	172	0.0	32.6	1.0	3.7

**Table 24-14.8 - 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
2013	5.5	-	20.1	36.7	12.7	31.6
2018	8.6	0.0	24.8	42.6	12.6	36.9
2023	4.7	0.0	15.8	24.3	30.4	43.5

**Table 24-14.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2013	3	2	14	-	-
2018	5	12	8	-	43
2023	4	1	6	-	5
Days Use Per Acre (ha)					
2013	9.4 (23.3)	1.3 (3.3)	25.5 (62.9)	-	-
2018	17.4 (43.0)	-	17.4 (43.0)	8.7 (21.5)*	-
2023	10.9 (26.9)	2.7 (6.6)	0.7 (1.7)	-	-

\*Pellets per acre (ha)

**Table 24-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency								
2013	12	16	3	162	-	11	79	327	-
2018	2	12	1	153	-	21	111	347	4
2023	-	20	5	194	4	37	209	113	-
year	Average Cover (%)								
2013	0.3	0.2	0.0	6.8	-	0.1	1.2	7.8	-
2018	0.0	0.1	0.0	7.8	-	0.3	2.0	15.6	0.2
2023	-	0.6	0.1	17.2	0.0	0.7	10.2	3.7	-

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

**Table 24-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria microphylla (littleleaf pussytoes)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Calochortus nuttallii (sego lily)	Crepis intermedia (limestone hawkbeard)	Cryptantha humilis (roundspike cryptantha)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum perenne <sup>i</sup> (blue flax)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)	Microsteris gracilis <sup>a</sup> (slender phlox)	Packera multilobata (lobeleaf groundsel)	Petradoria pumila (rock goldenrod)
year	Nested Frequency																
2013	-	2	34	6	-	-	-	25	27	14	-	-	1	-	3	12	5
2018	23	1	27	10	1	-	3	43	47	2	-	3	-	28	1	12	-
2023	1	0	17	-	-	1	11	72	43	5	8	2	-	152	-	1	5
year	Average Cover (%)																
2013	-	0.0	0.1	0.0	-	-	-	0.2	0.1	0.1	-	-	0.0	-	0.0	0.1	0.2
2018	0.1	0.0	0.1	0.1	0.0	-	0.0	0.3	0.3	0.0	-	0.0	-	0.1	0.0	0.0	-
2023	0.0	0.0	0.1	-	-	0.0	0.1	1.7	0.8	0.0	0.0	0.0	-	0.8	-	0.0	0.0

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Plectanthus spinosus (thorn skeletonweed)	Sphaeralcea coccinea (scarlet globemallow)	Trifolium gymnocarpon (hollyleaf clover)
year	Nested Frequency			
2013	83	6	2	3
2018	-	2	2	30
2023	22	8	-	87
year	Average Cover (%)			
2013	0.3	0.2	0.0	0.0
2018	-	0.0	0.0	0.2
2023	0.3	0.2	-	0.6

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

**Table 24-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)								
	year	Line Intercept Cover (%)							
Artemisia nova <sup>p</sup> (black sagebrush)	2013	-	-	1.9	-	0.2	-	8.4	0.5
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	2018	-	0.1	4.3	-	0.4	-	8	0
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	2023	0.3	0.2	3.8	-	-	-	10.3	0.8
Ericameria nauseosa (rubber rabbitbrush)	year	Quadrat Cover (%)							
Ericameria parryi var. parryi (Parry's rabbitbrush)	2013	0.1	0.0	1.3	0.8	0.0	-	6.4	0.2
Escobaria vivipara (spiny star)	2018	0.0	0.1	4.9	-	0.4	-	9.7	0.7
Gutierrezia sarothrae (broom snakeweed)	2023	0.2	0.0	3.9	-	0.1	0.0	8.2	0.1
Tetradymia canescens (spineless horsebrush)									

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

**Table 24-14.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

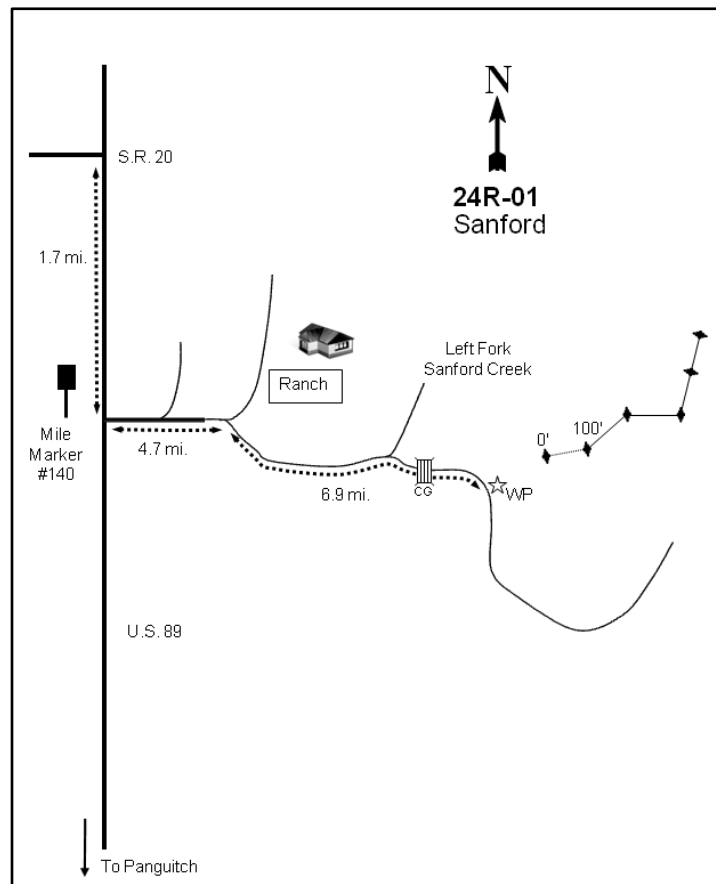
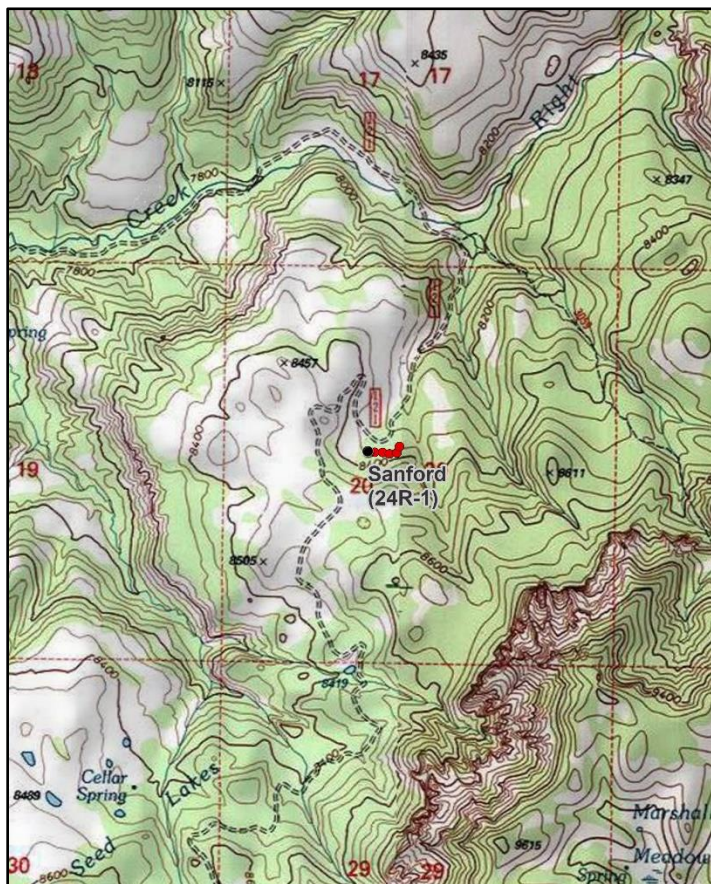
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2013	-	-	-	-	-	-	-	-	19/39
2018	120	-	50	50	0	17	17	0	21/42
2023	160	-	25	63	13	0	38	13	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2013	100	260	60	40	0	20	20	0	24/47
2018	240	-	100	0	0	8	0	0	28/53
2023	220	20	46	55	0	9	0	0	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2013	1260	80	13	87	0	21	35	8	13/38
2018	7900	240	3	92	6	46	30	17	13/25
2023	4720	-	11	89	0	0	0	0	- / -
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2013	-	-	-	-	-	-	-	-	26/44
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	100	0	0	0	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2013	20	-	100	0	0	0	100	100	- / -
2018	-	-	-	-	-	-	-	-	64/65
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
2013	800	-	5	95	0	30	5	18	21/49
2018	1940	-	4	96	0	11	12	0	17/32
2023	180	-	22	78	0	0	0	0	- / -
<b>Escobaria vivipara -- (spiny star)</b>									
2013	120	-	0	100	0	0	0	0	4/6
2018	40	-	0	100	0	0	0	0	6/8
2023	1020	-	8	92	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2013	38060	860	29	71	0	0	0	4	11/15
2018	22900	1960	4	94	2	14	0	1	11/16
2023	63320	2440	71	29	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	38/170
2023	-	-	-	-	-	-	-	-	-/-
<b>Ribes cereum<sup>p</sup> -- (wax currant)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	55/76
2023	-	-	-	-	-	-	-	-	-/-
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	48/109
2023	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2013	260	20	0	100	0	62	0	0	20/38
2018	380	-	37	58	5	0	16	0	25/36
2023	280	-	36	57	7	0	0	14	- / -

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



## SANFORD - STUDY NO. 24R-1

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Blind Spring Mountain; Township 33S, Range 4W, Section 20  
NAD 83 UTM ZONE 12, 389938 East 4197851 North

**Transect Information**

Browse Tag # (0' Stake)  
Transect Bearing

167  
87° magnetic (Line 2: 74° magnetic, Line 3: 93° magnetic, Line 4: 68° magnetic, Line 5: 7° 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**

Travel south from the junction of Highway 89 and SR-20 on Highway 89 for 1.7 miles, then turn left. Travel east for 4.7 miles, keeping right at all forks until you come to a fork with a sign to Sanford Creek. Proceed right at the fork and travel 6.9 miles up Sanford Creek Canyon to the witness post on the left (northeast) side of the road. You will cross the creek several times as you go up the canyon; stay right at the fork part way up the canyon. The 0-foot stake is 27 paces from the witness post at 185 degrees magnetic. The 0-foot stake is a half-high steel post marked by browse tag #167 and the remaining stakes are rebar.

**Site Information**

Land Ownership

Federal

Land Administrator

USFS

Allotment

Clark Mountain C&H

Elevation

8,420ft (2,566m)

Aspect

North

Slope

12-15%

Sample Dates

07/23/1998, 07/10/2003, 07/09/2008, 07/16/2013, 06/25/2018, 06/26/2023

**Table 24R-01.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Sanford	-	April-July 2002	60740

**Wildlife Habitat and Vegetation History****Table 24R-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	summer
Rocky Mountain Elk	substantial	summer
Mountain Goat	crucial	year-long

**Table 24R-01.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1998	Douglas Fir-White Fir/Quaking Aspen	NA
2003	Douglas Fir-White Fir/Quaking Aspen	NA
2008	Quaking Aspen	NA
2013	Quaking Aspen	NA
2018	Quaking Aspen	Phase I
2023	Quaking Aspen	Phase I

**Site Notes**

Coarse woody debris may impede big game movement through the area. In 2013, nearly all of the aspen were insect-infested with many of the trees producing galls.

**Soils****Table 24R-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	5.3	58.0	23.4	18.6	4.9	20.9	425.6	0.8	07/23/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	High Mountain Loam (Aspen)
NRCS Ecological Site #	R047XB508UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 1998, the plant community on this site was a mixed stand of Douglas fir (*Pseudotsuga menziesii*), quaking aspen (*Populus tremuloides*), and ponderosa pine (*Pinus ponderosa*). The perennial grass and forb communities were moderately diverse with mountain brome (*Bromus marginatus*) and Colorado columbine (*Aquilegia caerulea*) being the most prevalent grass and forb species, respectively. The Sanford fire in 2002 (Table 24R-01.1) set back the succession of this high mountain community, initiating a transition from a conifer-encroached state to a quaking aspen community. Since the 2003 sampling, the overstory has increased in diversity with quaking aspen as the dominant species (Table 24R-01.12, Table 24R-01.13). The herbaceous understory has also increased in diversity, with perennial grasses and forbs contributing a majority of the cover (Table 24R-01.7, Table 24R-01.10, Table 24R-01.11). In 2023, a Rocky Mountain juniper (*Juniperus scopulorum*) seedling was recorded in point-quarter data, indicating that this site may have the potential to be further encroached in future sample years (Table 24R-01.14).

This site may serve as adequate summer range for deer due to the abundant and diverse herbaceous understory. However, pellet transect data shows that deer presence has remained low to moderate since 2003 (Table 24R-01.9). In addition, the abundant grass and forb communities could provide valuable forage for summering elk (Table 24R-01.3; Beck & Peek, 2005), although elk presence has remained low since 2003 (Table 24R-01.9).

## Trend Summary Tables

**Table 24R-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
1998	5.3	7.7	9.8	-	-	4.2
2003	0.9	0.4	2.2	0.7	0.2	12.3
2008	4.1	7.3	8.3	7.8	7.9	25.2
2013	5.2	4.6	7.5	12.7	6.4	35.5
2018	7.4	4.3	3.3	12.4	6.8	50.3
2023	8.3	5.9	14.0	13.7	8.5	61.7

**Table 24R-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
1998	-	161	14	168	-	2.9	0.1	5.8
2003	-	49	48	39	-	0.8	1.0	0.7
2008	14	250	90	314	0.4	9.7	0.8	14.1
2013	4	324	39	314	0.0	16.3	0.4	11.4
2018	-	350	20	319	-	15.6	0.1	11.6
2023	-	286	57	304	-	11.3	0.8	13.2

**Table 24R-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
1998	0.2	0.2	94.0	0.0	0.2	33.0
2003	26.0	0.0	69.4	0.0	0.7	6.6
2008	13.8	1.2	54.0	0.4	0.5	43.9
2013	6.4	1.4	67.2	0.1	0.6	46.6
2018	7.5	2.4	75.1	0.5	0.6	42.6
2023	6.9	1.3	71.9	0.5	1.1	46.7

**Table 24R-01.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	2	1	-	-
2003	-	3	-	-
2008	2	4	7	3
2013	1	10	3	-
2018	1	11	-	-
2023	1	6	3	2
Year	Days Use Per Acre (ha)			
1998	-	-	-	-
2003	-	4.7 (11.6)	0.7 (1.7)	-
2008	6.5 (16.1)	13.4 (33.1)	6.7 (16.6)	-
2013	0.7 (1.8)	26.2 (64.6)	4.0 (9.9)	-
2018	0.7 (1.8)	15.4 (38.1)	0.7 (1.7)	-
2023	-	21.5 (53.0)	0.7 (1.7)	-

**Table 24R-01.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus marginatus (mountain brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex rossii (Ross' sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency													
1998	11	40	-	-	67	-	3	20	-	8	-	-	36	-
2003	-	28	-	2	-	-	-	-	22	-	-	6	2	-
2008	17	64	5	61	-	14	3	46	39	-	-	43	31	14
2013	34	124	3	119	7	4	6	-	113	10	-	45	29	-
2018	51	131	9	115	44	-	26	1	99	1	-	34	15	8
2023	24	91	2	32	-	-	34	-	59	-	60	74	-	15
year	Average Cover (%)													
1998	0.0	0.4	-	-	1.8	-	0.0	0.3	-	0.0	-	-	0.3	-
2003	-	0.4	-	0.0	-	-	-	-	0.3	-	-	0.0	0.0	-
2008	0.2	3.0	0.0	1.8	-	0.4	0.0	0.8	1.6	-	-	0.9	1.0	0.3
2013	0.8	5.8	0.0	3.3	0.2	0.0	0.3	-	3.4	0.1	-	1.5	0.8	-
2018	1.2	4.3	0.0	3.9	1.3	-	0.9	0.0	2.8	0.0	-	0.8	0.2	0.0
2023	0.2	2.7	0.1	0.6	-	-	0.7	-	1.8	-	2.0	3.1	-	0.1

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

**Table 24R-01.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Androsace septentrionalis <sup>ai</sup> (pygmyflower rockjasmine)	Antennaria microphylla (litt le/leaf pussytoes)	Aquilegia coerulea (Colorado blue columbine)	Arabis drummondii (Drummond's rockcress)	Arenaria fendleri (Fendler's sandwort)	Arnica latifolia (broadleaf arnica)	Astragalus miser (timber milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cirsium wheeleri (Wheeler's thistle)	Clematis ligusticifolia (western white clematis)	Collomia linearis <sup>a</sup> (tiny trumpet)	Descurainia incana <sup>a</sup> (mountain tansymustard)	Dracocephalum parviflorum (American dragonhead)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron eatonii (Eaton's fleabane)
year	Nested Frequency																
1998	35	4	35	52	3	14	-	33	2	-	-	-	-	-	-	-	21
2003	6	11	3	-	-	-	-	6	-	31	-	-	7	-	-	-	11
2008	45	23	4	-	10	2	-	15	-	13	0	1	29	-	-	-	35
2013	74	18	6	-	8	2	-	25	-	7	3	0	3	8	-	7	20
2018	65	17	8	-	2	4	-	27	-	-	7	-	-	-	-	-	17
2023	79	55	3	-	8	-	6	28	-	3	5	-	-	-	2	-	19
year	Average Cover (%)																
1998	0.9	0.0	1.3	1.5	0.0	0.1	-	1.0	0.0	-	-	-	-	-	-	-	0.2
2003	0.1	0.1	0.1	-	-	-	-	0.1	-	0.8	-	-	0.0	-	-	-	0.1
2008	0.5	0.1	0.0	-	0.0	0.0	-	0.2	-	0.1	0.0	0.1	0.1	-	-	-	0.6
2013	1.8	0.2	0.1	-	0.0	0.0	-	0.6	-	0.0	0.0	0.0	0.0	0.0	-	0.1	0.4
2018	0.9	0.1	0.0	-	0.0	0.0	-	0.7	-	-	0.0	-	-	-	-	-	0.1
2023	1.9	0.8	0.3	-	0.0	-	0.2	0.5	-	0.0	0.1	-	-	-	0.0	-	0.5

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

FORB SPECIES	Erigeron flagellaris (trailing fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Fragaria virginiana (Virginia strawberry)	Geranium richardsonii (Richardson's geranium)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orthocarpus luteus <sup>a</sup> (yellow owl's-clover)	Packera multilobata (lobeleaf groundsel)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla (cinquefoil)	Potentilla gracilis (slender cinquefoil)	Silene (catchfly)	Symphotrichum ascendens (western aster)
year	Nested Frequency																
1998	-	-	2	3	-	-	3	3	-	-	1	-	5	5	-	-	-
2003	-	-	6	-	-	-	-	-	-	-	-	-	13	-	-	-	-
2008	18	-	52	1	3	10	0	8	-	4	-	5	32	-	-	-	-
2013	24	4	40	-	6	2	1	19	-	-	-	5	-	-	-	-	-
2018	28	-	20	3	1	-	1	17	-	3	-	10	-	-	-	1	6
2023	8	5	4	9	3	4	1	12	3	-	-	6	-	-	1	-	5
year	Average Cover (%)																
1998	-	-	0.0	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0	0.0	-	-	-
2003	-	-	0.1	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-
2008	1.1	-	1.7	0.0	0.0	0.1	0.0	0.1	-	0.0	-	0.0	0.5	-	-	-	-
2013	0.2	0.0	0.9	-	0.0	0.0	0.0	0.3	-	-	-	0.0	-	-	-	-	-
2018	0.2	-	0.1	0.1	0.0	-	0.0	0.6	-	0.0	-	0.0	-	-	-	0.0	0.0
2023	0.3	0.0	0.0	0.7	0.0	0.0	0.0	0.4	0.0	-	-	0.0	-	-	0.0	-	0.1

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

FORB SPECIES	Taraxacum officinale (common dandelion)	Thalictrum fendleri (Fendler's meadow-rue)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Verbascum thapsus <sup>ai</sup> (common mullein)	Viola adunca (hookedspur violet)
year	Nested Frequency				
1998	33	-	4	-	10
2003	9	2	-	-	2
2008	249	0	3	-	4
2013	255	3	-	4	8
2018	272	11	-	-	13
2023	255	-	-	-	3
year	Average Cover (%)				
1998	0.7	-	0.0	-	0.1
2003	0.2	0.1	-	-	0.0
2008	9.6	0.0	0.0	-	0.0
2013	6.4	0.4	-	0.0	0.1
2018	8.1	0.6	-	-	0.1
2023	7.9	-	-	-	0.0

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

**Table 24R-01.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus communis (common juniper)	Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)	Mahonia repens (creeping barberry)	Pinus ponderosa <sup>i</sup> (ponderosa pine)	Populus tremulooides <sup>p</sup> (quaking aspen)	Pseudotsuga menziesii <sup>i</sup> (Douglas-fir)	Ribes cereum <sup>p</sup> (wax currant)	Rosa woodsii <sup>p</sup> (Woods' rose)	Sambucus nigra ssp. cerulea <sup>p</sup> (blue elderberry)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)														
1998	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	-	-	-	-	-	-	-	0.2	2	4.8	5.5	-	0.1	-	0.6
2008	-	0.5	-	-	-	-	-	7.9	3.7	17	4.5	-	0.7	0.7	5.9
2013	-	2.8	0.4	-	-	-	-	6	2.5	25.7	7.3	-	1.2	1	7.7
2018	-	0.2	-	0.7	-	-	-	6.1	4.5	37.1	8.7	0.1	1.3	0.2	10.6
2023	0.1	0.6	0.1	0.1	0.3	0	-	8	7.5	47.6	6.6	0.3	1.4	-	11.3
year	Quadrat Cover (%)														
1998	-	-	-	-	-	5.3	-	2.4	0.1	0.2	9.4	-	0.4	-	4.9
2003	-	-	-	-	-	-	-	0.4	0.0	1.6	0.6	-	0.0	-	0.8
2008	-	0.0	-	0.0	-	-	-	7.3	0.0	6.9	1.4	-	0.0	0.3	3.7
2013	-	0.3	0.4	-	-	-	-	4.2	0.0	5.6	1.9	-	0.4	0.2	4.3
2018	-	0.2	0.4	0.1	-	-	-	3.8	0.4	0.8	2.1	0.0	0.8	0.0	6.4
2023	0.0	0.5	0.4	0.0	0.0	0.0	0.4	5.5	6.2	6.7	0.7	0.0	1.0	-	6.8

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

**Table 24R-01.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	80	-	100	0	0	0	0	0	46/30
2013	-	-	-	-	-	-	-	-	-/-
2018	60	-	100	0	0	33	0	0	32/34
2023	20	-	100	0	0	0	0	0	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	51/73
2013	40	20	0	100	0	0	0	0	61/103
2018	120	-	67	33	0	0	0	0	69/97
2023	100	-	60	40	0	0	0	0	-/-
<b>Ceanothus -- (ceanothus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	-/-
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	33/49
2013	100	-	20	60	20	0	0	0	48/49
2018	80	-	25	75	0	0	0	0	53/55
2023	100	20	0	80	20	0	0	20	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	40	-	0	50	50	0	0	0	37/36
2013	40	-	0	50	50	0	0	0	68/64
2018	40	-	0	100	0	0	0	0	76/68
2023	20	-	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	20/20
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	80	-	0	100	0	0	0	0	- / -
<b>Juniperus communis -- (common juniper)</b>									
1998	760	-	11	87	3	0	0	11	66/85
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	21/63
2018	-	20	0	0	0	0	0	0	26/78
2023	40	60	50	50	0	0	0	0	- / -
<b>Juniperus scopulorum<sup>1</sup> -- (Rocky Mountain juniper)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	100	0	0	0	0	0	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
1998	4740	-	13	87	0	3	0	0	14/25
2003	1820	-	51	50	0	0	0	0	10/15
2008	11900	180	0	99	1	0	0	1	15/23
2013	13860	-	0	100	0	0	0	0	12/18
2018	20560	40	6	93	2	0	0	0	10/14
2023	19840	-	8	92	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	0	100	0	0	0	0	-/-
<b>Pinus ponderosa<sup>1</sup> -- (ponderosa pine)</b>									
1998	60	20	67	33	0	0	0	0	-/-
2003	20	-	0	100	0	0	0	0	-/-
2008	40	60	50	50	0	0	0	0	-/-
2013	20	-	0	100	0	0	0	0	-/-
2018	40	80	50	50	0	0	0	0	-/-
2023	220	180	73	27	0	0	0	0	-/-
<b>Populus tremuloides<sup>SP</sup> -- (quaking aspen)</b>									
1998	680	-	79	21	0	0	0	0	-/-
2003	2220	-	100	0	0	0	0	0	47/33
2008	3860	20	14	85	1	2	0	1	-/-
2013	See table 13a - Aspen Characteristics								
2018	See table 13a - Aspen Characteristics								
2023	See table 13a - Aspen Characteristics								
<b>Pseudotsuga menziesii<sup>1</sup> -- (Douglas-fir)</b>									
1998	1440	280	72	28	0	0	0	0	-/-
2003	240	20	75	17	8	0	0	17	-/-
2008	180	60	78	11	11	0	0	11	-/-
2013	180	80	78	22	0	0	0	0	-/-
2018	220	100	73	27	0	0	0	0	-/-
2023	140	200	71	29	0	0	0	0	-/-
<b>Ribes cereum<sup>P</sup> -- (wax currant)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	83/60
2018	-	-	-	-	-	-	-	-	131/144
2023	-	-	-	-	-	-	-	-	-/-
<b>Rosa woodsii<sup>P</sup> -- (Woods' rose)</b>									
1998	220	-	73	27	0	0	0	0	51/58
2003	240	20	58	42	0	0	0	0	9/11
2008	500	-	28	72	0	0	0	0	33/41
2013	780	-	23	77	0	0	0	0	37/33
2018	900	60	47	53	0	4	0	2	53/40
2023	1340	-	43	57	0	0	0	0	-/-
<b>Sambucus nigra ssp. cerulea<sup>P</sup> -- (blue elderberry)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	540	100	82	19	0	0	0	0	153/132
2013	60	-	67	33	0	0	0	0	152/145
2018	60	-	33	67	0	33	0	0	145/112
2023	20	-	0	100	0	0	0	0	-/-



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Symphoricarpos oreophilus <sup>p</sup> -- (mountain snowberry)									
1998	6060	260	39	61	0	0	0	0	37/40
2003	940	-	77	23	0	0	0	0	30/47
2008	1360	20	9	90	2	7	0	0	39/73
2013	1620	-	27	73	0	0	0	0	43/88
2018	3020	540	19	81	0	8	11	0	45/83
2023	3020	-	4	96	0	15	3	0	- / -

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

**Table 24R-01.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

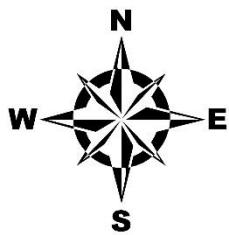
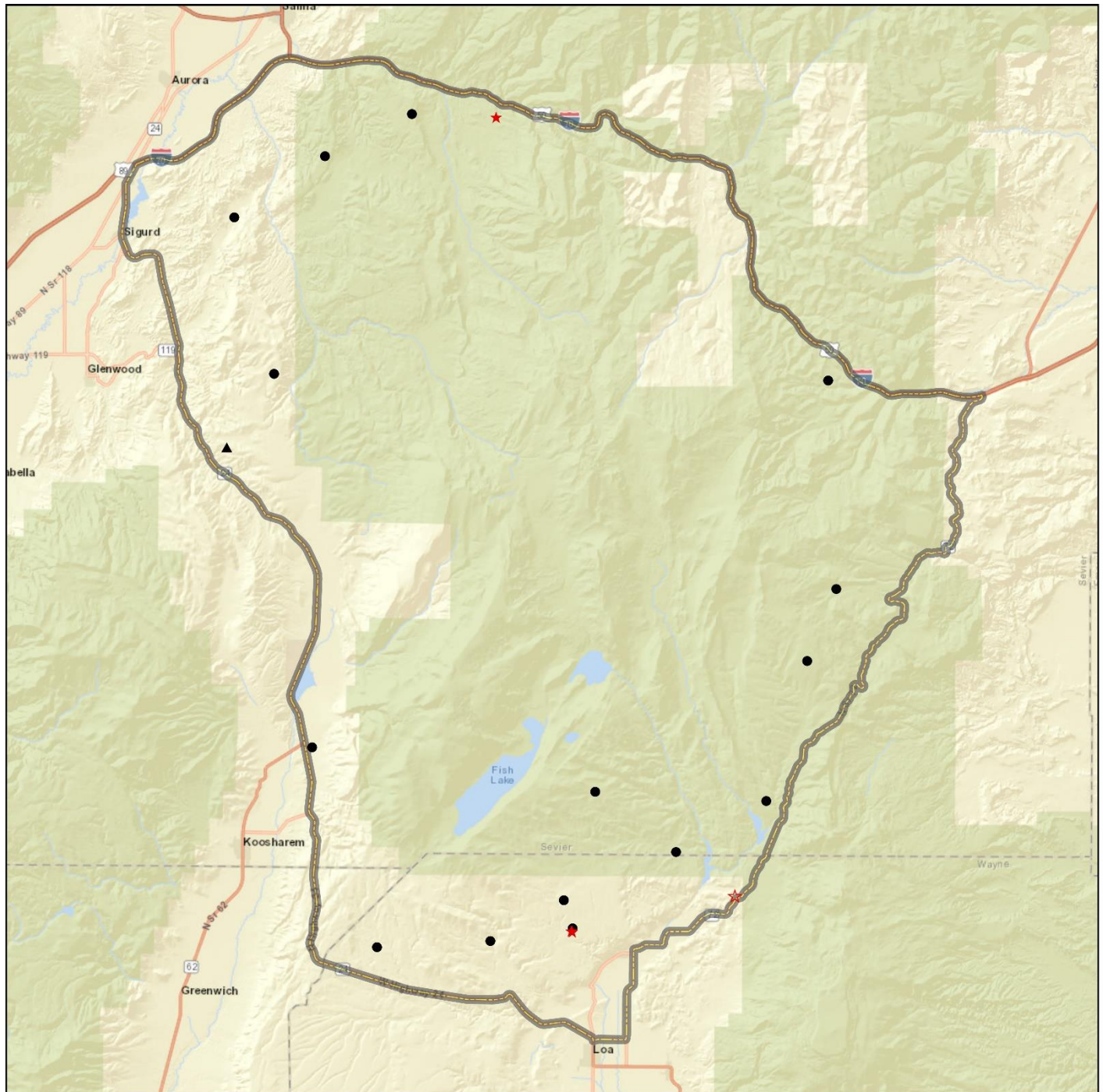
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
Populus tremuloides (quaking aspen)								
2013	3660	3	92	5	-	0	0	15
2018	2680	5	10	34	51	4	2	2
2023	2180	4	2	26	69	0	0	0

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

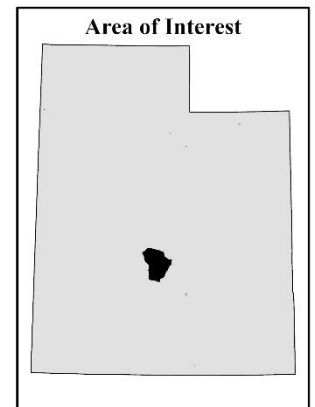
**Table 24R-01.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus scopulorum (Rocky Mountain juniper)							
2018	34	100	-	-	-	-	1.0
2023	1	100	-	-	-	-	2.0
Pinus ponderosa (ponderosa pine)							
2018	48	11	78	11	-	-	2.7
2023	35	13	50	38	-	-	6.1
Populus tremuloides (quaking aspen)							
2018	304	32	16	21	32	-	3.0
2023	409	18	29	12	-	41	5.4
Pseudotsuga menziesii (Douglas-fir)							
2018	119	64	36	-	-	-	1.4
2023	156	40	33	27	-	-	3.0

# WILDLIFE MANAGEMENT UNIT 25A – PLATEAU, FISHLAKE

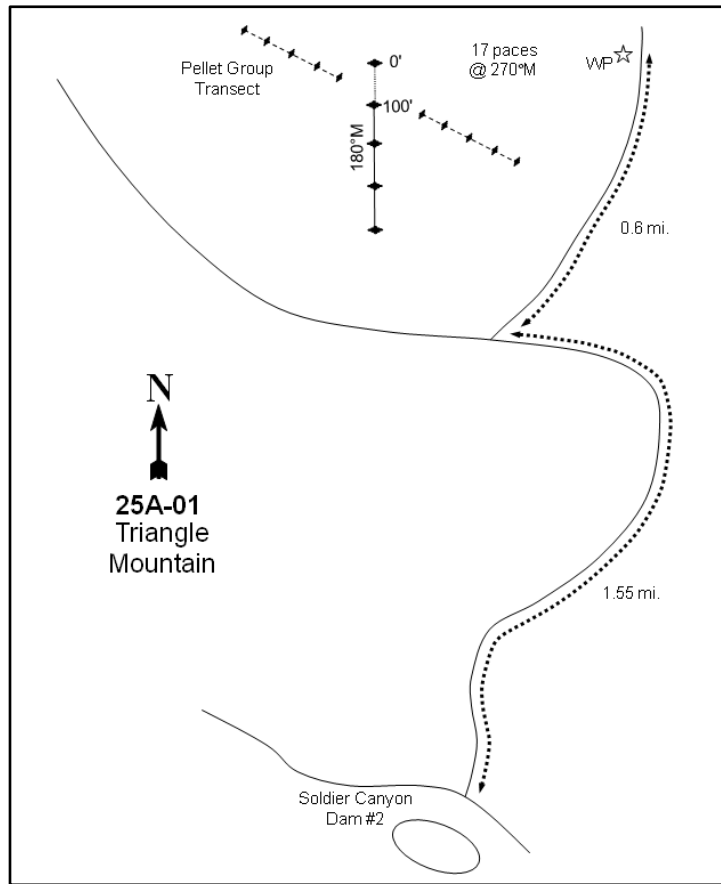
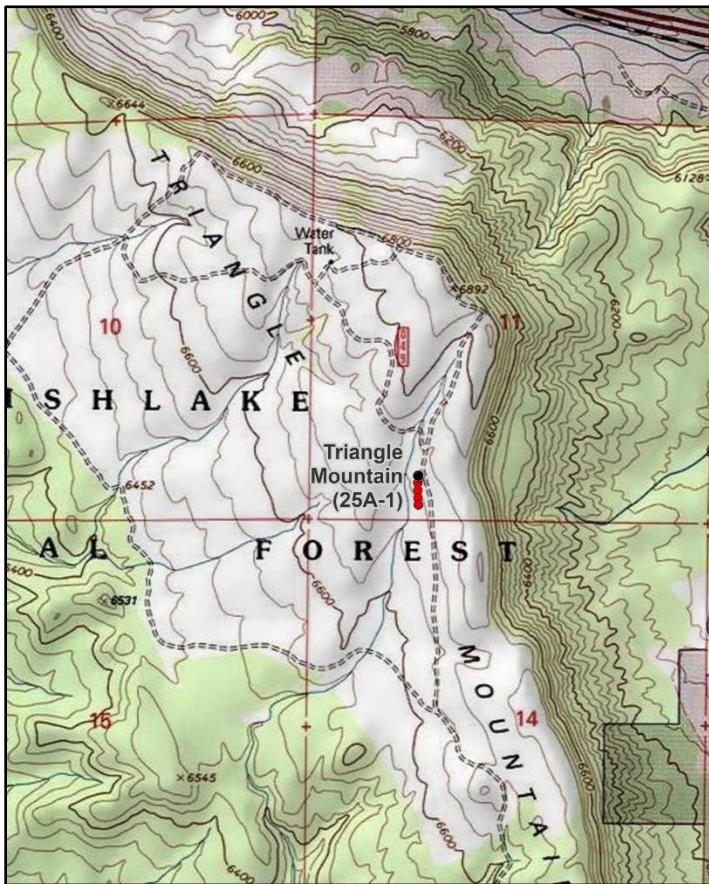


Study Locations Project, Status	Unit Boundary
● RT, Active	▭ Unit - 25A
★ RT, Suspended	
▲ WRI, Active	
☆ WRI, Suspended	



Credits: Bureau of Land Management, Utah AGRC, Esri, HERE, Garmin, NGA, USGS, NPS

## TRIANGLE MOUNTAIN - STUDY NO. 25A-1



### Location Information

USGS 7.5 min Map Info Salina SE; Township 22S, Range 1E, Section 11  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 433160 East 4306455 North

### Transect Information

Browse Tag # (0' Stake) 278  
 Transect Bearing 180° magnetic  
 Length 400ft  
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
 Belt Marker Placement Standard

### Directions to Site

From Gooseberry Creek Road outside of Salina, travel west on Soldier Canyon Road for approximately 2.5 miles to Soldier Canyon Dam #2. At the dam, turn right and proceed on the road to Triangle Mountain. Go 1.55 miles to a fork. Bear right at the fork and continue for 0.6 miles to the top of a low rise between two small draws. Walk 17 paces due west of the road to the 0-foot baseline stake, which is a 4-foot tall rebar marked with browse tag #278. A pellet group transect crosses the frequency baseline at the 100-foot mark.

### Site Information

Land Ownership Federal  
 Land Administrator USFS  
 Allotment Browns Hole Allotment  
 Elevation 6,700ft (2,042m)  
 Aspect Southwest  
 Slope 5-10%  
 Sample Dates 08/12/1999, 08/24/2004, 06/11/2009, 08/22/2013, 07/03/2018, 06/29/2023

**Table 25A-01.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1970	-
Seeding - Seed Unknown	-	-	1970	-
Harrow - Two-Way Dixie	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	216	Fall 2005	4079
Seeding - Broadcast	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	216	Fall 2005	1600

**Table 25A-01.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Fishlake National Forest PJ Maintenance			Broadcast	Oct 2005	1600
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Bromus marginatus	Mountain Brome	Bromar	0.13	0.13
G	Bromus marginatus	Mountain Brome	Bromar	1.88	1.83
G	Elymus lanceolatus	Thickspike Wheatgrass	Critana	2.00	1.70
G	Elymus trachycaulus	Slender Wheatgrass	Pryor	1.45	1.40
G	Elymus trachycaulus	Slender Wheatgrass		0.56	0.50
F	Linum perenne	Blue Flax		0.88	0.76
F	Medicago sativa	Alfalfa	Nomad	1.00	0.93
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.94
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.94

**Wildlife Habitat and Vegetation History**

**Table 25A-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 25A-01.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Perennial Grass	Phase I
1991	Perennial Grass	Phase I
1999	Perennial Grass/Pinyon-Juniper	Phase I transitioning to Phase II
2004	Perennial Grass/Pinyon-Juniper	Phase I transitioning to Phase II
2009	Perennial Grass	Phase I
2013	Perennial Grass	Phase I
2018	Perennial Grass	Phase I
2023	Perennial Grass	Phase I

**Site Notes**

The site may have been treated by a brush saw or lop and scatter.

**Soils**

**Table 25A-01.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.6	40.0	34.7	25.3	5.8	6.5	243.2	0.7	08/12/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation 13 inches  
 NRCS Ecological Site Upland Loam (Black Sagebrush)  
 NRCS Ecological Site # R047XB309UT  
 States and Transitions No state and transition model is available for this ecological site.

This site was dominated by seeded introduced perennial grass species such as crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*Thinopyrum intermedium*) upon study establishment in 1985 (Pre-1992 Data). Young twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) had begun to reestablish following a chaining treatment that took place in 1970, and the site began to transition from Phase I to Phase II of woodland succession as trees increased in size and abundance (Photos, Table 25A-01.14). However, the site was retreated in 2005 (Table 25A-01.1), and the study has been considered to be within Phase I since 2009 (Table 25A-01.4). Introduced perennial grasses have maintained dominance or codominance throughout the duration of the study. Forbs have remained sparse in most sample years. However, the weedy introduced annual forb species desert madwort (*Alyssum desertorum*) and curvseed butterwort (*Ceratocephala testiculata*) contributed over 10% cover in 2023 (Table 25A-01.7, Table 25A-01.10, Table 25A-01.11). Shrubs have been a minor vegetation component throughout the duration of the study (Table 25A-01.12, Table 25A-01.13).

Deer winter range condition has remained very poor since 1999. Improvement to deer wintering range can be accomplished through efforts that increase preferred browse density, cover, and reproduction; diversifying and increasing cover of native perennial forbs while reducing cheatgrass would also improve winter range conditions (Table 25A-01.15). Increasing density, cover, and reproduction of sagebrush would also likely prove beneficial for wintering elk (Table 25A-01.3; Wambolt, 1996). Pellet transect data indicates that deer presence has remained low since 2004. Elk presence has been high in many sample years, but was considered to be low in 2023 (Table 25A-01.9).

**Trend Summary Tables**

**Table 25A-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
1999	0.0	-	0.5	-	-	0.3
2004	0.2	0.1	1.2	0.9	0.5	1.4
2009	0.7	0.3	1.0	0.8	0.5	1.3
2013	0.7	0.2	1.3	0.9	0.5	2.0
2018	0.3	1.3	1.9	0.6	2.0	2.4
2023	0.5	0.7	0.0	0.9	1.5	-

**Table 25A-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
1999	7	391	304	162	0.0	11.6	1.4	3.7
2004	21	335	313	35	0.1	20.0	3.5	0.5
2009	16	390	350	45	0.1	24.9	6.0	1.0
2013	-	425	369	39	-	24.3	1.9	0.6
2018	25	394	333	23	0.2	21.4	2.8	0.3
2023	13	360	431	28	0.2	15.3	11.2	0.4

**Table 25A-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
1999	18.1	1.2	26.2	10.8	4.5	19.2
2004	18.4	2.3	30.8	23.0	6.7	26.1
2009	33.4	0.4	41.2	6.5	4.1	35.6
2013	13.1	0.1	54.1	7.9	2.6	31.7
2018	33.1	0.7	50.6	6.6	3.6	25.9
2023	28.3	0.4	25.5	22.1	5.1	24.2

**Table 25A-01.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1999	10	18	18	27
2004	12	16	12	44
2009	8	17	34	11
2013	4	5	35	14
2018	9	9	35	40
2023	19	8	19	7
Year	Days Use Per Acre (ha)			
1999	48.6 (120.1)	21.5 (53.0)	59.0 (145.7)	-
2004	5.1 (12.6)	10.0 (24.8)	12.1 (29.8)	-
2009	37.7 (93.2)	4.0 (9.9)	50.9 (125.8)	-
2013	12.3 (30.5)	-	44.2 (109.2)	-
2018	16.0 (39.5)	-	54.3 (134.1)	-
2023	8.0 (19.7)	1.3 (3.3)	14.1 (34.8)	-

**Table 25A-01.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Leymus salinus (saline wildrye)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency								
1999	1	284	-	7	-	31	103	2	201
2004	2	236	-	21	19	20	26	-	180
2009	-	290	-	16	1	-	63	13	209
2013	1	332	5	-	-	26	65	7	199
2018	-	245	-	25	1	26	109	6	162
2023	-	246	-	13	-	3	72	5	162
year	Average Cover (%)								
1999	0.0	7.2	-	0.0	-	0.2	1.8	0.0	2.5
2004	0.1	13.3	-	0.1	1.0	0.1	0.6	-	4.9
2009	-	15.6	-	0.1	0.1	-	2.6	0.1	6.4
2013	0.0	16.6	0.1	-	-	0.3	2.9	0.2	4.2
2018	-	11.2	-	0.2	0.0	0.3	4.1	0.2	5.7
2023	-	8.0	-	0.2	-	0.0	3.8	0.2	3.2

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

**Table 25A-01.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria (pussytoes)	Astragalus (milkvetch)	Astragalus calycosus (Torrey's milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum lewisii (Lewis flax)	Lithospermum ruderale (western stoneseed)	Medicago sativa <sup>i</sup> (alfalfa)	Melilotus officinalis <sup>i</sup> (sweetclover)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)
year	Nested Frequency																
1999	300	7	6	-	4	61	-	-	-	-	-	-	3	108	-	-	1
2004	226	2	2	-	222	1	-	4	-	0	-	-	-	25	-	-	2
2009	340	2	14	-	136	-	-	-	-	-	-	4	-	25	-	3	2
2013	365	1	6	-	82	-	-	3	1	-	-	-	4	10	13	-	3
2018	333	-	8	-	1	-	-	-	-	1	-	-	1	14	-	-	-
2023	412	-	-	2	318	-	3	-	-	-	3	-	-	16	-	1	3
year	Average Cover (%)																
1999	1.4	0.0	0.2	-	0.0	0.9	-	-	-	-	-	-	0.0	2.4	-	-	0.0
2004	1.1	0.0	0.0	-	2.4	0.0	-	0.0	-	0.0	-	-	-	0.5	-	-	0.0
2009	4.1	0.0	0.2	-	2.0	-	-	-	-	-	-	0.0	-	0.7	-	0.0	0.0
2013	1.7	0.0	0.0	-	0.2	-	-	0.0	0.0	-	-	-	0.1	0.2	0.2	-	0.1
2018	2.7	-	0.0	-	0.0	-	-	-	-	0.0	-	-	0.0	0.1	-	-	-
2023	7.2	-	-	0.0	4.0	-	0.0	-	-	-	0.0	-	-	0.2	-	0.0	0.1

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

FORB SPECIES	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Stenotus acaulis (stemless mock goldenweed)	Streptanthus cordatus (heartleaf twistflower)	Symphoricarichum (aster)	Townsendia (Townsend daisy)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency					
1999	-	-	-	1	-	-
2004	-	-	4	-	-	-
2009	-	-	-	-	-	-
2013	2	-	1	-	-	2
2018	-	2	-	-	-	-
2023	-	-	-	-	3	-
year	Average Cover (%)					
1999	-	-	-	0.0	-	-
2004	-	-	0.0	-	-	-
2009	-	-	-	-	-	-
2013	0.0	-	0.0	-	-	0.0
2018	-	0.1	-	-	-	-
2023	-	-	-	-	0.0	-

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

**Table 25A-01.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)						
1999	-	-	-	-	-	-	-
2004	0.9	0	-	0.5	1.4	-	-
2009	0.8	-	-	0.5	1.3	-	-
2013	0.9	-	-	0.4	2	0.1	-
2018	0.6	-	-	1.9	2.4	0.1	-
2023	0.9	-	-	1.2	-	0.3	-
year	Quadrat Cover (%)						
1999	0.0	-	-	-	-	-	0.5
2004	0.2	0.1	-	0.0	1.2	-	-
2009	0.7	-	0.0	0.3	1.0	-	-
2013	0.7	-	0.0	0.2	1.3	0.0	-
2018	0.3	-	-	1.3	1.9	0.0	-
2023	0.5	0.1	-	0.5	0.0	0.0	-

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

**Table 25A-01.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1999	480	40	38	63	0	29	0	4	34/49
2004	420	-	0	81	19	19	0	5	27/44
2009	420	-	14	86	0	5	0	5	30/59
2013	380	-	5	95	0	11	16	0	30/63
2018	420	60	10	91	0	14	0	0	38/69
2023	740	-	43	46	11	5	19	8	- / -
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
1999	40	-	0	100	0	0	0	0	20/21
2004	60	-	0	100	0	0	0	0	15/19
2009	40	-	0	100	0	100	0	100	20/19
2013	-	-	-	-	-	-	-	-	29/44
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1999	40	-	50	50	0	0	0	0	46/40
2004	-	-	-	-	-	-	-	-	44/49
2009	20	-	0	100	0	0	0	0	60/78
2013	20	-	100	0	0	0	0	0	92/134
2018	20	-	100	0	0	0	0	0	68/118
2023	-	-	-	-	-	-	-	-	- / -



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	66/102
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	240	-	0	100	0	0	0	0	79/110
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	20	-	0	100	0	0	0	0	23/18
2004	120	-	0	100	0	0	0	0	28/36
2009	460	-	4	96	0	0	0	0	19/27
2013	780	-	8	90	3	3	0	85	15/18
2018	2880	20	0	96	4	0	0	2	20/26
2023	1040	40	8	92	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	20	-	0	100	0	0	0	0	- / -
2009	40	-	0	0	100	0	0	100	- / -
2013	20	-	0	100	0	0	0	0	- / -
2018	40	-	0	100	0	0	0	0	- / -
2023	20	-	0	100	0	0	0	100	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1999	60	-	0	100	0	0	0	0	11/32
2004	40	-	0	100	0	0	0	0	14/27
2009	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	100	15/34
2018	80	-	0	100	0	0	0	0	7/23
2023	120	-	17	83	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1999	60	-	0	100	0	0	0	0	- / -

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

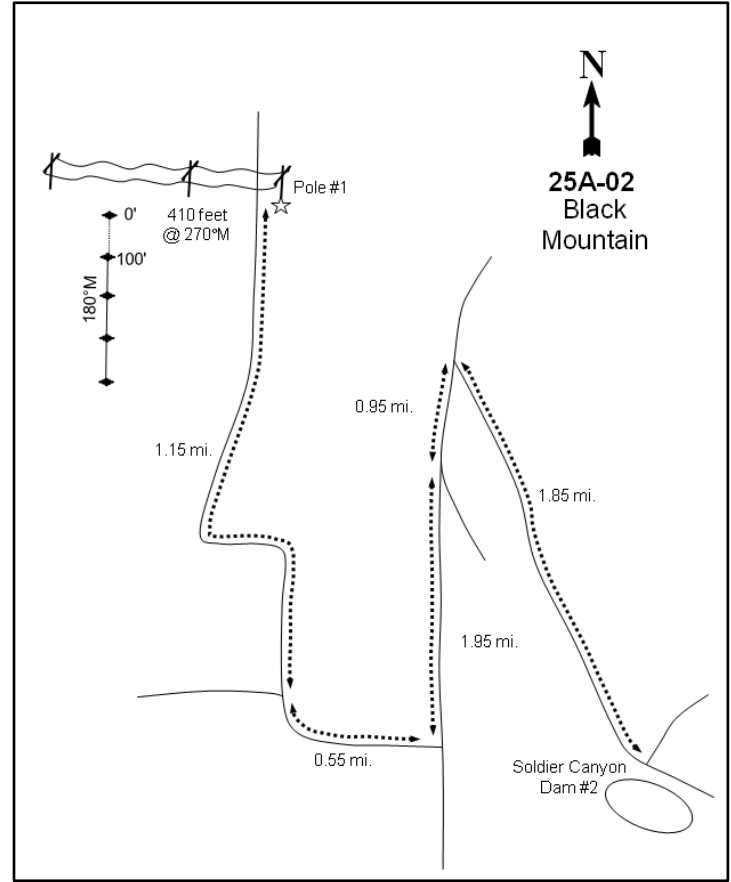
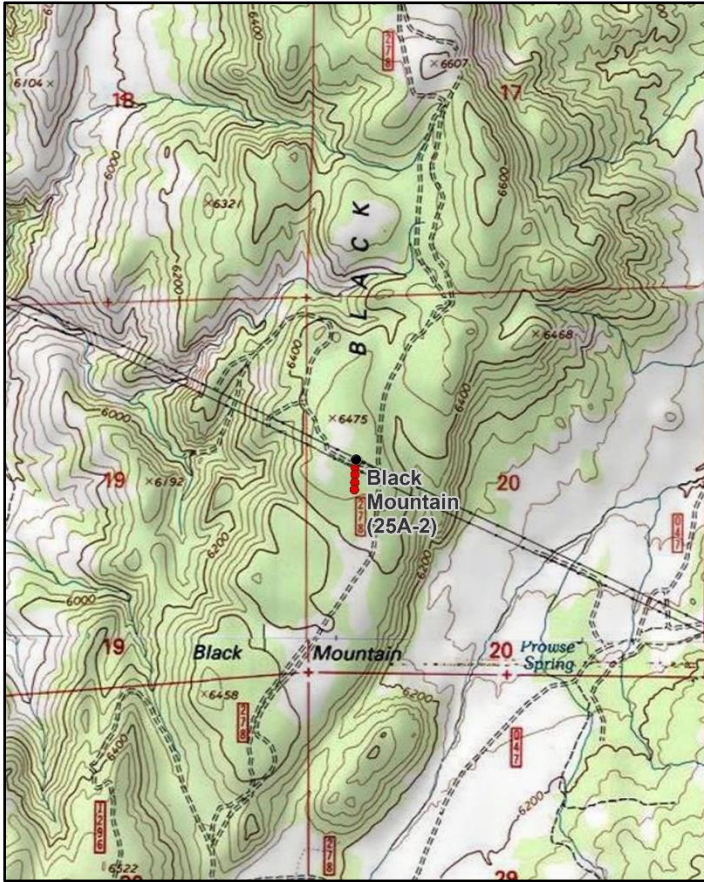
**Table 25A-01.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1999	27	-	-	-	-	-	13.4
2004	28	-	31	23	23	23	11.6
2009	11	-	57	43	-	-	10.9
2013	14	13	50	25	-	13	7.0
2018	15	11	44	33	11	-	8.7
2023	14	71	-	14	14	-	15.9
<b>Pinus edulis (twoneedle pinyon)</b>							
1999	41	-	-	-	-	-	10.9
2004	40	-	-	75	13	13	11.9
2009	3	-	-	67	-	33	12.0
2013	6	-	25	50	25	-	8.0
2018	13	50	50	-	-	-	2.5
2023	4	33	-	67	-	-	9.0

**Table 25A-01.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	0.0	0.0	0.0	23.2	0.0	7.3	0.0	<b>30.5</b>	Very Poor
2004	1.1	0.0	0.0	30.0	-0.1	1.1	0.0	<b>32.1</b>	Very Poor
2009	1.0	0.0	0.0	30.0	0.0	2.0	0.0	<b>32.9</b>	Very Poor
2013	1.1	0.0	0.0	30.0	0.0	1.3	0.0	<b>32.4</b>	Very Poor
2018	0.8	0.0	0.0	30.0	-0.2	0.6	0.0	<b>31.2</b>	Very Poor
2023	1.1	0.0	0.0	30.0	-0.2	0.8	0.0	<b>31.7</b>	Very Poor

## BLACK MOUNTAIN - STUDY NO. 25A-2

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Salina SW; Township 22S, Range 1E, Section 20  
NAD 83 UTM ZONE 12, 428021 East 4303957 North

**Transect Information**

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

7028  
180° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

From Soldier Canyon Dam #2, proceed 1.85 miles west on Soldier Canyon Road to Black Mountain Road. Make a sharp left turn onto this road and travel south-southeast for 0.95 miles to a junction. Take the right fork and continue for 0.85 miles to the double high-tension powerlines. The transect starts under these lines on the mesa to the right. Continue 1.1 miles beyond the powerlines to a 90-degree fork to the right. Turn right and go 0.55 miles to another fork. Stay to the right and proceed 1.15 miles up the hill and across a chaining until you are between the powerlines. Starting from the pole (#1) east of the road, walk 410 feet west directly under the lines to the start of the frequency baseline which is marked by browse tag #7028. A new 400-foot rebar stake was placed in 2018 as the original was more than 100 feet from the 300-foot stake. As a result, there are two stakes near the 400-foot mark: use the stake closest to the 300-foot stake to set up transect.

**Site Information**

Land Ownership: Federal  
Land Administrator: USFS  
Allotment: Browns Hole Allotment  
Elevation: 6,400ft (1,951m)  
Aspect: South  
Slope: 5%  
Sample Dates: 08/12/1999, 08/24/2004, 06/11/2009, 08/26/2013, 07/02/2018, 06/28/2023

**Table 25A-02.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1984	-
Seeding - Seed Unknown	-	-	1984	-
Harrow - Two-Way Dixie	Fishlake NF PJ Maintenance-Sagebrush Enhancement - Year 1	216	Fall 2005	4079
Mechanical - Bullhog	-	-	Between 1999 and 2004	-

**Wildlife Habitat and Vegetation History****Table 25A-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 25A-02.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Perennial Grass	Phase I
1991	Perennial Grass	Phase I
1999	Perennial Grass	Phase I
2004	Perennial Grass/Yellow Rabbitbrush	Phase I
2009	Perennial Grass/Yellow Rabbitbrush	Phase I
2013	Perennial Grass/Yellow Rabbitbrush	Phase I
2018	Perennial Grass/Yellow Rabbitbrush	Phase I
2023	Yellow Rabbitbrush	Phase I

**Site Notes**

The site may have been treated by a brush saw or lop and scatter. The nearest water source is approximately one and a half to two miles away.

**Soils****Table 25A-02.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.6	50.0	25.1	24.9	3.5	5.7	316.8	0.6	08/12/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation                      12 inches  
 NRCS Ecological Site    Upland Loam (Black Sagebrush)  
 NRCS Ecological Site #    R047XB309UT  
 States and Transitions    No state and transition model is available for this ecological site.

When established in 1985, this study site was dominated by perennial grasses (Pre-1992 Data). The area was chained in 1984, but young twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) had begun to reestablish (Photos). Following a bullhog treatment between 1999 and 2004 and a harrow treatment in 2005 (Table 25A-02.1), the site transitioned into a seeded introduced perennial grass state with yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) as a codominant component. Perennial grass cover and abundance decreased as of the most recent sampling, however, leaving yellow rabbitbrush as the sole dominant vegetation type in 2023. Forbs and other shrub species have been minor components in all sample years (Table 25A-02.7, Table 25A-02.10, Table 25A-02.11, Table 25A-02.12, Table 25A-02.13). Although the site has remained within Phase I of woodland succession throughout the duration of the study, the extant tree component (Table 25A-02.4, Table 25A-02.12, Table 25A-02.14) indicates that there may be potential for infilling over time.

Increasing sagebrush cover, density, and reproduction would likely benefit elk that may use the area during the winter (Table 25A-02.3; Wambolt, 1996). According to pellet transect data, elk presence was moderate and mule deer presence was high in 2023 (Table 25A-02.9).

## Trend Summary Tables

**Table 25A-02.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1999	1.7	2.1	1.9	-	-	-
2004	1.2	2.0	2.4	1.5	3.3	1.8
2009	0.9	2.4	1.9	1.1	3.8	2.0
2013	1.4	4.6	2.3	1.6	8.0	2.0
2018	1.6	5.8	3.5	2.0	7.2	2.2
2023	2.0	6.8	3.7	2.3	8.3	3.0

**Table 25A-02.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1999	144	289	222	16	1.3	8.1	0.6	0.1
2004	15	286	251	-	0.2	12.2	2.5	-
2009	26	263	360	9	0.5	10.5	6.0	0.2
2013	67	311	406	23	0.4	16.6	2.8	0.1
2018	91	281	352	9	0.6	11.4	4.5	0.0
2023	119	185	419	35	1.0	2.5	5.3	0.1

**Table 25A-02.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1999	29.7	0.1	21.7	11.5	4.7	18.3
2004	26.5	1.0	29.6	31.4	4.8	19.8
2009	27.0	1.0	34.1	16.2	5.6	22.3
2013	26.2	1.7	32.0	11.8	5.3	30.8
2018	45.6	0.7	37.0	7.5	4.8	25.4
2023	27.4	0.1	26.7	23.7	5.6	19.0

**Table 25A-02.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1999	16	24	15	18
2004	6	39	16	56
2009	16	37	8	42
2013	11	19	14	12
2018	4	16	7	42
2023	3	21	5	1
Year	Days Use Per Acre (ha)			
1999	24.0 (59.2)	77.7 (192.0)	37.5 (92.7)	-
2004	12.3 (30.5)	51.6 (127.5)	20.1 (49.7)	-
2009	36.3 (89.7)	43.6 (107.6)	14.7 (36.4)	-
2013	39.2 (96.8)	21.5 (53.0)	28.8 (71.2)	-
2018	2.9 (7.2)	26.8 (66.2)	5.3 (13.2)	-
2023	22.5 (55.6)	46.2 (114.2)	24.8 (61.2)	-

**Table 25A-02.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Pleuraphis jamesii (James' galleta)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency													
1999	105	42	83	144	85	30	-	-	-	7	5	12	7	47
2004	117	108	11	15	83	2	-	-	-	2	5	6	11	63
2009	148	82	11	26	33	-	-	2	-	-	5	11	16	65
2013	138	160	17	67	30	1	2	-	-	-	12	8	21	72
2018	38	167	21	91	41	8	10	-	-	5	16	28	21	47
2023	46	129	5	119	12	-	2	-	7	2	1	-	3	11
year	Average Cover (%)													
1999	2.9	0.8	1.2	1.3	1.6	0.4	-	-	-	0.1	0.1	0.1	0.1	0.9
2004	4.1	3.3	0.1	0.2	2.7	0.0	-	-	-	0.0	0.0	0.2	0.5	1.3
2009	5.7	2.5	0.1	0.5	0.7	-	-	0.0	-	-	0.0	0.2	0.4	0.7
2013	5.6	6.1	0.4	0.4	1.2	0.2	0.0	-	-	-	0.2	0.4	0.7	1.9
2018	0.8	6.0	0.5	0.6	0.8	0.1	0.2	-	-	0.1	0.1	1.2	0.8	1.0
2023	0.4	1.7	0.0	1.0	0.2	-	0.0	-	0.1	0.0	0.0	-	0.0	0.1

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

**Table 25A-02.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis (rockcress)	Astragalus (milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cryptantha (cryptantha)	Eriogonum ovalifolium (cushion buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gilia inconspicua <sup>a</sup> (shy gilia)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency										
1999	-	216	-	15	-	-	1	-	-	-	10
2004	-	145	-	-	198	-	-	-	-	10	-
2009	-	234	-	7	312	-	-	2	-	-	-
2013	-	357	3	14	335	1	3	3	-	-	-
2018	4	351	-	-	39	1	4	-	6	-	-
2023	3	399	-	-	301	32	-	1	3	3	-
year	Average Cover (%)										
1999	-	0.6	-	0.1	-	-	0.0	-	-	-	0.0
2004	-	1.3	-	-	1.1	-	-	-	-	0.0	-
2009	-	1.9	-	0.2	4.0	-	-	0.0	-	-	-
2013	-	1.6	0.0	0.1	1.2	0.0	0.0	0.0	-	-	-
2018	0.0	4.4	-	-	0.1	0.0	0.0	-	0.0	-	-
2023	0.0	3.7	-	-	1.6	0.1	-	0.0	0.0	0.0	-

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

**Table 25A-02.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)								
	year								
Artemisia nova <sup>p</sup> (black sagebrush)	1999	-	-	-	-	-	-	-	
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	2004	1.5	-	-	3.3	-	-	1.8	
Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	2009	1.1	-	-	3.8	-	-	2	
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	2013	1.6	-	-	8	-	0	2	
Ericameria nauseosa (rubber rabbitbrush)	2018	1.9	0.1	-	7.1	-	0.1	2.2	
Gutierrezia sarothrae (broom snakeweed)	2023	1.6	-	0.7	8.3	-	-	3	
Juniperus osteosperma <sup>i</sup> (Utah juniper)	year	Quadrat Cover (%)							
Pinus edulis <sup>i</sup> (twoneedle pinyon)	1999	1.7	-	-	2.1	-	-	1.8	0.0
	2004	1.0	0.1	-	2.0	-	-	2.3	0.1
	2009	0.9	-	-	2.4	-	-	1.9	-
	2013	1.4	0.0	-	4.6	0.0	0.0	2.3	-
	2018	0.9	0.6	0.1	5.8	-	0.0	3.5	-
	2023	1.6	0.0	0.5	6.8	-	-	3.7	-

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

**Table 25A-02.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1999	860	20	21	74	5	40	0	0	28/45
2004	540	-	0	37	63	22	15	48	28/47
2009	480	-	8	50	42	38	21	8	23/38
2013	440	80	5	91	5	55	27	5	22/44
2018	740	-	27	70	3	14	0	0	21/39
2023	900	-	42	51	7	36	20	7	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1999	40	-	100	0	0	100	0	0	32/42
2004	40	-	0	50	50	50	50	50	28/38
2009	-	-	-	-	-	-	-	-	47/112
2013	100	-	0	80	20	20	20	20	42/64
2018	240	-	83	17	0	0	8	0	51/82
2023	-	-	-	-	-	-	-	-	- / -
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	13/22
2013	-	-	-	-	-	-	-	-	- / -
2018	60	-	0	100	0	0	0	0	- / -
2023	740	-	5	92	3	65	30	3	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	2200	40	25	73	3	20	16	16	37/58
2004	1400	-	0	96	4	0	6	3	33/58
2009	4600	40	42	57	1	16	13	2	23/38
2013	4720	520	24	72	4	24	0	5	29/61
2018	8820	100	42	55	3	13	6	4	22/34
2023	6500	40	23	75	2	2	1	2	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	32/39
2013	20	-	100	0	0	0	0	0	54/64
2018	20	-	100	0	0	0	0	0	36/51
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	20/28
2018	20	-	0	100	0	0	0	0	13/17
2023	-	-	-	-	-	-	-	-	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1999	160	20	75	25	0	0	0	0	- / -
2004	80	-	25	75	0	25	0	0	- / -
2009	-	-	-	-	-	-	-	-	-/-
2013	80	20	50	50	0	0	0	0	- / -
2018	100	-	40	60	0	0	0	0	- / -
2023	100	-	20	80	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	5/11
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
1999	20	-	100	0	0	0	0	100	- / -
2004	-	-	-	-	-	-	-	-	- / -

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

**Table 25A-02.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

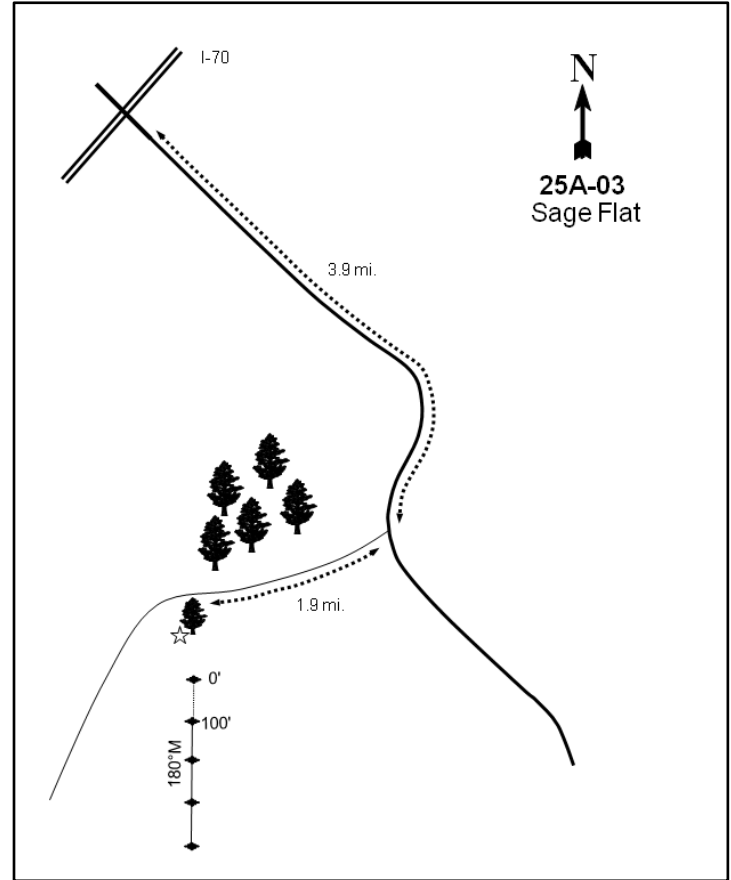
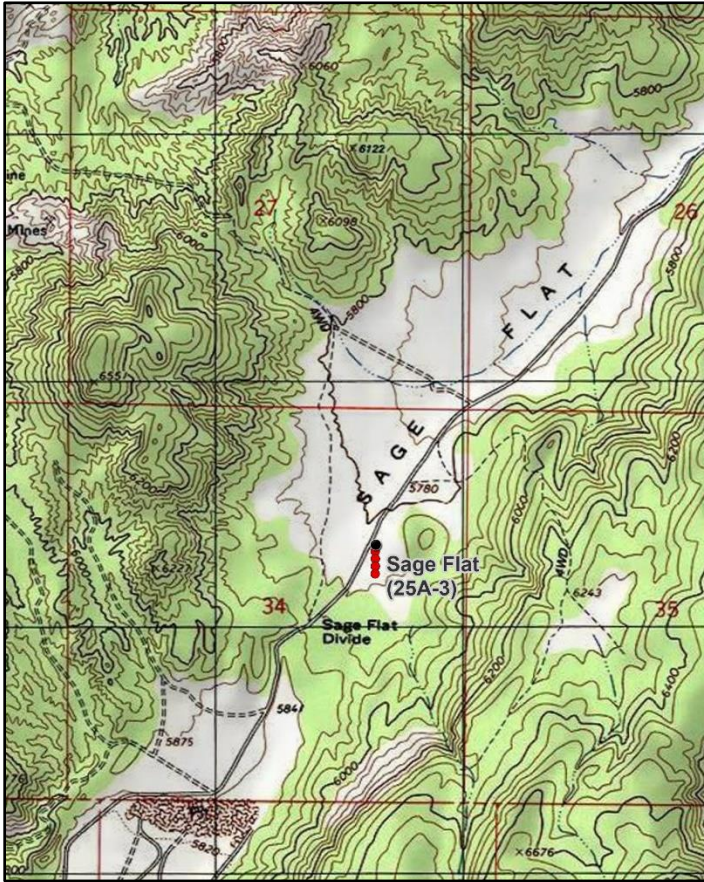
Year	Density Trees per Acre	Size Class Distribution					Average Diameter (cm)
		Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1999	75	-	-	-	-	-	5.8
2009	32	-	40	60	-	-	11.9
2013	32	13	40	27	13	7	6.5
2018	29	21	43	36	-	-	7.9
2023	23	33	11	33	22	-	11.4
<b>Pinus edulis (twoneedle pinyon)</b>							
1999	8	-	-	-	-	-	4.2
2009	3	-	100	-	-	-	9.0
2013	3	-	100	-	-	-	9.0
2018	18	-	50	50	-	-	3.0



**Table 25A-02.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	2.1	0.0	0.0	16.1	-1.0	0.2	0.0	<b>17.5</b>	Very Poor
2004	1.9	0.0	0.0	24.5	-0.1	0.0	0.0	<b>26.2</b>	Very Poor
2009	1.4	0.0	0.0	21.0	-0.4	0.3	0.0	<b>22.3</b>	Very Poor
2013	2.0	0.0	0.0	30.0	-0.3	0.3	0.0	<b>32.0</b>	Very Poor
2018	2.5	0.0	0.0	22.8	-0.5	0.0	0.0	<b>24.9</b>	Very Poor
2023	2.9	0.0	0.0	5.1	-0.8	0.1	0.0	<b>7.3</b>	Very Poor

## SAGE FLAT - STUDY NO. 25A-3

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Sigurd NE; Township 22S, Range 1W, Section 34  
NAD 83 UTM ZONE 12, 422656 East 4300339 North

**Transect Information**

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

7191  
180° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

Beginning at the point where Lost Creek Road passes under I-70 east of Aurora, proceed southeast up Lost Creek Road for 1.2 miles to a truck crossing. Continue past the truck crossing for 1.65 miles to a bridge, then 1.05 miles beyond the bridge to a road on the right. Turn right onto Sage Flat Road, then drive along this road for 1.9 miles to a slight bend with five junipers on the right side: stop the vehicle 20-30 yards beyond these trees. On the left (south) side of the road is a lone juniper. The baseline begins 15 feet south of this tree and the 0-foot stake is marked by browse tag #7191.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	GYPSUM
Elevation	5,800ft (1,768m)
Aspect	West
Slope	3-5%
Sample Dates	08/12/1999, 08/24/2004, 08/19/2009, 08/14/2013, 07/03/2018, 07/07/2023

**Wildlife Habitat and Vegetation History****Table 25A-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25A-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Wyoming Big Sagebrush/Annual Grass	Phase I
1991	Wyoming Big Sagebrush	Phase I
1999	Wyoming Big Sagebrush/Annual Grass	Phase I
2004	Wyoming Big Sagebrush/Annual Grass	Phase I
2009	Wyoming Big Sagebrush/Annual Grass	Phase I
2013	Wyoming Big Sagebrush/Annual Grass	Phase I
2018	Wyoming Big Sagebrush/Annual Grass	Phase I
2023	Wyoming Big Sagebrush/Annual Forb	Phase I

**Site Notes**

No Notes

**Soils****Table 25A-03.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.7	52.0	28.7	19.3	1.3	5.8	147.2	0.6	08/12/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation 11 inches  
 NRCS Ecological Site Semidesert Gravelly Loam (Wyoming Big Sagebrush)  
 NRCS Ecological Site # R047XB214UT  
 States and Transitions No state and transition model is available for this ecological site.

This study site has remained dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) since establishment in 1985 (Photos, Pre-1992 Data). The introduced annual grass species cheatgrass (*Bromus tectorum*) was a codominant vegetation component in most sample years through 2018, but decreased in 2023; the ecological resilience of the plant community on this site may be at risk if annual grasses increase again in future sample years. Cover and frequency of the weedy and introduced annual forb species desert madwort (*Alyssum desertorum*) and curvseed butterwort (*Ceratocephala testiculata*) increased in 2023, and annual forbs were codominant with sagebrush in that sample year (Table 25A-03.7, Table 25A-03.10, Table 25A-03.11). Cover of sagebrush has fluctuated, but density has exhibited a steadily decreasing trend (Table 25A-03.12, Table 25A-03.13). Little tree encroachment has occurred on this study site, and it has been considered to be within Phase I of woodland succession in all sample years (Table 25A-03.4, Table 25A-03.14). However, the site is in close proximity to a Utah juniper (*Juniperus osteosperma*) woodland (Photos), indicating that further encroachment may be possible in future sample years.

Deer winter range condition has ranged between very poor and fair since 1999. As of 2023, winter range condition was considered to be fair. Improvement to deer wintering range can be accomplished through efforts that support preferred browse reproduction; diversifying native perennial forbs while reducing cheatgrass would also improve winter range conditions (Table 25A-03.15). In addition, the sagebrush component of this site could provide valuable browse for elk during the winter (Table 25A-03.3; Wambolt, 1996). However, pellet group data indicates that elk presence has been low since the 1999 sample year. Mule deer presence was high between 1999 and 2009, but has since decreased and was considered to be moderate in 2023 (Table 25A-03.9).

## Trend Summary Tables

**Table 25A-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1999	14.8	-	-	-	-	-
2004	13.3	0.0	-	16.3	0.1	-
2009	8.8	0.1	-	10.7	0.1	-
2013	16.8	0.1	-	23.4	0.2	-
2018	11.3	0.0	-	12.2	-	-
2023	16.1	0.0	-	16.0	-	-

**Table 25A-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1999	429	4	194	-	14.9	0.2	2.3	-
2004	475	3	338	-	31.8	0.0	4.0	-
2009	438	-	372	-	27.2	-	12.1	-
2013	422	7	339	-	19.5	0.1	7.5	-
2018	391	-	344	3	10.1	-	5.5	0.0
2023	331	6	441	7	3.8	0.0	10.3	0.0

**Table 25A-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1999	19.9	0.1	36.8	10.2	1.3	30.4
2004	12.6	0.9	48.4	11.3	1.5	49.6
2009	16.1	0.0	42.6	4.9	1.2	45.3
2013	9.8	0.0	51.9	5.7	2.4	42.7
2018	24.6	0.1	60.1	8.8	1.9	30.2
2023	28.6	0.0	37.9	10.1	2.2	28.4

**Table 25A-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1999	2	53	-	35
2004	2	82	1	36
2009	1	69	2	60
2013	4	42	-	11
2018	-	7	1	51
2023	7	5	-	10
Year	Days Use Per Acre (ha)			
1999	5.8 (14.3)	123.3 (304.6)	4.0 (9.9)	-
2004	3.6 (9.0)	260.7 (643.9)	0.7 (1.7)	-
2009	7.2 (17.9)	187.7 (463.5)	-	-
2013	4.4 (10.8)	12.1 (29.8)	-	-
2018	9.4 (23.3)	12.1 (29.8)	-	-
2023	21.1 (52.0)	25.5 (62.9)	4.7 (11.6)	-

**Table 25A-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency		
Bromus tectorum <sup>ai</sup> (cheatgrass)			
Elymus elymoides (squirreltail)			
Sporobolus cryptandrus (sand dropseed)			
year	Average Cover (%)		
1999	429	3	1
2004	475	3	-
2009	438	-	-
2013	422	7	-
2018	391	-	-
2023	331	4	2
year	Average Cover (%)		
1999	14.9	0.0	0.2
2004	31.8	0.0	-
2009	27.2	-	-
2013	19.5	0.1	-
2018	10.1	-	-
2023	3.8	0.0	0.0

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

**Table 25A-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency									
Alyssum desertorum <sup>ai</sup> (desert madwort)										
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)										
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)										
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)										
Lactuca serriola <sup>ai</sup> (prickly lettuce)										
Lappula occidentalis <sup>a</sup> (flatspine stickseed)										
Salsola tragus <sup>ai</sup> (prickly Russian thistle)										
Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)										
Sphaeralcea coccinea (scarlet globemallow)										
Sphaeralcea grossularifolia (gooseberry/leaf globemallow)										
year	Average Cover (%)									
1999	28	160	-	-	-	-	-	20	-	-
2004	25	328	-	40	-	-	5	8	-	-
2009	127	336	-	79	-	-	-	31	-	-
2013	254	224	-	105	1	3	-	15	-	-
2018	318	36	-	96	4	22	-	-	3	-
2023	426	332	0	20	-	5	2	1	-	7
year	Average Cover (%)									
1999	0.2	0.9	-	-	-	-	-	1.2	-	-
2004	0.1	3.1	-	0.6	-	-	0.0	0.1	-	-
2009	1.5	8.0	-	2.2	-	-	-	0.4	-	-
2013	1.5	2.0	-	3.6	0.0	0.0	-	0.4	-	-
2018	4.2	0.1	-	1.2	0.0	0.1	-	-	0.0	-
2023	7.7	2.2	0.0	0.2	-	0.1	0.0	0.0	-	0.0

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

**Table 25A-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept	
	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Opuntia (pricklypear)
year	Line Intercept	
1999	-	-
2004	16.3	0.1
2009	10.7	0.1
2013	23.4	0.2
2018	12.2	-
2023	16	-
year	Quadrat Cover (%)	
1999	14.8	-
2004	13.3	0.0
2009	8.8	0.1
2013	16.8	0.1
2018	11.3	0.0
2023	16.1	0.0

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

**Table 25A-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
1999	3500	20	11	58	31	26	3	2	66/87
2004	3200	-	3	59	38	18	74	26	57/78
2009	2440	-	0	49	51	33	4	33	59/70
2013	2240	-	10	71	19	11	1	14	62/104
2018	1960	-	4	54	42	26	5	18	71/101
2023	1820	-	8	78	14	10	15	12	- / -
<b>Opuntia -- (pricklypear)</b>									
1999	20	-	0	100	0	0	0	0	- / -
2004	20	-	0	100	0	0	0	0	11/24
2009	20	-	0	100	0	0	0	0	10/40
2013	20	-	0	100	0	0	0	0	24/60
2018	-	-	-	-	-	-	-	-	8/17
2023	40	-	0	100	0	0	0	0	- / -

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

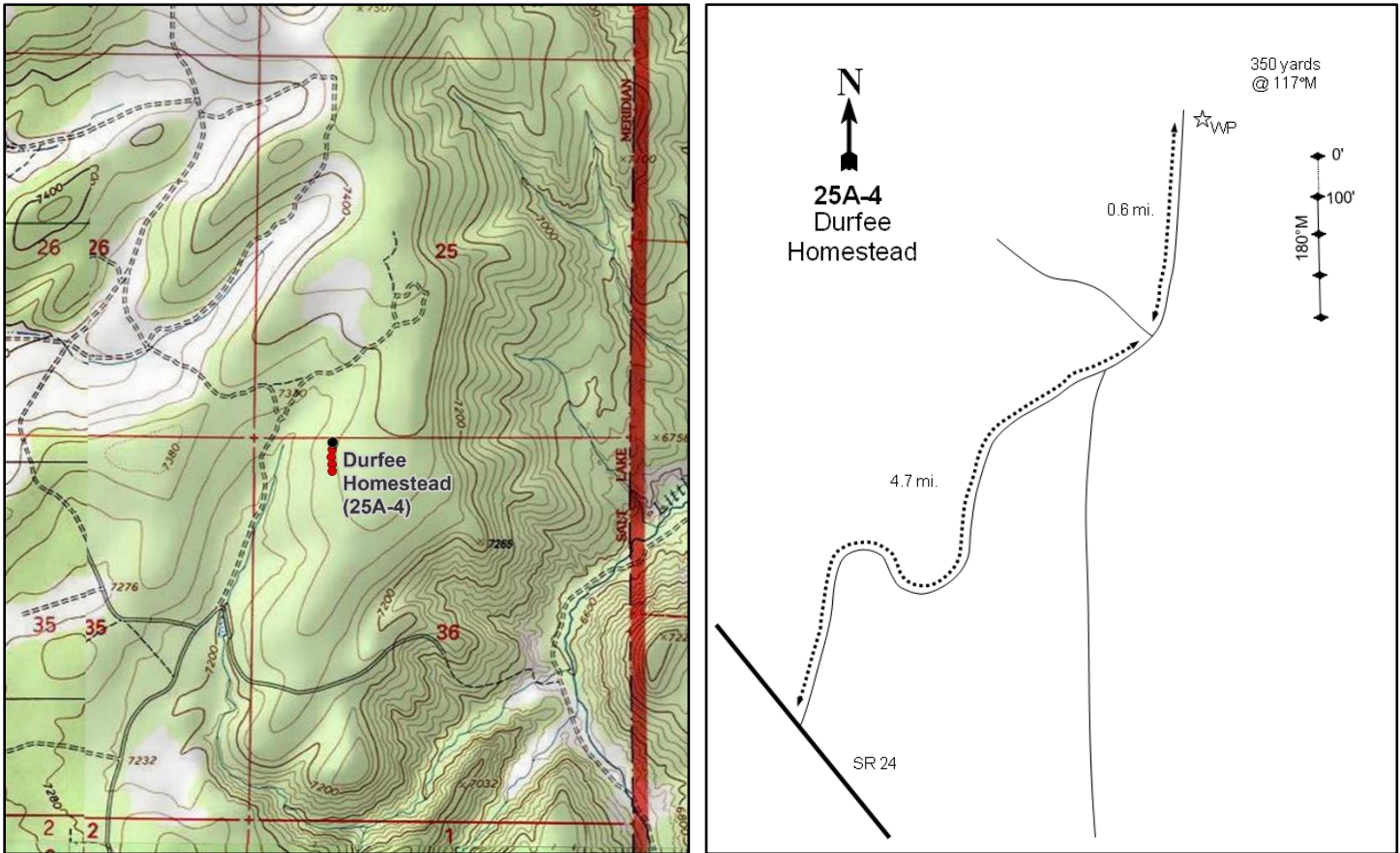
**Table 25A-03.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	5	-	-	-	-	100	49.5
2023	3	-	-	-	-	100	46.5

**Table 25A-03.15 - Deer Desirable Components Index: Semidesert Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	18.5	5.7	5.7	0.4	-11.2	0.0	0.0	<b>19.1</b>	Poor
2004	20.4	3.6	1.3	0.1	-20.0	0.0	0.0	<b>5.3</b>	Very Poor
2009	13.4	-0.2	0.0	0.0	-20.0	0.0	0.0	<b>-6.9</b>	Very Poor
2013	29.3	9.4	4.9	0.2	-14.6	0.0	0.0	<b>29.1</b>	Fair
2018	15.3	2.5	2.1	0.0	-7.6	0.0	0.0	<b>12.2</b>	Poor
2023	20.0	10.7	3.9	0.0	-2.9	0.1	0.0	<b>31.8</b>	Fair

## DURFEE HOMESTEAD - STUDY NO. 25A-4

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Rex Reservoir SW; Township 23S, Range 1W, Section 36  
NAD 83 UTM ZONE 12, 425009 East 4291073 North

**Transect Information**

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

7194  
180° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

From Sigurd, drive east on SR-24 to mile marker 21. Turn left (north) onto Sand Ledge Road and drive northeast for 1.6 miles. Turn left at the intersection and proceed north for 3.1 miles to an intersection with a trough and pond. Continue 0.1 miles to a road that goes up the bottom of the draw: travel on this road for 0.5 miles. Stop at the witness post (1/2-inch red rebar which is 2 feet tall on the east side of road) and walk out 350 yards at a bearing of 17 degrees magnetic from the witness post. The baseline starts in the chaining about 100 feet from the edge of the pinyon-juniper woodland, and the 0-foot baseline stake is marked by red browse tag #7194.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	GYPSUM
Elevation	7,400ft (2,256m)
Aspect	West
Slope	10%
Sample Dates	08/16/1999, 08/12/2004, 08/19/2009, 08/14/2013, 07/03/2018, 07/06/2023



**Table 25A-04.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1983	-
Seeding - Seed Unknown	-	-	1983	-
Fire - Prescribed Fire	Gypsum Sandledge Prescribed Fire	LTDL	August-September 1985	1000
Seeding - Aerial Unknown	Gypsum Sandledge Prescribed Fire	LTDL	October 1985	1000

**Table 25A-04.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Gypsum Burn			Aerial	Oct 1985	600
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Bromus inermis	Smooth Brome		2.00	0.00
G	Thinopyrum intermedium	Intermediate Wheatgrass		5.00	0.00
F	Medicago sativa	Alfalfa		2.00	0.00
F	Melilotus officinalis	Yellow Sweetclover		1.00	0.00

**Wildlife Habitat and Vegetation History****Table 25A-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25A-04.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Perennial Grass	Phase I
1999	Perennial Grass/Yellow Rabbitbrush	Phase I
2004	Perennial Grass/Yellow Rabbitbrush	Phase I
2009	Perennial Grass/Yellow Rabbitbrush	Phase I
2013	Perennial Grass/Yellow Rabbitbrush	Phase I
2018	Perennial Grass/Yellow Rabbitbrush	Phase I
2023	Perennial Grass/Yellow Rabbitbrush	Phase I

**Site Notes**

No Notes

**Soils****Table 25A-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
Clay Loam	7.5	34.0	38.7	27.3	4.3	38.1	214.4	0.7	08/16/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation                      18 inches  
 NRCS Ecological Site    Mountain Stony Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site #    R047XB462UT  
 States and Transitions    No state and transition model is available for this ecological site.

When the study was established in 1985, the plant community on this site consisted of a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with numerous other shrub species present in lesser amounts. The herbaceous understory was comprised of a mixture of native and intentionally introduced perennial grass species, while forbs were sparse (Photos, Pre-1992 Data). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were likely a major component of the study site prior to a 1983 chaining and 1985 fire (Table 25A-04.1). However, trees have been slow to reestablish in the years following treatment, and the site has been considered to be within Phase I of woodland succession in all sample years (Photos, Table 25A-04.4, Table 25A-04.14). Since 1991, the site has remained in a stable state with a mixture of introduced perennial and native grass species being a major vegetation component. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in all sample years since 1991, but in mostly low amounts (Table 25A-04.7, Table 25A-04.10). Photos show that much of the preferred browse component was detrimentally affected by the burn. Shrub species have increased over the duration of the study, with Gambel oak (*Quercus gambelii*) and yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) providing the most cover in 2023 (Table 25A-04.12, Table 25A-04.13). Without disturbance, browse species will likely continue to increase on this study site in future sample years.

Condition of deer winter range on this site has ranged from very poor to fair since 1999. As of 2023, deer winter range condition was considered to be fair. Improvement to deer wintering range can be accomplished through efforts that increase preferred browse cover and reproduction; diversifying native perennial forbs while reducing cheatgrass would also improve winter range conditions (Table 25A-04.15). In addition, increasing cover and reproduction of sagebrush could prove beneficial for wintering elk (Table 25A-04.3; Wambolt, 1996). However, pellet group data shows that both deer and elk presence have been low in almost all sample years since 1999 (Table 25A-04.9).

### Trend Summary Tables

**Table 25A-04.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1999	3.1	7.8	-	0.1	-	-
2004	4.0	7.4	-	4.9	12.8	1.0
2009	5.6	4.7	-	8.4	7.4	-
2013	5.7	5.0	0.0	9.2	6.7	1.4
2018	6.9	7.3	0.0	11.5	7.0	-
2023	11.8	7.0	0.9	10.7	5.3	1.2

**Table 25A-04.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1999	126	272	137	102	0.9	8.5	1.1	2.7
2004	110	230	273	107	2.6	9.6	1.3	2.7
2009	58	269	310	97	1.0	11.9	3.2	2.7
2013	30	307	149	117	0.2	15.9	0.7	2.1
2018	90	344	300	77	0.6	10.4	1.9	2.7
2023	21	347	244	100	0.1	19.3	1.2	3.7

**Table 25A-04.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1999	19.8	0.0	18.2	15.6	22.7	23.6
2004	8.7	0.0	14.9	29.0	29.7	27.2
2009	12.9	0.4	23.9	29.5	22.6	31.9
2013	9.2	0.0	26.0	16.1	34.2	29.5
2018	8.9	0.2	39.4	18.9	32.9	32.3
2023	9.8	0.0	21.6	19.5	23.2	35.4

**Table 25A-04.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1999	9	7	9	8
2004	1	11	7	56
2009	2	10	7	13
2013	2	8	4	12
2018	-	4	3	40
2023	2	4	5	14
Year	Days Use Per Acre (ha)			
1999	16.7 (41.2)	15.4 (38.1)	32.8 (81.1)	-
2004	3.6 (9.0)	14.7 (36.4)	6.7 (16.6)	-
2009	10.9 (26.9)	13.4 (33.1)	8.7 (21.5)	-
2013	-	7.4 (18.2)	3.4 (8.3)	-
2018	3.6 (9.0)	2.7 (6.6)	1.3 (3.3)	-
2023	1.5 (3.6)	0.7 (1.7)	3.4 (8.3)	-

**Table 25A-04.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus arvensis <sup>ai</sup> (field brome)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency										
1999	0	4	-	91	126	2	27	34	89	144	21
2004	-	9	-	92	110	-	10	16	40	139	15
2009	-	16	-	122	58	4	11	40	74	121	21
2013	2	3	-	161	30	8	3	35	110	130	42
2018	2	8	-	189	90	2	8	61	112	133	29
2023	0	4	2	219	21	2	12	21	56	109	34
year	Average Cover (%)										
1999	0.0	0.0	-	2.7	0.9	0.0	0.2	0.3	1.3	3.6	0.4
2004	-	0.1	-	2.4	2.6	-	0.1	0.5	0.4	5.6	0.6
2009	-	0.3	-	4.3	1.0	0.1	0.1	1.6	0.9	4.2	0.4
2013	0.0	0.0	-	7.7	0.2	0.4	0.1	0.9	1.8	4.2	0.8
2018	0.0	0.1	-	4.4	0.6	0.1	0.1	1.6	1.1	2.4	0.6
2023	0.0	0.1	0.0	11.6	0.1	0.0	0.6	0.3	0.4	4.9	1.3

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

**Table 25A-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus beckwithii (Beckwith's milkvetch)	Astragalus purshii (woollypod milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Collomia linearis <sup>a</sup> (tiny trumpet)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawkbeard)	Cymopterus longipes (longstalk springparsley)	Draba <sup>a</sup> (draba)
year	Nested Frequency																
1999	18	-	-	-	3	3	-	-	8	11	44	10	1	1	-	-	6
2004	4	-	-	-	4	4	-	-	73	-	42	200	59	-	2	-	3
2009	2	-	65	-	-	-	-	-	208	-	22	81	3	1	13	-	-
2013	2	3	62	-	15	3	3	-	66	-	38	65	-	1	1	3	10
2018	1	1	262	8	3	-	-	1	98	-	8	28	-	2	0	2	-
2023	8	8	137	-	5	5	3	0	157	-	3	104	1	2	-	-	-
year	Average Cover (%)																
1999	0.2	-	-	-	0.0	0.0	-	-	0.0	0.0	1.2	0.0	0.0	0.0	-	-	0.0
2004	0.0	-	-	-	0.0	0.0	-	-	0.2	-	1.3	0.5	0.2	-	0.0	-	0.0
2009	0.1	-	0.5	-	-	-	-	-	1.7	-	0.6	0.4	0.0	0.0	0.1	-	-
2013	0.0	0.0	0.2	-	0.0	0.0	0.0	-	0.3	-	0.6	0.1	-	0.0	0.0	0.0	0.0
2018	0.0	0.0	1.7	0.2	0.0	-	-	0.0	0.2	-	0.2	0.1	-	0.0	0.0	0.0	-
2023	0.0	0.0	0.3	-	0.0	0.1	0.0	0.0	0.5	-	0.0	0.3	0.0	0.0	-	-	-

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

FORB SPECIES	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lepidium <sup>a</sup> (pepperweed)	Lomatium (desertparsley)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Petradoria pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	
year	Nested Frequency																	
1999	41	6	22	6	4	22	-	-	-	17	-	24	6	3	8	3	63	
2004	5	2	5	6	2	26	-	7	-	4	-	70	19	29	34	-	0	
2009	-	-	1	7	1	-	-	-	-	1	0	84	17	30	24	5	1	
2013	2	4	6	13	4	5	1	2	-	2	-	-	20	19	20	-	-	
2018	-	-	3	16	-	-	-	-	-	-	-	-	36	5	-	-	3	
2023	-	1	12	8	-	0	-	-	5	-	-	12	41	8	3	-	7	
year	Average Cover (%)																	
1999	0.1	0.0	0.4	0.0	0.0	0.2	-	-	-	0.1	-	0.1	0.6	0.0	0.0	0.0	0.7	
2004	0.0	0.0	0.0	0.2	0.0	0.1	-	0.0	-	0.0	-	0.2	0.8	0.1	0.1	-	0.0	
2009	-	-	0.0	0.1	0.1	-	-	-	-	0.0	0.0	0.4	1.0	0.5	0.2	0.1	0.0	
2013	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	-	0.0	-	-	1.0	0.0	0.0	-	-	
2018	-	-	0.0	0.0	-	-	-	-	-	-	-	-	2.2	0.0	-	-	0.0	
2023	-	0.0	0.2	0.3	-	0.0	-	-	0.0	-	-	0.0	2.9	0.0	0.0	-	0.0	

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

FORB SPECIES	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested	
1999	-	-
2004	-	-
2009	-	2
2013	-	2
2018	3	-
2023	3	-
year	Average Cover (%)	
1999	-	-
2004	-	-
2009	-	0.0
2013	-	0.0
2018	0.0	-
2023	0.0	-

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

**Table 25A-04.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca <sup>p</sup> (rubber rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Sambucus nigra ssp. cerulea <sup>p</sup> (blue elderberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)											
1999	-	-	-	-	-	-	-	-	-	-	-	-
2004	0.1	0.9	0.3	6.9	0.1	-	5.9	1	0.6	2.5	0.4	-
2009	0.1	1.2	-	7.1	0.2	-	0.2	-	1.6	4.8	0.5	0.1
2013	0.2	1	-	5.9	0.3	0.2	0.6	1.4	1.9	4.9	0.7	0.2
2018	-	1.1	0.5	4.9	0.2	-	2	-	2	7.5	0.2	0.1
2023	0.1	0.9	0.2	4.8	0.1	0.3	0.3	1.2	1.6	7.5	-	0.2
year	Quadrat Cover (%)											
1999	0.0	0.1	0.0	6.4	0.2	-	1.4	-	0.3	2.0	0.4	0.0
2004	0.0	0.4	0.3	5.0	0.0	-	2.4	0.0	0.4	2.2	0.6	-
2009	0.0	0.3	0.3	4.5	0.0	0.1	0.1	-	0.6	3.6	0.6	0.0
2013	0.0	0.7	-	4.5	0.0	0.2	0.2	0.0	1.0	2.9	0.8	0.3
2018	0.0	1.1	0.3	4.8	0.0	0.2	2.4	0.0	1.4	3.7	0.1	0.0
2023	0.1	1.2	0.0	5.8	0.6	0.2	1.1	0.9	2.0	7.0	0.6	0.1

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

**Table 25A-04.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1999	-	20	0	0	0	0	0	0	50/71
2004	20	-	0	100	0	0	100	0	36/44
2009	20	-	0	100	0	0	0	0	53/63
2013	20	-	100	0	0	100	0	0	- / -
2018	20	-	100	0	0	100	0	0	58/62
2023	20	-	0	100	0	100	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1999	20	-	0	100	0	0	0	0	88/135
2004	100	-	20	80	0	40	0	0	41/56
2009	140	-	0	86	14	0	0	14	48/58
2013	180	-	0	100	0	44	0	0	46/70
2018	240	-	25	75	0	0	0	0	61/83
2023	220	-	27	64	9	0	0	9	- / -
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
1999	-	-	-	-	-	-	-	-	47/68
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1999	140	-	0	100	0	29	0	0	12/19
2004	260	-	0	77	23	31	69	8	9/19
2009	280	-	0	100	0	0	0	0	10/25
2013	20	-	0	100	0	0	0	100	8/16
2018	280	-	0	100	0	7	93	0	12/26
2023	380	-	5	95	0	0	0	0	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	3660	-	6	78	17	1	0	8	35/58
2004	4660	-	5	74	21	3	4	41	32/60
2009	3640	100	8	89	3	0	0	3	33/54
2013	3140	20	26	67	8	2	0	13	34/57
2018	4620	-	4	90	6	1	0	0	25/40
2023	2860	100	11	88	1	0	0	4	- / -
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1999	60	-	0	100	0	100	0	0	8/32
2004	120	-	0	100	0	0	0	0	19/37
2009	200	-	0	100	0	0	0	0	16/29
2013	220	100	0	100	0	0	0	0	17/35
2018	180	-	0	100	0	56	44	0	12/27
2023	300	-	27	73	0	27	7	0	- / -
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1999	60	-	0	100	0	0	0	0	57/81
2004	40	20	0	100	0	0	100	0	45/60
2009	20	-	0	100	0	0	0	0	60/81
2013	20	-	0	100	0	0	0	0	51/57
2018	100	-	0	100	0	20	80	0	44/30
2023	20	-	0	0	100	0	0	100	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	1700	20	6	94	0	0	1	0	21/26
2004	10200	20	3	97	0	0	0	0	24/32
2009	620	-	3	97	0	0	0	0	20/16
2013	640	60	13	88	0	3	0	0	18/23
2018	3600	-	18	81	1	1	0	2	24/27
2023	1800	-	6	94	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	-	80	0	0	0	0	0	0	- / -
2018	20	80	100	0	0	0	0	0	- / -
2023	80	-	75	25	0	0	0	0	- / -
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1999	40	-	0	100	0	0	100	0	52/121
2004	20	-	0	100	0	0	100	0	55/137
2009	40	-	0	100	0	0	0	0	61/172
2013	80	-	25	75	0	50	25	50	83/205
2018	40	-	0	100	0	0	0	0	75/170
2023	120	-	0	100	0	17	33	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1999	260	-	0	100	0	0	0	0	175/159
2004	600	-	10	90	0	0	0	0	130/93
2009	100	-	0	100	0	0	0	0	167/176
2013	560	-	0	100	0	0	0	0	131/95
2018	520	200	0	100	0	0	0	0	148/128
2023	280	-	0	100	0	7	0	0	- / -
<b>Sambucus nigra ssp. cerulea<sup>p</sup> -- (blue elderberry)</b>									
1999	20	-	0	100	0	0	0	100	109/131
2004	20	-	0	100	0	0	100	0	131/133
2009	60	-	33	67	0	0	0	0	95/109
2013	180	-	33	67	0	0	0	0	125/50
2018	20	-	0	100	0	0	100	0	- / -
2023	20	-	0	100	0	0	0	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1999	100	-	0	100	0	20	0	0	16/36
2004	40	-	0	100	0	50	0	0	34/58
2009	80	-	0	50	50	25	0	50	24/54
2013	340	-	6	88	6	41	24	53	22/48
2018	60	-	0	100	0	33	33	0	32/69
2023	120	40	0	100	0	33	17	0	- / -

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

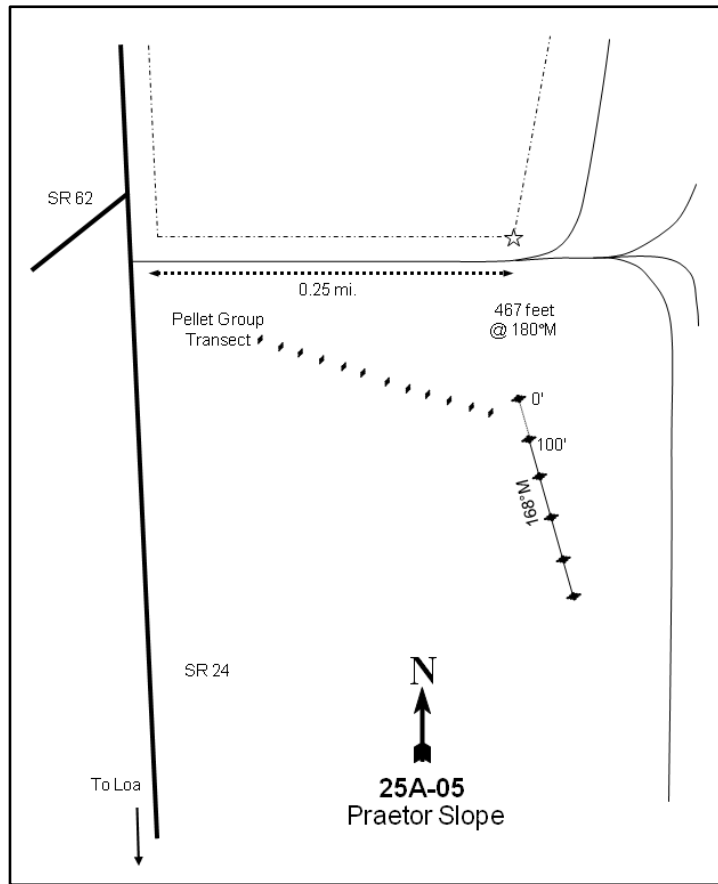
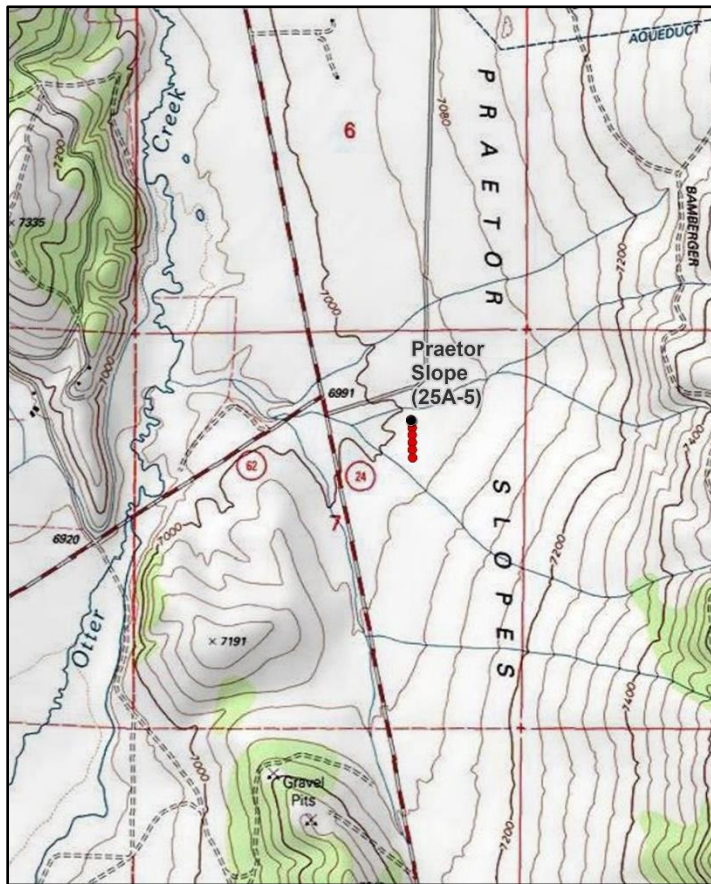
**Table 25A-04.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	16	75	25	-	-	-	2.0
2023	21	57	43	-	-	-	1.9

**Table 25A-04.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	3.5	0.0	0.0	17.1	-0.7	5.5	0.0	<b>25.4</b>	Very Poor
2004	5.8	0.0	0.0	19.2	-1.9	5.3	0.0	<b>28.4</b>	Very Poor
2009	9.9	14.4	1.0	23.7	-0.7	5.5	0.0	<b>53.7</b>	Poor-Fair
2013	11.0	15.0	4.9	30.0	-0.1	4.2	0.0	<b>65.0</b>	Fair
2018	13.1	15.0	1.2	20.9	-0.5	5.5	0.0	<b>55.1</b>	Poor-Fair
2023	11.9	14.5	1.6	30.0	-0.1	7.5	0.0	<b>65.4</b>	Fair

## PRAETOR SLOPE - STUDY NO. 25A-5



### Location Information

USGS 7.5 min Map Info Burrville NW; Township 26S, Range 1E, Section 07  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 427257 East 4268970 North

### Transect Information

Browse Tag # (0' Stake) 55  
 Transect Bearing 168° magnetic  
 Length 500ft  
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
 Belt Marker Placement Standard

### Directions to Site

From the junction of SR-62 and SR-24 south of Koosharem Reservoir, proceed south for 25 yards and turn left onto a dirt road. Go through the gate, follow the road for 0.25 miles to where the road turns at the fence corner, and park. Walk 467 feet due south from the fence corner to the top of a small rise. The baseline starts here, and the 0-foot stake is marked by a 5-foot tall steel fence post with a blue browse tag #55.

### Site Information

Land Ownership Federal  
 Land Administrator BLM  
 Allotment FISHLAKE  
 Elevation 7,000ft (2,134m)  
 Aspect West  
 Slope 2-5%  
 Sample Dates 08/23/1999, 08/10/2004, 08/19/2009, 08/14/2013, 07/09/2018, 06/26/2023



**Table 25A-05.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	Praetor Slopes Reseeding	LTDL	May 1963	1400
Seeding - Rangeland Drill	Praetor Slopes Reseeding	LTDL	Spring 1964	1440
Harrow - Two-Way Dixie	-	PDB	2002	3000
Seeding - Seed Unknown	-	PDB	2002	3000

**Table 25A-05.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Praetor Slopes Reseeding			Drill	Nov 1963	1440
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Agropyron cristatum</i>	Desert Wheatgrass		7.00	0.00

**Wildlife Habitat and Vegetation History****Table 25A-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25A-05.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Wyoming Big Sagebrush	No Encroachment
1991	Wyoming Big Sagebrush	No Encroachment
1999	Wyoming Big Sagebrush	No Encroachment
2004	Perennial Grass	No Encroachment
2009	Perennial Grass	No Encroachment
2013	Perennial Grass	No Encroachment
2018	Perennial Grass	No Encroachment
2023	Perennial Grass/Wyoming Big Sagebrush	No Encroachment

**Site Notes**

No Notes

**Soils****Table 25A-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
Loam	7.6	36.0	39.1	24.9	1.7	14.7	361.6	0.9	08/23/1999

**Site Potential**

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

Upon study establishment in 1985, the plant community on this site was a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and crested wheatgrass (*Agropyron cristatum*) (Photos, Pre-1992 Data). A 2002 harrow treatment removed most of the sagebrush (Table 25A-05.1, Table 25A-05.12, Table 25A-05.13). The site then transitioned to an introduced perennial grass state with crested wheatgrass as the dominant species; diversity of the herbaceous understory has remained limited (Table 25A-05.10, Table 25A-05.11). Sagebrush was a minor site component from 2004 through 2018. However, cover and density of sagebrush increased significantly in 2023, and it was considered to be codominant with crested wheatgrass in that year (Table 25A-05.12, Table 25A-05.13).

Deer winter range condition has ranged between very poor and excellent since 1999. As of 2023, deer winter range condition was considered to be good to excellent. Improvement to deer wintering range can be accomplished through efforts that increase preferred browse cover; diversifying native perennial forbs would also improve winter range conditions (Table 25A-05.15). In addition, the sagebrush component of this site could provide valuable browse for elk during the winter (Table 25A-05.3; Wambolt, 1996). However, pellet group data indicates that elk pellet groups were not observed in 2013 and that presence was low in 2018 and 2023. Deer pellets groups were not observed during the most recent sample year (Table 25A-05.9).

## Trend Summary Tables

**Table 25A-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
1999	12.0	-	-	-	-	-
2004	0.3	-	-	0.3	0.1	-
2009	1.0	-	-	0.6	-	-
2013	1.2	0.0	-	3.1	-	-
2018	2.3	-	-	3.1	-	-
2023	9.8	0.2	-	12.8	-	-

**Table 25A-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
1999	-	358	31	-	-	16.3	0.1	-
2004	-	305	203	100	-	27.6	2.2	1.9
2009	-	351	323	21	-	28.7	3.9	0.2
2013	-	391	22	78	-	31.8	0.1	0.6
2018	5	423	104	23	0.0	16.9	0.3	0.1
2023	-	345	217	105	-	19.1	1.6	1.1

**Table 25A-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
1999	11.2	1.1	21.5	29.5	12.2	25.2
2004	20.4	-	25.7	16.0	19.6	31.4
2009	10.8	-	25.6	30.7	10.4	32.1
2013	18.0	-	21.5	11.0	26.5	35.0
2018	27.3	0.4	29.4	27.1	15.4	17.9
2023	25.5	0.0	17.0	16.2	28.8	28.4

**Table 25A-05.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit	Domestic Sheep
	Quadrat Frequency				
1999	1	12	1	66	8
2004	-	1	2	45	-
2009	2	15	24	34	-
2013	17	5	5	23	-
2018	11	29	6	34	-
2023	8	10	1	16	-
Year	Days Use Per Acre (ha)				
1999	-	12.1 (29.8)	-	-	20.8 (51.3)
2004	-	-	4.0 (9.9)	-	-
2009	3.6 (9.0)	2.0 (5.0)	73.0 (180.4)	-	-
2013	5.8 (14.3)	-	-	-	-
2018	9.4 (23.3)	35.5 (87.7)	2.7 (6.6)	-	-
2023	19.6 (48.4)	-	0.7 (1.7)	-	-

**Table 25A-05.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Festuca idahoensis (Idaho fescue)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency						
1999	1	358	-	-	-	-	-
2004	-	301	-	-	3	2	8
2009	1	347	-	-	-	13	3
2013	3	390	-	9	-	6	11
2018	-	421	5	26	-	3	11
2023	-	344	-	5	2	5	13
year	Average Cover (%)						
1999	0.0	16.3	-	-	-	-	-
2004	-	27.5	-	-	0.0	0.0	0.1
2009	0.0	28.3	-	-	-	0.3	0.0
2013	0.1	31.0	-	0.2	-	0.0	0.4
2018	-	15.7	0.0	1.1	-	0.0	0.1
2023	-	18.7	-	0.2	0.0	0.0	0.1

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

**Table 25A-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Amaranthus <sup>ai</sup> (pigweed)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus calycosus (Torrey's milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Astragalus miser (timber milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cryptantha (cryptantha)	Draba <sup>a</sup> (draba)	Erigeron (fleabane)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Linum lewisii (Lewis flax)	Lomatium (desertparsley)	Microsteris gracilis <sup>a</sup> (slender phlox)
year	Nested Frequency																
1999	-	-	-	-	-	-	-	-	31	-	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	8	-	203	3	-	-	-	12	70	-	7
2009	-	-	4	-	-	-	-	-	323	-	-	-	1	-	-	-	-
2013	-	4	2	2	3	-	-	-	12	3	-	3	-	-	-	-	-
2018	38	-	-	-	-	-	7	-	81	-	-	-	-	-	-	-	-
2023	25	-	3	-	-	4	-	1	211	-	1	-	-	11	-	19	-
year	Average Cover (%)																
1999	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	0.1	-	2.1	0.0	-	-	-	0.1	1.4	-	0.0
2009	-	-	0.0	-	-	-	-	-	3.9	-	-	-	0.0	-	-	-	-
2013	-	0.0	0.0	0.0	0.0	-	-	-	0.0	0.0	-	0.0	-	-	-	-	-
2018	0.1	-	-	-	-	-	0.0	-	0.3	-	-	-	-	-	-	-	-
2023	0.1	-	0.0	-	-	0.0	-	0.0	1.3	-	0.0	-	-	0.2	-	0.0	-

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

FORB SPECIES	Penstemon (beardtongue)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Sanguisorba minor <sup>i</sup> (small burnet)	Sphaeralcea ambigua (desert globemallow)	Sphaeralcea grossulariifolia (gooseberry/leaf globemallow)	Trifolium gymnocarpon (hollyleaf clover)
year	Nested Frequency						
1999	-	-	-	-	-	-	-
2004	1	-	16	2	-	18	-
2009	-	2	1	-	-	13	-
2013	-	-	56	-	-	21	-
2018	-	-	-	-	-	13	5
2023	-	-	34	-	32	1	35
year	Average Cover (%)						
1999	-	-	-	-	-	-	-
2004	0.0	-	0.1	0.0	-	0.3	-
2009	-	0.0	0.0	-	-	0.1	-
2013	-	-	0.3	-	-	0.3	-
2018	-	-	-	-	-	0.1	0.0
2023	-	-	0.3	-	0.5	0.0	0.3

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

**Table 25A-05.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ericameria nauseosa (rubber rabbitbrush)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
1999	-	-	-	-
2004	0.3	-	0.1	-
2009	0.6	-	-	-
2013	3.1	-	-	-
2018	3.1	0	-	-
2023	12.8	-	-	-
year	Quadrat Cover (%)			
1999	12.0	-	-	-
2004	0.3	-	0.0	-
2009	1.0	-	-	-
2013	1.2	-	0.0	0.0
2018	2.3	0.0	-	-
2023	9.8	0.0	-	0.1

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

**Table 25A-05.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

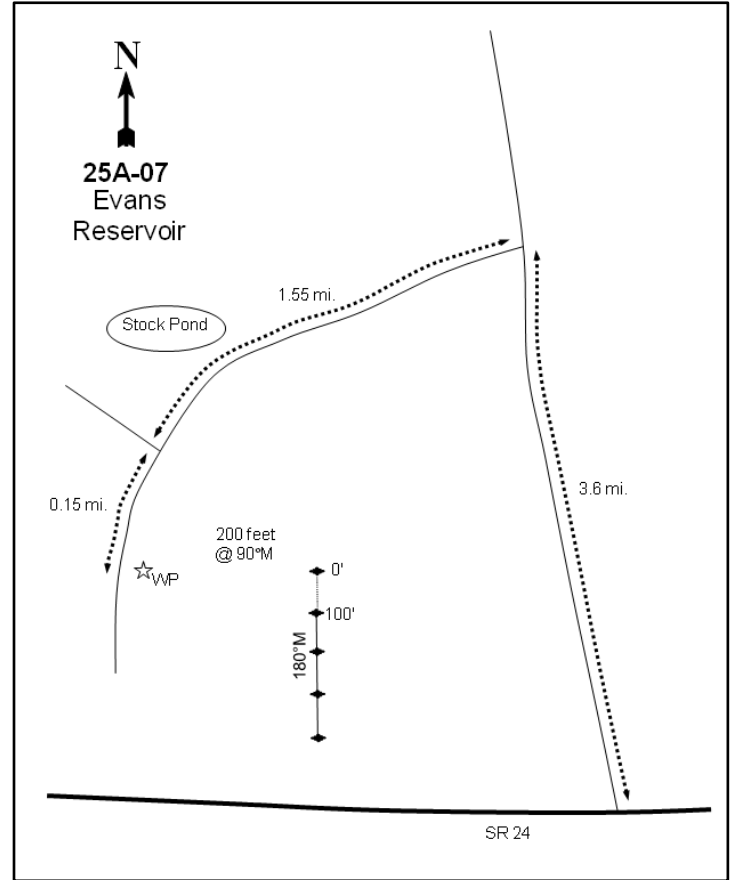
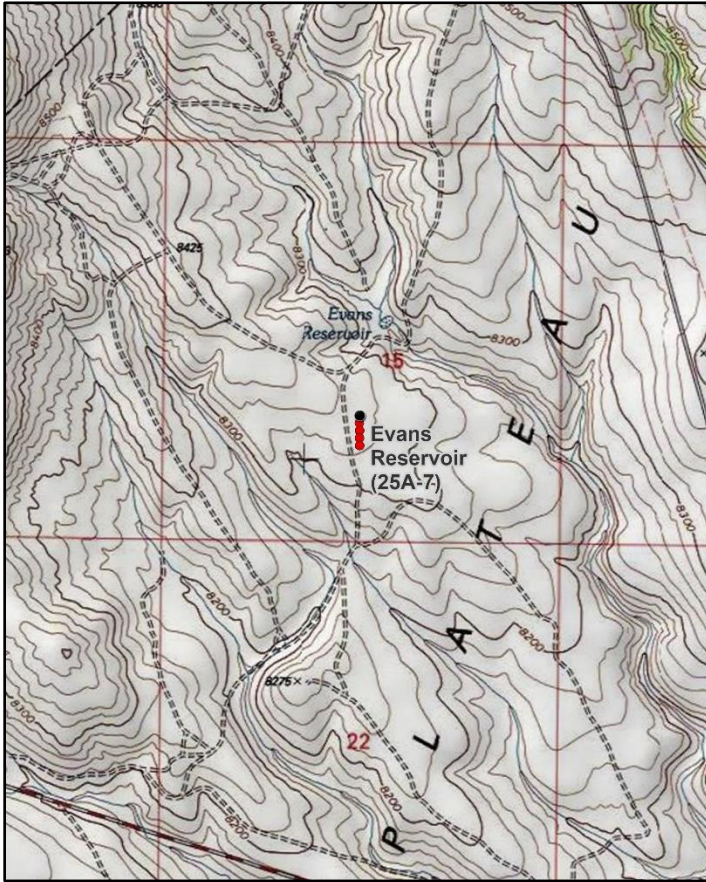
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1999	4420	-	1	68	30	62	23	11	54/72
2004	380	20	11	53	37	0	16	37	38/43
2009	500	-	4	92	4	0	0	0	45/44
2013	2160	2880	63	37	0	21	1	0	43/66
2018	1380	120	52	48	0	4	0	3	54/70
2023	7060	840	57	43	0	9	3	0	- / -
<b>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
1999	-	-	-	-	-	-	-	-	23/30
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	29/21
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	71/79
2013	20	-	100	0	0	0	0	0	62/121
2018	20	-	0	100	0	100	0	0	56/76
2023	-	20	0	0	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	20	-	0	100	0	0	0	0	12/18
2009	60	-	0	100	0	0	0	0	16/23
2013	20	-	100	0	0	0	0	0	23/27
2018	40	-	0	100	0	0	0	0	3/12
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	5/9
2018	20	-	0	100	0	0	0	0	10/18
2023	20	-	0	100	0	0	0	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	38/24

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

**Table 25A-05.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	15.0	5.9	0.7	30.0	0.0	0.0	0.0	<b>51.6</b>	Poor-Fair
2004	0.4	0.0	0.0	30.0	0.0	3.8	0.0	<b>34.2</b>	Very Poor-Poor
2009	0.8	0.0	0.0	30.0	0.0	0.4	0.0	<b>31.1</b>	Very Poor
2013	3.9	0.0	0.0	30.0	0.0	1.2	0.0	<b>35.1</b>	Very Poor-Poor
2018	3.9	0.0	0.0	30.0	0.0	0.2	0.0	<b>34.1</b>	Very Poor-Poor
2023	16.0	15.0	15.0	30.0	0.0	2.2	0.0	<b>78.2</b>	Good-Excellent

## EVANS RESERVOIR - STUDY NO. 25A-7

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Abes Knoll NE; Township 27S, Range 1E, Section 15  
NAD 83 UTM ZONE 12, 431095 East 4257134 North

**Transect Information**

Browse Tag # (0' Stake)	7122
Transect Bearing	180° 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**

Traveling northwest out of Loa on SR-24, turn right at mile marker 45. Drive for 3.5 miles to a green and yellow fencepost on the left (20 feet from the road on the west side). Continue about 0.1 miles past the fencepost and turn left. Travel 1.55 miles past a stock pond and up to a fork. Proceed left at the fork and go 0.15 miles to a steel rebar witness post on the left side of the road; in 2018, this witness post was bent over. From the witness post, walk 200 feet east to the 0-foot baseline stake, a rebar with browse tag #7122.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	FISHLAKE
Elevation	8,300ft (2,530m)
Aspect	North
Slope	2-5%
Sample Dates	08/11/1999, 08/10/2004, 08/18/2009, 08/19/2013, 07/01/2018, 07/07/2023

**Table 25A-07.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Dixie	-	PDB	Fall 1999	-
Seeding - Seed Unknown	-	PDB	Fall 1999	-

**Wildlife Habitat and Vegetation History****Table 25A-07.3 - 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
Pronghorn	crucial	year-long	

**Table 25A-07.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush/Black Sagebrush	No Encroachment
1991	Mountain Big Sagebrush/Black Sagebrush	No Encroachment
1999	Mountain Big Sagebrush/Black Sagebrush	No Encroachment
2004	Mountain Big Sagebrush/Black Sagebrush/Perennial Grass	No Encroachment
2009	Mountain Big Sagebrush/Black Sagebrush/Perennial Grass	No Encroachment
2013	Mountain Big Sagebrush/Black Sagebrush/Perennial Grass	No Encroachment
2018	Mountain Big Sagebrush/Black Sagebrush/Perennial Grass	No Encroachment
2023	Mountain Big Sagebrush/Black Sagebrush/Perennial Grass	No Encroachment

**Site Notes**

A stock pond is located a quarter of a mile north of the study site. Both deer and pronghorn use the area and sage-grouse have been seen in the area.

**Soils****Table 25A-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	7.0	59.3	21.4	19.3	1.6	8.8	217.6	121.0	08/11/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation                      20 inches  
 NRCS Ecological Site    Mountain Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site #    R047XB430UT  
 States and Transitions    No state and transition model is available for this ecological site.

When the study was established in 1985, this site was dominated by a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*A. nova*) with a diverse component of other shrub species which were limited in abundance. Various native perennial grass and forb species made up the herbaceous understory (Photos, Pre-1992 Data). Native perennial grasses increased in abundance following a 1999 harrow treatment (Table 25A-07.1) and became a codominant site component in 2004, while forbs have varied from year to year (Table 25A-07.7, Table 25A-07.10, Table 25A-07.11). The shrub component exhibited an initial post-treatment decrease, but has increased over time (Table 25A-07.12, Table 25A-07.13). Barring a major disturbance, sagebrush has the potential to continue to increase in cover and will likely remain a dominant vegetation component of the plant community.

Deer winter range condition has ranged between fair and good since 1999. In 2023, deer winter range condition was considered to be good. Improvement to deer wintering range can be accomplished through efforts that support an increase in preferred browse reproduction; diversifying and increasing cover of native perennial forbs and grasses would also improve winter range conditions (Table 25A-07.15). In addition, the sagebrush component of this site could provide valuable browse for wintering elk (Table 25A-07.3; Wambolt, 1996). However, pellet group data shows that both deer and elk presence were low in 2023 (Table 25A-07.9).



## Trend Summary Tables

**Table 25A-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
1999	16.6	0.6	-	-	-	-
2004	6.1	2.7	-	8.9	3.6	-
2009	5.8	2.5	-	9.4	2.1	-
2013	9.4	2.7	-	10.0	2.4	-
2018	11.6	6.0	-	12.7	3.4	-
2023	12.4	5.6	-	16.4	4.1	-

**Table 25A-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
1999	-	315	31	197	-	13.0	0.2	5.4
2004	-	317	28	164	-	18.9	0.1	3.4
2009	-	303	21	156	-	17.9	0.1	2.7
2013	-	357	37	195	-	23.8	0.1	3.8
2018	-	369	6	195	-	29.9	0.0	5.5
2023	-	328	22	157	-	21.9	0.3	4.4

**Table 25A-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
1999	10.9	0.1	25.1	24.8	1.4	35.1
2004	16.9	0.0	30.8	31.0	2.4	31.8
2009	20.7	-	35.7	14.2	0.4	33.4
2013	1.3	0.0	48.9	26.4	0.5	43.2
2018	21.1	0.0	40.4	14.9	1.5	42.7
2023	14.0	0.0	39.2	21.3	3.8	39.0

**Table 25A-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	Coyote	Mule Deer/Pronghorn	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
1999	-	6	38	2	45
2004	-	21	14	2	53
2009	-	9	53	-	58
2013	-	12	42	3	14
2018	-	8	25	-	37
2023	-	4	4	-	4
Year	Days Use Per Acre (ha)				
1999	-	16.1 (39.7)	50.9 (125.8)	26.2 (64.6)*	-
2004	8.7 (21.5)*	15.4 (38.1)	25.5 (62.9)	-	-
2009	-	78.4 (193.7)	24.8 (61.2)	17.4 (43.0)*	-
2013	-	4.0 (9.9)	16.8 (41.4)	34.9 (86.1)*	-
2018	-	0.7 (1.7)	50.9 (125.8)	-	-
2023	-	6.0 (14.9)	10.0 (24.8)	8.7 (21.5)*	-

\*Pellets per acre (ha)

**Table 25A-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum pinetorum (pine needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Carex (sedge)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency												
1999	8	107	-	52	18	-	26	-	5	156	11	140	-
2004	3	49	21	42	21	-	47	3	7	198	4	125	0
2009	6	119	17	37	26	-	41	-	7	129	2	126	7
2013	1	94	23	56	30	-	69	3	21	192	15	118	-
2018	4	116	18	56	33	-	64	-	54	262	5	81	-
2023	2	87	18	74	5	31	87	-	22	159	6	81	1
year	Average Cover (%)												
1999	0.3	1.5	-	0.7	0.6	-	0.7	-	0.2	4.7	0.1	4.2	-
2004	0.1	1.6	0.3	0.8	0.3	-	1.1	0.0	0.2	8.1	0.0	6.3	0.0
2009	0.1	4.1	0.7	1.3	0.2	-	1.0	-	0.2	4.5	0.0	5.7	0.2
2013	0.0	4.4	0.7	1.5	0.4	-	2.0	0.0	0.9	7.3	0.5	6.1	-
2018	0.2	4.3	0.3	2.7	0.5	-	1.5	-	3.0	13.4	0.2	3.8	-
2023	0.0	2.7	0.8	2.6	0.0	0.6	3.8	-	1.6	6.2	0.2	3.3	0.0

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

**Table 25A-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Arabis demissa (nodding rockcross)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Castilleja (Indian paintbrush)	Ceratocephala testiculata <sup>a</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Erigeron aphanactis <sup>a</sup> (rayless shaggy fleabane)	Erigeron pumilus (shaggy fleabane)	Erigeron alatum (winged buckwheat)	Erigeron racemosus (redroot buckwheat)	Erigeron umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)
year	Nested Frequency																
1999	31	3	-	77	-	-	8	-	-	4	17	-	5	2	1	10	-
2004	5	7	-	39	-	-	-	-	-	2	20	-	12	-	3	4	19
2009	-	10	-	27	-	-	-	3	3	2	5	-	4	3	2	4	13
2013	32	3	4	35	-	2	-	3	-	7	32	-	13	-	1	6	-
2018	6	3	-	45	4	-	-	-	-	3	38	-	24	6	4	1	-
2023	8	-	-	59	7	-	-	1	-	8	16	4	3	-	7	5	9
year	Average Cover (%)																
1999	0.2	0.0	-	2.2	-	-	0.0	-	-	0.1	0.3	-	0.0	0.0	0.0	0.2	-
2004	0.0	0.0	-	0.3	-	-	-	-	-	0.0	0.2	-	0.1	-	0.1	0.1	0.1
2009	-	0.1	-	0.2	-	-	-	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
2013	0.1	0.0	0.0	0.3	-	0.0	-	0.0	-	0.0	0.1	-	0.1	-	0.0	0.1	-
2018	0.0	0.0	-	0.6	0.0	-	-	-	-	0.0	0.5	-	0.2	0.1	0.0	0.0	-
2023	0.0	-	-	1.9	0.1	-	-	0.0	-	0.2	0.2	0.2	0.0	-	0.2	0.4	0.0

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

FORB SPECIES											
<i>Lappula occidentalis</i> <sup>a</sup> (flatspine stickseed)											
<i>Linum lewisii</i> (Lewis flax)											
<i>Lotus utahensis</i> (Utah bird's-foot trefoil)											
<i>Packera multilobata</i> (lobeleaf groundsel)											
<i>Penstemon comarrhenus</i> (dusty beardtongue)											
<i>Phlox austromontana</i> (mountain phlox)											
<i>Phlox longifolia</i> (longleaf phlox)											
<i>Sphaeralcea coccinea</i> (scarlet globemallow)											
<i>Streptanthus cordatus</i> (heartleaf twistflower)											
<i>Tragopogon dubius</i> <sup>at</sup> (yellow salsify)											
<i>Trifolium gymnocarpon</i> (hollyleaf clover)											
year	Nest Frequency										
1999	-	30	16	6	-	109	-	-	-	-	5
2004	8	1	16	-	1	104	9	-	2	-	2
2009	-	15	4	6	2	112	2	-	-	2	3
2013	-	59	24	6	5	114	11	3	-	-	1
2018	-	24	13	2	-	120	6	2	-	-	3
2023	-	5	8	-	8	66	6	-	-	-	22
year	Average Cover (%)										
1999	-	0.3	0.4	0.1	-	1.8	-	-	-	-	0.0
2004	0.0	0.0	0.8	-	0.0	1.7	0.0	-	0.0	-	0.0
2009	-	0.1	0.0	0.0	0.0	2.1	0.0	-	-	0.0	0.0
2013	-	0.7	0.2	0.0	0.0	2.2	0.0	0.0	-	-	0.0
2018	-	0.3	0.1	0.0	-	3.7	0.0	0.0	-	-	0.0
2023	-	0.1	0.3	-	0.0	0.9	0.1	-	-	-	0.1

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

**Table 25A-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES											
<i>Artemisia nova</i> <sup>p</sup> (black sagebrush)											
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)											
<i>Bassia prostrata</i> <sup>pi</sup> (forage kochia)											
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)											
<i>Eriogonum corymbosum</i> (crisp-leaf buckwheat)											
<i>Eriogonum microthecum</i> <sup>p</sup> (slender buckwheat)											
<i>Gutierrezia sarothrae</i> (broom snakeweed)											
<i>Linanthus pungens</i> (granite prickly phlox)											
<i>Opuntia</i> (pricklypear)											
<i>Tetradymia canescens</i> (spineless horsebrush)											
year	Line Intercept Cover (%)										
1999	-	-	-	-	-	-	-	-	-	-	-
2004	3.6	5.1	-	2.3	-	0.2	1	0.3	-	-	-
2009	3.5	5.9	-	0.7	-	-	1.2	0.2	-	-	-
2013	3.9	6	-	1.9	-	0.1	0.1	0.4	-	-	-
2018	5.5	7.1	-	1.7	-	0.1	1.4	0.3	-	-	-
2023	4.2	11.5	-	3.7	-	0.7	-	0.4	-	-	-
year	Quadrat Cover (%)										
1999	6.7	9.8	-	0.5	0.0	0.1	-	0.1	-	-	-
2004	2.4	3.5	0.0	1.6	0.0	0.2	0.9	0.2	-	-	-
2009	2.1	3.5	-	1.7	-	0.2	0.3	0.5	-	-	-
2013	3.4	6.0	-	2.0	-	0.1	0.1	0.6	-	-	-
2018	4.2	7.1	0.1	3.3	-	0.2	2.2	0.5	0.0	-	-
2023	5.0	7.2	-	4.9	-	0.2	0.0	0.5	0.0	0.1	-

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

**Table 25A-07.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1999	4140	80	6	51	44	44	1	24	29/48
2004	1820	2180	6	80	14	0	0	4	22/41
2009	2140	60	13	69	18	18	12	15	22/38
2013	2340	120	25	65	10	49	15	13	19/43
2018	2720	-	30	68	2	15	2	2	25/48
2023	2780	60	14	73	13	9	27	13	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1999	4360	-	10	37	53	62	10	16	42/72
2004	1620	1480	7	62	31	12	6	11	36/60
2009	1860	20	7	62	31	11	20	18	34/54
2013	1960	20	13	71	15	41	19	28	40/68
2018	2040	-	28	68	5	21	6	10	40/68
2023	2560	640	3	84	13	30	8	14	- / -
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	360	0	0	0	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	31/12
2013	-	-	-	-	-	-	-	-	13/17
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	1220	-	8	87	5	0	0	0	19/25
2004	1540	160	1	97	1	0	0	0	22/38
2009	1200	-	0	95	5	0	0	8	18/34
2013	1640	-	11	88	1	29	24	15	24/48
2018	1860	20	2	98	0	24	18	4	21/38
2023	3300	20	7	92	1	2	0	1	- / -
<b>Eriogonum corymbosum -- (crispleaf buckwheat)</b>									
1999	40	-	50	50	0	0	0	0	17/17
2004	60	-	0	100	0	33	0	0	22/29
2009	20	-	0	100	0	0	0	0	20/31
2013	20	-	0	100	0	100	0	100	21/31
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1999	80	-	0	100	0	25	0	0	9/9
2004	440	-	5	96	0	0	5	0	18/27
2009	200	-	0	100	0	0	0	0	16/23
2013	420	-	10	91	0	10	0	10	17/23
2018	200	-	10	90	0	20	0	10	16/17
2023	460	-	4	96	0	0	0	0	- / -
<b>Escobaria vivipara var. vivipara -- (spinystar)</b>									
1999	20	-	0	100	0	0	0	0	4/11
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-

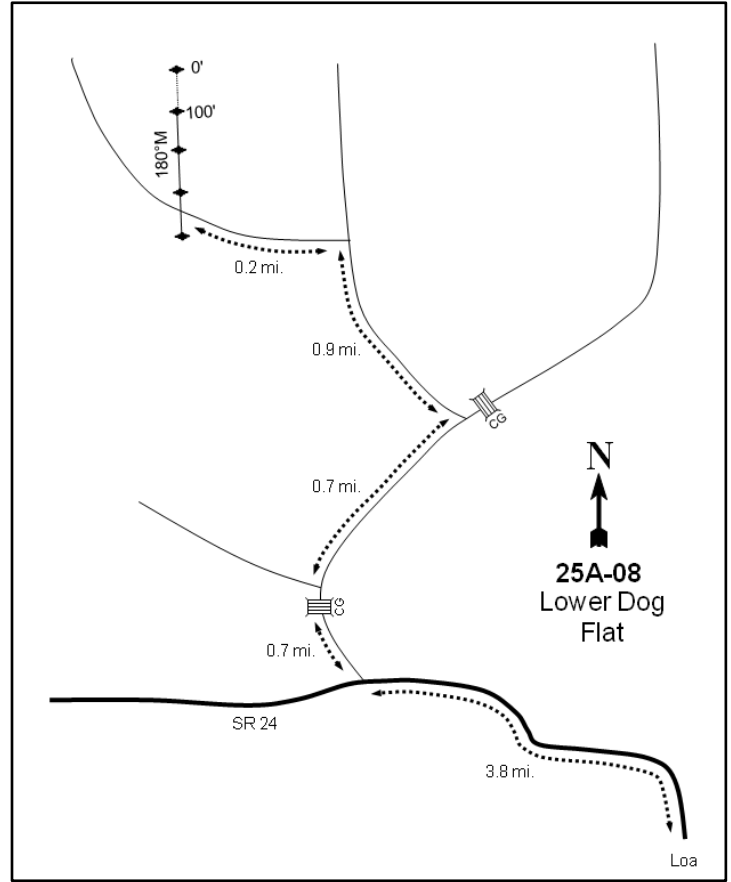
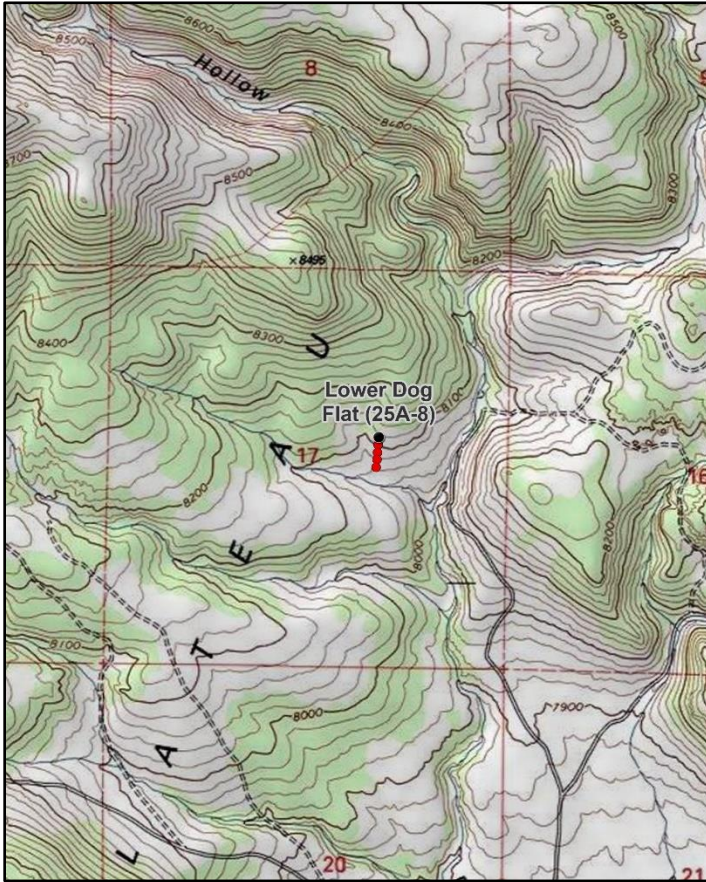
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	20	-	0	100	0	0	0	0	8/19
2004	920	100	0	100	0	0	0	0	23/34
2009	1100	-	6	75	20	13	0	14	16/22
2013	480	260	29	67	4	4	0	8	15/21
2018	3680	-	3	96	1	0	0	0	14/18
2023	100	-	40	60	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1999	600	-	7	93	0	0	0	0	15/20
2004	820	-	7	88	5	0	0	5	14/23
2009	780	-	0	100	0	0	0	3	12/21
2013	500	20	4	92	4	8	0	56	18/30
2018	540	-	0	93	7	26	0	0	15/23
2023	560	320	0	96	4	0	0	4	- / -
<b>Opuntia -- (pricklypear)</b>									
1999	20	-	0	100	0	0	0	0	13/35
2004	-	-	-	-	-	-	-	-	14/22
2009	20	-	0	100	0	0	0	0	11/29
2013	20	-	0	100	0	0	0	0	9/14
2018	20	-	100	0	0	0	0	0	10/18
2023	60	-	0	100	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	28/69
2009	-	-	-	-	-	-	-	-	14/47
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	14/38
2023	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	80	-	75	25	0	0	0	0	10/13
2009	40	-	0	100	0	0	0	0	10/11
2013	60	-	33	67	0	67	0	0	17/25
2018	100	-	40	60	0	0	0	0	17/15
2023	60	-	0	100	0	33	0	0	- / -

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

**Table 25A-07.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	20.8	0.3	4.1	26.0	0.0	10.0	0.0	<b>61.3</b>	Fair
2004	11.1	8.0	3.3	30.0	0.0	6.8	0.0	<b>59.2</b>	Fair
2009	11.8	7.1	4.5	30.0	0.0	5.5	0.0	<b>58.8</b>	Fair
2013	12.5	11.0	8.9	30.0	0.0	7.6	0.0	<b>70.0</b>	Fair-Good
2018	15.9	14.0	14.2	30.0	0.0	10.0	0.0	<b>84.1</b>	Good
2023	20.5	11.2	3.0	30.0	0.0	8.9	0.0	<b>73.6</b>	Good

## LOWER DOG FLAT - STUDY NO. 25A-8



### Location Information

USGS 7.5 min Map Info	Loa NW; Township 27S, Range 2E, Section 17
GPS (0' Stake)	NAD 83 UTM ZONE 12, 437801 East 4257498 North

### Transect Information

Browse Tag # (0' Stake)	7188
Transect Bearing	165° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

### Directions to Site

From Loa, travel northwest for 3.8 miles on SR-24 (0.9 miles beyond mile marker 49). Turn right (north) onto a gravel road and proceed for 0.7 miles. Just beyond the cattle guard, turn right and continue for another 0.7 miles. Turn left just before another cattle guard and proceed for 0.9 miles. At the bottom of the hill, a road forks off to the left, through a wash, up a steep hill, and west into the chaining; take this road for 0.2 miles and stop at a 3-foot tall rebar post on the right (north) side of the road marking the 300-foot stake of the baseline. The 0-foot baseline stake is marked by browse tag #7188.

### Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SEVEN MILE
Elevation	8,100ft (2,469m)
Aspect	South
Slope	13-15%
Sample Dates	08/24/1999, 08/10/2004, 08/18/2009, 08/19/2013, 07/17/2018, 07/19/2023

**Table 25A-08.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1980	-
Seeding - Seed Unknown	-	-	1980	-
Harrow - Two-Way Dixie	Seven Mile Dixie Harrow 2006	LTDL	October-December 2006	4275
Seeding - Broadcast Before	Seven Mile Dixie Harrow 2006	LTDL	November-December 2006	4275
Seeding - Aerial Unknown	Seven Mile Dixie Harrow 2006	LTDL	January 2007	2000

**Wildlife Habitat and Vegetation History****Table 25A-08.3 - 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
Pronghorn	crucial	winter	

**Table 25A-08.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1999	Mountain Big Sagebrush	Phase I
2004	Mountain Big Sagebrush	Phase I
2009	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

Only two of the five belts occur within the harrow treatment. Prior to 2023, all of the sagebrush on the site was classified as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) although some of the individual plants resembled black sagebrush (*A. nova*); an attempt to distinguish between the two species was made in 2023.

**Soils****Table 25A-08.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.3	43.3	29.4	27.3	2.3	6.7	201.6	0.7	08/24/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation 17 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.

This site has been dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since study establishment in 1985 (Photos, Pre-1992 Data, Table 25A-08.12, Table 25A-08.13). The herbaceous understory has fluctuated, but perennial grasses such as blue grama (*Bouteloua gracilis*) have contributed the most herbaceous cover since 1999 (Table 25A-08.10). Two of the five belts were treated with a harrow in 2006 (Table 25A-08.1). The shrub component and herbaceous understory exhibited an initial post-treatment decrease, but shrub cover has since recovered (Table 25A-08.6, Table 25A-08.7). Density of mountain big sagebrush decreased by nearly half between 2018 and 2023. However, this is likely due in part to the black sagebrush (*A. nova*) plants being called mountain big sagebrush in past years and the effort made to distinguish between the two species in 2023 (Table 25A-08.13). The study area was chained in 1980 (Table 25A-08.1), but infilling of twoneedle pinyon (*Pinus edulis*) and Rocky Mountain juniper (*Juniperus scopulorum*) is evident in photos, cover, and point-quarter data (Table 25A-08.12, Table 25A-08.14). Although the study site was considered to be within Phase I of woodland succession as of 2023 (Table 25A-08.4), there may be potential for further infilling over time.

Deer winter range condition has ranged between poor and good since 1999. As of 2023, deer winter range condition was considered to be fair. Improvement to deer wintering range can be accomplished through efforts that support diversifying and increasing cover of native perennial forbs and grasses (Table 25A-08.15). In addition, the sagebrush component of this site could provide valuable browse for elk during the winter (Table 25A-08.3; Wambolt, 1996). According to pellet transect data, both deer and elk presence were considered to be moderate in 2023 (Table 25A-08.9).

## Trend Summary Tables

**Table 25A-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
1999	17.6	1.2	-	-	-	-
2004	18.3	2.1	-	21.5	1.7	-
2009	15.6	0.2	0.0	15.8	0.4	-
2013	19.4	0.6	0.0	20.9	0.3	-
2018	18.2	3.1	0.1	19.3	2.3	-
2023	21.9	0.4	0.1	20.4	0.3	-

**Table 25A-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
1999	-	333	31	49	-	8.7	0.2	0.3
2004	-	251	27	27	-	7.8	0.1	0.1
2009	-	212	6	7	-	4.4	0.0	0.0
2013	-	227	-	17	-	5.8	-	0.0
2018	-	287	-	13	-	13.5	-	0.0
2023	-	205	89	38	-	6.4	0.5	0.2

**Table 25A-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
1999	13.1	0.1	20.8	24.1	24.7	27.0
2004	19.9	0.2	22.0	22.2	24.4	27.1
2009	21.6	0.0	23.6	15.6	20.7	20.7
2013	18.1	0.0	20.4	16.2	21.5	27.2
2018	23.0	0.0	26.1	26.6	25.5	29.7
2023	20.3	0.1	16.9	23.8	18.4	28.3

**Table 25A-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			
1999	4	10	3	26
2004	1	13	1	43
2009	2	9	2	56
2013	-	23	3	19
2018	-	15	-	33
2023	1	6	5	3
Year	Days Use Per Acre (ha)			
1999	8.0 (19.7)	17.4 (43.0)	1.3 (3.3)	-
2004	5.1 (12.6)	21.5 (53.0)	2.0 (5.0)	-
2009	5.1 (12.6)	61.0 (150.6)	7.4 (18.2)	-
2013	-	9.4 (23.2)	-	-
2018	2.9 (7.2)	14.7 (36.4)	0.7 (1.7)	-
2023	4.4 (10.8)	30.8 (76.1)	23.4 (57.9)	-



**Table 25A-08.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum pinetorum (pine needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency											
1999	-	3	16	248	13	151	3	4	4	-	-	2
2004	4	-	-	216	-	50	-	-	-	-	-	-
2009	2	-	-	178	-	46	-	5	-	-	-	-
2013	4	-	-	191	-	36	-	2	-	14	3	-
2018	9	4	-	241	-	69	1	14	4	7	-	3
2023	1	8	0	158	1	43	3	12	5	14	-	-
year	Average Cover (%)											
1999	-	0.0	0.1	7.1	0.1	1.3	0.0	0.0	0.0	-	-	0.0
2004	0.0	-	-	7.2	-	0.6	-	-	-	-	-	-
2009	0.1	-	-	4.0	-	0.3	-	0.1	-	-	-	-
2013	0.0	-	-	4.5	-	0.5	-	0.0	-	0.7	0.0	-
2018	0.3	0.2	-	11.5	-	0.9	0.0	0.1	0.0	0.3	-	0.1
2023	0.0	0.0	0.0	4.7	0.0	0.5	0.0	0.3	0.0	0.7	-	-

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

**Table 25A-08.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis demissa (nodding rockcress)	Astragalus (milkvetch)	Chenopodium <sup>a</sup> (goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Phlox longifolia (longleaf phlox)	Salsola tragus <sup>a</sup> (prickly Russian thistle)
year	Nested Frequency												
1999	29	-	3	-	-	-	6	41	-	3	-	4	-
2004	17	3	2	5	4	5	6	5	-	4	-	3	-
2009	3	-	-	-	-	-	-	5	-	-	-	2	3
2013	-	-	4	-	-	3	-	10	-	-	-	-	-
2018	-	-	2	-	-	5	-	2	-	-	-	4	-
2023	-	-	21	-	24	5	36	13	10	-	37	1	-
year	Average Cover (%)												
1999	0.1	-	0.0	-	-	-	0.0	0.2	-	0.0	-	0.0	-
2004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	-	0.0	-
2009	0.0	-	-	-	-	-	-	0.0	-	-	-	0.0	0.0
2013	-	-	0.0	-	-	0.0	-	0.0	-	-	-	-	-
2018	-	-	0.0	-	-	0.0	-	0.0	-	-	-	0.0	-
2023	-	-	0.1	-	0.1	0.0	0.1	0.1	0.0	-	0.2	0.0	-

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

**Table 25A-08.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)						
1999	-	-	-	-	-	-	-
2004	-	-	21.5	1.7	-	-	-
2009	-	-	15.8	0.4	-	-	-
2013	-	-	20.9	0.3	0	-	-
2018	-	-	19.3	2.1	0.2	-	-
2023	-	3.5	16.9	0.1	0.2	-	-
year	Quadrat Cover (%)						
1999	-	-	17.6	1.2	-	-	-
2004	-	-	18.3	2.1	-	0.0	-
2009	0.0	-	15.6	0.2	0.0	0.0	0.0
2013	-	-	19.4	0.6	0.0	-	0.0
2018	-	-	18.2	2.9	0.2	-	0.1
2023	-	4.5	17.4	0.4	0.0	-	0.1

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

**Table 25A-08.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	20	0	0	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1999	20	-	0	100	0	100	0	0	13/23
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	1900	-	4	92	4	10	32	12	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1999	6180	100	12	73	15	37	17	6	40/66
2004	6540	4740	3	76	21	48	17	7	41/72
2009	5020	-	2	81	18	26	0	9	38/60
2013	5760	5940	32	60	8	41	12	18	45/75
2018	8280	-	47	37	16	3	2	32	40/62
2023	4500	-	21	63	16	20	52	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 (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	12/15
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	80	-	0	100	0	0	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	20580	2800	68	31	0	0	0	0	16/16
2004	6800	640	14	86	0	0	0	0	16/20
2009	1340	20	2	99	0	0	0	0	15/14
2013	1280	20	14	86	0	0	0	2	13/17
2018	7180	-	6	94	0	0	0	25	11/14
2023	820	-	37	63	0	0	0	2	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1999	40	-	0	100	0	0	0	0	7/17
2004	40	-	0	100	0	0	0	0	10/30
2009	60	-	0	100	0	0	0	0	10/27
2013	80	-	0	100	0	0	0	0	10/25
2018	100	-	0	100	0	0	0	0	12/32
2023	160	-	13	88	0	0	0	0	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	40	-	50	50	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	1/3
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	0	100	0	0	0	0	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1999	-	40	0	0	0	0	0	0	-/-
2004	-	20	0	0	0	0	0	0	-/-
2009	20	20	0	100	0	0	0	0	-/-
2013	60	20	100	0	0	0	0	0	-/-
2018	80	-	25	75	0	0	0	25	-/-
2023	40	-	0	100	0	0	0	0	-/-

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

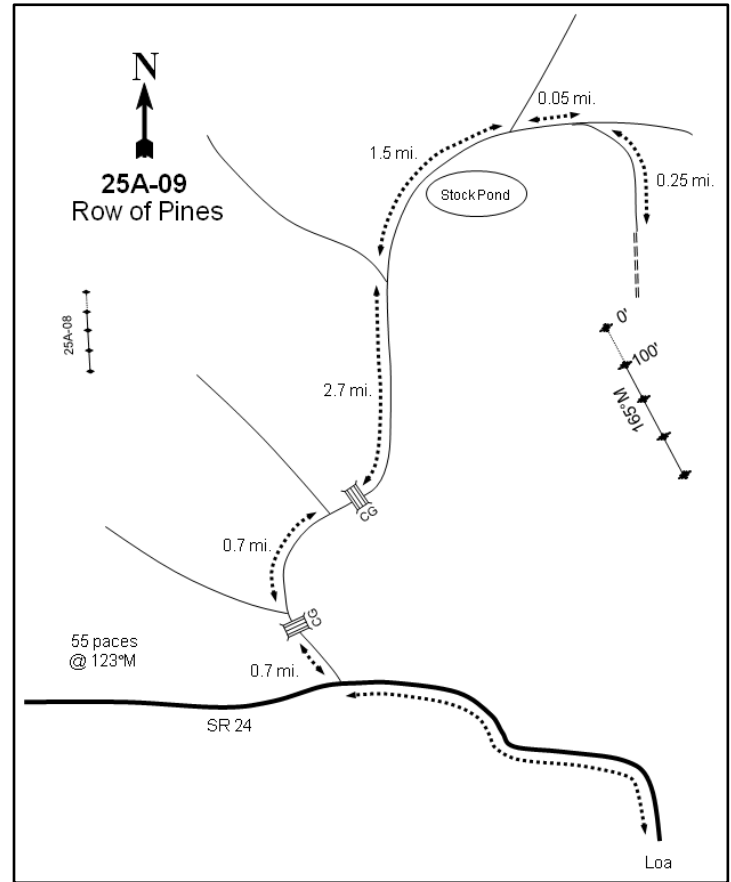
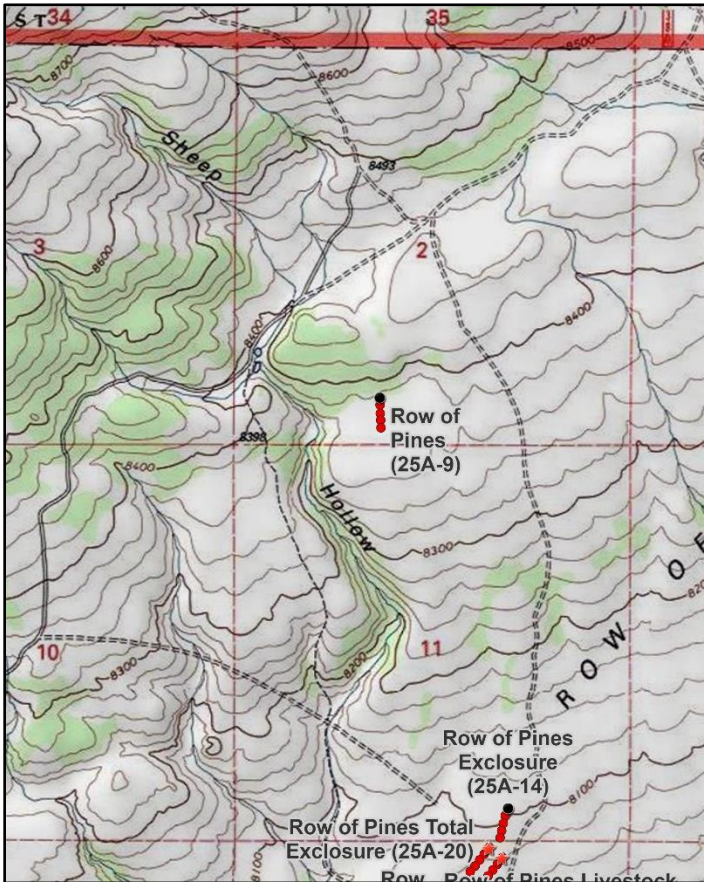
**Table 25A-08.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
1999	1	-	-	-	-	-	13.0
<b>Pinus edulis (twoneedle pinyon)</b>							
1999	3	-	-	-	-	-	9.0
2004	13	38	25	38	-	-	4.9
2009	7	-	29	71	-	-	6.9
2013	18	-	78	22	-	-	3.6
2018	19	10	90	-	-	-	2.6
2023	17	10	70	10	10	-	3.7

**Table 25A-08.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	22.0	10.4	6.2	17.4	0.0	0.5	0.0	<b>56.5</b>	Fair
2004	26.9	8.7	1.7	15.7	0.0	0.1	0.0	<b>53.0</b>	Fair
2009	19.8	9.8	0.8	8.8	0.0	0.1	0.0	<b>39.2</b>	Poor
2013	26.1	12.5	15.0	11.6	0.0	0.1	0.0	<b>65.3</b>	Fair-Good
2018	24.1	10.4	15.0	26.9	0.0	0.1	0.0	<b>76.5</b>	Good
2023	25.5	10.9	9.2	12.8	0.0	0.4	0.0	<b>58.8</b>	Fair

## ROW OF PINES - STUDY NO. 25A-9

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Loa NE; Township 27S, Range 2E, Section 02  
NAD 83 UTM ZONE 12, 442149 East 4259915 North

**Transect Information**

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

Not Available  
150° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt 4: 3ft

**Directions to Site**

From Loa, proceed northwest on SR-24 for 3.8 miles (0.9 miles beyond mile marker 49). Turn right and continue for 0.7 miles to a cattle guard. Just beyond the cattle guard turn right and go another 0.7 miles. Turn right again and cross another cattle guard. Proceed for 2.7 miles to an intersection, turn right, and continue 1.3 miles to a stock pond on the east side of the road. Continue for 0.2 miles to a fork, turn right, and go 0.05 miles. Turn right and drive for 0.25 miles to the end of the road, where a pellet group transect begins. On the left side of the road is a gray fencepost which marks the north end of the pellet transect. Count 16 stakes south through the belt of pinyon-juniper (the 16th stake is 25 feet from the trees). The beginning of the frequency baseline is 50 feet west of the 16th pellet group stake. Rebar (2-1/2 feet tall) is used to mark the transect; there is no browse tag.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	SEVEN MILE
Elevation	8,400ft (2,560m)
Aspect	South
Slope	0-3%
Sample Dates	08/24/1999, 08/11/2004, 08/18/2009, 08/15/2013, 07/18/2018, 07/19/2023

**Wildlife Habitat and Vegetation History****Table 25A-09.3 - 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
Pronghorn	crucial	winter	

**Table 25A-09.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1999	Mountain Big Sagebrush	Phase I
2004	Mountain Big Sagebrush	Phase I
2009	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Soils****Table 25A-09.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.9	51.3	23.4	25.3	1.1	9.1	192.0	0.5	08/23/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation 18 inches  
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)  
 NRCS Ecological Site # R047XB308UT  
 States and Transitions No state and transition model is available for this ecological site.

Since study establishment in 1985, this site has remained in a stable state with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) as the dominant shrub (Table 25A-09.12, Table 25A-09.13). The herbaceous understory has been comparatively limited in most sample years and has consisted of native grasses and forbs with perennial grasses providing the most cover (Photos, Pre-1992 Data, Table 25A-09.7, Table 25A-09.10, Table 25A-09.11). Twoneedle pinyon (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and/or Rocky Mountain juniper (*J. scopulorum*) have maintained a presence on this site in all sample years, albeit in low amounts (Photos, Table 25A-09.12, Table 25A-09.14). Although trees have been slow to increase over the duration of the study period, further encroachment could be possible as time progresses.

Deer winter range condition on this site has ranged between very poor and good since 1999. Deer winter range condition was considered to be fair in 2023. Improvement to deer wintering range can be accomplished through efforts that support preferred browse reproduction; diversifying and increasing cover of native perennial forbs and grasses would also improve winter range conditions (Table 25A-09.15). In addition, the sagebrush component of this site could provide valuable browse for wintering elk (Table 25A-09.3; Wambolt, 1996). However, pellet transect data indicates that elk presence has remained low since 1999; mule deer presence was moderate in 2023 (Table 25A-09.9).

## Trend Summary Tables

**Table 25A-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
1999	24.2	3.7	-	-	-	-
2004	19.5	0.4	0.0	20.8	0.3	-
2009	20.5	0.1	0.0	20.8	0.2	-
2013	21.9	0.1	-	28.1	0.1	-
2018	23.9	1.3	0.1	26.0	0.6	-
2023	27.2	0.0	0.0	27.4	0.7	-

**Table 25A-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
1999	-	235	83	64	-	5.6	0.4	0.5
2004	-	163	18	57	-	2.9	0.0	0.3
2009	-	157	2	13	-	2.4	0.0	0.0
2013	-	179	9	66	-	4.0	0.0	0.3
2018	-	237	1	15	-	9.8	0.0	0.1
2023	-	206	99	30	-	5.4	0.9	0.1

**Table 25A-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
1999	16.7	2.3	21.7	28.3	5.7	34.6
2004	23.3	1.9	32.6	27.0	6.7	23.7
2009	23.1	0.5	29.5	23.8	4.8	24.6
2013	10.0	0.8	33.0	31.6	9.7	28.3
2018	15.8	2.5	39.1	35.0	14.8	35.6
2023	20.4	0.4	24.2	18.9	6.7	31.9

**Table 25A-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	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
1999	2	-	14	-	-	26
2004	2	-	30	-	-	49
2009	-	-	17	2	-	49
2013	-	-	6	3	1	18
2018	1	-	12	-	-	12
2023	-	-	3	-	1	1
Year	Days Use Per Acre (ha)					
1999	2.9 (7.2)	-	13.4 (33.1)	0.7 (1.7)	-	-
2004	2.2 (5.4)	-	48.9 (120.8)	-	-	-
2009	2.2 (5.4)	8.7 (21.5)*	21.5 (53.0)	11.4 (28.1)	-	-
2013	3.6 (9.0)	-	8.7 (21.5)	1.3 (3.3)	-	-
2018	-	-	11.4 (28.1)	-	-	-
2023	4.4 (10.8)	-	22.1 (54.6)	6.0 (14.9)	-	-

\*Pellets per acre (ha)

**Table 25A-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achmatherum hymenoides (Indian ricegrass)	Achmatherum pinetorum (pine needlegrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency							
1999	10	5	139	107	14	-	2	3
2004	3	12	111	64	3	-	-	-
2009	8	-	102	50	7	-	-	-
2013	13	33	105	24	13	-	9	1
2018	56	26	130	62	15	4	4	1
2023	4	10	109	115	4	-	-	-
year	Average Cover (%)							
1999	0.1	0.0	4.6	0.8	0.1	-	0.0	0.0
2004	0.0	0.1	2.1	0.7	0.0	-	-	-
2009	0.0	-	2.0	0.4	0.0	-	-	-
2013	0.2	0.6	2.8	0.3	0.1	-	0.0	0.0
2018	1.1	0.4	6.7	1.3	0.2	0.0	0.0	0.0
2023	0.2	0.0	2.9	2.2	0.1	-	-	-

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

**Table 25A-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis demissa (nodding rockcress)	Astragalus lentiginosus (freckled milkvetch)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum ovalifolium (cushion buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Packera multilobata (lobeleaf groundsel)	Phlox longifolia (longleaf phlox)
year	Nested Frequency											
1999	80	-	6	3	-	-	5	35	14	-	15	0
2004	13	-	24	7	4	-	1	6	11	-	6	6
2009	-	-	-	-	2	3	-	9	1	-	-	-
2013	9	5	36	-	-	9	-	25	1	-	2	-
2018	1	6	-	-	-	8	-	5	-	-	-	-
2023	-	2	6	-	24	3	3	12	2	83	-	5
year	Average Cover (%)											
1999	0.4	-	0.0	0.0	-	-	0.0	0.2	0.2	-	0.0	0.0
2004	0.0	-	0.1	0.0	0.0	-	0.0	0.0	0.1	-	0.0	0.0
2009	-	-	-	-	0.0	0.0	-	0.0	0.0	-	-	-
2013	0.0	0.0	0.1	-	-	0.1	-	0.1	0.0	-	0.0	-
2018	0.0	0.0	-	-	-	0.0	-	0.0	-	-	-	-
2023	-	0.0	0.0	-	0.1	0.0	0.0	0.1	0.0	0.8	-	0.0

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



**Table 25A-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia fragilis (brittle pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)							
1999	-	-	-	-	-	-	-	-
2004	-	2.3	18.5	-	0.3	0	-	-
2009	-	1.3	19.5	-	0.2	-	-	-
2013	-	1.9	26.2	-	0.1	-	-	-
2018	-	1.1	24.9	0	0.6	-	-	-
2023	0.1	1.5	25.8	0.6	0.1	-	-	-
year	Quadrat Cover (%)							
1999	0.0	2.6	21.6	-	3.6	0.1	-	-
2004	0.0	2.3	17.2	0.0	0.2	0.2	0.0	0.0
2009	-	1.7	18.8	-	0.1	0.0	-	0.0
2013	-	0.6	21.3	-	0.1	0.0	-	-
2018	0.0	1.2	22.8	0.0	1.3	-	-	0.1
2023	0.0	1.0	26.2	0.0	0.0	0.0	-	0.0

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

**Table 25A-09.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
1999	240	-	8	83	8	17	42	0	9/12
2004	100	-	20	80	0	0	0	0	12/16
2009	20	-	0	100	0	0	0	0	18/6
2013	40	-	0	100	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	12/9
2023	20	-	0	100	0	0	0	0	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1999	1000	-	4	76	20	58	4	10	28/44
2004	1300	100	0	71	29	6	0	19	20/50
2009	940	-	0	30	70	34	38	64	22/44
2013	700	-	3	77	20	69	0	34	23/43
2018	1140	-	14	60	26	7	0	18	21/41
2023	1020	-	22	63	16	35	57	16	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1999	6340	120	6	51	43	41	9	18	46/72
2004	5760	1380	2	48	50	30	6	27	40/66
2009	7180	380	13	50	38	17	11	32	36/55
2013	9160	3920	32	53	15	38	18	20	41/68
2018	10320	20	18	57	25	19	0	24	36/56
2023	8400	20	16	65	19	19	46	36	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	60	-	0	100	0	0	0	0	14/17
2009	-	-	-	-	-	-	-	-	9/14
2013	20	-	0	100	0	100	0	100	-/-
2018	120	-	0	100	0	0	0	67	19/3
2023	-	-	-	-	-	-	-	-	-/-
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	7/12
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	8640	860	10	88	2	0	0	1	21/20
2004	640	-	6	94	0	0	0	0	14/17
2009	500	-	0	100	0	0	0	4	16/17
2013	1020	860	86	14	0	0	0	0	12/14
2018	3240	-	0	96	4	1	0	3	10/12
2023	20	-	100	0	0	0	0	0	-/-
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
1999	260	20	15	85	0	0	0	0	7/26
2004	220	-	0	100	0	0	0	9	5/24
2009	160	-	0	100	0	0	0	0	6/21
2013	80	20	25	75	0	0	0	0	5/13
2018	20	-	0	100	0	0	0	0	3/7
2023	60	20	67	33	0	0	0	0	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1999	20	-	0	100	0	0	0	0	4/6
2004	160	-	0	100	0	0	0	0	3/6
2009	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	2/8
2018	-	-	-	-	-	-	-	-	11/8
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1999	-	40	0	0	0	0	0	0	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	20	40	100	0	0	0	0	0	-/-
2013	40	-	100	0	0	0	0	50	-/-
2018	20	20	100	0	0	0	0	0	-/-
2023	20	-	100	0	0	0	0	0	-/-

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

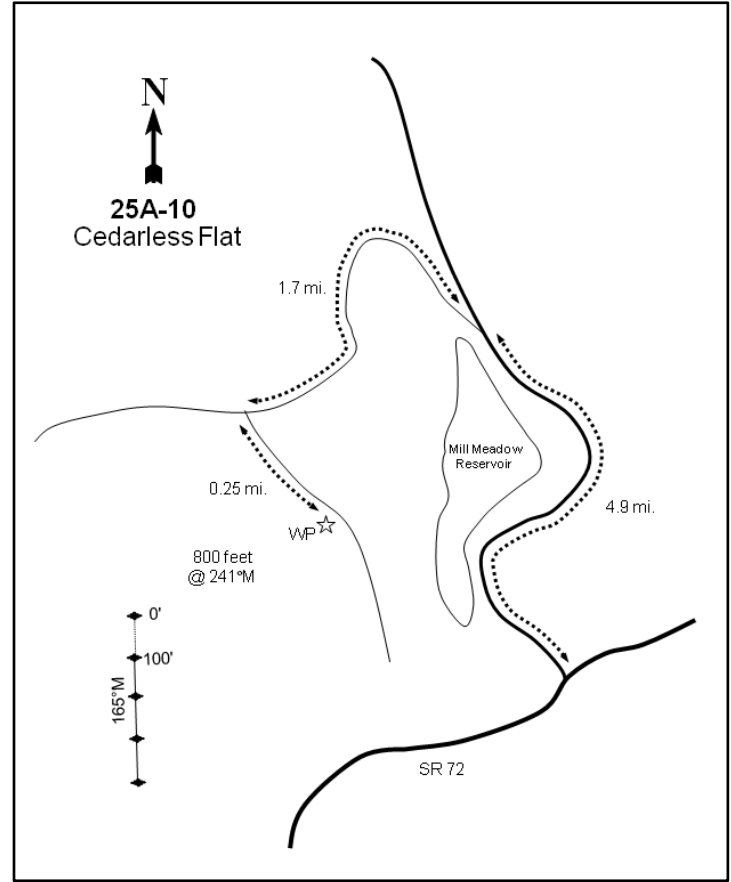
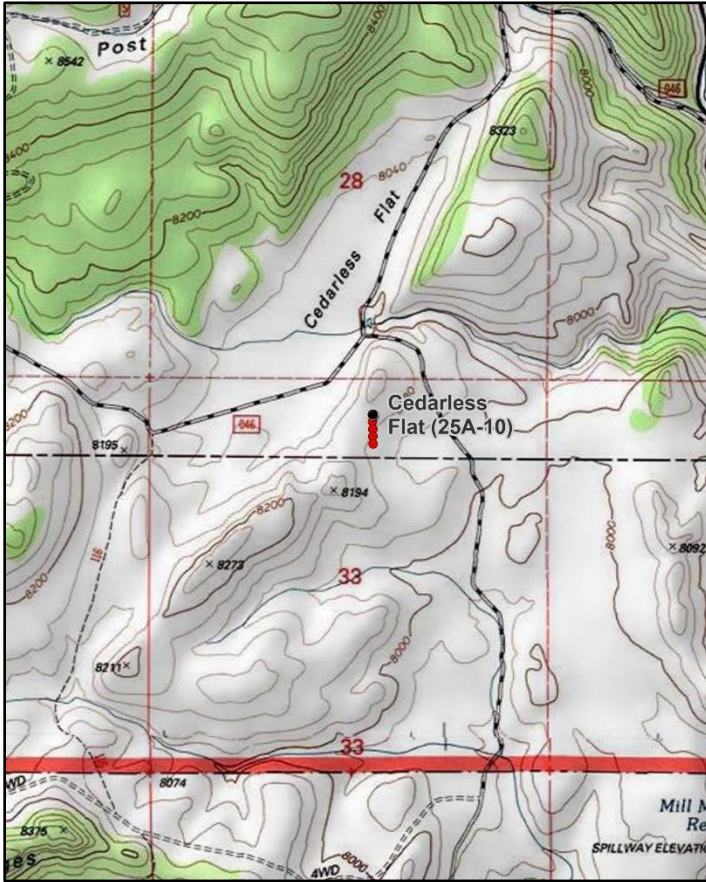
**Table 25A-09.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2009	2	-	-	50	50	-	21.0
2023	2	-	-	-	100	-	26.0
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	13	-	-	-	100	-	13.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2009	7	33	33	33	-	-	7.3
2018	17	50	50	-	-	-	2.5
2023	6	-	71	14	-	14	8.6

**Table 25A-09.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	30.0	2.9	2.9	11.2	0.0	1.1	0.0	<b>48.1</b>	Poor-Fair
2004	26.0	0.6	0.8	5.8	0.0	0.5	0.0	<b>33.7</b>	Very Poor-Poor
2009	26.0	3.1	5.9	4.8	0.0	0.1	0.0	<b>39.9</b>	Poor
2013	30.0	10.4	14.9	8.1	0.0	0.6	0.0	<b>63.9</b>	Fair-Good
2018	30.0	7.5	9.0	19.5	0.0	0.2	0.0	<b>66.1</b>	Fair-Good
2023	30.0	9.4	8.0	10.8	0.0	0.3	0.0	<b>58.5</b>	Fair

## CEDARLESS FLAT - STUDY NO. 25A-10

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Forsyth Reservoir SW; Township 26S, Range 3E, Section 33  
NAD 83 UTM ZONE 12, 448784 East 4262764 North

**Transect Information**

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

407  
165° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

From Fremont, travel northeast on SR-72 for 2.25 miles to a major fork (there is a sign that says "Mill Meadow Reservoir"). Turn left and proceed 4.5 miles past the reservoir to Fremont Creek. Cross the bridge and go 0.4 miles to a fork. Bear left on the Mytoge Road and proceed for 1.1 miles to a cattle guard in Cedarless Flat. From the cattleguard, go 0.6 miles to a fork. Proceed to the left and go exactly 0.25 miles to a witness post on the right (southwest) side of the road. From the witness post, walk 800 feet at 241 degrees magnetic to the 0-foot baseline stake which is marked with a red browse tag #407.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	UM Allotment
Elevation	8,200ft (2,499m)
Aspect	Southeast
Slope	12%
Sample Dates	08/25/1999, 08/10/2004, 08/18/2009, 08/12/2013, 07/16/2018, 07/18/2023

**Table 25A-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Mytoge-Tidwell Sage-Grouse Habitat Improvement Phase 1	3995	August 2017-July 2018	7964
Chaining - Chain Unknown	-	-	1987	-
Seeding - Seed Unknown	-	-	1987	-

**Wildlife Habitat and Vegetation History****Table 25A-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer

**Table 25A-10.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1999	Mountain Big Sagebrush	Phase I
2004	Mountain Big Sagebrush	Phase I
2009	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

The ridgeline to the southwest is covered by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*).

**Soils****Table 25A-10.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	7.4	43.3	25.4	31.3	2.6	7.0	112.0	0.6	08/25/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 1985, this site has remained in a stable state with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) as the dominant shrub; sagebrush exhibited an initial decrease following a 1987 chaining treatment, but has since recovered (Photos, Pre-1992 Data, Table 25A-10.12, Table 25A-10.13). The herbaceous understory has been dominated by native perennial grasses, mainly blue grama (*Bouteloua gracilis*), in most sample years. However, blue grama and the introduced species Russian wildrye (*Psathyrostachys juncea*) provided similar amounts of cover in 2023 (Table 25A-10.7, Table 25A-10.10, Table 25A-10.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been present in the vicinity throughout the duration of the study. A 2018 lop and scatter treatment removed many of the trees in the area (Table 25A-10.1), but they were still observed in low amounts in 2018 and 2023 (Photos, Table 25A-10.14). Barring a major disturbance, sagebrush will likely remain as the dominant vegetation component on this site in future sample years.

Due to the lack in abundance and diversity in the herbaceous community but an abundance in preferred browse, this site likely serves a adequate habitat for summering mule deer. However, this site may serve as better foraging range during very mild winters due to high sagebrush cover. According to pellet transect data, deer presence was low in 2023 (Table 25A-10.9).

## Trend Summary Tables

**Table 25A-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
1999	9.2	0.6	-	-	-	-
2004	7.7	0.5	-	11.5	0.3	-
2009	9.6	0.2	-	15.2	0.2	-
2013	11.3	0.5	-	17.9	0.7	-
2018	14.0	1.4	-	18.7	1.4	-
2023	16.5	1.9	-	17.1	1.9	-

**Table 25A-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
1999	-	293	11	11	-	13.3	0.0	0.1
2004	-	197	264	3	-	4.3	6.7	0.0
2009	-	218	26	1	-	5.9	0.1	0.0
2013	-	274	-	6	-	10.4	-	0.0
2018	-	329	-	7	-	20.7	-	0.0
2023	-	275	272	5	-	10.6	1.1	0.0

**Table 25A-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
1999	20.1	0.0	13.7	27.3	9.0	23.0
2004	23.5	-	19.3	43.7	7.6	18.5
2009	16.0	0.0	18.3	45.9	3.8	16.1
2013	10.7	0.0	17.5	40.0	17.7	25.6
2018	8.7	0.1	23.9	46.4	13.8	37.0
2023	15.7	0.0	22.1	36.5	19.3	26.9

**Table 25A-10.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1999	3	-	8	6	9
2004	1	-	19	2	40
2009	1	-	14	5	59
2013	-	-	7	2	13
2018	2	-	11	2	6
2023	5	-	5	8	10
Year	Days Use Per Acre (ha)				
1999	4.4 (10.8)	-	7.4 (18.2)	20.8 (51.3)	-
2004	2.9 (7.2)	8.7 (21.5)*	32.8 (81.1)	4.7 (11.6)	-
2009	2.2 (5.4)	-	50.9 (125.8)	14.7 (36.4)	-
2013	9.4 (23.3)	-	36.2 (89.4)	7.4 (18.2)	-
2018	0.7 (1.8)	-	28.1 (69.5)	1.3 (3.3)	-
2023	6.5 (16.1)	-	9.4 (23.2)	6.0 (14.9)	-

\*Pellets per acre (ha)

**Table 25A-10.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)
year	Nested Frequency								
1999	37	4	42	221	13	16	29	-	63
2004	19	-	29	108	-	16	19	-	53
2009	10	1	21	117	0	17	13	3	68
2013	3	7	19	162	-	29	17	6	97
2018	0	24	30	226	8	55	22	23	67
2023	7	7	27	133	1	46	44	-	97
year	Average Cover (%)								
1999	0.7	0.0	1.1	8.3	0.2	0.1	0.2	-	2.6
2004	0.1	-	0.7	1.9	-	0.1	0.1	-	1.4
2009	0.0	0.0	0.3	3.4	0.0	0.1	0.2	0.0	1.9
2013	0.0	0.1	0.7	5.3	-	0.1	0.5	0.0	3.7
2018	0.0	0.5	1.6	14.7	0.1	1.3	0.3	0.2	2.1
2023	0.1	0.2	1.0	3.5	0.1	0.7	1.0	-	4.0

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

**Table 25A-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Arabis demissa (nodding rockcress)	Astragalus lentiginosus (freckled milkvetch)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Phlox longifolia (longleaf phlox)
year	Nested Frequency										
1999	11	4	5	-	-	1	-	-	-	-	1
2004	-	-	1	25	258	-	3	-	3	-	2
2009	-	-	1	1	26	-	-	-	-	-	-
2013	-	-	-	-	-	3	-	-	-	-	3
2018	-	-	1	-	-	3	-	3	-	-	-
2023	-	-	-	-	271	1	4	4	-	4	-
year	Average Cover (%)										
1999	0.0	0.0	0.0	-	-	0.0	-	-	-	-	0.0
2004	-	-	0.0	0.3	6.4	-	0.0	-	0.0	-	0.0
2009	-	-	0.0	0.0	0.1	-	-	-	-	-	-
2013	-	-	-	-	-	0.0	-	-	-	-	0.0
2018	-	-	0.0	-	-	0.0	-	0.0	-	-	-
2023	-	-	-	-	1.1	0.0	0.0	0.0	-	0.0	-

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

**Table 25A-10.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Cylindropuntia (cholla)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)
year	Line Intercept Cover (%)						
1999	-	-	-	-	-	-	-
2004	-	11.5	-	-	0.3	0	-
2009	0.2	15	0.1	-	0	0.1	-
2013	-	17.9	0.1	-	0.4	0.2	-
2018	0.9	17.8	0.6	-	0.8	-	-
2023	-	17.1	0.9	-	1	-	-
year	Quadrat Cover (%)						
1999	-	9.2	0.1	-	0.4	0.0	0.0
2004	0.0	7.7	0.2	-	0.3	0.0	0.0
2009	0.0	9.6	0.2	-	0.0	0.0	-
2013	-	11.3	0.2	-	0.2	0.1	0.0
2018	0.7	13.3	0.5	0.0	0.9	0.0	0.0
2023	-	16.5	1.0	-	0.8	0.0	0.0

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

**Table 25A-10.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1999	80	-	0	100	0	0	0	0	16/37
2004	200	-	0	100	0	10	0	0	24/50
2009	120	20	0	67	33	0	0	17	22/35
2013	-	-	-	-	-	-	-	-	-/-
2018	120	-	0	83	17	17	0	0	19/35
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1999	5440	40	31	65	4	52	15	3	34/55
2004	4320	320	5	57	38	36	10	27	32/57
2009	5240	220	10	75	14	33	11	8	33/58
2013	5040	680	21	68	10	42	23	20	35/70
2018	5080	160	10	71	19	23	2	13	35/64
2023	5380	-	14	65	20	0	0	25	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1999	240	-	0	92	8	17	8	8	17/32
2004	240	80	0	100	0	0	0	0	18/34
2009	260	20	8	92	0	0	0	0	16/28
2013	280	-	14	79	7	7	0	14	18/36
2018	720	-	11	89	0	0	0	0	17/30
2023	1180	-	2	98	0	0	0	0	-/-



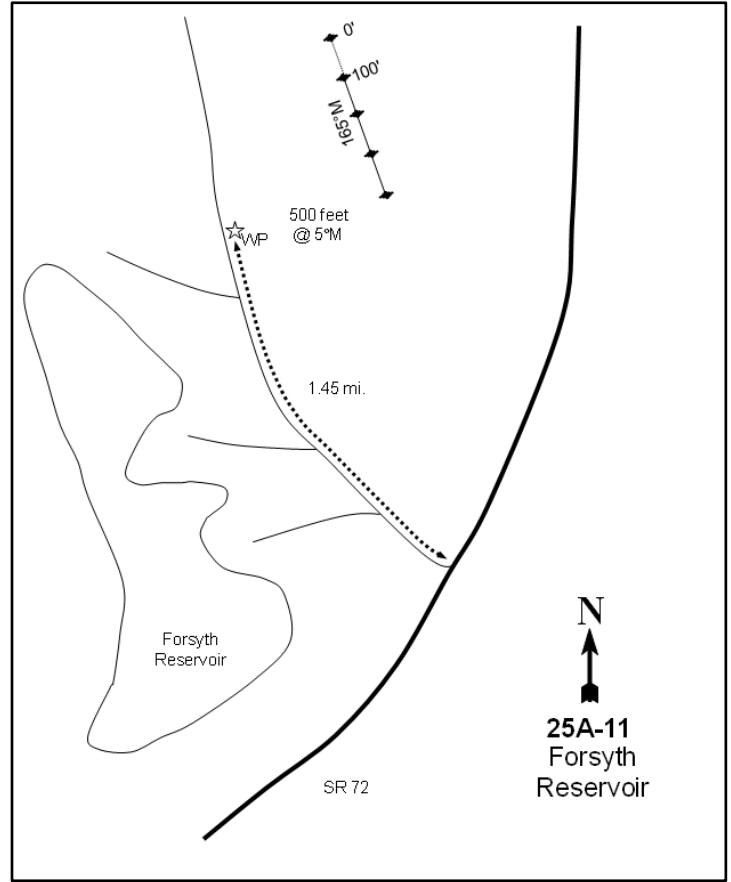
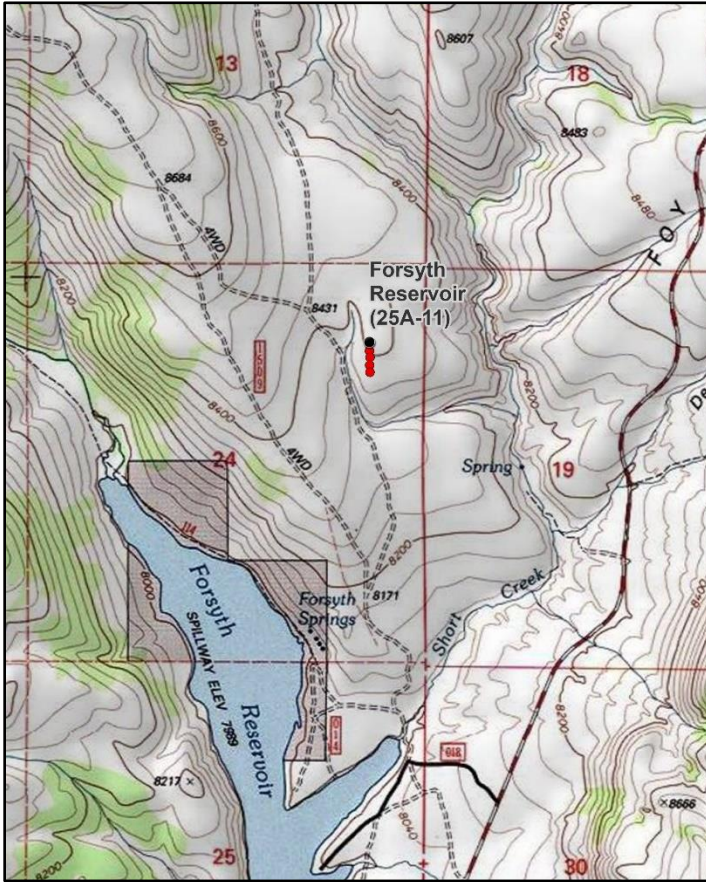
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	4240	100	52	48	0	0	0	0	11/11
2004	1720	-	5	95	0	0	0	0	13/17
2009	160	-	13	88	0	0	0	0	12/13
2013	960	-	44	56	0	0	0	0	11/15
2018	1860	140	7	91	2	2	0	2	10/15
2023	8800	-	25	73	2	0	3	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	21/38
2018	-	-	-	-	-	-	-	-	25/38
2023	-	-	-	-	-	-	-	-	- / -
<b>Opuntia -- (pricklypear)</b>									
1999	80	-	25	75	0	0	0	0	7/26
2004	100	-	20	80	0	0	0	0	7/24
2009	40	-	50	50	0	0	0	100	6/23
2013	80	-	25	75	0	0	0	0	6/22
2018	20	-	0	100	0	0	0	0	4/20
2023	80	-	25	75	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1999	60	-	33	67	0	0	0	0	4/9
2004	40	-	0	100	0	0	0	0	2/7
2009	-	-	-	-	-	-	-	-	- / -
2013	40	-	0	100	0	0	0	0	1/5
2018	20	-	0	100	0	0	0	0	2/6
2023	-	-	-	-	-	-	-	-	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	-	20	0	0	0	0	0	0	- / -
2018	-	20	0	0	0	0	0	0	- / -

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

**Table 25A-10.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	9	100	-	-	-	-	1.0
2023	4	100	-	-	-	-	1.0

## FORSYTH RESERVOIR - STUDY NO. 25A-11



### Location Information

USGS 7.5 min Map Info                      Forsyth Reservoir SE; Township 26S, Range 3E, Section 24  
 GPS (0' Stake)                                NAD 83 UTM ZONE 12, 454121 East 4265787 North

### Transect Information

Browse Tag # (0' Stake)                      7062  
 Transect Bearing                              165° 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

Between Lyman and Loa, turn north towards Fremont to connect with SR-72. Travel north on SR-72 until you cross a Forest Service boundary cattle guard (about 5 miles from Fremont). Continue another 2.7 miles to Forsyth Reservoir. Turn at the Forsyth Reservoir sign and drive 0.3 miles to a fork. Bear right and continue 0.1 miles to where the road crosses Short Creek (which empties into the east cove of Forsyth). From Short Creek, travel for 0.1 miles to a fork. Proceed to the right and go 0.25 miles to a cattle guard, then continue 0.15 miles beyond the cattle guard to a fork. Take the right fork and travel 0.55 miles to a draw below a ridge to the northeast; there is a steel rebar witness post on the right (east) side of the road. The last baseline stake is located 500 feet away from the witness post at a bearing of 5 degrees magnetic on top of the ridge. The 0-foot baseline stake is 400 feet due north and has a red browse tag #7062 attached.

### Site Information

Land Ownership                                Federal  
 Land Administrator                            USFS  
 Allotment                                        Tidwell Allotment  
 Elevation                                        8,400ft (2,560m)  
 Aspect    Southwest  
 Slope    12%  
 Sample Dates                                   08/19/1999, 08/26/2004, 08/19/2009, 08/14/2013, 07/16/2018, 07/20/2023

**Table 25A-11.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Mytoge-Tidwell Sage-Grouse Habitat Improvement Phase 2	4604	July 2018-June 2021	3504

**Wildlife Habitat and Vegetation History**

**Table 25A-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25A-11.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Black Sagebrush	Phase I
1991	Black Sagebrush	Phase I
1999	Black Sagebrush	Phase I
2004	Black Sagebrush	Phase I
2009	Black Sagebrush	Phase I
2013	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I
2023	Black Sagebrush	Phase I

**Site Notes**

A large area was sprayed with 2,4-D in the spring of 1976 to reduce shrub competition and release the grasses and forbs; however, it does not appear that the site itself was sprayed.

**Soils**

**Table 25A-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	7.0	41.3	35.4	23.3	2.2	2.6	89.6	0.5	08/19/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation                      17 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.

Black sagebrush (*Artemisia nova*) has been the dominant vegetation component on this site since study establishment in 1985, although there are a number of other shrub species present in lesser amounts (Photos Pre-1992 Data, Table 25A-11.12, Table 25A-11.13). The herbaceous understory has remained abundant and diverse throughout the study years, with perennial grasses contributing a majority of the cover; forbs have remained rare (Table 25A-11.7, Table 25A-11.10, Table 25A-11.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been observed in the area (Photos), placing the study in Phase I of woodland succession (Table 25A-11.4). Although a lop and scatter treatment removed most of the trees on site (Table 25A-11.1), pinyon seedlings were observed in point-quarter density in 2023 (Table 25A-11.14): this indicates that there may be potential for infilling over time.

Due to the abundance and diversity of the shrub and herbaceous communities, this site likely serves as adequate habitat for summering mule deer, but may serve as better foraging range during very mild winters because of the high sagebrush cover. Pellet group data shows that mule deer presence has remained low since 1999. Elk presence was low in 2023, but has been higher in the past (Table 25A-11.9). The herbaceous community of this site could prove valuable to elk in the area during the summer months; increasing forb diversity and abundance and the broader herbaceous understory would likely improve the quality of this area as elk summer range (Table 25A-11.3; Beck & Peek, 2005).

**Trend Summary Tables**

**Table 25A-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
1999	19.5	1.7	-	-	-	-
2004	15.9	1.8	-	21.1	2.3	-
2009	15.0	0.9	-	18.4	1.0	0.1
2013	19.4	1.1	-	24.7	0.9	-
2018	24.3	2.2	-	28.9	2.3	0.2
2023	23.2	1.5	-	29.6	0.9	-

**Table 25A-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
1999	-	330	3	123	-	6.8	0.0	1.1
2004	-	340	6	77	-	12.8	0.0	1.1
2009	-	348	-	78	-	10.0	-	0.2
2013	-	374	5	198	-	19.1	0.0	1.4
2018	-	375	-	41	-	18.4	-	0.1
2023	-	307	12	63	-	10.4	0.0	0.5

**Table 25A-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
1999	3.6	1.7	7.8	38.2	14.6	31.7
2004	4.7	1.8	20.5	47.4	9.8	31.4
2009	6.3	0.6	22.2	47.4	8.8	28.6
2013	0.3	1.2	13.3	25.1	26.8	46.7
2018	3.0	5.0	20.4	46.5	19.5	46.9
2023	2.4	1.6	24.9	32.6	25.3	30.6

**Table 25A-11.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
1999	2	5	19	-	6
2004	1	3	16	-	10
2009	3	1	26	-	47
2013	4	4	11	-	3
2018	2	7	13	-	23
2023	1	2	9	-	2
Year	Days Use Per Acre (ha)				
1999	6.5 (16.1)	2.0 (5.0)	53.6 (132.4)	-	-
2004	4.4 (10.8)	2.0 (5.0)	14.1 (34.8)	-	-
2009	9.4 (23.3)	-	34.2 (84.4)	139.4 (344.3)*	-
2013	1.5 (3.6)	1.3 (3.3)	3.4 (8.3)	8.7 (21.5)*	-
2018	4.4 (10.8)	6.0 (14.9)	11.4 (28.1)	17.4 (43.0)*	-
2023	3.6 (9.0)	2.7 (6.6)	4.0 (9.9)	-	-

\*Pellets per acre (ha)

**Table 25A-11.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bouteloua gracilis (blue grama)	Carex (sedge)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency											
1999	-	90	187	36	-	92	-	9	-	40	129	-
2004	-	77	206	51	-	83	-	-	-	11	137	1
2009	-	96	215	39	-	71	-	-	-	15	138	-
2013	-	92	260	74	-	34	11	-	7	62	137	1
2018	-	98	268	45	-	22	12	-	23	54	164	-
2023	1	45	239	25	23	64	11	-	-	39	53	-
year	Average Cover (%)											
1999	-	1.1	2.4	0.1	-	0.7	-	0.0	-	0.4	2.0	-
2004	-	1.4	6.0	0.5	-	1.4	-	-	-	0.2	3.5	0.0
2009	-	1.2	5.5	0.2	-	0.6	-	-	-	0.1	2.3	-
2013	-	1.5	11.0	0.9	-	0.5	0.0	-	0.0	1.4	3.8	0.0
2018	-	1.4	9.9	0.4	-	0.1	0.1	-	0.3	1.5	4.5	-
2023	0.0	0.5	7.0	0.1	0.3	1.1	0.1	-	-	0.7	0.6	-

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

**Table 25A-11.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Arabis demissa (nodding rockcross)	Astragalus serpens (plateau milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hymenoxys richardsonii (pingue rubberweed)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla pensylvanica (Pennsylvania cinquefoil)
year	Nested Frequency												
1999	3	26	-	3	71	-	17	10	11	2	19	-	1
2004	2	9	3	5	20	2	-	45	-	-	2	2	4
2009	-	9	-	-	63	-	-	3	-	-	4	-	4
2013	5	108	4	-	101	-	-	36	5	1	18	-	7
2018	-	17	3	-	8	-	-	3	-	-	2	-	12
2023	8	9	1	-	32	4	-	-	-	-	24	-	3
year	Average Cover (%)												
1999	0.0	0.1	-	0.0	0.2	-	0.7	0.0	0.0	0.0	0.1	-	0.0
2004	0.0	0.0	0.0	0.1	0.1	0.0	-	0.9	-	-	0.0	0.0	0.0
2009	-	0.0	-	-	0.2	-	-	0.0	-	-	0.0	-	0.0
2013	0.0	0.2	0.0	-	0.8	-	-	0.3	0.0	0.0	0.0	-	0.1
2018	-	0.0	0.0	-	0.0	-	-	0.0	-	-	0.0	-	0.0
2023	0.0	0.0	0.0	-	0.3	0.0	-	-	-	-	0.1	-	0.0

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

**Table 25A-11.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Escobaria vivipara var. arizonica (Arizona spiny star)	Gutierrezia sarothrae (broom snakeweed)	Linanthus pungens (granite prickly phlox)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)										
1999	-	-	-	-	-	-	-	-	-	-	-
2004	0.6	19.8	0.7	2	-	-	-	0.3	-	-	0
2009	0.2	17.2	1	1	-	0	-	-	-	-	0.1
2013	0.2	23.7	0.8	0.9	-	-	-	0	-	-	0
2018	0.1	27	1.8	1.4	-	-	-	0.9	-	-	0.2
2023	0	29.1	0.4	0.4	0	0.1	-	0.5	-	-	-
year	Quadrat Cover (%)										
1999	0.2	19.3	-	1.6	-	0.0	0.1	0.0	-	0.0	-
2004	0.3	15.5	0.0	1.6	-	0.1	-	0.2	-	0.0	0.0
2009	0.1	14.9	0.0	0.9	-	0.0	-	0.0	-	0.0	0.0
2013	0.3	19.1	0.0	1.0	-	0.0	0.0	0.1	0.0	0.0	0.0
2018	0.1	24.0	0.0	1.2	-	0.2	0.0	0.9	-	0.0	0.0
2023	0.2	22.1	0.8	1.2	0.0	0.2	0.0	0.3	0.0	0.0	-

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

**Table 25A-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 (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
1999	2240	40	13	88	0	8	0	0	8/14
2004	1780	-	6	93	1	2	0	0	14/23
2009	960	120	19	81	0	0	0	2	12/14
2013	1280	20	16	84	0	59	2	0	8/14
2018	340	-	18	82	0	6	0	0	5/10
2023	160	-	0	100	0	0	0	0	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1999	28180	120	27	43	30	37	1	2	17/42
2004	13080	240	0	60	40	0	0	19	20/38
2009	15180	4540	8	56	37	5	0	18	19/38
2013	17820	4100	24	70	6	45	11	5	18/41
2018	21920	140	23	67	10	25	1	3	18/39
2023	20540	-	32	52	17	6	3	20	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1999	40	-	0	100	0	50	50	0	28/63
2004	40	-	0	100	0	0	0	0	42/83
2009	40	80	0	100	0	0	0	0	45/96
2013	120	60	67	33	0	67	33	0	46/123
2018	100	-	60	40	0	20	0	0	48/92
2023	300	-	27	47	27	0	0	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 (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	1900	-	5	91	4	2	1	2	18/32
2004	1560	-	8	85	8	0	0	1	19/33
2009	1200	20	20	70	10	0	0	8	15/26
2013	1100	-	6	93	2	62	0	44	16/34
2018	1300	-	0	97	3	25	40	0	11/22
2023	1140	-	2	95	4	0	0	4	- / -
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1999	220	-	18	64	18	36	0	18	14/23
2004	200	-	0	100	0	0	40	0	15/24
2009	180	-	0	100	0	0	0	0	12/17
2013	160	-	13	88	0	13	0	0	15/26
2018	160	-	0	100	0	13	25	0	9/14
2023	100	-	0	100	0	0	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1999	20	-	0	100	0	0	100	0	17/22
2004	-	-	-	-	-	-	-	-	79/90
2009	20	-	0	100	0	0	0	0	56/59
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	46/45
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	20/35
2018	40	-	0	100	0	0	50	0	12/13
2023	80	-	25	75	0	0	0	0	- / -
<b>Escobaria vivipara var. arizonica -- (Arizona spiny star)</b>									
1999	120	-	0	100	0	0	0	0	3/6
2004	20	-	0	100	0	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	80	-	0	100	0	0	0	0	14/17
2004	340	-	6	94	0	0	0	0	18/20
2009	180	-	22	78	0	0	0	0	15/14
2013	660	-	42	58	0	0	0	3	9/11
2018	960	-	0	100	0	0	0	0	9/15
2023	840	-	45	55	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1999	120	-	0	100	0	0	0	0	19/23
2004	120	-	0	100	0	0	0	0	12/16
2009	40	-	0	100	0	0	0	0	6/13
2013	120	-	17	83	0	0	0	0	16/30
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1999	40	-	50	50	0	0	0	0	3/8
2004	60	-	0	100	0	0	0	0	2/6
2009	20	-	0	100	0	0	0	0	1/6
2013	40	-	0	100	0	0	0	0	3/7
2018	20	-	100	0	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1999	20	-	100	0	0	0	0	0	- / -
2004	20	-	100	0	0	100	0	0	- / -
2009	20	-	100	0	0	0	0	0	- / -
2013	20	-	100	0	0	0	0	0	- / -
2018	20	-	100	0	0	0	0	0	- / -
2023	20	-	100	0	0	0	0	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1999	20	-	0	100	0	0	0	0	18/25
2004	20	-	0	100	0	0	0	0	25/54
2009	-	-	-	-	-	-	-	-	33/78
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	46/102
2023	20	-	0	100	0	0	0	0	- / -

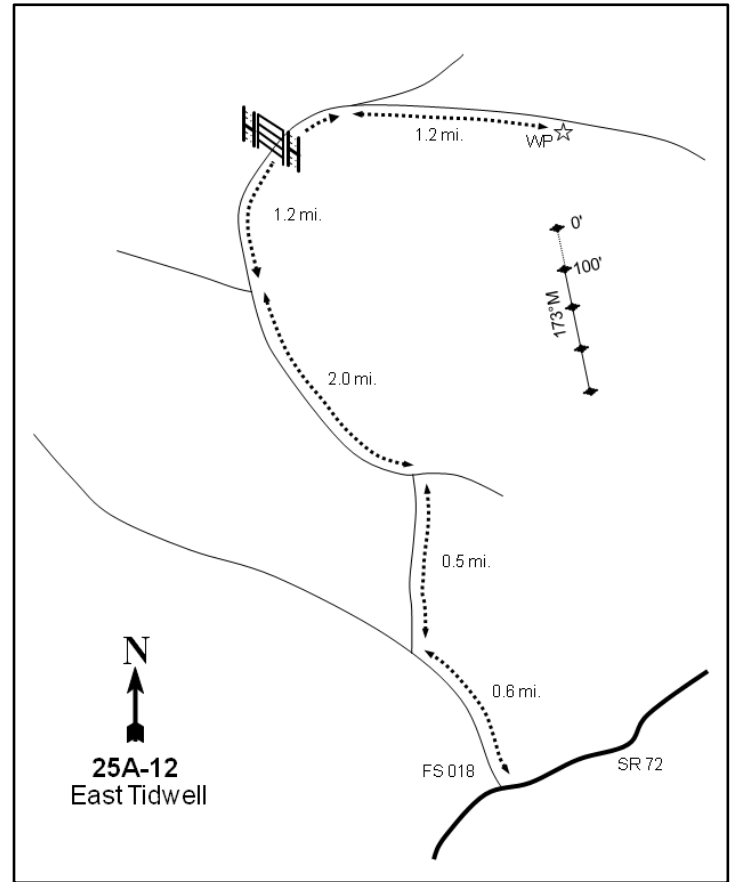
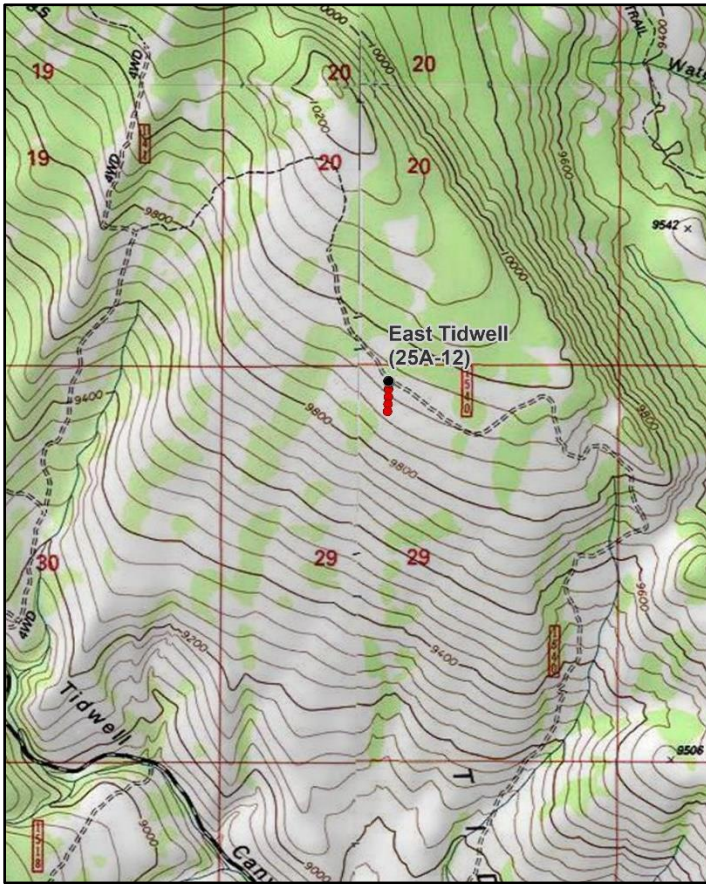
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 25A-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' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	12	-	100	-	-	-	13.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	5	-	100	-	-	-	6.0
2023	4	100	-	-	-	-	1.0



## EAST TIDWELL - STUDY NO. 25A-12

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Geyser Peak NW; Township 25S, Range 4E, Section 29  
NAD 83 UTM ZONE 12, 456537 East 4274079 North

**Transect Information**

Browse Tag # (0' Stake)	9078
Transect Bearing	173° 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**

**Use an ATV to access this site.** Traveling north on SR-72 from Fremont, turn west on Forest Service Road #018 (between the cattle guard and mile marker #16). Travel 0.6 miles (crossing a cattle guard) to a fork in the road and go right. One-half of a mile later is a "T" in the road: stay to the left. Continue 2.0 miles and turn right at a fork that goes up a steep hill. After 0.1 miles there is a faint intersection. Stay on the main road and travel north for 0.9 miles to a gate. Go through the gate and continue for 0.2 miles to a fork in the road. Bear right and go through a grove of trees and up a steep, rocky road. The road becomes very faint, but proceed for 1.2 miles to a witness post on the right (south) side of the road. The 0-foot baseline stake is easy to see and has browse tag #9078 attached.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Solomon Allotment
Elevation	10,000ft (3,048m)
Aspect	Southwest
Slope	7-12%
Sample Dates	08/18/1999, 08/23/2004, 08/19/2009, 08/13/2013, 07/18/2018, 07/20/2023

**Wildlife Habitat and Vegetation History****Table 25A-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25A-12.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1991	Perennial Forb/Parry's Rabbitbrush	NA
1999	Perennial Forb/Parry's Rabbitbrush	NA
2004	Perennial Forb/Parry's Rabbitbrush	NA
2009	Perennial Forb/Parry's Rabbitbrush	NA
2013	Perennial Forb/Parry's Rabbitbrush	NA
2018	Perennial Forb/Parry's Rabbitbrush/Black Sagebrush	NA
2023	Black Sagebrush/Parry's Rabbitbrush/Perennial Forb	NA

**Site Notes**

Large aspen (*Populus tremuloides*) stands grow to the north and west of the site.

**Soils****Table 25A-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
Loam	7.5	47.3	29.4	23.3	3.1	21.0	166.4	0.6	08/18/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation 23 inches  
 NRCS Ecological Site High Mountain Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site # R047XB516UT  
 States and Transitions No state and transition model is available for this ecological site.

Parry's rabbitbrush (*Ericameria parryi* var. *parryi*) has been a dominant shrub component on this site since study establishment in 1991; a number of other mountain brush species have been present that provided limited cover. Both cover and density of Parry's rabbitbrush decreased between 2018 and 2023, but it was still considered to be a dominant vegetation component during the most recent sampling. Black sagebrush (*Artemisia nova*) has increased in cover and abundance over the sample years and it became a co-dominant shrub species in 2018 (Photos, Pre-1992 Data, Table 25A-12.12, Table 25A-12.13). The herbaceous community has maintained a diverse component of native forbs and grasses, with perennial forbs contributing a majority of the cover in most sample years (Table 25A-12.7, Table 25A-12.10, Table 25A-12.11). Sagebrush will likely continue to increase on this site over time.

Due to the abundance and diversity of the shrub and herbaceous communities, this site likely serves a adequate habitat for summering mule deer. In addition, the diverse and abundant herbaceous understory could provide valuable forage for elk that use the area during the summer months (Table 25A-12.3; Beck & Peek, 2005). Pellet group data indicates that deer presence was low in 2023 while that of elk was moderate (Table 25A-12.9).

## Trend Summary Tables

**Table 25A-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
1999	1.1	7.6	-	-	-	-
2004	1.8	15.6	-	1.6	19.6	-
2009	2.4	7.2	-	4.0	9.2	-
2013	5.9	10.3	-	6.8	10.7	-
2018	9.7	10.2	-	10.4	10.4	-
2023	18.3	10.3	-	16.4	10.7	-

**Table 25A-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
1999	-	333	97	325	-	8.9	1.2	12.6
2004	-	317	88	311	-	9.3	1.8	11.6
2009	4	316	52	310	0.0	6.2	0.3	6.2
2013	-	342	82	319	-	10.7	1.0	11.4
2018	-	347	144	299	-	8.8	2.7	9.9
2023	-	260	90	273	-	7.1	1.4	11.1

**Table 25A-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
1999	4.0	0.2	6.2	43.6	10.8	29.8
2004	8.0	0.2	8.0	54.4	9.9	34.1
2009	11.9	0.0	13.1	48.9	9.2	26.3
2013	3.5	0.1	11.9	40.9	24.3	39.7
2018	6.7	0.4	20.8	47.9	16.8	41.3
2023	10.7	0.2	11.8	38.2	19.6	36.9

**Table 25A-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	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
1999	2	17	37	-	12
2004	1	15	25	-	34
2009	1	16	49	-	39
2013	-	10	24	-	13
2018	-	11	13	-	4
2023	1	6	39	-	6
Year	Days Use Per Acre (ha)				
1999	0.7 (1.8)	14.7 (36.4)	70.4 (173.8)	-	-
2004	5.1 (12.6)	16.1 (39.7)	34.9 (86.1)	-	-
2009	8.0 (19.7)	20.1 (49.7)	52.3 (129.1)	-	-
2013	2.2 (5.4)	2.0 (5.0)	67.0 (165.5)	-	-
2018	1.5 (3.6)	20.8 (51.3)	60.3 (149.0)	8.7 (21.5)*	-
2023	0.7 (1.8)	5.3 (13.2)	24.1 (59.6)	-	-

\*Pellets per acre (ha)

**Table 25A-12.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum pinetorum (pine needlegrass)	Bouteloua gracilis (blue grama)	Carex (sedge)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency											
1999	75	-	15	9	-	91	26	84	11	180	180	-
2004	133	-	2	16	-	71	88	21	1	177	109	-
2009	82	-	33	32	-	42	70	2	-	97	171	4
2013	113	-	14	10	-	64	101	65	18	140	113	-
2018	114	1	2	17	-	78	76	139	14	181	66	-
2023	96	-	5	18	3	51	52	18	16	93	71	-
year	Average Cover (%)											
1999	1.4	-	0.0	0.1	-	1.2	0.3	0.7	0.1	2.2	2.9	-
2004	2.3	-	0.0	0.2	-	1.0	1.0	0.1	0.0	3.2	1.5	-
2009	1.3	-	0.5	0.1	-	0.5	0.6	0.0	-	0.8	2.3	0.0
2013	2.1	-	0.1	0.2	-	1.2	1.0	0.7	0.2	2.5	2.6	-
2018	1.5	0.0	0.0	0.3	-	0.5	0.5	1.9	0.3	2.9	0.8	-
2023	1.4	-	0.0	0.1	0.1	0.7	0.8	0.3	0.6	1.7	1.5	-

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

**Table 25A-12.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria microphylla (littleleaf pussytoes)	Antennaria parvifolia (small-leaf pussytoes)	Arabis (rockcress)	Astragalus agrestis (purple milkvetch)	Astragalus cibirarius (browse milkvetch)	Astragalus miser (timber milkvetch)	Castilleja angustifolia (northwestern Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Comandra umbellata (bastard toadflax)	Erigeron aphanactis <sup>a</sup> (rayless shaggy fleabane)	Erigeron flagellaris (trailing fleabane)	Erigeron ursinus (Bear River fleabane)	Eriogonum alatum (winged buckwheat)
year	Nested Frequency																
1999	21	-	33	-	70	-	58	-	-	-	8	-	9	63	6	16	5
2004	4	-	1	-	73	-	64	-	-	-	12	-	7	88	8	13	10
2009	-	-	-	-	76	-	61	-	-	-	14	-	-	47	35	48	12
2013	13	2	52	35	70	1	87	1	8	-	29	-	19	38	22	60	8
2018	12	-	27	20	65	6	20	22	41	2	9	-	22	129	14	42	17
2023	9	1	20	2	46	3	38	-	-	2	7	3	31	64	33	13	20
year	Average Cover (%)																
1999	0.1	-	0.1	-	1.2	-	1.6	-	-	-	0.0	-	0.1	1.1	0.0	0.3	0.1
2004	0.1	-	0.0	-	2.5	-	0.8	-	-	-	0.2	-	0.0	1.8	0.2	0.1	0.1
2009	-	-	-	-	1.6	-	0.2	-	-	-	0.1	-	-	0.3	0.1	0.7	0.1
2013	0.1	0.0	0.1	0.9	1.9	0.0	1.2	0.0	0.0	-	0.2	-	0.1	0.8	0.4	1.1	0.1
2018	0.1	-	0.1	0.4	1.5	0.0	0.3	0.3	0.2	0.0	0.0	-	0.1	2.6	0.1	0.5	0.1
2023	0.0	0.0	0.1	0.0	1.9	0.0	0.7	-	-	0.0	0.0	0.0	0.8	1.3	0.8	0.3	0.1

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

FORB SPECIES	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gentiana calycosa (Raimier pleated gentian)	Geranium caespitosum (pineywoods geranium)	Hymenoxys richardsonii (pingue rubberweed)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lesquerella wardii (Ward's bladderpod)	Linum lewisii (Lewis flax)	Lupinus argenteus (silvery lupine)	Lygodesmia (skeletonplant)	Machaeranthera canescens (hoary tansyaster)	Oxytropis lambertii (purple locoweed)	Packera multilobata (lobeleaf groundsel)	Penstemon rydbergii (Rydberg's penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)
year	Nested Frequency																
1999	31	-	18	109	70	-	14	59	8	-	7	50	168	84	51	2	26
2004	32	-	-	119	48	-	5	31	6	0	14	5	81	41	69	-	66
2009	20	5	-	75	41	-	-	16	12	-	40	-	-	72	71	-	17
2013	45	-	-	65	48	3	9	44	24	-	79	3	70	45	28	-	15
2018	51	-	-	55	91	-	12	60	27	-	11	-	24	13	11	5	6
2023	50	5	1	27	60	1	-	16	9	-	3	10	23	71	66	1	13
year	Average Cover (%)																
1999	0.5	-	0.3	1.7	1.6	-	0.1	0.9	0.4	-	0.1	0.5	1.6	0.4	0.2	0.0	0.1
2004	0.5	-	-	1.7	1.1	-	0.0	0.6	0.4	0.0	0.2	0.3	0.6	0.3	0.3	-	0.7
2009	0.3	0.0	-	0.4	1.0	-	-	0.1	0.1	-	0.4	-	-	0.3	0.3	-	0.1
2013	0.8	-	-	0.5	0.9	0.0	0.0	0.3	0.4	-	0.5	0.0	0.6	0.2	0.1	-	0.1
2018	0.6	-	-	0.6	1.6	-	0.0	0.5	2.2	-	0.1	-	0.1	0.1	0.0	0.0	0.0
2023	0.8	0.0	0.1	0.6	1.9	0.0	-	0.1	0.8	-	0.0	0.1	0.1	0.8	0.2	0.0	0.1

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

FORB SPECIES	Potentilla hippiana (woolly cinquefoil)	Potentilla pennsylvanica (Pennsylvania cinquefoil)	Senecio spartioides var. multicapitatus (broom-like ragwort)	Silene drummondii (Drummond's campion)	Stanleya pinnata (desert princesplume)	Symphotrichum (aster)	Taraxacum officinale (common dandelion)
year	Nested Frequency						
1999	41	6	-	14	-	9	14
2004	26	-	-	-	-	1	9
2009	32	-	42	-	12	6	-
2013	26	8	-	5	-	12	10
2018	30	9	-	13	-	3	1
2023	26	3	-	5	-	3	3
year	Average Cover (%)						
1999	0.8	0.0	-	0.1	-	0.0	0.1
2004	0.8	-	-	-	-	0.0	0.0
2009	0.1	-	0.1	-	0.1	0.0	-
2013	0.7	0.0	-	0.0	-	0.1	0.1
2018	0.2	0.0	-	0.1	-	0.0	0.0
2023	0.4	0.0	-	0.0	-	0.2	0.1

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

**Table 25A-12.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)							
1999	-	-	-	-	-	-	-	-
2004	0.7	0.3	0.6	2.8	12.3	2.3	-	2.2
2009	0.8	1.3	1.9	1.1	6.7	0	-	1.4
2013	0.7	3.8	2.3	1.2	7.1	0.4	-	2
2018	0.3	5.2	4	2.1	6.7	0.5	0.9	1.1
2023	1.3	8	6.7	4.8	4.2	0.1	0.4	1.6
year	Quadrat Cover (%)							
1999	0.4	0.5	0.1	0.7	5.8	0.1	-	0.9
2004	0.8	0.8	0.2	1.1	10.7	1.8	-	1.9
2009	0.6	0.9	0.9	0.7	5.8	0.1	-	0.7
2013	0.7	3.8	1.4	1.4	6.8	0.7	-	1.5
2018	0.6	5.4	3.6	2.0	5.9	0.8	0.0	1.5
2023	2.1	7.6	8.6	3.9	4.6	0.7	0.0	1.1

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

**Table 25A-12.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
1999	4520	80	14	86	0	1	0	0	14/19
2004	1240	-	5	95	0	8	2	0	21/27
2009	1160	-	0	100	0	5	0	0	12/22
2013	2560	2000	18	82	0	61	4	0	9/17
2018	4000	40	13	87	0	0	0	0	6/10
2023	4380	360	55	45	0	0	0	0	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1999	140	-	29	71	0	0	0	0	26/71
2004	380	80	32	68	0	0	0	0	24/53
2009	3520	1800	67	33	0	0	0	0	17/41
2013	3220	400	34	66	0	45	1	0	14/43
2018	4460	100	34	66	0	3	0	0	16/37
2023	4400	800	16	83	2	0	0	2	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1999	40	-	0	100	0	50	0	0	24/61
2004	240	120	8	92	0	42	8	0	31/69
2009	1180	500	61	36	3	2	0	0	22/48
2013	2220	700	56	44	0	14	4	0	21/48
2018	2940	40	18	80	2	27	0	1	25/48
2023	2940	500	10	87	3	0	0	3	- / -

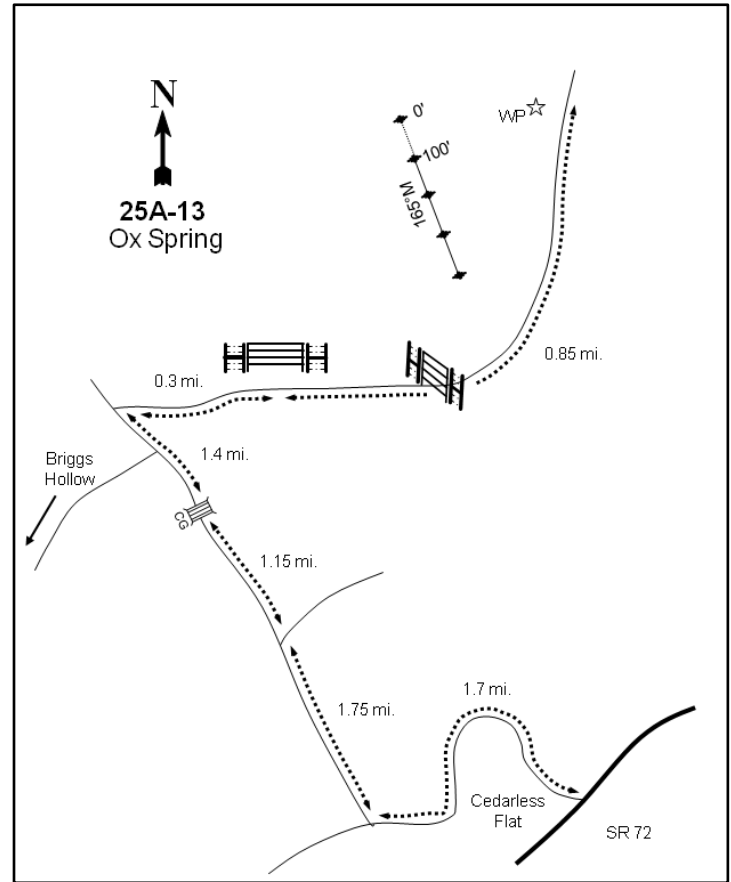
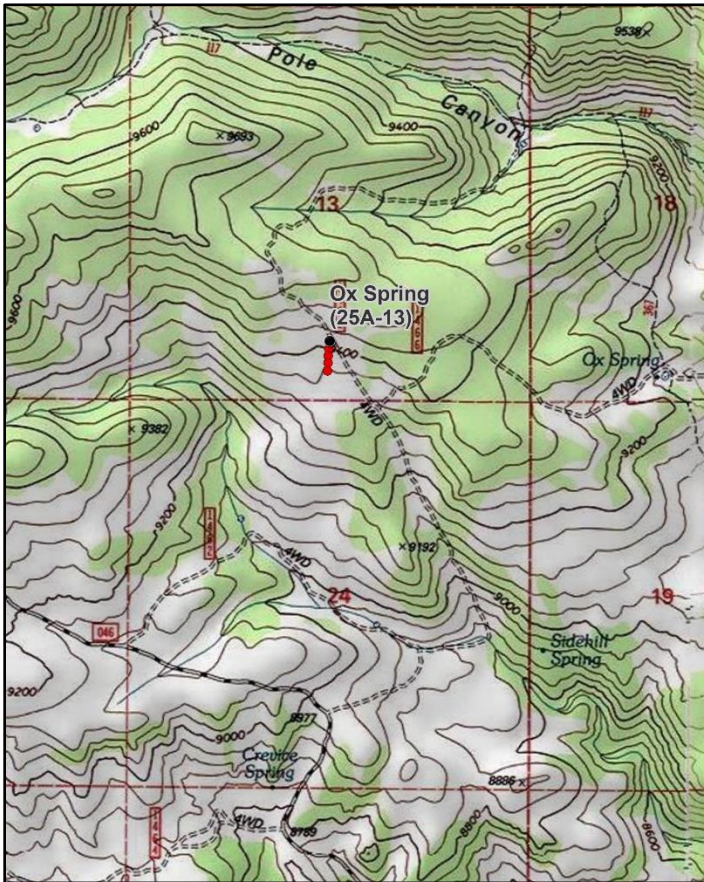
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	2220	-	10	86	5	0	1	4	13/22
2004	2480	-	4	91	5	0	0	4	17/31
2009	2340	-	7	92	1	0	0	0	11/21
2013	1420	100	14	83	3	3	7	0	15/30
2018	3920	100	12	88	0	0	0	0	12/22
2023	6520	40	12	88	0	0	0	0	- / -
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1999	13140	120	9	87	4	1	0	1	12/22
2004	7420	120	5	93	1	2	1	0	12/22
2009	21580	420	13	87	0	0	0	0	11/19
2013	13400	60	8	91	0	14	2	0	11/22
2018	17440	100	11	89	1	3	0	1	11/17
2023	10340	180	67	33	1	0	0	1	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	960	20	10	90	0	0	0	2	10/14
2004	3860	-	0	100	0	0	0	0	13/20
2009	280	-	0	100	0	0	0	0	10/14
2013	740	60	11	89	0	0	0	0	10/16
2018	2280	-	9	91	0	0	0	0	9/13
2023	2860	-	5	95	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1999	20	-	0	100	0	100	0	0	21/76
2004	-	-	-	-	-	-	-	-	25/74
2009	60	-	0	100	0	0	0	0	21/58
2013	20	-	0	100	0	0	0	0	19/63
2018	160	-	63	25	13	13	0	13	29/80
2023	140	-	0	100	0	0	0	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1999	2280	80	27	68	4	9	0	1	14/22
2004	3120	-	9	90	1	7	2	3	16/28
2009	2440	100	15	84	1	0	0	0	14/21
2013	2060	40	14	86	0	26	2	0	17/28
2018	2440	20	21	69	11	7	1	7	15/24
2023	1500	-	20	79	1	0	0	1	- / -

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

**Table 25A-12.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Populus tremuloides (quaking aspen)</b>							
2018	5	-	100	-	-	-	4.0

## OX SPRING - STUDY NO. 25A-13

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Fish Lake SE; Township 26S, Range 2E, Section 13  
NAD 83 UTM ZONE 12, 444004 East 4266336 North

**Transect Information**

Browse Tag # (0' Stake)	408
Transect Bearing	175° 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**

Turn west off of SR-72 onto Mill Meadow Road north of Fremont, then go past the lake and up Johnson Reservoir Road for 3.8 miles. Turn west off of the paved road and go 1.1 miles to a cattle guard at the head of Cedarless Flat. Continue for 0.6 miles to a fork in the road. Bear right and proceed for 1.75 miles to the Ox Spring trail turnoff. Stay left (on the main road) for 1.15 miles to another cattle guard. Travel for another 1.05 miles to the Briggs Hollow turnoff. Stay right and drive for 0.35 miles, turn right off the Mytoge Road, and go 0.3 miles. Before the gate turn right and follow the fenceline for 0.2 miles to another gate. Drive another 0.85 miles (passing through two more gates) to a half-high witness post among some rocks. Walk 11 paces off of the left (west) side of the road. From the witness post, the white-topped 0 foot baseline stake is 7 paces away at an azimuth of 284 degrees magnetic and is marked by browse tag #408.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Seven Mile Allotment
Elevation	9,400ft (2,865m)
Aspect	South
Slope	10-12%
Sample Dates	08/25/1999, 08/26/2004, 08/20/2009, 08/12/2013, 07/18/2018, 07/19/2023



**Table 25A-13.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed Fire	-	-	1989 or 1990	-

**Wildlife Habitat and Vegetation History****Table 25A-13.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25A-13.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1991	Perennial Grass	No Encroachment
1999	Yellow Rabbitbrush	No Encroachment
2004	Yellow Rabbitbrush	No Encroachment
2009	Yellow Rabbitbrush	No Encroachment
2013	Yellow Rabbitbrush	No Encroachment
2018	Yellow Rabbitbrush	No Encroachment
2023	Yellow Rabbitbrush	No Encroachment

**Site Notes**

No Notes

**Soils****Table 25A-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
Loam	7.3	33.3	43.4	23.3	5.2	20.5	428.8	0.7	08/25/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation                      23 inches  
 NRCS Ecological Site    High Mountain Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site #    R047XB516UT  
 States and Transitions    No state and transition model is available for this ecological site.

Following the prescribed burn in 1989 or 1990 (Table 25A-13.1), this site was dominated by native perennial grasses and a diverse assortment of perennial forbs. Yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) was the dominant browse species, although the majority of the plants were still young and low-growing (Photos, Pre-1992 Data). Shrub cover and diversity have increased over the sample years, but yellow rabbitbrush has remained the dominant shrub species (Table 25A-13.12, Table 25A-13.13). The herbaceous understory remained robust in 2023, but has generally decreased in cover over the duration of the study period (Table 25A-13.7, Table 25A-13.10, Table 25A-13.11). As the length of time elapsed since last fire increases, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and mountain snowberry (*Symphoricarpos oreophilus*) could slowly return to dominance in the plant community while the understory diminishes.

Due to the moderate abundance and diversity of the shrub and herbaceous communities, this site may serve as adequate habitat for summering mule deer. However, this site may better serve as foraging range during very mild winters due to a moderate amount of sagebrush and snowberry cover. In addition, the sagebrush component of this site could provide valuable browse for wintering elk (Table 25A-13.3; Wambolt, 1996). According to pellet group data, however, both elk and deer presence were low in 2023 (Table 25A-13.9).

**Trend Summary Tables**

**Table 25A-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
1999	1.1	14.7	-	-	-	-
2004	1.9	21.9	-	2.3	26.2	-
2009	2.5	15.3	-	3.6	17.6	-
2013	2.9	12.0	-	5.2	14.8	-
2018	5.8	15.2	-	7.6	15.9	-
2023	10.6	22.7	-	12.4	25.7	-

**Table 25A-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
1999	-	434	89	316	-	23.4	0.5	16.4
2004	-	357	68	203	-	16.3	0.4	5.3
2009	-	368	34	197	-	10.9	0.1	3.7
2013	-	389	39	240	-	19.6	0.1	5.9
2018	-	390	2	204	-	22.7	0.0	4.5
2023	-	334	275	184	-	17.1	3.1	6.0

**Table 25A-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
1999	9.2	-	35.5	12.8	5.7	56.4
2004	9.7	0.0	25.0	24.6	7.8	43.8
2009	11.4	-	33.6	22.9	3.4	35.9
2013	4.6	0.1	27.1	22.2	17.4	44.6
2018	9.8	-	36.3	33.1	11.1	48.5
2023	8.4	-	25.2	23.0	17.7	45.5

**Table 25A-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				
1999	8	7	57	1	4
2004	1	3	61	-	6
2009	5	7	60	-	49
2013	5	5	39	-	10
2018	1	7	26	-	9
2023	5	5	30	-	6
Year	Days Use Per Acre (ha)				
1999	24.7 (61.0)	8.7 (21.5)	97.9 (241.7)	-	-
2004	-	5.3 (13.2)	111.9 (276.4)	-	-
2009	13.8 (34.1)	10.7 (26.5)	91.1 (225.1)	-	-
2013	31.9 (78.9)	10.0 (24.8)	105.2 (259.9)	-	-
2018	-	0.7 (1.7)	30.2 (74.5)	-	-
2023	8.0 (19.7)	1.3 (3.3)	18.1 (44.7)	-	-

**Table 25A-13.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Bromus porteri (Porter brome)	Carex obtusata (obtuse sedge)	Elymus canadensis (Canada wildrye)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency										
1999	73	40	107	-	107	54	5	142	318	91	1
2004	72	1	18	-	61	78	8	42	238	91	-
2009	103	-	3	-	21	104	-	16	255	101	-
2013	123	18	43	-	35	82	16	90	284	34	-
2018	107	13	35	22	74	62	3	56	292	67	-
2023	77	3	16	5	30	56	47	32	183	78	11
year	Average Cover (%)										
1999	1.8	0.6	2.7	-	1.9	0.7	0.0	2.8	10.5	2.3	0.0
2004	2.0	0.0	0.3	-	1.1	1.3	0.1	0.8	6.6	4.1	-
2009	2.8	-	0.1	-	0.3	0.4	-	0.1	4.5	2.7	-
2013	3.7	0.1	1.1	-	1.2	1.4	0.1	1.7	9.1	1.1	-
2018	3.8	0.1	0.4	0.3	1.1	1.3	0.2	1.1	12.3	2.3	-
2023	2.0	0.0	0.2	0.1	0.8	2.0	2.1	0.7	6.3	2.7	0.1

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

**Table 25A-13.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria microphylla (litttleleaf pussytoes)	Arabis drummondii (Drummond's rockcress)	Astragalus (milkvetch)	Astragalus agrestis (purple milkvetch)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Astragalus serpens (plateau milkvetch)	Astragalus tenellus (looseflower milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chenopodium album <sup>a</sup> (lambsquarters)	Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium wheeleri (Wheeler's thistle)
year	Nested Frequency																
1999	-	88	140	-	41	-	-	-	-	-	-	7	-	-	-	-	-
2004	4	-	78	-	-	-	14	-	-	3	-	2	13	-	-	37	-
2009	7	-	66	-	-	-	-	-	-	17	-	-	5	-	-	23	-
2013	1	35	96	1	-	-	-	-	5	16	-	1	-	-	-	4	-
2018	-	2	41	-	-	-	4	-	-	13	-	5	-	-	-	0	-
2023	34	2	24	-	-	10	-	2	9	-	2	-	-	15	10	253	3
year	Average Cover (%)																
1999	-	0.4	5.1	-	0.2	-	-	-	-	-	-	0.1	-	-	-	-	-
2004	0.0	-	1.0	-	-	-	0.1	-	-	0.0	-	0.0	0.1	-	-	0.2	-
2009	0.0	-	1.5	-	-	-	-	-	-	0.1	-	-	0.0	-	-	0.1	-
2013	0.0	0.1	2.1	0.0	-	-	-	-	0.0	0.1	-	0.0	-	-	-	0.0	-
2018	-	0.0	0.8	-	-	-	0.0	-	-	0.2	-	0.1	-	-	-	0.0	-
2023	0.2	0.0	0.6	-	-	0.0	-	0.0	0.2	-	0.0	-	-	0.0	0.0	2.9	0.0

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

FORB SPECIES	Comandra umbellata (bastard toadflax)	Crepis intermedia (limestone hawkbeard)	Cryptantha (cryptantha)	Erigeron eatonii (Eaton's fleabane)	Erigeron flagellaris (trailing fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Fritillaria atropurpurea (spotted fritillary)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Heliomeris multiflora var. multiflora (showy goldeneye)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Penstemon watsonii (Watson's penstemon)	Phlox austromontana (mountain phlox)
year	Nested Frequency																
1999	-	5	-	-	-	9	77	6	-	-	1	-	28	115	2	70	-
2004	7	-	-	18	-	4	65	2	-	21	-	5	5	5	-	59	3
2009	37	-	-	27	3	18	65	9	-	10	-	-	8	3	1	36	1
2013	-	5	-	10	4	1	98	11	-	-	-	-	8	2	15	30	-
2018	-	2	-	20	5	6	88	18	-	-	-	-	4	2	6	5	-
2023	3	18	1	8	10	-	82	11	4	59	-	5	6	1	-	34	-
year	Average Cover (%)																
1999	-	0.0	-	-	-	0.1	1.7	0.1	-	-	0.0	-	0.5	3.5	0.0	1.9	-
2004	0.0	-	-	0.1	-	0.0	1.6	0.0	-	0.1	-	0.0	0.1	0.0	-	1.7	0.0
2009	0.2	-	-	0.3	0.0	0.1	0.8	0.1	-	0.0	-	-	0.0	0.0	0.0	0.4	0.0
2013	-	0.0	-	0.0	0.1	0.0	1.8	0.2	-	-	-	-	0.1	0.0	0.1	0.3	-
2018	-	0.0	-	0.2	0.0	0.1	1.7	0.3	-	-	-	-	0.0	0.0	0.2	0.2	-
2023	0.1	0.2	0.0	0.1	0.3	-	2.1	0.2	0.0	0.2	-	0.0	0.0	0.1	-	1.5	-

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla hippiana (woolly cinquefoil)	Silene drummondii (Drummond's campion)	Symphoricarum ascendens (western aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency						
1999	-	-	9	10	56	83	1
2004	8	-	5	5	34	3	-
2009	8	-	-	-	-	-	-
2013	11	-	-	2	50	11	-
2018	-	-	-	56	3	4	-
2023	13	1	3	-	3	7	-
year	Average Cover (%)						
1999	-	-	0.3	0.1	1.6	1.3	0.0
2004	0.1	-	0.1	0.0	0.2	0.0	-
2009	0.0	-	-	-	-	-	-
2013	0.0	-	-	0.0	0.9	0.1	-
2018	-	-	-	0.7	0.0	0.0	-
2023	0.1	0.0	0.0	-	0.0	0.0	-

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

**Table 25A-13.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Mahonia repens (creeping barberry)	Rosa woodsii <sup>p</sup> (Woods' rose)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)						
1999	-	-	-	-	-	-	-
2004	0.6	-	24.7	1.4	0.1	-	1.7
2009	1.4	-	14.9	2.7	-	-	2.2
2013	2	-	13.7	1.1	-	0.1	3.1
2018	3.8	-	15.4	0.5	-	-	3.8
2023	7.2	-	25.3	0.4	-	0.1	5.1
year	Quadrat Cover (%)						
1999	-	-	13.8	0.9	0.1	0.1	1.0
2004	0.6	-	20.0	1.7	0.1	0.0	1.3
2009	0.9	-	13.7	1.4	0.1	0.1	1.6
2013	1.3	-	11.0	1.0	0.1	0.2	1.4
2018	2.5	0.0	14.2	0.9	0.1	0.0	3.3
2023	5.6	-	22.1	0.3	0.3	0.4	4.6

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

**Table 25A-13.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

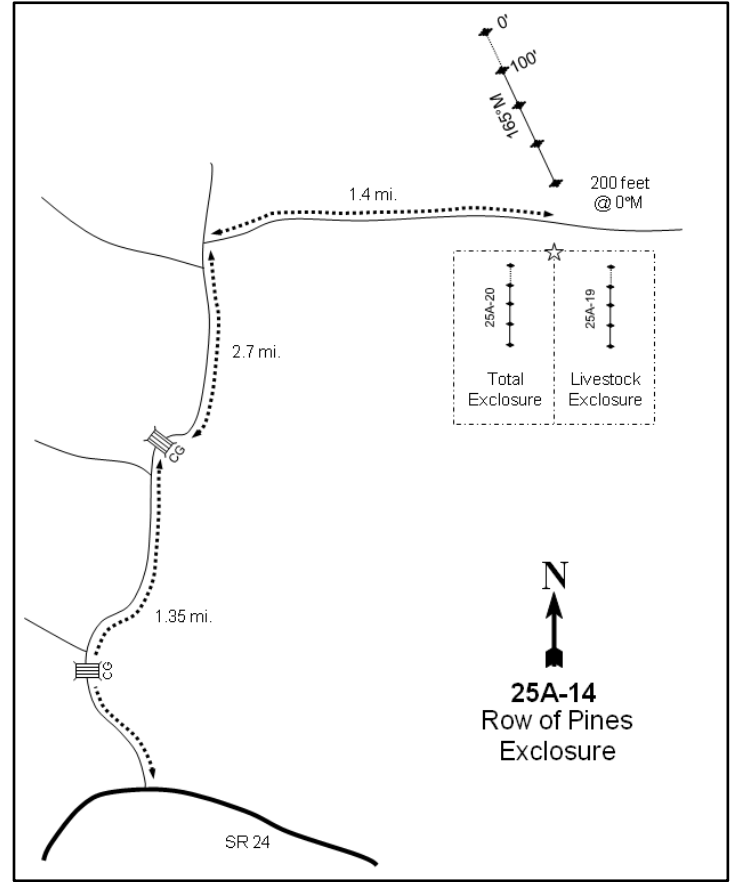
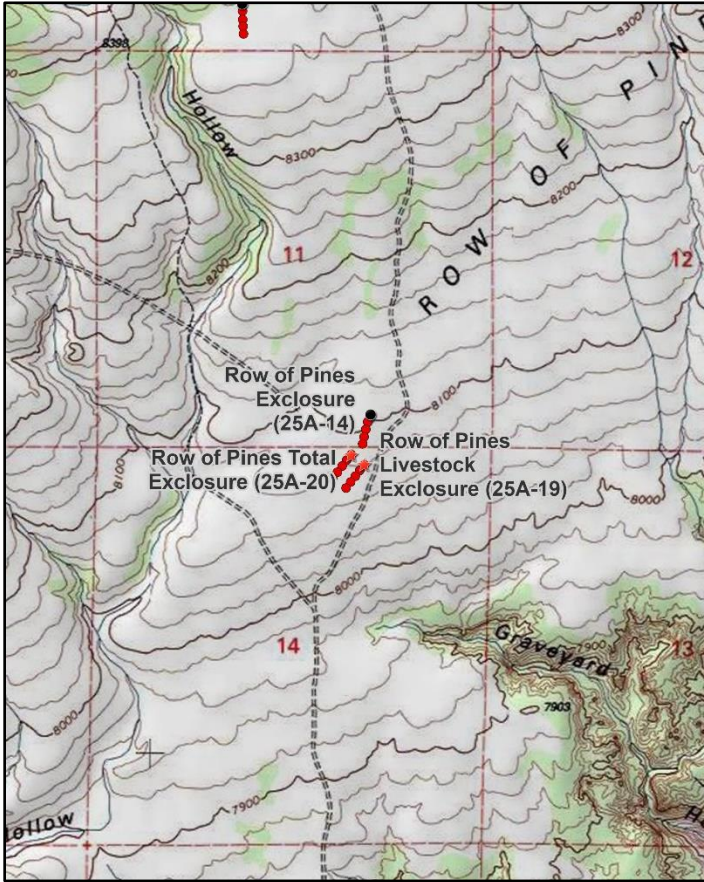
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	20	-	0	100	0	0	100	0	20/33
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	36/37
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	9/23
2018	-	-	-	-	-	-	-	-	28/50
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1999	160	-	50	50	0	0	0	0	56/97
2004	260	3140	46	54	0	39	0	0	35/54
2009	1580	460	51	49	0	6	1	0	26/40
2013	1160	80	55	43	2	10	19	3	32/58
2018	1720	60	30	70	0	4	0	0	39/53
2023	1320	20	15	73	12	0	0	12	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	100	0	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	7240	-	13	86	2	0	0	1	33/55
2004	10520	8740	9	90	1	0	0	1	28/47
2009	13800	940	20	48	32	0	0	38	21/42
2013	10380	540	27	72	1	23	7	11	21/40
2018	11600	1060	13	84	3	4	0	5	21/36
2023	14260	-	11	88	1	0	0	0	- / -
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1999	960	-	0	100	0	4	0	0	23/38
2004	1740	-	1	99	0	2	0	0	21/30
2009	1520	-	8	86	7	0	4	11	21/36
2013	1180	-	2	98	0	3	3	0	17/29
2018	1080	-	4	96	0	4	0	0	18/28
2023	440	-	0	100	0	0	0	0	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
1999	260	-	39	62	0	0	0	0	8/15
2004	900	-	24	76	0	0	0	0	10/7
2009	160	-	0	100	0	0	0	0	7/6
2013	860	-	0	100	0	0	0	0	10/8
2018	440	-	0	96	5	0	0	5	5/5
2023	160	-	0	100	0	0	0	0	- / -
<b>Purshia stansburiana<sup>P</sup> -- (Stansbury cliffrose)</b>									
1999	-	-	-	-	-	-	-	-	23/43
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Rosa woodsii<sup>P</sup> -- (Woods' rose)</b>									
1999	260	-	31	69	0	0	0	0	23/23
2004	220	-	36	46	18	0	0	18	16/11
2009	320	20	25	75	0	0	0	0	17/10
2013	140	-	14	86	0	14	71	14	27/26
2018	20	-	0	100	0	0	0	0	35/32
2023	120	-	0	100	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>P</sup> -- (mountain snowberry)</b>									
1999	440	-	27	68	5	0	0	0	41/73
2004	360	-	6	83	11	6	6	11	39/71
2009	460	-	9	91	0	9	30	22	39/73
2013	360	60	11	83	6	33	39	33	42/90
2018	740	60	30	70	0	3	0	0	49/90
2023	500	-	0	100	0	12	16	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Tetradymia canescens -- (spineless horsebrush)									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	26/39
2009	-	-	-	-	-	-	-	-	13/19
2013	-	-	-	-	-	-	-	-	20/32
2018	20	-	100	0	0	0	0	0	9/18

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

## ROW OF PINES EXCLOSURE - STUDY NO. 25A-14



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Loa NE; Township 27S, Range 2E, Section 11  
NAD 83 UTM ZONE 12, 442669 East 4258250 North

### Transect Information

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

Not Available  
10° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

### Directions to Site

From the Chappell Cheese Factory northwest of Loa on SR-24, travel 2.6 miles west to a side road on the north where the highway makes a sharp turn (0.95 miles west of mile marker #49). Travel on this road for 0.65 miles and turn right after crossing a cattle guard. After 0.7 more miles, turn right at the fork and cross another cattle guard. Drive 2.7 miles to another fork where you will again turn right. After about 60 feet, turn right (east) and go 1.4 miles to an exclosure. Stop at the middle of the exclosure and walk 200 feet at an azimuth of 0 degrees magnetic to the 400-foot stake. The 0-foot stake is 400 feet to the north in front of a large rock; there is no browse tag.

### Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	SEVEN MILE
Elevation	8,050ft (2,454m)
Aspect	South
Slope	3-5%
Sample Dates	08/24/1999, 08/11/2004, 08/13/2009, 08/15/2013, 07/18/2018, 07/20/2023



**Table 25A-14.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Unknown	Roe Pine Bench Chaining and Seeding 1983	LTDL	August-November 1983	2345
Seeding - Aerial Unknown	Roe Pine Bench Chaining and Seeding 1983	LTDL	August-November 1983	2345
Harrow - Two-Way Dixie	Seven Mile Dixie Harrow 2006	LTDL	October-December 2006	4275
Seeding - Broadcast Before	Seven Mile Dixie Harrow 2006	LTDL	November-December 2006	4275
Seeding - Aerial Unknown	Seven Mile Dixie Harrow 2006	LTDL	January 2007	2000

**Table 25A-14.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Roe Pine Bench Aerial Seeding			Aerial	Sep 1983	2345
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron desertorum	Desert Wheatgrass		1.00	0.00
G	Bromus inermis	Smooth Brome		1.00	0.00
G	Psathyrostachys juncea	Russian Wildrye		1.00	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	1.00	0.00
F	Medicago sativa	Alfalfa		3.00	0.00
F	Melilotus officinalis	Yellow Sweetclover		2.00	0.00
F	Sanguisorba minor	Small Burnet		2.00	0.00
S	Atriplex canescens	Fourwing Saltbush		0.00	0.00

Mix Name			Application Type	Application Date	Acres
Seven Mile - Low elevation			Broadcast	Nov 2006	4400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.50	0.45
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.29	0.26
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	0.22	0.19
G	Festuca ovina	Sheep Fescue		0.25	0.24
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.35	0.29
G	Leymus cinereus	Great Basin Wildrye	Trailhead	0.45	0.40
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.23	0.19
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.02	0.02
G	Poa secunda	Big Bluegrass	Sherman	0.15	0.12
G	Poa secunda	Big Bluegrass	Sherman	0.11	0.09
G	Psathyrostachys juncea	Russian Wildrye		0.99	0.91
G	Psathyrostachys juncea	Russian Wildrye		0.02	0.02
G	Thinopyrum intermedium	Pubescent Wheatgrass		0.50	0.42
F	Helianthus annuus	Annual Sunflower	Millard UT	0.03	0.03
F	Linum perenne	Blue Flax	Appar	0.20	0.19
F	Linum perenne	Blue Flax		0.12	0.11
F	Medicago sativa	Alfalfa	Ladak	0.50	0.47
F	Melilotus officinalis	Yellow Sweetclover		0.25	0.21
F	Sanguisorba minor	Small Burnet	Delar	2.00	1.86

Mix Name			Application Type	Application Date	Acres
Seven Mile - Browse Low Elevation			Aerial	Jan 2007	2000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver UT	0.50	0.11
S	Bassia prostrata	Forage Kochia	Elko/Lander NV	1.50	0.71

**Wildlife Habitat and Vegetation History****Table 25A-14.3 - 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
Pronghorn	crucial	winter	

**Table 25A-14.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1991	Mountain Big Sagebrush	No Encroachment
1999	Mountain Big Sagebrush	No Encroachment
2004	Mountain Big Sagebrush	No Encroachment
2009	Perennial Grass/Mountain Big Sagebrush	No Encroachment
2013	Perennial Grass/Mountain Big Sagebrush	No Encroachment
2018	Perennial Grass/Mountain Big Sagebrush	No Encroachment
2023	Mountain Big Sagebrush/Perennial Grass	No Encroachment

**Site Notes**

Large amounts of sage-grouse droppings were encountered in the area during site establishment in 1991 and again in 2023. Escape cover is located about one half of a mile from the study transect. Sagebrush displayed some chlorotic coloring in 2023, but it also appeared that sagebrush had an abundance in flower/seed-heads.

**Soils****Table 25A-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	7.0	47.3	27.4	25.3	1.6	8.5	163.2	0.6	08/24/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation                      15 inches  
 NRCS Ecological Site    Upland Stony Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site #    R047XB336UT  
 States and Transitions    No state and transition model is available for this ecological site.

When the study was established in 1991, this site was dominated by a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and broom snakeweed (*Gutierrezia sarothrae*). The herbaceous understory consisted of a mixture of native and introduced perennial grasses and a few forbs that were not abundant (Photos, Pre-1992 Data). From the harrow treatment in the fall of 2006 (Table 25A-14.1) through the 2018 sample year, both native and introduced perennial grasses increased in cover. However, cover of the native species blue grama (*Bouteloua gracilis*) decreased significantly between 2018 and 2023. Forbs have remained rare (Table 25A-14.7, Table 25A-14.10 Table 25A-14.11). Shrubs decreased in cover in 2009, but exhibited a subsequent increase in 2013 (Table 25A-14.11, Table 25A-14.12). Density of sagebrush has increased since 2004 (Table 25A-14.13), and the community will likely transition to a solely sagebrush dominated state should decreases in perennial grass cover continue in the future.

Deer winter range condition has ranged between very poor and good since 1999. As of 2023, deer winter range condition was considered to be good. Improvement to deer wintering range can be accomplished through efforts that support perennial forb production (Table 25A-14.15). In addition, the sagebrush component of this site could provide valuable browse for elk that may use the area during the winter (Table 25A-14.3; Wambolt, 1996). However, both mule deer and elk presence were considered to be low in 2023 (Table 25A-14.9).

## Trend Summary Tables

**Table 25A-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
1999	13.0	3.9	-	-	-	-
2004	11.1	0.8	-	9.6	1.2	-
2009	2.2	2.7	-	4.3	2.7	-
2013	8.7	1.1	-	9.3	0.4	-
2018	10.1	3.6	-	12.0	2.4	-
2023	12.8	0.5	-	17.2	-	-

**Table 25A-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
1999	-	298	16	76	-	8.8	0.0	0.6
2004	-	242	11	28	-	5.7	0.2	0.2
2009	-	233	14	13	-	10.3	0.1	0.0
2013	-	340	2	30	-	20.3	0.0	0.2
2018	-	347	-	8	-	22.8	-	0.0
2023	-	281	13	16	-	9.9	0.1	0.1

**Table 25A-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
1999	21.4	0.2	17.9	29.0	13.6	25.5
2004	34.8	0.1	20.9	26.5	13.1	18.2
2009	31.4	0.0	24.0	16.4	14.8	17.2
2013	20.1	0.0	22.5	25.5	15.8	29.2
2018	14.8	0.1	30.4	30.0	20.3	38.1
2023	29.1	0.0	18.8	20.1	13.1	22.3

**Table 25A-14.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer/Pronghorn	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
1999	3	-	16	5	-	34
2004	4	-	29	3	2	45
2009	1	-	11	-	-	65
2013	2	-	10	1	-	18
2018	2	-	16	-	-	10
2023	-	-	5	2	2	1
Year	Days Use Per Acre (ha)					
1999	14.5 (35.9)	-	28.8 (71.2)	15.4 (38.1)	-	-
2004	4.4 (10.8)	-	77.1 (190.4)	2.7 (6.6)	34.9 (86.1)*	-
2009	5.1 (12.6)	-	28.1 (69.5)	-	-	-
2013	8.0 (19.7)	-	8.7 (21.5)	2.0 (5.0)	-	-
2018	8.7 (21.5)	-	17.4 (43.0)	0.7 (1.7)	-	-
2023	5.1 (12.6)	8.7 (21.5)*	14.1 (34.8)	17.4 (43.0)	69.7 (172.1)*	-

\*Pellets per acre (ha)

**Table 25A-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)
year	Nested Frequency								
1999	19	-	37	169	9	163	1	-	20
2004	19	-	8	176	4	48	-	-	10
2009	31	-	2	167	-	42	-	-	23
2013	26	8	13	252	-	42	2	3	81
2018	28	18	21	309	-	79	6	1	16
2023	24	-	19	235	-	18	-	5	38
year	Average Cover (%)								
1999	0.1	-	0.2	6.5	0.1	1.7	0.0	-	0.2
2004	0.1	-	0.1	4.8	0.0	0.5	-	-	0.2
2009	0.5	-	0.0	9.1	-	0.4	-	-	0.3
2013	0.6	0.2	0.3	15.0	-	1.0	0.0	0.0	3.2
2018	0.3	0.2	1.0	19.0	-	1.5	0.2	0.0	0.5
2023	0.4	-	0.7	6.4	-	0.3	-	0.1	2.0

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

**Table 25A-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Arabis demissa (nodding rockcross)	Astragalus lentiginosus (freckled milkvetch)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum ovalifolium (cushion buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Phlox longifolia (longleaf phlox)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency											
1999	12	-	6	-	-	4	67	3	-	-	5	5
2004	-	3	17	2	4	5	-	-	-	-	4	4
2009	-	2	2	-	-	14	6	-	-	-	-	3
2013	-	4	-	-	-	2	19	1	-	-	1	9
2018	-	2	-	-	-	-	3	-	-	-	-	3
2023	-	3	-	-	4	-	4	3	7	5	5	1
year	Average Cover (%)											
1999	0.0	-	0.0	-	-	0.0	0.4	0.2	-	-	0.0	0.0
2004	-	0.1	0.0	0.1	0.0	0.0	-	-	-	-	0.0	0.0
2009	-	0.0	0.0	-	-	0.1	0.0	-	-	-	-	0.0
2013	-	0.0	-	-	-	0.0	0.1	0.0	-	-	0.0	0.0
2018	-	0.0	-	-	-	-	0.0	-	-	-	-	0.0
2023	-	0.0	-	-	0.0	-	0.1	0.0	0.0	0.0	0.0	0.0

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

**Table 25A-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)					
	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Opuntia fragilis (brittle pricklypear)
year	Line Intercept Cover (%)					
1999	-	-	-	-	-	-
2004	-	9.6	0.4	-	0.7	0.1
2009	-	4.3	0.1	-	2.6	-
2013	-	9.3	0.2	-	0.2	-
2018	-	12	0.1	-	2.3	-
2023	0.8	16.4	-	-	-	-
year	Quadrat Cover (%)					
1999	-	13.0	0.5	-	3.2	0.2
2004	-	11.1	0.5	-	0.3	0.1
2009	0.0	2.2	0.1	-	2.7	0.0
2013	0.0	8.6	0.4	-	0.6	0.1
2018	0.0	10.1	0.2	0.0	3.3	0.1
2023	0.0	12.8	0.3	-	0.0	0.2

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

**Table 25A-14.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
1999	200	-	10	90	0	20	40	0	12/16
2004	60	-	0	100	0	0	67	0	7/7
2009	20	-	0	100	0	0	0	0	14/16
2013	20	-	0	100	0	0	0	0	16/40
2018	20	-	0	100	0	0	0	0	13/23
2023	40	-	0	100	0	0	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1999	5580	60	6	65	29	45	17	14	34/60
2004	4780	360	2	56	42	44	22	19	32/64
2009	6640	440	38	56	6	7	0	8	21/27
2013	7020	9460	20	77	3	39	0	14	29/42
2018	10840	60	31	63	6	24	0	6	28/43
2023	8840	-	29	66	5	50	28	22	- / -
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	20	-	0	100	0	0	0	0	9/16
2023	-	-	-	-	-	-	-	-	- / -

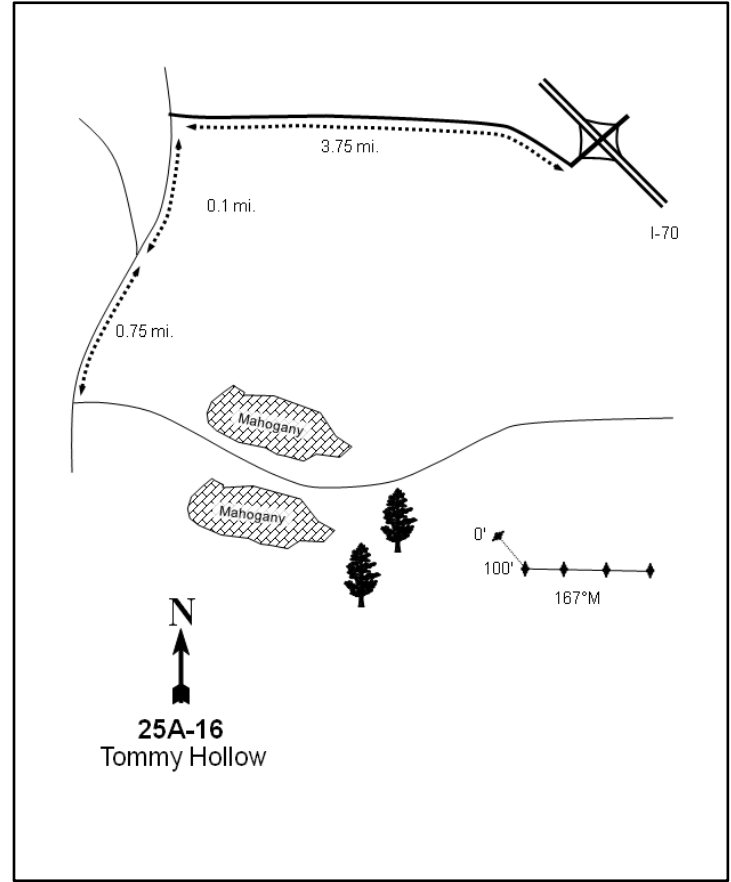
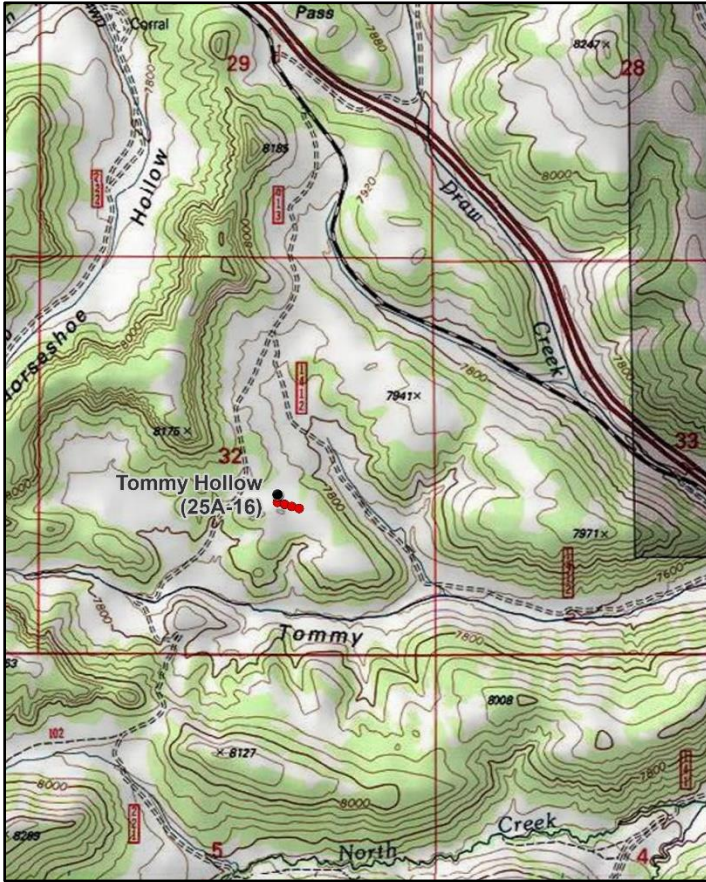
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1999	1100	-	2	75	24	7	0	13	11/24
2004	1060	60	6	85	9	8	0	6	14/28
2009	160	-	0	100	0	25	0	0	12/17
2013	380	-	5	74	21	11	5	47	13/20
2018	240	-	8	92	0	0	0	0	9/13
2023	160	-	25	75	0	0	0	0	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	8/12
2023	-	-	-	-	-	-	-	-	- / -
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	10/15
2009	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	60	-	0	100	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	10000	520	10	88	2	0	0	1	18/20
2004	1420	-	1	99	0	0	0	0	14/19
2009	8640	40	8	92	0	0	1	0	16/17
2013	1920	1860	30	56	14	5	1	18	11/16
2018	13100	100	7	92	2	0	0	6	8/11
2023	20	20	0	100	0	0	0	0	- / -
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
1999	540	-	7	89	4	0	0	4	5/20
2004	720	-	6	94	0	0	0	0	5/17
2009	20	20	0	100	0	0	0	0	4/14
2013	220	20	46	55	0	0	0	18	5/19
2018	220	-	0	100	0	0	0	0	5/14
2023	300	-	20	80	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1999	20	-	100	0	0	0	0	0	- / -
2004	40	-	0	100	0	0	0	0	2/6
2009	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	80	-	0	100	0	0	0	0	- / -

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

**Table 25A-14.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	16.3	6.3	3.1	17.6	0.0	1.2	0.0	<b>44.5</b>	Poor
2004	12.0	2.5	0.9	11.4	0.0	0.4	0.0	<b>27.1</b>	Very Poor
2009	5.4	0.0	0.0	20.6	0.0	0.1	0.0	<b>26.0</b>	Very Poor
2013	11.6	14.1	9.9	30.0	0.0	0.4	0.0	<b>65.9</b>	Fair-Good
2018	15.0	13.2	15.0	30.0	0.0	0.0	0.0	<b>73.3</b>	Good
2023	21.3	13.5	13.8	19.8	0.0	0.2	0.0	<b>68.6</b>	Good

## TOMMY HOLLOW - STUDY NO. 25A-16

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Old Woman Plateau SW; Township 23S, Range 4E, Section 32  
NAD 83 UTM ZONE 12, 457783 East 4290680 North

**Transect Information**

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

7193  
167° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

Travel on I-70 east from Salina for about 37.5 miles to a rest area exit. From the exit, turn right once, then right again to go west on the frontage road paralleling the freeway. Drive on the frontage road for 3.75 miles to a road (Forest Service Road #013) turning left. Take this left turn and proceed 0.1 miles to a "T" in the road, then turn left again and go south for 0.75 miles to the crest of the second hill. On the crest there is an old jeep trail turning left and going down the top of the hill: this road goes through a small clearing at the intersection, then through a thick patch of mahogany and junipers. The transect begins in the next sagebrush clearing beyond the trees, about 50 feet past two pinyons standing beside each other near the edge of the clearing. The transect is marked with 2-1/2 foot tall rebar. The 0-foot baseline stake has a red browse tag #7193 attached.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Beaver Dams Allotment
Elevation	7,800ft (2,377m)
Aspect	Northeast
Slope	1-2%
Sample Dates	08/17/1999, 08/25/2004, 08/10/2009, 08/21/2013, 07/17/2018, 07/31/2023



**Wildlife Habitat and Vegetation History****Table 25A-16.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
Mule Deer	Substantial	winter	
Rocky Mountain Elk	critical	winter	
Shiras Moose	crucial	year-long	Reproduction

**Table 25A-16.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush/Black Sagebrush	Phase I
1991	Mountain Big Sagebrush/Black Sagebrush	Phase I
1999	Mountain Big Sagebrush/Black Sagebrush	Phase I
2004	Mountain Big Sagebrush/Black Sagebrush	Phase I
2009	Mountain Big Sagebrush/Black Sagebrush	Phase I
2013	Mountain Big Sagebrush/Black Sagebrush	Phase I
2018	Mountain Big Sagebrush/Black Sagebrush	Phase I
2023	Mountain Big Sagebrush/Black Sagebrush	Phase I

**Site Notes**

No Notes

**Soils****Table 25A-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
Sandy Clay Loam	6.5	52.9	15.8	31.3	1.6	4.0	163.2	0.6	08/17/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 1985, the plant community on this site has existed as a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*A. nova*). A number of other shrub species have also been present, but have generally provided comparatively limited cover (Photos, Pre-1992 Data, Table 25A-16.12, Table 25A-16.13). Native and introduced perennial grasses, particularly muttongrass (*Poa fendleriana*), have been the most abundant herbaceous component, with limited cover provided by perennial and annual forbs. Annual grasses have not been observed since 1999 (Table 25A-16.7, Table 25A-16.10, Table 25A-16.11). Twoneedle pinyon (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and Rocky Mountain juniper (*J. scopulorum*) have begun to encroach in the area, and the study has been classified as being within Phase I of woodland succession since 1985 (Photos, Table 25A-16.4, Table 25A-16.12, Table 25A-16.14). Without a tree-removing disturbance, this plant community may be at risk of further encroachment in future sample years.

Deer winter range condition has generally remained good to excellent since 1999. In 2023, deer winter range condition was considered to be good. Improvement to deer wintering range can be accomplished through efforts that support preferred browse reproduction; diversifying and increasing native perennial forb production would also improve winter range condition (Table 25A-16.15). In addition, the sagebrush component of this site could provide valuable browse for elk that may use the area in the winter (Table 25A-16.3; Wambolt, 1996). Pellet group data indicates that mule deer presence was low and that elk presence was moderate in 2023 (Table 25A-16.9).

## Trend Summary Tables

**Table 25A-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
1999	20.6	6.8	-	-	-	-
2004	21.5	9.9	0.0	25.7	13.8	0.1
2009	21.1	3.2	0.8	27.6	4.4	0.6
2013	21.5	6.2	0.9	25.1	6.3	0.3
2018	24.4	6.6	0.5	24.0	6.5	0.6
2023	21.3	7.9	2.0	26.5	9.3	-

**Table 25A-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
1999	2	387	38	143	0.0	12.4	0.1	3.9
2004	-	402	58	126	-	13.0	0.2	1.5
2009	-	381	152	181	-	10.7	0.7	2.7
2013	-	410	25	184	-	14.2	0.0	2.4
2018	-	425	25	162	-	21.8	0.2	3.4
2023	-	365	65	184	-	11.6	0.3	4.1

**Table 25A-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
1999	27.5	6.7	35.9	0.5	0.0	45.4
2004	25.4	9.3	37.8	2.9	0.1	44.4
2009	26.6	5.2	44.4	0.8	0.0	39.0
2013	23.6	4.3	49.9	1.0	0.6	47.9
2018	28.1	14.3	33.4	1.9	0.2	54.5
2023	25.3	3.5	34.9	0.2	0.1	45.8

**Table 25A-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			
1999	3	15	32	67
2004	3	21	17	65
2009	3	4	12	63
2013	-	12	23	33
2018	2	27	5	43
2023	4	12	6	37
Year	Days Use Per Acre (ha)			
1999	9.4 (23.3)	97.2 (240.0)	93.2 (230.1)	-
2004	8.7 (21.5)	12.1 (29.8)	13.4 (33.1)	-
2009	8.0 (19.7)	5.3 (13.2)	33.5 (82.8)	-
2013	2.9 (7.2)	25.5 (62.9)	34.2 (84.4)	-
2018	8.0 (19.7)	73.0 (180.4)	19.4 (48.0)	-
2023	12.3 (30.5)	12.8 (31.5)	23.4 (57.9)	-

**Table 25A-16.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency											
1999	4	58	100	2	29	126	67	5	122	194	-	2
2004	-	50	54	-	173	76	4	0	99	251	10	19
2009	-	47	33	-	83	21	-	-	96	290	-	19
2013	7	36	73	-	221	37	4	7	77	259	17	20
2018	-	45	78	-	152	43	7	3	96	289	49	64
2023	-	20	133	-	129	80	-	16	108	164	3	19
year	Average Cover (%)											
1999	0.0	1.2	1.5	0.0	0.7	2.1	0.8	0.1	1.2	4.9	-	0.0
2004	-	0.7	1.1	-	1.6	2.2	0.1	0.0	1.1	6.2	0.1	0.1
2009	-	0.9	0.5	-	0.4	0.2	-	-	1.2	7.3	-	0.1
2013	0.1	0.5	2.1	-	3.1	0.4	0.1	0.1	1.0	6.3	0.2	0.4
2018	-	1.1	1.9	-	2.4	0.5	0.0	0.0	1.2	12.7	1.2	0.7
2023	-	0.3	2.0	-	1.8	1.8	-	0.1	1.0	4.4	0.0	0.1

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

**Table 25A-16.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Androsace septentrionalis <sup>ai</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis demissa (nodding rockcross)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus utahensis (Utah milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron eatonii (Eaton's fleabane)	Erigeron flagellaris (trailing fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)
year	Nested Frequency																
1999	2	28	32	13	9	1	-	6	3	-	-	-	15	-	14	-	13
2004	-	20	17	2	4	7	2	-	-	6	6	1	23	4	13	-	10
2009	-	1	8	8	3	1	-	-	2	124	28	-	26	30	18	-	23
2013	3	1	27	43	1	1	-	3	-	2	4	-	37	-	15	2	24
2018	-	17	26	11	-	-	-	-	4	3	-	-	36	12	7	14	37
2023	1	4	25	12	-	-	-	47	12	7	6	-	39	4	7	22	9
year	Average Cover (%)																
1999	0.0	0.1	2.4	0.0	0.2	0.0	-	0.0	0.0	-	-	-	0.1	-	0.0	-	0.1
2004	-	0.1	0.2	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.1	0.0	0.1	-	0.1
2009	-	0.0	0.2	0.0	0.0	0.0	-	-	0.0	0.6	0.1	-	0.3	0.3	0.1	-	0.5
2013	0.0	0.0	0.4	0.2	0.0	0.0	-	0.0	-	0.0	0.0	-	0.1	-	0.1	0.0	0.2
2018	-	0.2	0.4	0.0	-	-	-	-	0.0	0.0	-	-	0.3	0.1	0.1	0.1	0.3
2023	0.0	0.0	0.3	0.1	-	-	-	0.2	0.3	0.0	0.0	-	0.7	0.2	0.1	0.5	0.3

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

FORB SPECIES	Hymenoxys richardsonii (pingue rubberweed)	Ipomopsis aggregata (scarlet gilia)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orobanche (broomrape)	Packera multiflobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon comarrhenus (dusty beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Penstemon watsonii (Watson's penstemon)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Silene drummondii (Drummond's campion)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)
year	Nested Frequency																
1999	13	3	2	-	-	-	8	-	2	-	23	-	11	3	-	36	4
2004	18	-	-	3	-	-	5	3	-	-	11	3	26	-	-	48	3
2009	20	-	-	6	-	-	14	5	-	-	15	3	21	-	-	63	-
2013	6	-	5	-	-	-	-	3	-	9	16	3	18	-	3	51	-
2018	2	-	1	1	2	1	-	0	-	2	20	4	4	-	19	42	-
2023	-	-	-	3	-	2	-	0	-	14	17	-	51	-	-	69	-
year	Average Cover (%)																
1999	0.2	0.0	0.0	-	-	-	0.1	-	0.1	-	0.2	-	0.0	0.0	-	0.3	0.0
2004	0.2	-	-	0.0	-	-	0.1	0.0	-	-	0.2	0.0	0.1	-	-	0.4	0.0
2009	0.3	-	-	0.0	-	-	0.3	0.0	-	-	0.3	0.0	0.1	-	-	0.3	-
2013	0.2	-	0.0	-	-	-	-	0.0	-	0.2	0.6	0.0	0.0	-	0.0	0.3	-
2018	0.0	-	0.0	0.0	0.0	0.0	-	0.0	-	0.0	1.1	0.0	0.0	-	0.5	0.4	-
2023	-	-	-	0.0	-	0.0	-	0.0	-	0.7	0.3	-	0.2	-	-	0.4	-

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

FORB SPECIES	unknown perennial forb (unknown forb)	Zigadenus paniculatus (foothill deathcamas)
year	Nested	
1999	2	-
2004	-	-
2009	-	2
2013	-	2
2018	-	-
2023	-	-
year	Average Cover (%)	
1999	0.0	-
2004	-	-
2009	-	0.0
2013	-	0.0
2018	-	-
2023	-	-

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

**Table 25A-16.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. tridentata <sup>p</sup> (basin big sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus ledifolius <sup>p</sup> (curl-leaf mountain mahogany)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Echinocereus coccineus var. coccineus (scarlet hedgehog cactus)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)	Krascheninnikovia lanata <sup>p</sup> (winterfat)	Opuntia (pricklypear)	Opuntia fragilis (brittle pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)																
1999	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2004	0.6	-	9.1	1.3	12.7	-	-	11.1	-	2.4	-	-	-	0.2	-	-	0.1
2009	0.1	-	7.7	0.4	9.2	-	1.9	4.1	-	0.2	-	-	0	0.1	-	-	0.6
2013	-	-	9.2	1.6	6.4	-	0.3	6.1	-	0.1	-	-	0.1	0	-	0.1	0.3
2018	0.7	-	9.2	-	9	-	0.1	6.2	-	0.2	-	-	0.1	0.1	-	-	0.6
2023	0.3	-	12.4	1.4	6.7	-	-	9.2	-	-	0	0	0.1	0.1	0	-	0
year	Quadrat Cover (%)																
1999	0.4	-	3.6	0.1	13.3	0.0	0.0	5.6	0.0	0.9	-	-	0.0	0.3	-	-	-
2004	0.4	-	6.3	0.7	10.9	-	0.1	7.7	-	1.8	0.0	-	0.1	0.4	-	-	0.0
2009	0.0	0.1	5.6	0.1	8.7	-	1.3	2.6	-	0.2	-	-	0.1	0.4	-	-	0.8
2013	0.1	-	8.2	0.8	7.3	-	0.0	5.6	-	0.1	-	0.4	0.1	0.5	-	0.0	0.6
2018	0.7	-	9.0	0.0	8.2	-	0.2	5.8	0.0	0.5	0.4	-	0.2	0.3	-	-	0.2
2023	0.4	0.4	10.1	0.4	6.5	-	-	7.8	-	-	0.8	0.4	0.2	0.1	0.0	0.0	0.7

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

SHRUB SPECIES	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover		
1999	-	-	-
2004	1.9	0.1	0.1
2009	7.7	0.6	0
2013	6.7	0.8	-
2018	4.6	0.3	-
2023	5.1	0.5	-
year	Quadrat Cover (%)		
1999	3.0	0.2	-
2004	3.1	0.0	0.0
2009	5.0	0.1	0.0
2013	4.8	0.2	-
2018	6.0	0.0	-
2023	3.2	0.1	-

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

**Table 25A-16.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1999	100	-	40	60	0	40	40	0	96/74
2004	120	20	50	50	0	33	33	0	42/39
2009	60	-	0	100	0	67	33	67	40/42
2013	60	-	100	0	0	0	33	0	52/60
2018	140	-	14	86	0	29	57	0	29/31
2023	140	-	29	71	0	57	0	57	- / -
<b>Artemisia frigida<sup>P</sup> -- (prairie sagewort)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	120	-	0	100	0	100	0	0	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1999	7800	140	24	67	9	17	0	4	19/40
2004	6280	100	1	82	17	0	0	6	19/44
2009	8100	700	4	75	22	16	3	18	15/34
2013	6520	80	8	85	7	48	36	41	18/41
2018	7560	20	10	85	5	27	0	2	17/44
2023	10420	-	10	65	25	7	18	24	- / -
<b>Artemisia tridentata ssp. tridentata<sup>P</sup> -- (basin big sagebrush)</b>									
1999	20	-	0	0	100	0	0	0	- / -
2004	40	-	0	0	100	0	0	50	175/176
2009	20	-	0	0	100	100	0	100	133/169
2013	580	80	48	38	14	3	0	10	82/84
2018	100	-	0	100	0	0	0	0	- / -
2023	240	-	33	67	0	83	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1999	6880	260	29	51	21	31	0	3	53/82
2004	4340	180	7	56	37	30	26	24	46/72
2009	4880	280	8	57	35	41	6	28	48/65
2013	2620	60	12	52	37	47	38	37	48/71
2018	4320	-	7	69	25	22	0	20	49/69
2023	3300	20	11	64	25	18	16	24	- / -
<b>Cercocarpus ledifolius<sup>P</sup> -- (curl-leaf mountain mahogany)</b>									
1999	-	20	0	0	0	0	0	0	- / -
2004	-	-	-	-	-	-	-	-	87/113
2009	-	-	-	-	-	-	-	-	118/90
2013	-	-	-	-	-	-	-	-	150/104
2018	-	-	-	-	-	-	-	-	214/129
2023	-	-	-	-	-	-	-	-	- / -
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1999	180	-	0	100	0	33	33	0	7/14
2004	400	-	25	75	0	0	25	0	11/19
2009	2500	-	0	100	0	32	0	0	7/20
2013	220	-	0	100	0	0	36	0	8/22
2018	180	-	0	100	0	33	0	0	8/30
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	12580	-	3	95	2	0	0	0	11/24
2004	7120	360	1	98	1	0	0	0	13/25
2009	7680	-	10	89	1	0	0	2	11/23
2013	7860	20	5	95	0	36	28	1	10/26
2018	10260	60	4	95	0	4	0	0	8/21
2023	13500	100	5	95	0	0	0	0	- / -
<b>Echinocereus coccineus var. coccineus -- (scarlet hedgehog cactus)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	20	-	0	100	0	0	0	0	5/7
2009	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	3/2
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	5780	40	14	86	0	0	0	0	14/19
2004	2060	-	0	100	0	0	0	0	16/22
2009	1360	-	0	100	0	0	12	0	12/12
2013	520	80	4	96	0	0	0	0	13/18
2018	1480	-	15	85	0	0	0	0	8/12
2023	20	-	0	100	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	20	-	100	0	0	0	0	0	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	20	-	0	100	0	0	0	100	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Juniperus scopulorum<sup>1</sup> -- (Rocky Mountain juniper)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	40	-	50	50	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	40	20	0	100	0	0	0	0	- / -
<b>Krascheninnikovia lanata<sup>P</sup> -- (winterfat)</b>									
1999	220	20	0	91	9	27	73	0	7/7
2004	360	-	6	94	0	50	44	6	10/8
2009	360	-	6	94	0	0	0	0	7/10
2013	400	20	15	85	0	5	25	0	7/12
2018	180	-	22	78	0	67	11	0	6/10
2023	240	-	8	83	8	33	33	8	- / -
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	200	-	50	50	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1999	580	-	28	66	7	0	0	7	5/26
2004	920	-	2	98	0	0	0	0	6/18
2009	700	20	31	69	0	0	0	0	4/19
2013	600	20	30	70	0	0	0	13	6/20
2018	440	-	14	86	0	0	0	0	6/14
2023	380	20	21	79	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	40	-	50	50	0	0	0	0	6/8
2018	40	-	0	100	0	0	0	0	5/8
2023	140	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1999	40	20	100	0	0	0	0	0	- / -
2004	60	-	67	0	33	0	0	0	- / -
2009	60	-	100	0	0	0	0	0	- / -
2013	60	-	100	0	0	0	0	0	- / -
2018	20	20	0	100	0	0	0	0	- / -
2023	200	-	100	0	0	0	0	90	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1999	180	-	22	44	33	33	33	0	54/123
2004	280	20	7	79	14	0	93	7	43/117
2009	800	-	0	100	0	0	10	3	56/99
2013	780	-	3	80	18	36	62	18	48/108
2018	1040	-	6	90	4	6	79	2	33/66
2023	1200	-	0	97	3	40	43	3	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1999	120	-	33	67	0	0	0	0	37/69
2004	100	-	40	40	20	20	0	0	22/36
2009	80	-	0	100	0	0	0	0	34/56
2013	100	-	0	100	0	60	0	0	47/100
2018	140	-	0	100	0	0	0	0	38/66
2023	80	-	0	100	0	50	0	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1999	60	-	67	33	0	0	33	0	30/37
2004	160	-	88	13	0	0	0	0	7/20
2009	100	-	0	100	0	0	0	0	9/15
2013	-	-	-	-	-	-	-	-	19/29
2018	-	-	-	-	-	-	-	-	16/7

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



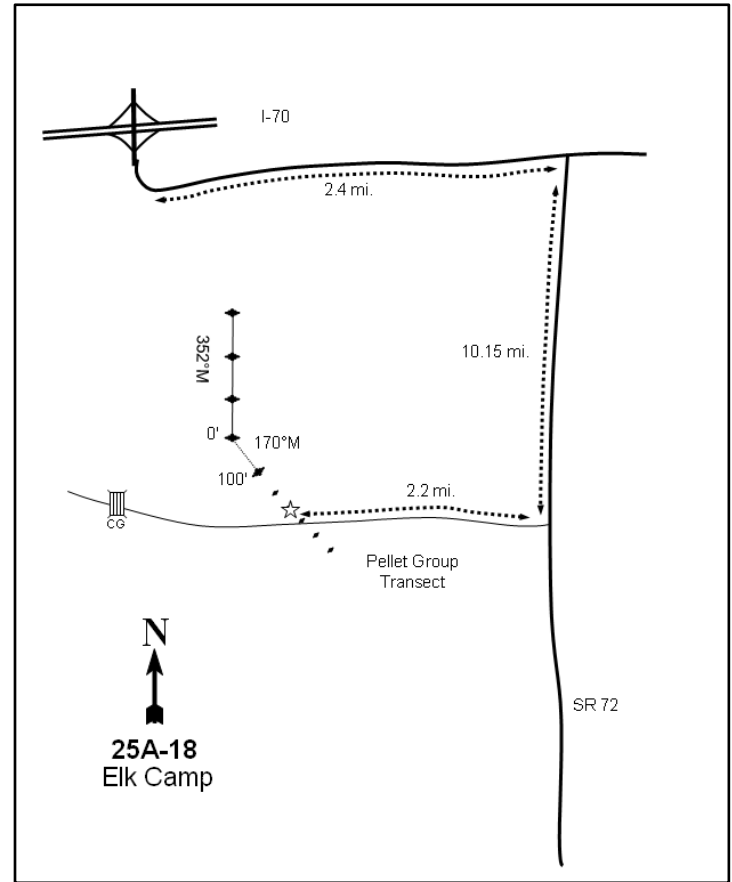
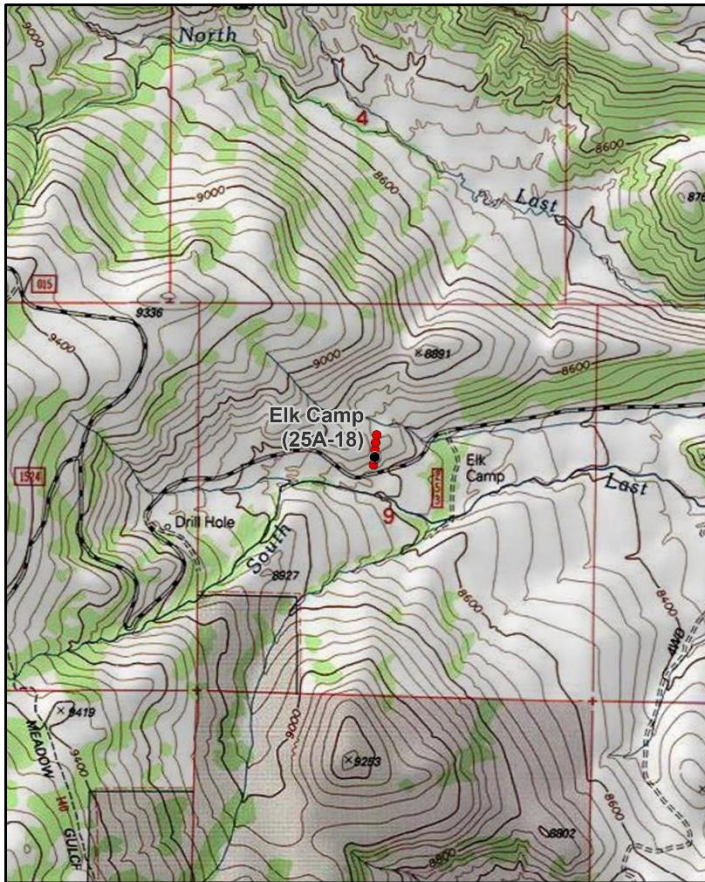
**Table 25A-16.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1999	2	-	-	-	-	-	21.5
2013	4	20	20	20	-	40	12.2
2018	9	17	33	17	-	33	15.8
2023	2	-	-	-	-	100	23.5
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
1999	4	-	-	-	-	-	10.4
2013	23	8	50	8	25	8	9.8
2018	30	7	36	14	21	21	10.9
2023	26	-	23	46	8	23	9.8
<b>Pinus edulis (twoneedle pinyon)</b>							
1999	12	-	-	-	-	-	13.4
2013	18	8	67	8	17	-	6.7
2018	28	19	38	44	-	-	4.6
2023	25	7	36	21	21	14	9.6

**Table 25A-16.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	26.5	8.9	13.5	24.8	0.0	7.9	0.0	<b>81.6</b>	Good-Excellent
2004	30.0	5.8	2.8	26.1	0.0	3.0	0.0	<b>67.7</b>	Good
2009	30.0	9.3	1.9	21.3	0.0	5.5	0.0	<b>68.0</b>	Good
2013	30.0	9.7	4.9	28.4	0.0	4.8	0.0	<b>77.8</b>	Good
2018	30.0	11.5	4.1	30.0	0.0	6.8	0.0	<b>82.4</b>	Excellent
2023	30.0	9.4	4.8	23.2	0.0	8.1	0.0	<b>75.6</b>	Good

## ELK CAMP - STUDY NO. 25A-18

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Johns Peak SW; Township 25S, Range 4E, Section 09  
NAD 83 UTM ZONE 12, 458264 East 4278340 North

**Transect Information**

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

7040  
170° magnetic (Lines 2-4: 352° magnetic)  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

Go east from Salina on I-70 for approximately 37.5 miles to a rest area exit. From the exit, travel 2.4 miles east on the frontage road to the junction with SR-72. Travel south on SR-72 for 10.15 miles to a gravel road on the right with a sign for Last Chance Road. Turn onto this road and drive 2 miles to the Elk Camp Road, then continue straight for another 0.2 miles. Stop here, approximately 90 yards short of a cattle guard, and look for a small yellow stake 10 feet off of the south side of the road. The yellow pellet group transect stakes run northwest, with one stake every 30 feet. Follow the yellow stakes 90 feet from the road to a large rebar which marks the 100-foot end of the frequency baseline. The 0-foot baseline stake is 100 feet north and is tagged with browse tag #7040.

**Site Information**

Land Ownership Federal  
Land Administrator USFS  
Allotment Last Chance Allotment  
Elevation 8,700ft (2,652m)  
Aspect South  
Slope 10-30%  
Sample Dates 08/18/1999, 08/23/2004, 08/20/2009, 08/13/2013, 07/17/2018, 07/19/2023

**Table 25A-18.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed Fire	-	-	1990	-
Hand Crew - Lop and Scatter	Last Chance Habitat Improvement Project Phase 1	5197	2023	6650

**Wildlife Habitat and Vegetation History****Table 25A-18.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25A-18.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mixed Mountain Brush	Phase I
1991	Mixed Mountain Brush	Phase I
1999	Mixed Mountain Brush	Phase I
2004	Mixed Mountain Brush	Phase I
2009	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I

**Site Notes**

The prescribed fire was spotty and impacted only one of the belts. Some of the hills in the area are covered with scattered twoneedle pinyon (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and patches of aspen (*Populus tremuloides*).

**Soils****Table 25A-18.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.5	50.9	29.8	19.3	3.0	16.8	211.2	0.5	08/18/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation                      20 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.

From study establishment in 1985 through the 2004 sample year, this site was dominated by a mixture of mountain brush species including mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*), and black sagebrush (*A. nova*), among others. Mountain big sagebrush cover increased, however, and it has been the dominant shrub species since 2009 (Photos, Pre-1992 Data, Table 25A-18.12, Table 25A-18.13). The herbaceous understory has fluctuated in cover, but has remained dominated largely by native perennial grasses throughout the duration of the study. The introduced annual grass species cheatgrass (*Bromus tectorum*) was sampled for the first time in 2023, but in low amounts (Table 25A-18.7, Table 25A-18.10, Table 25A-18.11). Twoneedle pinyon (*Pinus edulis*), Rocky Mountain juniper (*Juniperus scopulorum*), and/or Utah juniper (*J. osteosperma*) have been observed in all sample years, placing this site within Phase I of woodland succession (Photos, Table 25A-18.4, Table 25A-18.14). Although density decreased significantly between 2018 and 2023 due to a lop and scatter treatment (Table 25A-18.1), the presence of trees indicates that there may be potential for infilling in future sample years.

Deer winter range condition has generally remained good to excellent since 1999. As of 2023, deer winter range condition was considered to be good to excellent. Improvement to deer wintering range can be accomplished through efforts that reduce decadence and support reproduction of preferred browse; reducing cheatgrass would also improve winter range conditions (Table 25A-18.15). In addition, the sagebrush component of this site could provide valuable browse to elk that may use the area during the winter months (Table 25A-18.3; Wambolt, 1996). However, pellet group data indicates that both deer and elk presence have remained low since 2018 (Table 25A-18.9).

## Trend Summary Tables

**Table 25A-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
1999	21.9	4.6	2.5	-	-	0.4
2004	22.6	9.7	1.7	27.4	10.2	4.3
2009	19.6	6.2	2.6	25.2	4.0	4.1
2013	16.5	7.1	1.9	28.8	7.4	8.5
2018	19.9	8.3	5.0	29.2	8.0	6.4
2023	21.4	8.3	0.0	25.3	11.5	-

**Table 25A-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
1999	-	379	16	123	-	12.0	0.0	2.4
2004	-	322	31	104	-	11.3	0.2	2.4
2009	-	305	-	96	-	7.8	-	1.1
2013	-	325	1	96	-	8.8	0.0	1.1
2018	-	352	11	113	-	14.7	0.2	3.6
2023	4	351	107	144	0.0	14.2	1.1	5.5

**Table 25A-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
1999	14.0	0.1	33.7	2.5	15.5	41.7
2004	19.4	0.0	31.5	3.8	16.3	45.4
2009	24.8	0.0	37.2	2.6	13.8	37.4
2013	20.8	0.1	43.0	2.3	18.8	37.3
2018	15.6	0.3	46.4	6.0	21.1	51.7
2023	13.2	0.2	28.7	7.0	12.2	46.3

**Table 25A-18.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit	Domestic Sheep
	Quadrat Frequency				
1999	4	27	18	23	-
2004	1	49	4	27	-
2009	6	21	7	20	1
2013	2	15	7	5	-
2018	2	9	9	10	-
2023	1	7	17	-	-
Year	Days Use Per Acre (ha)				
1999	10.9 (26.9)	53.0 (130.8)	20.8 (51.3)	-	-
2004	4.4 (10.8)	65.7 (162.2)	-	-	-
2009	2.2 (5.4)	105.2 (259.9)	38.9 (96.0)	-	-
2013	2.2 (5.4)	2.0 (5.0)	26.8 (66.2)	-	-
2018	0.7 (1.8)	10.7 (26.5)	9.4 (23.2)	-	-
2023	5.1 (12.6)	16.8 (41.4)	16.8 (41.4)	-	-

**Table 25A-18.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)
year	Nested Frequency												
1999	50	-	108	-	117	50	9	-	20	223	-	-	-
2004	67	-	73	-	166	35	3	5	34	149	-	-	-
2009	58	-	42	-	118	7	-	-	56	165	-	-	-
2013	84	-	66	-	161	10	-	-	40	140	2	3	-
2018	54	-	80	-	186	69	-	11	36	161	8	15	1
2023	57	4	76	4	144	129	-	12	22	123	1	1	-
year	Average Cover (%)												
1999	0.9	-	3.6	-	3.2	0.4	0.1	-	0.1	3.6	-	-	-
2004	2.0	-	2.1	-	2.2	0.6	0.1	0.1	0.3	3.9	-	-	-
2009	1.2	-	0.8	-	1.2	0.2	-	-	0.6	3.9	-	-	-
2013	1.2	-	1.7	-	2.9	0.1	-	-	0.5	2.3	0.0	0.0	-
2018	1.5	-	2.8	-	2.0	0.8	-	0.5	0.3	6.4	0.1	0.1	0.0
2023	1.3	0.1	2.0	0.0	2.6	2.8	-	0.4	1.0	3.9	0.0	0.0	-

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

**Table 25A-18.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Androsace septentrionalis <sup>ai</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis demissa (nodding rockcross)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium <sup>a</sup> (goosefoot)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron aphanactis <sup>ai</sup> (rayless shaggy fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)
year	Nested Frequency																
1999	9	6	39	7	24	-	-	-	-	5	9	5	-	-	-	7	24
2004	12	-	20	-	9	-	-	3	8	7	-	8	-	-	5	9	32
2009	-	-	17	-	6	-	-	3	-	2	-	3	-	-	4	12	28
2013	-	-	21	9	6	-	4	3	1	2	-	-	-	-	4	6	31
2018	-	9	21	5	11	-	7	-	1	-	-	3	-	-	6	10	34
2023	4	6	28	-	16	7	8	-	42	-	-	5	7	3	5	11	51
year	Average Cover (%)																
1999	0.0	0.0	0.8	0.2	0.1	-	-	-	-	0.2	0.0	0.1	-	-	-	0.2	0.3
2004	0.0	-	0.8	-	0.1	-	-	0.0	0.1	0.1	-	0.0	-	-	0.0	0.0	0.5
2009	-	-	0.3	-	0.0	-	-	0.0	-	0.0	-	0.0	-	-	0.0	0.1	0.1
2013	-	-	0.2	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	-	-	0.0	0.2	0.2
2018	-	0.2	0.8	0.0	0.0	-	0.1	-	0.0	-	-	0.0	-	-	0.0	0.0	0.3
2023	0.0	0.1	0.8	-	0.4	0.1	0.3	-	0.2	-	-	0.2	0.0	0.0	0.0	0.1	0.9

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

FORB SPECIES	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Heliomeris multiflora (showy goldeneye)	Hymenoxys richardsonii (pingue rubberweed)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lithospermum incisum (narrowleaf stone seed)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Machaeranthera grindelioides (rayless tansyaster)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea coccinea (scarlet globemallow)	Symphytotrichum (aster)	unknown perennial forb (unknown forb)
year	Nested Frequency																
1999	4	-	-	-	-	-	-	13	-	7	11	35	4	1	4	-	-
2004	-	5	-	0	4	1	2	15	2	-	5	25	7	19	-	-	3
2009	3	-	-	-	-	-	1	-	13	2	3	34	2	-	-	3	1
2013	4	-	-	-	-	-	2	7	4	2	1	28	-	-	3	-	-
2018	11	1	-	5	-	-	1	-	5	4	6	47	14	-	-	-	-
2023	1	42	2	17	5	-	0	-	-	2	16	47	16	40	5	-	-
year	Average Cover (%)																
1999	0.0	-	-	-	-	-	-	0.1	-	0.0	0.1	0.3	0.0	0.0	0.0	-	-
2004	-	0.0	-	0.0	0.0	0.0	0.0	0.2	0.0	-	0.0	0.5	0.0	0.1	-	-	0.0
2009	0.0	-	-	-	-	-	0.0	-	0.1	0.0	0.0	0.4	0.0	-	-	0.0	0.0
2013	0.0	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.3	-	-	0.0	-	-
2018	0.1	0.0	-	0.0	-	-	0.0	-	0.0	0.0	0.1	2.0	0.1	-	-	-	-
2023	0.0	0.3	0.1	0.2	0.0	-	0.0	-	-	0.0	0.6	1.8	0.0	0.4	0.0	-	-

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

**Table 25A-18.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Escobaria vivipara var. vivipara (spiny star)	Gutierrezia sarothrae (broom snakeweed)	Mahonia repens (creeping barberry)	Opuntia fragilis (brittle pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Rosa woodsii <sup>p</sup> (Woods' rose)	Sarcobatus vermiculatus (greasewood)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)	
year	Line Intercept Cover (%)																
1999	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2004	0.1	5.7	9.5	7.6	0.7	-	1	0.1	-	-	4.3	8.4	1.3	-	2.4	0.8	
2009	-	3.8	12.9	1.8	0.3	-	1.7	-	0	-	4.1	6	0.3	-	2.2	0.2	
2013	-	5.4	12.9	7.2	0	-	0.1	-	0	-	8.5	6.8	0.3	-	3.4	0.1	
2018	0	4.3	15	6.5	0.2	-	0.9	0.3	-	-	6.4	6	0.7	-	3.2	0.1	
2023	0.3	5.7	11.1	4.1	2.6	-	4.3	0.2	0.1	-	-	4.6	0.6	-	3	0.2	
year	Quadrat Cover (%)																
1999	-	5.3	7.4	3.3	0.5	0.0	0.7	0.0	-	-	2.5	6.5	1.9	-	0.8	0.1	
2004	0.1	5.5	9.9	7.9	0.5	-	1.1	0.2	-	0.0	1.7	5.5	0.7	-	0.9	0.1	
2009	0.1	3.7	10.0	4.5	0.0	-	1.0	0.1	0.1	-	2.6	3.8	0.3	-	1.5	0.5	
2013	0.1	3.9	8.3	6.4	0.2	-	0.1	0.1	0.2	-	1.9	2.4	0.5	0.1	1.2	0.0	
2018	0.0	4.1	9.0	6.9	0.4	-	0.7	0.4	0.0	0.0	5.0	5.5	0.5	-	0.8	0.0	
2023	0.5	5.6	8.9	4.5	1.1	-	2.1	0.5	0.1	0.0	0.0	3.9	0.6	-	1.9	0.1	

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

**Table 25A-18.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	41/44
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	40	-	0	100	0	100	0	0	-/-
<b>Artemisia frigida<sup>P</sup> -- (prairie sagewort)</b>									
1999	120	-	33	67	0	33	0	0	9/21
2004	240	-	8	92	0	50	8	0	12/18
2009	100	-	0	100	0	0	0	0	10/16
2013	80	-	0	100	0	25	25	0	5/17
2018	220	-	0	100	0	0	0	0	4/7
2023	180	-	0	100	0	0	0	0	-/-
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1999	3560	60	10	69	21	35	7	2	28/54
2004	3200	300	4	70	26	23	13	10	26/48
2009	3020	40	10	82	9	0	0	7	24/49
2013	3100	260	23	70	7	34	9	27	22/43
2018	3140	20	10	75	15	5	1	9	21/43
2023	4040	-	14	81	5	6	72	5	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1999	2740	180	23	61	15	44	3	7	64/88
2004	2600	13140	19	64	18	40	22	9	48/80
2009	3540	420	29	65	6	18	2	3	46/77
2013	2660	20	19	68	13	41	15	12	50/80
2018	3560	-	3	92	6	6	0	5	46/70
2023	1980	40	10	77	13	7	46	13	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	4060	-	12	85	3	5	2	1	16/31
2004	6440	-	2	97	1	0	0	0	23/42
2009	5020	-	16	84	0	0	0	1	17/35
2013	6180	100	18	81	1	34	1	13	19/50
2018	6500	-	4	96	0	9	0	0	15/31
2023	3360	20	4	96	0	23	10	0	-/-
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1999	280	-	7	93	0	7	21	0	24/33
2004	360	-	0	100	0	39	0	0	29/44
2009	80	-	25	75	0	0	0	0	26/18
2013	100	-	0	100	0	20	40	0	17/29
2018	400	-	15	85	0	25	5	0	17/21
2023	920	-	9	91	0	0	0	0	-/-
<b>Escobaria vivipara var. vivipara -- (spinystar)</b>									
1999	40	-	0	100	0	0	0	0	7/6
2004	40	-	0	100	0	0	0	0	5/7
2009	-	-	-	-	-	-	-	-	-/-
2013	60	-	0	100	0	0	0	33	6/14
2018	-	-	-	-	-	-	-	-	-/-
2023	40	-	100	0	0	0	100	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	580	-	0	100	0	0	0	0	15/21
2004	1860	-	0	100	0	0	0	0	22/26
2009	1160	-	3	95	2	5	0	7	15/20
2013	280	-	0	100	0	0	0	0	13/18
2018	1460	-	0	100	0	0	0	0	11/14
2023	4240	-	34	66	0	0	1	0	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
1999	780	-	18	82	0	0	0	0	4/6
2004	1100	-	0	100	0	0	0	0	8/11
2009	520	-	0	100	0	0	0	0	5/7
2013	400	-	80	20	0	0	0	0	8/10
2018	840	-	24	76	0	0	0	0	7/13
2023	1480	-	95	5	0	0	0	0	- / -
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
1999	-	-	-	-	-	-	-	-	6/13
2004	80	-	50	50	0	0	0	0	7/20
2009	80	-	0	100	0	0	0	0	7/21
2013	100	-	40	60	0	0	0	0	11/28
2018	100	-	0	100	0	0	0	0	6/29
2023	100	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	120	-	67	33	0	0	0	0	8/13
2009	40	-	0	100	0	0	0	0	8/13
2013	-	-	-	-	-	-	-	-	6/8
2018	80	-	0	100	0	0	0	0	6/10
2023	20	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1999	60	-	33	67	0	0	0	0	- / -
2004	80	-	50	50	0	0	0	0	- / -
2009	60	-	67	33	0	0	0	0	- / -
2013	80	-	50	50	0	0	0	0	- / -
2018	60	-	67	33	0	0	0	0	- / -
2023	20	20	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1999	2560	20	14	81	6	32	52	3	29/65
2004	2060	-	5	86	9	9	90	7	32/70
2009	1520	-	5	91	4	32	57	42	25/64
2013	1300	20	8	59	34	12	40	54	44/110
2018	1780	20	14	84	2	38	32	1	32/64
2023	880	-	18	77	5	16	75	5	- / -
<b>Rosa woodsii<sup>P</sup> -- (Woods' rose)</b>									
1999	1480	60	42	58	0	0	0	0	32/37
2004	1320	-	3	97	0	0	0	0	18/19
2009	760	-	32	68	0	5	21	5	26/23
2013	800	-	33	68	0	0	0	0	28/38
2018	960	-	58	42	0	0	0	0	13/15
2023	1320	40	71	29	0	0	0	0	- / -



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1999	560	20	18	82	0	39	18	0	46/80
2004	800	20	13	88	0	8	0	0	42/81
2009	640	-	9	91	0	3	0	16	36/81
2013	860	-	21	65	14	44	7	9	39/76
2018	1480	100	27	73	0	5	1	0	35/59
2023	1000	-	20	78	2	12	26	6	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1999	260	-	8	62	31	54	0	8	25/24
2004	320	-	19	81	0	38	6	0	30/32
2009	120	-	0	100	0	0	0	0	19/30
2013	140	-	29	57	14	57	14	43	17/33
2018	200	-	0	90	10	40	0	10	18/23
2023	180	-	0	100	0	22	33	0	- / -
<b>Yucca -- (yucca)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	18/24
2009	-	-	-	-	-	-	-	-	17/16
2013	-	-	-	-	-	-	-	-	15/30
2018	-	-	-	-	-	-	-	-	27/39

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

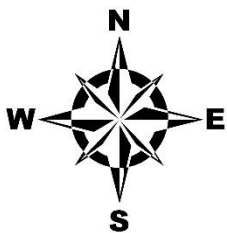
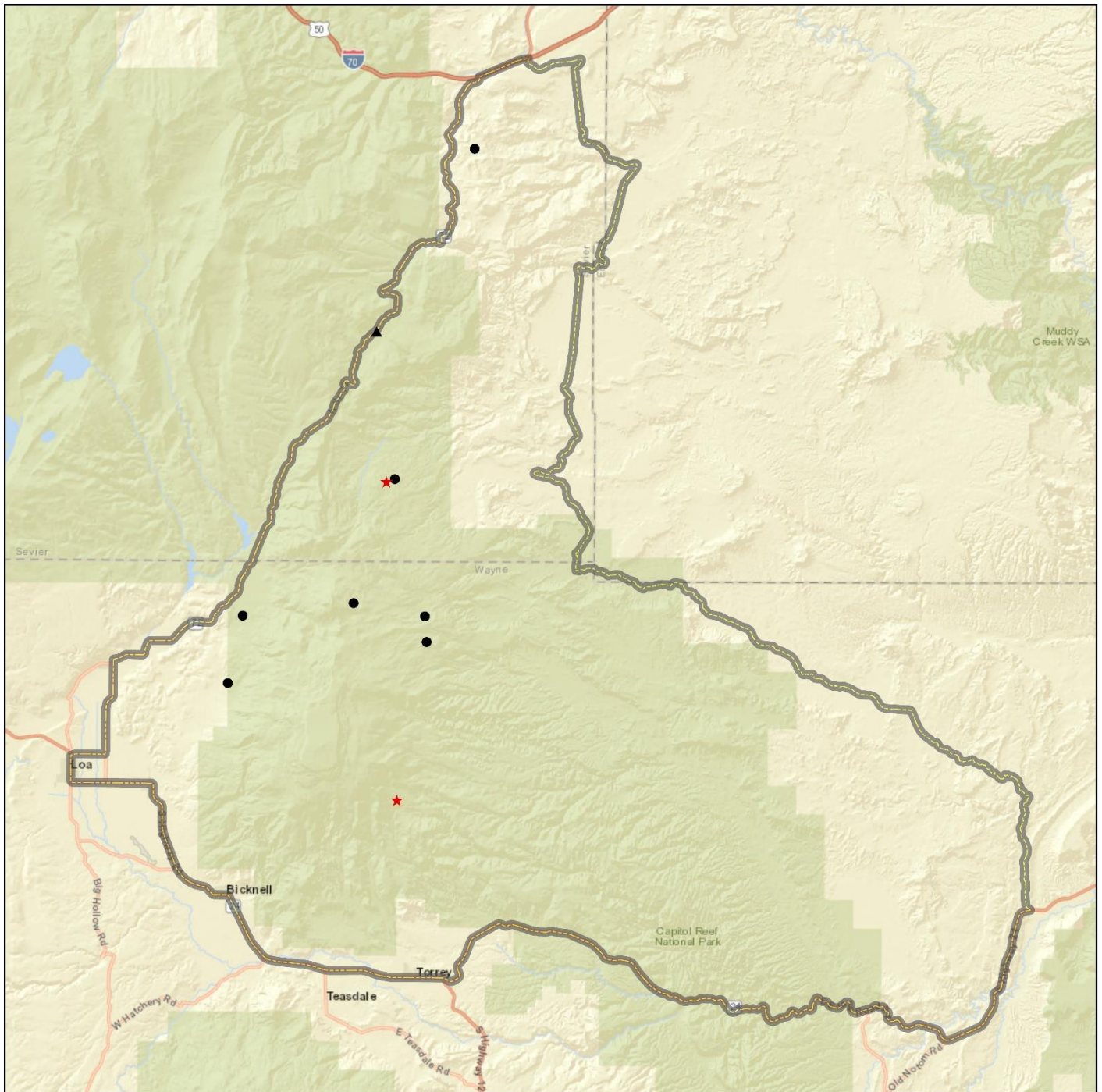
**Table 25A-18.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1999	7	-	-	-	-	-	12.5
2023	1	-	-	100	-	-	24.0
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2009	12	-	25	25	38	13	12.0
2013	13	-	22	22	44	11	15.3
2018	11	-	29	14	29	29	13.6
<b>Pinus edulis (twoneedle pinyon)</b>							
1999	4	-	-	-	-	-	6.8
2009	21	9	64	9	-	18	6.3
2013	22	8	50	25	8	8	7.7
2018	24	17	25	25	17	17	9.7
2023	5	100	-	-	-	-	4.0

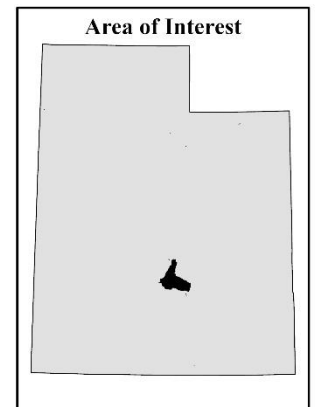
**Table 25A-18.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	28.8	11.4	9.4	24.0	0.0	4.9	0.0	<b>78.4</b>	Good
2004	30.0	10.8	5.0	22.5	0.0	4.8	0.0	<b>73.1</b>	Good
2009	30.0	13.5	9.5	15.5	0.0	2.2	0.0	<b>70.7</b>	Fair-Good
2013	30.0	10.0	8.7	17.5	0.0	2.2	0.0	<b>68.4</b>	Fair-Good
2018	30.0	13.3	5.0	29.3	0.0	7.3	0.0	<b>84.9</b>	Good
2023	30.0	12.6	7.5	28.3	0.0	10.0	0.0	<b>88.4</b>	Good-Excellent

# WILDLIFE MANAGEMENT UNIT 25B – PLATEAU, THOUSAND LAKE

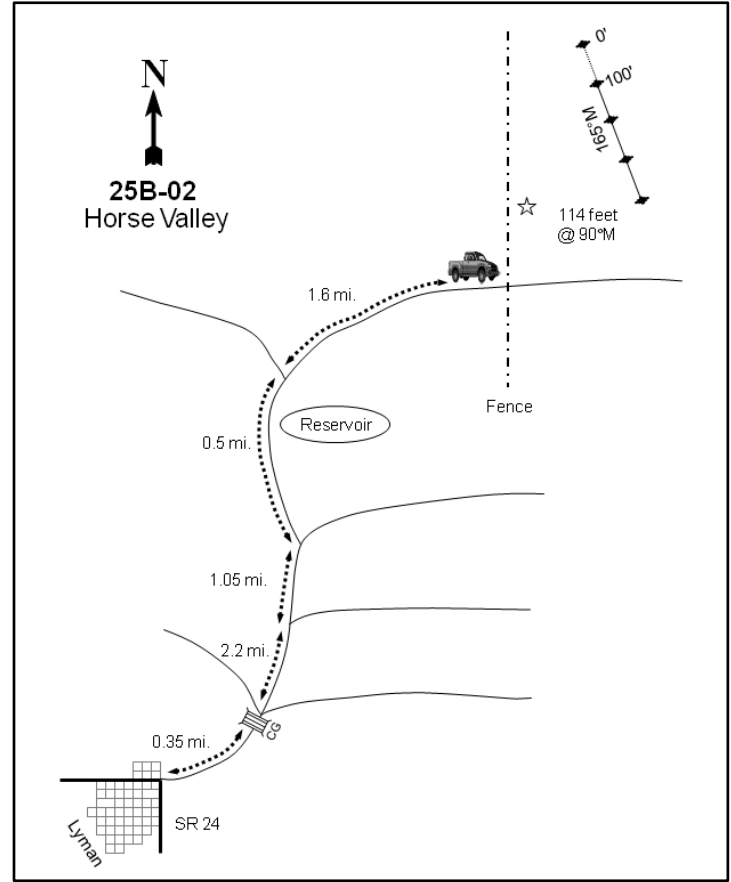
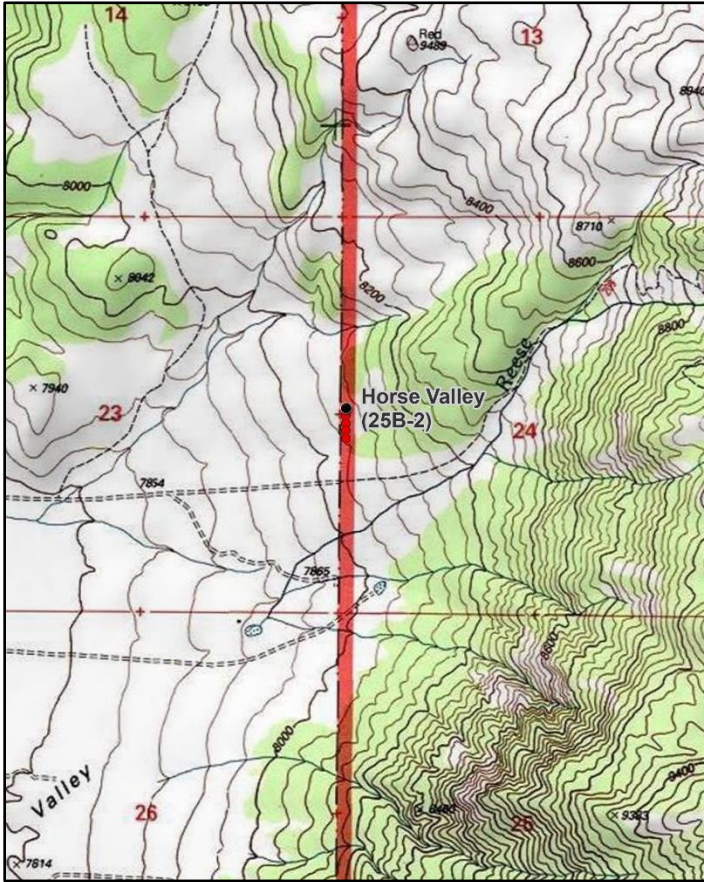


Study Locations Project, Status	Unit Boundary
● RT, Active	▭ Unit - 25B
★ RT, Suspended	
▲ WRI, Active	



Credits: Bureau of Land Management, Utah AGRC, Esri, HERE, Garmin, NGA, USGS, NPS

## HORSE VALLEY - STUDY NO. 25B-2

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Johns Peak SW; Township 27S, Range 3E, Section 24  
NAD 83 UTM ZONE 12, 452723 East 4255665 North

**Transect Information**

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

7065  
165° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

At the north end of Main Street (SR-24) in Lyman, SR-24 turns west towards Loa. Turn east here and travel 0.35 miles to a three-way split just beyond a cattle guard. Take the middle fork (the main road) and continue for 2.2 miles to a fork. Stay left and continue for 1.05 miles on the main road to another fork. Stay left again and proceed 0.5 miles north just past a small reservoir to an intersection: take the right fork toward Neffs Reservoir. On the main road, travel 1.6 miles up and east across the top of some private land to a cattle guard at the Forest Service boundary. Park here, then walk 532 feet north along the east side of the fence to a witness post (rebar) next to the fence. The 400-foot stake is 114 feet east of the witness post. The 0-foot baseline stake lies 400 feet north, and has a red browse tag #7065 attached.

**Site Information**

Land Ownership Federal

Land Administrator USFS

Allotment Thousand Lake Allotment

Elevation 8,020ft (2,444m)

Aspect Southwest

Slope 5-10%

Sample Dates 07/20/1994, 08/26/1999, 08/11/2004, 08/19/2009, 08/21/2013, 07/16/2018, 07/17/2023

**Table 25B-02.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Cedar Creek Winter Range Enhancement	818	Fall 2012	3569

**Wildlife Habitat and Vegetation History****Table 25B-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25B-02.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1994	Mountain Big Sagebrush	Phase I
1999	Mountain Big Sagebrush	Phase I
2004	Mountain Big Sagebrush	Phase I
2009	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

This site is thought to be a winter deer concentration area with many moving into the lower fields in late winter or early spring.

**Soils****Table 25B-02.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.6	50.9	27.8	21.3	2.2	7.7	112.0	0.5	08/26/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Stony Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB336UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 1985, this site has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Since 2009, sagebrush cover has steadily increased, although density has varied slightly over the same time period (Photos, Pre-1992 Data, Table 25B-02.12, Table 25B-02.13). The herbaceous understory has been limited throughout the duration of the study and has consisted of mainly native perennial grasses and forbs (Table 25B-02.7, Table 25B-02.10, Table 25B-02.11). Twoneedle pinyon (*Pinus edulis*) has been observed in all sample years. A 2012 bullhog treatment (Table 25B-02.1) removed most trees, but infilling was occurring as of the 2023 sample year. In addition, the areas surrounding the site are mostly pinyon and Utah juniper (*Juniperus osteosperma*) dominated (Photos, Table 25B-02.14). The proximity to pinyon and juniper dominated areas and infilling on the site itself indicates that further tree encroachment may be possible in future sample years without additional treatments.

Deer winter range condition on this site has fluctuated between very poor and fair since 1994; the study site was considered to be in poor to fair condition in 2023. Improvement to deer winter range could be accomplished through efforts that support preferred browse reproduction and reduce decadence within the population. Diversifying and increasing the native perennial forb and grass components would also improve winter range conditions (Table 25B-02.15). In addition, the sagebrush component of this site could provide valuable browse for elk during the winter months (Table 25B-02.3; Wambolt, 1996). However, pellet transect data indicates that elk and deer presence have been low in all years since 1999 (Table 25B-02.9).

## Trend Summary Tables

**Table 25B-02.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1994	15.0	1.3	-	-	-	-
1999	18.8	1.8	0.1	-	-	-
2004	17.7	5.4	0.2	18.3	5.6	0.7
2009	16.4	0.5	0.2	20.4	0.5	1.0
2013	16.7	1.6	0.2	21.6	1.4	0.4
2018	17.4	4.7	0.5	22.5	2.3	1.2
2023	21.9	1.4	0.7	26.4	1.1	1.6

**Table 25B-02.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1994	-	118	-	58	-	1.5	-	1.2
1999	-	121	7	61	-	2.2	0.0	2.2
2004	-	101	-	18	-	1.5	-	0.2
2009	-	89	-	19	-	1.6	-	0.1
2013	-	99	-	57	-	1.9	-	1.4
2018	-	84	-	54	-	3.3	-	1.4
2023	-	89	3	42	-	2.8	0.0	1.2

**Table 25B-02.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1994	34.5	1.2	16.7	8.7	18.8	18.7
1999	24.2	2.4	21.8	22.4	12.7	24.6
2004	25.6	1.5	23.1	27.3	16.3	24.3
2009	31.5	0.4	20.6	23.7	12.7	19.1
2013	28.1	1.0	21.2	21.9	10.3	20.5
2018	36.8	2.0	24.4	24.2	17.2	23.5
2023	23.1	1.7	18.8	24.1	14.9	26.4

**Table 25B-02.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1994	-	8	-	14
1999	-	3	-	9
2004	-	-	-	3
2009	-	2	1	37
2013	-	-	-	1
2018	-	1	1	17
2023	-	1	4	-
Year	Days Use Per Acre (ha)			
1994	-	-	-	-
1999	0.7 (1.8)	0.7 (1.7)	-	-
2004	-	1.3 (3.3)	1.3 (3.3)	-
2009	-	16.8 (41.4)	0.7 (1.7)	-
2013	-	1.3 (3.3)	-	-
2018	-	1.3 (3.3)	-	-
2023	-	1.3 (3.3)	0.7 (1.7)	-

**Table 25B-02.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum pinetorum (pine needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)
year	Nested Frequency						
1994	-	-	-	69	-	59	0
1999	1	-	-	69	-	55	1
2004	14	-	-	61	-	30	-
2009	3	-	-	51	-	43	-
2013	14	-	6	57	2	29	-
2018	7	-	5	50	-	29	1
2023	9	5	-	47	-	36	2
year	Average Cover (%)						
1994	-	-	-	1.2	-	0.3	0.0
1999	0.0	-	-	1.7	-	0.6	0.0
2004	0.1	-	-	1.2	-	0.2	-
2009	0.0	-	-	1.1	-	0.4	-
2013	0.3	-	0.1	1.1	0.0	0.5	-
2018	0.2	-	0.1	2.6	-	0.4	0.0
2023	0.3	0.0	-	1.2	-	1.2	0.0

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

**Table 25B-02.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Arabis demissa (nodding rockcress)	Astragalus convallarius (lesser rusby milkvetch)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cryptantha (cryptantha)	Cryptantha cinerea var. jamesii (James' cryptantha)	Erigeron pumilus (shaggy fleabane)	Eriogonum ovalifolium (cushion buckwheat)	Hymenoxys richardsonii (pingue rubberweed)	Phlox longifolia (longleaf phlox)	Salsola tragus <sup>iii</sup> (prickly Russian thistle)
year	Nested Frequency											
1994	-	-	3	-	-	3	6	3	-	44	-	-
1999	7	-	3	-	-	-	-	3	-	54	3	-
2004	-	-	-	-	-	-	11	-	-	7	-	-
2009	-	-	1	-	-	-	10	-	-	8	-	-
2013	-	13	-	-	-	-	25	1	-	19	-	-
2018	-	11	-	-	-	19	-	9	-	26	0	-
2023	-	-	2	1	2	5	12	-	0	25	-	1
year	Average Cover (%)											
1994	-	-	0.0	-	-	0.0	0.0	0.0	-	1.2	-	-
1999	0.0	-	0.0	-	-	-	-	0.0	-	2.2	0.0	-
2004	-	-	-	-	-	-	0.1	-	-	0.2	-	-
2009	-	-	0.0	-	-	-	0.1	-	-	0.1	-	-
2013	-	0.0	-	-	-	-	0.2	0.0	-	1.2	-	-
2018	-	0.0	-	-	-	0.5	-	0.1	-	0.8	0.0	-
2023	-	-	0.0	0.0	0.0	0.2	0.6	-	0.0	0.4	-	0.0

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

**Table 25B-02.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia fragilis (brittle pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)							
1994	-	-	-	-	-	-	-	-
1999	-	-	-	-	-	-	-	-
2004	-	18.3	0.8	4.8	-	-	-	0.7
2009	0.2	20.2	0.2	0.3	-	-	-	1
2013	0.3	21.3	0.4	0.6	-	0.2	0.2	0.4
2018	0.3	22.2	0.1	2.1	-	-	0.1	1.2
2023	1.8	24.6	0.7	0.4	-	-	0	1.6
year	Quadrat Cover (%)							
1994	-	15.0	1.1	0.2	-	-	0.0	-
1999	-	18.8	0.5	1.2	-	-	0.1	0.1
2004	-	17.7	1.7	3.4	-	-	0.2	0.2
2009	0.0	16.4	0.3	0.1	-	-	0.0	0.2
2013	0.0	16.7	0.9	0.3	-	0.1	0.2	0.2
2018	0.0	17.4	0.6	4.0	-	-	0.2	0.5
2023	3.0	18.9	1.2	0.0	0.0	-	0.2	0.7

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

**Table 25B-02.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	20	-	0	100	0	0	0	0	21/36
2013	20	-	0	100	0	0	0	0	19/45
2018	60	-	0	67	33	0	0	0	24/58
2023	120	-	0	83	17	17	17	17	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1994	3940	580	3	55	43	25	3	27	48/86
1999	4520	60	10	50	41	28	3	14	49/75
2004	4400	100	4	59	37	7	0	23	46/73
2009	4760	-	2	38	60	28	13	37	40/65
2013	3960	-	5	57	38	67	19	31	47/83
2018	4460	-	3	63	34	6	0	27	46/80
2023	3880	80	6	69	25	44	30	26	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	80	-	0	75	25	25	0	25	- / -
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1994	2940	-	0	69	31	30	8	12	11/16
1999	1180	20	15	63	22	0	0	12	14/27
2004	1480	-	5	64	31	8	7	12	17/28
2009	1300	40	5	77	19	0	0	17	28/17
2013	1040	20	6	90	4	15	10	12	16/27
2018	620	-	7	55	39	13	61	32	10/17
2023	860	-	9	91	0	0	0	0	- / -
<b>Echinocereus coccineus var. coccineus -- (scarlet hedgehog cactus)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	20	-	0	100	0	0	0	0	9/15
2004	20	-	0	100	0	0	0	0	7/16
2009	20	-	100	0	0	0	0	0	- / -
2013	20	-	0	100	0	0	0	0	12/22
2018	20	-	0	100	0	0	0	0	7/18
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1994	1420	-	14	79	7	0	0	1	18/16
1999	4980	2340	64	26	10	0	0	0	18/21
2004	5920	-	2	98	0	0	0	0	19/24
2009	940	-	17	70	13	0	2	9	15/13
2013	1160	440	38	60	2	0	0	2	17/21
2018	6340	-	4	93	4	0	0	9	14/16
2023	420	-	29	71	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	60	-	100	0	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	40	-	100	0	0	0	0	0	- / -
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	40	-	0	100	0	0	0	0	12/17
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
1994	160	-	0	88	13	0	0	0	7/18
1999	600	20	27	53	20	0	0	23	9/25
2004	400	-	0	100	0	0	0	0	9/30
2009	240	-	0	100	0	0	0	0	8/26
2013	440	40	14	86	0	0	0	5	8/26
2018	360	20	0	100	0	0	0	0	10/26
2023	580	-	38	59	3	0	0	3	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1999	80	40	100	0	0	0	0	0	- / -
2004	120	20	83	17	0	0	0	0	- / -
2009	120	20	50	50	0	0	17	0	- / -
2013	120	20	100	0	0	0	17	0	- / -
2018	160	200	75	25	0	0	0	0	- / -
2023	240	100	83	17	0	0	0	0	- / -
<b>Ulmus pumila<sup>i</sup> -- (Siberian elm)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	20	-	100	0	0	0	0	100	- / -

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

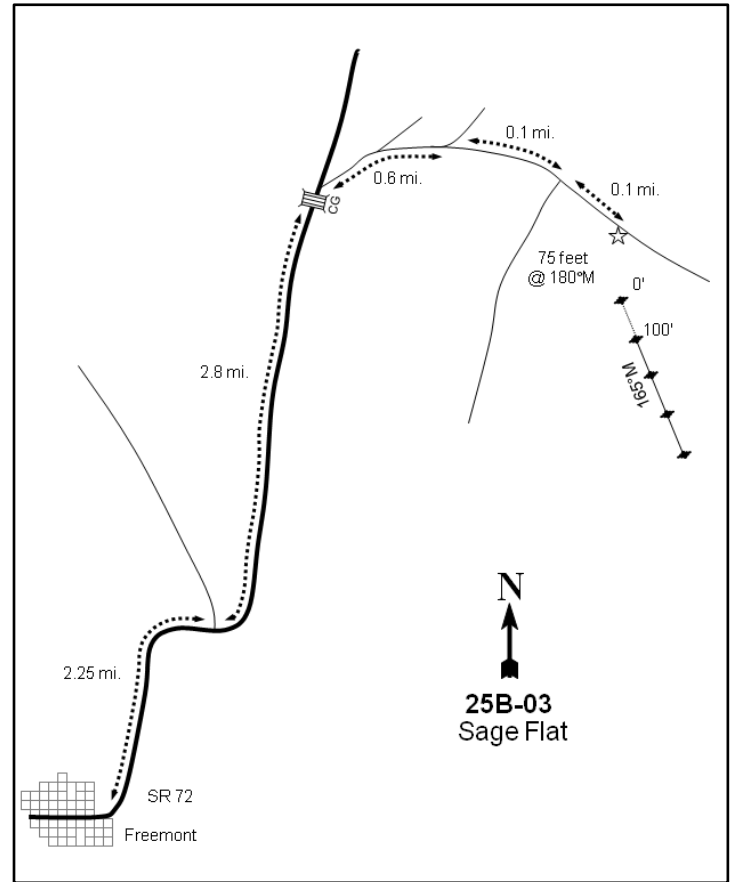
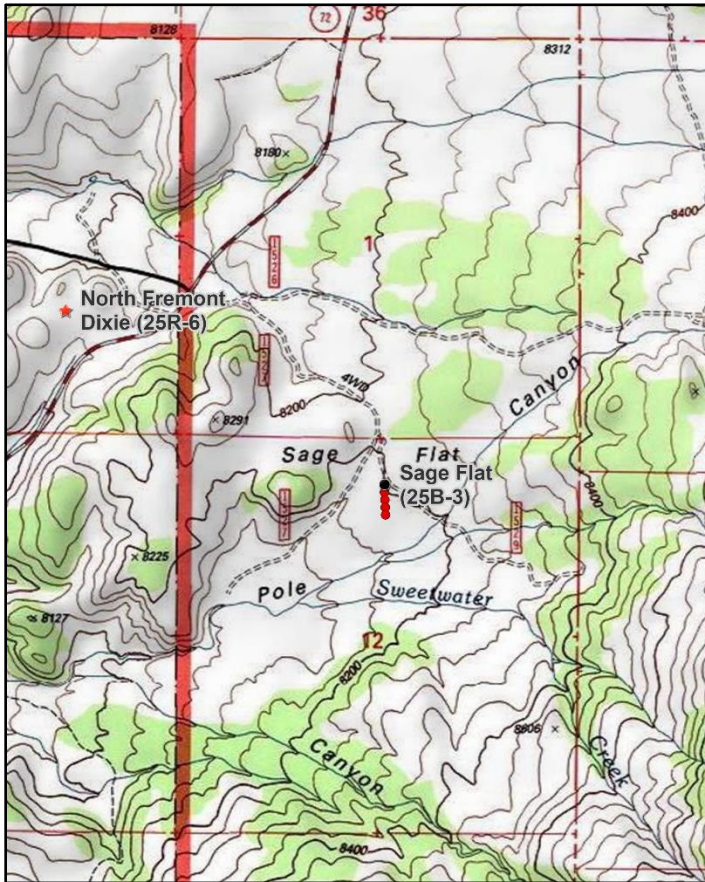
**Table 25B-02.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	12	-	100	-	-	-	3.0
2023	2	-	100	-	-	-	2.0
<b>Pinus edulis (twoneedle pinyon)</b>							
1994	19	-	-	-	-	-	5.7
1999	50	-	-	-	-	-	5.9
2004	122	74	16	-	11	-	2.6
2009	117	16	58	16	-	11	4.1
2013	96	29	64	7	-	-	4.5
2018	254	50	45	5	-	-	2.1
2023	132	-	72	28	-	-	3.9

**Table 25B-02.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1994	18.8	2.2	1.3	3.0	0.0	2.5	0.0	<b>27.7</b>	Very Poor
1999	23.6	2.8	4.9	4.4	0.0	4.4	0.0	<b>40.0</b>	Poor
2004	22.9	4.0	2.1	3.1	0.0	0.4	0.0	<b>32.4</b>	Very Poor
2009	25.5	-2.7	1.0	3.1	0.0	0.3	0.0	<b>27.2</b>	Very Poor
2013	27.0	3.6	2.5	3.8	0.0	2.8	0.0	<b>39.8</b>	Poor
2018	28.1	4.9	1.5	6.5	0.0	2.7	0.0	<b>43.8</b>	Poor
2023	30.0	7.8	2.9	5.6	0.0	2.4	0.0	<b>48.7</b>	Poor-Fair

## SAGE FLAT - STUDY NO. 25B-3

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Lyman NE; Township 27S, Range 3E, Section 12  
NAD 83 UTM ZONE 12, 453556 East 4259466 North

**Transect Information**

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

149  
165° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

Travel north on SR-72 for 2.25 miles from Fremont to a major fork, then bear right and continue 2.8 miles on SR-72 to a cattle guard at the Forest Service boundary. One hundred yards beyond the cattle guard, turn right. At 0.15 miles, a road forks off to the right: continue up this rough road for 0.45 miles to a fork. Turn right and travel for 0.1 miles to another fork. Turn left at the fork and continue for 0.1 miles into the flat to a witness post on the right (south) side of the road; the witness post and transect stakes are green steel fenceposts with white tops. The 0-foot stake is marked by browse tag #149 and marks the beginning of the frequency baseline, which starts 75 feet due south of the witness post.

**Site Information**

Land Ownership  
Land Administrator  
Allotment  
Elevation  
Aspect  
Slope  
Sample Dates

Federal  
USFS  
Thousand Lake Allotment  
8,200ft (2,499m)  
Southwest  
2-5%  
07/19/1994, 08/19/1999, 08/25/2004, 08/13/2009, 08/22/2013, 07/16/2018, 07/10/2023

**Wildlife Habitat and Vegetation History****Table 25B-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25B-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Wyoming Big Sagebrush	No Encroachment
1991	Wyoming Big Sagebrush	No Encroachment
1994	Wyoming Big Sagebrush	No Encroachment
1999	Wyoming Big Sagebrush	No Encroachment
2004	Wyoming Big Sagebrush	No Encroachment
2009	Wyoming Big Sagebrush	No Encroachment
2013	Wyoming Big Sagebrush	No Encroachment
2018	Wyoming Big Sagebrush	No Encroachment
2023	Wyoming Big Sagebrush	No Encroachment

**Site Notes**

The flat is thought to be an important deer concentration area in winter and spring and would be enhanced by early season herbaceous species.

**Soils****Table 25B-03.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.7	42.6	31.8	25.6	1.9	4.7	67.2	0.7	08/17/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 1985, this site has remained dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). Sagebrush cover has remained fairly stable, but density has decreased over time (Photos, Pre-1992 Data, Table 25B-03.12, Table 25B-03.13). The herbaceous understory has been limited over the duration of the study years and has mainly consisted of native perennial grass species (Table 25B-03.7, Table 25B-03.10, Table 25B-03.11). The areas surrounding the site are mostly dominated by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) (Photos). Although encroachment has not been observed on the site itself, the study area may have the potential to transition to a pinyon and juniper dominated community without treatment or fire in the surrounding areas.

Condition of deer winter range on this site has ranged from poor to fair since 1994. As of 2023, deer winter range condition was considered to be poor to fair. Improvement to deer wintering range can be accomplished through efforts that increase preferred browse reproduction while decreasing decadence; diversifying and increasing cover of native perennial forbs would also improve winter range conditions (Table 25B-03.15). In addition, the sagebrush component of this site could provide valuable browse for wintering elk (Table 25B-03.3; Wambolt, 1996). However, pellet transect data indicates that elk presence has been low since 1999 and that deer presence has remained low since 2004 (Table 25B-03.9).

## Trend Summary Tables

**Table 25B-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1994	21.5	0.7	-	-	-	-
1999	20.8	0.3	-	-	-	-
2004	22.8	2.6	-	20.4	1.6	-
2009	17.7	0.2	-	21.5	0.1	-
2013	19.3	0.6	-	22.3	0.3	-
2018	23.3	1.7	-	24.1	1.4	-
2023	21.6	1.6	-	21.9	0.8	-

**Table 25B-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1994	-	287	-	40	-	4.0	-	0.2
1999	-	272	-	57	-	3.0	-	0.4
2004	-	212	-	33	-	2.7	-	0.2
2009	-	172	2	19	-	2.4	0.0	0.2
2013	-	258	1	69	-	6.6	0.0	0.4
2018	-	302	-	50	-	4.8	-	0.7
2023	-	196	-	41	-	6.1	-	0.2

**Table 25B-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1994	50.2	7.3	18.1	1.0	1.7	24.8
1999	46.3	7.6	19.4	4.9	0.5	24.3
2004	46.5	10.4	18.9	4.8	2.0	26.3
2009	58.9	3.3	19.4	6.3	0.0	20.4
2013	46.5	4.5	20.7	6.7	0.2	26.5
2018	59.8	7.8	23.1	4.6	1.4	26.4
2023	54.5	3.0	24.7	5.3	2.2	27.2

**Table 25B-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1994	4	1	4	25
1999	2	2	3	53
2004	1	2	3	11
2009	-	12	-	54
2013	1	1	1	7
2018	3	4	1	22
2023	1	4	-	3
Year	Days Use Per Acre (ha)			
1994	-	-	-	-
1999	14.5 (35.9)	21.5 (53.0)	6.0 (14.9)	-
2004	-	9.4 (23.2)	2.7 (6.6)	-
2009	0.7 (1.8)	8.7 (21.5)	-	-
2013	1.5 (3.6)	0.7 (1.7)	1.3 (3.3)	-
2018	-	7.4 (18.2)	2.0 (5.0)	-
2023	2.9 (7.2)	2.0 (5.0)	0.7 (1.7)	-

**Table 25B-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>1</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency						
1994	6	19	60	222	-	-	-
1999	24	19	46	153	-	-	71
2004	29	17	46	142	-	-	3
2009	23	12	23	119	5	-	2
2013	24	25	45	187	-	-	-
2018	60	17	7	241	2	-	3
2023	16	18	65	107	0	3	5
year	Average Cover (%)						
1994	0.2	0.3	1.1	2.4	-	-	-
1999	0.3	0.4	0.7	1.2	-	-	0.5
2004	0.5	0.7	0.7	0.7	-	-	0.1
2009	0.6	0.7	0.3	0.8	0.0	-	0.0
2013	0.9	1.1	1.6	3.0	-	-	-
2018	0.9	0.3	0.1	3.5	0.0	-	0.0
2023	0.9	0.7	1.2	2.9	0.0	0.1	0.2

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

**Table 25B-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Hymenoxys richardsonii (pingue rubberweed)	Penstemon pachyphyllus (thickleaf beardtongue)	Phlox longifolia (longleaf phlox)
year	Nested Frequency						
1994	-	13	-	23	0	0	7
1999	2	-	-	42	2	1	13
2004	3	5	-	20	-	-	5
2009	-	12	2	3	-	-	4
2013	18	11	1	37	6	3	5
2018	-	15	-	31	-	3	1
2023	1	6	-	27	1	-	7
year	Average Cover (%)						
1994	-	0.1	-	0.1	0.0	0.0	0.0
1999	0.0	-	-	0.2	0.1	0.0	0.0
2004	0.0	0.0	-	0.1	-	-	0.0
2009	-	0.1	0.0	0.0	-	-	0.0
2013	0.1	0.0	0.0	0.3	0.0	0.0	0.0
2018	-	0.2	-	0.4	-	0.0	0.0

FORB SPECIES							
Arabis (rockcress)	0.0	0.0	-	0.2	0.0	-	0.0
Cryptantha (cryptantha)	0.0	0.0	-	0.2	0.0	-	0.0
Descurainia pinnata <sup>a</sup> (western tansymustard)	0.0	0.0	-	0.2	0.0	-	0.0
Erigeron pumilus (shaggy fleabane)	0.0	0.0	-	0.2	0.0	-	0.0
Hymenoxys richardsonii (pingue rubberweed)	0.0	0.0	-	0.2	0.0	-	0.0
Penstemon pachyphyllus (thickleaf beardtongue)	0.0	0.0	-	0.2	0.0	-	0.0
Phlox longifolia (longleaf phlox)	0.0	0.0	-	0.2	0.0	-	0.0

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

**Table 25B-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES						
Artemisia frigida <sup>p</sup> (prairie sagewort)						
Artemisia nova <sup>p</sup> (black sagebrush)						
Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)						
Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)						
Gutierrezia sarothrae (broom snakeweed)						
Pedocactus simpsonii (mountain ball cactus)						
year	Line Intercept Cover (%)					
1994	-	-	-	-	-	-
1999	-	-	-	-	-	-
2004	-	0.1	20.3	-	1.6	-
2009	0.1	0.3	21.1	-	0.1	-
2013	0.1	0.4	21.8	-	0.3	-
2018	0.1	0.4	23.6	-	1.4	-
2023	-	0.8	21.1	-	0.8	-
year	Quadrat Cover (%)					
1994	0.1	-	21.3	0.0	0.7	-
1999	0.3	0.6	19.9	0.0	0.3	-
2004	0.1	0.6	22.0	0.0	2.6	-
2009	0.0	0.1	17.5	0.0	0.2	-
2013	0.0	0.1	19.1	0.2	0.4	-
2018	0.2	0.0	23.2	0.0	1.6	-
2023	0.0	0.0	21.6	0.0	1.6	0.0

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

**Table 25B-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>P</sup> -- (prairie sagewort)</b>									
1994	320	-	0	100	0	0	0	0	8/13
1999	500	20	24	68	8	44	32	0	8/12
2004	220	-	0	100	0	27	0	0	7/12
2009	100	-	0	100	0	0	20	0	12/18
2013	140	-	14	86	0	0	0	0	13/28
2018	200	-	0	100	0	20	0	0	8/16
2023	100	-	0	100	0	0	0	0	- / -
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1999	140	-	57	29	14	57	0	0	14/26
2004	140	-	0	71	29	0	0	14	24/41
2009	120	-	0	67	33	0	0	33	19/35
2013	100	-	0	100	0	100	0	60	14/33
2018	60	-	0	100	0	0	0	0	22/38
2023	80	-	0	75	25	0	0	0	- / -
<b>Artemisia tridentata ssp. wyomingensis<sup>P</sup> -- (Wyoming big sagebrush)</b>									
1994	12960	40	39	45	16	1	0	8	48/74
1999	11920	280	43	33	24	54	10	8	45/70
2004	11360	20	27	54	20	26	8	11	38/59
2009	11480	-	7	67	27	28	2	29	35/52
2013	8420	540	10	70	20	46	44	34	35/57
2018	9760	60	13	59	28	18	1	36	39/63
2023	7080	60	11	58	32	42	40	29	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1994	240	-	8	58	33	0	0	0	8/12
1999	280	-	21	14	64	0	29	43	10/15
2004	360	-	33	61	6	17	0	6	12/18
2009	300	-	7	80	13	0	0	13	7/11
2013	520	-	15	81	4	35	8	12	10/18
2018	240	-	8	67	25	0	42	8	7/12
2023	480	-	17	83	0	0	0	0	- / -
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1999	-	-	-	-	-	-	-	-	- / -
2004	40	-	0	50	50	0	100	50	18/6
2009	20	-	0	100	0	0	0	0	4/9
2013	-	-	-	-	-	-	-	-	13/23
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Escobaria vivipara var. arizonica -- (Arizona spinystar)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1999	60	-	100	0	0	0	0	0	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1994	3760	60	7	85	9	0	0	1	13/12
1999	1200	840	47	50	3	0	0	2	15/16
2004	4500	-	0	100	0	0	0	0	16/21
2009	820	-	2	95	2	0	0	2	14/14
2013	2860	940	39	61	0	0	6	1	9/13
2018	6260	-	7	89	4	0	0	12	10/14
2023	12940	460	60	41	0	0	0	0	- / -
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
1994	20	-	100	0	0	0	0	0	4/5
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	60	-	0	100	0	67	0	0	20/30
2018	40	-	0	100	0	0	50	0	11/18
2023	-	-	-	-	-	-	-	-	-/-
<b>Mahonia repens -- (creeping barberry)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	100	0	0	- / -
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1994	-	-	-	-	-	-	-	-	7/23
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	6/24
2023	-	-	-	-	-	-	-	-	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	1/4
2018	-	-	-	-	-	-	-	-	-/-
2023	40	-	0	100	0	0	0	0	- / -

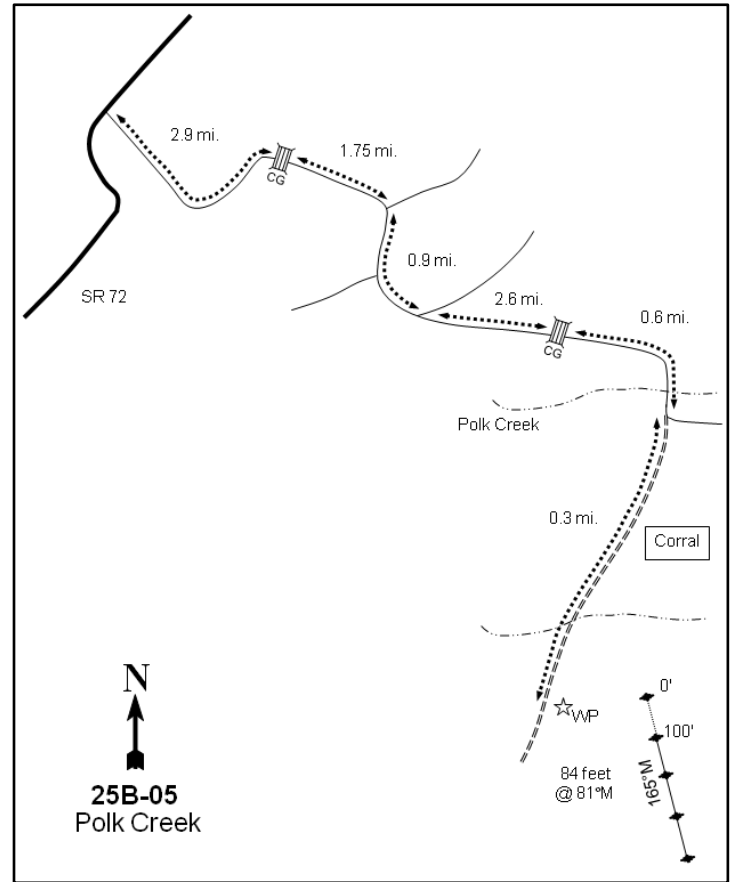
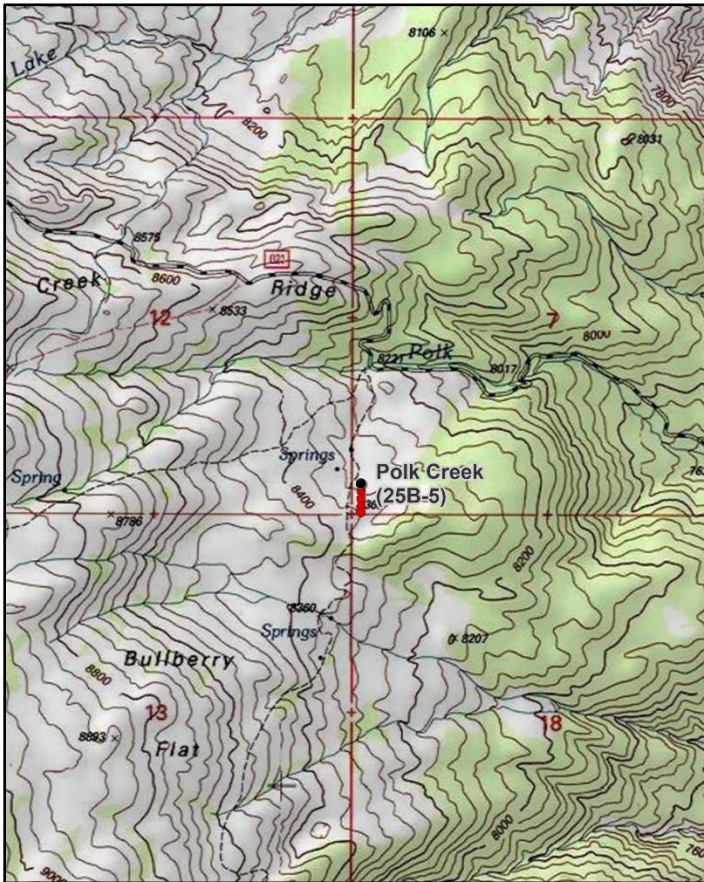
t - Tree Species; p - Preferred Browse; i - Introduced Species



**Table 25B-03.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1994	26.8	10.2	15.0	8.1	0.0	0.5	0.0	<b>60.6</b>	Fair
1999	26.0	8.1	15.0	6.0	0.0	0.7	0.0	<b>55.7</b>	Fair
2004	25.5	9.1	13.2	5.5	0.0	0.4	0.0	<b>53.6</b>	Fair
2009	26.9	7.0	3.2	4.8	0.0	0.4	0.0	<b>42.2</b>	Poor
2013	27.9	9.1	4.7	13.1	0.0	0.8	0.0	<b>55.6</b>	Fair
2018	30.0	6.7	6.5	9.6	0.0	1.4	0.0	<b>54.2</b>	Fair
2023	27.4	5.6	5.1	12.2	0.0	0.5	0.0	<b>50.6</b>	Poor-Fair

## POLK CREEK - STUDY NO. 25B-5

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Flat Top NE; Township 27S, Range 5E, Section 07  
NAD 83 UTM ZONE 12, 463910 East 4257980 North

**Transect Information**

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

Not Available  
165° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

Travel north from Fremont on SR-72 for 7.3 miles to the Elkhorn-Torrey Road. Turn right and go 2.9 miles to a cattle guard. From the cattle guard, continue for 1.75 miles to an intersection by Heart Lake. Take the right fork (#206) and go 0.4 miles toward Cathedral Valley. At the intersection, turn left (#22) toward Cathedral Valley. Proceed 0.5 miles to another fork (Round Lake turnout); stay right and go 2.6 miles to a cattle guard. From the cattle guard, proceed 0.6 miles down to Polk Creek. Immediately after crossing the creek, turn right onto the Polk Creek Trail. Continue for 0.3 miles, passing a camp and some corrals on the left, to another creek. Cross the creek, then look 110 feet beyond the creek (along the left fork of the road) for a steel rebar witness post on the left (east) side of the road. The frequency baseline of the study starts 84 feet east (81 degrees magnetic) of the witness post.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Thousand Lake Allotment
Elevation	8,400ft (2,560m)
Aspect	Northeast-East
Slope	0-11%
Sample Dates	07/19/1994, 08/25/1999, 08/25/2004, 08/17/2009, 08/20/2013, 07/17/2018, 07/17/2023

**Table 25B-05.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Thousand Lake Habitat Improvement Phase 3 (Proposed)	6563	Fall 2023 or Spring 2024	1220

**Wildlife Habitat and Vegetation History****Table 25B-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25B-05.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Bitterbrush/Black Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
1991	Bitterbrush/Black Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
1994	Bitterbrush/Black Sagebrush/Pinyon-Juniper	Phase II
1999	Bitterbrush/Black Sagebrush/Pinyon-Juniper	Phase II
2004	Bitterbrush/Black Sagebrush/Pinyon-Juniper	Phase II
2009	Bitterbrush/Black Sagebrush/Pinyon-Juniper	Phase II
2013	Bitterbrush/Black Sagebrush/Pinyon-Juniper	Phase II
2018	Bitterbrush/Black Sagebrush/Pinyon-Juniper	Phase II transitioning to Phase III
2023	Bitterbrush/Black Sagebrush/Pinyon-Juniper	Phase II transitioning to Phase III

**Site Notes**

No Notes

**Soils****Table 25B-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 Clay Loam	6.8	53.8	22.5	23.6	2.2	12.7	198.4	0.5	08/25/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation                      16 inches  
 NRCS Ecological Site    Mountain Stony Loam (Antelope Bitterbrush)  
 NRCS Ecological Site #    R047XB456UT  
 States and Transitions    No state and transition model is available for this ecological site.

The plant community on this site has existed as a mixed stand of antelope bitterbrush (*Purshia tridentata*) and black sagebrush (*Artemisia nova*) since study establishment in 1985; a diverse component of other shrub species have also been present to a lesser extent (Photos, Pre-1992 Data, Table 25B-05.12, Table 25B-05.13). Native perennial graminoids such as blue grama (*Bouteloua gracilis*) and obtuse sedge (*Carex obtusata*) have contributed a majority of the herbaceous cover in most sample years. Forbs have fluctuated from year to year, but have mainly been a minor component of the understory (Table 25B-05.7, Table 25B-05.10, Table 25B-05.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have increased in both density and cover over the sample years and the study site was considered to be within Phase II transitioning to Phase III of woodland succession as of 2023 (Table 25B-05.4, Table 25B-05.12, Table 25B-05.14). Without treatment or fire, trees will likely continue to increase in abundance and may have a detrimental effect on the shrub and herbaceous components.

Deer winter range condition on this site has ranged from poor to good since 1994. As of 2023, deer winter range condition was considered to be fair. Improvement to deer wintering range can be accomplished through efforts that increase reproduction of preferred browse species; increasing perennial grass cover and diversifying and increasing native perennial forbs would also improve winter range conditions (Table 25B-05.15). In addition, sagebrush on this site could provide valuable browse for elk during the winter months (Table 25B-05.3; Wambolt, 1996). However, pellet transect data indicates that although elk presence increased between 2018 and 2023, it has remained low since 1999. Mule deer presence was low in 2023, but has been higher in past sample years (Table 25B-05.9).

## Trend Summary Tables

**Table 25B-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
1994	26.2	2.9	4.3	-	-	-
1999	30.8	2.6	6.1	-	-	0.4
2004	24.4	4.8	7.4	29.7	6.6	14.2
2009	17.3	2.5	8.9	26.1	4.1	15.4
2013	21.0	2.7	9.4	27.6	5.8	21.1
2018	19.7	2.1	14.8	25.9	2.4	25.3
2023	16.5	2.4	15.6	26.2	2.2	32.3

**Table 25B-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
1994	-	231	5	129	-	4.7	0.0	1.9
1999	-	227	20	154	-	9.3	0.1	5.1
2004	-	234	27	85	-	9.3	0.1	1.7
2009	-	219	4	76	-	5.6	0.0	0.9
2013	-	236	6	116	-	8.4	0.2	2.0
2018	-	201	-	70	-	10.2	-	1.1
2023	-	200	79	103	-	8.8	0.2	2.1

**Table 25B-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
1994	13.7	0.1	30.6	8.7	17.3	38.3
1999	8.4	0.1	43.6	8.5	18.7	48.3
2004	9.3	0.1	38.0	10.6	18.4	42.4
2009	10.9	0.1	44.1	9.1	16.9	38.7
2013	10.9	0.2	40.3	7.8	15.2	43.1
2018	18.5	0.8	53.2	7.8	17.5	40.0
2023	10.4	0.1	49.3	7.9	17.0	40.1

**Table 25B-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	Shiras Moose	Rabbit
	Quadrat Frequency				
1994	4	23	7	-	23
1999	7	9	2	-	32
2004	-	23	3	-	15
2009	1	24	7	-	23
2013	3	18	3	-	3
2018	4	9	-	-	19
2023	3	20	10	-	15
Year	Days Use Per Acre (ha)				
1994	-	-	-	-	-
1999	7.2 (17.9)	20.1 (49.7)	1.3 (3.3)	-	-
2004	5.8 (14.3)	65.7 (162.2)	4.7 (11.6)	1.0 (2.4)	-
2009	2.2 (5.4)	70.4 (173.8)	6.7 (16.6)	-	-
2013	8.7 (21.5)	32.2 (79.5)	2.7 (6.6)	-	-
2018	1.5 (3.6)	21.5 (53.0)	5.3 (13.2)	-	-
2023	2.2 (5.4)	16.1 (39.7)	16.8 (41.4)	-	-

**Table 25B-05.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Bouteloua gracilis (blue grama)	Carex obtusata (obtus sedge)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency										
1994	-	-	109	93	125	-	7	3	38	-	8
1999	-	5	76	118	103	10	38	16	7	-	-
2004	0	-	96	110	112	5	31	4	6	-	-
2009	2	-	98	69	62	-	37	9	21	-	-
2013	-	-	117	88	58	10	40	15	12	-	-
2018	11	3	114	81	27	1	38	11	11	5	-
2023	-	20	87	69	53	1	35	17	3	-	1
year	Average Cover (%)										
1994	-	-	1.8	1.0	1.3	-	0.0	0.0	0.5	-	0.0
1999	-	0.3	1.5	3.3	2.8	0.2	0.9	0.1	0.1	-	-
2004	0.0	-	1.9	2.8	2.6	0.0	1.8	0.1	0.1	-	-
2009	0.1	-	2.7	1.0	0.8	-	0.6	0.1	0.2	-	-
2013	-	-	3.3	2.1	1.1	0.2	1.2	0.2	0.2	-	-
2018	0.1	0.0	4.5	3.5	0.5	0.0	1.0	0.1	0.4	0.2	-
2023	-	0.2	2.6	1.8	2.2	0.0	1.8	0.1	0.0	-	0.0

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

**Table 25B-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis demissa (nodding rockcress)	Artemisia dracunculus (tarragon)	Artemisia ludoviciana (white sagebrush)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Castilleja angustifolia (northwestern Indian paintbrush)	Castilleja linearifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album <sup>a</sup> (lambsquarters)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)
year	Nested Frequency																
1994	-	-	3	2	-	-	8	-	1	-	1	-	16	41	-	-	21
1999	-	1	-	16	-	1	-	-	-	-	-	2	14	14	-	9	16
2004	2	1	1	3	1	-	2	-	-	-	2	-	-	7	-	-	8
2009	-	-	1	-	-	-	-	-	-	-	-	-	3	2	-	-	9
2013	-	-	4	5	-	-	3	1	-	-	-	-	5	5	2	3	7
2018	-	-	-	-	2	-	-	-	-	1	-	-	1	7	-	-	10
2023	-	-	-	1	-	-	3	-	1	-	-	3	14	4	-	2	-
year	Average Cover (%)																
1994	-	-	0.0	0.0	-	-	0.0	-	0.0	-	0.0	-	0.2	0.3	-	-	0.1
1999	-	0.0	-	0.2	-	0.0	-	-	-	-	-	0.0	0.4	0.1	-	0.0	0.1
2004	0.0	0.0	0.0	0.0	0.0	-	0.0	-	-	-	0.0	-	-	0.0	-	-	0.0
2009	-	-	0.0	-	-	-	-	-	-	-	-	-	0.0	0.0	-	-	0.0
2013	-	-	0.2	0.0	-	-	0.0	0.0	-	-	-	-	0.1	0.0	0.0	0.1	0.1
2018	-	-	-	-	0.0	-	-	-	-	0.0	-	-	0.0	0.1	-	-	0.0
2023	-	-	-	0.0	-	-	0.0	-	0.1	-	-	0.0	0.1	0.0	-	0.0	-

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

FORB SPECIES	Eriogonum alatum (winged buckwheat)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hymenoxys richardsonii (pingue rubberweed)	Lepidium <sup>a</sup> (pepperweed)	Lithospermum incisum (narrowleaf stoneseed)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera (evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Penstemon humilis (low beardtongue)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency																
1994	-	1	17	1	26	-	0	5	-	1	1	-	4	10	32	3	1
1999	7	-	29	7	15	8	-	25	-	-	64	-	3	14	25	1	4
2004	8	-	18	2	3	2	-	2	12	-	19	-	4	4	25	4	2
2009	-	-	20	-	7	-	-	5	-	-	1	-	6	-	28	4	-
2013	11	-	30	-	4	-	6	7	-	2	10	2	8	22	28	-	0
2018	0	-	11	-	-	-	1	-	-	-	-	9	4	10	21	-	-
2023	-	-	30	71	-	-	-	-	-	-	5	2	10	29	28	14	-
year	Average Cover (%)																
1994	-	0.0	0.0	0.0	0.4	-	0.0	0.0	-	0.0	0.0	-	0.0	0.0	0.7	0.0	0.0
1999	0.1	-	0.5	0.1	0.5	0.0	-	0.2	-	-	1.7	-	0.0	0.1	1.2	0.0	0.0
2004	0.1	-	0.3	0.0	0.0	0.0	-	0.0	0.0	-	0.2	-	0.0	0.0	0.7	0.0	0.0
2009	-	-	0.1	-	0.1	-	-	0.0	-	-	0.0	-	0.0	-	0.5	0.0	-
2013	0.1	-	0.3	-	0.1	-	0.0	0.1	-	0.0	0.1	0.0	0.1	0.1	0.7	-	0.0
2018	0.0	-	0.1	-	-	-	0.0	-	-	-	-	0.0	0.0	0.0	0.8	-	-
2023	-	-	0.5	0.2	-	-	-	-	-	-	0.1	0.0	0.2	0.2	0.9	0.0	-

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

FORB SPECIES	Symphyotrichum (aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>a</sup> (yellow salsify)
year	Nested Frequency		
1994	-	-	-
1999	3	3	3
2004	8	-	4
2009	10	-	-
2013	4	-	3
2018	-	3	-
2023	-	-	-
year	Average Cover (%)		
1994	-	-	-
1999	0.0	0.0	0.0
2004	0.1	-	0.0
2009	0.0	-	-
2013	0.0	-	0.0
2018	-	0.0	-
2023	-	-	-

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

**Table 25B-05.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Escobaria vivipara var. arizonica (Arizona spiny star)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Krascheninnikovia lanata <sup>p</sup> (winterfat)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)	Yucca (yucca)
year	Line Intercept Cover (%)																
1994	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1999	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2004	9.3	0.6	0.7	2.8	1.4	-	-	1.3	1.5	-	0.5	-	12.7	18.3	0.8	0.6	0
2009	7.1	1.2	0.3	2.4	0.8	-	-	0.5	0.7	-	0	-	14.7	16.7	0.8	0.4	-
2013	8.9	1.5	1.2	4.3	0.6	-	0	0.2	1.2	-	0.3	-	19.9	15.5	0.5	0.4	-
2018	8	3.1	0.4	1.7	0.2	0.1	-	0.1	1.7	0.2	0	-	23.6	13.6	0.6	0.3	-
2023	4.5	3.4	0.1	1	0.6	0.1	0	0	2.3	-	0.1	-	30	17	1.2	0.4	-
year	Quadrat Cover (%)																
1994	15.6	0.5	0.1	1.8	0.3	-	-	0.1	-	0.0	0.2	-	4.3	9.9	-	0.4	-
1999	14.3	0.8	0.1	1.4	0.1	-	-	0.2	0.6	0.0	0.1	0.0	5.5	15.2	0.4	0.8	-
2004	9.5	0.9	0.4	1.3	0.7	-	-	1.7	0.1	0.0	0.1	-	7.2	13.2	0.4	0.9	0.0
2009	5.2	0.2	0.2	1.3	0.1	-	-	0.7	0.4	-	0.2	0.0	8.6	11.5	0.2	0.2	-
2013	6.7	1.5	1.0	1.4	0.2	0.2	0.0	0.3	0.1	-	0.2	-	9.3	11.6	0.2	0.4	0.0
2018	6.3	2.5	0.6	1.4	0.1	0.0	0.0	0.1	0.9	0.0	0.1	-	13.9	9.8	0.6	0.3	-
2023	4.6	2.5	0.3	1.3	0.4	0.1	0.0	0.2	1.9	-	0.2	0.0	13.7	8.3	0.9	0.2	-

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

**Table 25B-05.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1994	9120	5120	5	61	34	7	0	9	26/53
1999	9160	800	16	50	33	20	2	11	29/47
2004	7120	2620	11	58	31	8	0	19	22/41
2009	7340	60	23	60	17	2	1	11	21/34
2013	5320	400	12	74	14	29	9	12	21/39
2018	5060	20	10	73	17	1	0	32	23/35
2023	2900	-	7	79	14	10	3	15	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1994	100	-	0	100	0	0	0	0	54/75
1999	300	40	33	60	7	7	0	0	46/72
2004	360	620	22	56	22	22	0	11	36/51
2009	680	-	35	56	9	9	0	0	38/49
2013	540	40	15	78	7	0	4	4	33/62
2018	940	60	19	79	2	19	2	79	35/53
2023	720	-	0	94	6	14	11	6	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	20/30
2018	-	-	-	-	-	-	-	-	7/14
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1994	420	-	0	100	0	0	0	0	12/25
1999	480	-	4	96	0	21	25	0	9/17
2004	720	-	0	92	8	17	42	8	17/28
2009	400	-	5	80	15	0	15	10	8/18
2013	760	-	3	97	0	13	21	0	13/27
2018	620	-	0	97	3	26	61	10	11/21
2023	340	-	0	94	6	6	94	24	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)</b>									
1994	2120	60	5	93	3	0	0	0	16/27
1999	1740	120	5	92	3	1	0	1	25/34
2004	2060	60	14	82	5	8	0	3	26/37
2009	1640	-	4	88	9	2	2	10	25/31
2013	1120	-	5	88	7	20	2	14	30/45
2018	1760	-	2	82	16	51	9	52	21/28
2023	1800	-	2	96	2	4	1	2	-/-
<b>Echinocereus -- (hedgehog cactus)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	13/49
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1994	240	-	0	50	50	0	0	8	44/51
1999	220	-	18	55	27	9	9	0	61/73
2004	500	-	20	52	28	16	0	20	45/49
2009	180	20	0	78	22	11	0	13	46/50
2013	220	-	0	73	27	0	0	27	64/83
2018	200	-	0	90	10	40	0	40	55/59
2023	160	-	13	75	13	0	0	13	-/-
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	80	-	50	50	0	0	75	75	21/32
2018	160	-	0	75	25	38	13	38	28/29
2023	160	-	38	63	0	0	0	0	-/-



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Escobaria vivipara var. arizonica -- (Arizona spiny star)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	20	-	0	100	0	0	0	0	4/6
2009	-	-	-	-	-	-	-	-	-/-
2013	80	-	0	100	0	0	0	0	9/11
2018	80	-	0	100	0	0	0	0	4/7
2023	140	-	14	86	0	0	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1994	920	100	52	48	0	0	0	0	16/15
1999	580	360	7	93	0	0	0	0	19/20
2004	2820	20	7	93	0	0	0	0	21/22
2009	1820	-	31	69	0	0	0	0	19/19
2013	660	-	3	94	3	0	0	3	16/18
2018	380	-	11	90	0	0	0	5	15/13
2023	220	-	9	91	0	0	0	0	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	40	-	100	0	0	0	0	0	-/-
2004	60	-	67	33	0	0	0	0	-/-
2009	40	-	0	100	0	0	0	0	-/-
2013	60	-	33	67	0	0	0	0	-/-
2018	60	-	33	67	0	0	0	0	-/-
2023	100	-	80	20	0	0	0	0	-/-
<b>Krascheninnikovia lanata<sup>P</sup> -- (winterfat)</b>									
1994	60	-	0	100	0	0	0	0	15/10
1999	100	-	0	80	20	20	80	0	12/16
2004	80	-	50	25	25	0	50	25	13/13
2009	60	-	0	100	0	0	0	0	7/2
2013	60	40	67	33	0	33	0	33	12/11
2018	80	-	75	25	0	0	0	0	32/26
2023	20	-	100	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
1994	120	-	50	50	0	0	17	0	8/19
1999	80	-	0	100	0	0	0	0	13/40
2004	200	-	20	80	0	0	0	0	12/46
2009	440	-	5	96	0	0	0	91	7/23
2013	380	-	5	95	0	0	0	11	9/32
2018	340	-	0	100	0	0	0	0	9/44
2023	480	-	0	100	0	0	0	0	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1994	-	-	-	-	-	-	-	-	4/7
1999	60	-	67	33	0	0	0	0	-/-
2004	220	-	27	73	0	0	0	0	6/7
2009	60	-	0	100	0	0	0	0	6/10
2013	80	-	25	75	0	0	0	0	3/7
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	260	200	69	31	0	0	0	0	-/-
2004	460	20	70	30	0	0	0	13	-/-
2009	340	40	53	47	0	0	0	0	-/-
2013	420	980	57	43	0	0	0	5	-/-
2018	440	480	55	46	0	0	0	9	-/-
2023	500	260	36	64	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1994	2520	40	0	97	3	2	2	0	37/108
1999	1840	20	10	80	10	30	34	7	41/121
2004	2980	-	0	85	15	43	52	11	40/96
2009	3460	20	1	60	39	17	67	42	38/103
2013	2220	-	3	65	32	61	35	54	41/110
2018	2400	-	1	66	33	25	30	48	37/78
2023	2320	-	1	79	20	14	67	20	-/-
<b>Ribes<sup>p</sup> -- (currant)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	50/173
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1994	120	-	17	83	0	0	0	0	29/60
1999	140	-	0	100	0	33	0	0	45/70
2004	140	-	14	86	0	0	0	0	27/51
2009	220	-	0	100	0	27	0	18	38/66
2013	200	-	30	70	0	60	0	30	41/76
2018	240	-	0	75	25	25	17	75	45/90
2023	240	-	8	92	0	0	42	0	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1994	480	-	8	83	8	0	0	4	23/27
1999	700	-	20	66	14	14	3	3	25/30
2004	600	20	17	73	10	23	0	3	27/35
2009	540	-	7	70	22	30	15	19	23/25
2013	500	-	12	68	20	17	0	20	28/39
2018	320	-	0	63	38	6	0	56	27/25
2023	300	-	27	53	20	0	0	20	-/-
<b>Yucca -- (yucca)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1999	-	-	-	-	-	-	-	-	-/-
2004	20	-	100	0	0	0	0	0	-/-
2009	-	-	-	-	-	-	-	-	7/9
2013	-	-	-	-	-	-	-	-	4/9
2018	20	-	100	0	0	0	0	0	13/11

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

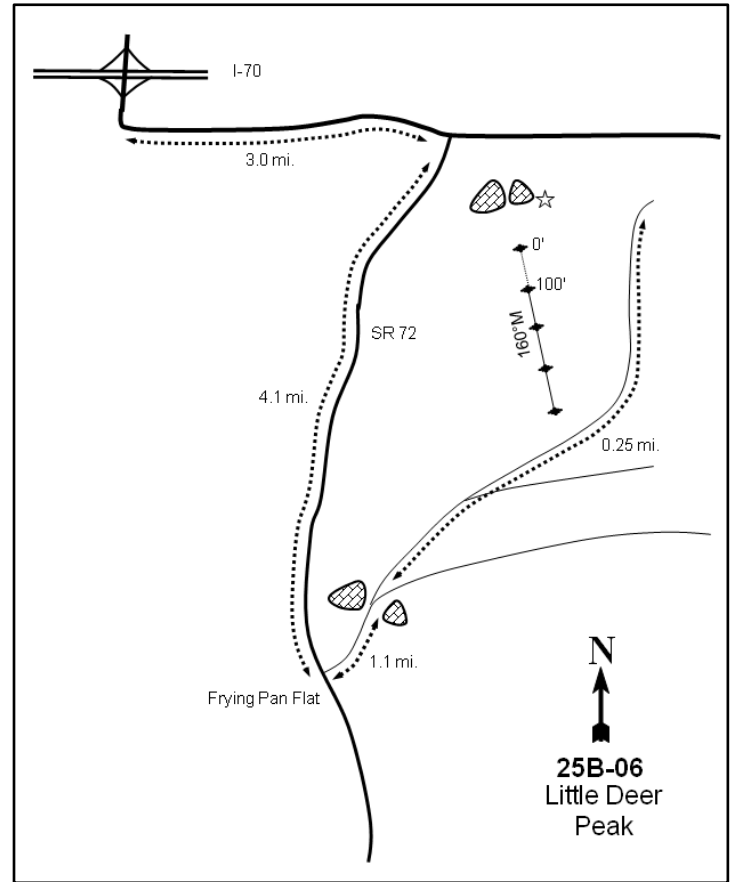
**Table 25B-05.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1994	52	-	-	-	-	-	3.2
1999	39	-	-	-	-	-	4.9
2004	56	7	43	50	-	-	4.7
2009	60	-	33	67	-	-	6.6
2013	55	-	14	64	21	-	6.4
2018	85	-	-	67	33	-	8.1
2023	65	-	-	46	38	15	10.6
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	57	-	-	-	100	-	8.0
2023	8	-	-	-	100	-	7.0
<b>Pinus edulis (twoneedle pinyon)</b>							
1994	167	-	-	-	-	-	6.7
1999	225	-	-	-	-	-	6.3
2004	236	10	55	20	15	-	7.2
2009	244	15	45	15	20	5	7.8
2013	210	20	10	35	30	5	8.4
2018	537	40	30	25	5	-	4.2
2023	398	35	10	30	20	5	7.7
<b>Pinus ponderosa (ponderosa pine)</b>							
1999	2	-	-	-	-	-	15.0
2009	2	-	-	-	-	100	19.0
2018	12	-	-	-	-	100	19.0
2023	2	-	-	-	-	100	23.0

**Table 25B-05.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1994	30.0	8.6	1.5	9.5	0.0	3.9	0.0	<b>53.4</b>	Poor-Fair
1999	30.0	8.9	6.7	18.7	0.0	10.0	0.0	<b>74.2</b>	Good
2004	30.0	9.0	2.1	18.5	0.0	3.4	0.0	<b>63.1</b>	Fair
2009	30.0	5.9	4.2	11.1	0.0	1.8	0.0	<b>52.9</b>	Poor
2013	30.0	8.1	3.4	16.8	0.0	4.0	0.0	<b>62.2</b>	Fair
2018	30.0	8.0	3.2	20.5	0.0	2.3	0.0	<b>63.9</b>	Fair
2023	30.0	10.2	1.1	17.6	0.0	4.2	0.0	<b>63.0</b>	Fair

## LITTLE DEER PEAK - STUDY NO. 25B-6

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Johns Peak NE; Township 24S, Range 5E, Section 17  
NAD 83 UTM ZONE 12, 466614 East 4285760 North

**Transect Information**

Browse Tag # (0' Stake) 710  
Transect Bearing 160° magnetic  
Length 400ft  
Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt Marker Placement Belt 3: No Rebar

**Directions to Site**

From Salina, go 37.5 miles east on I-70 to a rest area. From the rest area, travel approximately 3 miles east on the frontage road to Fremont Junction. Turn south onto SR-72 and drive 4.1 miles to a left turn across from Frying Pan Flat. Proceed left on this road for 1.1 miles to a fork between two large boulders. Bear left and continue 0.05 miles to another fork. Go left again and proceed 0.2 miles to a large split boulder which is 200 feet to the left of the road. The 0-foot baseline stake is 15 feet south of the split boulder and has browse tag #710 attached.

**Site Information**

Land Ownership Federal  
Land Administrator BLM  
Allotment DEER PEAK  
Elevation 7,500ft (2,286m)  
Aspect Southeast  
Slope 0-5%  
Sample Dates 08/17/1999, 08/24/2004, 08/26/2009, 08/21/2013, 07/17/2018, 07/31/2023

**Wildlife Habitat and Vegetation History****Table 25B-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25B-06.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	No Encroachment
1991	Mountain Big Sagebrush	No Encroachment
1999	Mountain Big Sagebrush	No Encroachment
2004	Mountain Big Sagebrush	No Encroachment
2009	Mountain Big Sagebrush	No Encroachment
2013	Mountain Big Sagebrush	No Encroachment
2018	Mountain Big Sagebrush/Perennial Grass	Phase I
2023	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

Belts 3 and 4 cross a road. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) plants on this study site are scrubby and stunted, looking similar to black sagebrush (*A. nova*). The area surrounding the sagebrush flat is a twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland.

**Soils****Table 25B-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	7.3	49.8	25.3	24.9	1.4	13.1	153.6	0.5	08/17/1999

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 1985, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has dominated the plant community on this site (Photos, Pre-1992 Data, Table 25B-06.12, Table 25B-06.13). The herbaceous understory has remained abundant and mainly comprised of the native perennial grass species blue grama (*Bouteloua gracilis*); perennial grasses have been a codominant vegetation component since 2018. Other grass and forb species have been comparatively sparse throughout the duration of the study (Table 25B-06.7, Table 25B-06.10, Table 25B-06.11). Twoneedle pinyon (*Pinus edulis*) has been observed with low density in point-quarter measurements since 2018, and the study has been considered to be within Phase I of woodland succession since that time (Table 25B-06.4, Table 25B-06.14). Although it may not be an immediate concern, the presence of trees and the proximity of the transect to denser woodlands (Photos) indicates that there may be potential for further encroachment over time.

Condition of deer winter range on this site has ranged between very poor and good since 1999. In 2023, winter range condition was considered to be fair. Improvements to deer winter range could be accomplished through efforts that increase preferred browse cover and reproduction while decreasing decadence; diversifying and increasing cover of native perennial forbs would also enhance deer winter range (Table 25B-06.15). In addition, the sagebrush component of this site could provide valuable browse to elk during the winter months (Table 25B-06.3; Wambolt, 1996). Pellet transect data indicates that both deer and elk presence have been low since 2018 (Table 25B-06.9).

## Trend Summary Tables

**Table 25B-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
1999	13.9	3.0	-	-	-	-
2004	12.9	4.5	-	14.9	7.4	-
2009	9.9	1.1	-	9.4	1.2	-
2013	12.0	2.4	-	14.1	3.4	-
2018	12.7	2.9	0.0	13.0	2.4	-
2023	13.9	3.2	-	10.1	4.3	-

**Table 25B-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
1999	-	367	1	175	-	16.8	0.0	1.5
2004	-	368	48	133	-	18.3	0.1	1.2
2009	-	352	5	56	-	11.0	0.0	0.2
2013	-	326	-	100	-	15.4	-	0.7
2018	-	380	6	109	-	25.9	0.0	0.9
2023	-	332	33	145	-	20.1	0.6	3.5

**Table 25B-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
1999	37.8	1.1	23.7	4.8	2.9	34.4
2004	41.0	2.2	24.4	7.9	2.9	36.4
2009	33.2	1.8	33.8	3.3	2.0	25.6
2013	43.9	2.0	31.4	3.5	2.4	30.5
2018	42.6	3.9	26.0	5.4	4.3	42.1
2023	46.3	2.5	26.3	7.8	4.0	31.5

**Table 25B-06.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1999	1	12	17	41
2004	1	8	8	20
2009	-	11	24	56
2013	-	10	20	11
2018	1	11	2	28
2023	1	14	15	27
Year	Days Use Per Acre (ha)			
1999	7.2 (17.9)	30.8 (76.1)	40.9 (101.0)	-
2004	4.4 (10.8)	3.4 (8.3)	21.5 (53.0)	-
2009	2.2 (5.4)	25.5 (62.9)	10.7 (26.5)	-
2013	1.5 (3.6)	11.4 (28.1)	25.5 (62.9)	-
2018	1.5 (3.6)	1.3 (3.3)	7.4 (18.2)	-
2023	2.2 (5.4)	14.7 (36.4)	15.4 (38.1)	-

**Table 25B-06.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)
year	Nested Frequency					
1999	-	0	326	-	209	-
2004	1	37	328	-	142	-
2009	27	18	331	-	49	-
2013	3	67	295	3	74	-
2018	13	51	346	-	101	-
2023	0	78	284	-	98	5
year	Average Cover (%)					
1999	-	0.0	14.1	-	2.7	-
2004	0.0	0.9	14.6	-	2.8	-
2009	0.4	0.1	10.1	-	0.4	-
2013	0.1	1.5	12.7	0.0	1.1	-
2018	0.1	1.4	22.1	-	2.4	-
2023	0.0	5.2	11.8	-	3.1	0.0

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

**Table 25B-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis demissa (nodding rockcress)	Astragalus miser (timber milkvetch)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Penstemon (beardtongue)	Penstemon comarrhenus (dusty beardtongue)	Sanguisorba minor <sup>i</sup> (small burnet)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency													
1999	7	-	-	-	-	-	1	8	-	-	2	-	-	166
2004	-	-	14	28	-	4	-	21	4	-	-	1	1	118
2009	-	-	5	-	-	-	-	7	-	-	-	-	-	49
2013	5	1	-	-	-	-	-	24	-	-	-	2	-	74
2018	-	-	3	-	-	-	-	32	-	3	-	7	-	78
2023	1	-	12	8	3	8	-	33	-	13	11	1	-	113
year	Average Cover (%)													
1999	0.0	-	-	-	-	-	0.0	0.1	-	-	0.0	-	-	1.4
2004	-	-	0.0	0.1	-	0.0	-	0.2	0.0	-	-	0.0	0.0	1.0
2009	-	-	0.0	-	-	-	-	0.0	-	-	-	-	-	0.1
2013	0.0	0.0	-	-	-	-	-	0.3	-	-	-	0.0	-	0.3
2018	-	-	0.0	-	-	-	-	0.4	-	0.0	-	0.2	-	0.3
2023	0.0	-	0.5	0.0	0.0	0.1	-	0.8	-	0.1	0.5	0.0	-	2.1

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

**Table 25B-06.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)								
1999	-	-	-	-	-	-	-	-	-
2004	0.2	-	14.7	4.9	2.4	-	0.1	-	-
2009	-	-	9.4	0.9	-	-	0.3	-	-
2013	0.1	-	14	3.2	0	-	0.2	-	-
2018	-	0.1	12.9	1.3	1	-	0.1	-	-
2023	-	-	10.1	3.5	0.8	-	-	-	-
year	Quadrat Cover (%)								
1999	0.1	-	13.8	1.4	1.6	-	0.0	-	-
2004	0.3	-	12.6	2.1	2.3	-	0.1	0.0	-
2009	0.0	-	9.9	1.0	-	0.0	0.1	0.0	-
2013	0.0	-	12.0	2.2	0.0	-	0.2	0.0	-
2018	0.2	0.1	12.4	1.4	1.3	-	0.1	0.0	0.0
2023	0.4	0.0	13.5	2.0	1.2	-	0.0	0.0	-

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

**Table 25B-06.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
1999	300	100	13	87	0	13	13	0	13/13
2004	160	-	0	100	0	0	0	0	19/23
2009	20	-	0	100	0	0	0	0	- / -
2013	20	-	0	100	0	0	0	100	- / -
2018	100	-	0	100	0	0	0	0	4/4
2023	20	-	0	100	0	0	0	0	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1999	100	-	0	0	100	0	0	100	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	240	-	0	33	67	0	0	67	31/62
2023	20	-	0	100	0	100	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1999	6200	180	11	59	30	36	2	7	31/61
2004	6220	20	1	70	29	21	26	13	34/63
2009	5220	400	3	40	57	24	29	56	30/59
2013	5740	220	15	64	21	38	52	64	34/65
2018	5860	20	3	60	37	29	0	43	33/61
2023	5200	-	10	49	42	22	2	42	- / -



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Cercocarpus ledifolius<sup>P</sup> -- (curl-leaf mountain mahogany)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	40	-	100	0	0	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	0	100	0	100	100	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1999	-	-	-	-	-	-	-	-	-/-
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	8/21
2023	20	-	0	100	0	0	0	100	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1999	3540	-	7	85	8	5	0	7	16/27
2004	3300	-	1	98	1	0	0	1	22/36
2009	2340	-	1	34	65	22	27	67	10/21
2013	3580	-	8	80	11	37	5	79	16/31
2018	2540	-	1	72	28	39	19	28	11/21
2023	2600	-	9	91	0	0	0	0	-/-
<b>Echinocereus coccineus var. coccineus -- (scarlet hedgehog cactus)</b>									
1999	100	-	20	80	0	0	0	0	3/7
2004	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	40	-	0	100	0	0	0	0	3/6
2018	-	-	-	-	-	-	-	-	6/8
2023	20	-	0	100	0	0	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1999	2940	340	6	94	0	1	0	0	16/23
2004	2820	-	0	100	0	0	0	0	17/23
2009	100	-	0	80	20	0	0	20	10/14
2013	240	-	42	42	17	0	0	17	10/11
2018	4900	-	2	95	3	0	0	4	10/13
2023	2460	-	37	63	0	0	0	0	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1999	80	-	0	75	25	0	0	25	13/20
2004	120	-	0	100	0	0	0	0	13/19
2009	60	20	0	67	33	0	0	33	7/9
2013	60	-	0	100	0	0	67	67	16/33
2018	20	-	0	0	100	0	0	100	4/18
2023	20	-	0	100	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
1999	380	40	11	84	5	0	0	11	8/28
2004	320	-	6	94	0	0	0	0	5/18
2009	220	-	27	55	18	0	0	27	4/15
2013	240	-	33	67	0	0	0	0	6/12
2018	140	-	14	86	0	0	0	14	6/17
2023	140	-	0	100	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1999	40	-	100	0	0	0	0	0	3/8
2004	160	-	13	88	0	0	0	0	3/6
2009	80	20	25	75	0	0	0	0	1/3
2013	220	-	9	91	0	0	0	0	3/6
2018	20	-	0	100	0	0	0	0	- / -
2023	60	-	67	33	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1999	-	-	-	-	-	-	-	-	- / -
2004	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	20	0	0	0	0	0	0	- / -

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

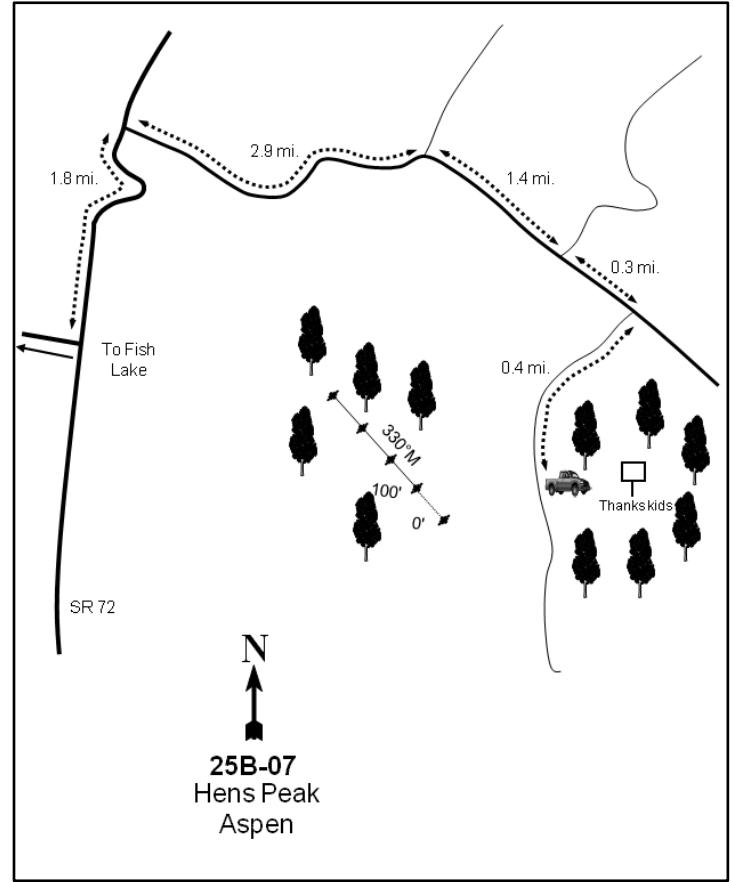
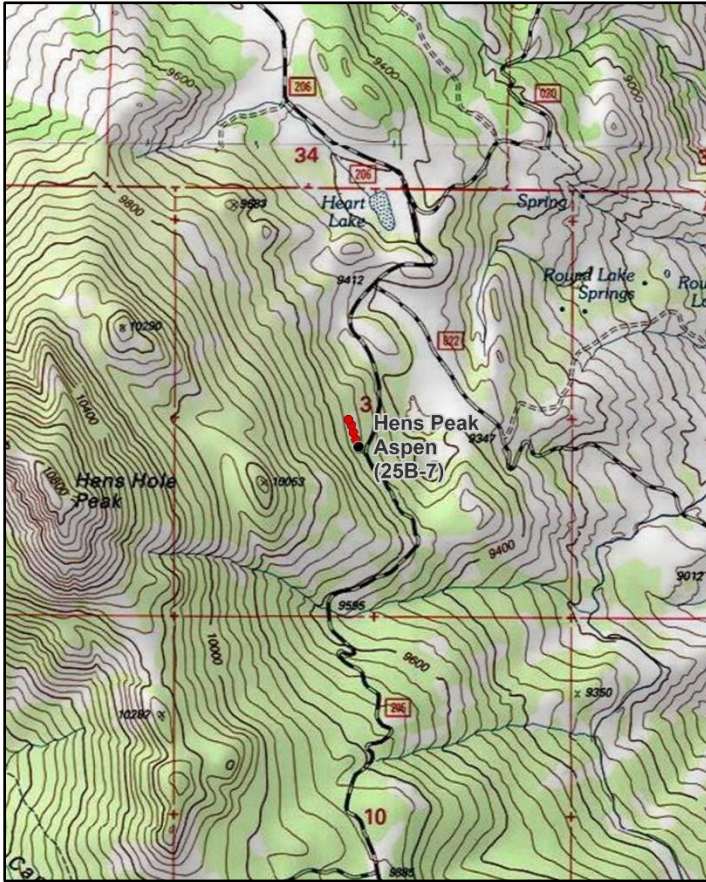
**Table 25B-06.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	5	67	33	-	-	-	2.0
2023	4	100	-	-	-	-	1.0

**Table 25B-06.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1999	17.4	6.0	5.5	30.0	0.0	3.1	0.0	<b>61.9</b>	Fair
2004	18.6	6.3	0.5	30.0	0.0	2.5	0.0	<b>57.9</b>	Fair
2009	11.8	-2.1	1.6	22.0	0.0	0.3	0.0	<b>33.5</b>	Very Poor-Poor
2013	17.6	8.9	7.6	30.0	0.0	1.4	0.0	<b>65.5</b>	Fair-Good
2018	16.3	3.9	1.7	30.0	0.0	1.8	0.0	<b>53.6</b>	Fair
2023	12.6	2.6	5.0	30.0	0.0	7.0	0.0	<b>57.2</b>	Fair

## HENS PEAK ASPEN - STUDY NO. 25B-7



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Flat Top NW; Township 27S, Range 4E, Section 03  
NAD 83 UTM ZONE 12, 459800 East 4260171 North

### Transect Information

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

600  
330° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

### Directions to Site

Travel north out of Fremont on Highway 72 to the turnoff for Fish Lake (approximately 5 miles). Continue on Highway 72 for another 1.8 miles. Turn right onto Elkhorn Road and go approximately 2.9 miles to an intersection (stay on Elkhorn Road for 5 miles to the study site). Stay right and proceed for 1.4 miles to another intersection and stay right again. Travel another 0.3 miles to another intersection and again stay right. In 0.4 miles you will come to an aspen rejuvenation sign: park the truck here. The transect is adjacent to the west side of the road. The 0-stake is marked by browse tag #400.

### Site Information

Land Ownership  
Land Administrator  
Allotment  
Elevation  
Aspect  
Slope  
Sample Dates

Federal  
USFS  
Solomon Allotment  
9,555ft (2,912m)  
Southeast  
10-20%  
08/20/2013, 07/17/2018, 07/19/2023

**Table 25B-07.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Hens Peak	-	July 1996	630
Seeding - Seed Unknown	-	-	1996	-

**Wildlife Habitat and Vegetation History****Table 25B-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	summer
Rocky Mountain Elk	substantial	summer
Shiras Moose	substantial	year-long

**Table 25B-07.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Quaking Aspen	NA
2018	Quaking Aspen	NA
2023	Quaking Aspen	NA

**Site Notes**

Soil data was not taken for this site. The site appears to have been seeded due to the presence of seeded species being sampled: this seeding probably occurred following the fire in 1996.

**Site Potential**

1981 - 2010 Average Annual Precipitation	24 inches
NRCS Ecological Site	High Mountain Stony Loam (Aspen)
NRCS Ecological Site #	R047XB531UT
States and Transitions	No state and transition model is available for this ecological site.

This site has been dominated by quaking aspen (*Populus tremuloides*) with young conifer trees scattered throughout the understory since study establishment in 2013 (Photos, Table 25B-07.12, Table 25B-07.13, Table 25B-07.13a); the area burned in 1996, removing most of the older, mature trees in the stand (Table 25B-07.1). The herbaceous understory has remained diverse, with the introduced perennial grass smooth brome (*Bromus inermis*) contributing the most cover of any single species in 2023 (Table 25B-07.7, Table 25B-07.10, Table 25B-07.11). The shrub component has been somewhat diverse and dominated by mountain snowberry (*Symphoricarpos oreophilus*) (Table 25B-07.12, Table 25B-07.13). With the presence of the young conifer trees, the site has the potential to transition into a conifer-encroached state, but this is not likely for some time due to the stand's age.

Due to the abundance and diversity of the shrub and herbaceous components, this site likely serves as adequate habitat for summering mule deer. In addition, the diverse herbaceous understory of this site could provide important forage for elk that may use the area during the summer months (Table 25B-07.3; Beck & Peek, 2005). However, pellet transect data shows that both deer and elk presence have remained low since study establishment (Table 25B-07.9).

**Trend Summary Tables**

**Table 25B-07.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	2.8	0.5	8.3	3.6	0.6	51.2
2018	3.5	0.9	7.0	3.9	0.8	63.1
2023	5.0	0.6	13.0	5.4	1.1	69.9

**Table 25B-07.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	40	259	27	288	0.2	8.3	0.2	9.6
2018	10	249	33	236	0.1	6.7	0.2	9.1
2023	1	206	82	198	0.0	8.8	1.1	7.6

**Table 25B-07.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	8.1	-	50.8	17.6	4.8	31.7
2018	19.2	0.5	58.8	12.1	7.5	24.6
2023	6.7	0.0	55.9	10.1	5.3	31.9

**Table 25B-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			
2013	3	3	-	3
2018	2	-	1	5
2023	2	2	-	5
Days Use Per Acre (ha)				
2013	23.2 (57.4)	6.0 (14.9)	3.4 (8.3)	-
2018	5.1 (12.6)	6.0 (14.9)	-	-
2023	18.9 (46.6)	3.4 (8.3)	2.0 (5.0)	-

**Table 25B-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Hordeum jubatum (foxtail barley)	Pascopyrum smithii (western wheatgrass)	Phleum alpinum (alpine timothy)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)
year	Nested Frequency																
2013	27	-	18	26	-	40	47	-	52	2	10	13	12	8	5	47	91
2018	13	-	19	3	20	10	8	39	58	2	4	10	-	24	-	36	107
2023	29	2	46	8	-	1	47	2	74	3	1	5	-	2	-	5	25
year	Average Cover (%)																
2013	0.2	-	0.5	0.9	-	0.2	0.9	-	1.0	0.0	0.1	0.3	0.1	0.0	0.1	1.1	3.0
2018	0.2	-	1.0	0.0	0.2	0.1	0.2	0.7	1.3	0.0	0.1	0.2	-	0.2	-	0.4	2.2
2023	0.7	0.0	2.7	0.2	-	0.0	1.5	0.0	1.9	0.0	0.0	0.2	-	0.0	-	0.0	0.9

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

GRASS SPECIES	
	Poa secunda (Sandberg bluegrass)
year	Nested
2013	-
2018	-
2023	29
year	Average Cover (%)
2013	-
2018	-
2023	0.6

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

**Table 25B-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Agoseris glauca (pale agoseris)																	
Androsace septentrionalis <sup>a,i</sup> (pygmyflower rockjasmine)																	
Antennaria (pussytoes)																	
Aquilegia coerulea (Colorado blue columbine)																	
Arabis (rockcress)																	
Arnica mollis (hairy arnica)																	
Artemisia carruthii (Carruth's sagewort)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Chenopodium <sup>a</sup> (goosefoot)																	
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																	
Cryptantha (cryptantha)																	
Cymopterus (springparsley)																	
Descurainia californica <sup>a</sup> (Sierra tansymustard)																	
Draba <sup>a</sup> (draba)																	
Dracocephalum parviflorum (American dragonhead)																	
Erigeron compositus (cutleaf daisy)																	
Erigeron eatonii (Eaton's fleabane)																	
year	Nested Frequency																
2013	-	10	5	-	22	-	-	13	-	2	4	3	3	2	56	5	-
2018	3	21	5	-	17	-	-	6	-	-	-	4	-	5	3	11	-
2023	-	34	8	1	23	3	3	12	3	-	-	1	5	-	9	11	10
year	Average Cover (%)																
2013	-	0.0	0.2	-	0.1	-	-	0.1	-	0.0	0.0	0.0	0.0	0.0	1.0	0.1	-
2018	0.0	0.1	0.1	-	0.1	-	-	0.2	-	-	-	0.2	-	0.0	0.0	0.2	-
2023	-	0.7	0.3	0.0	0.0	0.1	0.1	0.1	0.0	-	-	0.0	0.0	-	0.0	0.1	0.0

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

FORB SPECIES	Nested Frequency																	
Erigeron flagellaris (trailing fleabane)	107	21	2	5	-	7	12	8	17	31	10	21	6	-	6	-	2	
Eriogonum alatum (winged buckwheat)	149	-	2	4	-	-	-	2	17	2	-	14	-	-	4	-	7	
Eriogonum racemosum (redroot buckwheat)	57	10	12	-	17	-	-	8	35	3	6	14	7	31	1	2	-	
Fragaria virginiana (Virginia strawberry)	Average Cover (%)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	4.7	0.0	0.0	0.2	-	0.1	0.1	0.2	0.3	0.4	0.1	0.1	0.0	-	0.0	-	0.0	
Heliomeris multiflora var. multiflora (showy goldeneye)	2013	2018	2023	2013	2018	2023	2013	2018	2023	2013	2018	2023	2013	2018	2023	2013	2018	2023
Hymenoxys (rubberweed)	4.4	-	0.0	0.0	-	-	-	0.0	1.3	0.0	-	0.1	-	-	0.0	-	0.1	
Lappula occidentalis <sup>a</sup> (flatspine stickseed)	1.7	0.1	0.5	-	0.1	-	-	0.0	1.9	0.0	0.0	0.1	0.0	0.2	0.0	0.0	-	
Lupinus argenteus (silvery lupine)	Nested Frequency																	
Machaeranthera canescens (hoary tansyaster)	136	-	2	114	2	5	86	-	-	2.0	-	0.0	2.1	0.2	0.1	2.3	-	-
Mentha arvensis (wild mint)	Average Cover (%)																	
Packera multilobata (lobeleaf groundsel)	2013	2018	2023	2013	2018	2023	2013	2018	2023	2013	2018	2023	2013	2018	2023	2013	2018	2023
Penstemon humilis (low beardtongue)	107	21	2	5	-	7	12	8	17	31	10	21	6	-	6	-	2	
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	149	-	2	4	-	-	-	2	17	2	-	14	-	-	4	-	7	
Potentilla gracilis (slender cinquefoil)	57	10	12	-	17	-	-	8	35	3	6	14	7	31	1	2	-	
Silene douglasii (Douglas's catchfly)	Average Cover (%)																	
Symphotrichum (aster)	4.7	0.0	0.0	0.2	-	0.1	0.1	0.2	0.3	0.4	0.1	0.1	0.0	-	0.0	-	0.0	
	2013	2018	2023	2013	2018	2023	2013	2018	2023	2013	2018	2023	2013	2018	2023	2013	2018	2023

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

FORB SPECIES	Nested Frequency		
Taraxacum officinale (common dandelion)	136	-	2
Thalictrum fendleri (Fendler's meadow-rue)	114	2	5
Tragopogon dubius <sup>ai</sup> (yellow salsify)	86	-	-
FORB SPECIES	Average Cover (%)		
Taraxacum officinale (common dandelion)	2.0	-	0.0
Thalictrum fendleri (Fendler's meadow-rue)	2.1	0.2	0.1
Tragopogon dubius <sup>ai</sup> (yellow salsify)	2.3	-	-

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

**Table 25B-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies lasiocarpa <sup>t</sup> (subalpine fir)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Mahonia repens (creeping barberry)	Picea engelmannii <sup>t</sup> (Engelmann spruce)	Pinus ponderosa <sup>t</sup> (ponderosa pine)	Populus tremulooides <sup>p</sup> (quaking aspen)	Pseudotsuga menziesii <sup>t</sup> (Douglas-fir)	Ribes cereum <sup>p</sup> (wax currant)	Rosa woodsii <sup>p</sup> (Wood's rose)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)											
2013	2.5	0.1	0	0.4	0.2	0	1.6	47.1	-	-	-	3.5
2018	1.6	0.2	0.1	0.7	-	0.7	1.4	56	3.4	0.2	-	3.5
2023	3.5	0.3	0.8	0.1	0.2	0.6	3.6	61.2	1	0.1	-	5
year	Quadrat Cover (%)											
2013	0.8	0.2	0.2	0.3	0.0	1.1	0.4	6.1	-	0.2	0.0	2.4
2018	0.4	0.5	0.0	0.7	0.1	1.8	0.0	2.8	2.0	0.2	0.0	2.8
2023	1.0	1.2	0.5	0.0	0.0	1.2	3.1	7.6	0.0	0.0	0.0	3.7

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

**Table 25B-07.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Abies lasiocarpa<sup>t</sup> -- (subalpine fir)</b>									
2013	160	60	100	0	0	13	0	25	- / -
2018	60	-	33	67	0	0	0	0	- / -
2023	100	20	80	20	0	0	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2013	60	-	67	33	0	33	0	33	38/66
2018	40	-	0	100	0	0	0	0	39/67
2023	300	-	73	20	7	0	0	7	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2013	280	-	14	79	7	57	7	14	23/28
2018	260	-	8	92	0	0	0	0	36/39
2023	520	-	12	89	0	0	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2013	-	-	-	-	-	-	-	-	22/24
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
2013	140	-	0	100	0	14	0	0	30/45
2018	200	-	20	80	0	10	10	0	28/45
2023	60	-	0	100	0	0	0	0	- / -
<b>Juniperus communis -- (common juniper)</b>									
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	51/185
2023	-	-	-	-	-	-	-	-	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
2013	160	-	0	100	0	0	0	0	6/9
2018	240	-	0	100	0	0	0	0	10/12
2023	160	-	100	0	0	0	0	0	- / -



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Picea engelmannii<sup>t</sup> -- (Engelmann spruce)</b>									
2013	60	-	100	0	0	0	0	33	- / -
2018	60	20	100	0	0	0	0	0	- / -
2023	20	-	0	100	0	0	0	0	- / -
<b>Pinus ponderosa<sup>t</sup> -- (ponderosa pine)</b>									
2013	120	-	100	0	0	0	0	33	- / -
2018	80	-	100	0	0	0	0	50	- / -
2023	120	-	17	83	0	0	0	0	- / -
<b>Pseudotsuga menziesii<sup>t</sup> -- (Douglas-fir)</b>									
2013	-	-	-	-	-	-	-	-	- / -
2018	200	40	100	0	0	0	0	0	- / -
2023	80	-	75	25	0	0	0	0	- / -
<b>Ribes cereum<sup>p</sup> -- (wax currant)</b>									
2013	80	-	50	0	50	0	0	25	89/83
2018	40	-	50	50	0	0	0	0	152/144
2023	100	-	0	100	0	0	0	0	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2013	160	-	100	0	0	0	0	0	39/42
2018	80	-	100	0	0	0	0	100	27/32
2023	40	-	100	0	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2013	340	-	12	88	0	24	0	0	55/114
2018	800	20	23	78	0	15	3	0	40/85
2023	1140	-	7	93	0	9	11	0	- / -

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

**Table 25B-07.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

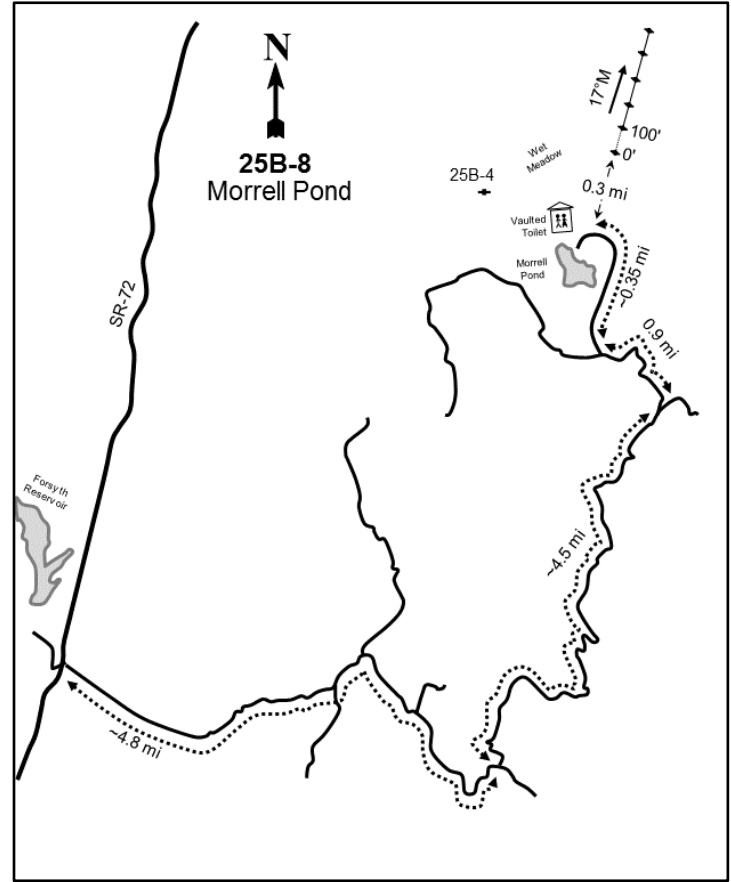
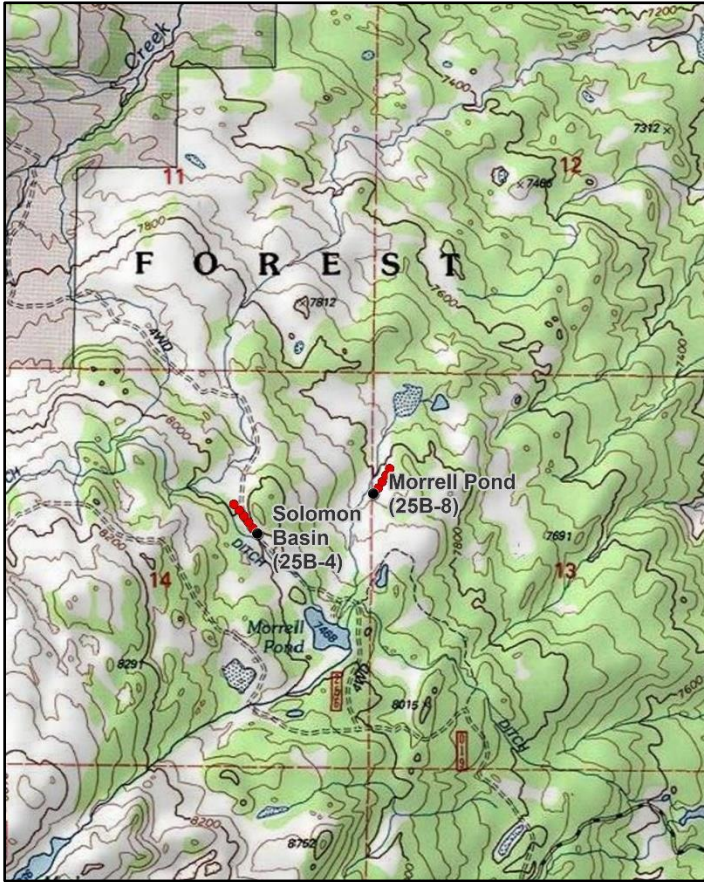
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
<b>Populus tremuloides (quaking aspen)</b>								
2013	2500	14	18	30	38	4	0	33
2018	2500	11	9	10	70	11	1	2
2023	2580	21	10	28	41	1	4	1

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

**Table 25B-07.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Abies concolor (white fir)</b>							
2013	18	14	43	43	-	-	2.6
<b>Abies lasiocarpa (subalpine fir)</b>							
2018	7	25	25	50	-	-	3.3
<b>Picea engelmannii (Engelmann spruce)</b>							
2018	39	-	23	54	15	8	5.5
2023	57	22	-	44	11	22	11.2
<b>Pinus ponderosa (ponderosa pine)</b>							
2013	38	-	80	20	-	-	4.5
2018	58	-	31	62	8	-	6.0
2023	62	-	25	50	25	-	6.3
<b>Picea pungens (blue spruce)</b>							
2013	35	-	75	25	-	-	4.3
<b>Populus tremuloides (quaking aspen)</b>							
2013	844	10	15	5	15	55	8.8
2018	1596	-	10	5	5	80	8.8
2023	1320	5	-	5	16	74	24.4
<b>Pseudotsuga menziesii (Douglas-fir)</b>							
2013	21	13	63	-	-	25	9.3
2018	60	29	57	-	7	7	5.3

## MORRELL POND - STUDY NO. 25B-8

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Geyser Peak SE; Township 26S, Range 4E, Section 14  
NAD 83 UTM ZONE 12, 462122 East 4267161 North

**Transect Information**

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

527  
17° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (71ft), Line 4 (59ft)  
Belts 2, 5: 5ft

**Directions to Site**

From Fremont, drive north on Highway 72 for 6 miles and turn right onto Elkhorn Road. Stay on the main road and proceed 4.8 miles to a Y next to a stock pond that is on the right-hand side of the road. At this Y, bear left onto forest road 20. Keep on the primary road, passing through a grove of trees. Continue 4.8 miles to another Y, turn left and drive 0.9 miles to yet another Y. From here, proceed to the right and follow the road 0.3 miles to a parking lot for Morrell Pond. Park here and hike north for 650 paces to the 0-foot stake.

**Site Information**

Land Ownership  
Land Administrator  
Allotment  
Elevation  
Aspect  
Slope  
Sample Dates

Federal  
USFS  
Solomon Allotment  
7,800ft (2,377m)  
Northwest  
5-10%  
07/19/2018, 07/19/2023

**Wildlife Habitat and Vegetation History****Table 25B-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25B-08.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

In 2018, it was noted that grasses were very dry and lacking seedheads which possibly resulted in some grasses being misidentified. In addition, some of the slender buckwheat (*Eriogonum microthecum*) may actually be crispleaf buckwheat (*E. corymbosum*).

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

The primary browse species on this site is mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with smaller amounts of black sagebrush (*Artemisia nova*) also present. Greasewood (*Sarcobatus vermiculatus*) was also observed with moderate cover being noted in the 2018 and 2023 sample years (Table 25B-08.12). A majority of the browse species showed poor vigor in the initial sample year of 2018, likely due to the extensive drought that occurred across the state (Table 25B-08.13). The understory has remained dominated by graminoids with thickspike wheatgrass (*Elymus lanceolatus*) and needleleaf sedge (*Carex duriuscula*) being the dominant components; lesser amounts of other perennial species have also been sampled (Table 25B-08.10). Forbs have been limited in species diversity and quantity (Table 25B-08.7, Table 25B-08.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been observed with low density and the site has been considered to be within Phase I of woodland succession since 2018 (Table 25B-08.4, Table 25B-08.6, Table 25B-08.14). However, it should be noted that the site is located on a sagebrush island between areas of dense tree cover and further encroachment is likely to occur.

Deer winter range condition was considered to be fair in 2018 and poor to fair in 2023. Condition of deer winter range could be improved through efforts that increase preferred browse cover and reproduction while decreasing decadence. Increasing perennial grass and forb cover and species diversity would also improve winter range conditions (Table 25B-08.15). In addition, sagebrush on this site could provide valuable browse for elk that may use the area during the winter months (Table 25B-08.3; Wambolt, 1996). However, pellet transect data indicates that no elk pellet groups were observed in 2018 and that presence was low in 2023. Mule deer presence was low in 2018 and high in 2023 (Table 25B-08.9).

**Trend Summary Tables****Table 25B-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
2018	14.1	6.9	3.0	20.4	5.9	3.7
2023	16.9	4.8	2.5	19.9	8.5	3.7

**Table 25B-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
2018	4	288	-	28	0.1	7.5	-	0.1
2023	6	226	25	36	0.0	4.3	0.1	0.7

**Table 25B-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
2018	57.3	1.1	32.3	4.3	1.1	27.5
2023	54.9	0.1	30.8	5.2	1.4	25.5

**Table 25B-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2018	9	-	9	-	12
2023	5	-	26	16	2
Year	Days Use Per Acre (ha)				
	2018	20.3 (50.2)	8.7 (21.5)*	14.7 (36.4)	-
2023	5.8 (14.3)	-	44.2 (109.2)	11.4 (28.1)	-

\*Pellets per acre (ha)

**Table 25B-08.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex duriuscula (needleleaf sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Juncus arcticus (arctic rush)	Poa fendleriana (muttongrass)
year	Nested Frequency								
2018	7	15	4	115	15	155	3	16	22
2023	22	11	6	164	14	62	-	12	-
year	Average Cover (%)								
2018	0.1	0.3	0.1	3.6	0.3	2.7	0.1	0.1	0.4
2023	0.2	0.2	0.0	2.1	0.1	1.6	-	0.1	-

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

**Table 25B-08.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Hymenoxys richardsonii (pingue rubberweed)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Penstemon rydbergii (Rydberg's penstemon)	Phlox longifolia (longleaf phlox)	Sphaeralcea coccinea (scarlet globemallow)	Symphotrichum ascendens (western aster)
year	Nested Frequency											
2018	-	-	-	-	-	-	4	-	12	8	3	1
2023	3	3	5	13	1	1	4	8	2	14	9	3
year	Average Cover (%)											
2018	-	-	-	-	-	-	0.1	-	0.0	0.0	0.0	0.0
2023	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.3	0.0

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

**Table 25B-08.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Escobaria vivipara var. arizonica (Arizona spiny star)	Gutierrezia sarothrae (broom snakeweed)	Opuntia polyacantha (plains pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Rosa woodsii <sup>p</sup> (Woods' rose)	Sarcobatus vermiculatus (greasewood)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)														
2018	1.9	17.8	0.1	-	0.2	0.4	0.1	-	0.7	-	-	3.7	-	4.6	0.5
2023	3.9	14.2	-	2.7	0.2	-	0.3	-	0.5	-	-	3.7	-	5.1	1.5
year	Quadrat Cover (%)														
2018	2.7	10.9	0.0	0.2	0.6	1.2	0.1	0.0	1.1	0.0	-	3.0	-	3.8	0.2
2023	2.4	13.2	-	1.3	0.3	-	0.0	0.0	0.6	0.0	0.0	2.5	0.1	2.6	1.2

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

**Table 25B-08.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2018	-	-	-	-	-	-	-	-	204/224
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2018	1460	-	19	70	11	36	0	37	23/52
2023	1240	-	24	53	23	7	0	19	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	5440	80	19	67	14	31	5	61	45/70
2023	3640	40	10	73	17	28	4	32	-/-
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2018	120	-	17	67	17	33	50	17	34/29
2023	120	-	0	67	33	0	67	33	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2018	60	-	0	33	67	0	0	100	21/29
2023	40	-	0	100	0	0	0	0	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2018	1560	-	0	4	96	42	41	73	18/24
2023	1820	-	0	99	1	1	0	1	-/-
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
2018	160	-	0	100	0	63	13	0	13/21
2023	20	-	0	100	0	0	0	0	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2018	300	-	0	47	53	20	47	87	62/58
2023	20	-	100	0	0	0	0	0	-/-
<b>Escobaria vivipara var. arizonica -- (Arizona spiny star)</b>									
2018	80	-	0	75	25	0	0	0	5/10
2023	60	-	0	100	0	0	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	3460	-	13	79	8	2	0	43	12/13
2023	2040	20	16	83	1	0	0	1	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	40	-	0	100	0	0	0	0	9/21
2023	40	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2018	-	-	-	-	-	-	-	-	3/6
2023	40	-	50	50	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	60	40	33	67	0	0	0	0	- / -
2023	40	-	0	100	0	0	0	0	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2018	60	-	0	100	0	0	0	0	74/30
2023	-	-	-	-	-	-	-	-	- / -
<b>Sarcobatus vermiculatus -- (greasewood)</b>									
2018	1780	20	11	46	43	14	18	44	61/68
2023	1980	-	46	30	24	2	67	24	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2018	180	-	0	0	100	89	11	100	40/64
2023	280	-	7	50	43	0	0	43	- / -
<b>Yucca -- (yucca)</b>									
2018	-	-	-	-	-	-	-	-	17/19

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

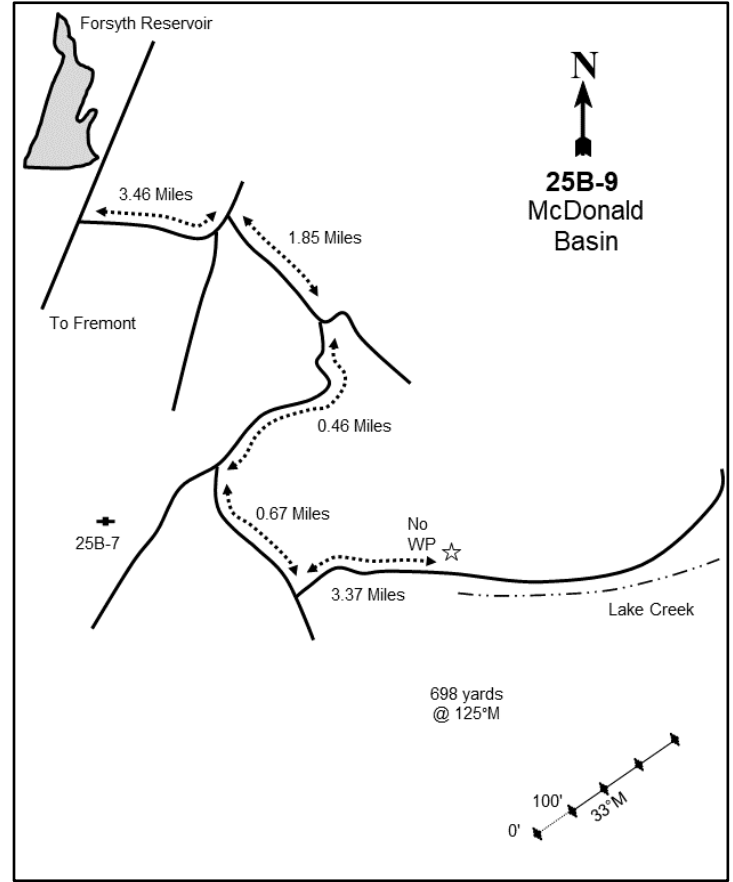
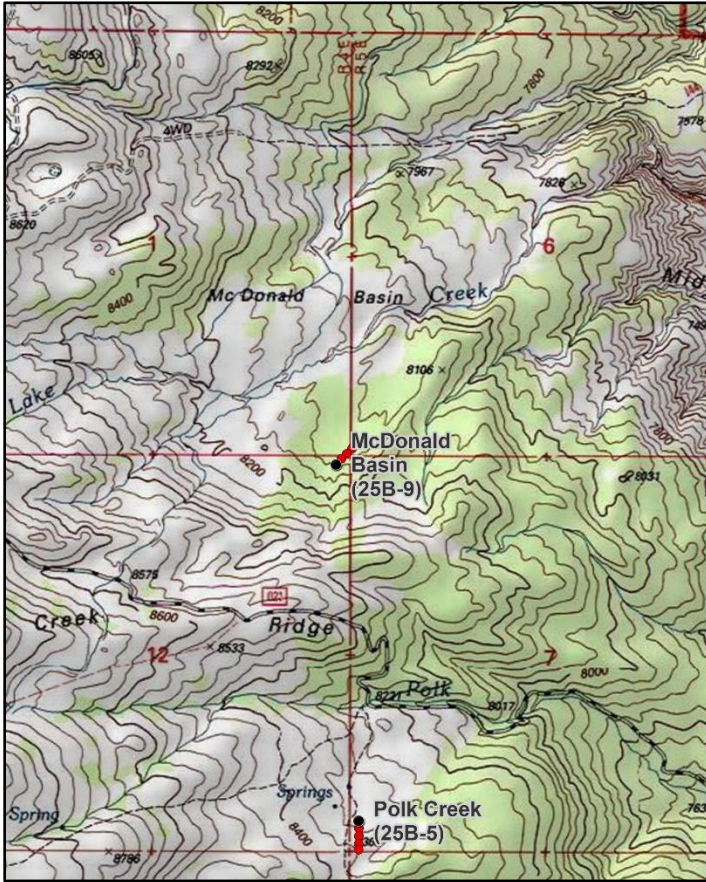
**Table 25B-08.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2023	1	-	-	-	-	100	87.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	48	8	46	15	31	-	9.5
2023	55	-	50	14	14	21	9.5

**Table 25B-08.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	25.4	10.4	9.3	15.0	0.0	0.3	0.0	<b>60.2</b>	Fair
2023	24.5	9.1	6.2	8.7	0.0	1.3	0.0	<b>49.7</b>	Poor-Fair

## MCDONALD BASIN - STUDY NO. 25B-9



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Flat Top NE; Township 27S, Range 4E, Section 12  
NAD 83 UTM ZONE 12, 463818 East 4259424 North

### Transect Information

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

Not Available  
33° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (71ft), Line 4 (59ft)  
Standard

### Directions to Site

Travel north out of Fremont on Highway 72 to the turnoff for Fish Lake (approximately 5 miles). Continue on Highway 72 for another 1.8 miles. Turn right onto Elkhorn Road and go approximately 2.9 miles to an intersection (stay on Elkhorn Road for 5 miles to the study site). Stay right and proceed for 1.4 miles to another intersection and stay right again. Travel another 0.3 miles to another intersection, and turn left (Polk Creek Road). Travel 1.5 miles to another intersection and turn left on to Trail #2577. Drive another 1.1 miles to an intersection at Sandcreek RV Park Road and turn right. Drive approximately 1 mile to reach a parking place that is closest to the McDonald Basin site. Use a GPS to locate the 0-foot stake and all other stake locations.

### Site Information

Land Ownership  
Land Administrator  
Allotment  
Elevation  
Aspect  
Slope  
Sample Dates

Federal  
USFS  
Solomon Allotment  
8,120ft (2,475m)  
Northeast  
5%  
07/19/2023



**Table 25B-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Thousand Lake Habitat Improvement Project Phase 1	5206	June 2021-October 2022	247

**Wildlife Habitat and Vegetation History****Table 25B-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25B-09.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

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

**Site Notes**

No Notes

**Soils****Table 25B-09.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.6	61.4	26.8	11.8	2.5	17.0	292.0	0.3	07/19/2023

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB430UT
States and Transitions	No state and transition model is available for this ecological site.

At the time of study establishment in 2023, this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*A. nova*) with a mixture of other preferred browse species like antelope bitterbrush (*Purshia tridentata*) and Utah serviceberry (*Amelanchier utahensis*) also present (Table 25B-09.12, Table 25B-09.13). The herbaceous community was dominated by a variety of native perennial grasses with squirreltail (*Elymus elymoides*), blue grama (*Bouteloua gracilis*), and needle and thread (*Hesperostipa comata*) being the most abundant species (Table 25B-9.10). A 2022 lop and scatter treatment (Table 25B-09.1) removed most trees, but a few twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were sampled in 2023 (Table 25B-09.13, Table 25B-09.14). Many trees dominate the surrounding area, and infilling on the site itself indicates that further tree encroachment may be possible.

In 2023, deer winter range condition on this study site was considered to be fair. Improvement to this condition could be accomplished through efforts that increase preferred browse cover and recruitment of young while decreasing decadence; increasing perennial forb cover would also be beneficial for wintering range (Table 25B-09.15). In addition, the sagebrush component of this site could provide valuable browse for wintering elk (Table 25B-09.3; Wambolt, 1996). Pellet transect data indicates that both deer and elk presence were low in 2023 (Table 25B-09.9).

**Trend Summary Tables****Table 25B-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
2023	10.3	3.4	1.1	11.4	3.5	1.1

**Table 25B-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
2023	-	298	142	109	-	20.7	3.2	3.1

**Table 25B-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
2023	9.1	0.5	68.4	2.1	3.1	32.8

**Table 25B-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			
2023	2	11	4	13
Year	Days Use Per Acre (ha)			
	2023	2.9 (7.2)	6.7 (16.6)	10.7 (26.5)

**Table 25B-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES														
Achnatherum nelsonii (Columbia needlegrass)														
Bouteloua gracilis (blue grama)														
Bromus marginatus (mountain brome)														
Carex duriuscula (needleleaf sedge)														
Carex rossii (Ross' sedge)														
Elymus elymoides (squirreltail)														
Elymus lanceolatus (thickspike wheatgrass)														
Festuca idahoensis (Idaho fescue)														
Hesperostipa comata (needle and thread)														
Piptatheropsis micrantha (littelseed ricegrass)														
Poa fendleriana (muttongrass)														
Poa pratensis <sup>i</sup> (Kentucky bluegrass)														
Poa secunda (Sandberg bluegrass)														
year	Nested Frequency													
2023	10	99	0	46	1	128	3	2	51	15	55	4	5	
year	Average Cover (%)													
2023	0.3	4.4	0.0	0.4	0.0	7.4	0.1	0.1	4.4	1.3	2.2	0.0	0.0	

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

**Table 25B-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																		
Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)																		
Antennaria parvifolia (small-leaf pussytoes)																		
Arabis demissa (nodding rockcress)																		
Artemisia dracunculus (tarragon)																		
Calochortus nuttallii (sego lily)																		
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																		
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)																		
Chenopodium pratericola <sup>a</sup> (desert goosefoot)																		
Cryptantha humilis (roundspike cryptantha)																		
Descurainia incana <sup>a</sup> (mountain tansymustard)																		
Descurainia pinnata <sup>a</sup> (western tansymustard)																		
Eriogonum racemosum (redroot buckwheat)																		
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																		
Ipomopsis aggregata (scarlet gilia)																		
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																		
Lepidium ramosissimum <sup>a</sup> (manybranched pepperweed)																		
Packera multilobata (lobeleaf groundsel)																		
year	Nested Frequency																	
2023	26	2	19	4	2	9	4	2	4	17	14	32	57	10	17	1	10	
year	Average Cover (%)																	
2023	0.7	0.1	0.6	0.2	0.0	0.1	0.0	0.0	0.1	0.8	0.4	0.6	0.6	0.3	0.4	0.0	0.4	

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

FORB SPECIES	Penstemon comarrhenus (dusty beardtongue)	Penstemon watsonii (Watson's penstemon)	Phlox longifolia (longleaf phlox)	Pleiactanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Silene drummondii (Drummond's campion)	Tragopogon dubius <sup>at</sup> (yellow salsify)
year	Nested Frequency							
2023	6	2	10	16	42	5	7	1
year	Average Cover (%)							
2023	0.3	0.0	0.1	0.2	0.2	0.1	0.2	0.0

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

**Table 25B-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. consimilis (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>1</sup> (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>1</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)												
2023	0.7	6	3.8	3.1	-	0.2	0.9	0.1	-	0.2	0.5	0.4	0.1
year	Quadrat Cover (%)												
2023	0.7	3.9	4.6	2.7	0.1	0.2	1.0	0.2	0.0	0.1	0.2	0.9	0.1

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

**Table 25B-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 (%)				
Amelanchier utahensis <sup>p</sup> -- (Utah serviceberry)									
2023	120	-	17	83	0	0	0	0	- / -
Artemisia nova <sup>p</sup> -- (black sagebrush)									
2023	1900	-	4	82	14	0	0	14	- / -
Artemisia tridentata ssp. vaseyana <sup>p</sup> -- (mountain big sagebrush)									
2023	1680	40	17	68	16	0	0	16	- / -
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)									
2023	1680	-	1	99	0	0	0	0	- / -
Ericameria nauseosa ssp. consimilis -- (rubber rabbitbrush)									
2023	40	-	0	100	0	0	0	0	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2023	420	-	10	91	0	0	0	0	- / -
Juniperus osteosperma <sup>1</sup> -- (Utah juniper)									
2023	40	-	50	50	0	0	0	0	- / -
Opuntia polyacantha -- (plains pricklypear)									
2023	180	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pinus edulis <sup>t</sup> -- (twoneedle pinyon)									
2023	160	-	63	38	0	0	0	0	- / -
Purshia tridentata <sup>p</sup> -- (antelope bitterbrush)									
2023	80	-	0	75	25	0	0	25	- / -
Symphoricarpos oreophilus <sup>p</sup> -- (mountain snowberry)									
2023	160	-	0	100	0	0	0	0	- / -
Tetradymia canescens -- (spineless horsebrush)									
2023	40	-	50	50	0	0	0	0	- / -

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

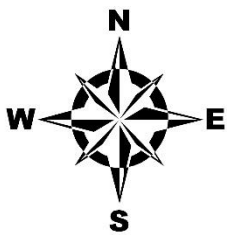
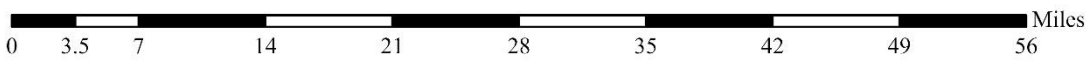
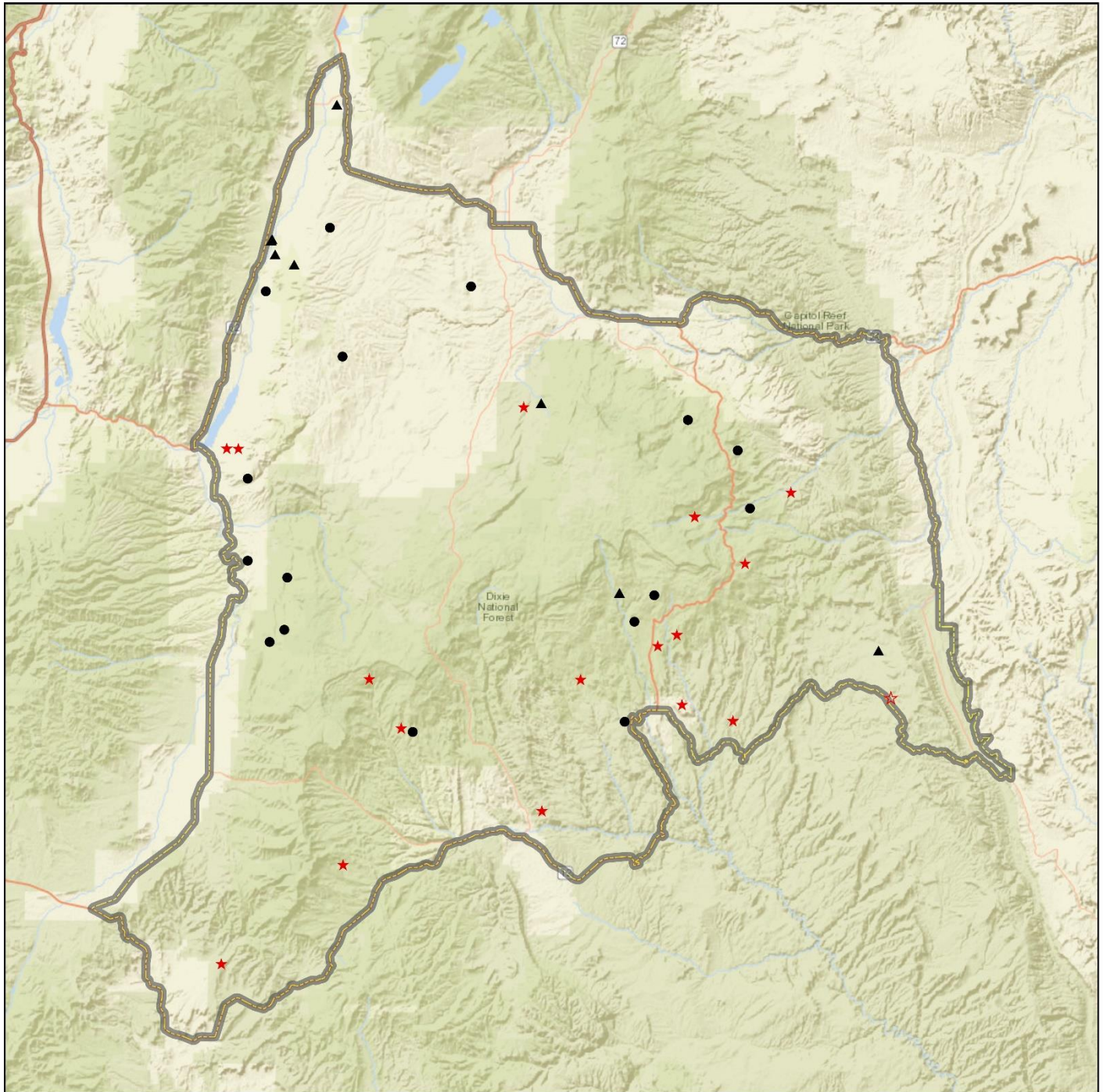
**Table 25B-09.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2023	4	100	-	-	-	-	1.0
Pinus edulis (twoneedle pinyon)							
2023	29	27	64	9	-	-	3.0

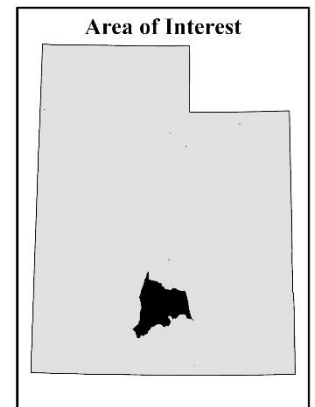
**Table 25B-09.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2023	14.5	11.0	4.4	30.0	0.0	6.2	0.0	<b>66.0</b>	Fair

# WILDLIFE MANAGEMENT UNIT 25C – PLATEAU, BOULDER

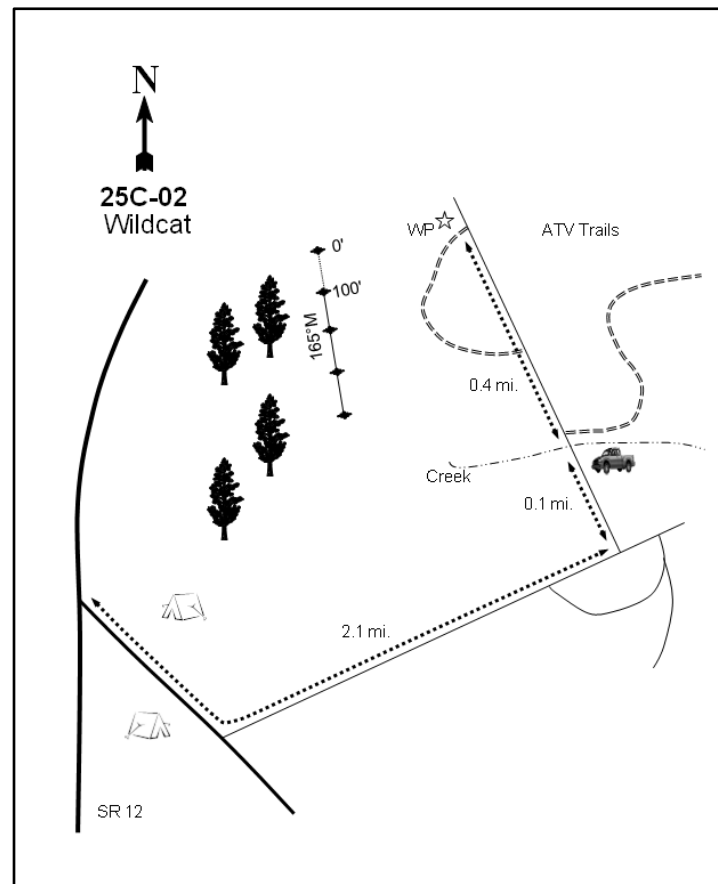
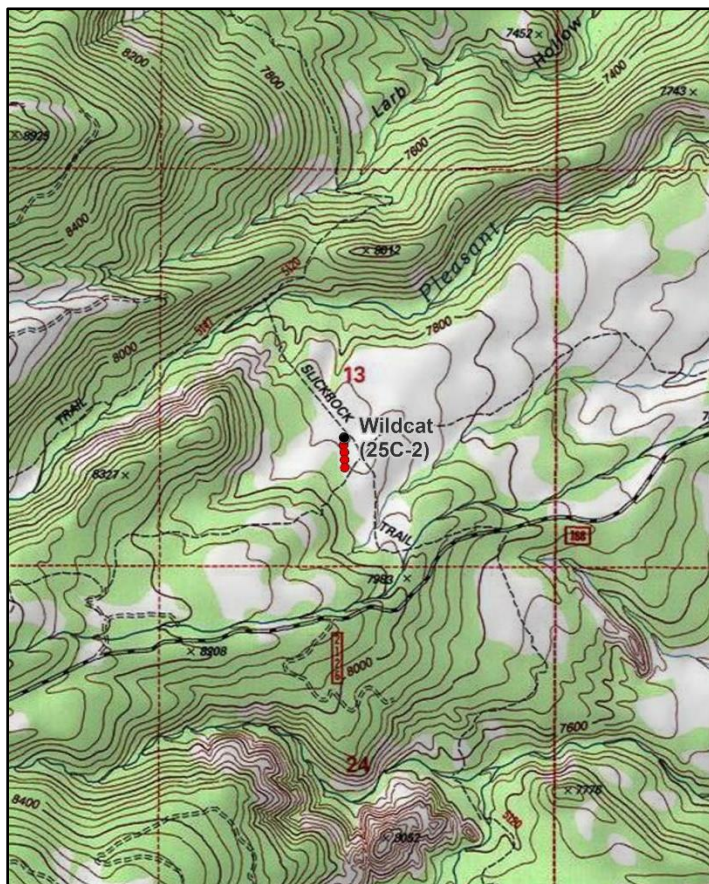


Study Locations Project, Status	Unit Boundary
● RT, Active	▭ Unit - 25C
★ RT, Suspended	
▲ WRI, Active	
☆ WRI, Suspended	



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

## WILDCAT - STUDY NO. 25C-2

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Lower Bowns Reservoir; Township 31S, Range 5E, Section 13  
NAD 83 UTM ZONE 12, 473193 East 4217862 North

**Transect Information**

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

7116  
165° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

**Access to this site is by hiking or ATV.** On SR-12 south of Torrey, go about 50 yards south of Pleasant Creek Campgrounds then turn east onto the Lower Browns Reservoir Road. Proceed 2.1 miles, turn left, and continue for 0.1 miles: from here the road is closed. Walk across the creek and down the ATV trail approximately 0.4 miles to the witness post on the left (west) side of the road; the stakes are full-high fenceposts. The 0-foot stake is marked by browse tag #7116. Ignore the fencepost that was misplaced near the south end of the baseline.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Pleasant Creek
Elevation	7,880ft (2,402m)
Aspect	Northeast-East
Slope	2-10%
Sample Dates	07/26/1994, 07/21/1998, 08/19/2003, 08/21/2008, 08/14/2013, 08/06/2018, 07/17/2023

**Table 25C-02.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1970	-
Seeding - Seed Unknown	-	-	1970	-
Machanical - Bullhog	-	-	August-December 2005	-

**Wildlife Habitat and Vegetation History****Table 25C-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-02.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1994	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	No Encroachment
2013	Mountain Big Sagebrush	No Encroachment
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

The study area falls in close proximity to a one-way Dixie harrow treatment designed to re-treat encroaching pinyon-juniper (WRI Project #125), but the site itself was not treated. A deer carcass was found on the site in 2003.

**Soils****Table 25C-02.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loamy Fine Sand	6.3	82.0	9.4	8.6	1.2	13.6	92.8	0.6	07/21/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      13 inches  
 NRCS Ecological Site    Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)  
 NRCS Ecological Site #    R047XB308UT  
 States and Transitions    No state and transition model is available for this ecological site.

This site has maintained a robust population of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since study establishment in 1985 (Photos, Pre-1992 Data, Table 25C-02.12, Table 25C-02.13). The perennial grass species crested wheatgrass (*Agropyron cristatum*) and blue grama (*Bouteloua gracilis*) have contributed a majority of the herbaceous cover in all sample years, although perennial grass cover decreased significantly between 2018 and 2023. Forbs have remained rare since 2018 (Table 25C-02.7, Table 25C-02.10, Table 25C-02.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) had a period of encroachment from 1994 to 2003, but were removed by a bullhog treatment between 2003 and 2008 (Table 25C-02.1). However, pinyon was observed in 2018 and 2023 point-quarter data, albeit in low amounts (Table 25C-02.14). This reestablishment of trees indicates that there is likely potential for further infilling in future sample years.

Mule deer summer range was considered to be in fair condition in 2023 due to the amount of preferred browse available for forage, although browse forage is not the focus of mule deer on this range type. The site's fair condition could be attributed to the lack of herbaceous diversity and abundance. Range improvement could be made by increasing native forb production and diversity while diversifying age structure of preferred browse species. Pellet transect data indicates that elk presence was low in 2023, but has been higher in previous sample years; mule deer presence was moderate in 2023 (Table 25C-02.9). The herbaceous understory of this site could provide forage for elk that may use the area during the summer months. Improvement to elk summer range could be accomplished by diversifying and increasing the perennial forb and grass components (Table 25C-02.3; Beck & Peek, 2005).

## Trend Summary Tables

**Table 25C-02.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1994	9.7	0.5	0.3	-	-	-
1998	7.8	0.3	-	-	-	-
2003	12.3	0.8	-	16.5	0.3	-
2008	10.3	0.8	-	16.3	0.1	-
2013	14.2	0.5	-	22.8	1.0	-
2018	19.1	1.1	-	22.0	1.1	-
2023	22.0	2.0	-	26.1	6.9	-

**Table 25C-02.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1994	-	405	76	111	-	15.0	0.3	1.2
1998	-	433	111	173	-	31.8	0.6	12.3
2003	-	385	169	121	-	17.2	1.9	3.7
2008	-	409	46	131	-	23.0	0.5	6.0
2013	-	379	42	122	-	19.9	0.2	2.1
2018	-	393	40	50	-	32.3	0.3	0.8
2023	-	240	57	59	-	6.5	0.3	0.7

**Table 25C-02.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1994	34.4	-	31.0	2.3	1.3	25.2
1998	27.4	-	47.5	3.6	2.2	54.7
2003	32.0	0.6	39.4	3.0	1.3	36.3
2008	22.4	0.0	33.4	6.6	0.8	46.3
2013	36.4	0.0	37.2	0.5	0.2	37.7
2018	41.2	0.2	40.3	1.6	0.6	43.9
2023	46.4	0.2	25.7	1.7	0.1	29.1

**Table 25C-02.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1994	18	32	41	28
1998	16	29	39	17
2003	23	39	27	27
2008	15	35	41	62
2013	11	20	25	13
2018	5	20	12	18
2023	7	18	5	2
Year	Days Use Per Acre (ha)			
1994	-	-	-	-
1998	32.7 (80.7)	17.4 (43.0)	44.9 (110.9)	-
2003	29.0 (71.7)	46.2 (114.2)	28.8 (71.2)	-
2008	22.5 (55.6)	31.5 (77.8)	42.2 (104.3)	-
2013	8.0 (19.7)	12.8 (31.5)	21.5 (53.0)	-
2018	42.1 (104.0)	14.7 (36.4)	20.8 (51.3)	-
2023	8.0 (19.7)	20.1 (49.7)	1.3 (3.3)	-



**Table 25C-02.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Dasyochloa pulchella (low woollygrass)	Elymus elymoides (squirreltail)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency					
1994	333	-	293	-	4	3
1998	358	4	335	-	5	7
2003	261	3	311	-	-	-
2008	267	-	323	-	4	-
2013	211	-	290	-	8	1
2018	178	-	290	2	-	7
2023	185	1	113	-	-	2
year	Average Cover (%)					
1994	7.6	-	7.4	-	0.0	0.0
1998	13.0	0.0	18.7	-	0.0	0.1
2003	6.7	0.0	10.5	-	-	-
2008	9.0	-	14.0	-	0.1	-
2013	6.7	-	13.1	-	0.0	0.0
2018	10.8	-	21.3	0.0	-	0.2
2023	3.9	0.0	2.6	-	-	0.0

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

**Table 25C-02.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Aliciella hutchinsifolia <sup>a</sup> (desert pale gilia)	Allium cernuum (nodding onion)	Arabis fendleri (Fendler's rockcross)	Arenaria fendleri (Fendler's sandwort)	Artemisia ludoviciana (white sagebrush)	Astragalus (milkvetch)	Cordylanthus kingi <sup>a</sup> (King's bird's-beak)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Fritillaria atropurpurea (spotted fritillary)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lepidium <sup>a</sup> (pepperweed)	Lupinus argenteus (silvery lupine)	Lygodesmia (skeletonplant)
year	Nested Frequency																
1994	56	-	-	-	-	-	-	1	1	-	-	19	-	-	-	84	-
1998	-	2	-	29	-	2	-	12	-	3	-	27	-	6	74	133	2
2003	-	-	-	-	-	-	-	-	11	-	2	31	-	-	-	97	3
2008	-	-	-	-	-	1	-	6	-	2	-	25	-	-	0	94	3
2013	-	-	1	-	3	1	4	-	9	2	-	29	-	-	2	45	-
2018	-	-	-	-	-	2	6	3	-	5	2	28	-	-	-	2	-
2023	-	-	-	-	-	-	22	9	-	-	-	24	1	2	4	12	-
year	Average Cover (%)																
1994	0.2	-	-	-	-	-	-	0.0	0.0	-	-	0.2	-	-	-	0.9	-
1998	-	0.0	-	0.2	-	0.0	-	0.0	-	0.0	-	0.3	-	0.0	0.2	11.8	0.0
2003	-	-	-	-	-	-	-	-	0.0	-	0.0	0.2	-	-	-	3.4	0.0
2008	-	-	-	-	-	0.0	-	0.0	-	0.0	-	0.3	-	-	0.0	5.4	0.0
2013	-	-	0.0	-	0.1	0.0	0.0	-	0.0	0.0	-	0.4	-	-	0.0	1.0	-
2018	-	-	-	-	-	0.0	0.1	0.0	-	0.1	0.1	0.2	-	-	-	0.0	-
2023	-	-	-	-	-	-	0.1	0.1	-	-	-	0.5	0.0	0.0	0.0	0.1	-

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

FORB SPECIES	Mirabilis linearis (narrow/leaf four o'clock)	Oenothera pallida <sup>a</sup> (pale evening primrose)	Orthocarpus luteus <sup>a</sup> (yellow owl's-clover)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Senecio flaccidus var. flaccidus (threadleaf ragwort)	Sphaeralcea coccinea (scarlet globemallow)	Tragopogon dubius <sup>at</sup> (yellow salsify)
year	Nested Frequency								
1994	-	4	20	1	22	2	-	2	-
1998	-	22	15	3	6	27	-	1	1
2003	-	19	140	3	4	-	-	1	-
2008	-	15	15	16	6	17	2	1	-
2013	2	25	-	15	4	7	40	-	-
2018	4	32	-	3	-	2	8	1	-
2023	-	11	8	8	8	14	-	3	-
year	Average Cover (%)								
1994	-	0.0	0.1	0.0	0.1	0.0	-	0.0	-
1998	-	0.2	0.0	0.0	0.0	0.1	-	0.0	0.0
2003	-	0.0	1.8	0.0	0.0	-	-	0.0	-
2008	-	0.1	0.4	0.1	0.0	0.0	0.1	0.0	-
2013	0.0	0.1	-	0.1	0.0	0.0	0.4	-	-
2018	0.1	0.2	-	0.0	-	0.0	0.3	0.0	-
2023	-	0.0	0.0	0.0	0.0	0.0	-	0.0	-

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

**Table 25C-02.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Linanthus pungens (granite prickly phlox)	Opuntia fragilis (brittle pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)											
1994	-	-	-	-	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-	-	-	-	-
2003	1.6	14.8	-	-	-	-	0.1	0.2	-	0	-	0.1
2008	1.7	14.6	-	-	-	-	-	-	-	0.1	-	0
2013	2.6	20.2	-	-	-	-	-	0.3	-	0.6	-	0.1
2018	3	19	-	0.1	-	-	-	-	-	0.8	-	0.2
2023	8.7	17.4	-	-	-	0	-	0.5	-	5.8	-	0.6
year	Quadrat Cover (%)											
1994	-	9.6	-	0.0	-	-	0.1	0.1	-	0.0	0.3	0.5
1998	1.3	6.5	-	-	-	-	0.1	0.1	-	-	-	0.2
2003	1.6	10.6	-	0.2	-	-	0.0	0.2	-	0.0	-	0.4
2008	1.6	8.7	-	-	-	-	-	0.2	-	0.2	-	0.4
2013	2.1	12.0	-	0.0	-	-	0.0	0.2	-	0.2	-	0.1
2018	2.4	16.6	-	0.1	-	-	-	0.0	0.0	0.6	-	0.3
2023	5.8	16.1	0.1	-	0.0	0.0	-	0.0	-	1.4	-	0.5

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

**Table 25C-02.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1994	-	-	-	-	-	-	-	-	65/95
1998	-	-	-	-	-	-	-	-	102/132
2003	-	-	-	-	-	-	-	-	93/101
2008	-	-	-	-	-	-	-	-	130/139
2013	-	-	-	-	-	-	-	-	119/169
2018	-	-	-	-	-	-	-	-	170/182
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	940	140	28	55	17	47	2	13	39/55
2003	880	-	0	89	11	34	2	2	36/51
2008	820	40	17	54	29	27	0	20	30/66
2013	700	60	6	94	0	14	0	0	31/56
2018	940	-	17	83	0	0	0	0	29/66
2023	2560	160	18	72	10	29	66	10	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1994	5320	40	11	64	25	40	4	16	38/61
1998	2640	100	12	71	17	31	5	5	54/76
2003	2860	-	4	75	22	21	3	8	62/84
2008	4360	100	20	51	29	27	12	12	58/87
2013	3960	420	33	61	6	34	12	9	59/96
2018	4600	-	17	71	12	25	6	7	51/86
2023	3020	60	19	68	13	27	33	14	-/-
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	60	-	0	100	0	33	33	0	9/14
2013	20	-	0	100	0	0	100	0	7/20
2018	40	-	0	100	0	0	50	0	6/18
2023	120	20	100	0	0	67	0	0	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1994	80	-	25	75	0	75	0	0	-/-
1998	-	-	-	-	-	-	-	-	21/56
2003	80	-	0	100	0	0	0	0	19/20
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	13/19
2018	20	-	0	100	0	0	0	0	13/20
2023	60	-	100	0	0	0	0	0	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	15/19
2023	20	-	0	100	0	0	0	0	-/-

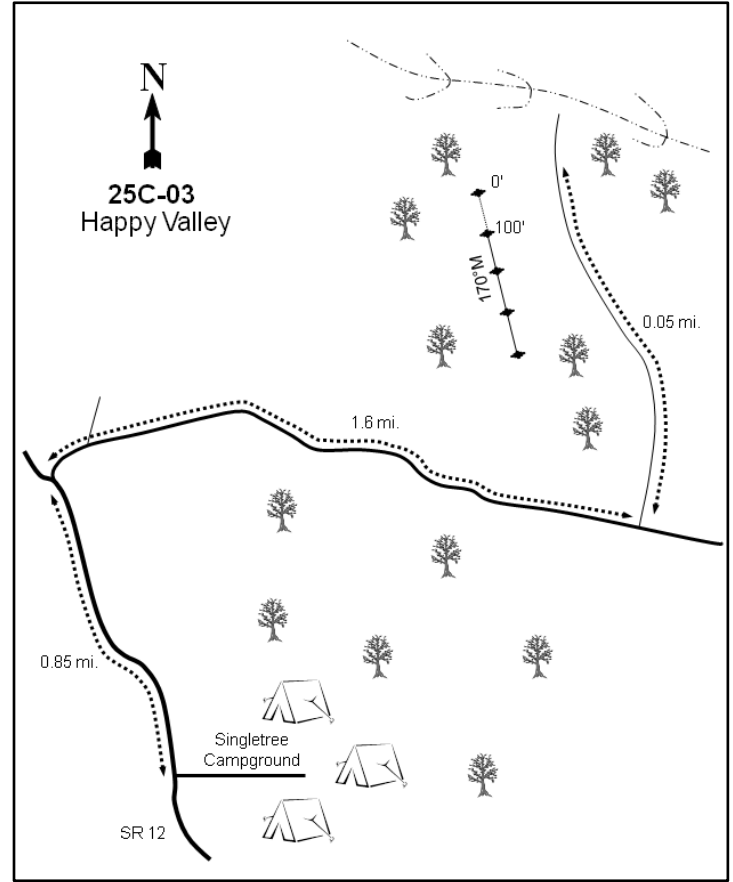
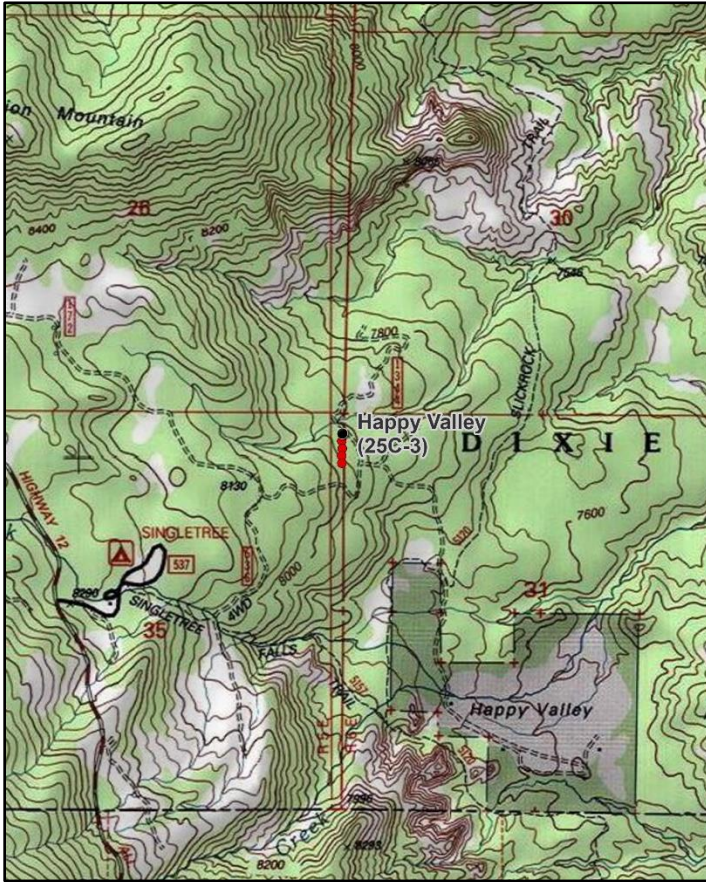
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
1994	500	-	4	96	0	0	84	0	7/15
1998	240	-	25	75	0	25	0	0	9/19
2003	220	-	0	100	0	18	73	0	10/13
2008	140	-	0	100	0	0	0	0	9/11
2013	160	-	25	75	0	0	13	0	9/12
2018	120	-	0	100	0	33	17	0	8/10
2023	40	-	0	100	0	100	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1998	20	-	0	100	0	100	0	0	- / -
2003	20	-	0	100	0	0	100	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1994	280	-	14	79	7	0	0	0	14/11
1998	120	40	0	100	0	17	0	0	24/20
2003	340	-	0	94	6	0	0	0	19/19
2008	280	-	0	100	0	0	0	0	20/21
2013	200	-	10	90	0	0	0	0	19/44
2018	180	-	0	89	11	0	0	11	16/21
2023	280	220	71	29	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
1994	40	-	50	50	0	0	0	0	7/27
1998	-	40	0	0	0	0	0	0	- / -
2003	400	-	0	100	0	0	0	5	5/12
2008	320	120	25	75	0	0	0	6	7/24
2013	1320	-	26	74	0	0	0	2	7/18
2018	2460	-	29	68	3	0	0	2	7/17
2023	4160	1180	35	64	1	0	0	7	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1994	800	20	33	57	10	28	33	13	9/11
1998	820	60	34	56	10	42	32	2	12/20
2003	880	-	16	77	7	23	18	2	16/18
2008	1240	100	29	68	3	5	0	2	13/15
2013	460	20	30	70	0	22	44	17	12/19
2018	600	-	27	70	3	10	17	17	12/13
2023	940	-	55	43	2	13	40	2	- / -

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

**Table 25C-02.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Pinus edulis (twoneedle pinyon)</b>							
1994	3	-	-	-	-	-	4.0
1998	4	-	-	-	-	-	7.7
2018	4	-	100	-	-	-	2.0
2023	1	-	100	-	-	-	3.0
<b>Pinus ponderosa (ponderosa pine)</b>							
1994	3	-	-	-	-	-	15.0
1998	3	-	-	-	-	-	24.0
2018	14	-	-	-	-	100	34.0
2023	4	-	-	-	-	100	42.0

## HAPPY VALLEY - STUDY NO. 25C-3



### Location Information

USGS 7.5 min Map Info Grover SW; Township 30S, Range 5E, Section 36  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 471802 East 4224454 North

### Transect Information

Browse Tag # (0' Stake) 7066  
 Transect Bearing 170° magnetic  
 Length 400ft  
 Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
 Belt Marker Placement Belt 2: 1ft, Belt 5: 1ft

### Directions to Site

From the entrance to Singletree Campground on SR-12, drive 0.85 miles north to the turnoff to Happy Valley. Turn east and go 1.6 miles, staying on the main road until a minor fork is reached. Turn left onto a faint two-track road and continue 0.05 miles to a ponderosa pine and a rebar witness post located 15 feet off of the left (west) side of the road. The baseline starts 75 feet west of the witness post and then runs south. The 0-foot baseline stake is marked with browse tag #7066.

### Site Information

Land Ownership Federal  
 Land Administrator USFS  
 Allotment Pleasant Creek  
 Elevation 7,920ft (2,414m)  
 Aspect East  
 Slope 15-34%  
 Sample Dates 07/15/1994, 07/21/1998, 08/28/2003, 08/21/2008, 08/15/2013, 08/07/2018, 07/18/2023

**Table 25C-03.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	-	-	June 1984	-
Seeding - Seed Unknown	-	-	1984	-

**Wildlife Habitat and Vegetation History**

**Table 25C-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Bitterbrush	No Encroachment
1991	Bitterbrush	No Encroachment
1994	Ponderosa Pine/Bitterbrush	Phase I
1998	Ponderosa Pine/Bitterbrush	Phase I
2003	Ponderosa Pine/Bitterbrush	Phase I
2008	Ponderosa Pine/Bitterbrush	Phase I
2013	Ponderosa Pine/Bitterbrush	Phase I
2018	Ponderosa Pine/Bitterbrush	Phase I
2023	Ponderosa Pine/Bitterbrush	Phase I

**Site Notes**

A wildfire prior to study establishment in 1985 likely killed many of the small to medium sized ponderosa pine (*Pinus ponderosa*) trees, but many of the larger trees survived the fire. Ponderosa pine seedlings were planted by the U.S. Forest Service within the surrounding area following the fire. A guzzler pipe transverses line 3 and runs east.

**Soils**

**Table 25C-03.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.5	56.0	21.4	22.6	3.3	21.4	153.6	0.7	07/21/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      13 inches  
 NRCS Ecological Site    Mountain Gravelly Loam (Ponderosa Pine)  
 NRCS Ecological Site #    R047XB412UT  
 States and Transitions    No state and transition model is available for this ecological site.

Prior to study establishment in 1985, this site was likely occupied by a mixed, moderately dense stand of ponderosa pine (*Pinus ponderosa*) and Utah juniper (*Juniperus osteosperma*) trees. Following the wildfire in 1984 (Table 25C-03.1), ponderosa pine decreased significantly in cover and density, leaving antelope bitterbrush (*Purshia tridentata*) as the dominant understory species. Ponderosa pine has since increased in cover and density, however, and has been considered to be a codominant vegetation component since 1994 (Photos, Pre-1992 Data, Table 25C-03.12, Table 25C-03.13). Perennial grasses and forbs have remained diverse and abundant over the duration of the study (Table 25C-03.7, Table 25C-03.10, Table 25C-03.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper have been observed in point-quarter measurements since 1994 (Table 25C-03.14), and the study site has been considered to be within Phase I of woodland succession since that time (Table 25C-03.4).

Deer winter range condition has ranged between very poor and good since 1994, while generally improving due to increases in young preferred browse density and perennial grass cover. As of 2023, winter range condition was considered to be good. Improvement to deer wintering range can be accomplished through efforts that increase preferred browse cover and reproduction; increasing native perennial forb cover for incidental species would also improve winter range conditions (Table 25C-03.15). Pellet group data indicates that both mule deer and elk presence were low in 2023 (Table 25C-03.9).

## Trend Summary Tables

**Table 25C-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1994	4.1	7.4	1.5	-	-	-
1998	5.1	6.9	3.8	-	-	0.5
2003	9.0	8.3	3.7	7.7	8.0	13.5
2008	8.7	5.7	2.5	9.8	7.3	17.3
2013	9.7	5.9	3.6	11.0	6.9	19.2
2018	12.3	4.0	2.7	10.0	4.7	23.2
2023	13.3	5.4	4.1	14.7	4.3	14.1

**Table 25C-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1994	1	275	10	208	0.0	11.3	0.0	5.8
1998	17	342	39	240	0.3	16.3	0.2	7.6
2003	1	336	20	202	0.0	12.3	0.2	4.2
2008	-	349	6	179	-	11.9	0.0	2.4
2013	-	341	6	185	-	12.9	0.0	3.1
2018	-	324	-	134	-	12.3	-	2.1
2023	-	300	2	120	-	14.5	0.0	2.3

**Table 25C-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1994	13.0	-	30.6	1.4	22.9	25.6
1998	15.5	0.3	39.1	8.4	30.0	39.1
2003	8.8	-	39.6	5.9	26.1	35.0
2008	7.1	-	34.3	5.5	28.0	36.0
2013	8.8	0.0	38.7	2.6	22.4	41.7
2018	13.6	0.2	57.0	5.8	25.4	31.7
2023	9.5	0.1	39.3	3.4	19.5	38.7

**Table 25C-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
1994	-	14	2	-	4
1998	4	14	4	-	4
2003	6	37	1	-	9
2008	6	32	4	-	36
2013	-	10	-	-	1
2018	-	14	-	-	11
2023	2	16	4	-	8
Year	Days Use Per Acre (ha)				
1994	-	-	-	-	-
1998	15.3 (37.7)	11.4 (28.1)	1.3 (3.3)	-	-
2003	13.8 (34.1)	61.0 (150.6)	4.7 (11.6)	-	-
2008	10.9 (26.9)	33.5 (82.8)	4.0 (9.9)	-	-
2013	10.2 (25.1)	9.4 (23.2)	2.7 (6.6)	-	-
2018	8.0 (19.7)	24.8 (61.2)	0.7 (1.7)	-	-
2023	6.5 (16.1)	8.7 (21.5)	2.7 (6.6)	1.2 (2.9)	-



**Table 25C-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Carex geyeri (Geyer's sedge)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency												
1994	30	5	68	-	1	72	-	-	64	38	103	31	6
1998	47	15	113	-	17	76	-	-	114	18	161	21	6
2003	19	13	136	-	1	71	-	-	59	9	172	36	10
2008	24	27	172	5	-	68	-	-	87	9	114	4	5
2013	20	42	170	-	-	54	-	-	53	30	132	24	2
2018	6	33	147	-	-	15	21	13	25	23	123	17	22
2023	13	8	142	-	-	39	-	4	56	23	138	-	-
year	Average Cover (%)												
1994	2.2	0.2	2.8	-	0.0	1.0	-	-	0.6	0.9	2.9	0.8	0.0
1998	1.8	0.4	4.4	-	0.3	1.4	-	-	2.1	0.6	5.2	0.4	0.0
2003	0.2	0.2	5.8	-	0.0	0.8	-	-	0.4	0.1	4.2	0.6	0.0
2008	0.4	0.3	6.3	0.4	-	0.7	-	-	0.8	0.1	2.7	0.2	0.0
2013	0.5	0.6	5.9	-	-	0.4	-	-	0.8	1.5	2.7	0.5	0.0
2018	0.2	0.6	6.1	-	-	0.1	0.2	0.1	0.1	0.6	3.5	0.3	0.3
2023	0.5	0.5	5.0	-	-	0.4	-	0.0	0.7	0.7	6.8	-	-

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

**Table 25C-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria parvifolia (small-leaf pussytoes)	Arabis demissa (nodding rockress)	Artemisia carruthii (Carruth's sagewort)	Artemisia dracunculul (tarragon)	Astragalus (milkvetch)	Chenopodium album <sup>a</sup> (lambsquarters)	Cirsium (thistle)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron divergens <sup>ai</sup> (spreading fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron flagellaris (trailing fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum alatum (winged buckwheat)
year	Nested Frequency																
1994	1	-	3	-	122	-	9	5	-	6	-	-	-	6	-	3	3
1998	10	-	3	3	163	-	-	-	3	-	2	5	-	6	-	9	7
2003	14	2	4	-	116	1	1	10	-	2	-	2	-	1	5	2	1
2008	6	-	5	-	120	-	5	-	-	1	-	-	3	7	-	-	-
2013	19	-	4	-	112	5	-	-	-	1	-	-	-	1	-	3	2
2018	4	-	2	0	79	-	-	-	-	-	-	-	-	-	4	9	5
2023	4	-	-	10	51	-	0	1	-	-	-	-	-	4	-	0	1
year	Average Cover (%)																
1994	0.0	-	0.2	-	3.8	-	0.1	0.0	-	0.0	-	-	-	0.0	-	0.0	0.0
1998	0.1	-	0.0	0.0	4.5	-	-	-	0.0	-	0.0	0.0	-	0.0	-	0.0	0.0
2003	0.1	0.0	0.1	-	2.0	0.0	0.0	0.0	-	0.0	-	0.0	-	0.0	0.2	0.0	0.0
2008	0.0	-	0.2	-	1.4	-	0.0	-	-	0.0	-	-	0.0	0.1	-	-	-
2013	0.1	-	0.1	-	1.6	0.0	-	-	-	0.0	-	-	-	0.0	-	0.0	0.0
2018	0.1	-	0.0	0.0	0.6	-	-	-	-	-	-	-	-	-	0.1	0.1	0.0
2023	0.0	-	-	0.0	0.9	-	0.0	0.0	-	-	-	-	-	0.2	-	0.0	0.0

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

FORB SPECIES	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hedysamum boreale (Utah sweetvetch)	Hymenoxys richardsonii (pingue rubberweed)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium <sup>a</sup> (pepperweed)	Linum kingii (King's flax)	Lithospermum ruderale (western stone seed)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Machaeranthera grindelioides (rayless tansyaster)	Mirabilis linearis (narrowleaf four o'clock)	Penstemon comarrhenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)
year	Nested Frequency																
1994	2	64	-	-	3	18	7	-	-	-	-	7	-	-	-	-	10
1998	-	90	-	3	5	9	19	14	-	-	2	2	2	-	-	3	6
2003	-	77	-	-	1	11	10	-	-	1	-	-	-	-	2	2	18
2008	3	43	2	-	1	7	-	-	2	-	-	11	-	-	10	-	2
2013	-	71	-	-	5	16	-	2	-	2	5	-	-	-	2	-	3
2018	-	48	-	-	-	13	-	-	3	1	-	4	-	6	1	-	7
2023	-	46	-	1	1	6	-	-	-	-	-	4	-	-	0	-	10
year	Average Cover (%)																
1994	0.0	0.4	-	-	0.1	0.7	0.0	-	-	-	-	0.0	-	-	-	-	0.5
1998	-	1.5	-	0.0	0.3	0.3	0.0	0.0	-	-	0.0	0.0	0.1	-	-	0.0	0.2
2003	-	0.7	-	-	0.0	0.3	0.1	-	-	0.0	-	-	-	-	0.0	0.0	0.7
2008	0.0	0.2	0.0	-	0.0	0.2	-	-	0.0	-	-	0.1	-	-	0.1	-	0.0
2013	-	0.6	-	-	0.3	0.1	-	0.0	-	0.0	0.0	-	-	-	0.0	-	0.0
2018	-	0.3	-	-	-	0.2	-	-	0.0	0.0	-	0.0	-	0.1	0.0	-	0.2
2023	-	0.4	-	0.0	0.0	0.3	-	-	-	-	-	0.1	-	-	0.0	-	0.1

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

FORB SPECIES	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Sphaeralcea coccinea (scarlet globemallow)	Symphyotrichum ascendens (western aster)	Tetraneris acaulis (stemless four-nerve daisy)	Tragopogon dubius <sup>a</sup> (yellow salsify)
year	Nested Frequency					
1994	-	5	8	-	-	-
1998	3	2	16	-	1	1
2003	1	11	4	-	-	-
2008	-	-	3	3	-	-
2013	4	16	3	-	-	-
2018	-	2	4	-	-	-
2023	-	-	5	-	-	-
year	Average Cover (%)					
1994	-	0.0	0.0	-	-	-
1998	0.0	0.0	0.3	-	0.0	0.0
2003	0.0	0.1	0.0	-	-	-
2008	-	-	0.0	0.0	-	-
2013	0.0	0.1	0.1	-	-	-
2018	-	0.0	0.1	-	-	-
2023	-	-	0.2	-	-	-

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

**Table 25C-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Pinus ponderosa <sup>i</sup> (ponderosa pine)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Ribes <sup>p</sup> (currant)	Sambucus racemosa <sup>p</sup> (red elderberry)	Tetradymia canescens (spineless horsebrush)	Yucca harrimaniae (Spanish bayonet)
year	Line Intercept Cover (%)																
1994	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	0.2	-	-	-	0.4	2.3	0.1	1.9	-	-	-	13.5	7.2	-	0.3	0.1	3.2
2008	0.3	-	-	-	0.5	2.3	0	1.3	-	0.1	-	17.3	9.3	-	0.2	0.1	3
2013	0.7	-	-	-	0.1	0.5	0.1	3	-	-	-	19.2	10.3	-	-	0	3.2
2018	0.8	-	-	0	0.1	0.3	0.1	0.3	-	-	-	23.2	9.2	-	-	-	3.9
2023	1.2	0.2	-	0.1	0.6	-	-	0.1	-	-	-	14.1	13.2	-	-	0.5	3.1
year	Quadrat Cover (%)																
1994	0.0	-	-	-	1.6	0.7	0.1	1.9	0.0	-	0.0	1.5	4.1	-	-	0.1	2.9
1998	0.0	0.1	0.0	0.3	1.4	0.8	0.2	1.5	0.0	-	-	3.8	4.5	0.0	0.0	0.3	2.6
2003	0.2	-	-	0.1	0.6	2.7	0.2	0.7	-	0.0	-	3.7	8.8	-	0.0	0.4	3.6
2008	0.2	-	-	0.0	0.2	1.9	0.0	0.6	-	0.0	-	2.5	8.5	-	0.0	0.0	2.9
2013	0.4	-	-	-	0.0	0.8	0.1	1.6	-	-	-	3.6	9.1	0.1	-	0.1	3.3
2018	0.6	-	-	0.1	0.0	0.2	0.1	0.7	0.0	-	-	2.7	11.6	-	-	0.1	3.0
2023	1.4	0.4	-	0.1	0.1	0.0	0.1	0.0	-	-	-	4.1	11.5	-	-	0.6	4.5

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

**Table 25C-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1994	80	-	0	100	0	0	0	0	27/46
1998	60	-	0	100	0	0	0	0	37/56
2003	160	-	13	88	0	0	0	0	21/63
2008	240	80	33	50	17	58	8	8	18/43
2013	240	240	50	42	8	8	0	8	26/77
2018	820	-	63	37	0	0	0	0	21/36
2023	560	-	25	75	0	82	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1994	-	-	-	-	-	-	-	-	20/20
1998	-	-	-	-	-	-	-	-	27/23
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	100	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
1994	-	-	-	-	-	-	-	-	31/37
1998	20	-	0	100	0	100	0	0	34/62
2003	-	-	-	-	-	-	-	-	25/44
2008	-	-	-	-	-	-	-	-	23/56
2013	-	-	-	-	-	-	-	-	86/85
2018	-	-	-	-	-	-	-	-	75/81
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	140	-	14	86	0	57	0	0	17/35
2003	100	-	0	100	0	40	60	0	5/17
2008	80	40	25	25	50	25	50	25	4/16
2013	20	-	0	100	0	0	0	100	-/-
2018	160	-	0	75	25	0	100	0	6/18
2023	200	-	0	100	0	0	0	0	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1994	940	-	2	94	4	13	0	0	30/60
1998	760	-	0	97	3	0	0	0	39/48
2003	800	20	15	80	5	38	18	0	25/33
2008	400	-	0	15	85	10	80	65	42/52
2013	120	-	50	50	0	33	0	0	32/32
2018	280	-	0	43	57	36	57	71	29/37
2023	360	20	44	56	0	0	0	0	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	80	-	25	75	0	0	0	0	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1994	860	20	5	93	2	0	0	0	47/52
1998	600	-	7	90	3	0	0	3	62/72
2003	300	-	0	67	33	13	7	0	66/67
2008	400	40	5	75	20	15	0	10	81/75
2013	140	-	14	14	71	29	0	57	79/79
2018	80	-	25	50	25	0	0	25	77/72
2023	60	-	0	67	33	33	0	33	-/-
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1994	180	-	0	100	0	44	44	0	11/28
1998	220	-	18	82	0	0	0	0	25/42
2003	440	-	5	68	27	68	14	0	22/29
2008	420	-	19	76	5	14	14	19	17/19
2013	180	-	33	67	0	11	0	0	26/30
2018	120	-	17	83	0	0	0	0	13/14
2023	80	-	0	75	25	0	0	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 (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1994	7280	460	27	69	4	0	0	1	16/16
1998	3700	440	6	94	0	0	0	0	24/22
2003	3340	-	6	93	1	0	0	0	18/18
2008	2720	180	19	77	4	0	0	4	17/17
2013	2740	-	7	91	2	1	0	2	21/25
2018	2260	-	2	97	2	1	0	2	14/11
2023	900	-	60	40	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	20	0	0	0	0	0	0	- / -
2023	-	20	0	0	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1994	320	-	6	94	0	0	0	0	5/19
1998	20	-	0	100	0	0	0	0	4/10
2003	20	-	0	100	0	0	0	0	5/19
2008	-	-	-	-	-	-	-	-	5/13
2013	-	-	-	-	-	-	-	-	4/11
2018	40	-	0	100	0	0	0	0	6/23
2023	40	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	0	0	4/6
2008	20	-	0	100	0	0	0	0	4/9
2013	-	-	-	-	-	-	-	-	- / -
2018	40	-	0	0	100	0	100	100	- / -
2023	20	-	0	100	0	0	100	0	- / -
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	20	0	0	0	0	0	0	- / -
2023	-	20	0	0	0	0	0	0	- / -
<b>Pinus ponderosa<sup>1</sup> -- (ponderosa pine)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1998	200	40	90	10	0	0	0	0	- / -
2003	200	-	70	30	0	0	0	0	- / -
2008	200	-	30	70	0	0	0	0	- / -
2013	220	-	46	55	0	0	0	27	- / -
2018	200	-	20	80	0	0	0	0	- / -
2023	240	60	8	92	0	0	25	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1994	940	-	2	96	2	32	11	6	36/114
1998	760	40	8	92	0	45	37	5	41/124
2003	1100	-	4	89	7	20	80	2	42/121
2008	1520	20	7	88	5	51	30	1	34/95
2013	1900	120	17	82	1	26	61	1	37/118
2018	2520	-	13	52	35	16	68	55	32/101
2023	3580	20	21	75	5	37	36	3	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	103/190
2003	-	-	-	-	-	-	-	-	69/39
2008	-	-	-	-	-	-	-	-	70/56
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	40/39
2023	-	-	-	-	-	-	-	-	-/-
<b>Sambucus racemosa<sup>p</sup> -- (red elderberry)</b>									
1994	140	-	0	100	0	0	0	0	66/67
1998	20	-	0	100	0	0	0	0	73/85
2003	40	-	50	50	0	0	50	0	52/77
2008	40	-	50	50	0	0	50	0	48/61
2013	20	-	0	100	0	0	0	0	34/46
2018	20	-	0	100	0	0	100	0	17/31
2023	20	-	0	100	0	0	100	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1994	120	-	17	83	0	33	0	0	21/41
1998	200	20	10	90	0	30	0	0	24/40
2003	260	-	15	69	15	39	39	8	19/30
2008	80	-	0	50	50	0	50	0	12/18
2013	200	-	50	50	0	30	0	0	23/37
2018	220	-	55	36	9	18	9	18	18/28
2023	580	-	17	83	0	10	0	0	- / -
<b>Yucca harrimaniae -- (Spanish bayonet)</b>									
1994	1580	-	3	98	0	0	0	0	32/62
1998	1520	-	16	82	3	0	0	1	31/54
2003	1400	-	44	54	1	0	0	1	38/52
2008	1860	-	23	71	7	0	0	1	25/42
2013	1700	300	34	66	0	0	0	0	33/48
2018	1980	-	19	81	0	0	0	0	25/39
2023	2560	80	40	60	0	0	0	0	- / -

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

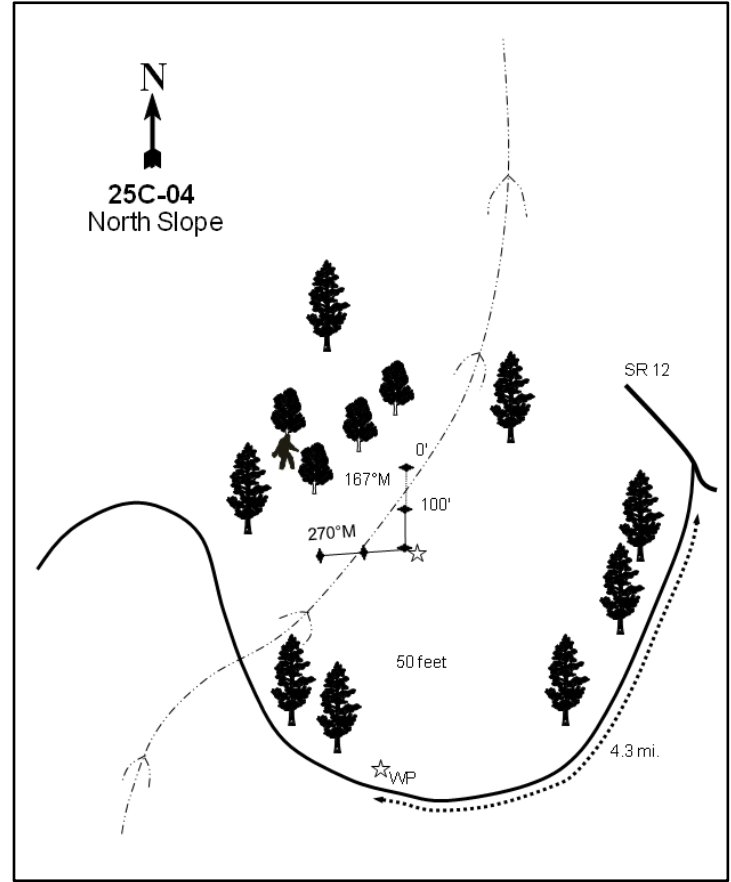
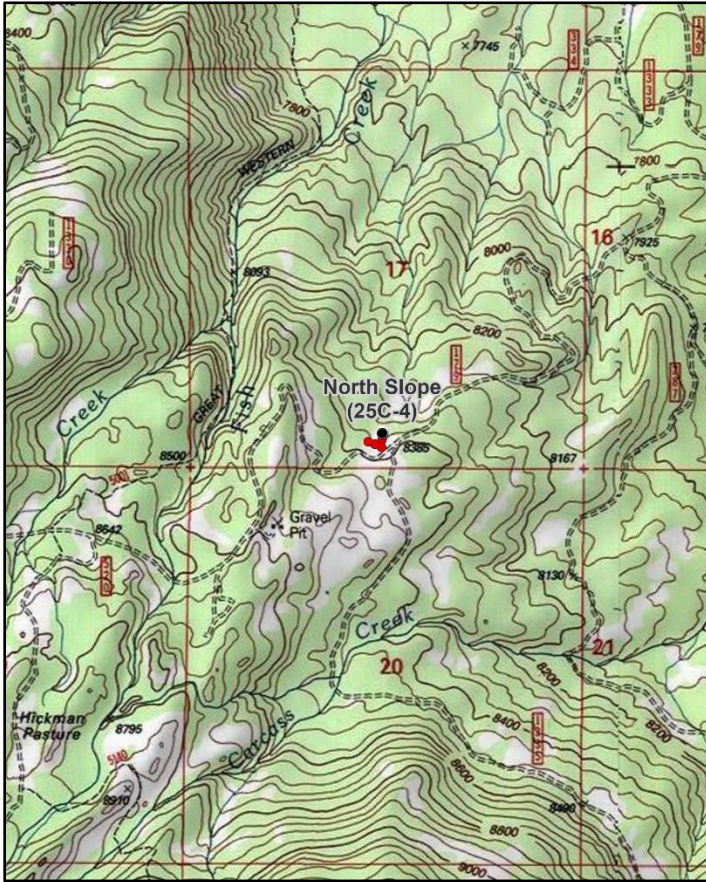
**Table 25C-03.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Abies concolor (white fir)</b>							
1994	6	-	-	-	-	-	3.0
<b>Juniperus osteosperma (Utah juniper)</b>							
1994	2	-	-	-	-	-	3.5
1998	4	-	-	-	-	-	3.7
2013	7	-	50	50	-	-	5.8
2018	22	20	60	20	-	-	4.9
2023	16	25	25	50	-	-	6.3
<b>Pinus edulis (twoneedle pinyon)</b>							
1994	3	-	-	-	-	-	3.0
1998	7	-	-	-	-	-	3.0
2013	4	-	-	100	-	-	4.5
2018	38	57	14	29	-	-	2.9
2023	23	33	17	17	33	-	7.8
<b>Pinus ponderosa (ponderosa pine)</b>							
1994	111	-	-	-	-	-	14.8
1998	143	-	-	-	-	-	12.5
2003	149	-	37	16	-	47	14.7
2008	141	-	20	25	5	50	24.4
2013	167	-	16	16	16	53	18.7
2018	151	-	11	11	32	47	16.0
2023	168	-	5	10	10	75	22.4
<b>Pseudotsuga menziesii (Douglas-fir)</b>							
1998	6	-	-	-	-	-	3.5
2013	8	-	-	50	50	-	7.5
2018	38	-	-	-	50	50	8.5
2023	5	-	-	-	-	100	12.0
<b>Quercus gambelii (Gambel oak)</b>							
1994	1	-	-	-	-	-	1.0

**Table 25C-03.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1994	6.2	0.0	0.0	22.6	0.0	10.0	0.0	<b>38.8</b>	Very Poor-Poor
1998	7.5	14.4	3.9	30.0	-0.3	10.0	0.0	<b>65.5</b>	Fair
2003	11.5	13.0	2.8	24.7	0.0	8.3	0.0	<b>60.3</b>	Fair
2008	14.6	13.3	4.2	23.8	0.0	4.8	0.0	<b>60.7</b>	Fair
2013	16.3	14.5	9.5	25.9	0.0	6.2	0.0	<b>72.4</b>	Good
2018	14.8	5.4	8.4	24.5	0.0	4.2	0.0	<b>57.2</b>	Fair
2023	21.7	13.8	10.3	29.0	0.0	4.6	0.0	<b>79.4</b>	Good

## NORTH SLOPE - STUDY NO. 25C-4

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Blind Lake NE; Township 30S, Range 5E, Section 17  
NAD 83 UTM ZONE 12, 466142 East 4227918 North

**Transect Information**

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

7077  
167° magnetic (Lines 3-4: 270° magnetic)  
400ft  
Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (95ft), Line 4 (59ft)  
Belt 2: 3ft, Belt 5: 1ft

**Directions to Site**

From Grover, Utah, travel 1.5 miles northwest on SR-12 to North Slope Road. Turn up this road, staying left on the main road, and continue for 4.3 miles. Stop before you get to a bend in the road near the head of a draw. Look for a witness post at the base of a ponderosa pine 10 feet below (north of) the road: the witness post is a 2.5 foot steel rebar tagged #7181, and the 200-foot stake is a full-high post 50 feet from the witness post. The 0-foot baseline stake is marked by browse tag #7077.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	North Slope C&H
Elevation	8,330ft (2,539m)
Aspect	North-Northeast
Slope	10-20%
Sample Dates	07/22/1998, 08/28/2003, 08/21/2008, 08/12/2013, 08/07/2018, 07/18/2023



**Table 25C-04.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Teasdale Front Fuels Reduction Treatment Phase 1	5543	June-August 2021	1017
Mechanical - Bullhog	-	-	Between 2016 and 2017	-

**Wildlife Habitat and Vegetation History****Table 25C-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-04.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Pinyon-Juniper	Phase II
1991	Pinyon-Juniper	Phase II
1998	Bitterbrush	Phase I
2003	Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Bitterbrush/Pinyon-Juniper	Phase I transitioning to Phase II
2023	Bitterbrush	Phase I

**Site Notes**

In 1998, the site was moved to better sample the area of interest. The new baseline is located entirely within a more open area where the key browse and herbaceous communities are more representative of those in the surrounding area.

**Soils****Table 25C-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	5.9	64.0	19.4	16.6	2.9	12.0	137.6	0.5	07/22/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Mountain Gravelly Loam (Ponderosa Pine)
NRCS Ecological Site #	R047XB412UT
States and Transitions	No state and transition model is available for this ecological site.

Since the reestablishment of the study site in 1998, antelope bitterbrush (*Purshia tridentata*) has generally decreased in cover, but has maintained a stable density; bitterbrush has been considered to be a dominant vegetation component since 1998. The tree community has also maintained stable populations, and the site was classified as being within Phase I transitioning to Phase II of woodland succession from 1998 through the 2013 sample year. However, a bullhog treatment sometime between 2016 and 2017 (Table 25C-04.1) removed some of the twoneedle pinyon (*Pinus edulis*) trees, and the site has since been considered to be within Phase I (Photos, Table 25C-04.4, Table 25C-04.12, Table 25C-04.14). The herbaceous understory has remained diverse and abundant throughout the study period, with perennial grasses such as blue grama (*Bouteloua gracilis*) and muttongrass (*Poa fendleriana*) contributing a majority of the cover (Table 25C-04.7, Table 25C-04.10, Table 25C-04.11).

This mule deer summer range is considered to be in fair condition due to the amount of preferred browse available for forage, although browse forage is not the focus of mule deer on this range type. The site's fair condition could be attributed to the lack of herbaceous diversity and abundance. Range improvement could be made by increasing native forb and grass cover among sampled species while diversifying age structure of preferred browse species. According to pellet transect data, deer presence has been low since 2018 and elk presence has remained low since 1998 (Table 25C-04.9). However, the herbaceous understory of this study site could provide forage for summering elk; increasing perennial forb and grass cover and species diversity could improve elk summer habitat in the immediate area (Table 25C-04.3; Beck & Peek, 2005).

## Trend Summary Tables

**Table 25C-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
1998	16.4	9.6	2.3	-	-	0.4
2003	17.6	9.3	3.2	19.9	7.3	4.0
2008	11.7	3.5	3.1	20.9	4.5	5.9
2013	11.7	4.4	2.6	14.7	4.7	5.7
2018	12.7	3.7	2.7	15.6	3.1	2.8
2023	15.2	3.9	0.9	19.0	5.0	2.7

**Table 25C-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
1998	-	385	124	229	-	23.2	1.1	13.1
2003	-	355	131	172	-	13.2	0.9	3.9
2008	-	369	-	190	-	19.0	-	3.7
2013	-	381	5	161	-	19.8	0.2	3.7
2018	-	372	11	153	-	24.6	0.2	3.7
2023	-	345	87	136	-	15.3	0.4	3.3

**Table 25C-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
1998	9.6	4.0	48.8	8.1	14.2	54.5
2003	10.7	0.2	39.2	7.0	17.1	44.7
2008	11.9	0.4	29.5	10.0	15.1	46.4
2013	12.4	1.4	39.7	5.6	11.9	45.6
2018	18.2	1.7	50.3	7.4	15.6	40.7
2023	18.1	0.2	41.9	6.5	12.6	37.5

**Table 25C-04.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
1998	12	30	3	-	24
2003	5	37	4	-	24
2008	6	29	7	-	63
2013	13	26	1	1	11
2018	1	6	2	-	30
2023	7	7	1	-	4
Year	Days Use Per Acre (ha)				
1998	35.6 (87.9)	50.2 (124.1)	2.7 (6.6)	-	-
2003	14.5 (35.9)	56.3 (139.0)	0.7 (1.7)	-	-
2008	1.5 (3.6)	44.9 (110.9)	3.4 (8.3)	-	-
2013	17.4 (43.0)	22.1 (54.6)	-	-	-
2018	2.2 (5.4)	4.7 (11.6)	0.7 (1.7)	-	-
2023	10.2 (25.1)	3.4 (8.3)	4.7 (11.6)	-	-

**Table 25C-04.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achmatherum hymenoides (Indian ricegrass)	Achmatherum lettermanii (Letterman's needlegrass)	Achmatherum nelsonii (Columbia needlegrass)	Bouteloua gracilis (blue grama)	Bromus porteri (Porter brome)	Carex (sedge)	Carex geyeri (Geyer's sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency										
1998	-	-	-	229	-	53	-	111	24	223	16
2003	1	-	-	231	-	35	-	58	20	199	-
2008	3	-	-	259	-	99	-	29	46	93	3
2013	1	-	3	280	5	66	-	42	22	158	2
2018	1	3	8	205	4	30	3	16	27	224	3
2023	-	-	4	254	5	6	-	25	20	131	4
year	Average Cover (%)										
1998	-	-	-	8.0	-	1.2	-	2.2	0.4	11.0	0.3
2003	0.0	-	-	6.6	-	0.4	-	0.5	0.4	5.3	-
2008	0.0	-	-	11.8	-	2.6	-	0.5	1.3	2.8	0.0
2013	0.0	-	0.0	11.4	0.0	1.1	-	0.7	0.5	5.9	0.0
2018	0.0	0.0	0.1	10.6	0.0	1.7	0.0	0.7	1.7	9.8	0.0
2023	-	-	0.0	10.4	0.0	0.2	-	0.6	0.6	3.4	0.2

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

**Table 25C-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum <sup>a</sup> (desert madwort)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria parvifolia (small-leaf pussytoes)	Arabis demissa (nodding rockcross)	Artemisia canthioides (Carruth's sagewort)	Artemisia dracunculoides (tarragon)	Astragalus (milkvetch)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album <sup>a</sup> (lambsquarters)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium (thistle)	Cryptantha (cryptantha)	Descurainia pinnatifida <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron eatonii (Eaton's fleabane)	Erigeron flagellaris (trailing fleabane)
year	Nested Frequency																
1998	1	-	100	35	10	126	25	-	6	-	-	2	-	8	-	17	11
2003	-	16	27	28	5	56	10	-	-	57	46	-	-	3	1	4	10
2008	-	-	-	38	6	74	-	9	-	-	-	1	3	-	-	11	4
2013	-	-	3	41	12	56	15	-	-	-	2	-	3	-	-	14	9
2018	-	-	-	47	23	59	3	-	-	-	-	-	-	11	-	13	11
2023	-	-	1	39	5	24	4	-	-	21	26	0	-	4	-	4	1
year	Average Cover (%)																
1998	0.0	-	0.9	1.7	0.1	3.1	0.9	-	0.0	-	-	0.0	-	0.0	-	0.3	0.3
2003	-	0.2	0.1	0.2	0.0	0.9	0.1	-	-	0.3	0.2	-	-	0.0	0.0	0.1	0.1
2008	-	-	-	1.1	0.0	0.6	-	0.1	-	-	-	0.1	0.0	-	-	0.0	0.1
2013	-	-	0.1	0.7	0.0	1.3	0.3	-	-	-	0.0	-	0.0	-	-	0.1	0.1
2018	-	-	-	0.9	0.1	1.1	0.1	-	-	-	-	-	-	0.2	-	0.1	0.2
2023	-	-	0.0	1.4	0.0	0.2	0.0	-	-	0.1	0.1	0.0	-	0.0	-	0.2	0.0

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

FORB SPECIES	Nestled Frequency																	
Erigeron pumilus (shaggy fleabane)	10	2	-	32	-	2	3	9	33	85	-	8	1	17	5	14	-	
Eriogonum (buckwheat)	12	-	0	27	6	-	1	9	8	50	-	3	5	6	-	6	1	
Eriogonum alatum (winged buckwheat)	13	-	-	23	-	-	2	-	-	36	-	20	4	7	-	1	15	
Eriogonum racemosum (redroot buckwheat)	8	-	3	25	-	-	-	-	-	4	-	20	5	11	-	35	-	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	22	4	3	19	-	-	-	0	-	4	3	10	4	9	-	31	-	
Gilia inospicua <sup>a</sup> (shy gilia)	2023	8	-	-	19	25	6	3	-	4	26	-	17	-	10	7	1	-
Hymenoxys richardsonii (pingue rubberweed)	year	Average Cover (%)																
Lappula occidentalis <sup>a</sup> (flatspine stickseed)	1998	0.2	0.0	-	0.3	-	0.0	0.0	0.0	0.1	5.1	-	0.2	0.1	0.4	0.0	0.1	-
Lepidium <sup>a</sup> (pepperweed)	2003	0.2	-	0.0	0.2	0.0	-	0.0	0.1	0.0	1.3	-	0.0	0.1	0.3	-	0.1	0.0
Lupinus argenteus (silvery lupine)	2008	0.2	-	-	0.1	-	-	0.0	-	-	0.6	-	0.1	0.1	0.2	-	0.0	0.1
Mirabilis linearis (narrowleaf four o'clock)	2013	0.1	-	0.1	0.2	-	-	-	-	-	0.0	-	0.1	0.0	0.3	-	0.3	-
Penstemon comarrhenus (dusty beardtongue)	2018	0.2	0.0	0.0	0.3	-	-	-	0.0	-	0.1	0.0	0.1	0.0	0.3	-	0.3	-
Petradoria pumila (rock goldenrod)	2023	0.1	-	-	0.2	0.1	0.0	0.0	-	0.0	0.5	-	0.3	-	0.1	0.0	0.0	-
Pleiacanthus spinosus (thorn skeletonweed)																		
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)																		
Potentilla gracilis (slender cinquefoil)																		
Potentilla hippiana (woolly cinquefoil)																		

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

FORB SPECIES	Nestled Frequency							
Pteridium aquilinum (western brackenfern)	-	-	-	11	1	4	1	
Silene antirrhina <sup>a</sup> (sleepy silene)	-	3	-	7	-	-	7	
Silene drummondii (Drummond's campion)	-	-	1	5	-	-	-	
Sphaeralcea coccinea (scarlet globemallow)	1	-	-	7	-	-	-	
Taraxacum officinale (common dandelion)	-	-	2	5	-	-	-	
Tragopogon dubius <sup>ai</sup> (yellow salsify)	-	-	-	12	-	7	-	
unknown perennial forb (unknown forb)	year	Average Cover (%)						
	1998	-	-	-	0.1	0.0	0.0	0.0
	2003	-	0.0	-	0.2	-	-	0.1
	2008	-	-	0.0	0.0	-	-	-
	2013	0.0	-	-	0.1	-	-	-
	2018	-	-	0.0	0.0	-	-	-
	2023	-	-	-	0.2	-	0.0	-

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

**Table 25C-04.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Dasiphora fruticosa (shrubby cinquefoil)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Escobaria vivipara (spiny star)	Gutierrezia sarothrae (broom snakeweed)	Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Pinus ponderosa <sup>i</sup> (ponderosa pine)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)	Yucca (yucca)
year	Line Intercept Cover (%)														
1998	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	1.8	0.2	-	6	-	0.8	-	0.4	2.1	-	1.9	-	17.9	0.1	-
2008	1.8	0.1	-	3.4	-	0.5	-	0.6	2.7	-	2.1	1.1	19	0	-
2013	2.3	0.4	0.2	4.4	-	0.1	-	-	2.8	-	2.9	-	11.8	0.2	-
2018	3.4	-	-	1.4	-	0.4	-	1.3	0.5	-	2.3	-	12.2	-	-
2023	3.9	1.9	0.5	3.8	-	0	-	1.1	0.2	-	2.5	-	12.7	0.1	-
year	Quadrat Cover (%)														
1998	1.8	0.3	0.2	7.8	-	0.8	-	0.8	1.5	0.1	0.8	0.0	14.1	0.1	-
2003	1.5	0.3	-	8.0	0.0	0.8	-	0.4	1.5	0.1	1.8	-	15.7	0.0	-
2008	1.0	0.9	-	2.5	-	0.5	-	0.5	1.0	0.0	2.1	0.0	9.9	0.0	-
2013	3.0	0.3	0.1	4.1	-	0.1	-	0.1	1.4	0.0	1.2	-	8.4	0.1	0.1
2018	3.7	0.1	-	1.9	-	0.2	0.0	1.4	0.1	0.0	2.5	-	8.9	0.1	-
2023	4.6	1.1	1.2	3.3	-	0.2	-	0.4	0.1	-	0.8	-	8.3	0.0	-

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

**Table 25C-04.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1998	1000	40	50	48	2	2	0	2	35/51
2003	820	-	0	76	24	17	0	20	29/37
2008	1720	240	45	47	8	34	4	1	22/42
2013	1420	600	35	62	3	14	1	9	31/50
2018	2600	-	49	42	9	18	1	5	29/53
2023	2140	-	7	94	0	31	8	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	220	-	27	73	0	0	0	0	55/71
2003	300	-	7	93	0	47	7	0	55/63
2008	540	20	33	56	11	63	0	7	27/45
2013	140	-	57	43	0	86	0	29	50/64
2018	200	-	30	70	0	50	20	0	42/56
2023	280	-	7	93	0	21	7	0	- / -
<b>Ceanothus velutinus -- (snowbrush ceanothus)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	13/19
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
1998	260	-	0	92	8	0	0	0	20/29
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	100	-	0	100	0	0	0	0	20/28
2018	-	-	-	-	-	-	-	-	-/-
2023	720	20	25	72	3	0	75	8	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	4060	-	7	81	11	2	0	1	50/56
2003	4300	40	7	81	11	7	0	1	41/49
2008	2820	-	1	33	66	21	9	46	36/44
2013	2620	-	5	75	21	35	16	25	39/54
2018	1980	-	7	47	47	18	13	41	26/35
2023	2280	-	14	84	2	13	11	2	-/-
<b>Dasiphora fruticosa -- (shrubby cinquefoil)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	20	0	0	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	15/16
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1998	940	-	6	77	17	0	0	0	24/26
2003	820	-	10	90	0	49	7	0	21/28
2008	480	-	13	83	4	4	0	0	20/22
2013	180	-	0	89	11	11	0	11	22/25
2018	540	-	37	56	7	0	33	19	24/32
2023	180	-	22	78	0	0	11	0	-/-
<b>Escobaria vivipara -- (spiny star)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	9/9
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	1400	-	4	90	6	0	0	3	27/30
2003	900	-	16	84	0	0	0	0	17/15
2008	1480	40	8	89	3	14	0	3	15/21
2013	720	-	28	72	0	0	0	0	18/21
2018	2520	-	3	97	0	0	0	0	15/17
2023	1540	40	34	65	1	12	12	1	-/-
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	100	0	0	0	0	0	-/-
2013	20	-	100	0	0	0	0	0	-/-
2018	20	-	100	0	0	0	0	0	-/-
2023	40	-	100	0	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	80	20	0	100	0	0	0	0	2/11
2003	80	-	0	100	0	0	0	0	3/8
2008	100	-	0	100	0	0	0	0	5/7
2013	100	-	0	100	0	0	0	0	5/10
2018	-	-	-	-	-	-	-	-	4/8
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1998	40	20	50	50	0	0	0	0	-/-
2003	20	20	100	0	0	0	0	0	-/-
2008	40	-	50	50	0	0	0	0	-/-
2013	60	-	67	33	0	0	0	0	-/-
2018	40	40	100	0	0	0	0	0	-/-
2023	20	-	100	0	0	0	0	0	-/-
<b>Pinus ponderosa<sup>t</sup> -- (ponderosa pine)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	100	0	0	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	2000	120	9	88	3	77	1	0	53/112
2003	1540	-	4	84	12	31	62	0	63/128
2008	1580	20	8	56	37	47	17	6	48/102
2013	1740	160	6	84	10	45	33	22	56/110
2018	1340	20	2	43	55	40	27	57	47/98
2023	1680	40	1	96	2	50	18	8	-/-
<b>Sclerocactus -- (fishhook cactus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	10/23
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	80	-	0	75	25	0	0	0	30/41
2003	120	-	0	67	33	0	17	17	21/31
2008	160	-	13	38	50	0	0	50	22/36
2013	100	-	20	80	0	60	0	0	28/44
2018	60	-	0	33	67	67	0	67	27/37
2023	240	-	42	58	0	33	0	0	-/-

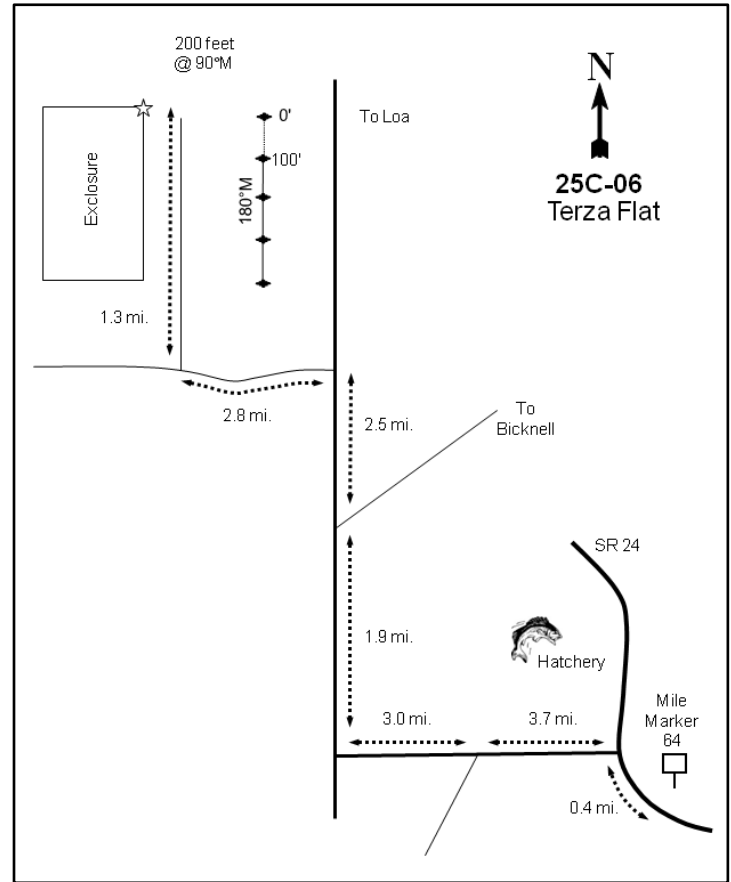
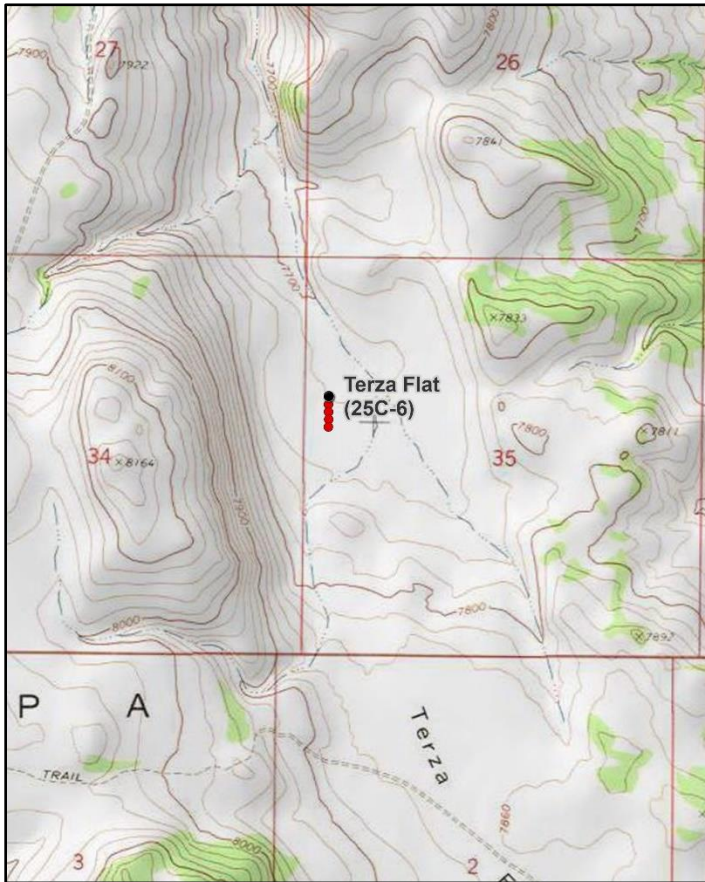
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 25C-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' (%)	
<b>Juniperus osteosperma &amp; J. scopulorum (Utah and Rocky Mountain juniper)</b>							
1998	10	-	-	-	-	-	11.6
2008	21	-	8	8	33	50	20.0
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2003	21	-	20	30	10	40	16.7
2008	21	-	8	8	33	50	20.0
2013	20	-	11	11	33	44	21.8
2018	23	29	29	43	-	-	11.4
2023	17	33	67	-	-	-	2.3
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	23	-	-	-	-	-	10.4
2003	36	-	41	12	18	29	10.6
2008	39	-	18	24	18	41	13.1
2013	38	14	14	21	14	36	13.1
2018	21	11	44	11	22	11	8.4
<b>Pinus ponderosa (ponderosa pine)</b>							
1998	14	-	-	-	-	-	31.0
2008	13	-	29	-	-	71	23.6
2013	10	-	40	-	-	60	23.6
2018	19	-	29	-	-	71	21.4
2023	22	27	-	9	-	64	20.5



## TERZA FLAT - STUDY NO. 25C-6

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Moroni Peak NE; Township 28S, Range 2E, Section 35  
NAD 83 UTM ZONE 12, 441498 East 4243112 North

**Transect Information**

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

7175  
170° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

Traveling south from Bicknell, turn on the road (east) towards Bicknell Fish Hatchery: this road is 0.4 miles north of mile marker 64. Travel east for 3.7 miles to a fork and stay right (a sign says left is toward King's Ranch). Continue 3.0 miles to an intersection. Turn right (north) here and drive for 1.9 miles to a fork; stay left (straight) and proceed for another 2.5 miles to a road going left (west). Turn left and drive 2.8 miles to a road going right (north). Take this road for 1.3 miles to an enclosure -- drive to the northeast corner. The 0-foot end of the baseline is 200 feet east of the corner in line with the fence. The 0-foot stake is a fencepost marked by browse tag #7175 and the other stakes are marked by rebar.

**Site Information**

Land Ownership Federal  
Land Administrator BLM  
Allotment LOA WINTER  
Elevation 7,710ft (2,350m)  
Aspect Northeast  
Slope 3%  
Sample Dates 07/21/1994, 07/22/1998, 08/21/2003, 08/20/2008, 08/12/2013, 07/18/2018, 07/17/2023

**Wildlife Habitat and Vegetation History****Table 25C-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Pronghorn	crucial	winter

**Table 25C-06.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Yellow Rabbitbrush	No Encroachment
1991	Yellow Rabbitbrush	No Encroachment
1994	Yellow Rabbitbrush	No Encroachment
1998	Yellow Rabbitbrush	No Encroachment
2003	Yellow Rabbitbrush	No Encroachment
2008	Yellow Rabbitbrush	No Encroachment
2013	Yellow Rabbitbrush	No Encroachment
2023	Yellow Rabbitbrush	No Encroachment

**Site Notes**

There appears to have been some sort of disturbance prior to study establishment in 1985. Pronghorn can be found in the area year-round. Due to the difficulty in distinguishing between pronghorn and deer pellet groups, pellet groups for these species have been combined.

**Soils****Table 25C-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	7.2	50.0	25.4	24.6	1.4	7.7	128.0	0.6	07/22/1998

**Site Potential**

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

Since the establishment of the study in 1985, yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *stenophyllus*) has dominated the shrub component of this site. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has increased in cover since 2003, but remains a minor component as of the most recent sample year (Photos, Pre-1992 Data, Table 25C-06.12, Table 25C-06.13). A diverse number of annual forb species persisted between 1994 and 2013 and again in 2023, with saltlover (*Halogeton glomeratus*) as the most abundant species. However, no forbs were observed in the 2018 sample year (Table 25C-06.7, Table 25C-06.11). This site will likely need rehabilitation to improve the sparse herbaceous understory.

Deer winter range condition has generally remained very poor since 1994. Improvement to deer wintering range can be accomplished through efforts that support mature preferred browse populations and recruitment of young. In addition, diversifying and increasing cover for both native perennial forbs and grasses would greatly improve winter range conditions (Table 25C-06.15). According to pellet transect data, mule deer presence has remained low since 2013 (Table 25C-06.9).

## Trend Summary Tables

**Table 25C-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
1994	2.1	7.4	-	-	-	-
1998	4.4	10.9	-	-	-	-
2003	2.7	6.7	-	2.9	9.0	-
2008	2.7	6.2	-	3.9	11.6	-
2013	2.3	8.5	-	4.8	14.0	-
2018	2.7	7.4	-	5.0	10.4	-
2023	3.8	13.1	-	6.7	20.2	-

**Table 25C-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
1994	-	44	126	4	-	0.4	3.9	0.0
1998	-	38	91	-	-	0.4	1.7	-
2003	-	-	141	-	-	-	7.1	-
2008	-	0	157	4	-	0.0	9.5	0.0
2013	-	3	126	1	-	0.0	3.3	0.0
2018	-	1	-	-	-	0.0	-	-
2023	-	4	72	3	-	0.0	6.7	0.0

**Table 25C-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
1994	33.6	0.0	16.2	25.2	6.6	13.7
1998	43.4	0.2	12.0	30.3	6.4	17.3
2003	38.6	0.0	6.9	34.5	9.9	16.7
2008	22.9	0.2	13.3	53.4	6.1	19.0
2013	45.2	0.1	6.4	33.0	5.4	13.7
2018	47.5	0.1	13.4	40.7	8.2	10.7
2023	32.4	0.1	7.3	36.7	18.0	22.0

**Table 25C-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	Rocky Mountain Elk	Rabbit	Domestic Sheep
	Quadrat Frequency				
1994	-	20	4	74	-
1998	1	50	6	61	-
2003	-	6	-	39	-
2008	1	21	2	85	-
2013	-	3	-	10	-
2018	-	1	2	62	-
2023	-	5	-	2	-
Year	Days Use Per Acre (ha)				
1994	-	-	-	-	-
1998	2.9 (7.2)	56.3 (139.0)	9.4 (23.2)	-	4.7 (11.6)
2003	0.7 (1.8)	10.7 (26.5)	0.7 (1.7)	-	-
2008	-	24.1 (59.6)	-	-	-
2013	0.7 (1.8)	11.4 (28.1)	-	-	-
2018	0.7 (1.8)	4.0 (9.9)	1.3 (3.3)	-	-
2023	-	2.7 (6.6)	1.3 (3.3)	-	-

**Table 25C-06.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested	
	Achnatherum hymenoides (Indian ricegrass)	
Elymus elymoides (squirreltail)		
year	Nested	
1994	-	44
1998	2	38
2003	-	-
2008	-	0
2013	-	3
2018	-	1
2023	0	4
year	Average Cover (%)	
1994	-	0.4
1998	0.0	0.4
2003	-	-
2008	-	0.0
2013	-	0.0
2018	-	0.0
2023	0.0	0.0

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

**Table 25C-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency											
Astragalus (milkvetch)												
Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)												
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)												
Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)												
Descurainia <sup>a</sup> (tansymustard)												
Draba <sup>a</sup> (draba)												
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)												
Halogeton glomeratus <sup>ai</sup> (saltlover)												
Lappula occidentalis <sup>a</sup> (flatspine stickseed)												
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)												
Salsola tragus <sup>ai</sup> (prickly Russian thistle)												
Sphaeralcea grossularifolia (gooseberryleaf globemallow)												
year	Nested Frequency											
1994	4	-	8	-	-	4	-	118	-	5	67	-
1998	-	-	-	-	1	-	-	89	7	-	-	-
2003	-	-	9	2	-	-	0	139	-	-	-	-
2008	4	5	-	-	-	-	-	152	-	-	-	-
2013	-	-	-	-	-	-	-	100	-	-	26	1
2018	-	-	-	-	-	-	-	-	-	-	-	-
2023	2	-	3	1	8	-	-	66	26	-	-	1
year	Average Cover (%)											
1994	0.0	-	0.0	-	-	0.0	-	2.8	-	0.0	1.0	-
1998	-	-	-	-	0.0	-	-	1.7	0.0	-	-	-
2003	-	-	0.1	0.0	-	-	0.0	7.0	-	-	-	-
2008	0.0	0.0	-	-	-	-	-	9.5	-	-	-	-
2013	-	-	-	-	-	-	-	3.0	-	-	0.2	0.0
2018	-	-	-	-	-	-	-	-	-	-	-	-
2023	0.0	-	0.0	0.0	0.2	-	-	5.7	0.7	-	-	0.0

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

**Table 25C-06.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)					
	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Krascheninnikovia lanata <sup>p</sup> (winterfat)
year	Line Intercept Cover (%)					
1994	-	-	-	-	-	-
1998	-	-	-	-	-	-
2003	-	0	2.6	8.8	0.2	0.3
2008	0.1	-	3.7	11.4	0.2	0.1
2013	0.1	-	4.7	14	-	-
2018	0.1	-	4.9	10	0.4	-
2023	0.1	-	6.4	19.9	0.3	0.2
year	Quadrat Cover (%)					
1994	0.6	0.4	1.1	7.2	0.2	0.1
1998	0.8	1.0	2.3	10.8	0.1	0.4
2003	0.1	0.0	2.4	6.3	0.3	0.2
2008	0.1	0.1	2.4	5.8	0.4	0.1
2013	0.0	0.0	2.2	8.4	0.1	0.1
2018	0.0	-	2.6	7.2	0.2	0.0
2023	0.0	-	3.6	12.5	0.6	0.1

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

**Table 25C-06.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
1994	4260	-	4	70	26	0	0	18	5/12
1998	1320	4240	23	76	2	20	5	0	11/18
2003	140	-	0	100	0	0	14	0	12/14
2008	700	20	11	86	3	40	23	0	9/17
2013	60	-	0	100	0	0	0	0	8/19
2018	80	-	0	100	0	25	0	0	4/11
2023	80	-	50	50	0	0	0	0	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1994	460	-	0	100	0	0	0	0	30/50
1998	360	-	11	83	6	39	0	0	29/45
2003	60	-	0	33	67	33	0	0	34/61
2008	20	-	0	100	0	0	0	0	24/57
2013	140	-	14	86	0	57	29	0	38/62
2018	20	-	0	0	100	0	0	0	- / -
2023	40	-	0	100	0	0	0	0	- / -

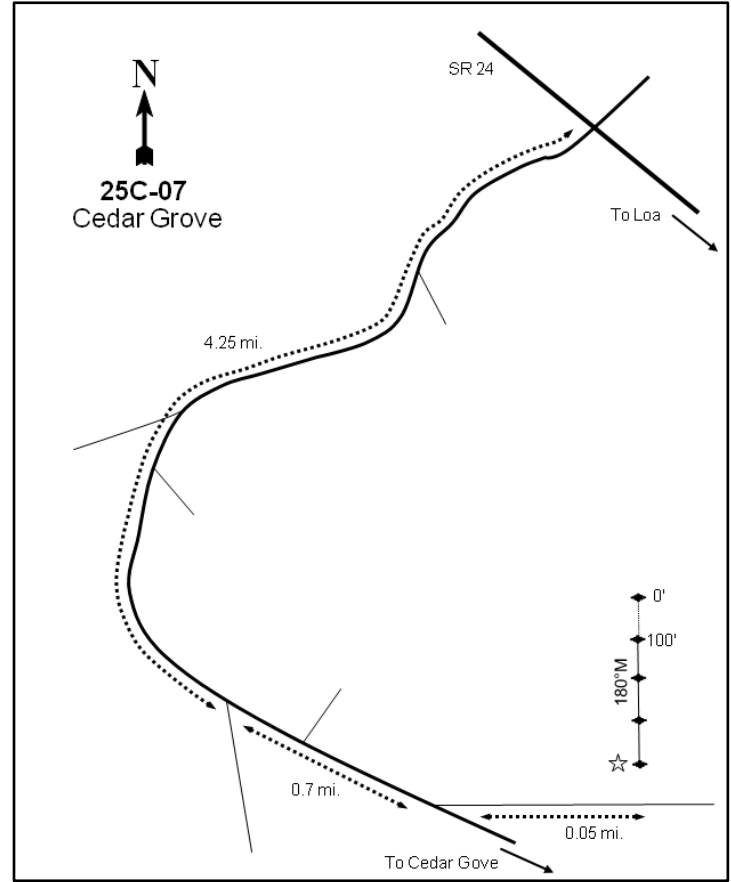
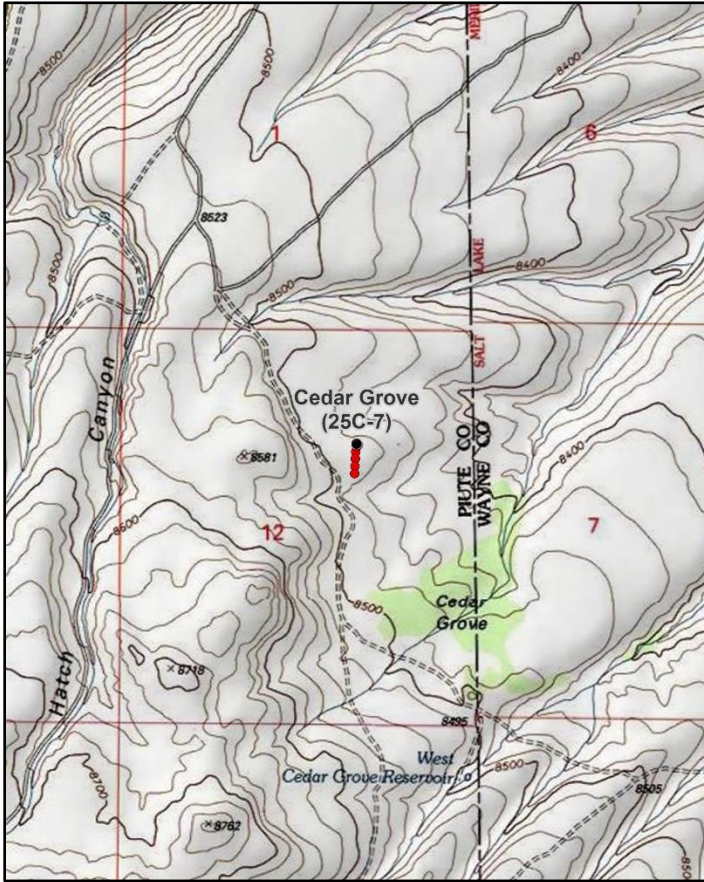
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1994	440	-	0	100	0	9	0	0	31/51
1998	520	-	12	73	15	19	0	0	41/68
2003	640	-	3	66	31	9	3	19	48/86
2008	720	40	8	72	19	19	47	8	44/75
2013	680	-	21	74	6	32	15	0	39/77
2018	760	-	8	55	37	0	5	45	45/98
2023	620	-	3	68	29	29	7	29	- / -
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
1994	200	-	0	100	0	10	40	0	13/16
1998	80	-	100	0	0	25	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	20	-	100	0	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	100	0	0	0	0	0	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1994	11140	660	13	80	7	0	0	3	16/36
1998	10920	720	26	61	13	1	0	3	20/37
2003	9200	-	3	90	8	0	1	4	18/30
2008	11360	20	8	77	15	39	18	5	18/35
2013	9660	1840	34	66	0	1	0	0	19/40
2018	11080	-	11	76	13	24	10	73	15/29
2023	12540	-	30	69	2	0	0	2	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1994	1300	40	2	82	17	0	0	8	13/14
1998	120	580	0	100	0	0	0	0	14/14
2003	720	-	0	100	0	0	0	0	16/24
2008	720	-	0	100	0	0	0	0	14/19
2013	140	60	0	100	0	0	0	0	13/14
2018	1600	-	0	94	6	0	0	18	9/12
2023	1360	-	18	82	0	0	0	0	- / -
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
1994	1120	-	0	77	23	36	0	9	10/13
1998	1380	60	12	87	1	48	20	1	7/13
2003	460	-	0	96	4	0	91	4	15/21
2008	440	60	14	73	14	9	86	0	9/12
2013	140	-	0	100	0	0	100	0	5/9
2018	200	-	10	70	20	0	70	50	5/8
2023	220	-	18	82	0	0	9	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	16/32
2003	-	-	-	-	-	-	-	-	- / -
2008	20	-	0	100	0	0	0	0	13/26
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	9/56

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

**Table 25C-06.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1994	2.5	0.0	0.0	0.9	0.0	0.0	0.0	<b>3.4</b>	Very Poor
1998	5.3	0.0	0.0	0.8	0.0	0.0	0.0	<b>6.1</b>	Very Poor
2003	3.6	0.0	0.0	0.0	0.0	0.0	0.0	<b>3.6</b>	Very Poor
2008	4.9	0.0	0.0	0.0	0.0	0.0	0.0	<b>4.9</b>	Very Poor
2013	6.0	0.0	0.0	0.1	0.0	0.0	0.0	<b>6.1</b>	Very Poor
2018	6.2	0.0	0.0	0.1	0.0	0.0	0.0	<b>6.3</b>	Very Poor
2023	8.4	6.7	2.2	0.1	0.0	0.1	0.0	<b>17.4</b>	Very Poor

## CEDAR GROVE - STUDY NO. 25C-7

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Abes Knoll SW; Township 28S, Range 1W, Section 12  
NAD 83 UTM ZONE 12, 425461 East 4249782 North

**Transect Information**

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

\*7178  
180° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

Travel northwest out of Loa on SR-24 for about 11 miles to the summit (marked by a sign saying "Elevation 8410 ft."). Turn left on a gravel road (Cedar Grove Road) and go 4.25 miles to a fork (West Cedar Grove Road). Turn left and continue for 0.75 miles to a faint road to the left. Turn onto this road and travel for 0.05 miles (about 55 paces) to a rebar 50 feet to the north of the road: this rebar is tagged #7179 and marks the 400-foot stake. The other stakes are marked by short (1-foot) rebar. The 0-foot baseline stake is 390 feet true north of the 400-foot stake. \*The 100-foot stake has a red browse tag #7178 attached.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	8,480ft (2,585m)
Aspect	Southeast
Slope	5-7%
Sample Dates	08/19/1998, 08/25/2003, 08/20/2008, 08/08/2013, 07/18/2018, 07/18/2023



**Wildlife Habitat and Vegetation History****Table 25C-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-07.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush/Black Sagebrush	No Encroachment
1991	Mountain Big Sagebrush/Black Sagebrush	No Encroachment
1998	Mountain Big Sagebrush/Black Sagebrush	No Encroachment
2003	Mountain Big Sagebrush/Black Sagebrush	No Encroachment
2008	Mountain Big Sagebrush/Black Sagebrush	No Encroachment
2013	Mountain Big Sagebrush/Black Sagebrush	No Encroachment
2023	Mountain Big Sagebrush/Black Sagebrush	No Encroachment

**Site Notes**

Pronghorn may be present in the area year-round. Due to the similarities between pronghorn and deer pellet groups, the two species' pellet groups have been combined. Thermal and escape cover for wildlife is minimal in the area, but can be found in a small stand of Utah juniper (*Juniperus osteosperma*) a third of a mile away from the study site. Cattle were present on the site in 1985 and 1991.

**Soils****Table 25C-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	6.1	48.0	29.4	22.6	2.4	16.9	195.2	0.4	08/19/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      21 inches  
 NRCS Ecological Site    Upland Stony Loam (Black Sagebrush)  
 NRCS Ecological Site #    R047XB332UT  
 States and Transitions    No state and transition model is available for this ecological site.

This site has maintained a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*A. nova*) since study establishment in 1985; other shrub species have remained relatively scarce (Photos, Pre-1992 Data, Table 25C-07.12, Table 25C-07.13). The herbaceous understory has been diverse, with the perennial grass muttongrass (*Poa fendleriana*) as the most abundant species in all sample years (Table 25C-07.7, Table 25C-07.10, Table 25C-07.11). Rocky Mountain juniper (*Juniperus scopulorum*) was observed in point-quarter measurements in 2018 and again in 2023 (Table 25C-07.14). Although the site is considered to be within Phase I of woodland succession as of 2023 (Table 25C-07.4), there may be potential for further encroachment in future sample years.

Deer winter range condition has ranged between poor and good since 1998. In 2023, deer winter range condition was considered to be fair. Improvement to deer wintering range can be accomplished through efforts that increase age class diversification for each respective population of sagebrush. Diversifying species composition of native perennial forbs while increasing cover would also improve winter range condition (Table 25C-07.15). In addition, sagebrush on this study site could provide valuable browse for elk that may use the area during the winter months (Table 25C-07.3; Wambolt, 1996). However, pellet transect data indicates that elk presence has been low since 2008; deer presence has remained low since 1998 (Table 25C-07.9).

## Trend Summary Tables

**Table 25C-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
1998	15.0	0.0	-	-	-	-
2003	21.2	0.1	-	20.6	-	-
2008	16.4	0.2	-	23.3	0.1	-
2013	16.4	0.0	-	21.8	-	-
2018	19.9	-	-	21.2	0.1	-
2023	19.1	0.3	-	22.9	0.1	-

**Table 25C-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
1998	-	300	64	151	-	10.0	0.4	1.5
2003	-	271	34	73	-	8.8	0.1	0.9
2008	-	279	20	121	-	9.8	0.1	1.2
2013	-	281	25	109	-	11.0	0.1	1.4
2018	-	285	11	78	-	12.8	0.1	0.8
2023	-	247	41	121	-	8.9	0.2	2.7

**Table 25C-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
1998	16.3	0.4	27.7	24.0	9.0	32.4
2003	22.6	0.9	21.1	22.8	12.5	28.3
2008	25.2	0.7	22.6	32.2	9.9	26.2
2013	21.8	0.9	21.4	23.6	9.4	30.4
2018	42.0	2.2	22.7	18.3	11.3	26.1
2023	27.9	0.7	25.9	17.1	19.0	25.7

**Table 25C-07.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	-	7	9	30
2003	1	8	11	58
2008	3	6	2	74
2013	2	7	-	22
2018	-	2	1	60
2023	-	10	-	20
Year	Days Use Per Acre (ha)			
1998	4.4 (10.8)	3.4 (8.3)	25.5 (62.9)	-
2003	8.0 (19.7)	8.7 (21.5)	24.8 (61.2)	-
2008	2.2 (5.4)	13.4 (33.1)	6.0 (14.9)	-
2013	4.4 (10.8)	2.7 (6.6)	-	-
2018	3.6 (9.0)	10.0 (24.8)	4.0 (9.9)	-
2023	2.9 (7.2)	10.7 (26.5)	3.4 (8.3)	-

**Table 25C-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Bouteloua gracilis (blue grama)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency						
1998	-	14	33	51	1	252	5
2003	3	17	12	40	2	244	4
2008	17	15	53	26	2	233	26
2013	12	23	61	24	4	231	9
2018	13	22	72	41	4	214	5
2023	11	16	92	50	12	140	2
year	Average Cover (%)						
1998	-	0.3	0.2	0.4	0.0	9.0	0.1
2003	0.0	0.5	0.0	0.3	0.0	7.8	0.2
2008	0.2	0.4	0.3	0.3	0.0	7.8	0.7
2013	0.1	0.3	0.5	0.4	0.0	9.2	0.4
2018	0.3	0.6	0.8	1.2	0.0	9.6	0.2
2023	0.3	0.6	2.1	0.8	0.1	4.9	0.0

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

**Table 25C-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis demissa (nodding rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Astragalus purshii (woollypod milkvetch)	Brassicaceae <sup>a</sup> (mustard family)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)
year	Nested Frequency																
1998	63	2	11	15	-	-	-	-	-	3	-	4	1	-	33	30	-
2003	21	1	-	3	1	-	-	7	2	-	-	-	-	3	1	9	-
2008	20	5	10	12	4	-	-	-	-	-	-	16	-	-	13	11	-
2013	23	4	8	6	-	-	-	-	-	-	4	10	2	-	5	8	-
2018	11	12	-	-	-	3	3	-	-	1	-	8	-	-	10	4	-
2023	16	-	4	5	2	-	-	-	-	-	5	5	-	-	14	4	10
year	Average Cover (%)																
1998	0.4	0.0	0.0	0.1	-	-	-	-	-	0.0	-	0.0	0.0	-	0.1	0.3	-
2003	0.1	0.0	-	0.0	0.0	-	-	0.0	0.0	-	-	-	-	0.0	0.0	0.0	-
2008	0.1	0.0	0.0	0.1	0.0	-	-	-	-	-	-	0.1	-	-	0.0	0.1	-
2013	0.1	0.0	0.0	0.0	-	-	-	-	-	-	0.0	0.1	0.0	-	0.0	0.1	-
2018	0.1	0.1	-	-	-	0.0	0.0	-	-	0.0	-	0.1	-	-	0.1	0.0	-
2023	0.2	-	0.1	0.1	0.1	-	-	-	-	-	0.0	0.0	-	-	0.3	0.0	0.0

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

FORB SPECIES	Hymenoxys richardsonii (pingue rubberweed)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lomatium triternatum (nineleaf biscuitroot)	Lotus utahensis (Utah bird's-foot trefoil)	Machaeranthera grindelioioides (rayless tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Packera multilobata (lobeleaf groundsel)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Silene antirrhina <sup>a</sup> (sleepy silene)	Trifolium (clover)
year	Nested Frequency													
1998	-	-	-	-	1	-	-	3	21	55	20	1	-	0
2003	-	-	3	9	-	-	3	-	15	20	21	-	2	3
2008	-	-	-	1	4	2	-	3	32	43	14	-	-	7
2013	1	-	-	-	5	5	-	3	21	26	19	-	-	1
2018	-	-	-	-	3	1	-	-	20	13	13	-	-	-
2023	-	2	6	25	5	2	6	-	19	39	23	-	-	13
year	Average Cover (%)													
1998	-	-	-	-	0.0	-	-	0.0	0.4	0.2	0.4	0.0	-	0.0
2003	-	-	0.0	0.0	-	-	0.0	-	0.2	0.1	0.5	-	0.0	0.0
2008	-	-	-	0.0	0.0	0.0	-	0.0	0.2	0.1	0.4	-	-	0.1
2013	0.0	-	-	-	0.0	0.0	-	0.0	0.5	0.1	0.6	-	-	0.0
2018	-	-	-	-	0.0	0.0	-	-	0.2	0.1	0.3	-	-	-
2023	-	0.0	0.0	0.1	0.3	0.0	0.0	-	0.7	0.2	0.7	-	-	0.1

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

**Table 25C-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)
year	Line Intercept Cover (%)						
1998	-	-	-	-	-	-	-
2003	13.2	7.4	-	0	-	-	-
2008	13.4	9.9	0.1	0	0	-	-
2013	12.8	9	-	-	-	0	-
2018	11.9	9.2	-	0.1	0.1	-	-
2023	8.9	13.9	0.1	0.1	-	-	-
year	Quadrat Cover (%)						
1998	7.4	7.6	-	0.0	0.0	-	-
2003	11.6	9.6	0.1	0.0	0.0	-	0.0
2008	7.8	8.6	0.0	0.0	0.2	-	0.0
2013	9.4	6.9	-	0.0	-	0.0	0.0
2018	10.4	9.4	-	0.1	0.0	-	-
2023	9.7	9.3	0.0	0.1	0.3	-	-

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

**Table 25C-07.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>P</sup> -- (prairie sagewort)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	80	-	0	100	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1998	4120	80	6	79	16	12	12	5	29/55
2003	4000	-	0	69	32	6	1	17	31/57
2008	4440	1460	1	51	49	14	25	30	26/57
2013	3680	140	12	73	15	21	0	16	29/62
2018	5240	-	8	68	24	1	1	17	24/49
2023	3760	320	9	73	18	2	1	18	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	2440	40	2	56	43	37	21	16	42/66
2003	2780	-	1	45	53	13	4	27	50/76
2008	2600	1180	8	38	55	30	52	39	45/78
2013	2320	-	10	62	28	46	8	24	53/85
2018	2540	-	8	58	34	12	0	16	44/71
2023	3000	140	3	71	27	29	3	28	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1998	60	-	0	100	0	0	0	0	21/22
2003	440	20	18	82	0	0	0	0	15/14
2008	60	-	0	67	33	0	33	0	19/21
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	120	-	17	83	0	0	0	0	- / -
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1998	260	-	15	85	0	0	0	0	15/20
2003	280	-	0	100	0	50	36	0	13/17
2008	240	20	0	83	17	25	58	17	13/15
2013	140	-	43	57	0	14	0	0	12/16
2018	260	-	23	77	0	8	0	8	11/15
2023	100	-	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	220	-	0	100	0	0	0	0	22/23
2003	240	-	25	75	0	0	0	0	10/12
2008	540	40	0	100	0	7	15	0	16/16
2013	20	-	0	100	0	0	0	0	19/24
2018	220	-	0	100	0	0	0	0	13/14
2023	180	-	0	100	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	15/9
2008	20	-	0	0	100	0	0	0	21/35
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	7/11
2013	20	-	100	0	0	0	0	0	6/12
2018	-	-	-	-	-	-	-	-	11/28
2023	20	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	60	-	0	100	0	0	0	0	2/4
2008	40	-	50	50	0	0	0	0	4/6
2013	40	-	0	100	0	0	0	0	3/8
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	0	100	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	-	-	-	-	-	-	-	-	77/225
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1998	-	-	-	-	-	-	-	-	48/125
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	25/72
2018	-	-	-	-	-	-	-	-	29/69
2023	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	20	-	0	100	0	100	0	0	10/13
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	100	0	0	0	0	0	- / -
2023	20	-	0	100	0	0	0	0	- / -

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

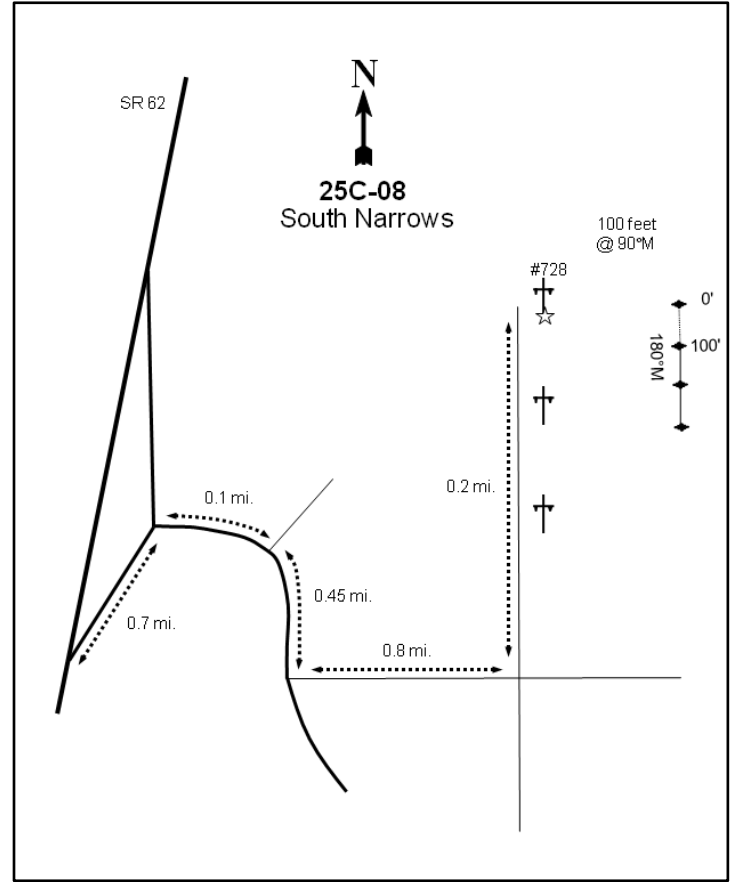
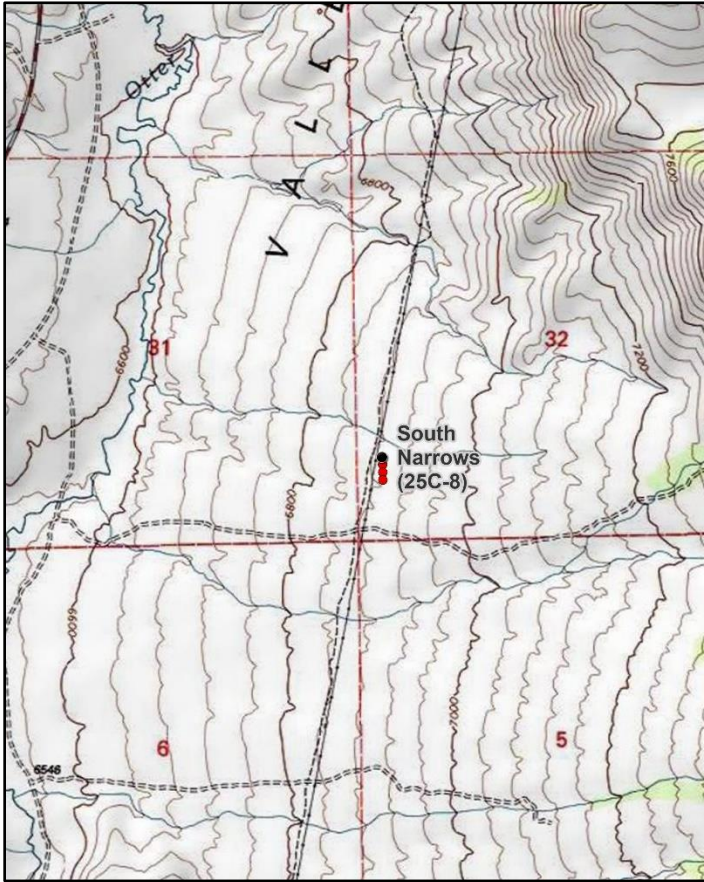
**Table 25C-07.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	10	-	100	-	-	-	3.0
2023	2	-	100	-	-	-	4.0

**Table 25C-07.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	18.8	6.2	1.8	20.0	0.0	3.0	0.0	<b>49.8</b>	Poor-Fair
2003	25.8	3.2	0.3	17.7	0.0	1.8	0.0	<b>48.7</b>	Poor-Fair
2008	29.1	-0.4	1.8	19.6	0.0	2.4	0.0	<b>52.5</b>	Fair
2013	27.3	8.9	5.5	21.9	0.0	2.9	0.0	<b>66.5</b>	Fair-Good
2018	26.5	6.5	3.9	25.5	0.0	1.6	0.0	<b>64.0</b>	Fair-Good
2023	28.6	8.0	2.6	17.7	0.0	5.4	0.0	<b>62.3</b>	Fair

## SOUTH NARROWS - STUDY NO. 25C-8

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Parker Knoll NE; Township 28S, Range 1W, Section 32  
NAD 83 UTM ZONE 12, 418168 East 4242552 North

**Transect Information**

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

7120  
172° magnetic  
300ft  
Line 1 (11ft & 71ft), Line 2 (34ft & 95ft), Line 3 (59ft)  
Belt 4: 2ft

**Directions to Site**

Proceed south of Koosharem on SR-62. Turn left (east) at mile marker 24, travel northeast for 0.7 miles, and turn right. Proceed east 0.1 miles to another fork and turn right. Continue for 0.45 miles and turn left, just across the creek (Otter Creek). Go 0.8 miles east and turn left. Drive parallel to the powerline (north) for 0.2 miles to pole #728. The frequency baseline begins 100 feet east of this powerpole; the 0-foot baseline stake is tagged #7120 and all stakes are rebar.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	SOUTH NARROWS
Elevation	6,900ft (2,103m)
Aspect	Southwest
Slope	4%
Sample Dates	07/27/1994, 08/07/1998, 08/27/2003, 08/14/2008, 06/25/2009, 08/05/2013, 07/01/2018, 07/07/2023

**Wildlife Habitat and Vegetation History****Table 25C-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-08.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1994	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2009	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

Water for wildlife can be found one half of a mile away at Otter Creek. A deer carcass was found south of the site in 2013.

**Soils****Table 25C-08.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.3	54.0	31.4	14.6	1.5	13.5	105.6	0.5	08/07/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      9 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.

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has dominated the shrub component of this site since study establishment in 1985, while other shrub species have been present to a lesser extent (Photos, Pre-1992 Data, Table 25C-08.12, Table 25C-08.13). Perennial grasses, primarily blue grama (*Bouteloua gracilis*) and needle and thread (*Hesperostipa comata*), have contributed a majority of the herbaceous cover in all sample years since 1994. Annual grasses as well as perennial and annual forbs have remained rare (Table 25C-08.7, Table 25C-08.10, Table 25C-08.11). Utah juniper (*Juniperus osteosperma*) and/or twoneedle pinyon (*Pinus edulis*) have been observed in low amounts in all sample years (Photos, Table 25C-08.12, Table 25C-08.13, Table 25C-08.14), and the site has been considered to be within Phase I of woodland succession since study establishment (Table 25C-08.4).

Deer winter range condition has ranged between poor and fair since 1994. In 2023, deer winter range condition was considered to be poor to fair. Improvement to deer winter range can be accomplished through efforts that support the diversification of preferred browse age class structure and increasing preferred browse cover; increasing cover of and diversifying native perennial forb species while reducing cheatgrass would also improve winter range conditions (Table 25C-08.15). In addition, sagebrush on this site could provide valuable browse for wintering elk (Table 25C-08.3; Wambolt, 1996). However, pellet transect data shows that elk presence has remained low since 1998; mule deer presence has been low since 2013 (Table 25C-08.9).



## Trend Summary Tables

**Table 25C-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
1994	11.1	0.0	0.1	-	-	-
1998	9.9	0.1	0.0	-	-	-
2003	14.1	0.4	-	12.9	-	-
2008	10.4	0.3	-	15.8	0.2	-
2009	12.9	0.2	-	13.4	0.1	-
2013	12.3	0.4	-	16.9	-	-
2018	11.0	0.0	-	13.1	-	-
2023	9.1	0.0	-	15.4	-	-

**Table 25C-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
1994	1	396	90	19	0.0	18.0	0.3	0.1
1998	14	402	14	12	0.1	13.5	0.0	0.1
2003	-	368	41	4	-	13.5	0.3	0.0
2008	-	360	-	1	-	17.9	-	0.0
2009	-	377	8	6	-	16.4	0.0	0.0
2013	-	368	-	23	-	19.6	-	0.1
2018	5	384	3	15	0.0	17.3	0.0	0.1
2023	9	350	76	18	0.2	21.2	1.1	0.1

**Table 25C-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
1994	16.2	0.3	17.2	3.6	25.5	26.8
1998	20.4	0.9	26.4	15.1	25.7	27.5
2003	17.6	0.5	20.4	15.3	25.2	28.2
2008	6.9	0.5	30.1	16.9	24.7	32.3
2009	15.3	0.4	22.9	11.8	23.6	28.5
2013	11.2	0.1	24.2	13.7	22.6	34.2
2018	24.5	0.1	24.7	12.4	28.8	23.5
2023	12.9	0.3	26.4	11.0	35.4	30.4

**Table 25C-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1994	3	-	24	7	17
1998	1	-	36	11	16
2003	2	-	23	5	23
2008	4	-	42	4	56
2009	1	-	28	5	27
2013	1	-	18	-	12
2018	2	-	16	-	40
2023	1	-	29	-	4
Year	Days Use Per Acre (ha)				
1994	-	-	-	-	-
1998	2.9 (7.2)	-	30.2 (74.5)	16.1 (39.7)	-
2003	9.4 (23.3)	-	29.5 (72.8)	16.8 (41.4)	-
2008	8.7 (21.5)	8.7 (21.5)*	70.4 (173.8)	17.4 (43.0)	-
2009	-	-	-	-	-
2013	4.4 (10.8)	-	14.7 (36.4)	2.0 (5.0)	-
2018	8.7 (21.5)	-	16.8 (41.4)	-	-
2023	0.7 (1.8)	-	15.4 (38.1)	2.0 (5.0)	-

\*Pellets per acre (ha)

**Table 25C-08.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Phleum pratense <sup>i</sup> (timothy)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency						
1994	52	351	1	61	114	-	8
1998	27	328	14	63	185	-	3
2003	8	312	-	22	178	-	1
2008	12	294	-	20	217	-	-
2009	15	317	-	18	205	-	-
2013	86	285	-	12	171	5	-
2018	25	322	5	49	200	-	-
2023	7	300	9	74	119	-	13
year	Average Cover (%)						
1994	1.8	12.3	0.0	0.9	3.0	-	0.1
1998	0.4	9.3	0.1	0.4	3.5	-	0.0
2003	0.2	10.0	-	0.1	3.2	-	0.0
2008	0.3	10.7	-	0.3	6.6	-	-
2009	0.5	11.0	-	0.1	4.8	-	-
2013	2.9	9.2	-	0.1	7.4	0.1	-
2018	0.4	12.2	0.0	1.2	3.5	-	-
2023	0.2	13.2	0.2	2.1	5.7	-	0.1

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

**Table 25C-08.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus (milkvetch)	Chenopodium album <sup>a</sup> (lambsquarters)	Chenopodium leptophyllum <sup>a</sup> (narrow/leaf goosefoot)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron pumilus (shaggy fleabane)	Eriogonum (buckwheat)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium <sup>a</sup> (pepperweed)	Phlox hoodii (spiny phlox)	Phlox longifolia (longleaf phlox)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency												
1994	-	6	-	-	20	12	10	-	65	21	-	3	-
1998	-	3	-	-	2	9	9	-	3	-	-	-	-
2003	-	-	-	-	17	-	-	-	28	-	1	-	3
2008	-	-	-	-	-	-	1	-	-	-	-	-	-
2009	1	-	1	-	-	-	2	2	6	-	-	-	2
2013	-	-	-	-	-	-	23	-	-	-	-	-	-
2018	-	6	-	-	-	-	9	-	3	-	-	-	-
2023	-	1	3	10	22	-	10	-	33	36	-	-	7
year	Average Cover (%)												
1994	-	0.0	-	-	0.1	0.0	0.1	-	0.2	0.1	-	0.0	-
1998	-	0.0	-	-	0.0	0.0	0.1	-	0.0	-	-	-	-
2003	-	-	-	-	0.2	-	-	-	0.2	-	0.0	-	0.0
2008	-	-	-	-	-	-	0.0	-	-	-	-	-	-
2009	0.0	-	0.0	-	-	-	0.0	0.0	0.0	-	-	-	0.0
2013	-	-	-	-	-	-	0.1	-	-	-	-	-	-
2018	-	0.1	-	-	-	-	0.0	-	0.0	-	-	-	-
2023	-	0.0	0.0	0.0	0.1	-	0.1	-	0.4	0.5	-	-	0.0

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

**Table 25C-08.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Echinocereus (hedghehog cactus)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)								
1994	-	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-	-
2003	12.9	-	-	-	-	-	0	-	-
2008	15.8	-	-	0.1	-	-	0.1	-	-
2009	13.4	-	-	-	-	-	0	-	0.1
2013	16.9	0	-	-	-	-	0	0	-
2018	13.1	-	-	-	-	-	-	-	-
2023	15.4	-	-	-	-	-	-	-	-
year	Quadrat Cover (%)								
1994	11.1	-	0.0	-	-	0.1	0.0	-	-
1998	9.9	-	-	-	-	0.0	0.0	0.1	-
2003	14.1	-	-	-	0.0	-	0.4	0.0	-
2008	10.4	-	-	0.0	-	-	0.2	-	-
2009	12.9	-	-	-	-	-	0.2	-	0.0
2013	12.3	0.0	-	-	-	-	0.3	0.0	-
2018	11.0	-	-	-	-	-	-	0.0	-
2023	9.1	-	-	-	-	-	-	0.0	-

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

**Table 25C-08.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1994	4340	40	4	61	35	34	2	17	44/74
1998	3900	20	14	54	32	39	10	15	43/71
2003	4440	-	1	43	56	17	0	31	45/73
2008	3980	-	2	32	66	45	22	65	39/71
2009	-	-	-	-	-	-	-	-	43/80
2013	3720	300	2	67	31	57	28	29	49/83
2018	3620	140	3	66	31	3	0	25	44/72
2023	3080	-	8	60	33	20	47	35	- / -
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2009	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	0	0	0	16/29
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	20	-	0	100	0	100	0	0	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	14/28
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	19/29
2003	20	-	0	0	100	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	20	-	0	100	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	20	-	0	100	0	0	0	0	24/15
2003	20	-	0	100	0	0	0	0	17/25
2008	20	-	0	100	0	0	0	0	18/18
2009	-	-	-	-	-	-	-	-	13/13
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1994	60	20	0	100	0	0	0	0	4/8
1998	100	-	40	60	0	0	0	0	9/16
2003	260	-	0	100	0	0	0	8	10/25
2008	140	20	29	57	14	14	0	14	8/28
2009	-	-	-	-	-	-	-	-	8/20
2013	140	-	14	71	14	14	0	29	7/18
2018	40	-	50	50	0	0	0	0	9/16
2023	80	-	50	50	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	140	20	29	71	0	0	0	0	3/6
2003	40	-	0	100	0	0	0	0	5/6
2008	-	-	-	-	-	-	-	-	5/8
2009	-	-	-	-	-	-	-	-	3/6
2013	20	-	0	100	0	0	0	0	3/9
2018	-	20	0	0	0	0	0	0	- / -
2023	20	-	100	0	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	20	0	0	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2009	-	-	-	-	-	-	-	-	11/26

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

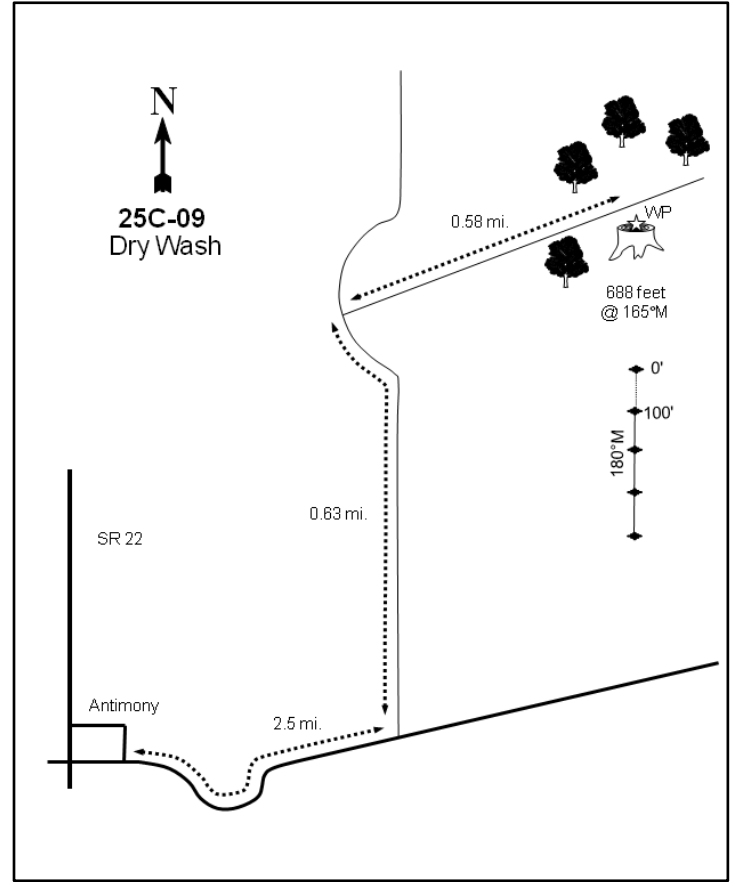
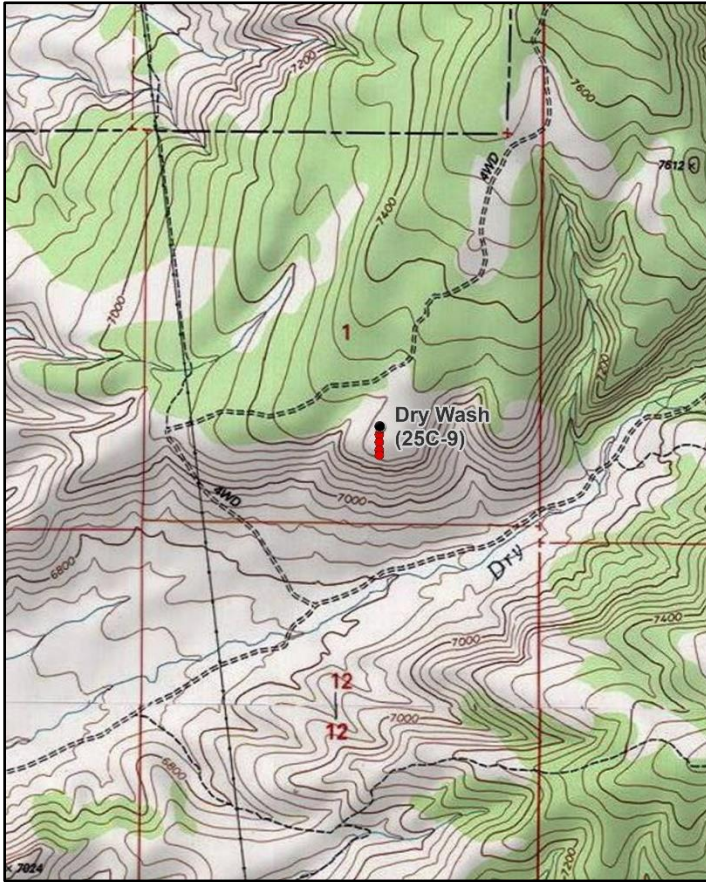
**Table 25C-08.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	1	-	-	100	-	-	23.0
2023	1	-	-	100	-	-	31.0

**Table 25C-08.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1994	13.9	4.5	1.8	30.0	0.0	0.2	0.0	<b>50.4</b>	Poor-Fair
1998	12.4	5.3	6.9	27.1	0.0	0.2	0.0	<b>51.9</b>	Poor-Fair
2003	16.1	-1.8	0.5	27.1	0.0	0.0	0.0	<b>41.9</b>	Poor
2008	19.8	-4.9	1.0	30.0	0.0	0.0	0.0	<b>45.9</b>	Poor
2009	16.8	0.0	0.0	30.0	0.0	0.0	0.0	<b>46.8</b>	Poor
2013	21.1	5.6	1.1	30.0	0.0	0.2	0.0	<b>58.1</b>	Fair
2018	16.4	5.7	1.7	30.0	0.0	0.2	0.0	<b>53.9</b>	Fair
2023	19.3	5.3	3.9	30.0	-0.1	0.2	0.0	<b>58.5</b>	Fair

## DRY WASH - STUDY NO. 25C-9



### Location Information

USGS 7.5 min Map Info      Angle SW; Township 31S, Range 2W, Section 01  
 GPS (0' Stake)              NAD 83 UTM ZONE 12, 416120 East 4221253 North

### Transect Information

Browse Tag # (0' Stake)      7177  
 Transect Bearing              170° magnetic  
 Length                          400ft  
 Belt Placement                Line 1 (95ft), Line 2 (11ft & 71ft), Line 3 (34ft), Line 4 (59ft)  
 Belt Marker Placement      Standard

### Directions to Site

From the town of Antimony, go east on the dump road (off of Main Street between the Antimony School and Antimony Mercantile) 2.5 miles up Dry Wash Canyon, then turn left. Go up the hill 0.63 miles to the top of the ridge and turn right. Drive 0.58 miles to a small stump on the right (south) side of the road with tagged rebar #7176. The 0-foot baseline stake is 688 feet away at 165 degrees magnetic and is marked with browse tag #7177. Because of rocks, the 100-foot end of the baseline is marked by a rebar that is 101 feet away.

### Site Information

Land Ownership                Federal  
 Land Administrator          BLM  
 Allotment                      DRY WASH  
 Elevation                      7,300ft (2,225m)  
 Aspect                          North  
 Slope                            5-10%  
 Sample Dates                 07/27/1994, 08/06/1998, 08/01/2003, 08/06/2008, 07/16/2013, 07/01/2018, 07/05/2023

**Wildlife Habitat and Vegetation History**

**Table 25C-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-09.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1985	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1994	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

In 1994, the old baseline was abandoned as the transect and the new baseline was incorporated into the density plot transect 100 feet to the east. In addition, both transects were read in 1994, but only the new transect’s data was reported. It has been noted that the site has had a history of heavy grazing pressures.

**Soils**

**Table 25C-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	7.2	48.0	29.4	22.6	3.5	9.7	179.2	0.5	08/06/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      9 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.

Since study establishment in 1985, the shrub community on this site has been primarily comprised of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Broom snakeweed (*Gutierrezia sarothrae*) has been present and has increased overall in cover and density (Table 25C-09.12, Table 25C-09.13). Native perennial grasses have consistently been the primary component of the herbaceous understory, with needle and thread (*Hesperostipa comata*) and blue grama (*Bouteloua gracilis*) contributing a majority of the cover. Nested frequency of perennial grasses has fluctuated, while cover has shown an overall increase. Small amounts of cheatgrass (*Bromus tectorum*) have been observed, but with little cover or frequency in most sample years (Table 25C-09.10). Forbs have remained sparse throughout the study period (Table 25C-09.11). Tree cover has increased slightly, but the average diameter has increased significantly over time as trees have aged (Table 25C-09.6, Table 25C-09.14). Without treatment, it is expected that tree cover will continue to increase.

As of 2023, deer winter range condition on this site was considered to be poor to fair. Improvement to deer winter range can be accomplished through efforts that support the diversification of preferred browse age class structure and increasing preferred browse cover; increasing cover of and diversifying native perennial forb species while reducing or removing cheatgrass would also improve winter range conditions (Table 25C-09.15). In addition, the sagebrush component of this site could provide valuable browse to elk that may use the area during the winter months (Table 25C-09.3; Wambolt, 1996). According to pellet group data, mule deer presence was considered to be high in 2023 and is considered high most sample years, while elk presence was moderate but has also been considered high most sample years (Table 25C-09.9).

**Trend Summary Tables**

**Table 25C-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
1994	12.5	2.1	1.0	-	-	-
1998	10.8	3.7	2.3	-	-	0.4
2003	12.2	1.7	3.1	9.0	2.2	7.0
2008	8.2	3.9	3.5	9.8	4.6	6.5
2013	9.1	2.9	4.3	12.9	4.2	7.9
2018	8.8	5.8	5.1	9.9	3.7	9.4
2023	10.6	2.3	5.7	12.9	2.8	10.8

**Table 25C-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
1994	19	277	136	19	0.1	6.1	0.4	0.1
1998	181	300	15	28	1.2	6.7	0.0	0.1
2003	167	246	127	1	3.9	5.2	0.9	0.0
2008	39	253	1	-	0.1	6.9	0.0	-
2013	3	244	6	7	0.0	8.2	0.0	0.0
2018	2	252	-	3	0.0	10.6	-	0.0
2023	13	255	28	6	0.1	11.3	0.1	0.0

**Table 25C-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
1994	11.6	0.0	27.4	11.2	28.9	23.4
1998	17.2	-	23.6	20.8	29.1	25.4
2003	4.5	0.7	24.5	21.1	34.9	26.9
2008	7.4	0.6	30.1	20.5	29.2	21.7
2013	10.8	0.4	28.7	9.4	41.7	22.8
2018	5.7	0.2	35.3	20.1	42.3	28.4
2023	4.1	0.1	32.3	11.5	41.7	28.7

**Table 25C-09.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
1994	-	33	30	-	33
1998	4	34	34	1	37
2003	1	23	26	-	8
2008	-	32	57	-	83
2013	1	31	17	-	23
2018	2	21	4	-	22
2023	1	27	7	1	4
Year	Days Use Per Acre (ha)				
1994	-	-	-	-	-
1998	3.6 (9.0)	40.2 (99.3)	54.3 (134.1)	-	-
2003	2.9 (7.2)	66.4 (163.9)	78.4 (193.7)	-	-
2008	-	22.1 (54.6)	69.0 (170.5)	-	-
2013	3.6 (9.0)	51.6 (127.5)	57.0 (140.7)	-	-
2018	-	38.9 (96.0)	18.7 (46.3)	-	-
2023	-	45.6 (112.6)	30.8 (76.1)	-	-



**Table 25C-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Sporobolus cryptandrus (sand dropseed)
year	Nested Frequency					
1994	117	113	19	81	84	3
1998	111	61	181	103	108	5
2003	49	102	167	34	120	-
2008	41	84	39	59	122	40
2013	44	129	3	77	99	3
2018	67	137	2	9	96	1
2023	61	105	13	43	105	44
year	Average Cover (%)					
1994	1.2	3.1	0.1	0.9	0.9	0.0
1998	1.0	2.2	1.2	1.1	2.2	0.2
2003	0.7	2.4	3.9	0.3	1.8	-
2008	0.9	2.3	0.1	0.8	1.6	1.2
2013	0.5	3.9	0.0	1.4	2.3	0.0
2018	1.6	6.8	0.0	0.2	2.0	0.0
2023	2.2	3.2	0.1	0.9	4.3	0.6

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

**Table 25C-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis demissa (nodding rockcress)	Astragalus purshii (woollypod milkvetch)	Castilleja (Indian paintbrush)	Chenopodium album <sup>a</sup> (lambsquarters)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Salsola tragus <sup>ni</sup> (prickly Russian thistle)
year	Nested Frequency								
1994	-	3	-	24	4	88	14	68	-
1998	-	5	1	-	5	-	18	15	-
2003	-	-	-	-	-	95	1	63	-
2008	-	-	-	1	-	-	-	-	-
2013	2	3	-	3	-	-	2	-	6
2018	-	3	-	-	-	-	-	-	-
2023	-	-	-	15	1	4	5	9	-
year	Average Cover (%)								
1994	-	0.0	-	0.1	0.0	0.2	0.1	0.1	-
1998	-	0.0	0.0	-	0.0	-	0.1	0.0	-
2003	-	-	-	-	-	0.6	0.0	0.3	-
2008	-	-	-	0.0	-	-	-	-	-
2013	0.0	0.0	-	0.0	-	-	0.0	-	0.0
2018	-	0.0	-	-	-	-	-	-	-
2023	-	-	-	0.1	0.0	0.0	0.0	0.0	-

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

**Table 25C-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Krascheninnikovia lanata <sup>p</sup> (winterfat)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)									
1994	-	-	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-	-	-
2003	7.6	1	1.7	0.4	-	0.4	0.1	-	7	-
2008	8.6	0.8	0.8	3.6	-	0.4	0.2	-	6.5	-
2013	12.1	0.4	1.6	2.4	-	0.4	-	0.2	7.9	-
2018	9.6	0.2	0.3	3.3	-	0.1	0.1	-	9.4	-
2023	10.9	1.2	1	1.7	-	0.8	0.1	-	10.8	-
year	Quadrat Cover (%)									
1994	8.1	2.0	1.6	0.5	-	2.4	-	-	1.0	-
1998	5.2	1.0	2.7	1.0	0.1	4.7	-	0.0	2.1	-
2003	9.9	1.6	0.7	1.1	-	0.8	0.0	-	3.1	-
2008	7.2	0.8	0.4	3.5	-	0.2	0.0	-	3.5	-
2013	8.4	0.3	1.1	1.8	-	0.2	-	0.0	4.3	0.1
2018	8.0	0.7	0.4	5.4	-	0.1	0.0	0.0	5.1	-
2023	8.9	1.2	0.3	1.9	-	0.5	0.1	-	5.7	-

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

**Table 25C-09.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1994	4440	240	24	64	12	10	11	7	41/72
1998	2660	240	26	59	14	32	1	9	37/57
2003	4660	-	6	57	37	35	22	12	33/55
2008	4080	-	2	55	43	47	46	21	30/57
2013	4080	140	4	79	17	51	36	9	32/61
2018	4000	-	4	69	28	60	17	23	31/54
2023	3900	-	3	68	29	23	51	31	- / -
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
1994	460	-	9	78	13	22	4	9	54/73
1998	340	-	18	71	12	65	12	6	49/63
2003	360	-	6	67	28	44	33	6	55/67
2008	480	20	8	25	67	58	21	17	64/86
2013	400	-	25	60	15	5	85	0	54/78
2018	280	-	0	57	43	21	79	43	35/44
2023	780	-	15	82	3	18	15	3	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1994	1260	60	44	56	0	5	5	0	23/39
1998	2820	-	17	83	0	0	0	0	23/33
2003	1480	-	0	92	8	0	0	0	18/28
2008	1240	-	0	44	56	2	0	21	14/26
2013	1100	-	9	91	0	38	4	38	18/34
2018	560	-	4	64	32	11	0	4	13/27
2023	1060	-	0	91	9	2	0	9	- / -
<b>Echinocereus -- (hedgehog cactus)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	0	0	0	7/11
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1998	60	-	100	0	0	0	0	0	- / -
2003	60	-	67	33	0	67	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1994	1360	-	22	77	2	0	0	0	19/22
1998	1320	20	20	79	2	0	0	2	22/25
2003	4040	160	46	52	3	2	0	2	16/17
2008	5940	20	0	71	29	0	0	11	19/23
2013	9560	60	41	59	0	0	0	0	12/15
2018	5800	20	1	99	0	0	0	0	14/21
2023	4980	60	39	60	1	0	0	1	- / -
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
1994	18520	-	11	89	0	17	11	0	14/14
1998	11900	-	23	77	0	62	29	0	9/14
2003	4760	-	1	98	0	21	71	0	13/13
2008	2880	-	1	67	31	28	69	19	11/12
2013	2620	20	4	95	1	24	55	2	9/13
2018	500	-	24	72	4	36	56	20	6/10
2023	880	-	16	84	0	34	39	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1994	60	-	0	100	0	0	0	0	9/29
1998	40	-	0	100	0	0	0	0	12/27
2003	60	-	0	100	0	0	0	0	7/29
2008	20	-	0	100	0	0	0	0	10/26
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	40	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	20	-	0	100	0	0	0	0	3/11
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	6/9
2013	100	20	20	80	0	0	0	0	3/7
2018	20	-	0	100	0	0	0	0	2/4
2023	40	-	0	100	0	0	0	0	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	20	-	100	0	0	0	0	0	-/-
2003	160	-	13	88	0	0	0	0	-/-
2008	140	-	0	100	0	0	0	0	-/-
2013	120	20	33	67	0	0	0	0	-/-
2018	120	60	17	83	0	0	0	0	-/-
2023	120	40	17	83	0	0	0	0	-/-
<b>Yucca -- (yucca)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	17/26

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

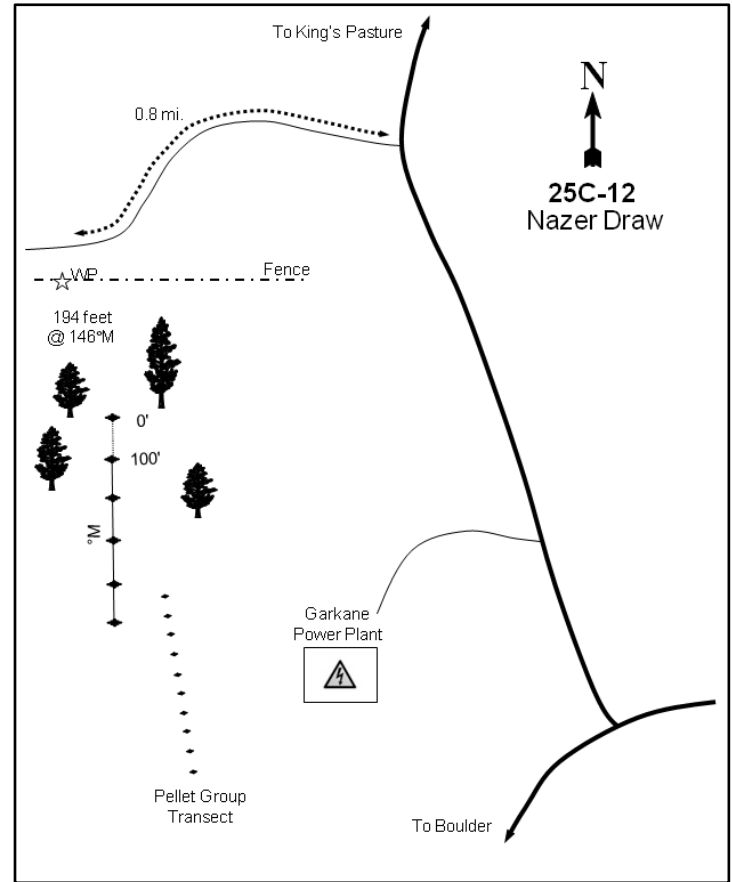
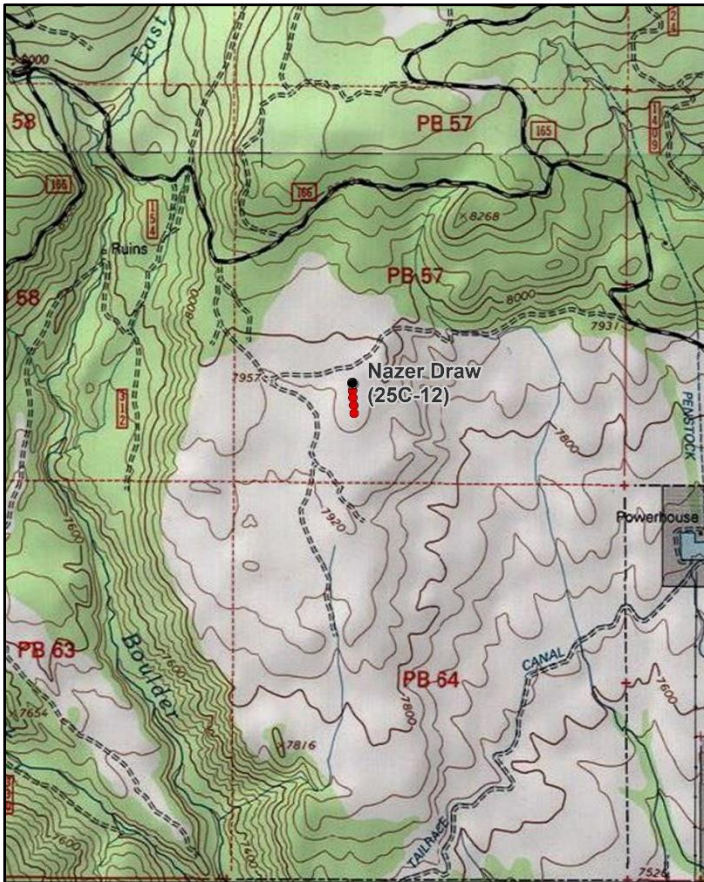
**Table 25C-09.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	1	-	-	-	-	-	6.0
<b>Pinus edulis (twoneedle pinyon)</b>							
1994	31	-	-	-	-	-	6.6
1998	29	-	-	-	-	-	7.4
2008	40	-	8	58	17	17	14.8
2013	35	-	8	67	8	17	14.1
2018	48	-	-	42	25	33	16.5
2023	21	-	-	33	25	42	15.0

**Table 25C-09.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1994	15.6	12.0	9.6	12.2	0.0	0.2	0.0	<b>49.4</b>	Poor-Fair
1998	13.5	12.7	12.1	13.4	-0.9	0.2	0.0	<b>51.0</b>	Poor-Fair
2003	11.3	4.7	2.9	10.4	-2.9	0.1	0.0	<b>26.4</b>	Very Poor
2008	12.3	1.6	1.0	13.7	-0.1	0.0	0.0	<b>28.6</b>	Very Poor
2013	16.1	10.2	2.5	16.4	0.0	0.0	0.0	<b>45.2</b>	Poor
2018	12.4	6.7	2.1	21.1	0.0	0.0	0.0	<b>42.3</b>	Poor
2023	16.1	7.5	2.3	22.5	-0.1	0.1	0.0	<b>48.5</b>	Poor-Fair

## NAZER DRAW - STUDY NO. 25C-12



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Boulder Town NW; Township 32S, Range 4E, Section 57  
NAD 83 UTM ZONE 12, 460065 East 4204984 North

### Transect Information

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

7131  
161° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
No Rebar

### Directions to Site

Travel north from Boulder on SR-12 for approximately 5.0 miles to Garkane Power Plant Road: turn left (west) onto this road and proceed for 0.95 miles to a cattle guard. Continue 0.2 miles to a minor fork. Bear left onto a rough road and go 0.8 miles (this road is now closed so you will have to walk the 0.8 miles to the site). Stop along the fence by an orange fencepost, which serves as a witness post for the range trend study and adjacent pellet group transect. The transect starts 195 feet south of the fence and the 0-foot baseline stake is a 1 1/2-foot tall fencepost marked with browse tag #7131.

### Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Boulder
Elevation	7,980ft (2,432m)
Aspect	Flat
Slope	1-5%
Sample Dates	08/03/1994, 07/30/1998, 08/26/2003, 08/20/2008, 08/07/2013, 08/08/2018, 06/20/2023

**Table 25C-12.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Seed Unknown	-	-	1955	1200

**Wildlife Habitat and Vegetation History****Table 25C-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-12.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Black Sagebrush	Phase I
1991	Black Sagebrush	Phase I
1994	Black Sagebrush	Phase I
1998	Black Sagebrush	Phase I
2003	Black Sagebrush	Phase I
2008	Black Sagebrush	Phase I
2013	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I
2023	Black Sagebrush	Phase I

**Site Notes**

Deer pellet groups were found in moderate abundance in 1991 and 1994 (Jense, et al., 1991; Shields, et al., 1994).

**Soils****Table 25C-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	5.6	60.0	21.8	18.2	2.4	10.3	112.0	0.4	07/30/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation            16 inches  
 NRCS Ecological Site                                    Mountain Gravelly Loam (Ponderosa Pine)  
 NRCS Ecological Site #                                R047XB412UT  
 States and Transitions                                No state and transition model is available for the above ecological site.

Black sagebrush (*Artemisia nova*) has been the dominant shrub species on this site since study establishment in 1987, with a number of other species also present to a lesser extent. Ponderosa pine (*Pinus ponderosa*) has also been present over the duration of the study (Photos, Pre-1992 Data, Table 25C-12.12, Table 25C-12.13). The herbaceous understory has remained abundant and diverse with native and introduced perennial grasses providing the most cover. The introduced annual grass species cheatgrass (*Bromus tectorum*) was observed in 2003, 2008, and 2023, but in low amounts (Table 25C-12.7, Table 25C-12.10, Table 25C-12.11). Twoneedle pinyon (*Pinus edulis*) has been present with low density in point-quarter measurements since 1994 (Table 25C-12.14). Although the site was considered to be within Phase I of woodland succession as of 2023 (Table 25C-12.4), presence of pinyon trees indicates that there may be potential for further encroachment over time.

Due to the abundance and diversity of the shrub and herbaceous communities, this site likely serves as adequate habitat for summering mule deer, but may serve as better foraging range during very mild winters due to high sagebrush and bitterbrush (*Purshia tridentata*) cover. Sagebrush on this site could also provide valuable browse for elk that may use the area during the winter months (Table 25C-12.3; Wambolt, 1996). However, pellet transect data shows that elk presence on this site has remained low since 1998; deer presence was moderate in 2023 (Table 25C-12.9).

## Trend Summary Tables

**Table 25C-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
1994	27.3	0.4	0.2	-	-	-
1998	29.7	1.6	0.3	-	-	-
2003	36.8	1.0	0.3	36.2	1.0	0.6
2008	25.8	0.4	0.4	36.4	0.8	2.1
2013	37.6	0.2	1.0	47.8	0.4	2.0
2018	34.2	0.6	1.5	41.9	0.8	2.7
2023	35.6	0.7	0.3	43.3	1.2	1.3

**Table 25C-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
1994	-	280	36	218	-	8.3	0.1	3.2
1998	-	301	135	243	-	13.9	2.0	6.2
2003	1	299	45	157	0.0	6.1	0.6	2.0
2008	1	296	26	195	0.0	7.4	0.3	3.9
2013	-	257	22	200	-	7.5	0.3	2.7
2018	-	272	6	82	-	8.5	0.2	1.4
2023	3	267	52	153	0.0	9.7	0.4	2.7

**Table 25C-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
1994	12.3	0.0	34.6	5.0	14.8	33.2
1998	10.1	-	54.2	12.0	15.3	49.1
2003	10.9	0.4	41.8	6.0	14.1	42.2
2008	8.8	-	39.9	11.2	13.9	37.3
2013	5.3	1.1	51.5	5.9	10.1	49.1
2018	15.9	-	57.4	6.3	12.1	41.1
2023	9.6	-	41.7	7.1	12.5	44.7

**Table 25C-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			
1994	-	35	5	23
1998	2	23	12	10
2003	4	38	6	12
2008	1	43	1	35
2013	-	35	5	7
2018	-	17	2	13
2023	1	18	5	1
Year	Days Use Per Acre (ha)			
1994	-	-	-	-
1998	5.8 (14.3)	27.5 (67.9)	9.4 (23.2)	-
2003	5.1 (12.6)	63.0 (155.6)	10.7 (26.5)	-
2008	0.7 (1.8)	24.1 (59.6)	14.7 (36.4)	-
2013	2.2 (5.4)	46.9 (115.9)	11.4 (28.1)	-
2018	-	27.5 (67.9)	3.4 (8.3)	-
2023	5.1 (12.6)	32.8 (81.1)	7.4 (18.2)	-

**Table 25C-12.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex geyeri (Geyer's sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency									
1994	2	121	173	5	-	1	15	-	-	19
1998	-	50	212	5	-	6	81	-	-	57
2003	-	81	195	-	1	-	64	3	-	30
2008	-	75	182	7	1	12	70	5	-	39
2013	-	55	173	11	-	19	35	8	-	34
2018	7	69	186	-	-	16	26	-	-	26
2023	-	43	168	-	3	13	38	-	2	60
year	Average Cover (%)									
1994	0.0	1.6	5.5	0.0	-	0.0	0.9	-	-	0.3
1998	-	1.0	9.6	0.1	-	0.4	1.4	-	-	1.3
2003	-	0.9	4.2	-	0.0	-	0.6	0.0	-	0.4
2008	-	1.6	4.4	0.0	0.0	0.2	0.9	0.1	-	0.2
2013	-	0.8	5.0	0.0	-	0.6	0.4	0.4	-	0.2
2018	0.0	1.5	5.9	-	-	0.6	0.3	-	-	0.2
2023	-	1.0	6.5	-	0.0	0.8	0.3	-	0.2	0.9

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

**Table 25C-12.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Antennaria parvifolia (small-leaf pussytoes)	Arabis (rockcross)	Artemisia carruthii (Carruth's sagewort)	Astragalus newberryi (Newberry's milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cordylanthus <sup>a</sup> (bird's-beak)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron divergens <sup>a</sup> (spreading fleabane)
year	Nested Frequency																
1994	-	-	-	22	-	-	4	3	-	-	8	-	1	25	-	-	3
1998	3	5	5	39	6	-	19	15	-	-	22	-	3	10	-	-	41
2003	-	-	-	9	-	3	1	-	-	-	0	-	5	-	6	1	-
2008	-	-	4	14	1	-	3	-	-	-	7	-	-	3	-	-	-
2013	-	-	6	12	1	3	-	3	-	2	4	14	-	2	-	-	4
2018	-	3	-	13	-	-	-	-	-	-	6	3	-	1	-	-	3
2023	13	-	6	8	2	13	9	-	1	-	26	35	2	3	-	-	6
year	Average Cover (%)																
1994	-	-	-	0.2	-	-	0.0	0.0	-	-	0.0	-	0.0	0.1	-	-	0.0
1998	0.0	0.1	0.0	0.9	0.1	-	0.4	0.2	-	-	0.5	-	0.1	0.1	-	-	0.3
2003	-	-	-	0.3	-	0.0	0.0	-	-	-	0.0	-	0.0	-	0.0	0.0	-
2008	-	-	0.0	0.1	0.0	-	0.0	-	-	-	0.0	-	-	0.0	-	-	-
2013	-	-	0.1	0.1	0.0	0.0	-	0.0	-	0.0	0.0	0.1	-	0.0	-	-	0.0
2018	-	0.0	-	0.2	-	-	-	-	-	-	0.0	0.0	-	0.0	-	-	0.1
2023	0.1	-	0.0	0.2	0.0	0.1	0.3	-	0.0	-	0.2	0.2	0.0	0.0	-	-	0.1

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



FORB SPECIES	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hymenopappus filifolius (fineleaf hymenopappus)	Hymenoxys cooperi (Cooper's rubberweed)	Lepidium ramosissimum <sup>a</sup> (manybranched pepperweed)	Linum lewisii (Lewis flax)	Lomatium (desertparsley)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus kingii <sup>a</sup> (King's lupine)	Oenothera pallida <sup>a</sup> (pale evening primrose)	Orobanche (broomrape)	Orthocarpus purpureoalbus <sup>a</sup> (purplewhite owl's-clover)	Penstemon (beardtongue)	Penstemon comarrhenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
1994	18	90	57	14	-	1	3	5	-	59	1	15	-	-	16	14	52
1998	26	100	56	-	-	2	40	6	3	30	10	6	-	48	-	41	36
2003	5	63	39	-	-	-	3	7	5	-	-	-	-	36	6	6	42
2008	9	68	58	-	4	-	2	6	3	37	4	8	-	11	-	17	53
2013	3	75	75	-	-	2	-	4	-	24	0	2	-	-	3	3	52
2018	7	27	28	-	-	-	-	0	-	-	-	-	-	-	-	-	6
2023	19	45	17	10	-	2	-	-	6	9	2	-	8	-	2	3	23
year	Average Cover (%)																
1994	0.1	0.7	0.8	0.0	-	0.0	0.0	0.1	-	0.4	0.0	0.1	-	-	0.1	0.1	0.1
1998	0.4	1.0	0.9	-	-	0.1	0.1	0.1	0.0	0.8	0.3	0.0	-	1.1	-	0.3	0.1
2003	0.1	0.6	0.6	-	-	-	0.0	0.0	0.0	-	-	-	-	0.5	0.0	0.1	0.3
2008	0.5	0.5	0.7	-	0.0	-	0.0	0.3	0.0	1.0	0.0	0.2	-	0.1	-	0.2	0.3
2013	0.1	0.5	0.9	-	-	0.0	-	0.0	-	0.4	0.1	0.0	-	-	0.1	0.0	0.3
2018	0.1	0.3	0.5	-	-	-	-	0.0	-	-	-	-	-	-	-	-	0.1
2023	0.2	0.7	0.2	0.1	-	0.1	-	-	0.2	0.1	0.0	-	0.0	-	0.0	0.0	0.2

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

FORB SPECIES	Physaria (twinnpod)	Plectanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Senecio flaccidus var. flaccidus (threadleaf ragwort)	Silene drummondii (Drummond's campion)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)	Tetranneuris acaulis (stemless four-nerve daisy)	Townsendia incana (hoary Townsend daisy)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency									
1994	-	14	-	-	3	9	4	3	1	-
1998	-	8	8	-	2	-	-	13	3	-
2003	-	2	-	-	-	11	-	-	-	-
2008	-	6	1	2	-	9	-	-	-	-
2013	1	9	1	9	-	2	-	3	-	-
2018	-	6	-	-	-	-	-	3	-	-
2023	-	-	-	-	-	2	-	-	-	18
year	Average Cover (%)									
1994	-	0.2	-	-	0.0	0.1	0.0	0.0	0.0	-
1998	-	0.0	0.1	-	0.0	-	-	0.1	0.0	-
2003	-	0.0	-	-	-	0.1	-	-	-	-
2008	-	0.1	0.0	0.0	-	0.2	-	-	-	-
2013	0.0	0.1	0.0	0.1	-	0.0	-	0.0	-	-
2018	-	0.1	-	-	-	-	-	0.1	-	-
2023	-	-	-	-	-	0.0	-	-	-	0.1

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

**Table 25C-12.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. tridentata <sup>p</sup> (basin big sagebrush)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Escobaria vivipara (spiny star)	Gutierrezia sarothrae (broom snakeweed)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Pinus ponderosa <sup>i</sup> (ponderosa pine)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)														
1994	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	0.2	25.6	-	-	-	0.7	0.2	-	0.2	0.1	0	0.6	6.1	4.1	-
2008	0.2	23.7	-	-	-	0.7	0.1	-	-	0.1	1.5	0.6	9.2	3.2	-
2013	0.5	26.1	-	-	-	0.4	0.3	-	-	-	2	-	12.8	8.1	-
2018	0.4	26.2	-	0.1	0.1	0.5	0.1	-	0.3	-	2.5	0.2	8.6	6.4	-
2023	0.7	30.8	-	-	0.1	1.1	-	0.1	-	-	1.3	-	6.2	5.5	-
year	Quadrat Cover (%)														
1994	0.3	17.0	-	-	0.1	0.4	0.1	-	0.1	-	-	0.2	7.4	2.5	-
1998	0.5	17.3	-	-	0.5	1.1	0.8	-	0.4	0.0	-	0.3	5.5	5.3	-
2003	0.5	25.7	-	-	0.1	0.7	0.3	-	0.2	0.0	0.0	0.3	7.0	3.2	-
2008	0.3	16.3	0.4	-	0.1	0.3	0.2	-	0.0	0.1	0.1	0.3	5.1	3.4	-
2013	0.5	21.8	-	-	0.3	0.2	0.1	-	0.0	0.0	1.0	-	9.8	5.0	-
2018	0.5	21.5	-	0.0	0.1	0.6	0.1	0.0	0.0	-	1.4	0.1	8.2	3.8	0.0
2023	0.5	22.4	-	-	0.3	0.6	0.1	0.1	-	-	0.3	-	9.2	3.0	-

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

**Table 25C-12.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1994	40	-	0	100	0	0	50	0	57/61
1998	100	-	40	60	0	20	0	20	53/69
2003	80	-	25	50	25	25	50	25	51/49
2008	200	-	70	30	0	10	10	0	58/75
2013	140	-	57	43	0	29	43	14	42/46
2018	180	-	22	67	11	0	56	33	42/48
2023	200	-	10	90	0	10	30	0	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1994	8820	14640	19	59	22	22	0	4	35/55
1998	11080	2000	42	40	18	15	0	2	37/66
2003	19540	180	23	60	18	0	0	9	30/45
2008	18400	820	17	52	31	18	4	12	28/43
2013	10060	-	10	74	16	25	25	15	31/59
2018	14200	-	1	74	25	10	0	16	27/45
2023	9360	20	1	87	12	16	0	11	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. tridentata<sup>P</sup> -- (basin big sagebrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	47/85
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
1994	20	-	0	100	0	0	0	0	47/41
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	51/52
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	54/85
2018	20	-	0	100	0	0	100	0	56/71
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1994	280	-	0	93	7	14	0	0	10/19
1998	180	-	0	100	0	0	0	0	7/21
2003	100	-	0	60	40	40	60	20	9/19
2008	260	-	8	69	23	15	46	8	9/18
2013	160	-	25	75	0	0	0	0	12/22
2018	240	-	0	100	0	0	100	42	7/16
2023	140	20	29	71	0	0	0	0	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1994	360	-	0	100	0	0	0	0	24/37
1998	540	-	33	63	4	0	0	4	69/87
2003	400	-	0	85	15	5	0	10	19/27
2008	280	20	7	71	21	0	7	7	36/40
2013	400	-	20	80	0	0	5	35	25/34
2018	320	-	13	88	0	19	19	0	14/21
2023	500	-	0	100	0	4	0	0	-/-
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1994	640	-	19	81	0	6	0	0	9/13
1998	800	60	35	65	0	3	0	0	15/19
2003	840	-	7	93	0	43	7	0	16/15
2008	680	-	3	94	3	3	6	0	13/18
2013	400	20	0	100	0	5	10	0	17/23
2018	300	-	0	100	0	0	27	0	10/12
2023	-	-	-	-	-	-	-	-	-/-
<b>Escobaria vivipara -- (spiny star)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	260	20	8	31	62	0	0	0	5/8
2023	180	-	33	67	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1994	60	-	0	67	33	0	0	0	21/17
1998	660	100	12	88	0	0	0	0	22/20
2003	220	-	0	100	0	0	0	9	20/17
2008	220	-	0	100	0	0	0	0	19/21
2013	60	-	100	0	0	0	0	0	18/18
2018	180	-	11	89	0	0	0	0	14/18
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1994	40	-	0	100	0	0	0	0	4/8
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	200	-	20	80	0	0	0	0	9/14
2003	200	-	20	70	10	0	0	10	5/8
2008	260	-	15	85	0	0	0	0	5/8
2013	80	20	0	100	0	0	0	0	8/13
2018	20	20	0	100	0	0	0	0	6/6
2023	40	-	0	100	0	0	50	50	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	20	-	100	0	0	0	0	0	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	40	0	0	0	0	0	0	-/-
2023	20	-	0	100	0	0	0	0	-/-
<b>Pinus ponderosa<sup>1</sup> -- (ponderosa pine)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	80	-	100	0	0	0	0	0	-/-
2003	40	-	100	0	0	0	0	0	-/-
2008	40	20	100	0	0	0	0	0	-/-
2013	20	-	100	0	0	0	0	100	-/-
2018	20	-	0	100	0	0	0	100	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1994	1500	20	3	87	11	60	16	0	27/88
1998	540	-	22	74	4	19	26	0	49/124
2003	1440	-	1	53	46	3	97	32	38/92
2008	1720	-	2	83	15	61	28	2	45/90
2013	1480	180	0	100	0	11	82	31	50/102
2018	1840	-	3	35	62	1	92	96	52/104
2023	1480	-	1	78	20	14	85	26	-/-

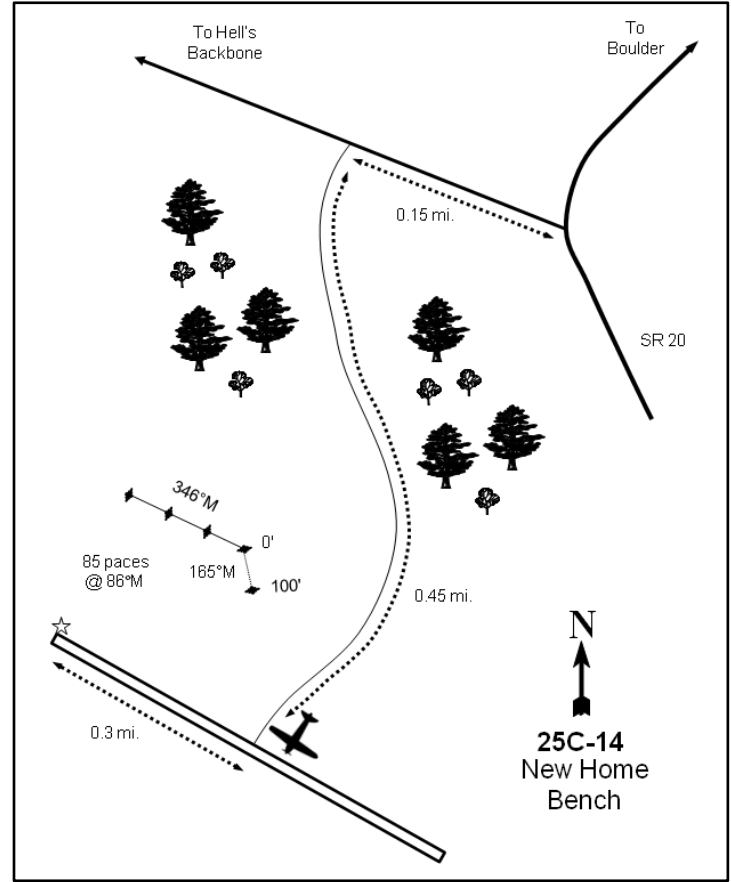
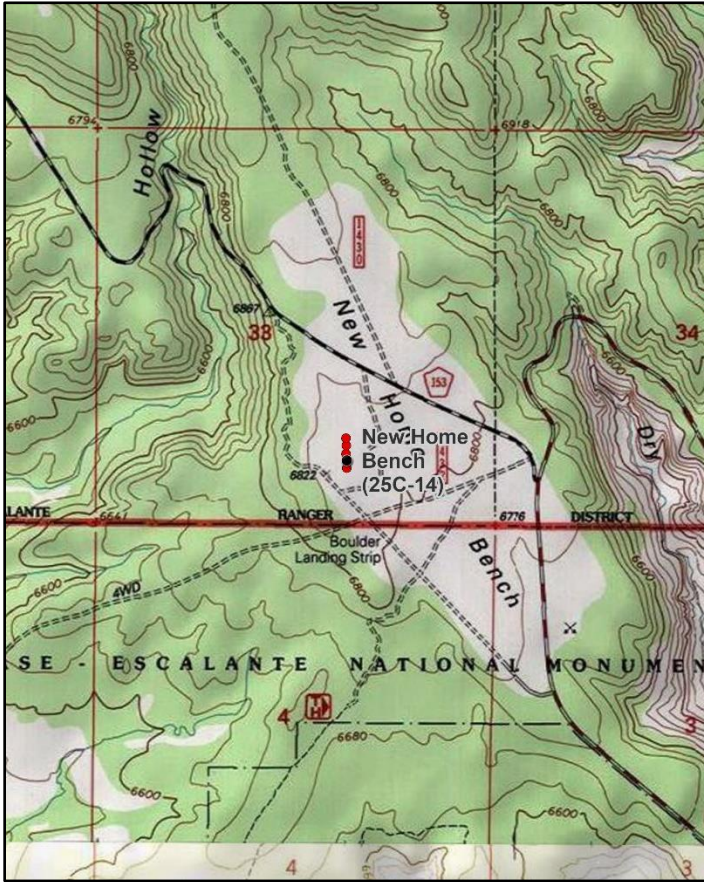
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	1680	520	24	74	2	0	0	1	126/100
2003	1500	-	28	67	5	0	0	12	82/47
2008	1480	100	31	60	10	0	0	4	126/69
2013	960	160	31	69	0	4	0	0	51/44
2018	1420	-	14	83	3	0	14	0	87/66
2023	1100	20	13	84	4	4	2	4	- / -
<b>Sclerocactus -- (fishhook cactus)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	140	-	71	29	0	0	0	0	7/9
2003	-	-	-	-	-	-	-	-	-/-
2008	60	-	0	100	0	0	0	0	6/9
2013	-	-	-	-	-	-	-	-	6/12
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1994	-	-	-	-	-	-	-	-	16/18
1998	20	-	0	100	0	0	0	0	13/16
2003	40	-	50	0	50	0	0	0	17/16
2008	20	-	0	100	0	0	0	0	14/11
2013	20	-	100	0	0	0	0	0	- / -
2018	280	-	0	86	14	0	0	14	8/9

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

**Table 25C-12.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Pinus edulis (twoneedle pinyon)</b>							
1994	5	-	-	-	-	-	6.5
1998	6	-	-	-	-	-	11.0
2003	6	-	60	-	-	40	10.6
2008	6	-	-	60	20	20	9.8
2013	7	-	33	33	-	33	8.3
2018	13	18	45	18	9	9	8.9
2023	16	-	64	-	9	27	11.1
<b>Pinus ponderosa (ponderosa pine)</b>							
1994	38	-	-	-	-	-	7.0
1998	35	-	-	-	-	-	16.2
2003	25	-	33	42	-	25	19.0
2008	25	-	45	9	27	18	10.1
2013	27	-	25	25	25	25	23.0
2018	39	7	14	29	14	36	18.2
2023	32	7	13	20	7	53	22.2
<b>Pseudotsuga menziesii (Douglas-fir)</b>							
1994	1	-	-	-	-	-	30.0
2003	1	-	-	-	-	100	42.0
2013	1	-	-	-	-	100	47.0
2018	4	-	-	-	-	100	45.0
<b>Quercus gambelii (Gambel oak)</b>							
1994	22	-	-	-	-	-	1.8

## NEW HOME BENCH - STUDY NO. 25C-14

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Boulder Town SW; Township 33S, Range 4E, Section 33  
NAD 83 UTM ZONE 12, 458949 East 4193601 North

**Transect Information**

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

7145  
165° magnetic (Lines 2-4: 346° magnetic)  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

Travel southwest on SR-12 out of Boulder for approximately 3 miles to the top of the bench above Dry Hollow, then turn onto the Hells Backbone-Salt Gulch Road. Travel 0.15 miles northwest to a road turning off to the left: proceed for 0.45 miles on this road to the Boulder airstrip. Turn right and drive down the airstrip for 0.3 miles. The transect starts approximately 85 paces from the end of the airstrip at a bearing of 86 degrees magnetic. The 0-foot baseline stake is marked by browse tag #7145.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Boulder
Elevation	6,830ft (2,082m)
Aspect	South
Slope	2-5%
Sample Dates	07/28/1998, 09/09/2003, 08/19/2008, 08/13/2013, 06/26/2018, 06/28/2023

**Wildlife Habitat and Vegetation History****Table 25C-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-14.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

There is another transect nearby that is not associated with the study.

**Soils****Table 25C-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 Loam	6.8	69.4	12.0	18.6	1.0	12.4	112.0	0.5	07/28/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY308UT
States and Transitions	1987-2023 - Current Potential State: Community Phase 2.3

Since the establishment of the study in 1987, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has dominated the shrub component of this site (Photos, Pre-1992 Data, Table 25C-14.12, Table 25C-14.13). The understory has fluctuated in abundance and cover, with the perennial grass species blue grama (*Bouteloua gracilis*) contributing a majority of the cover in most sample years; needle and thread (*Hesperostipa comata*) provided the most herbaceous cover of any single species in 2023. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been recorded in cover and frequency between 2008 and 2018, but in low amounts; both annual and perennial forbs have remained limited (Table 25C-14.7, Table 25C-14.10, Table 25C-14.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been scattered throughout the area since study establishment. Although tree density was low and cover was moderate as of 2023 (Photos, Table 25C-14.12, Table 25C-14.14), there may be potential for trees to increase over time and cause the site to progress through the phases of woodland succession (Table 25C-14.4).

Due to the abundance and diversity of the shrub and herbaceous communities, this site likely serves as adequate habitat for summering mule deer, but may serve as better foraging range during very mild winters due to high sagebrush cover. According to pellet group data, mule deer presence was high in 2023 (Table 25C-14.9). Sagebrush on this site could provide valuable browse for wintering elk (Table 25C-14.3; Wambolt, 1996). However, elk presence has remained low since 1998 (Table 25C-14.9).

## Trend Summary Tables

**Table 25C-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
1998	18.6	0.9	0.4	-	-	-
2003	17.2	0.6	1.2	9.5	0.3	1.6
2008	12.8	0.1	2.1	14.9	0.2	2.3
2013	13.8	0.8	1.8	16.7	1.0	2.7
2018	13.0	2.4	2.2	14.0	1.0	4.9
2023	13.5	0.6	2.2	14.5	0.7	6.8

**Table 25C-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
1998	243	181	6	10	8.6	6.9	0.0	0.1
2003	-	102	22	4	-	2.5	0.1	0.1
2008	14	94	23	2	0.0	1.6	0.1	0.0
2013	8	117	-	25	0.1	4.9	-	0.9
2018	34	164	10	20	0.1	7.5	0.0	0.1
2023	153	148	112	23	2.0	7.5	2.2	0.6

**Table 25C-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
1998	51.3	12.2	29.0	2.5	0.2	31.7
2003	51.1	6.1	29.6	2.4	0.2	20.7
2008	48.8	4.4	39.7	3.0	0.1	16.7
2013	52.1	3.5	28.4	1.4	0.1	22.1
2018	50.8	10.4	35.6	3.1	0.4	23.9
2023	49.3	2.9	37.3	2.1	0.3	27.1

**Table 25C-14.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit	Domestic Sheep
	Quadrat Frequency					
1998	-	-	38	-	36	-
2003	-	-	51	3	28	-
2008	1	-	49	1	64	-
2013	2	-	48	-	5	-
2018	-	-	39	4	21	-
2023	-	-	43	2	4	-
Year	Days Use Per Acre (ha)					
1998	1.5 (3.6)	-	66.4 (163.9)	-	-	0.7 (1.7)
2003	-	-	95.1 (235.0)	6.7 (16.6)	-	-
2008	4.4 (10.8)	8.7 (21.5)*	148.1 (365.8)	4.7 (11.6)	-	-
2013	0.7 (1.8)	-	74.4 (183.7)	0.7 (1.7)	-	-
2018	-	-	38.9 (96.0)	1.3 (3.3)	-	-
2023	0.7 (1.8)	-	73.0 (180.4)	12.1 (29.8)	-	-

\*Pellets per acre (ha)



**Table 25C-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency						
1998	6	105	-	62	51	-	243
2003	-	90	-	10	3	-	-
2008	15	59	2	6	22	-	12
2013	-	68	6	12	49	-	2
2018	34	89	3	17	45	-	31
2023	10	69	-	22	59	4	153
year	Average Cover (%)						
1998	0.1	4.3	-	1.2	1.3	-	8.6
2003	-	2.3	-	0.1	0.2	-	-
2008	0.1	1.2	0.0	0.1	0.2	-	0.0
2013	-	3.1	0.0	0.3	1.5	-	0.0
2018	1.3	4.2	0.0	0.4	1.6	-	0.1
2023	0.6	2.9	-	0.7	3.3	0.0	2.0

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

**Table 25C-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Ambrosia psilostachya (Cuman ragweed)	Astragalus lentiginosus (freckled milkvetch)	Chenopodium <sup>a</sup> (goosefoot)	Cordylanthus wrightii <sup>a</sup> (Wright's bird's beak)	Cryptantha fulvocanescens (tawny cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogon pumilus (shaggy fleabane)	Eriogonum (buckwheat)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Machaeranthera canescens (hoary tansyaster)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phacelia ivesiana <sup>a</sup> (Ives' phacelia)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
1998	-	-	-	-	-	6	2	8	-	-	-	-	-	-	-	-	-
2003	-	-	-	-	-	18	-	-	3	-	-	-	-	1	-	-	2
2008	-	-	-	-	-	16	-	-	7	-	3	-	-	-	-	-	-
2013	-	11	-	-	2	-	-	-	-	-	-	-	-	-	3	-	-
2018	-	8	-	-	1	4	-	-	3	-	-	4	-	3	-	-	4
2023	3	7	1	25	-	19	4	-	30	25	42	-	3	-	-	13	2
year	Average Cover (%)																
1998	-	-	-	-	-	0.0	0.0	0.1	-	-	-	-	-	-	-	-	-
2003	-	-	-	-	-	0.1	-	-	0.0	-	-	-	-	0.0	-	-	0.0
2008	-	-	-	-	-	0.1	-	-	0.1	-	0.0	-	-	-	-	-	-
2013	-	0.7	-	-	0.0	-	-	-	-	-	-	-	-	-	0.0	-	-
2018	-	0.0	-	-	0.0	0.0	-	-	0.0	-	-	0.0	-	-	0.0	-	0.0
2023	0.0	0.5	0.0	0.9	-	0.4	0.0	-	0.2	0.1	0.5	-	0.0	-	-	0.2	0.0

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

FORB SPECIES	Nested Frequency		
<i>Plantago patagonica</i> <sup>a</sup> (woolly plantain)	-	-	-
<i>Sisymbrium altissimum</i> <sup>ai</sup> (tall tumblemustard)	-	1	1
<i>Sphaeralcea coccinea</i> (scarlet globemallow)	-	-	2
year	Nested Frequency		
1998	-	-	-
2003	-	1	1
2008	-	-	2
2013	-	-	9
2018	-	3	-
2023	4	-	7
FORB SPECIES	Average Cover (%)		
<i>Plantago patagonica</i> <sup>a</sup> (woolly plantain)	-	-	-
<i>Sisymbrium altissimum</i> <sup>ai</sup> (tall tumblemustard)	-	0.0	0.0
<i>Sphaeralcea coccinea</i> (scarlet globemallow)	-	-	0.0
year	Average Cover (%)		
1998	-	-	-
2003	-	0.0	0.0
2008	-	-	0.0
2013	-	-	0.2
2018	-	0.0	-
2023	0.0	-	0.0

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

**Table 25C-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)							
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)	-	-	-	-	-	-	-	-
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)	9.5	0	-	-	0.3	0.5	-	1.1
<i>Ephedra torreyana</i> (Torrey's jointfir)	14.9	0.1	-	-	0.1	0.6	-	1.7
<i>Eriogonum microthecum</i> <sup>p</sup> (slender buckwheat)	16.7	0.2	-	0	0.8	0.5	-	2.2
<i>Gutierrezia sarothrae</i> (broom snakeweed)	14	0.1	-	-	0.9	1.5	-	3.4
<i>Juniperus osteosperma</i> <sup>i</sup> (Utah juniper)	14.5	0.2	-	-	0.5	3.1	-	3.7
<i>Opuntia</i> (pricklypear)								
<i>Pinus edulis</i> <sup>t</sup> (twoneedle pinyon)								
SHRUB SPECIES	Quadrat Cover (%)							
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)	18.6	-	-	0.0	0.9	0.4	-	-
<i>Chrysothamnus viscidiflorus</i> ssp. <i>viscidiflorus</i> var. <i>viscidiflorus</i> (yellow rabbitbrush)	17.2	0.0	0.1	0.0	0.4	0.4	-	0.8
<i>Ephedra torreyana</i> (Torrey's jointfir)	12.8	0.0	0.0	0.0	0.0	1.3	-	0.8
<i>Eriogonum microthecum</i> <sup>p</sup> (slender buckwheat)	13.8	0.1	-	0.0	0.6	0.8	-	1.0
<i>Gutierrezia sarothrae</i> (broom snakeweed)	12.9	0.4	-	0.0	1.9	0.4	0.1	1.9
<i>Juniperus osteosperma</i> <sup>i</sup> (Utah juniper)	13.5	0.3	-	-	0.3	0.9	-	1.3

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

**Table 25C-14.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	4120	200	13	52	35	39	10	6	61/90
2003	4100	-	1	8	91	52	8	70	62/92
2008	3940	1680	15	15	71	29	17	55	61/92
2013	3320	40	9	46	45	50	24	40	66/109
2018	4020	-	8	60	32	33	2	29	51/75
2023	3800	240	8	64	28	26	46	25	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	120	-	33	50	17	0	0	0	34/29
2008	40	-	50	50	0	0	0	0	41/35
2013	280	40	0	100	0	0	7	0	31/37
2018	120	40	17	67	17	17	0	33	40/32
2023	500	-	36	64	0	0	0	0	- / -
<b>Ephedra torreyana -- (Torrey's jointfir)</b>									
1998	180	-	22	78	0	44	56	0	29/33
2003	60	-	0	67	33	0	33	0	44/37
2008	100	-	100	0	0	0	100	100	61/124
2013	20	-	0	100	0	0	0	0	39/35
2018	20	-	0	100	0	0	0	0	39/54
2023	60	-	0	100	0	0	0	0	- / -
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1998	40	-	100	0	0	0	0	0	- / -
2003	40	-	0	100	0	0	0	0	24/28
2008	40	-	0	100	0	0	50	0	17/16
2013	20	-	0	100	0	0	100	0	8/13
2018	40	-	0	100	0	100	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	2720	360	29	70	1	0	0	0	21/21
2003	1180	-	27	66	7	0	0	2	23/28
2008	320	60	19	75	6	0	0	6	19/17
2013	1800	60	18	81	1	0	0	1	18/23
2018	3960	20	1	70	29	0	0	13	15/19
2023	980	-	2	98	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	20	60	100	0	0	0	0	0	- / -
2003	60	-	67	33	0	0	0	0	- / -
2008	60	-	67	33	0	0	0	0	- / -
2013	20	-	100	0	0	0	0	0	- / -
2018	60	-	100	0	0	0	0	0	- / -
2023	60	-	0	67	33	0	0	33	- / -
<b>Krascheninnikovia lanata<sup>P</sup> -- (winterfat)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	100	0	28/13
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1998	80	-	0	100	0	0	0	0	6/19
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	9/59
2018	-	-	-	-	-	-	-	-	12/35
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis -- (twoneedle pinyon)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	40	-	50	50	0	0	0	0	-/-
2008	20	40	0	100	0	0	0	0	-/-
2013	20	-	0	100	0	0	0	0	-/-
2018	40	-	50	50	0	0	0	0	-/-
2023	40	-	50	50	0	0	0	0	-/-

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

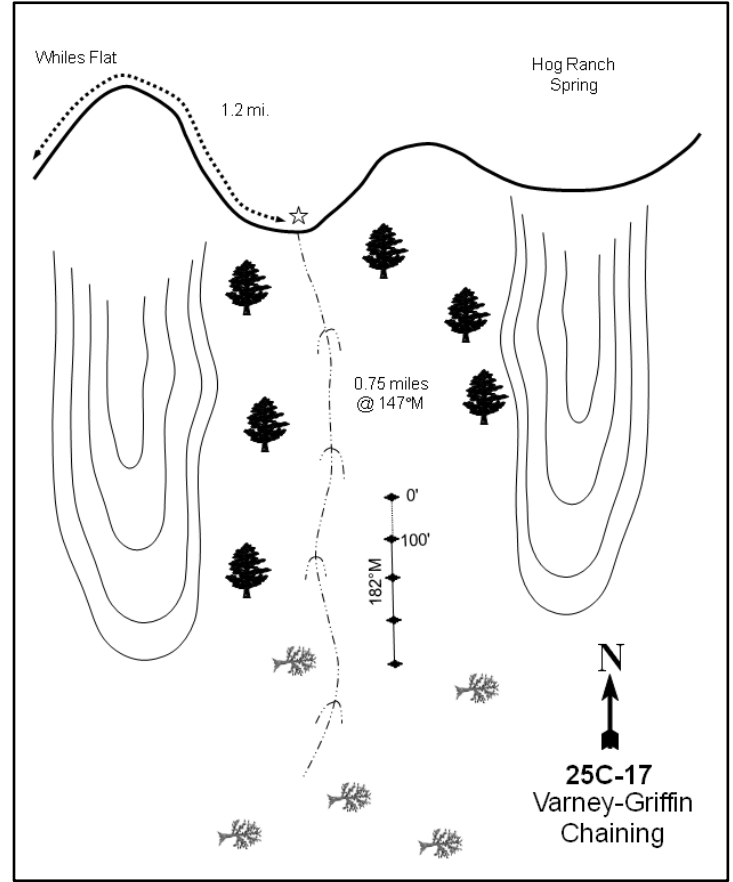
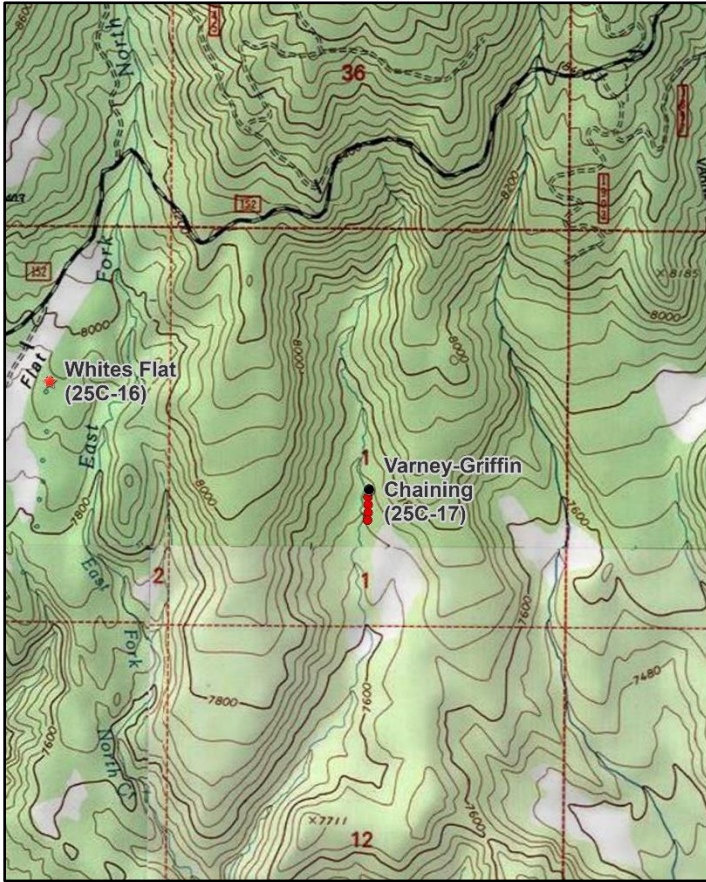
**Table 25C-14.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	15	-	-	-	-	-	8.6
2003	17	-	73	-	27	-	8.6
2008	15	-	73	9	18	-	7.7
2013	19	-	27	36	18	18	13.9
2018	20	10	20	50	20	-	7.3
2023	16	-	36	18	45	-	17.1
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	17	-	-	-	-	-	8.5
2003	18	-	33	25	42	-	8.7
2008	15	-	18	36	36	9	11.0
2013	19	-	17	25	50	8	11.8
2018	18	-	9	18	45	27	17.1
2023	17	-	9	18	73	-	17.3

**Table 25C-14.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	23.2	4.5	6.6	13.7	-6.5	0.1	0	<b>41.8</b>	Poor
2003	11.9	-12.4	0.3	5.1	0	0.1	0	<b>4.9</b>	Very Poor
2008	18.6	-6.2	7.4	3.1	0	0	0	<b>22.9</b>	Very Poor
2013	20.9	1.6	4.5	9.8	0	1.8	0	<b>38.6</b>	Poor
2018	17.5	5.3	4	15	-0.1	0.2	0	<b>41.9</b>	Poor
2023	18.1	6.6	4	15	-1.5	1.2	0	<b>43.4</b>	Poor

## VARNEY-GRIFFIN CHAINING - STUDY NO. 25C-17



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Posy Lake SW; Township 34S, Range 1E, Section 01  
NAD 83 UTM ZONE 12, 434869 East 4192437 North

### Transect Information

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

7146  
172° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

### Directions to Site

North Creek Road begins at mile marker 55 off of SR-12; from North Creek Reservoir, continue north on the main road for 2 miles to a fork. Bear right and proceed for 2 miles to Whites Flat, then continue towards Hog Ranch Spring for 1.2 miles. Stop where the road curves across a large ridgetop. Walk along the east edge of this flat-topped ridge to where you can see the chaining in the drainage below, then hike down the side of the ridge toward the chaining. The study area is in the north end of this chained drainage and the 0-foot stake is marked by browse tag #7146.

### Site Information

Land Ownership  
Land Administrator  
Allotment  
Elevation  
Aspect  
Slope  
Sample Dates

Federal  
USFS  
North Creek  
7,720ft (2,353m)  
Southwest  
5-10%  
08/18/1998, 08/06/2003, 08/19/2008, 08/13/2013, 06/27/2018, 06/28/2023

**Table 25C-17.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1981	1100
Seeding - Seed Unknown	-	-	1981	1100
Mechanical - Bullhog	-	-	Between 2003 and 2008	1100
Fire - Slash Pile	-	-	1981	1100

**Wildlife Habitat and Vegetation History**

**Table 25C-17.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-17.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Perennial Grass	Phase I
1991	Perennial Grass	Phase I
1998	Perennial Grass	Phase I
2003	Perennial Grass/Mountain Big Sagebrush	Phase I transitioning to Phase II
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Soils**

**Table 25C-17.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.1	73.0	12.4	14.6	1.4	12.8	134.4	0.3	08/18/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      17 inches  
 NRCS Ecological Site    Mountain Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site #    R047XB430UT  
 States and Transitions    No state and transition model is available for this ecological site.

Upon study establishment in 1987, this site was dominated by introduced perennial grass species, mainly crested wheatgrass (*Agropyron cristatum*); perennial forbs were found to be diverse, but not very abundant in comparison with grasses (Photos, Pre-1992 Data). Cover of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) increased over time while that of perennial grasses decreased, and sagebrush became the dominant vegetation component in 2003 (Table 25C-17.7, Table 25C-17.10, Table 25C-17.12, Table 25C-17.13). Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) have been observed since study establishment. The study was considered to be within Phase I transitioning to Phase II of woodland succession in 2003, but a bullhog treatment between 2003 and 2008 removed many of the trees in the area (Table 25C-17.1). Although the study was classified as being within Phase I as of 2023, point-quarter data shows that trees were still present in moderate amounts (Photos, Table 25C-17.4, Table 25C-17.14). This continued tree presence implies that there may be potential for infilling in future sample years.

Deer winter range condition has ranged between poor and good since 1998. As of 2023, deer winter range condition was considered to be good, which can be attributed to high preferred browse and perennial grass cover. Improvement to deer wintering range can be accomplished through efforts that support an increase in preferred browse reproduction; diversifying and increasing cover of native perennial forbs would also improve winter range conditions (Table 25C-17.15). In addition, the sagebrush component of this site could provide valuable browse for elk that may use the area during the winter months (Table 25C-17.3; Wambolt, 1996). According to pellet transect data, mule deer presence was low in 2023 while elk presence was considered to be high (Table 25C-17.9).

**Trend Summary Tables**

**Table 25C-17.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	9.5	1.6	2.9	0.1	-	0.1
2003	13.9	2.1	4.6	14.2	1.9	5.7
2008	8.0	0.1	0.4	9.7	0.1	0.8
2013	12.2	1.0	0.8	17.0	1.2	1.5
2018	16.6	2.5	0.2	16.5	1.6	1.5
2023	23.8	1.1	0.5	32.4	2.6	2.3

**Table 25C-17.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	-	405	53	164	-	23.6	0.2	4.9
2003	-	225	38	191	-	5.4	1.1	4.7
2008	-	275	18	153	-	10.3	0.2	2.2
2013	-	308	11	82	-	8.5	0.0	0.6
2018	-	305	-	84	-	13.9	-	0.9
2023	-	273	279	121	-	11.1	4.5	3.6

**Table 25C-17.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	10.7	0.9	68.1	1.1	0.2	48.1
2003	30.2	-	55.1	2.6	0.2	29.7
2008	35.5	0.0	47.8	4.0	0.8	24.0
2013	31.9	0.0	54.1	0.6	0.3	27.2
2018	30.4	0.0	58.1	2.0	0.5	33.4
2023	40.6	-	41.2	1.0	0.9	37.5

**Table 25C-17.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1998	6	-	9	13	51
2003	3	-	9	41	20
2008	4	-	10	28	67
2013	1	-	13	36	18
2018	2	-	4	31	10
2023	3	-	9	39	4
Year	Days Use Per Acre (ha)				
1998	23.2 (57.4)	-	26.2 (64.6)	40.9 (101.0)	-
2003	2.2 (5.4)	-	0.7 (1.7)	73.7 (182.1)	-
2008	5.1 (12.6)	-	0.7 (1.7)	40.2 (99.3)	-
2013	6.5 (16.1)	8.7 (21.5)*	13.4 (33.1)	41.5 (102.6)	-
2018	-	-	1.3 (3.3)	33.5 (82.8)	-
2023	5.8 (14.3)	-	4.0 (9.9)	65.7 (162.2)	-

\*Pellets per acre (ha)

**Table 25C-17.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Carex (sedge)	Carex duriuscula (needleleaf sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Leymus salinus (saline wildrye)	Poa fendleriana (muttongrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency												
1998	3	268	45	211	32	-	4	-	31	5	26	2	72
2003	-	136	54	30	3	-	-	-	26	-	15	-	14
2008	-	105	69	42	34	-	4	-	40	33	45	27	28
2013	2	204	43	34	44	-	2	-	37	6	7	9	20
2018	12	105	100	15	71	-	19	-	25	-	28	16	46
2023	-	135	57	54	71	8	6	1	25	-	10	28	12
year	Average Cover (%)												
1998	0.0	13.3	0.8	6.5	0.5	-	0.0	-	0.4	0.1	0.8	0.0	1.1
2003	-	3.1	1.0	0.3	0.0	-	-	-	0.4	-	0.5	-	0.1
2008	-	2.7	2.2	0.9	0.4	-	0.0	-	1.4	0.7	0.9	0.6	0.4
2013	0.0	3.8	1.0	0.2	2.4	-	0.0	-	0.6	0.2	0.1	0.1	0.2
2018	0.5	4.9	2.9	0.3	2.8	-	0.2	-	0.5	-	0.9	0.1	0.9
2023	-	5.2	0.8	0.6	2.1	0.3	0.1	0.0	0.8	-	0.4	0.5	0.3

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

**Table 25C-17.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>a</sup> (desert madwort)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Artemisia canthioides (Carruth's sagewort)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dusty maiden)	Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Dalea (prairie clover)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron (fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)
year	Nested Frequency																
1998	27	10	-	2	6	-	1	-	-	46	7	-	1	9	-	10	5
2003	-	-	-	-	2	-	-	2	15	32	-	1	-	-	-	12	2
2008	-	-	3	-	10	-	-	3	3	27	-	-	-	2	-	7	5
2013	-	1	3	-	-	-	-	-	-	24	-	-	1	3	1	-	8
2018	-	-	-	1	8	-	-	-	-	44	3	-	-	3	-	5	10
2023	7	-	3	2	-	5	-	22	-	13	6	-	9	-	1	14	-
year	Average Cover (%)																
1998	0.1	0.0	-	0.1	0.0	-	0.0	-	-	1.1	0.0	-	0.0	0.0	-	0.1	0.0
2003	-	-	-	-	0.0	-	-	0.0	0.5	0.2	-	0.0	-	-	-	0.1	0.0
2008	-	-	0.0	-	0.1	-	-	0.0	0.0	0.5	-	-	-	0.0	-	0.1	0.0
2013	-	0.0	0.0	-	-	-	-	-	-	0.1	-	-	0.0	0.0	0.0	-	0.1
2018	-	-	-	0.0	0.0	-	-	-	-	0.4	0.0	-	-	0.0	-	0.0	0.1
2023	0.0	-	0.0	0.0	-	0.1	-	0.0	-	0.2	0.0	-	0.1	-	0.0	0.3	-

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



FORB SPECIES	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Medicago sativa <sup>i</sup> (alfalfa)	Oenothera (evening primrose)	Oenothera pallida <sup>a</sup> (pale evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon comarrhenus (dusty beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Phlox longifolia (longleaf phlox)	Physaria rectipes (straight bladderpod)
year	Nested Frequency																
1998	-	-	-	6	1	1	68	5	0	7	14	13	7	-	-	6	8
2003	-	-	-	-	11	-	35	-	-	-	12	142	1	-	-	1	-
2008	-	-	-	1	-	-	69	-	-	-	9	12	-	29	4	8	-
2013	-	-	-	1	6	4	18	-	1	-	-	22	-	6	-	2	1
2018	-	-	-	-	-	-	-	-	-	-	-	23	-	-	-	2	-
2023	25	256	3	4	38	-	41	-	-	-	1	34	2	7	-	17	0
year	Average Cover (%)																
1998	-	-	-	0.2	0.0	0.1	2.9	0.0	0.0	0.0	0.1	0.1	0.0	-	-	0.0	0.0
2003	-	-	-	-	0.4	-	1.1	-	-	-	0.2	3.2	0.0	-	-	0.0	-
2008	-	-	-	0.0	-	-	1.1	-	-	-	0.2	0.1	-	0.2	0.1	0.0	-
2013	-	-	-	0.0	0.0	0.0	0.2	-	0.0	-	-	0.2	-	0.0	-	0.0	0.0
2018	-	-	-	-	-	-	-	-	-	-	-	0.4	-	-	-	0.0	-
2023	0.1	4.0	0.2	0.0	0.2	-	1.9	-	-	-	0.0	0.3	0.0	0.2	-	0.3	0.0

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

FORB SPECIES	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Silene drummondii (Drummond's campion)	Sphaeralcea coccinea (scarlet globemallow)
year	Nested Frequency		
1998	6	2	3
2003	-	-	7
2008	-	3	-
2013	2	-	4
2018	-	-	-
2023	8	2	6
year	Average Cover (%)		
1998	0.0	0.0	0.0
2003	-	-	0.0
2008	-	0.0	-
2013	0.0	-	0.0
2018	-	-	-
2023	0.0	0.0	0.2

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

**Table 25C-17.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)												
1998	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	-	0.2	9.6	0.4	-	1.4	1.4	-	4.3	1.2	2.9	0.3	0.1
2008	-	0.1	6.1	-	-	0.1	0.5	-	0.3	1	2.5	-	0
2013	-	0.3	11	0.6	0.3	0.1	1	-	0.5	1.5	3.6	0.6	0.2
2018	-	0.3	12	0.1	-	1.2	0.8	-	0.7	1.2	2.7	0.3	0.3
2023	-	0.1	27.3	1.3	-	-	1.1	-	1.2	0.2	4	0.8	1.3
year	Quadrat Cover (%)												
1998	-	-	5.8	0.4	-	1.2	1.1	-	1.8	0.4	2.5	0.9	0.0
2003	-	0.2	8.6	0.8	-	1.2	1.9	-	2.7	0.7	3.5	1.0	0.0
2008	-	0.0	5.3	0.0	-	0.1	0.3	-	0.1	0.4	1.6	0.6	0.0
2013	-	0.4	7.2	0.1	0.0	0.9	0.8	0.0	0.0	0.5	3.5	0.6	0.0
2018	-	0.3	12.7	0.1	-	2.3	0.2	-	0.0	0.8	2.7	0.1	0.1
2023	0.0	0.3	21.9	0.6	-	0.0	0.4	-	0.1	0.1	1.3	0.1	0.5

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

**Table 25C-17.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	131/136
2008	-	-	-	-	-	-	-	-	217/178
2013	-	-	-	-	-	-	-	-	105/131
2018	-	-	-	-	-	-	-	-	166/175
2023	40	-	0	100	0	0	0	0	-/-
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	140	-	0	100	0	0	0	0	34/33
2008	120	-	0	100	0	17	0	0	15/17
2013	200	-	10	90	0	20	0	0	21/36
2018	1420	-	7	93	0	14	1	13	9/10
2023	340	-	0	100	0	6	0	0	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	820	80	27	71	2	5	0	0	73/104
2003	780	-	8	77	15	28	5	0	79/113
2008	1420	140	32	41	27	9	3	14	70/102
2013	10640	420	88	11	1	1	0	5	71/109
2018	8540	-	13	85	2	22	34	7	50/69
2023	8000	60	5	94	1	28	26	1	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	180	40	11	89	0	0	0	0	56/57
2003	1740	-	10	86	3	2	0	1	40/44
2008	140	-	43	14	43	14	43	29	41/63
2013	160	-	0	88	13	0	13	13	50/66
2018	240	-	0	83	17	17	33	17	51/65
2023	260	-	0	92	8	0	0	8	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	117/145
2008	20	-	0	0	100	100	0	0	115/154
2013	100	-	0	80	20	60	20	20	76/105
2018	-	-	-	-	-	-	-	-	95/127
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	1400	520	47	53	0	0	0	0	30/31
2003	2720	-	10	88	2	0	0	1	23/22
2008	380	160	21	79	0	0	0	0	18/19
2013	860	-	2	81	16	0	5	21	24/35
2018	5060	40	5	93	2	0	0	13	11/14
2023	60	-	0	100	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	40	-	100	0	0	0	0	0	- / -
2003	60	-	0	100	0	0	0	0	- / -
2008	20	-	0	100	0	0	0	0	- / -
2013	20	-	0	100	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	- / -
2023	20	-	0	100	0	0	0	0	- / -
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	20	-	100	0	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	4/15
2023	60	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
1998	120	20	83	17	0	0	0	0	- / -
2003	180	-	56	44	0	0	0	0	- / -
2008	100	-	40	20	40	0	0	40	- / -
2013	40	-	100	0	0	0	0	0	- / -
2018	40	-	0	100	0	0	0	0	- / -
2023	60	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	40	-	0	100	0	0	0	0	77/123
2003	80	-	0	75	25	25	25	25	83/137
2008	160	-	38	38	25	13	38	13	60/107
2013	140	-	14	86	0	29	71	43	71/126
2018	160	-	0	100	0	75	25	13	59/100
2023	80	-	0	100	0	0	100	0	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	320	-	13	69	19	0	0	6	159/98
2003	480	-	0	100	0	0	0	0	107/77
2008	380	-	37	63	0	0	0	0	133/79
2013	280	-	100	0	0	0	0	0	104/140
2018	340	-	0	100	0	0	0	0	142/83
2023	580	-	0	100	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1998	20	-	0	100	0	0	0	0	66/277
2003	20	-	0	100	0	0	0	0	89/147
2008	20	-	0	100	0	0	0	0	61/147
2013	40	-	0	100	0	100	0	0	59/108
2018	80	-	0	100	0	0	0	0	67/99
2023	100	-	0	100	0	0	0	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	20	-	0	100	0	0	0	0	50/72
2003	40	-	0	100	0	0	0	0	51/77
2008	40	-	0	0	100	0	0	100	33/36
2013	40	-	0	100	0	0	50	0	29/57
2018	20	-	0	100	0	0	100	0	37/83
2023	60	40	0	100	0	33	0	0	- / -

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

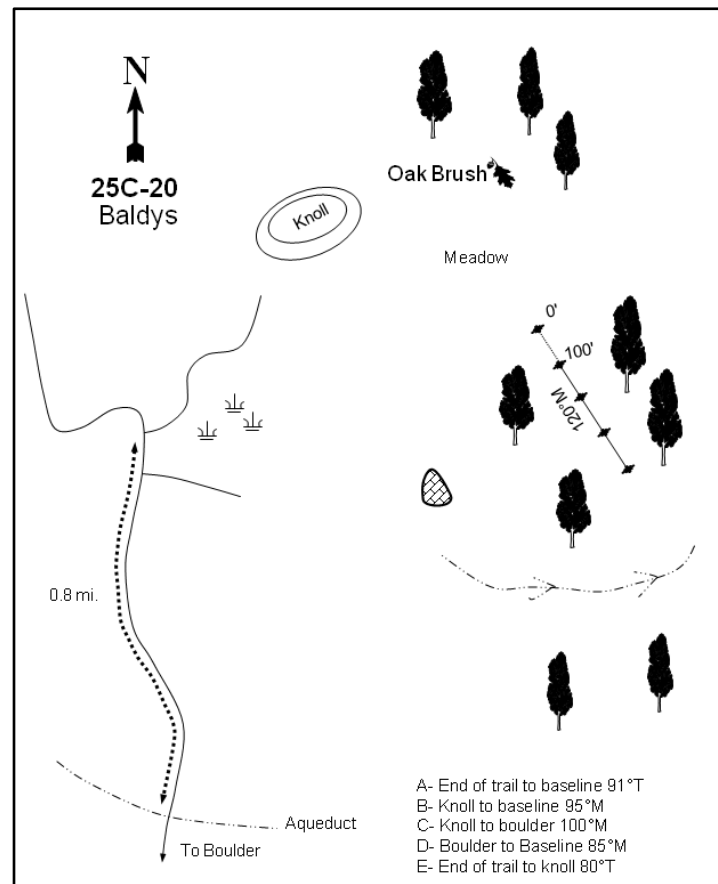
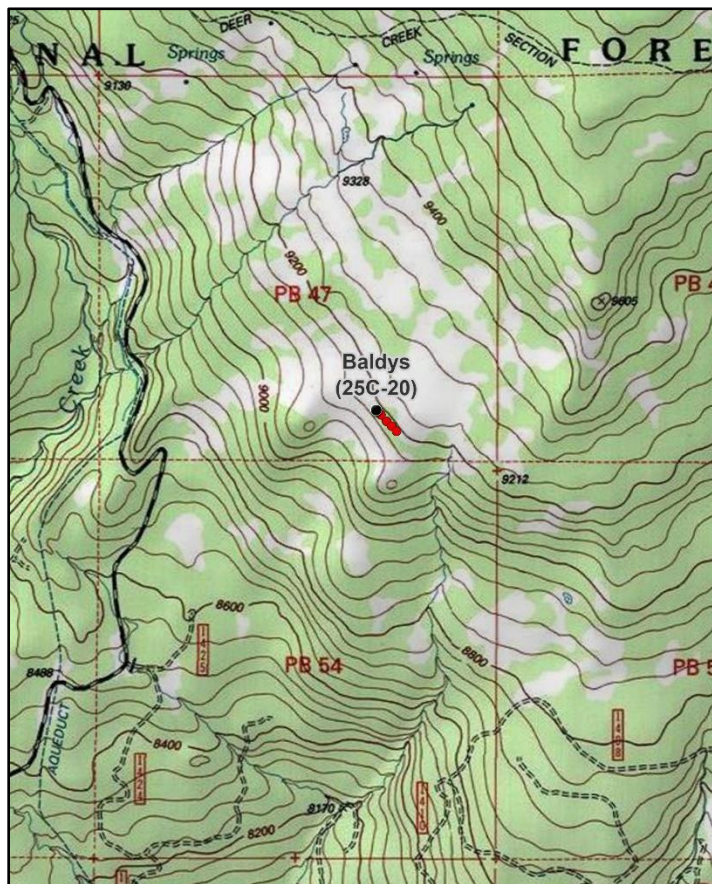
**Table 25C-17.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	8	-	-	-	-	-	9.9
2003	20	18	9	45	18	9	9.0
2008	10	-	100	-	-	-	11.4
2013	9	13	88	-	-	-	6.5
2018	9	-	100	-	-	-	4.6
2023	5	-	67	33	-	-	8.0
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	37	-	-	-	-	-	7.4
2003	106	58	11	16	11	5	4.8
2008	129	11	89	-	-	-	3.1
2013	115	6	88	6	-	-	3.4
2018	107	-	94	6	-	-	4.3
2023	89	-	20	80	-	-	7.1

**Table 25C-17.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	11.1	13.1	9.8	30.0	0.0	9.9	0.0	<b>73.9</b>	Good
2003	17.2	11.2	2.6	10.8	0.0	9.4	0.0	<b>51.3</b>	Poor
2008	11.7	9.2	15.0	20.5	0.0	4.3	0.0	<b>60.7</b>	Fair
2013	20.5	14.8	15.0	17.0	0.0	1.2	0.0	<b>68.6</b>	Fair-Good
2018	20.1	14.7	4.9	27.8	0.0	1.8	0.0	<b>69.3</b>	Fair-Good
2023	30.0	14.7	1.9	22.1	0.0	7.2	0.0	<b>75.8</b>	Good

## BALDYS - STUDY NO. 25C-20

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Deer Creek Lake SE; Township 32S, Range 4E, Section 47  
NAD 83 UTM ZONE 12, 462324 East 4207990 North

**Transect Information**

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

7172  
120° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

From SR-12 north of Boulder, turn onto Garkane Power Plant Road. Travel 1.8 miles to a fork and go right toward Kings Pasture. Proceed 1.2 miles to a cattle guard and pipeline crossing. Continue for 0.8 miles to a fork at a sharp curve in the road: be sure to take the second fork (150-200 feet before the correct fork is another minor fork). Go 0.2 miles up a rocky road, park at the creek, then walk across the creek and marshy area and follow the old road up the hill to the northeast. At the end of the road/trail where it tops out on the hill, take bearings to the clump of aspens where the study is located; the aspen stand contains a spruce along line 2 and there are no other conifers around. The rocky knoll (shown on the map) is a small knoll, and from the knoll to the site is approximately 600 feet. The study is marked by short fenceposts and the 0-foot baseline stake is marked by browse tag #7172.

**Site Information**

Land Ownership  
Land Administrator  
Allotment  
Elevation  
Aspect  
Slope  
Sample Dates

Federal  
USFS  
Boulder  
9,220ft (2,810m)  
South-Southwest  
10-30%  
08/01/1994, 07/29/1998, 08/26/2003, 08/20/2008, 08/14/2013, 08/08/2018, 06/20/2023

**Wildlife Habitat and Vegetation History****Table 25C-20.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-20.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Quaking Aspen	NA
1991	Quaking Aspen	NA
1994	Quaking Aspen	NA
1998	Quaking Aspen	NA
2003	Quaking Aspen	NA
2008	Quaking Aspen	NA
2013	Quaking Aspen	NA
2018	Quaking Aspen	NA
2023	Quaking Aspen	NA

**Site Notes**

No Notes

**Soils****Table 25C-20.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.0	62.7	16.7	20.6	6.1	28.4	329.6	0.6	07/29/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      23 inches  
 NRCS Ecological Site    High Mountain Loam (Aspen)  
 NRCS Ecological Site #    R047XB508UT  
 States and Transitions    No state and transition model is available for this ecological site.

Since study establishment in 1987, this site has maintained a mature stand of quaking aspen (*Populus tremuloides*) with mountain snowberry (*Symphoricarpos oreophilus*) as the dominant shrub species. Although still significant, both density and cover of aspen have decreased over time (Table 25C-20.12, Table 25C-20.13, Table 25C-20.13a). The understory has remained abundant and diverse with perennial grasses and forbs as the most abundant herbaceous components in all sample years. In 2023, the most abundant perennial grass was Kentucky bluegrass (*Poa pratensis*) and the dominant perennial forb was common dandelion (*Taraxacum officinale*) (Table 25C-20.7, Table 25C-20.10, Table 25C-20.11). Barring a major disturbance, this study site will likely continue to remain in this or a similar state in future sample years.

Due to the abundance and diversity of the shrub and herbaceous communities, this site likely serves as adequate habitat for summering mule deer. The diverse and abundant herbaceous understory could also provide forage for elk that may use the area during the summer months (Table 25C-20.3; Beck & Peek, 2005). According to pellet group data, deer presence was low in 2023 while elk presence was moderate (Table 25C-20.9).

## Trend Summary Tables

**Table 25C-20.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1994	12.8	-	0.9	-	-	-
1998	14.5	-	1.8	-	-	6.3
2003	14.8	-	10.9	15.7	-	72.2
2008	11.0	-	3.2	23.3	-	73.6
2013	13.0	-	2.4	20.3	-	64.5
2018	15.7	-	1.6	23.0	-	65.2
2023	18.2	-	6.4	25.7	-	59.0

**Table 25C-20.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1994	-	320	15	313	-	8.1	0.1	10.1
1998	-	324	46	374	-	13.7	0.5	25.7
2003	-	324	14	279	-	12.6	0.1	13.1
2008	-	355	36	318	-	12.6	0.3	18.6
2013	-	390	27	330	-	14.4	0.3	13.9
2018	-	375	17	329	-	18.2	0.2	16.6
2023	-	349	21	329	-	10.2	0.6	22.4

**Table 25C-20.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1994	4.4	-	59.9	0.5	9.5	28.8
1998	4.9	0.0	81.0	1.0	5.8	49.3
2003	1.1	0.1	65.4	0.6	7.7	42.7
2008	4.0	0.0	52.5	0.8	8.5	47.2
2013	3.2	-	62.8	0.0	5.5	43.6
2018	5.6	0.0	72.5	0.2	6.5	42.0
2023	6.2	-	57.2	0.4	7.5	50.9

**Table 25C-20.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1994	4	-	1	3	1
1998	4	-	5	11	-
2003	4	-	2	18	1
2008	4	-	5	18	3
2013	1	-	3	12	1
2018	1	-	11	8	5
2023	2	-	4	7	-
Year	Days Use Per Acre (ha)				
1994	-	-	-	-	-
1998	13.8 (34.1)	-	7.4 (18.2)	32.2 (79.5)	-
2003	6.5 (16.1)	-	12.1 (29.8)	32.2 (79.5)	-
2008	25.4 (62.8)	-	20.1 (49.7)	44.9 (110.9)	-
2013	2.2 (5.4)	-	5.3 (13.2)	18.1 (44.7)	-
2018	2.9 (7.2)	-	2.7 (6.6)	20.8 (51.3)	-
2023	3.6 (9.0)	8.7 (21.5)*	10.7 (26.5)	20.8 (51.3)	-

\*Pellets per acre (ha)



**Table 25C-20.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bouteloua gracilis (blue grama)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Carex obtusata (obtuse sedge)	Carex rossii (Ross' sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Festuca thurberi (Thurber's fescue)	Hesperostipa comata (needle and thread)	Juncus arcticus (arctic rush)	Koeleria macrantha (prairie Junegrass)	Muhlenbergia richardsonis (mat muhly)	Poa fendleriana (muttongrass)
year	Nested Frequency																
1994	44	-	1	-	17	111	-	1	48	36	39	4	-	33	5	-	107
1998	15	19	-	0	4	82	-	-	6	8	50	-	-	-	-	15	96
2003	9	6	1	3	2	58	-	-	73	8	42	-	-	6	-	1	76
2008	-	16	3	1	-	140	-	1	52	14	57	4	3	23	1	5	77
2013	28	22	-	7	1	109	-	12	68	7	35	-	-	15	5	6	79
2018	11	11	4	-	14	42	9	-	58	6	32	5	-	23	-	15	44
2023	95	1	3	17	-	2	-	-	23	3	-	-	-	20	5	100	31
year	Average Cover (%)																
1994	0.7	-	0.0	-	0.6	0.9	-	0.0	0.6	0.2	0.3	0.1	-	0.2	0.0	-	2.3
1998	0.1	0.1	-	0.0	0.0	1.4	-	-	0.1	0.2	1.3	-	-	-	-	0.5	2.1
2003	0.2	0.0	0.0	0.2	0.0	1.0	-	-	2.3	0.1	0.5	-	-	0.0	-	0.0	2.5
2008	-	0.4	0.0	0.0	-	3.1	-	0.0	1.1	0.2	0.5	0.2	0.0	0.1	0.0	0.1	1.5
2013	0.6	0.2	-	0.1	0.0	1.6	-	0.3	1.2	0.1	0.6	-	-	0.2	0.0	0.0	1.0
2018	0.3	0.1	0.1	-	0.3	0.4	0.1	-	1.6	0.2	0.5	0.2	-	0.1	-	0.4	1.0
2023	1.8	0.0	0.0	0.4	-	0.0	-	-	0.3	0.1	-	-	-	0.3	0.0	3.4	1.0

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

GRASS SPECIES	Poa pratensis <sup>i</sup> (Kentucky bluegrass)
year	Nested
1994	141
1998	169
2003	190
2008	173
2013	310
2018	298
2023	137
year	Average Cover (%)
1994	2.1
1998	7.8
2003	5.7
2008	5.4
2013	8.3
2018	13.0
2023	2.9

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

**Table 25C-20.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Allium cernuum (nodding onion)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria parvifolia (small-leaf pussytoes)	Arabis drummondii (Drummond's rockcross)	Artemisia carruthii (Carruth's sagewort)	Artemisia dracunculus (tarragon)	Artemisia ludoviciana (white sagebrush)	Astragalus convallarius (lesser rusby milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chenopodium album <sup>a</sup> (lambsquarters)	Cirsium vulgare <sup>a</sup> (bull thistle)	Collomia linearis <sup>a</sup> (tiny trumpet)	Descurainia <sup>a</sup> (tansymustard)	Erigeron (fleabane)	Erigeron eatonii (Eaton's fleabane)
year	Nested Frequency																
1994	104	-	22	3	22	-	-	-	-	-	-	4	3	-	-	-	-
1998	143	5	15	10	34	-	-	6	-	5	-	14	4	2	5	3	-
2003	98	19	12	-	24	-	-	6	-	-	3	1	3	-	-	5	2
2008	84	-	26	3	19	13	-	-	5	-	1	-	1	-	-	-	4
2013	63	-	21	6	25	6	4	-	-	2	3	2	8	-	-	-	-
2018	69	-	16	-	21	2	4	2	-	-	-	4	6	4	-	-	5
2023	71	7	21	11	13	1	1	-	-	7	-	-	-	-	-	-	-
year	Average Cover (%)																
1994	1.8	-	0.2	0.0	0.1	-	-	-	-	-	-	0.0	0.1	-	-	-	-
1998	3.6	0.0	0.1	0.2	0.6	-	-	0.0	-	0.2	-	0.1	0.0	0.0	0.0	0.0	-
2003	1.5	0.7	0.3	-	0.3	-	-	0.0	-	-	0.0	0.0	0.0	-	-	0.0	0.0
2008	1.2	-	0.1	0.0	0.3	0.1	-	-	0.0	-	0.1	-	0.0	-	-	-	0.0
2013	0.7	-	0.2	0.0	0.6	0.0	0.1	-	-	0.0	0.0	0.0	0.2	-	-	-	-
2018	1.0	-	0.1	-	0.4	0.0	0.0	0.0	-	-	-	0.0	0.1	0.0	-	-	0.0
2023	2.0	0.1	0.1	0.3	0.2	0.0	0.0	-	-	0.0	-	-	-	-	-	-	-

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

FORB SPECIES	Erigeron flagellaris (trailing fleabane)	Eriogonum racemosum (redroot buckwheat)	Geranium richardsonii (Richardson's geranium)	Hymenoxys hoopesii (owl's-claws)	Ipomopsis aggregata (scarlet gilia)	Iris missouriensis (Rocky Mountain iris)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lathyrus lanszwertii (Nevada pea)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Osmorhiza occidentalis (western sweetroot)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phacelia heterophylla <sup>a</sup> (varileaf phacelia)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)
year	Nested Frequency																
1994	30	-	48	42	-	16	-	23	-	33	-	-	10	-	35	-	9
1998	29	-	32	43	-	25	-	67	4	39	7	-	-	-	15	-	13
2003	36	-	17	43	4	5	-	28	-	19	-	-	4	2	30	-	6
2008	19	3	20	44	4	4	-	85	-	29	-	-	3	0	41	1	30
2013	23	-	18	44	-	8	1	5	-	47	-	-	-	5	37	7	5
2018	18	-	19	47	4	3	-	26	-	12	-	17	3	-	41	7	3
2023	-	1	3	37	-	-	-	76	21	10	-	-	-	8	57	-	2
year	Average Cover (%)																
1994	0.2	-	0.6	0.9	-	0.4	-	1.1	-	1.6	-	-	0.0	-	0.8	-	0.0
1998	1.1	-	0.3	2.5	-	0.4	-	3.8	0.2	2.3	0.0	-	-	-	0.6	-	0.2
2003	0.3	-	0.3	1.3	0.0	0.2	-	1.4	-	0.9	-	-	0.0	0.0	0.9	-	0.0
2008	0.1	0.0	0.3	1.1	0.0	0.0	-	4.1	-	2.9	-	-	0.0	0.0	0.8	0.0	0.1
2013	0.3	-	0.2	1.6	-	0.1	0.0	0.2	-	3.4	-	-	-	0.0	0.5	0.3	0.0
2018	0.4	-	0.3	2.5	0.0	0.2	-	0.7	-	0.6	-	0.1	0.0	-	0.9	0.2	0.0
2023	-	0.0	0.1	2.3	-	-	-	2.9	0.3	0.1	-	-	-	0.3	1.8	-	0.0

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

FORB SPECIES	Potentilla gracilis (slender cinquefoil)	Potentilla hippiana (woolly cinquefoil)	Pseudocymopterus montanus (alpine false springsparsley)	Senecio eremophilus (desert ragwort)	Silene drummondii (Drummond's campion)	Symphoricarpon ascendens (western aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium gymnocarpon (hollyleaf clover)	Vicia americana (American vetch)	Viola (violet)
year	Nested Frequency										
1994	13	6	15	13	-	5	174	-	-	59	-
1998	5	1	1	14	2	19	227	-	-	105	4
2003	-	3	25	11	-	14	169	2	-	53	7
2008	1	1	23	16	5	11	220	5	-	22	1
2013	3	1	31	14	3	15	175	-	5	134	7
2018	-	-	15	3	-	5	249	-	-	92	2
2023	5	-	-	2	-	13	227	1	1	16	-
year	Average Cover (%)										
1994	0.5	0.0	0.1	0.1	-	0.0	1.3	-	-	0.3	-
1998	0.1	0.0	0.0	0.1	0.0	0.1	8.1	-	-	1.6	0.0
2003	-	0.1	0.4	0.1	-	0.1	3.1	0.0	-	0.9	0.2
2008	0.0	0.0	0.3	0.1	0.0	0.2	6.1	0.1	-	0.5	0.0
2013	0.1	0.0	0.1	0.3	0.0	0.1	2.4	-	0.1	2.6	0.2
2018	-	-	0.1	0.0	-	0.0	6.9	-	-	2.1	0.0
2023	0.0	-	-	0.1	-	0.5	11.8	0.0	0.0	0.1	-

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

**Table 25C-20.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Populus tremulooides <sup>p</sup> (quaking aspen)	Quercus gambelii <sup>p</sup> (Gambel oak)	Ribes montigenum <sup>p</sup> (gooseberry currant)	Rosa woodsii <sup>p</sup> (Woods' rose)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)					
1994	-	-	-	-	-	-
1998	-	-	-	-	-	-
2003	0.7	72.2	-	0.4	0.7	13.9
2008	0.4	73.6	-	0.1	1.4	21.4
2013	0	64.5	-	0.2	0.6	19.5
2018	0.7	65.2	-	0.1	1.4	20.8
2023	0.1	59	0	0.1	0.7	24.8
year	Quadrat Cover (%)					
1994	0.4	0.9	-	0.0	0.7	11.6
1998	-	1.8	-	-	1.2	13.3
2003	0.3	10.9	-	0.0	1.2	13.3
2008	0.3	3.2	-	0.0	0.6	10.1
2013	0.2	2.4	-	0.0	0.3	12.6
2018	0.3	1.6	0.0	0.0	0.5	14.8
2023	0.2	6.4	0.0	0.6	0.6	16.7

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

**Table 25C-20.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1994	420	-	0	100	0	71	0	0	24/16
1998	-	-	-	-	-	-	-	-	-/-
2003	740	-	62	19	19	22	16	5	47/23
2008	640	60	25	50	25	13	0	9	32/32
2013	160	-	75	25	0	13	0	0	41/43
2018	580	-	3	97	0	0	0	0	31/34
2023	440	-	36	64	0	0	0	0	-/-
<b>Chrysothamnus viscidiflorus ssp. lanceolatus -- (yellow rabbitbrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	43/71
2008	-	-	-	-	-	-	-	-	35/50
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	100	0	0	0	0	0	24/23
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Populus tremuloides<sup>SP</sup> -- (quaking aspen)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	1000	-	48	48	4	10	0	4	-/-
2003	1180	-	53	46	2	15	0	0	-/-
2008	1100	140	44	51	6	14	13	18	-/-
2013	See table 13a - Aspen Characteristics								
2018	See table 13a - Aspen Characteristics								
2023	See table 13a - Aspen Characteristics								
<b>Quercus gambelii<sup>P</sup> -- (Gambel oak)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	51/42
2018	-	-	-	-	-	-	-	-	40/6
2023	40	-	100	0	0	0	0	0	-/-
<b>Ribes montigenum<sup>P</sup> -- (gooseberry currant)</b>									
1994	60	-	0	100	0	0	0	0	49/159
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	100	-	40	60	0	0	0	0	54/77
2013	60	-	33	67	0	0	0	0	60/85
2018	60	-	33	67	0	0	0	0	68/69
2023	180	-	0	100	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
1994	1340	20	30	69	2	0	0	0	36/29
1998	1540	240	36	61	3	1	0	0	47/38
2003	2440	-	0	98	2	0	0	1	30/22
2008	2020	-	21	78	1	0	0	1	37/22
2013	960	-	52	48	0	0	0	0	47/34
2018	2080	-	14	84	3	18	1	0	51/44
2023	640	-	6	91	3	44	0	3	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1994	5780	20	7	93	0	3	0	0	41/62
1998	5080	120	24	75	0	2	0	0	50/70
2003	6600	-	16	82	2	0	0	0	42/69
2008	7720	120	11	83	6	4	2	3	43/66
2013	6080	80	20	80	0	8	0	3	46/71
2018	8460	-	6	94	0	14	2	0	46/71
2023	8740	-	3	97	0	0	0	0	- / -

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

**Table 25C-20.13a - Aspen Characteristics.** Characteristics of aspen populations including density, size class distribution, and vigor of plants.

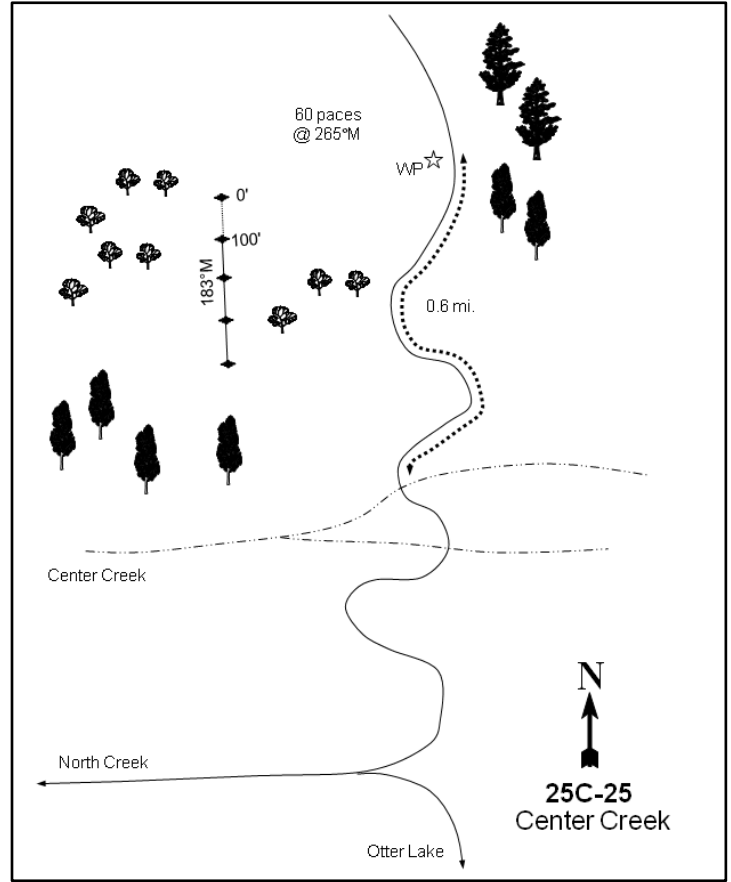
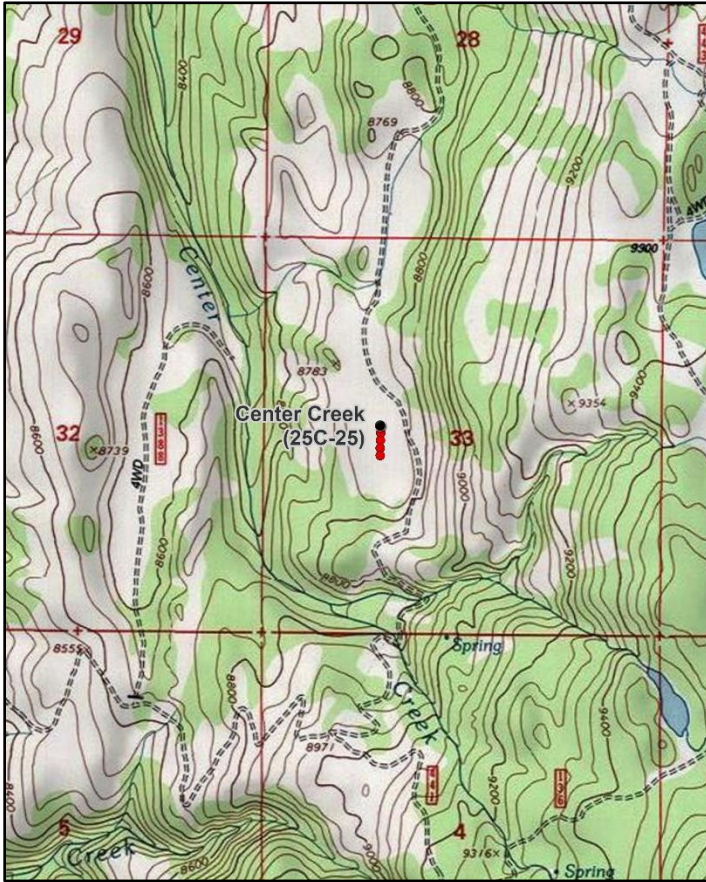
Year	Density	Size Class Distribution				Utilization		Poor Vigor (%)
	Plants per Acre	Class I (%)	Class II (%)	Class III (%)	Class IV (%)	Moderate (%)	Heavy (%)	
<b>Populus tremuloides (quaking aspen)</b>								
2013	1260	10	54	35	2	7	0	2
2018	1440	13	58	4	25	14	14	8
2023	1520	21	34	12	33	3	0	5

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

**Table 25C-20.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Abies lasiocarpa (subalpine fir)</b>							
2018	22	100	-	-	-	-	5.0
<b>Picea (spruce)</b>							
2018	6	-	100	-	-	-	9.0
<b>Populus tremuloides (quaking aspen)</b>							
1998	428	-	-	-	-	-	23.3
2008	1121	-	45	-	-	55	15.8
2013	2080	20	35	-	-	45	11.1
2018	1844	5	35	15	-	45	13.2
2023	1581	10	15	25	-	50	16.4

## CENTER CREEK - STUDY NO. 25C-25



### Location Information

USGS 7.5 min Map Info	Grass Lakes NE; Township 32S, Range 1W, Section 33
GPS (0' Stake)	NAD 83 UTM ZONE 12, 420274 East 4204061 North

### Transect Information

Browse Tag # (0' Stake)	7147
Transect Bearing	178° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Belt 2: No Rebar

### Directions to Site

From the intersection of SR-12 and Route 1660 (to 22) turn left onto Johns Flat Road. Go 17.2 miles to the Grass Lake Road (USFS sign) and turn east. Travel 1.2 miles on this road to a fork by some fields. Proceed to the right and continue 0.4 miles to the Horse Creek Fork. Bear left and drive 1.15 miles to a fork with a sign. Stay left and continue 0.25 miles on the main road. At the fork past the buildings at Birch Creek, proceed to the right and go 0.6 miles. Stay left at the next fork and proceed 0.75 miles to a cattle guard, then continue 0.75 miles to another fork. Stay left and proceed for 1.65 miles to a USFS enclosure. Continue 2.55 miles to a cattle guard, then drive for 0.5 miles to North Creek. Go 2.6 miles, passing the North Creek transect, to the Center Creek-Otter Lake intersection. Bear left and go 1.25 miles to a witness post on the left (west) side of the road. Walk 60 paces west at 265 degrees to the 0-foot baseline stake, a short fencepost marked with a red browse tag #7147.

### Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Coyote Hollow
Elevation	8,750ft (2,667m)
Aspect	Southwest
Slope	3%
Sample Dates	07/28/1994, 08/05/1998, 08/18/2003, 08/12/2008, 07/17/2013, 06/26/2018, 06/27/2023

**Table 25C-25.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed Fire	-	-	1984	-
Seeding - Seed Unknown	-	-	Historic	-

**Wildlife Habitat and Vegetation History**

**Table 25C-25.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-25.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Perennial Grass/Yellow Rabbitbrush	No Encroachment
1991	Yellow Rabbitbrush/Perennial Grass	No Encroachment
1994	Yellow Rabbitbrush/Perennial Grass	No Encroachment
1998	Yellow Rabbitbrush/Perennial Grass	No Encroachment
2003	Yellow Rabbitbrush/Mountain Big Sagebrush	No Encroachment
2008	Yellow Rabbitbrush/Mountain Big Sagebrush	No Encroachment
2013	Yellow Rabbitbrush/Mountain Big Sagebrush	No Encroachment
2018	Mountain Big Sagebrush/Yellow Rabbitbrush	No Encroachment
2023	Mountain Big Sagebrush/Yellow Rabbitbrush	No Encroachment

**Site Notes**

There is a full-high stake with a browse tag very close to the site: this is not the 0-foot stake! Deer pellet groups were moderately abundant in 1991 (Jense, et al., 1991). Sage-grouse clockers were observed on the site in 2023, which indicates some nesting activity is occurring.

**Soils**

**Table 25C-25.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	6.1	48.4	31.1	20.6	2.7	15.3	249.6	0.4	08/05/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      21 inches  
 NRCS Ecological Site    Mountain Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site #    R047XB430UT  
 States and Transitions    No state and transition model is available for this ecological site.

When this study was established in 1987, the plant community was comprised mainly of yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) with a diverse understory of introduced and native perennial grasses and forbs (Photos, Pre-1992 Data). Perennial grasses and forbs exhibited a slight decrease over the sample years (Table 25C-25.7, Table 25C-25.10, Table 25C-25.11), and the site transitioned from a community dominated by yellow rabbitbrush and perennial grasses to one dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and yellow rabbitbrush in 1998 (Table 25C-25.4, Table 25C-25.12, Table 25C-25.13). Without disturbance, sagebrush will likely continue to increase and become the sole dominant vegetation component of this study site.

Due to the abundance and diversity of the shrub and herbaceous communities, this site likely serves as adequate habitat for summering mule deer, but may serve as better foraging range during very mild winters due to high sagebrush cover. In addition, sagebrush on this site could provide valuable browse for elk during the winter (Table 25C-25.3; Wambolt, 1996). However, pellet transect data shows that both deer and elk presence were low in 2023 (Table 25C-25.9).

**Trend Summary Tables**

**Table 25C-25.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1994	1.8	15.9	-	-	-	-
1998	2.2	15.1	-	-	-	-
2003	7.5	14.1	-	12.5	19.0	-
2008	6.2	12.2	-	12.7	18.3	-
2013	10.1	8.4	-	12.6	9.0	-
2018	13.3	5.1	-	15.1	5.5	-
2023	17.0	7.3	-	20.7	9.4	-

**Table 25C-25.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1994	-	402	52	217	-	19.6	0.2	3.2
1998	1	431	93	265	0.0	24.3	0.4	11.9
2003	-	397	30	200	-	16.8	0.2	6.3
2008	-	410	57	264	-	15.4	0.3	5.3
2013	-	408	22	219	-	17.0	0.1	3.0
2018	-	402	17	193	-	13.4	0.0	1.4
2023	-	352	159	213	-	16.7	0.6	6.5

**Table 25C-25.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1994	8.6	-	29.7	24.1	1.9	36.6
1998	4.5	0.0	41.1	32.4	0.3	53.6
2003	3.9	0.0	20.4	43.7	1.1	43.0
2008	4.8	0.1	27.6	31.5	0.5	47.7
2013	17.1	0.0	36.3	26.2	0.2	39.0
2018	19.8	1.1	41.3	24.9	0.2	33.8
2023	26.0	-	27.3	26.8	0.3	38.2

**Table 25C-25.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
1994	1	29	12	-	12
1998	8	24	4	-	14
2003	17	8	6	-	12
2008	17	33	31	-	50
2013	7	10	19	-	2
2018	5	11	7	-	28
2023	8	18	2	-	10
Year	Days Use Per Acre (ha)				
1994	-	-	-	-	-
1998	31.9 (78.9)	36.2 (89.4)	12.1 (29.8)	-	-
2003	26.8 (66.3)	24.8 (61.2)	12.1 (29.8)	-	-
2008	16.7 (41.2)	19.4 (48.0)	32.2 (79.5)	-	-
2013	20.3 (50.2)	14.7 (36.4)	28.1 (69.5)	-	-
2018	22.5 (55.6)	16.8 (41.4)	11.4 (28.1)	-	-
2023	31.2 (77.1)	16.1 (39.7)	10.7 (26.5)	8.7 (21.5)*	-

\*Pellets per acre (ha)



**Table 25C-25.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus arvensis <sup>ai</sup> (field brome)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus porteri (Porter brome)	Carex (sedge)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency																
1994	318	-	145	29	-	135	-	2	90	6	-	-	20	4	-	5	5
1998	191	-	182	17	1	198	-	4	148	8	29	0	142	4	1	13	29
2003	174	-	135	52	-	236	-	2	73	-	27	-	113	7	9	-	6
2008	178	4	164	24	-	255	-	9	44	-	21	-	162	91	8	-	10
2013	140	4	21	19	-	230	4	10	56	-	85	-	111	108	11	-	3
2018	228	-	53	20	-	298	-	19	6	1	22	6	151	-	4	-	3
2023	131	-	39	18	-	247	-	3	17	-	15	-	134	-	-	-	9
year	Average Cover (%)																
1994	11.3	-	3.2	1.6	-	2.3	-	0.0	0.6	0.0	-	-	0.4	0.1	-	0.0	0.0
1998	4.2	-	5.2	0.5	0.0	6.4	-	0.0	3.1	0.1	0.4	0.0	3.4	0.4	0.0	0.2	0.3
2003	2.7	-	2.2	1.4	-	5.1	-	0.0	1.0	-	0.4	-	3.5	0.3	0.1	-	0.1
2008	2.8	0.0	2.3	0.6	-	4.3	-	0.0	0.5	-	0.2	-	2.9	1.4	0.0	-	0.1
2013	3.2	0.0	0.3	0.5	-	4.0	0.4	0.2	0.4	-	1.9	-	2.8	3.0	0.3	-	0.0
2018	3.6	-	0.6	0.5	-	5.6	-	0.7	0.1	0.0	0.3	0.0	2.0	-	0.0	-	0.0
2023	2.9	-	0.7	0.9	-	7.6	-	0.0	0.3	-	0.2	-	3.8	-	-	-	0.2

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

**Table 25C-25.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Androsace septentrionalis <sup>a</sup> (pygmy flower rockjasmine)	Antennaria parvifolia (small-leaf pussytoes)	Arabis drummondii (Drummond's rockcross)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Castilleja linearifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album <sup>a</sup> (lambquarters)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Collomia linearis <sup>a</sup> (tiny trumpet)	Crepis acuminata (tapertip hawkbeard)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Dracocephalum parviflorum (American dragonhead)
year	Nested Frequency																
1994	-	-	20	4	-	-	6	4	-	2	23	5	-	-	-	-	-
1998	3	1	79	7	3	1	16	-	-	14	19	3	-	2	4	3	-
2003	1	-	4	4	2	-	-	3	-	7	-	3	4	-	-	3	2
2008	-	-	4	5	2	-	11	-	-	7	-	3	3	2	-	-	-
2013	-	-	4	11	7	-	-	-	-	12	-	1	4	-	-	-	-
2018	5	-	-	7	-	-	3	-	-	8	-	-	-	-	-	-	-
2023	2	-	19	5	-	-	6	19	0	0	-	-	-	-	-	-	-
year	Average Cover (%)																
1994	-	-	0.1	0.0	-	-	0.0	0.0	-	0.0	0.1	0.0	-	-	-	-	-
1998	0.0	0.0	0.3	0.3	0.0	0.0	0.2	-	-	0.1	0.1	0.0	-	0.0	0.0	0.0	-
2003	0.0	-	0.0	0.1	0.0	-	-	0.0	-	0.3	-	0.2	0.0	-	-	0.0	0.0
2008	-	-	0.0	0.0	0.0	-	0.0	-	-	0.1	-	0.0	0.0	0.0	-	-	-
2013	-	-	0.0	0.2	0.0	-	-	-	-	0.0	-	0.0	0.0	-	-	-	-
2018	0.0	-	-	0.2	-	-	0.0	-	-	0.0	-	-	-	-	-	-	-
2023	0.0	-	0.1	0.2	-	-	0.2	0.3	0.0	0.0	-	-	-	-	-	-	-

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

FORB SPECIES	Erigeron divergens <sup>a</sup> (spreading fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron flagellaris (trailing fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus sericeus (silky lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera caespitosa (tufted evening primrose)	Orthocarpus <sup>a</sup> (owl's-clover)
year	Nested Frequency																
1994	-	-	-	39	23	92	-	1	-	6	-	102	32	4	-	-	-
1998	-	29	10	8	2	118	-	-	-	6	2	119	60	2	-	-	-
2003	-	15	-	32	-	112	6	-	-	-	6	43	18	14	2	-	-
2008	-	48	8	62	3	122	3	-	-	1	1	92	26	5	-	-	3
2013	-	26	9	24	1	117	-	-	-	-	5	47	35	3	-	1	-
2018	-	47	16	34	-	105	-	-	15	-	2	13	1	-	-	-	-
2023	0	31	-	31	-	94	-	-	141	2	4	35	30	-	-	-	-
year	Average Cover (%)																
1994	-	-	-	0.3	0.1	0.8	-	0.0	-	0.0	-	0.4	1.3	0.0	-	-	-
1998	-	0.2	0.1	0.1	0.0	2.0	-	-	-	0.2	0.0	2.7	5.4	0.0	-	-	-
2003	-	0.1	-	0.4	-	1.8	0.0	-	-	-	0.0	0.4	2.3	0.2	0.0	-	-
2008	-	0.3	0.1	0.4	0.0	1.2	0.0	-	-	0.0	0.0	0.8	1.4	0.0	-	-	0.0
2013	-	0.1	0.0	0.1	0.0	0.9	-	-	-	-	0.0	0.2	1.0	0.0	-	0.0	-
2018	-	0.3	0.1	0.2	-	0.4	-	-	0.0	-	0.0	0.0	0.0	-	-	-	-
2023	0.0	0.4	-	0.3	-	2.0	-	-	0.4	0.0	0.0	0.4	1.5	-	-	-	-

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

FORB SPECIES	Packera multilobata (lobeleaf groundsel)	Penstemon comarthenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla hippiana (woolly cinquefoil)	Silene antirrhina <sup>a</sup> (sleepy silene)	Silene drummondii (Drummond's campion)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency								
1994	22	17	35	7	-	-	-	42	-
1998	2	5	5	-	0	1	-	77	7
2003	7	29	2	3	1	-	1	3	8
2008	10	31	41	33	2	-	-	26	7
2013	7	28	28	8	3	-	-	20	-
2018	11	10	1	-	3	-	-	4	-
2023	4	12	64	11	1	1	8	13	-
year	Average Cover (%)								
1994	0.1	0.1	0.1	0.0	-	-	-	0.1	-
1998	0.0	0.0	0.0	-	0.0	0.0	-	0.4	0.0
2003	0.0	0.5	0.0	0.0	0.0	-	0.0	0.2	0.0
2008	0.1	0.5	0.2	0.1	0.0	-	-	0.2	0.1
2013	0.0	0.2	0.1	0.0	0.0	-	-	0.1	-
2018	0.1	0.1	0.0	-	0.1	-	-	0.0	-
2023	0.0	0.1	0.8	0.0	0.0	0.0	0.0	0.1	-

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

**Table 25C-25.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi (Parry's rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)						
1994	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-
2003	12.3	17.6	0.8	-	-	0.2	0.6
2008	12.7	16.9	0.8	-	-	-	0.6
2013	12.6	8.4	0.5	-	-	-	0.1
2018	14.8	5.1	0.1	-	-	0.3	0.3
2023	20.7	9.2	0.1	-	-	0	0.1
year	Quadrat Cover (%)						
1994	1.4	14.5	0.3	-	-	0.4	1.0
1998	1.5	14.4	-	-	-	0.8	0.7
2003	7.3	13.7	0.2	-	-	0.2	0.2
2008	6.0	12.0	0.1	-	-	0.2	0.1
2013	9.8	8.3	0.0	-	0.1	0.2	0.0
2018	12.9	5.1	0.0	0.0	-	0.4	0.0
2023	16.8	7.3	0.0	-	-	0.2	0.0

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

**Table 25C-25.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

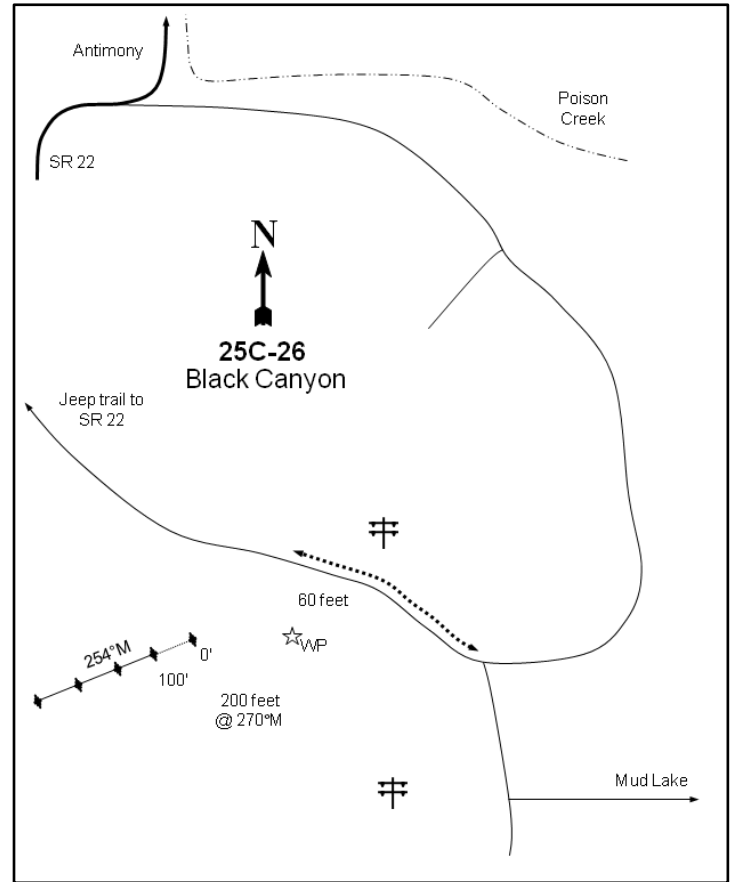
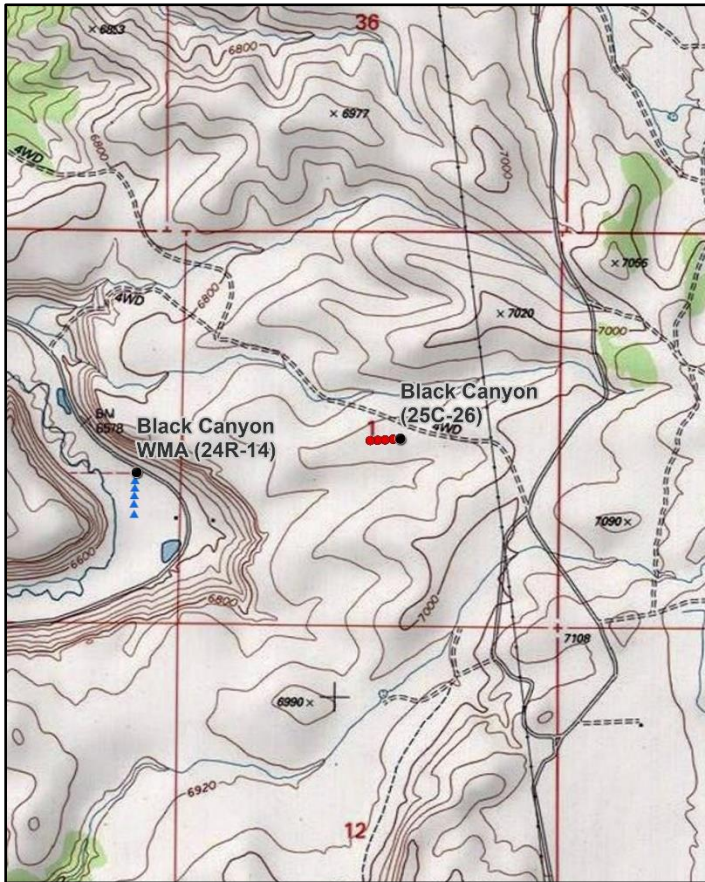
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1994	1380	540	17	80	3	9	0	0	32/45
1998	1420	240	32	66	1	13	0	0	49/76
2003	2620	-	16	80	4	11	0	1	45/69
2008	5980	4160	62	30	8	19	2	2	48/86
2013	6840	980	51	46	3	35	15	7	40/74
2018	7980	20	34	57	9	1	2	8	44/68
2023	6860	620	15	81	5	19	29	4	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1994	25460	480	77	18	5	0	1	0	47/65
1998	12360	860	48	49	3	0	1	5	50/61
2003	18080	20	21	75	3	1	0	0	31/39
2008	22300	820	20	51	30	13	0	4	28/37
2013	13240	220	27	73	0	28	9	10	23/30
2018	16280	140	40	57	2	12	9	10	21/29
2023	15060	-	18	82	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	40	-	0	100	0	0	0	0	59/27
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1994	740	20	41	54	5	8	0	3	55/68
1998	180	-	22	67	11	0	0	11	74/65
2003	340	-	6	77	18	25	0	0	79/72
2008	320	-	0	56	44	6	0	31	66/71
2013	120	-	0	83	17	17	0	17	66/70
2018	140	-	0	43	57	0	0	29	58/58
2023	100	-	20	20	60	0	0	40	- / -
<b>Ericameria parryi -- (Parry's rabbitbrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	100	0	0	0	0	0	22/12
2023	40	-	0	100	0	100	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	45/41
2023	300	-	40	60	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	38/43
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	100	0	0	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1994	60	-	33	67	0	0	0	0	37/96
1998	60	-	33	67	0	0	0	0	56/188
2003	40	-	50	50	0	0	0	0	57/177
2008	40	-	100	0	0	0	0	0	45/95
2013	100	-	0	100	0	80	0	80	33/115
2018	120	-	0	83	17	17	0	0	43/76
2023	200	-	10	90	0	20	30	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1994	640	-	28	69	3	6	6	0	33/49
1998	400	-	5	80	15	20	0	5	40/57
2003	340	-	0	71	29	0	0	12	28/37
2008	280	-	14	36	50	14	0	21	31/42
2013	120	-	0	100	0	50	17	17	28/34
2018	440	-	14	86	0	0	0	0	19/23
2023	80	-	50	50	0	0	0	0	- / -

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

## BLACK CANYON - STUDY NO. 25C-26

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Antimony SW; Township 32S, Range 2W, Section 01  
NAD 83 UTM ZONE 12, 416109 East 4211914 North

**Transect Information**

Browse Tag # (0' Stake)	698
Transect Bearing	254° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

**Directions to Site**

From Antimony, travel south on SR-22 to the turnoff to Mud Lake Road. Turn east, travel along Poison Creek for 1.2 miles to a fork, and stay right. Continue southeast for 2.2 miles to another major fork. At this point there is a faint jeep trail leading back to the north. Follow this jeep trail for 0.35 miles, continuing under the powerlines and up on the ridge to a green fencepost (witness post) about 20 yards away from the south (left) side of the road. The transect starts 200 feet west of the witness post. The study is marked by 1.5-foot tall fenceposts and the 0-foot stake is marked with browse tag #698.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	POISON CREEK
Elevation	6,960ft (2,121m)
Aspect	West
Slope	5%
Sample Dates	08/19/1998, 07/31/2003, 08/13/2008, 07/16/2013, 07/09/2018, 06/26/2023

**Wildlife Habitat and Vegetation History****Table 25C-26.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-26.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush/Black Sagebrush	No Encroachment
1991	Mountain Big Sagebrush/Black Sagebrush	No Encroachment
1998	Mountain Big Sagebrush/Black Sagebrush	No Encroachment
2003	Black Sagebrush/Mountain Big Sagebrush	No Encroachment
2008	Black Sagebrush/Mountain Big Sagebrush	No Encroachment
2013	Black Sagebrush/Mountain Big Sagebrush	No Encroachment
2018	Black Sagebrush/Mountain Big Sagebrush	Phase I
2023	Black Sagebrush/Mountain Big Sagebrush	No Encroachment

**Site Notes**

There has been difficulty distinguishing between mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*A. nova*) over the sample years (particularly in 2008 and 2023) due to hybridization. Due to the difficulty of differentiating between deer and pronghorn pellet groups, pronghorn pellet groups have been combined with deer pellet group data. Sage-grouse pellets and clockers (associated with nesting activity) were observed on the site in 2023.

**Soils****Table 25C-26.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.1	62.0	19.4	18.6	1.8	3.5	134.4	0.4	08/19/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	9 inches
NRCS Ecological Site	Upland Gravelly Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB306UT
States and Transitions	No state and transition model is available for this ecological site.

This site has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and black sagebrush (*A. nova*) since study establishment in 1987 (Photos, Pre-1992 Data, Table 25C-26.12, Table 25C-26.13). Due to hybridization of the two sagebrush species and difficulties in differentiation, it should be noted that shifts between these two populations are likely negligible. The herbaceous understory has remained abundant, but not very diverse; blue grama (*Bouteloua gracilis*) has provided nearly all of the herbaceous cover since 1998 (Table 25C-26.7, Table 25C-26.10, Table 25C-26.11). Twoneedle pinyon (*Pinus edulis*) was observed for the first time in 2018, but was absent in 2023 (Table 25C-26.4). Although continued encroachment could be possible, the infrequency of sampling (Photos, Table 25C-26.14) indicates that this is not likely to occur for some time.

Deer winter range condition has ranged between poor and good since 1998. Deer winter range condition was considered to be fair in 2023. Improvement to deer wintering range can be accomplished through efforts that support sagebrush reproduction while reducing the decadent portion of the population; diversifying and increasing cover of native perennial forbs would also improve winter range condition (Table 25C-26.15). The sagebrush component of this site could also provide valuable browse for elk that may use the area during the winter (Table 25C-26.3; Wambolt, 1996). However, pellet transect data indicates that elk presence has remained low since 1998, with no pellet groups being observed in many years, including 2023. Mule deer presence has fluctuated from year to year, but was considered to be low in 2023 (Table 25C-26.9).

## Trend Summary Tables

**Table 25C-26.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	11.7	0.3	-	-	-	-
2003	15.5	1.4	-	14.8	1.2	-
2008	17.1	1.1	-	23.3	1.3	-
2013	16.7	2.2	-	22.8	2.1	-
2018	15.6	1.5	-	21.6	1.6	-
2023	12.2	2.8	-	16.4	2.7	-

**Table 25C-26.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	-	309	5	51	-	12.6	0.0	0.6
2003	-	291	8	4	-	14.0	0.0	0.0
2008	-	305	-	6	-	18.1	-	0.0
2013	-	290	2	25	-	10.0	0.0	0.1
2018	-	326	3	29	-	16.8	0.0	0.1
2023	-	288	81	30	-	15.6	0.6	0.4

**Table 25C-26.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	11.0	0.6	21.0	34.0	7.0	28.4
2003	15.9	0.5	21.0	32.1	7.8	30.6
2008	5.1	0.1	21.1	36.3	9.6	38.8
2013	17.2	0.3	22.0	29.9	12.4	28.5
2018	14.7	1.4	25.1	37.2	9.9	30.5
2023	12.1	0.2	23.6	42.5	10.5	28.3

**Table 25C-26.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer/Pronghorn	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
1998	1	-	19	2	-	13
2003	-	-	7	-	-	2
2008	1	-	12	-	-	42
2013	1	-	22	-	-	4
2018	1	-	34	1	-	16
2023	2	-	21	-	1	-
Year	Days Use Per Acre (ha)					
1998	6.5 (16.1)	-	55.6 (137.4)	6.0 (14.9)	-	-
2003	3.6 (9.0)	-	15.4 (38.1)	-	-	-
2008	1.5 (3.6)	8.7 (21.5)*	20.1 (49.7)	-	-	-
2013	5.1 (12.6)	-	54.3 (134.1)	-	-	-
2018	5.1 (12.6)	-	28.8 (71.2)	1.3 (3.3)	-	-
2023	4.4 (10.8)	8.7 (21.5)*	18.1 (44.7)	-	-	-

\*Pellets per acre (ha)



**Table 25C-26.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency			
<i>Bouteloua gracilis</i> (blue grama)	291	11	9	4
<i>Elymus elymoides</i> (squirreltail)	280	4	15	-
<i>Hesperostipa comata</i> (needle and thread)	283	8	29	1
<i>Sporobolus cryptandrus</i> (sand dropseed)	256	17	42	1
	298	16	43	-
	266	33	9	-
year	Average Cover (%)			
1998	12.4	0.1	0.0	0.0
2003	13.6	0.1	0.3	-
2008	17.1	0.2	0.8	0.0
2013	9.2	0.1	0.7	0.0
2018	15.6	0.3	1.0	-
2023	14.2	1.1	0.4	-

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

**Table 25C-26.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
<i>Astragalus</i> (milkvetch)	26	-	-	-	4	-	-	1	-	22	-	-	-	-	-	5	-
<i>Astragalus calycosus</i> (Torrey's milkvetch)	-	-	-	-	5	-	3	-	-	-	-	-	-	2	1	1	-
<i>Astragalus lentiginosus</i> (freckled milkvetch)	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	4	-
<i>Astragalus purshii</i> (woollypod milkvetch)	-	3	-	4	2	-	-	-	-	12	-	-	-	-	-	6	-
<i>Chenopodium</i> <sup>a</sup> (goosefoot)	-	3	3	6	-	-	3	-	-	13	-	-	-	-	-	4	-
<i>Collinsia parviflora</i> <sup>a</sup> (maiden blue eyed Mary)	3	-	-	-	34	1	33	-	1	12	5	1	28	2	-	-	9
<i>Descurainia pinnata</i> <sup>a</sup> (western tansymustard)																	
<i>Draba</i> <sup>a</sup> (draba)																	
<i>Erigeron aphanactis</i> <sup>a</sup> (rayless shaggy fleabane)																	
<i>Erigeron pumilus</i> (shaggy fleabane)																	
<i>Eriogonum cernuum</i> <sup>a</sup> (nodding buckwheat)																	
<i>Gayophytum ramosissimum</i> <sup>a</sup> (pinyon groundsmoke)																	
<i>Lappula occidentalis</i> <sup>a</sup> (flatspine stickseed)																	
<i>Lesquerella</i> (bladderpod)																	
<i>Machaeranthera canescens</i> (hoary tansyaster)																	
<i>Phlox longifolia</i> (longleaf phlox)																	
<i>Sphaeralcea grossularifolia</i> (gooseberry/leaf globemallow)																	
year	Average Cover (%)																
1998	0.5	-	-	-	0.0	-	-	0.0	-	0.1	-	-	-	-	-	0.0	-
2003	-	-	-	-	0.0	-	0.0	-	-	-	-	-	-	0.0	0.0	0.0	-
2008	0.0	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-
2013	-	0.0	-	0.0	0.0	-	-	-	-	0.1	-	-	-	-	-	0.0	-
2018	-	0.0	0.0	0.0	-	-	0.0	-	-	0.0	-	-	-	-	-	0.0	-
2023	0.0	-	-	-	0.3	0.0	0.2	-	0.0	0.1	0.0	0.0	0.1	0.0	-	-	0.2

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

FORB SPECIES	Townsendia incana (hoary Townsend daisy)
year	Nested
1998	-
2003	-
2008	-
2013	-
2018	-
2023	5
year	Average Cover (%)
1998	-
2003	-
2008	-
2013	-
2018	-
2023	0.0

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

**Table 25C-26.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ephedra nevadensis <sup>p</sup> (Nevada jointfir)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)
year	Line Intercept Cover (%)						
1998	-	-	-	-	-	-	-
2003	7.1	7.7	0.9	-	0.3	-	-
2008	22.4	0.9	1.1	-	0.2	0	-
2013	13.6	9.2	1.5	-	0.6	-	-
2018	14.7	6.9	1.3	-	0.3	-	-
2023	15.9	0.5	2.1	-	0.6	-	-
year	Quadrat Cover (%)						
1998	6.1	5.6	0.1	0.0	0.2	0.0	0.0
2003	10.0	5.5	0.9	0.0	0.4	0.0	-
2008	16.4	0.7	0.7	0.0	0.2	0.2	0.0
2013	14.1	2.5	1.1	0.0	0.7	0.3	-
2018	12.0	3.6	0.8	0.0	0.4	0.2	-
2023	12.0	0.2	2.0	0.0	0.9	-	-

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

**Table 25C-26.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1998	2800	140	9	77	14	14	1	7	27/55
2003	6060	-	0	71	29	8	0	14	17/39
2008	6920	20	3	65	32	20	0	25	24/56
2013	4640	-	3	80	17	41	50	14	21/55
2018	5360	-	3	65	32	26	13	24	18/52
2023	4540	40	3	74	23	6	45	21	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	3720	180	14	78	8	32	4	5	28/55
2003	1520	-	0	54	46	21	0	20	42/84
2008	220	-	9	73	18	0	0	0	45/86
2013	1320	-	8	74	18	30	55	27	31/75
2018	1060	-	4	68	28	0	0	17	36/76
2023	180	-	11	78	11	0	89	11	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1998	980	120	20	55	25	0	0	12	21/36
2003	1160	-	0	74	26	0	0	5	17/31
2008	820	20	5	59	37	5	0	27	17/30
2013	980	60	14	86	0	51	4	57	15/34
2018	800	-	0	78	23	8	0	20	15/31
2023	1320	20	9	86	5	0	0	5	- / -
<b>Echinocereus -- (hedgehog cactus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	15/34
2023	-	-	-	-	-	-	-	-	-/-
<b>Ephedra nevadensis<sup>P</sup> -- (Nevada jointfir)</b>									
1998	20	-	100	0	0	0	0	0	31/36
2003	20	-	0	100	0	0	0	0	38/40
2008	20	-	100	0	0	0	0	0	39/31
2013	60	-	100	0	0	100	0	0	29/26
2018	120	-	100	0	0	0	100	17	17/14
2023	60	-	100	0	0	100	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	360	200	39	56	6	0	0	0	21/26
2003	760	-	0	95	5	0	0	0	18/19
2008	580	60	24	62	14	0	0	10	17/22
2013	2220	-	26	74	0	0	0	0	15/17
2018	1500	-	0	77	23	0	0	29	9/9
2023	1600	40	14	86	0	0	1	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1998	60	-	33	67	0	0	0	0	11/30
2003	80	-	0	100	0	0	0	0	12/32
2008	100	-	0	100	0	0	0	0	13/34
2013	100	-	0	100	0	0	0	20	11/31
2018	100	-	40	40	20	0	0	20	8/15
2023	20	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Pediocactus simpsonii -- (mountain ball cactus)									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	3/7

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

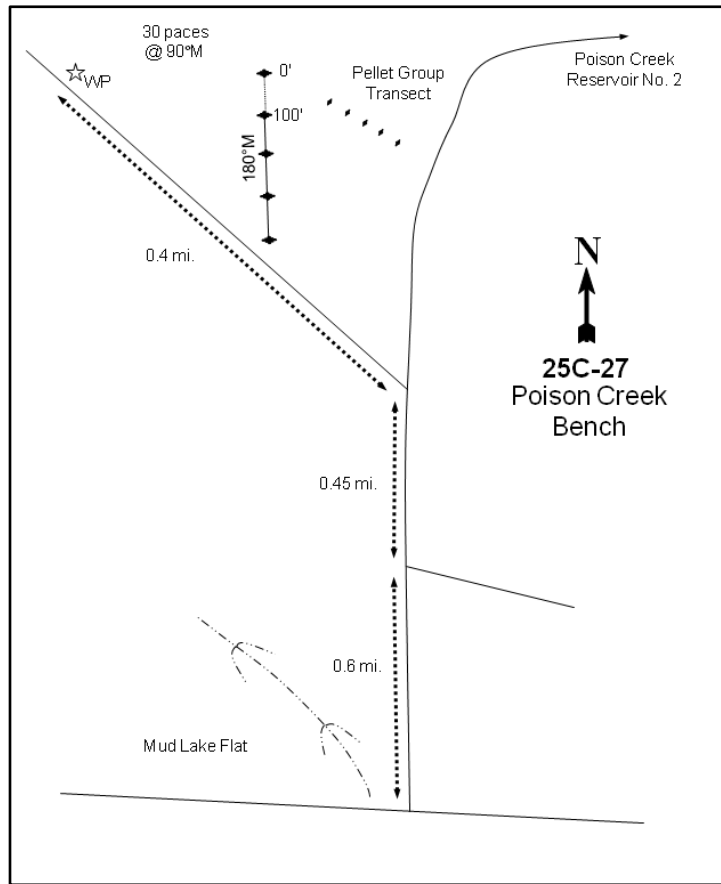
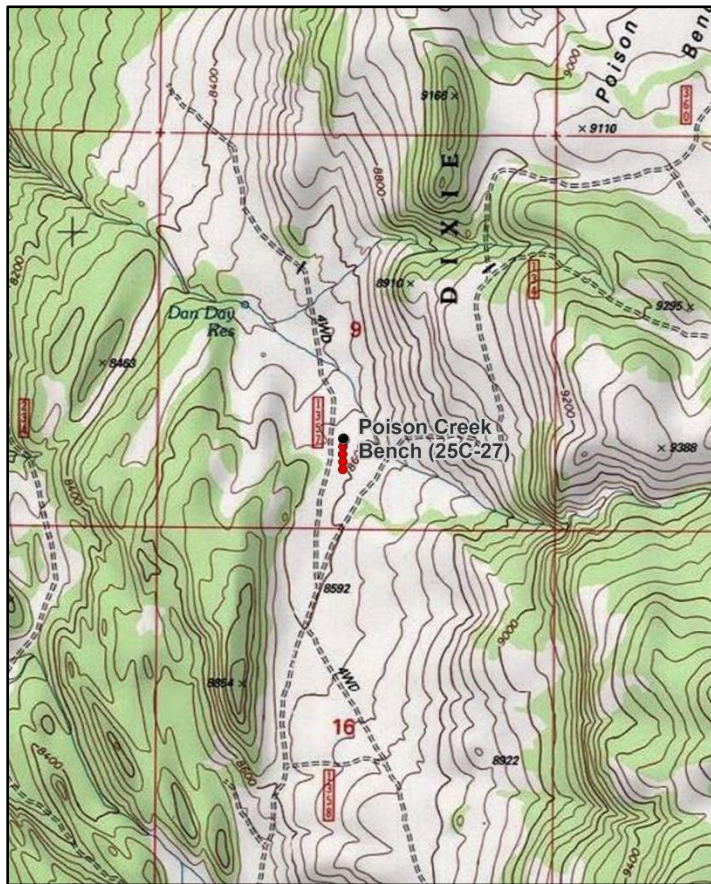
**Table 25C-26.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Pinus edulis (twoneedle pinyon)							
2018	5	100	-	-	-	-	2.0

**Table 25C-26.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	14.6	11.6	5.7	25.1	0.0	1.3	0.0	<b>58.3</b>	Fair
2003	18.5	3.6	0.1	27.9	0.0	0.0	0.0	<b>50.2</b>	Poor-Fair
2008	29.1	5.6	1.6	30.0	0.0	0.1	0.0	<b>66.4</b>	Fair-Good
2013	28.5	9.7	2.3	20.0	0.0	0.2	0.0	<b>60.7</b>	Fair
2018	27.0	5.8	1.6	30.0	0.0	0.2	0.0	<b>64.7</b>	Fair-Good
2023	20.5	8.2	1.7	30.0	0.0	0.8	0.0	<b>61.2</b>	Fair

## POISON CREEK BENCH - STUDY NO. 25C-27



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Antimony SE; Township 32S, Range 1W, Section 09  
NAD 83 UTM ZONE 12, 420601 East 420993 North

### Transect Information

Browse Tag # (0' Stake) 9001  
Transect Bearing 180° magnetic  
Length 400ft  
Belt Placement Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt Marker Placement Belt 3: 2ft

### Directions to Site

From the Center Creek study site (25C-25), continue north on the main road for 2.3 miles to the Mud Lake/Pacer Lake fork. Continue straight on the main road for 0.4 miles to another fork near an intermittent stream and turn right; this area can also be reached by coming from the north along the Poison Creek and Mud Lake roads, but these roads may be rougher. Drive 0.6 miles to another fork. Proceed straight through the fork and continue for 0.45 miles to another fork. Bear left and proceed 0.4 miles to the study site which is identified by a witness post on the right (north) side of the road. The 0-foot baseline stake is about 30 paces east of the witness post. Attached to the 2-foot tall metal fencepost that is the 0-foot stake is the browse tag #9001.

### Site Information

Land Ownership Federal  
Land Administrator USFS  
Allotment Coyote Hollow  
Elevation 8,580ft (2,615m)  
Aspect Northwest  
Slope 1-2%  
Sample Dates 08/28/1994, 08/05/1998, 07/31/2003, 08/13/2008, 07/17/2013, 06/25/2018, 06/27/2023

**Table 25C-27.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Prescribed Fire	-	-	1994	-

**Wildlife Habitat and Vegetation History**

**Table 25C-27.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-27.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush	Phase I
1991	Mountain Big Sagebrush	Phase I
1994	Mountain Big Sagebrush	Phase I
1998	Perennial Grass-Forb	Phase I
2003	Mountain Big Sagebrush/Yellow Rabbitbrush	Phase I
2008	Mountain Big Sagebrush/Yellow Rabbitbrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

The study is situated on high elevation winter range on the west side of the unit, and is likely used more by big game as transitional and summer range. In 2013, nearly all the grasses were heavily grazed with some moderate use on silky lupine (*Lupinus sericeus*).

**Soils**

**Table 25C-27.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.0	54.0	27.4	18.6	5.4	35.2	313.6	0.5	08/05/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      20 inches  
 NRCS Ecological Site    Mountain Gravelly Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site #    R047XB406UT  
 States and Transitions    No state and transition model is available for this ecological site.

When the site was established in 1987, the plant community existed as a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) with a limited understory of perennial grasses and forbs (Photos, Pre-1992 Data). A prescribed burn in 1994 (Table 25C-27.1) removed nearly all of the sagebrush, leaving the perennial grass and forb communities as the major vegetation component in 1998 (Table 25C-27.7, Table 25C-27.10, Table 25C-27.11). Sagebrush has steadily increased in density and cover and became dominant again in 2003; yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) was codominant in 2003 and 2008 (Table 25C-27.12, Table 25C-27.13). Rocky Mountain juniper (*J. scopulorum*) has been observed in all sample years (Photos, Table 25C-27.12, Table 25C-27.14), and the study was considered to be within Phase I of woodland succession as of 2023 (Table 25C-27.4).

Deer winter range condition has ranged between poor and excellent since 1994; increases in preferred browse cover and a diversified age class structure for sagebrush have led to an improvement in deer winter range. As of 2023, deer winter range condition was considered to be fair to good. Further improvement to deer wintering range can be accomplished through efforts that support preferred browse reproduction; diversifying and increasing cover of native perennial forbs would also improve winter range conditions (Table 25C-27.15). In addition, sagebrush on this site could provide valuable browse for wintering elk (Table 25C-27.3; Wambolt, 1996). However, pellet transect data indicates that both elk and deer presence have remained low since 1998 (Table 25C-27.9).

**Trend Summary Tables**

**Table 25C-27.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1994	30.6	1.1	0.1	-	-	-
1998	2.7	3.0	-	-	-	-
2003	7.6	8.7	-	9.3	9.2	-
2008	11.5	8.8	-	14.7	9.8	-
2013	21.6	7.2	-	20.9	5.6	-
2018	25.9	3.2	-	28.1	3.2	-
2023	30.2	4.2	-	36.3	5.4	-

**Table 25C-27.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1994	-	313	21	213	-	10.2	0.1	3.2
1998	0	358	55	241	0.0	23.2	0.6	15.0
2003	-	403	69	164	-	24.5	0.9	4.9
2008	-	419	16	170	-	21.5	0.1	3.1
2013	-	385	45	181	-	14.7	0.1	3.7
2018	-	353	57	159	-	15.1	0.3	1.9
2023	-	270	171	157	-	7.7	0.6	3.2

**Table 25C-27.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1994	8.9	0.1	43.5	3.7	18.3	42.4
1998	13.7	0.0	30.2	21.5	9.7	51.6
2003	10.1	0.0	22.0	19.9	13.6	49.1
2008	7.0	0.0	31.7	20.3	10.9	51.6
2013	7.8	0.3	33.5	13.3	20.0	41.4
2018	9.2	1.1	37.5	26.4	9.8	45.4
2023	12.1	0.2	34.3	18.1	16.6	38.5

**Table 25C-27.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1994	5	30	-	21
1998	3	18	1	8
2003	15	8	2	3
2008	19	17	5	80
2013	12	8	-	14
2018	2	4	1	9
2023	5	3	-	2
Year	Days Use Per Acre (ha)			
1994	-	-	-	-
1998	10.9 (26.9)	10.7 (26.5)	1.3 (3.3)	-
2003	33.4 (82.5)	16.8 (41.4)	8.1 (19.9)	-
2008	36.3 (89.7)	12.1 (29.8)	2.7 (6.6)	-
2013	13.8 (34.1)	6.7 (16.6)	3.4 (8.3)	-
2018	7.2 (17.9)	6.0 (14.9)	3.4 (8.3)	-
2023	3.6 (9.0)	5.3 (13.2)	2.0 (5.0)	-

**Table 25C-27.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus arvensis <sup>ai</sup> (field brome)	Bromus porteri (Porter brome)	Carex (sedge)	Carex duriuscula (needleleaf sedge)	Carex geyeri (Geyer's sedge)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency																
1994	117	-	-	39	-	-	151	-	-	-	80	8	15	-	88	-	-
1998	88	25	4	35	0	-	210	-	-	-	105	63	5	-	60	-	-
2003	92	3	-	48	-	2	223	-	-	-	143	97	-	-	32	-	1
2008	143	-	-	58	-	-	226	-	-	-	103	143	7	32	44	4	3
2013	116	6	2	49	-	-	-	226	9	-	82	176	-	3	10	-	-
2018	129	-	3	56	-	-	-	160	4	-	19	135	4	4	79	-	-
2023	42	-	-	48	-	-	13	48	3	19	85	81	1	1	55	-	-
year	Average Cover (%)																
1994	3.6	-	-	1.1	-	-	2.1	-	-	-	0.8	0.4	0.1	-	2.1	-	-
1998	2.7	0.9	0.0	1.0	0.0	-	11.4	-	-	-	3.0	2.4	0.1	-	1.6	-	-
2003	2.7	0.0	-	2.1	-	0.0	12.0	-	-	-	3.7	3.6	-	-	0.4	-	0.0
2008	3.7	-	-	1.5	-	-	10.1	-	-	-	1.1	4.3	0.0	0.1	0.5	0.0	0.0
2013	2.6	0.0	0.0	1.6	-	-	-	5.6	0.5	-	0.8	3.5	-	0.0	0.1	-	-
2018	2.4	-	0.0	2.8	-	-	-	4.1	0.2	-	0.4	3.4	0.0	0.0	1.7	-	-
2023	0.7	-	-	1.3	-	-	0.1	0.7	0.1	0.3	1.5	1.9	0.0	0.0	1.0	-	-

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

GRASS SPECIES	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested	
1994	-	-
1998	-	1
2003	9	-
2008	3	-
2013	-	2
2018	-	4
2023	-	-
year	Average Cover (%)	
1994	-	-
1998	-	0.0
2003	0.0	-
2008	0.0	-
2013	-	0.0
2018	-	0.0
2023	-	-

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



**Table 25C-27.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria parvifolia (small-leaf pussytoes)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Artemisia carruthii (Carruth's sagewort)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Crepis intermedia (limestone hawkbeard)	Cryptantha flavoculata (roughseed cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)
year	Nested Frequency																
1994	-	3	-	11	1	10	5	26	2	-	-	5	-	-	11	17	39
1998	-	32	6	16	1	17	-	36	11	-	5	-	9	-	28	22	41
2003	12	8	-	2	3	5	-	4	3	19	0	-	1	-	15	39	55
2008	-	2	5	6	4	7	-	7	-	3	-	1	1	-	23	31	57
2013	4	5	3	-	4	3	-	29	8	21	-	8	-	7	52	36	55
2018	-	38	11	7	3	2	-	24	3	-	-	3	-	3	35	32	42
2023	4	26	3	11	8	2	-	17	-	-	2	1	-	-	22	10	49
year	Average Cover (%)																
1994	-	0.0	-	0.0	0.0	0.1	0.0	0.3	0.0	-	-	0.0	-	-	0.1	0.1	0.2
1998	-	0.3	0.1	0.1	0.0	0.3	-	1.1	0.1	-	0.0	-	0.0	-	0.5	0.4	0.7
2003	0.1	0.0	-	0.0	0.4	0.2	-	0.1	0.0	0.2	0.0	-	0.0	-	0.1	0.4	0.9
2008	-	0.0	0.0	0.0	0.1	0.1	-	0.2	-	0.0	-	0.0	0.0	-	0.2	0.2	0.7
2013	0.0	0.0	0.1	-	0.0	0.0	-	0.2	0.0	0.1	-	0.0	-	0.0	0.4	0.3	0.6
2018	-	0.1	0.0	0.1	0.0	0.0	-	0.7	0.0	-	-	0.0	-	0.0	0.2	0.1	0.1
2023	0.0	0.2	0.0	0.0	0.0	0.0	-	0.2	-	-	0.0	0.0	-	-	0.3	0.0	0.8

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

FORB SPECIES	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenoxys richardsonii (pingue rubberweed)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus sericeus (silky lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera pallida <sup>a</sup> (pale evening primrose)	Orthocarpus luteus <sup>a</sup> (yellow owl's-clover)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Petroradia pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
1994	31	-	6	3	5	-	2	66	81	7	-	-	3	16	3	2	17
1998	12	-	-	3	8	-	3	35	66	1	2	-	-	79	18	1	12
2003	14	28	-	3	-	15	-	8	28	4	5	1	1	14	5	1	18
2008	18	-	-	2	2	3	-	25	13	17	-	4	1	5	17	-	23
2013	34	17	-	-	3	2	1	21	6	-	-	-	-	17	1	4	16
2018	24	9	-	-	-	2	1	7	5	-	1	3	-	4	1	1	18
2023	32	146	-	-	3	4	-	18	1	-	-	-	-	9	12	-	7
year	Average Cover (%)																
1994	0.3	-	0.0	0.0	0.0	-	0.0	0.2	1.5	0.1	-	-	0.0	0.0	0.0	0.0	0.0
1998	0.6	-	-	0.2	0.4	-	0.0	1.3	6.7	0.0	0.0	-	-	2.2	0.1	0.0	0.1
2003	0.5	0.1	-	0.2	-	0.4	-	0.2	1.3	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1
2008	0.4	-	-	0.2	0.0	0.0	-	0.2	0.1	0.1	-	0.0	0.0	0.1	0.1	-	0.1
2013	1.1	0.0	-	-	0.0	0.0	0.0	0.2	0.2	-	-	-	-	0.1	0.0	0.1	0.1
2018	0.3	0.0	-	-	-	0.0	0.0	0.0	0.1	-	0.0	0.0	-	0.0	0.0	0.0	0.1
2023	0.6	0.4	-	-	0.0	0.0	-	0.5	0.1	-	-	-	-	0.0	0.1	-	0.0

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

FORB SPECIES	Pleiacanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla hippiana (woolly cinquefoil)	Silene drummondii (Drummond's campion)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Veronica biloba <sup>ai</sup> (two-lobed speedwell)
year	Nested Frequency						
1994	2	-	2	-	-	-	-
1998	6	-	1	10	5	-	3
2003	4	-	3	-	1	0	-
2008	4	-	3	-	1	-	-
2013	1	1	8	-	-	-	-
2018	4	1	2	-	1	1	-
2023	4	7	1	3	-	-	-
year	Average Cover (%)						
1994	0.1	-	0.0	-	-	-	-
1998	0.1	-	0.0	0.1	0.1	-	0.1
2003	0.2	-	0.0	-	0.0	0.0	-
2008	0.1	-	0.0	-	0.0	-	-
2013	0.0	0.0	0.2	-	-	-	-
2018	0.0	0.0	0.1	-	0.0	0.0	-
2023	0.1	0.0	0.1	0.0	-	-	-

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

**Table 25C-27.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ceanothus fendleri (Fendler's ceanothus)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)	Li nanthus pungens (granite prickly phlox)	Opuntia polyacantha (plains pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)											
1994	-	-	-	-	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-	-	-	-	-
2003	-	8.5	-	7.4	1.7	0.1	-	-	-	-	0.8	-
2008	-	13.2	-	6.8	2	0.9	-	0.1	-	-	1.5	-
2013	-	19.3	-	4.8	0.7	-	-	0.1	-	-	1.6	-
2018	-	26.6	-	2.5	0.7	0	-	-	-	-	1.5	-
2023	-	33.9	-	4.3	0.2	0.7	-	0.2	-	-	2.4	-
year	Quadrat Cover (%)											
1994	1.8	20.3	-	0.5	0.2	-	0.1	0.4	0.1	-	8.5	0.0
1998	-	2.5	-	3.0	-	0.0	-	0.0	-	0.0	0.2	0.0
2003	-	7.5	-	7.3	1.0	0.2	-	0.0	-	-	0.1	0.1
2008	-	11.1	-	6.6	1.4	0.6	-	0.0	-	0.0	0.5	0.1
2013	0.0	20.9	-	5.8	1.1	-	-	0.0	-	0.0	0.7	0.1
2018	-	24.7	-	2.5	0.5	0.1	-	-	-	0.0	1.2	0.0
2023	-	29.1	0.0	3.5	0.3	0.3	-	0.0	-	0.0	1.0	0.0

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

**Table 25C-27.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1994	520	-	0	54	46	23	0	42	16/45
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	100	0	0	- / -
2008	20	-	0	100	0	100	0	0	26/50
2013	20	-	0	100	0	0	0	0	30/46
2018	40	-	0	100	0	0	0	0	28/80
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1994	6760	1720	17	62	21	23	2	5	64/90
1998	1280	480	36	41	23	20	0	3	40/63
2003	2460	-	2	89	8	15	0	2	44/68
2008	9500	4500	75	22	3	8	0	3	46/72
2013	8260	1260	38	63	0	29	12	5	38/68
2018	9300	400	42	54	5	3	0	33	51/90
2023	8620	120	10	84	6	24	31	5	- / -
<b>Ceanothus fendleri -- (Fendler's ceanothus)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	20/60
2013	40	-	0	100	0	0	0	0	25/65
2018	-	-	-	-	-	-	-	-	24/76
2023	-	-	-	-	-	-	-	-	-/-
<b>Cercocarpus ledifolius<sup>P</sup> -- (curl-leaf mountain mahogany)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	40	-	100	0	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1994	1920	-	7	90	3	6	8	0	31/32
1998	2520	60	20	79	2	0	0	1	34/41
2003	2260	-	1	98	1	1	0	0	41/61
2008	2880	360	6	50	44	6	2	31	37/59
2013	3040	-	6	89	5	26	3	14	37/54
2018	2600	20	18	66	16	6	13	17	27/40
2023	2920	-	6	90	3	0	0	4	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	40	-	50	50	0	0	0	0	26/44
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	100	0	0	- / -
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1994	740	20	3	97	0	19	14	0	16/14
1998	-	-	-	-	-	-	-	-	-/-
2003	1180	-	0	98	2	5	2	0	21/25
2008	1100	-	9	66	26	6	2	6	27/38
2013	780	-	5	95	0	0	5	0	23/35
2018	900	-	22	78	0	16	49	0	16/23
2023	320	-	31	69	0	19	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1994	120	-	0	100	0	0	0	0	21/19
1998	200	60	40	60	0	0	0	0	22/25
2003	520	20	0	100	0	0	0	0	13/9
2008	880	-	0	64	36	0	0	18	17/25
2013	20	-	0	100	0	0	0	0	19/20
2018	280	60	29	71	0	0	0	14	22/29
2023	1360	-	13	87	0	0	0	0	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1994	740	-	0	100	0	0	0	0	15/20
1998	80	-	0	0	100	0	0	0	24/29
2003	360	-	0	100	0	0	0	0	13/21
2008	440	-	0	23	77	0	0	14	12/23
2013	280	-	0	100	0	0	0	0	10/20
2018	320	-	0	94	6	19	25	0	9/14
2023	540	-	0	74	26	11	0	26	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1994	80	-	0	100	0	0	0	0	2/6
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1994	-	-	-	-	-	-	-	-	-/-
1998	240	-	25	75	0	0	0	0	4/7
2003	20	-	0	100	0	0	0	0	2/8
2008	60	-	33	33	33	0	0	33	5/8
2013	40	-	50	50	0	0	0	0	4/6
2018	60	-	33	67	0	0	0	0	4/6
2023	80	-	0	100	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1994	920	40	11	46	44	50	9	0	72/143
1998	40	20	100	0	0	0	0	0	62/109
2003	120	-	0	83	17	33	50	0	41/76
2008	120	-	33	0	67	0	67	17	62/130
2013	100	20	20	80	0	40	40	0	55/133
2018	240	20	50	50	0	67	25	0	58/104
2023	420	20	24	71	5	19	71	5	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
1994	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	24/25
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1994	20	-	0	100	0	0	0	0	25/28
1998	-	-	-	-	-	-	-	-	33/92
2003	-	-	-	-	-	-	-	-	37/69
2008	-	-	-	-	-	-	-	-	49/114
2013	-	-	-	-	-	-	-	-	45/138
2018	-	-	-	-	-	-	-	-	44/86
2023	-	-	-	-	-	-	-	-	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1994	60	-	33	67	0	0	0	0	7/5
1998	140	-	57	43	0	0	0	0	27/30
2003	40	-	0	100	0	100	0	0	33/43
2008	80	-	0	0	100	0	0	50	29/33
2013	40	-	0	50	50	0	50	50	- / -
2018	80	-	0	100	0	0	50	0	23/25
2023	20	-	100	0	0	0	0	0	- / -

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

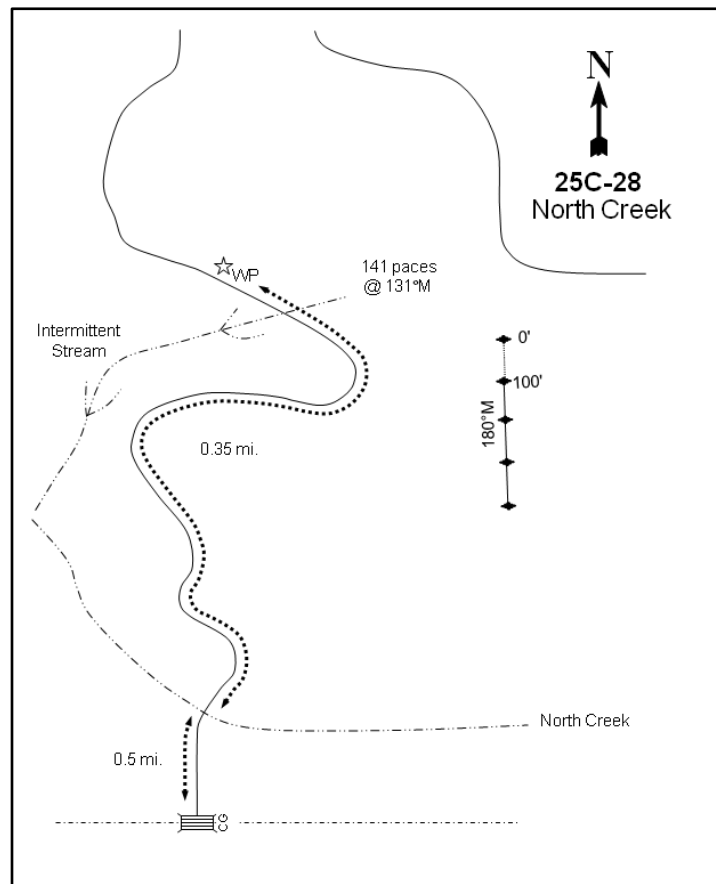
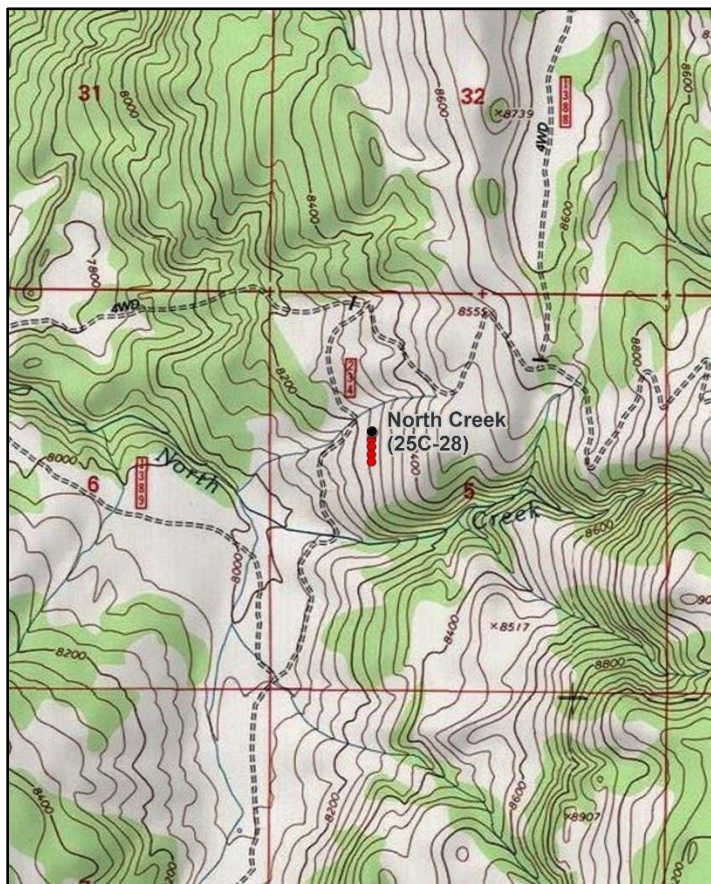
**Table 25C-27.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
1994	3	-	-	-	-	-	10.0
2018	5	-	50	-	-	50	19.5
2023	2	-	50	-	-	50	25.0

**Table 25C-27.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1994	30.0	6.4	7.0	20.4	0.0	6.3	0.0	<b>70.1</b>	Fair-Good
1998	3.4	0.0	0.0	30.0	0.0	10.0	0.0	<b>43.4</b>	Poor
2003	11.8	12.3	1.1	30.0	0.0	9.8	0.0	<b>65.1</b>	Fair
2008	18.8	12.0	15.0	30.0	0.0	6.3	0.0	<b>82.1</b>	Good
2013	26.5	15.0	15.0	29.4	0.0	7.4	0.0	<b>93.3</b>	Excellent
2018	30.0	13.7	15.0	30.0	0.0	3.9	0.0	<b>92.6</b>	Excellent

## NORTH CREEK - STUDY NO. 25C-28



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Grass Lakes NE; Township 33S, Range 1W, Section 05  
NAD 83 UTM ZONE 12, 418600 East 4202672 North

### Transect Information

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

Not Available  
170° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

### Directions to Site

At the intersection of SR-12 and Route 1660 (to SR-22), turn left onto Johns Flat Road. Drive 17.2 miles north to Grass Lake Road (USFS sign) and turn east. Travel 1.2 miles on this road to a fork by hayfields. Turn right and continue 0.4 miles to the Horse Creek fork. Bear left and proceed 1.15 miles to a fork with a sign. Stay left and continue for 0.25 miles on the main road. Pass the buildings at Birch Creek, take the right fork, and go 0.6 miles. Stay left at the fork and travel 0.75 miles to a cattle guard. Continue 0.75 miles to another fork; stay left and go 1.65 miles to a U.S. Forest Service enclosure. Continue 2.55 miles to a cattle guard, then proceed for 0.5 miles to North Creek. Cross the creek and drive for 0.35 miles, over an intermittent stream and partway up a hill, to a witness post on the right (north) side of the road. The transect is 80 paces from the witness post at a bearing of 118 degrees magnetic up on a hillside.

### Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Coyote Hollow
Elevation	8,230ft (2,509m)
Aspect	West
Slope	10-23%
Sample Dates	08/05/1998, 08/18/2003, 08/12/2008, 07/17/2013, 06/26/2018, 06/26/2023

**Table 25C-28.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	-	-	2002	-

**Wildlife Habitat and Vegetation History****Table 25C-28.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-28.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
1991	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
1998	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

The study is situated on high elevation winter range on the west side of the unit, and is likely used more by big game as transitional and summer range.

**Soils****Table 25C-28.5 - 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	6.1	46.0	29.4	24.6	2.6	8.3	211.2	0.4	08/05/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Gravelly Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB406UT
States and Transitions	No state and transition model is available for this ecological site.

When this site was established in 1987, the plant community existed as a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*). A 2002 fire (Table 25C-28.1) removed much of the sagebrush, but it maintained dominance in the plant community and has since increased in density and cover (Photos, Pre-1992 Data, Table 25C-28.12, Table 25C-28.13). Although limited prior to the burn, the herbaceous understory has remained moderately diverse and somewhat abundant since 2003: much of this cover has been contributed by perennial grasses and/or forbs since that time period. However, most of the herbaceous cover was provided by the introduced annual grass species cheatgrass (*Bromus tectorum*) in 2023 (Table 25C-28.7, Table 25C-28.10, Table 25C-28.11). Due to the high cover of cheatgrass amplifying the fuel load, the area is at risk of wildfire capable of spreading through the understory and threatening the removal of valuable browse for wildlife. Twoneedle pinyon (*Pinus edulis*) and Rocky Mountain juniper (*Juniperus scopulorum*) have been observed throughout the study period, and the site was considered to be within Phase I transitioning to Phase II of woodland succession through the 1998 sample year. Although the site has been classified as being in Phase I following the fire, point-quarter measurements demonstrate an increasing trend in tree density: this indicates that there may be potential for infilling over time (Photos, Table 25C-28.4, Table 25C-28.14).

Deer winter range condition has ranged between very poor and good since study establishment. Deer winter range was at it poorest immediately following the wildfire. As of 2023, deer winter range condition was considered to be fair. Improvement to deer wintering range can be accomplished through efforts that support preferred browse reproduction; diversifying and increasing cover of native perennial grasses while reducing cheatgrass would also improve winter range conditions (Table 25C-28.15). In addition, the sagebrush component of this site could provide valuable browse for elk during the winter (Table 25C-28.3; Wambolt, 1996). However, pellet group data indicates that elk presence was low in 2018 and 2023; deer presence was also low in 2023 (Table 25C-28.9).

## Trend Summary Tables

**Table 25C-28.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	32.9	0.3	4.1	-	-	0.5
2003	5.3	1.8	0.1	6.3	2.1	0.8
2008	7.1	5.8	0.2	10.8	6.1	0.9
2013	11.9	5.6	0.5	17.5	7.5	1.1
2018	15.9	8.5	0.8	21.3	7.7	1.4
2023	16.3	4.5	1.4	25.7	5.7	1.8

**Table 25C-28.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	2	80	8	94	0.0	0.7	0.0	0.8
2003	16	53	80	130	0.2	1.9	0.6	5.7
2008	77	306	41	168	0.4	7.2	0.1	2.7
2013	139	250	58	204	1.2	6.9	0.3	5.1
2018	234	139	2	98	2.5	2.3	0.0	1.6
2023	420	84	47	138	12.2	2.6	0.6	5.1

**Table 25C-28.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	4.6	-	34.3	31.9	15.7	42.5
2003	11.2	-	13.8	38.1	29.9	14.6
2008	6.4	-	22.8	29.7	21.0	29.3
2013	10.0	0.0	25.6	20.1	31.9	31.6
2018	7.8	0.0	33.2	38.5	18.9	31.2
2023	5.3	0.0	27.2	17.3	35.6	35.7

**Table 25C-28.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	-	14	-	7
2003	-	1	-	1
2008	6	8	9	74
2013	7	7	15	5
2018	-	11	1	10
2023	2	2	-	3
Year	Days Use Per Acre (ha)			
1998	-	18.1 (44.7)	0.7 (1.7)	-
2003	0.7 (1.8)	10.7 (26.5)	-	-
2008	18.9 (46.6)	8.7 (21.5)	13.4 (33.1)	-
2013	8.7 (21.5)	12.1 (29.8)	22.8 (56.3)	-
2018	-	20.1 (49.7)	5.3 (13.2)	-
2023	5.1 (12.6)	11.4 (28.1)	1.3 (3.3)	-



**Table 25C-28.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency										
1998	1	0	1	2	4	2	74	-	2	-	-
2003	-	-	-	2	-	16	49	-	3	0	1
2008	5	-	10	7	-	77	298	-	1	-	3
2013	-	-	3	2	3	139	234	9	5	-	10
2018	7	-	16	4	14	234	102	-	8	-	-
2023	7	1	1	6	11	420	65	4	8	-	-
year	Average Cover (%)										
1998	0.0	0.0	0.0	0.1	0.0	0.0	0.5	-	0.0	-	-
2003	-	-	-	0.1	-	0.2	1.6	-	0.1	0.0	0.0
2008	0.1	-	0.0	0.1	-	0.4	6.9	-	0.0	-	0.2
2013	-	-	0.0	0.4	0.0	1.2	6.2	0.0	0.1	-	0.1
2018	0.0	-	0.6	0.2	0.2	2.5	1.4	-	0.0	-	-
2023	0.3	0.0	0.1	0.2	0.2	12.2	1.7	0.1	0.0	-	-

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

**Table 25C-28.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Antennaria (pussytoes)	Arabis holboellii <sup>a</sup> (Holboell's rockcross)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Caulanthus crassicaulis <sup>a</sup> (thickstem wild cabbage)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Crepis acuminata (tapertip hawkbeard)	Cryptantha bakeri (Baker's cryptantha)	Cryptantha flaccida <sup>a</sup> (weakstem cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron divergens <sup>a</sup> (spreading fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)
year	Nested Frequency																
1998	1	7	5	14	-	-	5	-	3	10	-	1	-	-	24	-	3
2003	-	1	3	30	-	-	-	-	-	16	-	-	-	-	8	-	10
2008	-	21	1	8	-	-	23	17	1	16	-	-	-	-	40	2	34
2013	2	33	2	17	-	-	20	4	4	25	-	-	-	1	42	16	36
2018	1	2	3	-	-	-	-	-	-	9	-	-	-	-	11	-	23
2023	2	24	2	21	1	1	9	-	4	10	6	-	11	-	14	-	29
year	Average Cover (%)																
1998	0.0	0.0	0.2	0.1	-	-	0.0	-	0.0	0.1	-	0.0	-	-	0.1	-	0.1
2003	-	0.0	0.0	1.7	-	-	-	-	-	0.3	-	-	-	-	0.2	-	0.2
2008	-	0.1	0.0	0.0	-	-	0.3	0.0	0.0	0.1	-	-	-	-	0.3	0.0	0.4
2013	0.0	0.1	0.0	0.3	-	-	0.4	0.0	0.0	0.1	-	-	-	0.0	0.3	0.2	0.6
2018	0.0	0.0	0.0	-	-	-	-	-	-	0.0	-	-	-	-	0.0	-	0.2
2023	0.0	0.1	0.2	0.4	0.0	0.0	0.2	-	0.0	0.3	0.2	-	0.2	-	0.1	-	0.6

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

FORB SPECIES	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hedysamum boreale (Utah sweetvetch)	Hymenopappus filifolius (fineleaf hymenopappus)	Hymenoxys richardsonii (pingue rubberweed)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Oenothera caespitosa (tufted evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon comarrhenus (dusty beardtongue)	Petradoria pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
1998	-	-	-	-	-	-	-	-	-	7	-	0	-	34	-	4	5
2003	-	73	5	-	1	-	-	-	-	10	-	2	7	56	-	3	6
2008	2	3	-	-	-	-	2	-	-	1	-	42	8	1	-	17	8
2013	6	1	-	12	-	14	-	-	3	-	-	77	-	12	2	13	5
2018	-	-	-	-	26	-	-	-	-	-	-	1	-	3	-	24	-
2023	-	-	-	-	43	-	1	5	1	-	1	-	7	11	2	21	5
year	Average Cover (%)																
1998	-	-	-	-	-	-	-	-	-	0.0	-	0.0	-	0.1	-	0.1	0.0
2003	-	0.6	0.1	-	0.2	-	-	-	-	0.2	-	0.2	0.7	1.6	-	0.2	0.0
2008	0.0	0.0	-	-	-	-	0.0	-	-	0.0	-	0.3	0.0	0.0	-	0.4	0.0
2013	0.0	0.0	-	0.2	-	0.6	-	-	0.0	-	-	1.1	-	0.2	0.0	0.7	0.0
2018	-	-	-	-	0.3	-	-	-	-	-	-	0.0	-	0.0	-	0.4	-
2023	-	-	-	-	1.0	-	0.1	0.0	0.0	-	0.0	-	0.2	0.0	0.0	1.1	0.1

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

FORB SPECIES	Pleiocanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency			
1998	1	-	1	-
2003	8	-	-	1
2008	16	-	1	-
2013	23	5	-	-
2018	24	-	-	-
2023	17	-	-	-
year	Average Cover (%)			
1998	0.0	-	0.0	-
2003	0.2	-	-	0.0
2008	0.7	-	0.0	-
2013	0.7	0.0	-	-
2018	0.6	-	-	-
2023	0.8	-	-	-

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

**Table 25C-28.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)											
1998	-	-	-	-	-	-	-	-	-	-	-	-
2003	-	-	6.3	0.3	0.5	-	1.3	0.8	-	-	-	-
2008	0.1	-	10.7	1.2	1.9	-	3	0.9	-	-	-	-
2013	0.1	-	17.4	4.3	0.3	0.1	2.7	1.1	-	-	-	0.1
2018	-	-	21.1	3.2	-	0.7	3.7	1.4	-	-	0.2	0.1
2023	-	-	25.3	4.8	-	0.2	0.7	1.8	-	-	0.4	-
year	Quadrat Cover (%)											
1998	-	1.7	21.0	0.0	-	-	0.3	1.5	-	2.6	10.3	-
2003	-	-	5.3	0.4	0.5	-	0.9	0.1	0.0	-	0.0	-
2008	0.0	-	6.9	0.9	1.3	-	3.6	0.2	-	-	0.1	-
2013	0.0	-	11.9	3.1	0.3	0.2	2.0	0.5	-	-	0.0	0.0
2018	-	-	15.2	2.4	-	0.7	5.3	0.8	-	-	0.8	0.0
2023	-	-	15.8	3.5	-	0.2	0.8	1.4	-	0.0	0.5	-

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

**Table 25C-28.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	100	0	0	23/28
2013	40	-	100	0	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1998	340	-	0	82	18	29	0	6	22/39
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	38/66
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	6380	40	3	77	19	38	1	19	40/64
2003	1520	40	9	62	29	0	0	11	36/58
2008	4120	320	21	58	20	26	1	8	38/66
2013	5420	1880	30	68	2	31	3	17	41/75
2018	8900	-	21	68	12	5	1	37	38/66
2023	7360	40	16	79	6	31	16	4	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	9/28
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	140	-	14	86	0	0	0	0	26/24
2003	80	-	0	100	0	0	0	0	32/47
2008	3340	220	50	40	10	53	29	3	29/41
2013	8760	480	18	81	1	1	0	9	25/39
2018	4460	-	4	92	4	53	0	3	24/27
2023	9320	580	55	45	0	1	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1998	40	-	0	100	0	0	0	0	29/33
2003	240	-	0	100	0	0	0	0	28/39
2008	2140	-	29	51	20	18	5	3	31/48
2013	580	-	10	90	0	48	28	28	18/28
2018	-	-	-	-	-	-	-	-	53/42
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	220	-	9	91	0	0	0	0	25/29
2018	920	-	4	96	0	22	2	0	27/40
2023	240	-	67	33	0	50	50	0	- / -
<b>Escobaria vivipara -- (spiny star)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	7/18
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	180	60	11	89	0	0	0	0	28/23
2003	1160	-	2	98	0	0	0	0	26/28
2008	4560	80	8	83	9	0	0	2	21/26
2013	3860	1680	25	74	1	0	0	1	16/16
2018	8680	20	4	90	6	0	0	5	16/18
2023	11060	400	77	23	0	0	0	0	- / -
<b>Juniperus scopulorum<sup>1</sup> -- (Rocky Mountain juniper)</b>									
1998	40	60	50	50	0	0	0	0	- / -
2003	20	-	0	100	0	0	0	0	- / -
2008	20	-	0	100	0	0	0	0	- / -
2013	40	-	50	50	0	0	0	0	- / -
2018	40	-	50	50	0	0	0	0	- / -
2023	40	-	50	50	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	40	-	0	100	0	0	0	0	2/6
2008	40	-	50	50	0	0	0	0	5/7
2013	-	-	-	-	-	-	-	-	5/7
2018	20	-	0	100	0	0	0	0	6/10
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1998	180	40	78	22	0	0	0	0	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	20	100	0	0	0	0	0	-/-
2023	20	20	0	100	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	1100	60	11	80	9	47	0	4	77/147
2003	80	20	25	50	25	25	50	25	39/58
2008	120	40	17	50	33	50	33	17	49/99
2013	140	40	0	100	0	29	71	0	46/95
2018	180	-	11	78	11	33	56	0	56/104
2023	200	-	10	90	0	20	60	0	-/-
<b>Ribes<sup>p</sup> -- (currant)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	58/71
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	115/175
2023	-	-	-	-	-	-	-	-	-/-
<b>Sambucus<sup>p</sup> -- (elderberry)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	27/13
2023	-	-	-	-	-	-	-	-	-/-
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	34/73
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	27/34
2008	40	-	0	0	100	50	50	0	21/44
2013	20	-	0	0	100	0	0	0	29/44
2018	20	-	0	100	0	100	0	0	29/41

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

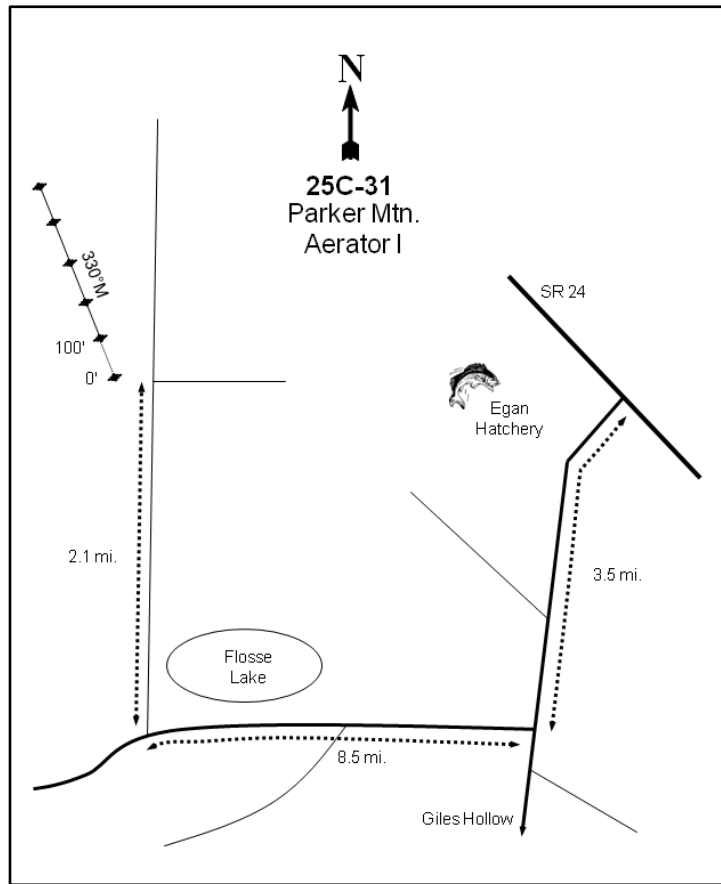
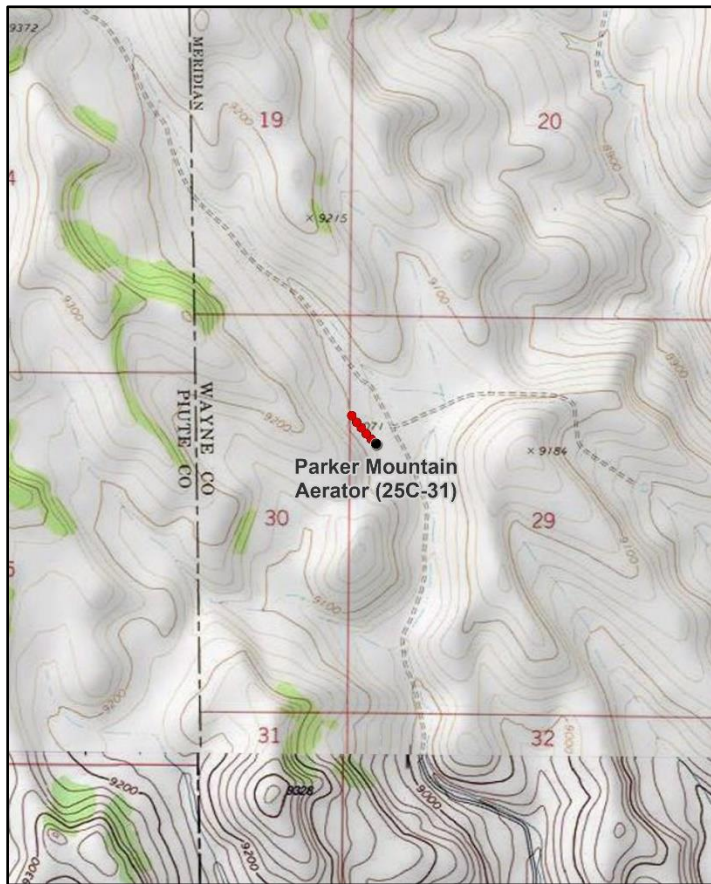
**Table 25C-28.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
1998	18	-	-	-	-	-	14.3
2008	8	-	14	43	43	-	15.7
2013	8	-	14	71	14	-	12.3
2018	13	-	43	57	-	-	7.9
2023	8	14	14	43	29	-	13.4
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	44	-	-	-	-	-	9.1
2008	8	17	50	33	-	-	4.0
2013	9	-	57	43	-	-	4.7
2018	22	10	50	40	-	-	4.5
2023	23	-	25	67	8	-	12.8

**Table 25C-28.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	30.0	10.2	2.7	1.5	0.0	1.6	0.0	<b>46.0</b>	Poor
2003	7.9	6.3	4.6	3.9	-0.2	10.0	0.0	<b>32.5</b>	Very Poor
2008	13.5	8.9	10.6	14.5	-0.3	5.4	0.0	<b>52.6</b>	Poor
2013	21.9	14.3	15.0	13.7	-0.9	10.0	0.0	<b>74.0</b>	Good
2018	26.7	11.6	10.3	4.7	-1.9	3.2	0.0	<b>54.5</b>	Poor-Fair
2023	30.0	13.3	7.7	5.2	-9.2	10.0	0.0	<b>57.1</b>	Fair

## PARKER MOUNTAIN AERATOR - STUDY NO. 25C-31



### Location Information

USGS 7.5 min Map Info	Jakes Knoll SW; Township 29S, Range 1E, Section 29
GPS (0' Stake)	NAD 83 UTM ZONE 12, 426889 East 4235143 North

### Transect Information

Browse Tag # (0' Stake)	158
Transect Bearing	310° 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 on SR-24 south of Bicknell, turn west onto Bicknell Circle. Drive 3.5 miles to a left-hand turn (you will pass the Egan Fish Hatchery). Turn left and drive for 8.5 miles on the main road, then turn right (north). Drive 2.1 miles to a road going off to the right (east). Park here and walk 64 paces at 200 degrees magnetic to the 0-foot stake which is marked by browse tag #158.

### Site Information

Land Ownership	State
Land Administrator	SITLA
Allotment	No data
Elevation	9,100ft (2,774m)
Aspect	East
Slope	3-5%
Sample Dates	09/10/2003, 08/14/2008, 08/08/2013, 07/17/2018, 07/18/2023

**Table 25C-31.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Aerator - Double Drum	-	-	2002	-

**Wildlife Habitat and Vegetation History****Table 25C-31.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 25C-31.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2003	Mountain Big Sagebrush	No Encroachment
2008	Mountain Big Sagebrush	No Encroachment
2013	Mountain Big Sagebrush	No Encroachment
2018	Mountain Big Sagebrush	No Encroachment
2023	Mountain Big Sagebrush	No Encroachment

**Site Notes**

Due to the difficulties in distinguishing between pronghorn and deer pellet groups, pronghorn pellet groups have been reported with deer pellet groups. In 2013, all the grasses that were not sheltered by shrubs were heavily grazed. Sage-grouse were also seen near the site, but no pellet groups were observed.

**Site Potential**

1981 - 2010 Average Annual Precipitation	23 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB430UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2003, this site has been dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with other shrubs present to a lesser extent; cover of sagebrush has increased in the years following treatment (Table 25C-31.1, Table 25C-31.12, Table 25C-31.13). The understory has remained diverse and abundant over the sample years. Perennial grasses and graminoids such as Letterman's needlegrass (*Achnatherum lettermanii*), Geyer's sedge (*Carex geyeri*), and muttongrass (*Poa fendleriana*) and perennial forbs have contributed a majority of the herbaceous cover throughout the duration of the study period (Table 25C-31.7, Table 25C-31.10, Table 25C-31.11). Barring the occurrence of a major disturbance, this site can reasonably be expected to remain in this or a similar state in future sample years.

Due to the abundance and diversity of the shrub and herbaceous communities, this site likely serves as adequate habitat for summering mule deer, but may serve as better foraging range during very mild winters due to high sagebrush and bitterbrush cover. The diverse and abundant herbaceous understory could also provide forage for elk during the summer months (Table 25C-31.3; Beck & Peek, 2005). However, pellet transect data indicates that both deer and elk presence on this site have remained low since 2003 (Table 25C-31.9).



**Trend Summary Tables**

**Table 25C-31.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2003	13.0	-	-	11.8	-	-
2008	24.7	-	-	34.9	-	-
2013	29.0	-	-	37.8	-	-
2018	28.6	-	-	42.0	-	-
2023	32.9	-	-	44.9	-	-

**Table 25C-31.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2003	-	337	113	192	-	7.8	0.7	6.2
2008	-	400	16	247	-	13.1	0.1	11.7
2013	-	389	20	266	-	12.3	0.1	7.9
2018	-	399	35	241	-	19.7	0.1	7.8
2023	-	355	138	248	-	11.8	0.7	11.7

**Table 25C-31.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2003	16.7	0.1	63.0	0.7	1.4	25.8
2008	12.5	-	52.6	1.0	1.2	55.4
2013	10.1	-	58.5	0.4	0.5	52.4
2018	21.5	0.1	61.9	0.3	1.1	46.1
2023	17.9	-	55.8	0.9	1.8	45.5

**Table 25C-31.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
2003	3	7	1	5	72
2008	10	28	2	-	68
2013	9	18	-	-	10
2018	5	5	2	-	49
2023	10	2	-	-	4
Year	Days Use Per Acre (ha)				
2003	8.0 (19.7)	13.4 (33.1)	-	-	-
2008	25.4 (62.8)	15.4 (38.1)	4.0 (9.9)	-	-
2013	50.1 (123.7)	15.4 (38.1)	2.0 (5.0)	-	-
2018	18.1 (44.8)	0.7 (1.7)	0.7 (1.7)	-	-
2023	45.0 (111.2)	1.3 (3.3)	0.7 (1.7)	-	-

**Table 25C-31.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Carex (sedge)	Carex geyeri (Geyer's sedge)	Carex obtusata (obtuse sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency												
2003	98	24	231	-	-	16	99	12	5	-	23	32	-
2008	155	23	236	-	-	41	172	17	3	-	28	26	1
2013	175	3	257	-	-	7	86	22	2	-	36	21	41
2018	162	7	-	33	207	91	167	8	18	2	74	19	-
2023	123	14	-	20	155	28	85	3	35	5	52	7	12
year	Average Cover (%)												
2003	1.8	0.9	2.7	-	-	0.3	0.9	0.1	0.3	-	0.2	0.5	-
2008	3.5	0.3	5.3	-	-	0.3	2.4	0.3	0.0	-	0.6	0.3	0.0
2013	3.9	0.0	6.3	-	-	0.0	0.8	0.3	0.0	-	0.4	0.1	0.4
2018	6.5	0.1	-	2.0	3.8	1.8	2.0	0.1	0.6	0.0	2.7	0.3	-
2023	3.1	0.4	-	0.8	3.3	0.5	0.9	0.0	0.8	0.1	1.5	0.3	0.1

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

**Table 25C-31.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria parvifolia (small-leaf pussytoes)	Arabis drummondii (Drummond's rockcress)	Arenaria fendleri (Fendler's sandwort)	Astragalus agrestis (purple milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum (buckwheat)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hymenoxys richardsonii (pinque rubberweed)
year	Nested Frequency																
2003	58	8	-	1	-	29	-	3	10	-	-	12	-	3	20	50	4
2008	4	3	13	4	-	102	-	4	17	1	3	-	-	-	25	-	4
2013	11	5	6	-	-	175	1	-	16	-	-	-	1	-	30	-	1
2018	35	6	4	-	-	148	4	-	15	-	-	-	-	-	22	-	6
2023	65	6	9	-	54	119	3	-	12	-	-	1	4	-	23	54	7
year	Average Cover (%)																
2003	0.4	0.2	-	0.0	-	0.2	-	0.0	0.2	-	-	0.0	-	0.0	0.2	0.2	0.1
2008	0.0	0.1	0.1	0.0	-	1.6	-	0.0	0.3	0.0	0.0	-	-	-	0.3	-	0.1
2013	0.0	0.2	0.0	-	-	1.4	0.0	-	0.2	-	-	-	0.0	-	0.3	-	0.0
2018	0.1	0.4	0.0	-	-	1.5	0.0	-	0.5	-	-	-	-	-	0.2	-	0.1
2023	0.3	0.2	0.1	-	1.8	2.6	0.0	-	0.4	-	-	0.0	0.0	-	0.5	0.2	0.2

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

FORB SPECIES	Nest Frequency												
Lotus utahensis (Utah bird's-foot trefoil)													
Lupinus argenteus (silvery lupine)													
Packera multilobata (lobeleaf groundsel)													
Penstemon (beardtongue)													
Penstemon procerus (littletower penstemon)													
Penstemon rydbergii (Rydberg's penstemon)													
Phlox longifolia (longleaf phlox)													
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)													
Potentilla gracilis (slender cinquefoil)													
Potentilla hippiana (woolly cinquefoil)													
Silene drummondii (Drummond's campion)													
Taraxacum officinale (common dandelion)													
year	Average Cover (%)												
2003	-	3.7	0.0	0.9	-	-	0.1	0.1	0.2	0.0	-	0.2	
2008	0.0	7.7	-	0.7	-	-	0.3	0.0	-	0.4	0.0	0.1	
2013	0.0	5.2	-	0.1	-	-	0.2	0.0	0.1	0.1	0.0	0.1	
2018	0.0	3.1	-	-	0.0	1.1	0.3	-	0.3	-	0.0	0.1	
2023	0.1	3.5	-	-	0.3	1.1	0.5	0.1	0.2	0.0	0.0	0.1	

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

**Table 25C-31.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover		
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)			
Rosa woodsii <sup>p</sup> (Woods' rose)			
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)			
year	Quadrat Cover (%)		
2003	11.8	-	-
2008	34.8	-	0.1
2013	37.5	-	0.3
2018	41.7	-	0.3
2023	44	-	0.9
2003	12.9	0.0	0.1
2008	24.5	0.2	0.0
2013	28.9	0.0	0.0
2018	28.4	-	0.2
2023	32.5	0.0	0.3

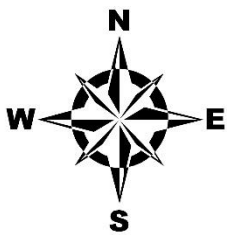
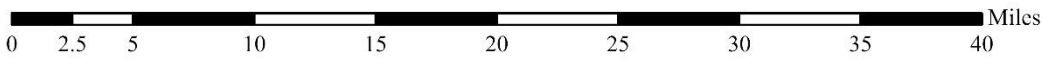
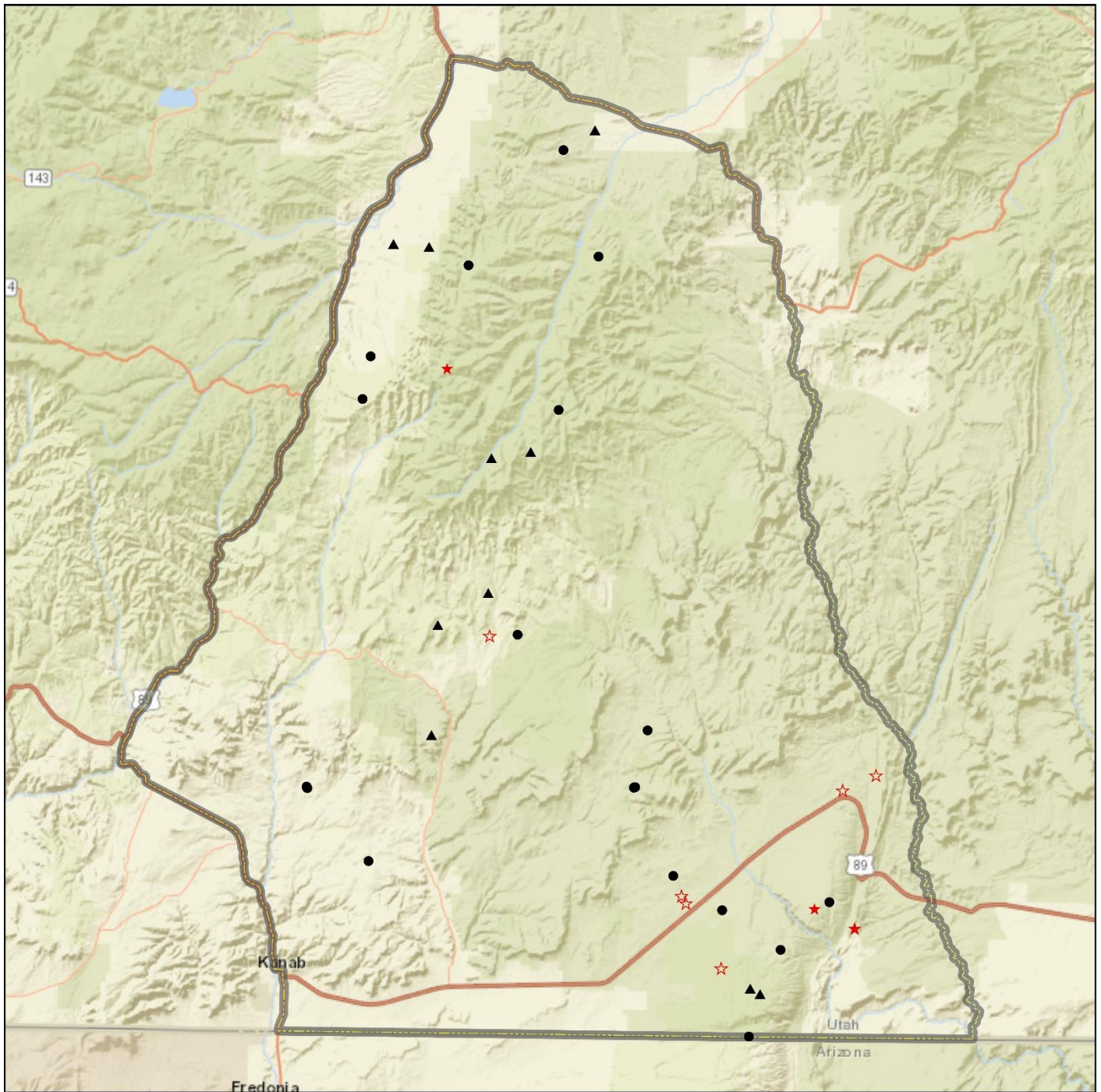
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 25C-31.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

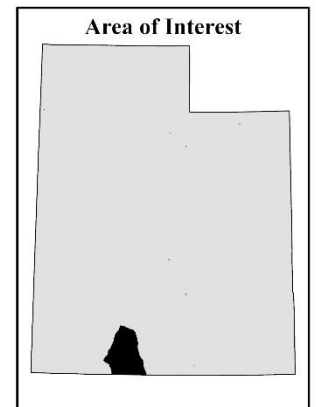
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2003	7100	1740	16	48	36	1	0	37	29/44
2008	18320	4320	63	31	6	8	0	5	42/81
2013	8360	180	26	65	9	27	0	16	50/84
2018	9220	-	11	64	25	7	0	17	53/80
2023	7340	-	5	60	34	0	0	34	- / -
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2003	-	-	-	-	-	-	-	-	- / -
2008	-	40	0	0	0	0	0	0	47/103
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2003	-	20	0	0	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2003	120	-	0	100	0	0	0	0	16/18
2008	100	-	60	40	0	60	40	0	14/15
2013	100	-	80	20	0	0	0	0	18/20
2018	60	-	0	67	33	67	33	0	10/7
2023	80	-	100	0	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2003	200	-	20	60	20	0	20	10	22/28
2008	140	-	0	100	0	14	29	0	27/51
2013	120	-	33	67	0	17	17	17	31/47
2018	140	-	0	100	0	0	71	0	30/35
2023	120	-	33	67	0	17	0	0	- / -

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

# WILDLIFE MANAGEMENT UNIT 27 – PAUNSAUGUNT

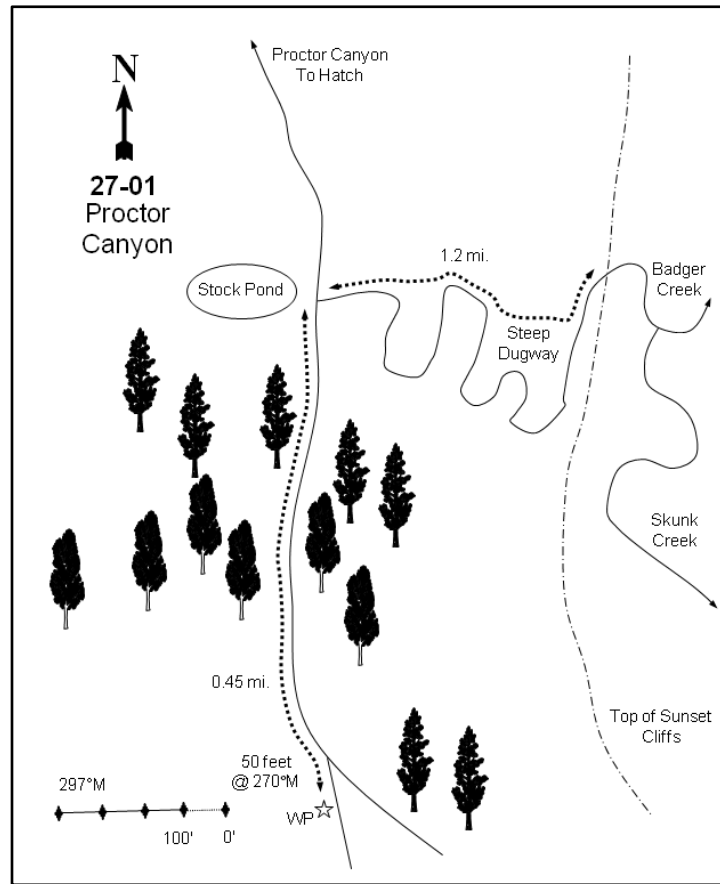
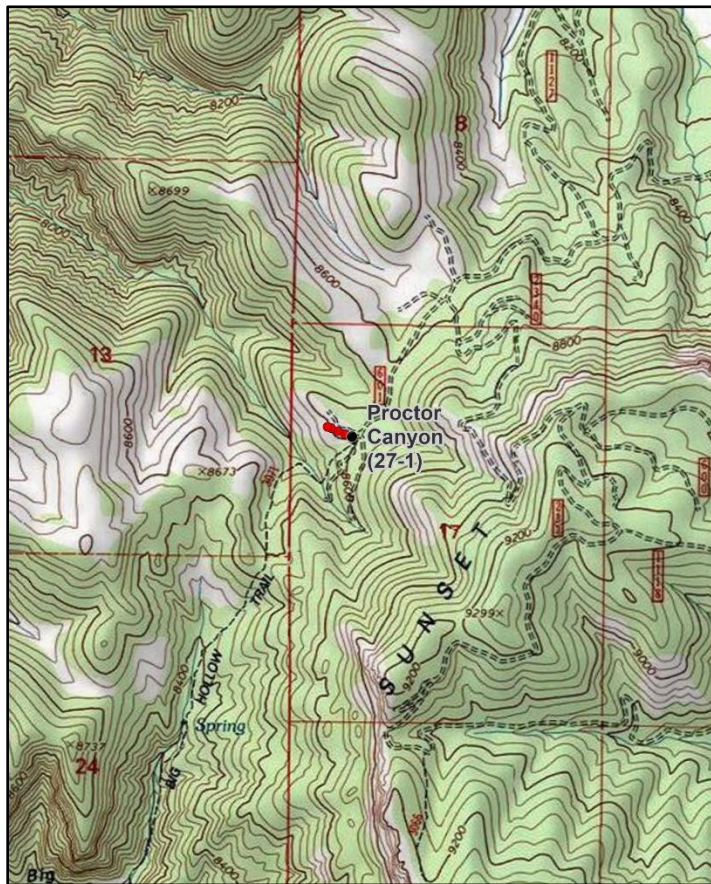


Study Locations Project, Status	Unit Boundary
● RT, Active	▭ Unit - 27
★ RT, Suspended	
▲ WRI, Active	
☆ WRI, Suspended	



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

## PROCTOR CANYON - STUDY NO. 27-1



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Tropic Reservoir NW; Township 37S, Range 4W, Section 17  
NAD 83 UTM ZONE 12, 380077 East 4161288 North

### Transect Information

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

7161  
280° magnetic  
400ft  
Line 1 (11ft & 71ft), Line 2 (95ft), Line 3 (59ft), Line 4 (34ft)  
Standard; Line 4: 50ft Long

### Directions to Site

At the south end of Tropic Reservoir, turn west off of the East Fork Sevier Road and proceed up Badger Creek for 2.45 miles. Keep left at the fork and continue towards Proctor Canyon for 3.5 miles to a fork at the top of the mountain. Go right towards Hatch for 1.2 miles (down a narrow, rocky dugway) to a fork in the aspen. Turn left hard towards Big Hollow/Camp Eli, and continue 0.45 miles to a clearing and the witness post on the right (west) side of the road. The frequency baseline starts near the top of the hill and runs west-northwest. The trend study is marked by 2-foot tall green fenceposts. The 0-foot baseline stake is 50 feet west of the witness post and is marked with a red browse tag #7161.

### Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Hatch C&H
Elevation	8,360ft (2,548m)
Aspect	Southwest
Slope	2-13%
Sample Dates	08/13/1992, 08/05/1997, 07/17/2003, 07/16/2008, 07/31/2013, 06/19/2018, 06/20/2023

**Wildlife Habitat and Vegetation History**

**Table 27-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 27-01.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mixed Mountain Brush	Phase I
1992	Mixed Mountain Brush	Phase I
1997	Mixed Mountain Brush	Phase I
2003	Mixed Mountain Brush	Phase I
2008	Mixed Mountain Brush	Phase I
2013	Mixed Mountain Brush	Phase I
2018	Mixed Mountain Brush	Phase I
2023	Mixed Mountain Brush	Phase I

**Site Notes**

The small open ridge-top where the study is located is populated by a mixed mountain brush community surrounded by dense conifer forest and quaking aspen (*Populus tremuloides*) stands; it is representative of larger, but more inaccessible, open ridges to the northwest. In the same cattle allotment and one-half mile to the north is a seeded area and stock pond. Deer sign -- consisting of pellet groups and antler drops -- was noted in 1992, along with a few elk pellet groups.

**Soils**

**Table 27-01.5 - 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	7.1	80.0	7.1	12.9	1.5	8.0	54.4	0.4	08/05/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation                      23 inches  
 NRCS Ecological Site    Mountain Stony Loam (Antelope Bitterbrush)  
 NRCS Ecological Site #    R047XB456UT  
 States and Transitions    No state and transition model is available for this ecological site.

Since study establishment in 1987, the vegetation on this site has remained in a stable state as a mixed mountain browse plant community consisting mainly of black sagebrush (*Artemisia nova*), antelope bitterbrush (*Purshia tridentata*), and yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*); a number of other shrub species are present, but contribute less cover (Table 27-01.12). The herbaceous understory has been abundant throughout the study years and has consisted of a diverse number of largely native plant species with no single species establishing dominance (Table 27-01.7, Table 27-01.10, Table 21-07.11). Although not particularly abundant on the study site itself (Table 21-07.14), photos reveal that denser stands of trees are present just adjacent to the transect. Without a disturbance such as fire, this site has the potential to transition to a conifer-encroached state.

Due to the diverse and abundant shrub and herbaceous components, this site likely serves as adequate habitat for summering deer. Although pellet transect data shows that deer presence has been low since 2013, presence was considered to be high in 2003 and 2008. Elk presence has also remained low over the study period (Table 27-01.9), but the grass and forb communities could provide forage during the summer months (Table 27-01.3; Beck & Peek, 2005).

**Trend Summary Tables**

**Table 27-01.6 - 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
1992	37.2	6.6	4.3	-	-	-
1997	36.8	4.4	3.4	-	-	-
2003	38.5	6.5	2.8	43.7	6.7	7.6
2008	34.2	7.0	2.9	53.5	13.6	8.6
2013	37.8	6.6	5.2	52.0	7.9	10.0
2018	47.5	7.5	3.1	53.2	7.2	11.2
2023	45.2	7.6	4.4	56.1	9.2	9.6

**Table 27-01.7 - 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
1992	-	375	174	277	-	18.4	3.1	8.3
1997	-	346	119	266	-	8.3	0.8	5.0
2003	-	339	102	168	-	9.1	0.9	2.7
2008	-	328	92	234	-	9.6	1.5	5.3
2013	1	308	42	212	0.0	8.8	0.5	5.1
2018	-	349	34	220	-	14.0	0.5	6.7
2023	2	314	122	245	0.1	12.2	1.6	10.3

**Table 27-01.8 - 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
1992	19.9	0.2	40.7	0.0	2.8	62.8
1997	21.6	0.8	49.8	1.6	0.4	52.8
2003	23.1	0.4	47.7	0.7	0.8	57.1
2008	14.7	0.1	41.7	1.9	0.8	62.9
2013	23.6	0.3	49.8	0.9	0.4	60.0
2018	17.6	1.2	62.6	0.6	0.8	64.3
2023	16.0	0.6	46.6	1.6	0.9	60.8

**Table 27-01.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1992	-	-	13	3	6
1997	2	-	22	2	1
2003	4	-	19	5	6
2008	3	-	16	1	17
2013	6	-	4	-	-
2018	3	-	4	-	13
2023	4	1	8	-	5
Year	Days Use Per Acre (ha)				
1992	-	-	-	-	-
1997	-	-	-	-	-
2003	8.0 (19.7)	-	48.9 (120.8)	2.0 (5.0)	-
2008	-	-	78.4 (193.7)	2.0 (5.0)	-
2013	13.8 (34.1)	-	14.7 (36.4)	0.7 (1.7)	-
2018	4.4 (10.8)	-	8.1 (19.9)	-	-
2023	6.5 (16.1)	8.7 (21.5)*	8.1 (19.9)	0.7 (1.7)	-

\*Pellets per acre (ha)



**Table 27-01.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bouteloua gracilis (blue grama)	Bromus porteri (Porter brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency												
1992	128	1	16	45	-	27	126	109	168	-	88	45	28
1997	91	16	14	1	-	12	43	138	85	-	46	116	30
2003	101	9	3	0	-	7	54	112	75	-	85	48	-
2008	83	1	5	3	-	11	71	45	123	-	82	96	24
2013	74	11	6	8	1	22	82	35	52	-	101	101	-
2018	132	35	6	17	-	36	85	45	62	-	16	98	1
2023	93	27	3	4	2	13	3	19	78	70	97	64	7
year	Average Cover (%)												
1992	2.8	0.0	0.4	0.8	-	0.9	1.7	3.2	3.0	-	2.5	3.0	0.2
1997	1.2	0.1	0.2	0.0	-	0.1	0.1	3.1	0.6	-	0.5	2.3	0.1
2003	1.1	0.0	0.0	0.0	-	0.1	0.6	3.3	1.1	-	1.1	1.7	-
2008	2.0	0.0	0.0	0.0	-	0.2	0.8	1.0	1.7	-	1.5	1.8	0.3
2013	1.5	0.1	0.2	0.1	0.0	0.4	1.2	0.6	1.0	-	2.3	1.4	-
2018	3.6	0.9	0.5	0.1	-	1.3	1.1	1.5	1.5	-	0.9	2.5	0.0
2023	3.0	0.5	0.1	0.0	0.1	0.3	0.0	1.4	1.6	1.1	2.3	1.6	0.2

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

**Table 27-01.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis (rockcross)	Artemisia dracunculus (tarragon)	Artemisia ludoviciana (white sagebrush)	Asclepias (milkweed)	Astragalus (milkvetch)	Astragalus humistratus (groundcover milkvetch)	Astragalus tenellus (looseflower milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)
year	Nested Frequency																
1992	43	-	-	8	3	1	37	7	-	-	31	5	7	2	1	-	-
1997	57	-	-	2	3	2	25	6	-	-	30	8	4	12	-	1	3
2003	20	5	6	5	-	-	4	-	-	-	1	3	8	3	-	-	1
2008	45	12	4	8	5	1	-	-	-	-	16	-	20	7	-	-	-
2013	62	-	-	3	2	-	1	-	-	2	28	3	-	8	-	-	-
2018	79	9	-	7	14	14	7	7	5	-	18	10	1	13	-	-	1
2023	89	42	-	51	14	1	11	3	-	-	6	3	60	21	-	-	1
year	Average Cover (%)																
1992	0.8	-	-	0.0	0.1	0.0	1.1	0.1	-	-	0.4	0.1	0.0	0.0	0.0	-	-
1997	0.6	-	-	0.0	0.1	0.0	0.7	0.1	-	-	0.2	0.0	0.0	0.1	-	0.0	0.0
2003	0.1	0.0	0.0	0.0	-	-	0.1	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0
2008	0.5	0.1	0.0	0.0	0.0	0.0	-	-	-	-	0.3	-	0.0	0.0	-	-	-
2013	1.0	-	-	0.0	0.4	-	0.0	-	-	0.0	0.5	0.0	-	0.0	-	-	-
2018	1.6	0.1	-	0.0	0.1	0.0	0.4	0.0	0.1	-	0.1	0.1	0.0	0.3	-	-	0.0
2023	2.8	0.3	-	0.4	0.4	0.0	0.1	0.0	-	-	0.0	0.0	0.3	0.3	-	-	0.0

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

FORB SPECIES	Cirsium arizonicum <sup>a</sup> (Arizona thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cordylanthus <sup>a</sup> (bird's-beak)	Crepis acuminata (tapertip hawkbeard)	Erigeron eatonii (Eaton's fleabane)	Erigeron flagellaris (trailing fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Fritillaria atropurpurea (spotted fritillary)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Heterotheca villosa (hairy false goldenaster)	Hymenoxys richardsonii (pingue rubberweed)	Ipomopsis aggregata (scarlet gilia)	Lepidium <sup>a</sup> (pepperweed)	Linum lewisii (Lewis flax)	Machaeranthera canescens (hoary tansyaster)
year	Nested Frequency																
1992	41	-	-	-	-	70	5	45	50	-	-	-	23	17	-	21	17
1997	37	-	-	2	12	7	10	52	29	4	3	-	-	6	-	18	13
2003	11	13	-	3	1	10	13	39	30	-	11	-	10	-	-	-	22
2008	15	-	-	1	6	5	10	53	30	-	8	-	14	-	-	7	18
2013	16	-	8	-	9	42	7	37	16	-	3	-	3	3	-	4	15
2018	12	-	-	2	2	12	23	44	22	-	1	1	5	-	2	9	20
2023	4	-	32	10	13	2	6	34	35	-	35	-	6	5	-	0	1
year	Average Cover (%)																
1992	1.2	-	-	-	-	0.5	0.2	1.0	1.1	-	-	-	0.2	0.1	-	0.3	0.1
1997	0.4	-	-	0.0	0.1	0.0	0.0	0.3	1.2	0.0	0.0	-	-	0.0	-	0.1	0.1
2003	0.1	0.0	-	0.1	0.0	0.1	0.1	0.4	0.6	-	0.1	-	0.2	-	-	-	0.3
2008	0.4	-	-	0.0	0.0	0.2	0.1	0.6	0.6	-	0.0	-	0.4	-	-	0.1	0.8
2013	0.3	-	0.0	-	0.1	0.9	0.2	0.4	0.3	-	0.0	-	0.1	0.0	-	0.1	0.3
2018	0.4	-	-	0.0	0.0	0.2	0.3	0.8	0.8	-	0.0	0.0	0.2	-	0.0	0.1	0.2
2023	0.2	-	0.6	0.1	0.1	0.0	0.1	1.0	1.7	-	0.1	-	0.2	0.0	-	0.0	0.0

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

FORB SPECIES	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera caespitosa (tufted evening primrose)	Oenothera pallida <sup>a</sup> (pale evening primrose)	Orthocarpus luteus <sup>a</sup> (yellow owl's-clover)	Penstemon comarrhenus (dusty beardtongue)	Penstemon humilis (low beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla hippiana (woolly cinquefoil)	Senecio flaccidus var. flaccidus (threadleaf ragwort)	Senecio spartioides (broom-like ragwort)	Silene drummondii (Drummond's campion)	Symphotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>a</sup> (yellow salsify)
year	Nested Frequency														
1992	-	2	3	58	43	-	68	87	24	-	-	10	69	1	15
1997	-	-	-	14	41	-	58	61	33	-	-	1	48	4	10
2003	9	-	14	47	24	3	17	2	26	-	-	6	16	-	-
2008	-	-	12	50	36	7	76	13	31	4	-	-	6	7	6
2013	-	-	15	-	17	6	44	9	23	-	-	1	20	5	-
2018	-	-	6	-	13	2	17	1	24	-	1	3	31	15	8
2023	6	1	-	-	16	-	49	27	30	-	-	3	8	15	4
year	Average Cover (%)														
1992	-	0.0	0.0	1.5	0.1	-	0.5	0.3	0.9	-	-	0.0	0.7	0.0	0.1
1997	-	-	-	0.2	0.2	-	0.3	0.1	0.7	-	-	0.0	0.2	0.0	0.0
2003	0.0	-	0.2	0.4	0.1	0.0	0.0	0.0	0.5	-	-	0.0	0.1	-	-
2008	-	-	0.1	0.8	0.3	0.2	0.3	0.0	0.6	0.1	-	-	0.0	0.0	0.0
2013	-	-	0.2	-	0.1	0.0	0.2	0.0	0.3	-	-	0.0	0.1	0.0	-
2018	-	-	0.0	-	0.1	0.0	0.0	0.0	0.6	-	0.0	0.0	0.1	0.1	0.0
2023	0.0	0.1	-	-	0.1	-	0.4	0.1	1.9	-	-	0.0	0.1	0.1	0.0

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

**Table 27-01.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria parryi var. attenuata (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)	Mahonia repens (creeping barberry)	Opuntia (pricklypear)	Pinus ponderosa <sup>i</sup> (ponderosa pine)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Ribes cereum var. pedicellare <sup>p</sup> (whisky currant)	Rosa woodsii <sup>p</sup> (Woods' rose)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)															
1992	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	3.9	6.2	-	1.6	5.3	0.2	-	7.6	-	-	-	25.6	1.4	0.7	4.3	1.2
2008	3	8.9	-	2.6	11.4	0.2	-	8	-	-	0.6	28.9	1.6	2.6	5.9	2
2013	3.4	9.5	-	2.3	6.9	0.6	-	9.2	-	-	0.8	30.2	1.5	1.7	3.4	0.4
2018	6.2	7.2	-	1.1	6.3	-	-	9.9	-	-	1.3	33	0.6	1.8	3.3	0.9
2023	5.8	9.7	-	4	8.2	0.1	-	8.4	-	-	1.2	28.9	1.2	2.2	4.3	0.9
year	Quadrat Cover (%)															
1992	3.4	4.9	-	1.2	5.0	0.2	0.3	4.3	-	-	0.0	22.7	1.7	0.8	2.4	1.1
1997	2.3	5.6	-	1.4	4.1	0.0	0.0	3.4	0.0	-	-	22.0	1.8	0.8	3.0	0.2
2003	4.7	7.3	-	1.1	5.7	0.0	0.0	2.8	-	-	-	19.7	1.9	0.5	3.4	0.7
2008	4.2	8.2	-	2.0	6.0	0.0	0.2	2.9	-	-	0.0	14.4	0.5	1.9	3.0	0.7
2013	2.8	7.9	0.1	2.1	6.1	0.1	-	5.2	-	0.0	0.0	20.4	0.7	1.4	2.3	0.3
2018	6.1	7.6	-	1.8	6.3	-	-	3.1	-	0.0	0.0	26.0	1.6	0.9	3.4	1.2
2023	4.9	8.1	-	2.9	7.3	0.1	-	4.4	0.0	0.0	0.0	22.5	3.0	1.3	2.5	0.2

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

**Table 27-01.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1992	1000	-	62	28	10	66	8	94	- / -
1997	480	-	17	83	0	58	8	25	101/91
2003	440	-	14	73	14	23	32	5	115/111
2008	460	-	13	70	17	30	4	17	116/121
2013	380	-	5	84	11	32	37	11	130/132
2018	740	20	16	81	3	32	16	0	118/116
2023	1200	-	37	63	0	7	7	0	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1992	1840	60	27	62	11	12	3	0	- / -
1997	1540	20	12	66	22	10	0	7	33/69
2003	2720	-	19	71	10	10	0	1	53/71
2008	3100	960	12	60	28	38	0	7	42/73
2013	2020	-	17	64	19	54	2	18	47/76
2018	2480	-	13	83	4	1	0	2	45/65
2023	2440	480	13	75	12	18	3	11	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	97/113
2023	-	-	-	-	-	-	-	-	-/-
<b>Cercocarpus ledifolius<sup>P</sup> -- (curl-leaf mountain mahogany)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	153/120
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1992	2880	-	15	85	0	0	0	1	- / -
1997	900	-	11	87	2	0	7	2	10/32
2003	2480	-	0	100	0	6	15	0	10/22
2008	1940	-	0	100	0	45	30	0	11/26
2013	2940	-	2	98	0	55	17	0	11/29
2018	2180	-	0	100	0	6	62	29	13/26
2023	3900	-	0	99	1	0	0	1	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1992	5060	80	35	57	8	2	0	2	- / -
1997	3500	-	3	97	1	0	0	0	41/45
2003	3640	-	0	94	6	0	1	1	37/42
2008	3960	80	2	87	11	0	0	5	48/66
2013	2840	-	6	89	5	7	0	2	51/64
2018	3260	-	11	87	2	1	0	1	47/55
2023	2480	240	13	78	9	0	1	10	- / -
<b>Ericameria parryi var. attenuata -- (Parry's rabbitbrush)</b>									
1992	580	-	31	69	0	0	3	0	- / -
1997	320	-	44	56	0	0	0	0	31/17
2003	420	-	0	100	0	0	0	0	14/19
2008	100	100	0	100	0	0	0	0	18/28
2013	60	-	0	100	0	67	0	0	15/32
2018	20	-	0	100	0	0	0	0	13/25
2023	140	-	0	100	0	29	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1992	580	-	10	90	0	0	0	0	- / -
1997	200	-	0	100	0	0	0	0	19/17
2003	100	-	80	20	0	0	0	0	22/13
2008	80	-	0	100	0	25	0	0	19/25
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	18/18
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Juniperus communis -- (common juniper)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	55/160
2023	40	-	0	100	0	0	0	0	-/-
<b>Juniperus scopulorum<sup>1</sup> -- (Rocky Mountain juniper)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	-/-
2013	20	-	100	0	0	0	0	0	-/-
2018	20	-	100	0	0	0	0	0	-/-
2023	20	-	100	0	0	0	0	100	-/-
<b>Mahonia repens -- (creeping barberry)</b>									
1992	20	-	100	0	0	0	0	0	-/-
1997	20	-	0	100	0	0	0	0	7/12
2003	-	-	-	-	-	-	-	-	7/13
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	10/8
2023	20	-	0	100	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
1992	60	-	100	0	0	0	0	0	-/-
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	8/43
2013	20	-	100	0	0	0	0	0	7/15
2018	-	-	-	-	-	-	-	-	-/-
2023	20	20	0	100	0	0	0	0	-/-
<b>Pinus ponderosa<sup>1</sup> -- (ponderosa pine)</b>									
1992	20	-	100	0	0	100	0	0	-/-
1997	20	-	100	0	0	0	0	0	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1992	3460	180	21	75	4	50	31	0	-/-
1997	1680	140	8	87	5	54	33	1	63/142
2003	2340	-	3	92	4	9	80	0	61/124
2008	1960	60	0	96	4	58	18	3	60/132
2013	2700	-	2	94	4	26	50	2	72/142
2018	2960	40	10	90	1	16	19	0	76/121
2023	3500	-	5	90	6	23	38	6	-/-

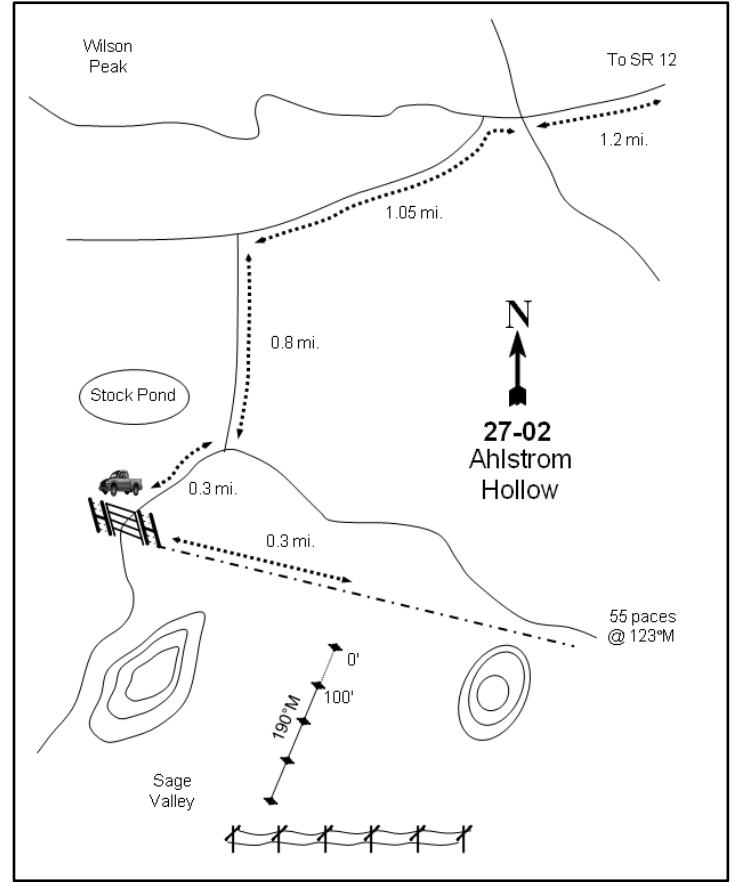
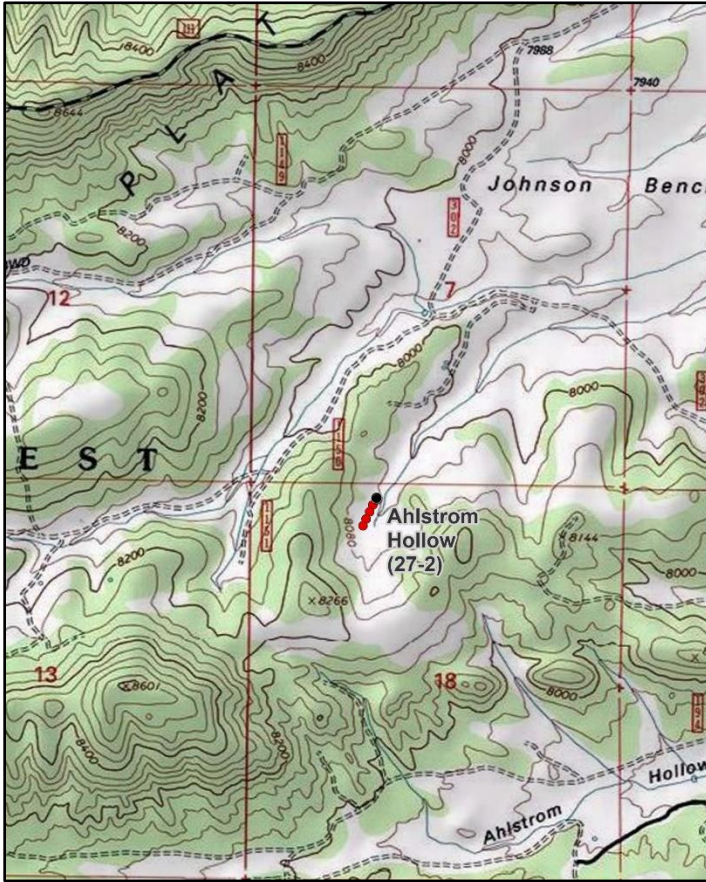
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ribes cereum var. pedicellare<sup>p</sup> -- (whisky currant)</b>									
1992	280	40	57	36	7	0	0	7	- / -
1997	80	-	0	100	0	0	0	0	158/186
2003	80	-	0	75	25	0	0	0	149/118
2008	20	-	0	100	0	100	0	0	144/197
2013	100	-	0	100	0	20	0	0	131/150
2018	100	-	0	100	0	0	0	0	133/124
2023	120	-	17	50	33	17	0	33	- / -
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
1992	1880	-	97	3	0	0	0	0	- / -
1997	1200	60	48	52	0	0	0	0	36/38
2003	1140	120	70	30	0	0	0	0	20/19
2008	1140	20	21	79	0	0	0	0	29/24
2013	1680	-	10	91	0	2	0	0	34/23
2018	2040	-	18	82	0	4	0	0	33/21
2023	2180	-	23	77	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1992	1260	-	59	40	2	2	0	2	- / -
1997	480	-	17	79	4	8	0	4	40/87
2003	1200	-	3	95	2	2	10	2	36/53
2008	900	-	18	82	0	2	0	0	50/95
2013	1000	-	32	68	0	2	0	0	40/88
2018	1720	-	17	83	0	14	2	0	46/68
2023	1200	-	7	93	0	0	0	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1992	820	-	56	37	7	0	0	0	- / -
1997	400	-	10	75	15	0	0	0	35/34
2003	940	-	17	77	6	0	0	0	28/31
2008	640	60	6	59	34	0	0	6	23/30
2013	420	-	10	91	0	5	0	19	23/29
2018	360	-	0	100	0	0	0	0	28/34
2023	480	-	4	88	8	0	0	8	- / -

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

**Table 27-01.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	12	-	25	13	25	38	21.6
2023	25	-	33	8	17	42	22.7
<b>Pinus ponderosa (ponderosa pine)</b>							
2018	6	-	-	-	25	75	30.3
2023	5	-	20	-	20	60	24.6
<b>Pseudotsuga menziesii (Douglas-fir)</b>							
2018	13	-	25	25	50	-	7.1
2023	1	-	-	-	100	-	14.0

## AHLSTROM HOLLOW - STUDY NO. 27-2



### Location Information

USGS 7.5 min Map Info Wilson Peak SE; Township 36S, Range 4W, Section 18  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 388141 East 4171099 North

### Transect Information

Browse Tag # (0' Stake) Not Available  
 Transect Bearing 190° magnetic  
 Length 400ft  
 Belt Placement Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
 Belt Marker Placement Standard

### Directions to Site

From the Bryce Canyon area, travel on SR-12 west towards Red Canyon. From the Forest Service boundary sign and mile marker 9, go 0.6 miles further west. Turn left onto Wilson Peak Road #111, cross a cattle guard, and travel for 1.2 miles to the Ahlstrom Hollow Road intersection. Pass this 90 degree intersection and continue 0.05 miles on the Wilson Peak Road to a dirt road going off to the left at a 45 degree angle. Travel on this road for 1.05 miles to a fork. Bear left and continue for 0.8 miles to a fork by a stock pond. Turn right and go 0.3 miles to a fence; park here. Walk east along the fenceline up and over a ridge and down to the middle of the next valley. At the bottom of this valley, turn and walk up (south) along the bottom for about 400 yards to the 0-foot baseline marked with a 2-foot tall fencepost; there is no browse tag.

### Site Information

Land Ownership Federal  
 Land Administrator USFS  
 Allotment Blue Fly C&H  
 Elevation 8,040ft (2,451m)  
 Aspect Northeast  
 Slope 8-10%  
 Sample Dates 08/12/1992, 08/07/1997, 07/17/2003, 07/17/2008, 07/18/2013, 06/18/2018, 06/14/2023

**Table 27-02.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	-	-	Between 1997 and 2002	-

**Wildlife Habitat and Vegetation History**

**Table 27-02.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 27-02.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Black Sagebrush	Phase I
1992	Black Sagebrush	Phase I
1997	Black Sagebrush	Phase I
2003	Black Sagebrush	Phase I
2008	Black Sagebrush	Phase I
2013	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I
2023	Black Sagebrush	Phase I

**Site Notes**

The small valley sampled by this trend study is above Johnson Bench, which is in an area seeded mainly with smooth brome (*Bromus inermis*) and other grasses. This particular black sagebrush (*Artemisia nova*) and rabbitbrush (*Chrysothamnus spp.*) valley shows little evidence of the seeding treatments done in the early 1950s.

**Soils**

**Table 27-02.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.4	66.4	19.1	14.6	2.5	15.9	86.4	0.5	07/30/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation                      18 inches  
 NRCS Ecological Site    Mountain Loam (Black Sagebrush)  
 NRCS Ecological Site #    R047XB426UT  
 States and Transitions    No state and transition model is available for this ecological site.

This study site has remained in a stable state with black sagebrush (*Artemisia nova*) dominating the browse component since 1987 (Photos, Pre-1992 Data, Table 27-02.12, Table 27-02.13). A wildfire between 1997 and 2002 (Table 27-02.1) removed the shrub component from part of the transect for a limited time, but shrubs have since reestablished. The herbaceous understory has remained well-developed throughout the study period with a majority of the cover being contributed by native grass species such as muttongrass (*Poa fendleriana*), blue grama (*Bouteloua gracilis*), and needle and thread (*Hesperostipa comata*), among others. Annual and perennial forbs have been relatively rare in most sample years, but frequency and cover of both increased between 2018 and 2023. Furthermore, forb species have been almost exclusively native in all sample years since 1992 (Pre-1992 Data, Table 27-02.7, Table 27-02.10, Table 27-02.11). A dense population of twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees occurs in the area (Photos) and trees are slowly increasing in abundance on the site itself (Table 27-02.14). Although classified as being within Phase I of woodland succession as of 2023 (Table 27-02.4), further encroachment is possible on this site in future sample years if a tree-removing disturbance/treatment does not occur.

This site may serve as adequate summer habitat for deer due to the diverse and abundant shrub and herbaceous components. The site may also serve as foraging range for deer during mild winters due to the substantial preferred browse cover. However, pellet transect data indicates that deer presence has remained low since 2003 (Table 27-02.9). The grass and forb communities could also provide forage for summering elk in the area (Table 27-02.3; Beck & Peek, 2005). Elk presence was high in 2003, but has remained low since 2008 with no pellet groups being observed in 2023 (Table 27-02.9).



**Trend Summary Tables**

**Table 27-02.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1992	25.1	7.1	0.1	-	-	-
1997	21.3	2.8	0.8	-	-	-
2003	15.0	7.7	0.8	16.4	7.2	2.0
2008	18.3	5.5	1.0	23.8	11.5	2.2
2013	19.1	6.6	1.3	19.0	9.4	2.6
2018	17.8	8.3	1.5	20.6	8.8	3.2
2023	20.0	7.8	0.8	29.1	13.0	6.1

**Table 27-02.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1992	-	360	151	148	-	15.9	2.9	2.3
1997	3	364	183	166	0.0	7.4	1.7	1.9
2003	4	360	120	116	0.0	9.7	2.4	0.8
2008	-	401	210	153	-	14.4	2.7	1.9
2013	2	357	115	147	0.0	12.8	1.2	1.8
2018	-	390	15	126	-	24.6	0.1	1.7
2023	12	275	275	193	0.2	14.6	4.1	6.0

**Table 27-02.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1992	31.1	0.4	31.4	0.9	7.9	46.7
1997	22.2	0.5	42.6	7.1	0.1	38.5
2003	37.7	0.0	33.3	4.2	0.5	38.2
2008	20.1	0.1	38.7	5.5	1.2	49.4
2013	40.2	0.1	36.0	3.3	0.1	43.0
2018	34.3	0.6	45.1	3.4	1.2	44.4
2023	30.7	0.0	23.8	5.8	0.7	44.9

**Table 27-02.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1992	3	6	22	31
1997	6	14	7	11
2003	8	8	12	13
2008	10	3	10	47
2013	10	5	3	3
2018	14	11	6	21
2023	7	5	-	-
Year	Days Use Per Acre (ha)			
1992	-	-	-	-
1997	-	-	-	-
2003	31.9 (78.9)	7.4 (18.2)	29.5 (72.8)	-
2008	37.7 (93.2)	5.3 (13.2)	19.4 (48.0)	-
2013	29.8 (73.5)	8.1 (19.9)	7.4 (18.2)	-
2018	29.8 (73.5)	6.7 (16.6)	4.7 (11.6)	-
2023	18.9 (46.6)	1.3 (3.3)	-	-

**Table 27-02.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency													
1992	0	32	-	80	-	-	-	14	85	148	268	-	5	-
1997	-	36	-	70	-	3	-	21	125	99	226	-	39	-
2003	-	9	-	32	-	-	2	51	121	81	214	-	24	4
2008	-	19	0	78	-	-	-	125	159	69	187	4	10	-
2013	1	27	-	64	1	2	140	25	105	48	193	-	10	-
2018	2	97	4	69	1	-	38	-	37	80	275	-	3	-
2023	-	13	-	71	18	12	2	2	50	48	135	36	12	-
year	Average Cover (%)													
1992	0.0	0.7	-	2.2	-	-	-	0.4	2.0	3.1	7.5	-	0.0	-
1997	-	0.6	-	0.7	-	0.0	-	0.1	1.3	1.0	2.9	-	0.8	-
2003	-	0.2	-	0.3	-	-	0.0	0.6	3.0	0.9	4.4	-	0.2	0.0
2008	-	0.5	0.0	1.1	-	-	-	3.5	4.4	1.3	3.4	0.1	0.2	-
2013	0.0	0.6	-	1.9	0.0	0.0	2.2	0.9	2.0	0.5	4.5	-	0.1	-
2018	0.4	4.5	0.0	2.8	0.0	-	0.2	-	1.3	2.7	12.6	-	0.1	-
2023	-	0.6	-	1.9	0.4	0.2	0.2	0.1	3.3	0.9	5.3	1.6	0.2	-

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

**Table 27-02.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Ambrosia <sup>a</sup> (ragweed)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis (rockcross)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Brassicaceae <sup>a</sup> (mustard family)	Calochortus nuttallii (sego lily)	Castilleja (Indian paintbrush)	Castilleja angustifolia (northwestern Indian paintbrush)	Castilleja linarifolia (Wyoming Indian paintbrush)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cordylanthus <sup>a</sup> (bird's-beak)
year	Nested Frequency																
1992	-	-	3	5	6	6	-	-	3	-	-	-	-	-	-	-	-
1997	1	-	-	3	9	12	-	-	-	-	-	-	-	-	-	1	-
2003	37	0	-	-	-	-	-	-	-	2	0	-	9	2	9	-	-
2008	9	7	-	13	3	2	-	-	-	2	-	-	10	1	2	-	-
2013	1	1	-	4	-	4	1	3	-	-	-	-	1	5	-	-	72
2018	8	-	-	7	-	1	-	-	-	-	5	2	3	-	5	2	-
2023	55	1	-	-	-	-	-	-	-	19	28	15	-	-	32	6	40
year	Average Cover (%)																
1992	-	-	0.1	0.0	0.0	0.0	-	-	0.0	-	-	-	-	-	-	-	-
1997	0.0	-	-	0.0	0.3	0.0	-	-	-	-	-	-	-	-	-	0.0	-
2003	0.2	0.0	-	-	-	-	-	-	0.0	0.0	-	-	0.0	0.0	0.0	-	-
2008	0.0	0.1	-	0.1	0.0	0.0	-	-	-	0.0	-	-	0.0	0.0	0.0	-	-
2013	0.0	0.0	-	0.0	-	0.0	0.0	0.0	-	-	-	-	0.0	0.1	-	-	0.9
2018	0.0	-	-	0.0	-	0.0	-	-	-	-	0.1	0.0	0.1	-	0.1	0.0	-
2023	0.9	0.0	-	-	-	-	-	-	-	0.3	1.0	0.5	-	-	0.1	0.0	0.4

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

FORB SPECIES	Crepis acuminata (tapertip hawksbeard)	Cryptantha bakeri (Baker's cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Erigeron racemosus (redroot buckwheat)	Erigeron umbellatum (sulphur-flower buckwheat)	Euphorbia brachycera (horned spurge)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Heterotheca villosa (hairy false goldenaster)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lomatium (desertparsley)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Microsteris gracilis <sup>a</sup> (slender phlox)
year	Nested Frequency																
1992	-	12	-	-	-	27	1	14	12	3	-	3	-	-	21	-	-
1997	-	21	1	-	-	2	22	14	18	4	15	2	6	-	14	-	65
2003	4	-	-	38	2	12	11	8	15	-	1	5	60	-	12	2	2
2008	-	6	-	8	-	30	18	10	15	-	5	20	89	-	18	-	9
2013	3	11	-	5	-	35	6	18	8	2	-	21	22	-	18	-	-
2018	16	1	2	-	-	19	9	25	4	-	-	14	-	-	3	-	3
2023	3	1	3	35	-	38	2	18	0	-	224	-	8	1	9	-	5
year	Average Cover (%)																
1992	-	0.1	-	-	-	0.3	0.1	0.2	0.1	0.2	-	0.1	-	-	0.3	-	-
1997	-	0.1	0.0	-	-	0.0	0.2	0.2	0.2	0.1	0.0	0.0	0.0	-	0.3	-	0.2
2003	0.0	-	-	0.7	0.0	0.0	0.1	0.0	0.3	-	0.0	0.1	1.4	-	0.1	0.0	0.0
2008	-	0.0	-	0.0	-	0.2	0.1	0.1	0.2	-	0.0	0.6	0.9	-	0.1	-	0.0
2013	0.0	0.1	-	0.0	-	0.4	0.0	0.2	0.1	0.0	-	0.3	0.2	-	0.1	-	-
2018	0.1	0.0	0.0	-	-	0.2	0.1	0.3	0.1	-	-	0.7	-	-	0.0	-	0.0
2023	0.2	0.0	0.0	1.3	-	0.5	0.0	0.2	0.0	-	1.7	-	0.2	0.0	0.1	-	0.0

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

FORB SPECIES	Oenothera pallida <sup>a</sup> (pale evening primrose)	Orthocarpus luteus <sup>a</sup> (yellow owl's-clover)	Packera multilobata (lobeleaf groundsel)	Pedicularis centranchera (dwarf lousewort)	Penstemon (beardtongue)	Penstemon comarrhenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Silene antirrhina <sup>a</sup> (sleepy silene)	Sphaeralcea coccinea (scarlet globemallow)	Symphotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>a</sup> (yellow salsify)	Trifolium kingii (King's clover)
year	Nested Frequency													
1992	-	129	-	-	-	8	71	26	-	-	-	7	-	6
1997	3	115	-	-	8	12	74	27	3	-	8	8	5	9
2003	7	36	-	-	1	-	23	-	-	-	-	2	-	1
2008	11	106	-	10	14	15	30	39	-	2	-	3	2	10
2013	2	-	3	-	-	26	49	25	4	1	3	-	-	-
2018	-	-	1	5	-	4	13	-	-	2	-	-	-	8
2023	-	-	-	0	5	16	29	36	-	5	-	7	-	7
year	Average Cover (%)													
1992	-	2.7	-	-	-	0.0	0.3	0.1	-	-	-	0.4	-	0.0
1997	0.0	1.4	-	-	0.1	0.1	0.3	0.1	0.0	-	0.0	0.1	0.0	0.0
2003	0.1	0.2	-	-	0.0	-	0.1	-	-	-	-	0.0	-	0.0
2008	0.1	1.4	-	0.0	0.1	0.1	0.2	0.1	-	0.0	-	0.1	0.0	0.1
2013	0.0	-	0.0	-	-	0.2	0.2	0.0	0.0	0.0	0.1	-	-	-
2018	-	-	0.0	0.0	-	0.0	0.0	-	-	0.0	-	-	-	0.0
2023	-	-	-	0.0	0.8	0.3	0.6	0.3	-	0.2	-	0.1	-	0.1

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

**Table 27-02.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Juniperus scopulorum <sup>t</sup> (Rocky Mountain juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)							
1992	-	-	-	-	-	-	-	-
1997	-	-	-	-	-	-	-	-
2003	15.9	-	6.9	2	0.2	-	0.5	0.1
2008	23.3	-	10.8	2.2	0.5	-	0.5	0.2
2013	17.5	0.7	9.1	2.6	0.2	-	0.8	0.1
2018	19.8	0.1	8.1	3.2	0.4	-	0.7	0.3
2023	27.5	-	12.7	6.1	0.3	-	1.6	0
year	Quadrat Cover (%)							
1992	24.0	0.7	4.7	0.1	2.3	0.0	0.4	0.1
1997	21.2	-	1.9	0.8	0.6	0.0	0.0	0.2
2003	15.0	-	6.9	0.8	0.7	0.0	0.0	0.1
2008	17.5	0.4	4.9	1.0	0.4	0.0	0.4	0.2
2013	18.6	0.1	5.8	1.3	0.5	-	0.4	0.2
2018	17.3	0.0	6.8	1.5	1.1	0.0	0.5	0.5
2023	19.3	-	7.0	0.8	0.6	0.0	0.7	0.1

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

**Table 27-02.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	27/18
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1992	16200	1020	21	56	23	22	2	4	- / -
1997	9680	1140	11	75	14	5	0	4	40/74
2003	8120	-	6	74	20	9	0	4	37/56
2008	7960	1200	13	72	15	7	2	6	37/60
2013	7180	920	21	73	5	4	0	6	29/59
2018	8740	-	13	83	5	2	0	10	32/56
2023	7180	6480	2	96	2	19	1	2	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Cercocarpus ledifolius var. ledifolius<sup>P</sup> -- (curl-leaf mountain mahogany)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	248/249
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1992	1920	-	52	48	0	5	1	0	- / -
1997	1900	-	2	98	0	0	0	0	15/23
2003	-	-	-	-	-	-	-	-	-/-
2008	600	-	0	100	0	47	3	0	9/19
2013	380	-	37	63	0	0	0	0	13/30
2018	40	-	0	100	0	0	0	0	12/17
2023	100	-	60	40	0	0	0	0	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1992	4080	20	39	58	3	4	1	1	- / -
1997	900	-	2	87	11	0	0	2	36/46
2003	4300	-	1	96	4	0	0	1	31/45
2008	3000	40	8	62	30	2	0	10	38/70
2013	3160	-	7	91	3	0	0	2	40/60
2018	4080	60	10	73	17	0	1	3	23/37
2023	4100	-	8	91	1	0	1	1	- / -
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
1992	20	-	100	0	0	100	0	0	- / -
1997	40	-	50	50	0	0	0	0	- / -
2003	20	-	0	100	0	0	0	100	- / -
2008	20	-	0	100	0	0	0	0	- / -
2013	20	-	0	100	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	- / -
2023	40	-	0	100	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1992	5040	-	8	90	2	0	0	2	- / -
1997	2780	60	8	91	1	0	0	1	15/16
2003	1720	-	2	92	6	0	0	6	13/19
2008	1200	-	5	87	8	0	0	0	14/20
2013	1320	20	24	76	0	0	0	0	18/29
2018	1260	-	0	97	3	0	0	11	16/19
2023	640	-	6	88	6	0	0	6	- / -
<b>Opuntia fragilis -- (brittle pricklypear)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	4/16
2023	-	-	-	-	-	-	-	-	-/-

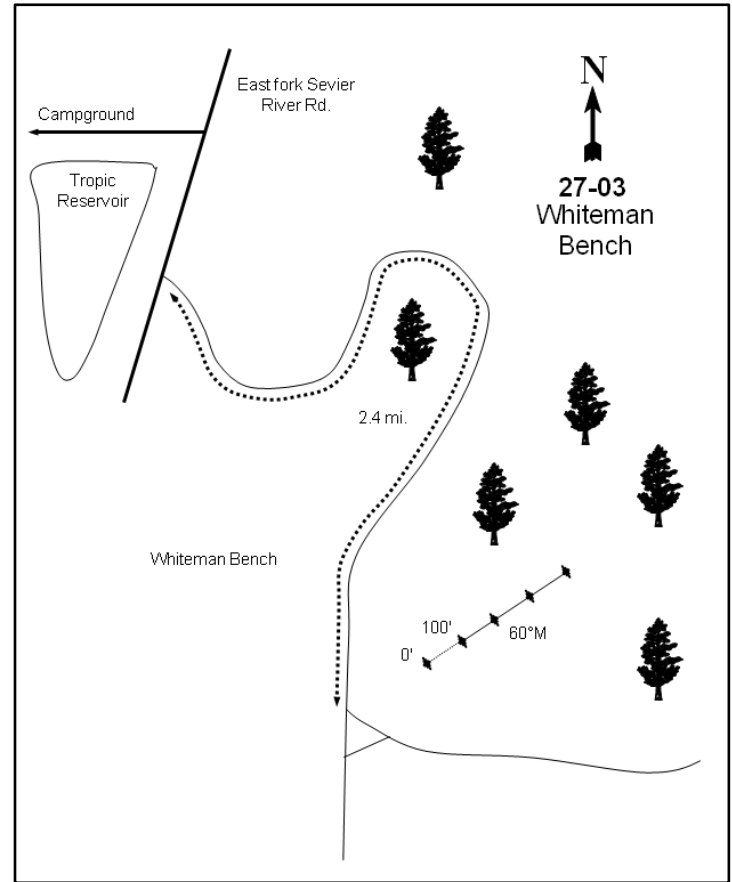
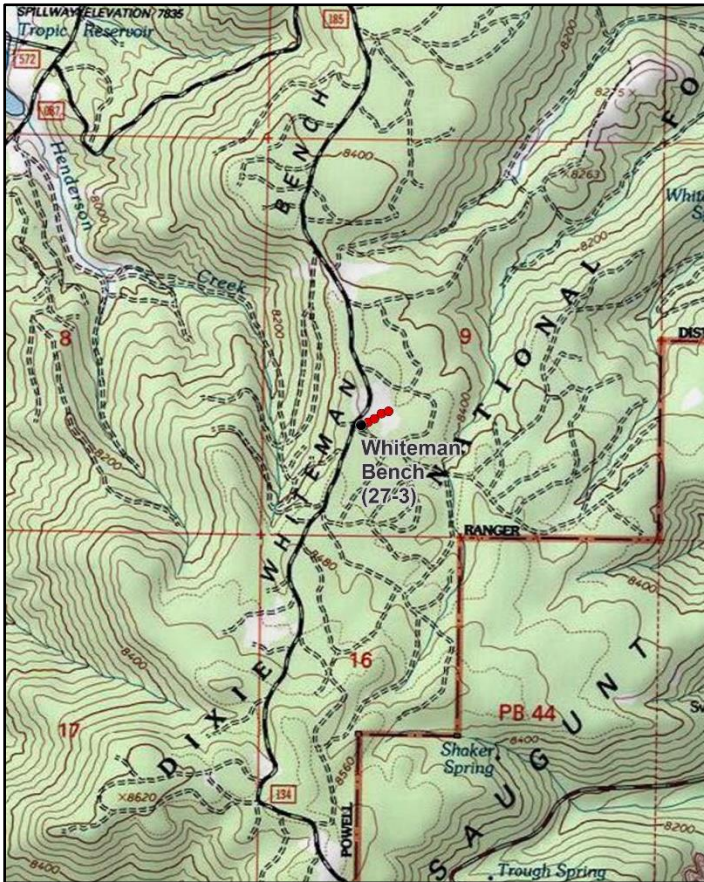
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1992	120	-	83	0	17	0	0	0	- / -
1997	20	-	100	0	0	0	0	0	- / -
2003	20	-	0	100	0	0	0	0	- / -
2008	20	-	0	100	0	0	0	0	- / -
2013	20	-	100	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	40	-	50	50	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1992	100	-	80	20	0	0	60	0	- / -
1997	40	-	0	100	0	50	50	0	58/101
2003	20	-	0	0	100	0	100	0	48/146
2008	40	-	0	100	0	0	0	0	55/123
2013	160	-	38	63	0	25	38	0	57/121
2018	120	-	0	100	0	33	33	0	32/69
2023	200	-	0	70	30	50	0	30	- / -
<b>Ribes cereum<sup>p</sup> -- (wax currant)</b>									
1992	-	-	-	-	-	-	-	-	- / -
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	55/69
2023	-	-	-	-	-	-	-	-	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1992	420	-	48	48	5	14	5	0	- / -
1997	400	60	40	60	0	0	0	0	23/27
2003	300	-	7	87	7	0	0	7	22/28
2008	280	-	14	86	0	0	0	0	30/50
2013	320	-	25	75	0	31	0	6	30/49
2018	240	-	8	92	0	17	0	0	27/40
2023	20	-	0	100	0	0	0	0	- / -

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

**Table 27-02.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	5	-	-	20	20	60	27.0
2023	7	-	17	17	17	50	21.2
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	3	-	100	-	-	-	2.0
2023	1	-	100	-	-	-	3.0

## WHITEMAN BENCH - STUDY NO. 27-3

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Bryce Point NW; Township 37S, Range 4W, Section 09  
NAD 83 UTM ZONE 12, 391136 East 4162028 North

**Transect Information**

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

7153  
52° magnetic  
400ft  
Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
Belt 5: 11ft

**Directions to Site**

East of the Tropic Reservoir Dam on the East Fork Sevier River Road, follow the Whiteman Bench Road east for 2.40 miles to a fork in the road: stop here. Walk east for 18 paces to the first stake, which is a red-painted fencepost 18" high marked with browse tag #7153. The frequency baseline runs northeast from here.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	East Fork/Crawford
Elevation	8,420ft (2,566m)
Aspect	North
Slope	2-3%
Sample Dates	08/12/1992, 08/07/1997, 07/17/2003, 07/17/2008, 07/18/2013, 06/18/2018, 06/14/2023

**Table 27-03.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Logging/Clear-Cut	-	-	Historic	-

**Wildlife Habitat and Vegetation History****Table 27-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 27-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Ponderosa Pine	NA
1992	Ponderosa Pine	NA
1997	Ponderosa Pine	NA
2003	Ponderosa Pine	NA
2008	Ponderosa Pine	NA
2013	Ponderosa Pine	NA
2018	Ponderosa Pine	NA
2023	Ponderosa Pine	NA

**Site Notes**

No Notes

**Soils****Table 27-03.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	6.9	36.4	32.1	31.6	3.6	7.6	163.2	0.6	08/05/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation 19 inches  
 NRCS Ecological Site Mountain Shallow Loam (Ponderosa Pine)  
 NRCS Ecological Site # R047XB450UT  
 States and Transitions No state and transition model is available for this ecological site.

Since establishment in 1987, this study site has remained in a stable state with a plant community mainly dominated by ponderosa pine (*Pinus ponderosa*) (Table 27-03.14). The shrub layer has been abundant in all sample years, with antelope bitterbrush (*Purshia tridentata*) and longflower rabbitbrush (*Chrysothamnus depressus*) contributing the most cover since 2003 (Photos, Pre-1992 Data, Table 27-03.12, Table 27-03.13). The herbaceous understory has also remained abundant and diverse. Native perennial grasses -- mainly muttongrass (*Poa fendleriana*) and needle and thread (*Hesperostipa comata*) -- and forbs, namely rock goldenrod (*Petradoria pumila*), have contributed the most herbaceous cover since 1992. Finally, annual grasses have not been observed in cover or frequency data in any sample year (Table 27-03.7, Table 23-07.10, Table 23-07.11).

This site may serve as adequate summer range for deer due to the abundance and diversity of the shrub and herbaceous understories. According to pellet group transect data, deer presence was moderate in 2003 and 2008, but has remained low since 2013. Elk presence has also remained low in most sample years since 2003 (Table 27-03.9), but the herbaceous understory could provide forage during the summer months (Table 27-03.3; Beck & Peek, 2005).



**Trend Summary Tables**

**Table 27-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1992	16.4	0.7	11.1	-	-	-
1997	12.1	0.1	2.2	-	-	-
2003	12.7	0.9	6.7	13.1	0.5	17.0
2008	10.9	1.3	0.8	18.1	1.2	23.0
2013	10.3	1.6	0.6	15.8	0.7	17.9
2018	13.4	1.0	0.6	15.5	0.6	27.0
2023	8.5	3.1	0.6	11.9	4.9	25.6

**Table 27-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1992	-	280	54	253	-	6.7	0.2	7.8
1997	-	242	35	186	-	3.4	0.1	4.7
2003	-	199	42	200	-	2.4	0.6	7.8
2008	-	244	23	224	-	5.8	0.2	8.5
2013	-	310	32	204	-	7.8	0.1	8.6
2018	-	298	2	220	-	8.7	0.0	9.5
2023	-	305	39	233	-	9.2	0.2	8.0

**Table 27-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1992	20.8	1.0	49.0	0.0	12.5	42.0
1997	17.1	1.8	47.7	4.8	8.3	29.6
2003	21.8	0.0	50.9	0.6	10.0	28.2
2008	15.0	0.1	58.9	2.9	7.8	28.2
2013	20.4	0.2	55.4	2.3	7.0	28.9
2018	18.9	0.8	57.6	3.4	7.5	34.2
2023	20.1	0.2	56.8	3.5	7.2	26.8

**Table 27-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1992	-	6	3	6
1997	-	7	8	-
2003	-	7	9	3
2008	2	19	6	14
2013	-	2	2	-
2018	-	7	4	1
2023	-	7	4	-
Year	Days Use Per Acre (ha)			
1992	-	-	-	-
1997	-	-	-	-
2003	-	24.1 (59.6)	12.1 (29.8)	-
2008	0.7 (1.8)	26.2 (64.6)	29.5 (72.8)	-
2013	2.2 (5.4)	13.4 (33.1)	0.7 (1.7)	-
2018	0.7 (1.8)	6.7 (16.6)	4.7 (11.6)	-
2023	-	2.7 (6.6)	1.3 (3.3)	-

**Table 27-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum (needlegrass)	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency										
1992	4	3	94	49	31	41	61	36	-	164	-
1997	-	-	56	36	9	78	57	30	-	81	3
2003	-	-	53	32	23	21	53	14	-	73	-
2008	-	4	50	40	3	82	53	20	-	84	4
2013	-	8	28	51	22	91	60	45	-	137	-
2018	7	18	42	15	30	68	19	11	-	187	19
2023	-	35	-	42	19	3	40	23	126	153	-
year	Average Cover (%)										
1992	0.0	0.0	0.9	0.6	0.1	0.3	1.0	0.4	-	3.2	-
1997	-	-	0.5	0.7	0.1	0.3	0.6	0.2	-	0.9	0.0
2003	-	-	0.4	0.4	0.1	0.2	0.5	0.1	-	0.7	-
2008	-	0.0	1.1	0.7	0.0	1.1	1.5	0.2	-	1.2	0.0
2013	-	0.1	0.7	0.8	0.3	0.5	1.6	0.8	-	2.9	-
2018	0.2	0.3	0.4	0.3	0.2	0.8	0.8	0.5	-	5.0	0.2
2023	-	0.9	-	0.8	0.2	0.0	1.7	0.5	2.1	2.9	-

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

**Table 27-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria microphylla (littleleaf pussytoes)	Arabis demissa (nodding rockcress)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Arabis pulchra (beautiful rockcress)	Arenaria fendleri (Fendler's sandwort)	Artemisia ludoviciana (white sagebrush)	Astragalus humistratus (groundcover milkvetch)	Calochortus nuttallii (sego lily)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium wheeleri (Wheeler's thistle)	Cordylanthus <sup>a</sup> (bird's-beak)	Crepis intermedia (limestone hawkbeard)	Cryptantha humilis (roundspike cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron flagellaris (trailing fleabane)
year	Nested Frequency																
1992	2	2	8	16	-	13	93	4	6	1	-	1	-	4	1	-	20
1997	-	-	4	12	-	-	68	-	0	-	-	1	-	4	-	-	1
2003	7	18	5	8	-	-	44	4	-	7	-	1	-	3	3	3	3
2008	-	3	7	-	-	-	51	-	-	2	0	-	-	3	7	-	12
2013	1	9	4	15	-	-	50	-	4	1	-	-	15	-	8	4	2
2018	5	-	10	5	-	-	55	-	-	-	-	-	-	1	-	-	2
2023	24	-	-	8	23	-	32	-	-	60	-	-	-	9	8	-	12
year	Average Cover (%)																
1992	0.0	0.0	0.0	0.0	-	0.0	1.5	0.0	0.1	0.0	-	0.0	-	0.0	0.0	-	0.3
1997	-	-	0.0	0.0	-	-	0.5	-	0.0	-	-	0.0	-	0.0	-	-	0.0
2003	0.1	0.0	0.0	0.0	-	-	0.5	0.1	-	0.0	-	0.0	-	0.0	0.0	0.0	0.0
2008	-	0.0	0.1	-	-	-	0.5	-	-	0.0	0.0	-	-	0.0	0.0	-	0.1
2013	0.0	0.0	0.2	0.1	-	-	0.8	-	0.0	0.0	-	-	0.0	-	0.1	0.0	0.0
2018	0.0	-	0.2	0.0	-	-	0.8	-	-	-	-	-	-	0.0	-	-	0.0
2023	0.2	-	-	0.2	0.1	-	0.7	-	-	0.3	-	-	-	0.1	0.1	-	0.2

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

FORB SPECIES	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Erysimum (wallflower)	Hymenoxys richardsonii (pingue rubberweed)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Leucocrocin montanum (common starfily)	Lewisia pygmaea (alpine lewisia)	Linum kingii (King's flax)	Oenothera (evening primrose)	Orthocarpus luteus <sup>a</sup> (yellow owl's-clover)	Packera multilobata (lobeleaf groundsel)	Pedicularis centranthera (dwarf lousewort)	Penstemon (beardtongue)	Penstemon caespitosus (mat penstemon)	Penstemon procerus (littletower penstemon)
year	Nested Frequency																
1992	-	38	3	-	0	4	-	-	-	-	-	21	-	-	6	7	-
1997	3	30	-	-	-	5	-	-	-	-	-	4	-	-	3	3	-
2003	-	17	-	-	-	-	18	-	-	-	-	2	1	9	3	0	-
2008	4	18	-	-	-	-	3	-	-	1	-	16	-	8	3	7	-
2013	6	28	-	-	-	-	1	-	-	-	0	-	-	1	-	7	3
2018	16	31	-	1	-	-	-	-	-	1	-	2	-	13	-	6	3
2023	-	21	-	-	-	-	2	3	2	-	-	-	-	10	-	3	3
year	Average Cover (%)																
1992	-	0.3	0.0	-	0.0	0.0	-	-	-	-	-	0.1	-	-	0.1	0.1	-
1997	0.0	0.1	-	-	-	0.0	-	-	-	-	-	0.0	-	-	0.0	0.0	-
2003	-	0.1	-	-	-	-	0.5	-	-	-	-	0.0	0.0	0.1	0.0	0.0	-
2008	0.0	1.0	-	-	-	-	0.0	-	-	0.0	-	0.2	-	0.2	0.0	0.0	-
2013	0.0	0.2	-	-	-	-	0.0	-	-	-	0.0	-	-	0.0	-	0.0	0.0
2018	0.1	0.1	-	0.0	-	-	-	-	-	0.0	-	0.0	-	0.2	-	0.1	0.1
2023	-	0.2	-	-	-	-	0.0	0.0	0.0	-	-	-	-	0.5	-	0.0	0.0

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

FORB SPECIES	Petroradia pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla crinita (bearded cinquefoil)	Silene drummondii (Drummond's campion)	Symphyotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>a</sup> (yellow salsify)	unknown perennial forb (unknown forb)
year	Nested Frequency								
1992	125	15	34	16	1	76	-	-	-
1997	106	-	31	-	-	32	1	-	-
2003	145	-	9	1	-	14	-	-	1
2008	162	3	2	-	-	19	-	2	-
2013	144	-	5	4	-	19	-	-	-
2018	157	-	-	5	-	13	-	-	-
2023	129	-	14	5	-	6	-	-	-
year	Average Cover (%)								
1992	4.5	0.0	0.1	0.2	0.0	0.5	-	-	-
1997	3.9	-	0.1	-	-	0.1	0.0	-	-
2003	6.6	-	0.0	0.0	-	0.1	-	-	0.0
2008	6.4	0.0	0.0	-	-	0.1	-	0.0	-
2013	6.9	-	0.0	0.0	-	0.1	-	-	-
2018	7.8	-	-	0.0	-	0.1	-	-	-
2023	5.4	-	0.1	0.0	-	0.1	-	-	-

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

**Table 27-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Ceanothus fendleri (Fendler's ceanothus)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Ericameria parryi var. attenuata (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Mahonia repens (creeping barberry)	Pinus ponderosa <sup>i</sup> (ponderosa pine)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Ribes cereum var. pedicellare <sup>p</sup> (whisky currant)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)										
1992	-	-	-	-	-	-	-	-	-	-	-
1997	-	-	-	-	-	-	-	-	-	-	-
2003	2	-	7	0.4	0	-	17	3.2	0.7	0.2	0.1
2008	1.2	-	9.5	0.7	0.4	-	23	6.3	0.6	0.5	0.1
2013	1.3	-	8.4	0.3	0.2	-	17.9	5.3	0.4	0.4	0.2
2018	2.2	-	9	0.6	-	-	27	3.7	0.3	0.3	-
2023	0.8	-	6.9	2.3	-	-	25.6	3.5	-	0.7	2.6
year	Quadrat Cover (%)										
1992	2.0	-	8.3	0.4	0.0	0.0	11.1	5.2	-	0.9	0.2
1997	1.1	-	7.2	0.0	-	0.0	2.2	2.9	-	0.8	0.1
2003	1.5	-	7.6	0.6	0.0	-	6.7	2.9	0.1	0.6	0.2
2008	0.8	-	5.7	0.6	0.4	-	0.8	4.0	0.1	0.4	0.2
2013	0.9	0.1	5.0	1.3	0.0	-	0.6	3.6	0.1	0.6	0.1
2018	1.0	-	8.8	0.7	0.1	0.1	0.6	3.4	0.0	0.2	0.1
2023	0.4	-	6.0	1.1	0.1	0.0	0.6	1.8	-	0.4	2.0

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

**Table 27-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1992	2020	1060	26	36	39	44	3	19	- / -
1997	1380	-	10	71	19	0	0	13	30/55
2003	1340	-	8	76	16	2	0	9	34/41
2008	1760	120	25	32	43	0	0	16	31/47
2013	800	200	0	95	5	18	3	10	24/40
2018	1480	60	11	82	7	0	0	3	28/36
2023	820	-	5	71	24	0	0	24	- / -
<b>Ceanothus fendleri -- (Fendler's ceanothus)</b>									
1992	-	-	-	-	-	-	-	-	- / -
1997	-	-	-	-	-	-	-	-	25/123
2003	20	-	0	100	0	0	0	0	19/61
2008	-	-	-	-	-	-	-	-	16/19
2013	200	-	30	70	0	10	0	0	27/41
2018	60	-	0	100	0	100	0	0	15/22
2023	40	-	50	50	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1992	21840	780	15	78	7	15	2	4	- / -
1997	13380	40	6	92	2	0	0	1	13/29
2003	14980	-	3	91	6	10	10	2	12/23
2008	11160	140	3	82	16	43	8	3	11/25
2013	7120	-	3	97	0	17	0	0	12/27
2018	12160	-	4	95	0	9	11	0	10/22
2023	11720	80	24	76	0	16	16	0	- / -
<b>Ericameria parryi var. attenuata -- (Parry's rabbitbrush)</b>									
1992	1460	40	34	30	36	29	15	8	- / -
1997	80	-	25	50	25	0	0	0	19/25
2003	1220	-	3	92	5	8	10	5	18/29
2008	1160	-	0	98	2	5	0	0	17/32
2013	3140	-	12	87	1	10	0	1	14/28
2018	1240	-	5	95	0	21	19	0	16/19
2023	2320	380	0	99	1	0	2	1	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1992	380	40	5	95	0	5	0	5	- / -
1997	60	-	67	33	0	0	0	0	- / -
2003	400	-	80	20	0	0	0	0	12/14
2008	1240	80	2	68	31	0	0	2	14/21
2013	700	180	23	77	0	0	0	0	16/26
2018	360	60	28	67	6	0	0	6	13/19
2023	-	-	-	-	-	-	-	-	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
1992	280	140	93	7	0	0	0	0	- / -
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	10/14
2008	40	-	0	100	0	0	0	0	9/15
2013	-	40	0	0	0	0	0	0	11/16
2018	100	-	0	100	0	0	0	0	5/16
2023	60	-	0	100	0	0	0	0	- / -
<b>Pinus ponderosa<sup>1</sup> -- (ponderosa pine)</b>									
1992	120	20	33	67	0	0	0	0	- / -
1997	80	-	25	75	0	0	0	0	- / -
2003	80	-	25	75	0	0	0	0	- / -
2008	100	-	0	100	0	0	0	0	- / -
2013	100	-	0	100	0	0	0	0	- / -
2018	80	-	0	100	0	0	0	0	- / -
2023	100	20	0	100	0	0	0	40	- / -
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1992	1820	140	45	45	10	39	19	4	- / -
1997	620	40	13	71	16	52	7	0	36/107
2003	720	-	3	58	39	36	61	0	43/98
2008	820	20	5	78	17	24	2	0	38/97
2013	720	20	3	89	8	58	11	28	43/100
2018	880	120	11	68	21	21	46	11	37/84
2023	540	-	4	93	4	22	63	4	- / -

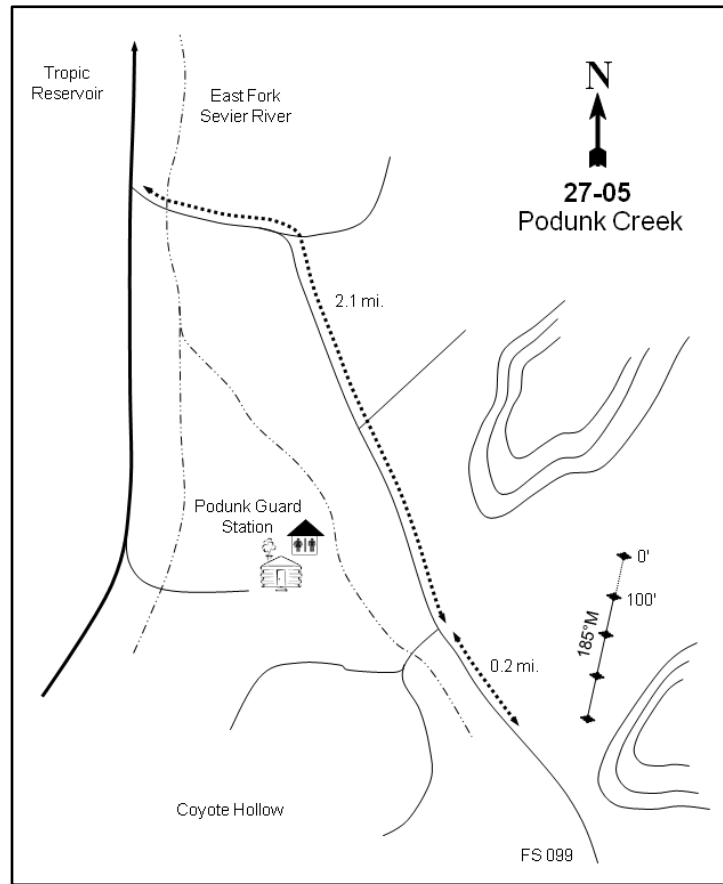
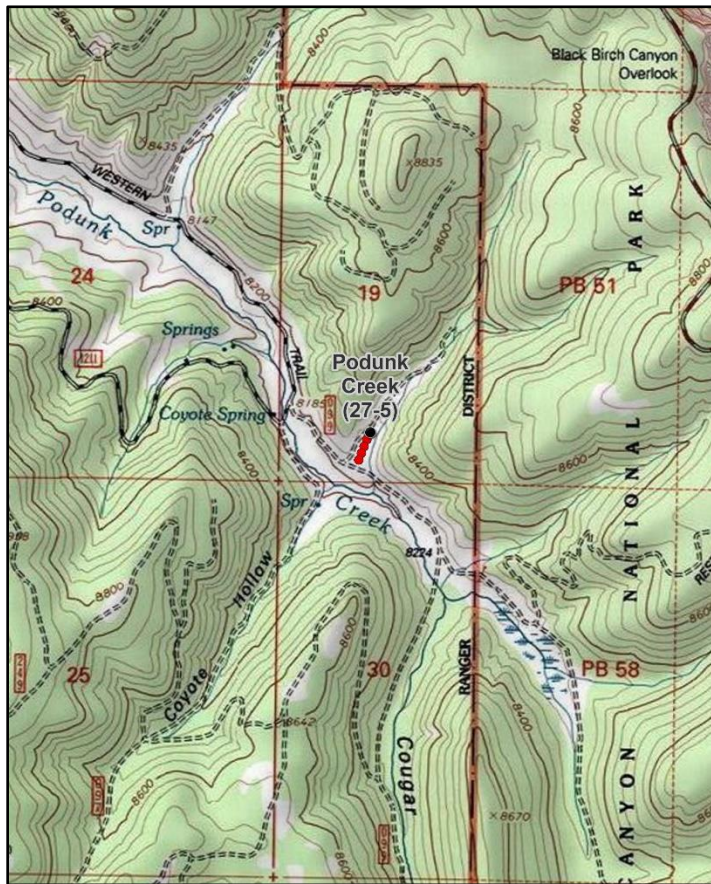
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ribes cereum var. pedicellare<sup>p</sup> -- (whisky currant)</b>									
1992	160	20	63	25	13	75	0	0	- / -
1997	20	-	0	100	0	0	0	0	100/144
2003	20	-	0	100	0	100	0	0	102/127
2008	20	-	0	0	100	0	0	0	80/117
2013	60	-	0	100	0	0	0	0	61/81
2018	20	-	0	100	0	0	0	0	63/72
2023	40	-	0	100	0	50	50	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1992	300	20	53	40	7	13	40	0	- / -
1997	240	-	25	75	0	8	0	0	40/98
2003	300	-	20	80	0	33	27	0	32/60
2008	320	-	6	88	6	63	0	0	25/65
2013	220	-	18	82	0	46	18	0	28/69
2018	340	-	29	71	0	24	6	0	23/58
2023	440	-	41	59	0	18	36	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1992	540	20	44	33	22	22	4	0	- / -
1997	200	-	30	70	0	0	0	0	19/21
2003	420	-	19	81	0	0	0	0	23/27
2008	340	20	18	77	6	6	0	6	19/24
2013	260	-	31	69	0	8	0	0	26/31
2018	340	-	24	71	6	12	0	6	19/21
2023	1820	-	7	93	0	1	0	1	- / -

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

**Table 27-03.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Pinus ponderosa (ponderosa pine)</b>							
1992	70	6	-	6	-	88	-
2003	46	-	-	6	-	94	24.6
2008	57	-	-	6	-	94	28.2
2013	51	-	-	-	6	94	23.1
2018	58	-	6	-	6	89	25.3
2023	65	-	6	-	6	89	29.9

## PODUNK CREEK - STUDY NO. 27-5



### Location Information

USGS 7.5 min Map Info Podunk Creek NE; Township 38S, Range 4W, Section 19  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 387735 East 4148957 North

### Transect Information

Browse Tag # (0' Stake) Not Available  
 Transect Bearing 185° magnetic  
 Length 400ft  
 Belt Placement Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
 Belt Marker Placement Standard

### Directions to Site

Travel about 7.0 miles south of Tropic Reservoir on the East Fork of the Sevier River Road to a major fork; turn left towards Podunk Creek and the boundary with Bryce Canyon National Park. Travel southeast for 2.1 miles on the main road up Podunk Creek to a fork at Coyote Hollow. Stay left on USFS Road #099 and continue for about 0.2 miles to a point in the middle of the valley to the north: the transect is in the bottom of this seeded meadow valley. The end of the baseline can be found 125 feet north of the road. The study is marked by short fenceposts, and the 0-foot baseline stake is 375 feet north of the end stake as the study runs from there back to the southwest.

### Site Information

Land Ownership Federal  
 Land Administrator USFS  
 Allotment East Fork/Crawford  
 Elevation 8,220ft (2,505m)  
 Aspect South-Southwest  
 Slope 5%  
 Sample Dates 08/11/1992, 08/05/1997, 07/28/2003, 07/16/2008, 07/31/2013, 07/11/2018, 07/05/2023

**Table 27-05.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Terrace - Contour Trench	-	-	1960s	-
Seeding - Seed Unknown	-	-	1960s	-

**Wildlife Habitat and Vegetation History**

**Table 27-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 27-05.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Perennial Grass	No Encroachment
1992	Perennial Grass	No Encroachment
1997	Perennial Grass	No Encroachment
2003	Perennial Grass	No Encroachment
2008	Perennial Grass	No Encroachment
2013	Perennial Grass	No Encroachment
2018	Perennial Grass	No Encroachment
2023	Perennial Grass	No Encroachment

**Site Notes**

Due to serious erosion and gully formation caused by overgrazing in the early part of the areas grazing history, watershed rehabilitation treatments were undertaken in the 1960s all along the East Fork of the Sevier River drainage. The treatment here successfully established a dense stand of perennial grasses, stopped overland flows and erosion, and helped heal the adjacent gully. Erosion is now almost non-existent due to the contoured trenching treatment and the dense grass and litter cover.

**Soils**

**Table 27-05.5 - 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	7.2	31.7	37.7	30.6	4.1	24.5	332.8	0.7	07/30/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation                      24 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.

This study site has remained dominated by seeded perennial grass species, mainly smooth brome (*Bromus inermis*), since establishment in 1987 (Photos, Pre-1992 Data, Table 27-05.7, Table 27-05.10). Other herbaceous species are moderately abundant, with woolly cinquefoil (*Potentilla hippiana*) contributing the most cover of any forb species since 2018 (Table 27-05.11). Shrubs have been rare throughout the study years, although density of yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *lanceolatus*) has exhibited an overall increase (Table 27-05.13). Although not observed on the study site itself, conifers surround the perimeter of the valley, indicating that there may be potential for encroachment in future sample years (Photos).

The abundant grass and forb communities on this site may provide forage for elk (Beck & Peek, 2005) and deer during the summer months (Table 27-05.3). However, pellet transect data indicates that presence for both deer and elk has remained low since 2003 (Table 27-05.9).



**Trend Summary Tables**

**Table 27-05.6 - 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
1992	-	2.7	-	-	-	-
1997	-	4.8	-	-	-	-
2003	-	0.8	-	-	1.5	-
2008	-	2.7	-	-	3.7	-
2013	-	3.3	-	-	2.9	-
2018	-	3.5	-	-	2.5	-
2023	-	4.7	-	-	4.9	-

**Table 27-05.7 - 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
1992	-	479	48	350	-	43.8	0.2	15.0
1997	-	465	5	252	-	25.4	0.0	5.6
2003	-	438	45	288	-	22.8	0.1	7.6
2008	-	451	41	266	-	34.4	0.1	9.4
2013	-	461	13	314	-	29.6	0.0	12.3
2018	-	472	4	312	-	54.4	0.0	7.6
2023	-	446	42	197	-	54.3	0.3	6.8

**Table 27-05.8 - 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
1992	26.9	0.0	27.8	0.0	5.7	53.1
1997	21.9	-	39.0	5.0	1.0	38.7
2003	33.5	-	33.7	5.9	3.8	32.3
2008	17.4	-	40.6	3.9	1.1	48.5
2013	36.0	-	33.6	1.4	1.0	46.6
2018	16.6	0.0	44.3	5.6	0.9	60.6
2023	24.3	-	24.1	1.6	1.1	64.7

**Table 27-05.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1992	6	3	-	-
1997	23	4	3	-
2003	32	-	-	-
2008	36	2	2	4
2013	29	1	1	-
2018	5	1	1	-
2023	11	-	1	-
Year	Days Use Per Acre (ha)			
1992	-	-	-	-
1997	-	-	-	-
2003	71.9 (177.5)	-	4.0 (9.9)	-
2008	36.3 (89.7)	2.7 (6.6)	10.7 (26.5)	-
2013	39.9 (98.6)	0.7 (1.7)	-	-
2018	40.6 (100.4)	-	2.7 (6.6)	-
2023	42.8 (105.8)	4.7 (11.6)	1.3 (3.3)	-

**Table 27-05.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Koeleria macrantha (prairie Junegrass)	Muhlenbergia montana (mountain muhly)	Poa fendleriana (nuttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency									
1992	203	3	-	439	17	80	2	282	-	-
1997	192	3	-	448	-	92	-	47	-	-
2003	89	-	-	428	-	7	6	17	1	-
2008	114	-	-	442	-	71	18	43	13	4
2013	166	-	80	452	17	-	2	64	5	2
2018	115	-	99	467	9	-	5	110	-	-
2023	37	4	61	442	11	-	2	5	-	-
year	Average Cover (%)									
1992	4.1	0.0	-	30.8	0.3	1.5	0.1	6.9	-	-
1997	1.7	0.0	-	21.9	-	1.6	-	0.2	-	-
2003	1.1	-	-	21.6	-	0.1	0.0	0.1	0.0	-
2008	2.3	-	-	30.0	-	1.7	0.1	0.3	0.0	0.1
2013	2.1	-	1.8	24.6	0.2	-	0.0	0.8	0.0	0.0
2018	2.0	-	3.4	46.6	0.1	-	0.0	2.3	-	-
2023	1.1	0.1	1.1	51.9	0.0	-	0.0	0.0	-	-

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

**Table 27-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Artemisia dracunculus (tarragon)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus humistratus (groundcover milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Equisetum laevigatum (smooth horsetail)	Erigeron (fleabane)	Erigeron flagellaris (trailing fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Hymenoxys richardsonii (pingue rubberweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Potentilla hippiana (woolly cinquefoil)
year	Nested Frequency																
1992	26	10	-	0	192	-	-	-	-	-	216	-	19	6	15	92	-
1997	-	7	8	-	1	-	-	3	-	19	59	-	31	-	5	59	-
2003	35	4	-	-	-	6	-	-	-	-	253	-	10	-	-	17	49
2008	13	15	1	-	-	-	2	-	-	-	152	3	16	2	29	26	30
2013	4	10	2	-	-	4	-	-	3	-	188	-	21	3	5	14	65
2018	4	10	1	-	-	3	-	-	1	-	233	-	14	3	-	21	90
2023	41	6	-	-	-	-	6	-	-	-	74	-	15	-	3	26	80
year	Average Cover (%)																
1992	0.1	0.6	-	0.0	3.0	-	-	-	-	-	4.5	-	0.8	0.1	0.0	6.0	-
1997	-	0.3	0.4	-	0.0	-	-	0.0	-	0.1	0.7	-	0.6	-	0.0	2.2	-
2003	0.1	0.2	-	-	-	0.1	-	-	-	-	5.2	-	0.2	-	-	0.5	1.2
2008	0.0	1.4	0.0	-	-	-	0.0	-	-	-	2.8	0.0	0.2	0.0	0.1	1.3	1.4
2013	0.0	0.8	0.1	-	-	0.0	-	-	0.0	-	4.0	-	0.3	0.0	0.0	0.7	2.9
2018	0.0	1.0	0.0	-	-	0.0	-	-	0.0	-	1.8	-	0.2	0.0	-	0.6	3.4
2023	0.3	0.3	-	-	-	-	0.0	-	-	-	0.3	-	0.3	-	0.0	1.1	4.1

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

FORB SPECIES	Senecio flaccidus var. flaccidus (threadleaf ragwort)	Senecio spartioides (broom-like ragwort)	Symphyotrichum spathulatum var. spathulatum (western mountain aster)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Vicia americana (American vetch)
year	Nested Frequency				
1992	-	5	-	7	2
1997	-	-	143	-	-
2003	-	-	41	10	-
2008	14	-	119	1	-
2013	-	-	131	4	-
2018	-	3	81	-	-
2023	-	-	63	-	-
year	Average Cover (%)				
1992	-	0.0	-	0.1	0.0
1997	-	-	1.4	-	-
2003	-	-	0.2	0.0	-
2008	0.1	-	2.1	0.0	-
2013	-	-	3.4	0.0	-
2018	-	0.0	0.5	-	-
2023	-	-	0.7	-	-

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

**Table 27-05.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Chrysothamnus viscidiflorus ssp. lanceolatus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)
year	Line Intercept Cover (%)			
1992	-	-	-	-
1997	-	-	-	-
2003	1.2	0.3	-	-
2008	2.8	-	0.9	-
2013	2.4	-	0.5	-
2018	1.8	0.2	0.5	-
2023	4.5	0.1	0.3	-
year	Quadrat Cover (%)			
1992	1.7	0.2	0.8	-
1997	3.2	0.3	1.2	0.1
2003	0.8	0.0	-	-
2008	2.4	-	0.3	-
2013	2.7	-	0.6	-
2018	2.5	0.3	0.7	-
2023	4.4	0.1	0.2	-

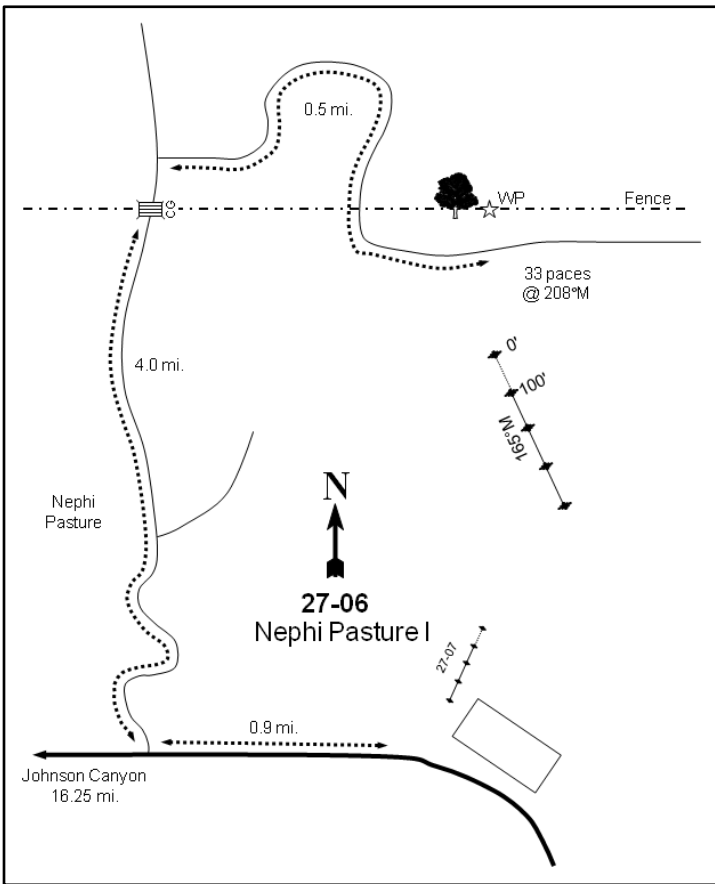
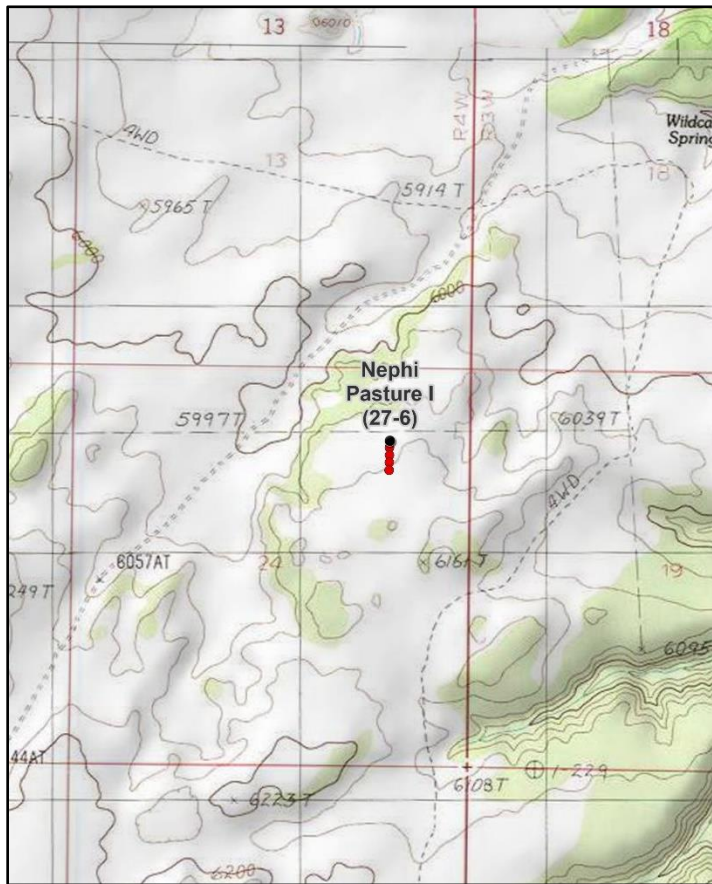
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 27-05.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. lanceolatus -- (yellow rabbitbrush)</b>									
1992	2860	-	15	76	8	0	0	3	- / -
1997	4060	-	1	100	0	0	0	1	17/34
2003	1180	-	0	76	24	0	0	9	21/35
2008	2840	180	4	97	0	9	1	0	19/37
2013	3340	20	26	74	0	0	1	1	17/35
2018	4860	-	33	68	0	0	0	0	11/23
2023	5460	800	1	98	1	0	0	1	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1992	340	-	12	53	35	18	0	0	- / -
1997	80	-	50	50	0	0	0	0	26/32
2003	100	-	0	100	0	0	40	0	44/56
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	200	-	20	70	10	0	0	0	26/32
2023	200	-	0	100	0	0	0	0	- / -
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
1992	-	-	-	-	-	-	-	-	- / -
1997	-	-	-	-	-	-	-	-	42/46
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1992	120	-	33	33	33	33	0	17	- / -
1997	480	-	58	42	0	0	0	0	40/50
2003	200	-	0	80	20	40	0	20	32/41
2008	260	-	8	62	31	0	0	0	44/55
2013	240	-	25	58	17	33	8	0	49/60
2018	280	-	0	86	14	21	0	7	44/56
2023	60	-	0	67	33	0	0	33	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1992	20	-	0	100	0	0	0	0	- / -
1997	20	-	0	100	0	0	0	0	39/50
2003	60	-	0	33	67	0	0	0	11/10
2008	-	-	-	-	-	-	-	-	- / -
2013	40	-	0	100	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	16/23

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

## NEPHI PASTURE I - STUDY NO. 27-6



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Nephi Point NE; Township 41S, Range 4W, Section 24  
NAD 83 UTM ZONE 12, 395313 East 4121659 North

### Transect Information

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

Not Available  
165° magnetic  
400ft  
Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
Standard

### Directions to Site

From Kanab, travel east on US-89 for 9.4 miles to the Johnson Canyon turnoff. Turn left and proceed up Johnson Canyon for 9.75 miles to the Lock Ridge-Nephi Pasture road, then turn right. Go 3.6 miles to a cattle guard. Continue another 0.8 miles to a fork, and bear right (there are many forks -- stay on the main Nephi Pasture road). Travel for 1.25 miles to a fork, then keep right. Go 0.85 miles to a fork by a cattle guard and continue straight. Continue for 1.2 miles to a cattle guard. Travel for 4.7 miles to a fork, then bear right. Go 0.7 miles to another cattle guard, and continue 2.8 miles to an intersection. Turn left (straight goes to Nephi Point and the Nephi Pasture exclosure) and follow this road 4.0 miles to a cattle guard. Turn right and follow the road up near the fence for 0.5 miles to a yellow-painted wood post marking the pellet group transect and range trend study. The 0-foot baseline stake is 33 paces at 208 degrees magnetic away from the yellow post. The trend study is marked by short fenceposts and runs south along the pellet group transect.

### Site Information

Land Ownership: Federal  
Land Administrator: BLM  
Allotment: VERMILION  
Elevation: 6,100ft (1,859m)  
Aspect: Northwest  
Slope: 5-10%  
Sample Dates: 08/15/1992, 08/06/1997, 07/30/2003, 07/29/2008, 07/23/2013, 06/26/2018, 07/11/2023

**Wildlife Habitat and Vegetation History****Table 27-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 27-06.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mixed Mountain Brush	Phase I
1992	Mixed Mountain Brush	Phase I
1997	Mixed Mountain Brush	Phase I
2003	Mixed Mountain Brush	Phase I
2008	Mixed Mountain Brush/Juniper	Phase I transitioning to Phase II
2013	Mixed Mountain Brush/Juniper	Phase I transitioning to Phase II
2018	Mixed Mountain Brush/Juniper	Phase I transitioning to Phase II
2023	Mixed Mountain Brush/Juniper	Phase I transitioning to Phase II

**Site Notes**

Most of the area below the White Cliffs consists of either sagebrush-grass or pinyon-juniper (*Pinus edulis* and *Juniperus osteosperma*) woodland communities. Water is limited in this area in the summer.

**Soils****Table 27-06.5 - 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
Loamy Fine Sand	6.5	88.4	4.1	7.6	0.6	13.0	57.6	0.3	08/06/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Sand (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY307UT
States and Transitions	1987-2023 - State Undefined: Community Phase Undefined

Since study establishment in 1987, this site has been dominated by a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), Utah serviceberry (*Amelanchier utahensis*), and antelope bitterbrush (*Purshia tridentata*) (Photos, Table 27-06.12, Table 27-06.13). The herbaceous understory has remained comparatively sparse, with the native perennial grass species sandhill muhly (*Muhlenbergia pungens*) contributing a majority of the cover (Table 27-06.7, Table 27-06.10). Utah juniper (*Juniperus osteosperma*) trees have increased in density and cover over the sample period, and the site has been considered to be within Phase I transitioning to Phase II of woodland succession since 2008 (Table 27-06.4, Table 27-06.12, Table 27-06.13, Table 27-06.14). Without a tree-removing disturbance, juniper will likely continue to increase, eventually becoming the dominant vegetation component.

Deer wintering range condition has ranged between poor and good since 1992. As of 2023, deer winter range condition was considered to be good. Improvements to winter habitat could be accomplished through efforts that decrease decadence in the preferred browse community and increase cover and diversity of the perennial grass and forb components (Table 27-06.15). Pellet group data suggests that deer presence for all sample years has been moderate to high (Table 27-06.9).

**Trend Summary Tables**

**Table 27-06.6 - 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
1992	26.0	1.4	1.0	-	-	-
1997	19.0	1.8	0.6	-	-	-
2003	18.7	0.2	0.8	21.1	0.1	1.4
2008	17.7	0.1	2.5	23.7	-	3.7
2013	19.5	0.5	3.0	27.9	1.1	7.0
2018	24.1	1.4	5.3	31.0	0.7	7.4
2023	19.3	0.4	6.1	28.7	0.7	10.3

**Table 27-06.7 - 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
1992	14	119	77	98	0.0	4.4	0.2	0.6
1997	192	146	69	119	1.3	4.1	0.4	1.4
2003	5	42	-	82	0.0	0.7	-	2.3
2008	16	38	127	78	0.1	1.2	0.5	0.8
2013	45	77	24	93	0.2	2.8	0.2	1.3
2018	4	77	4	109	0.0	4.1	0.0	3.6
2023	8	99	19	105	0.0	4.3	0.1	3.5

**Table 27-06.8 - 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
1992	39.6	1.4	48.1	0.0	1.1	33.7
1997	34.6	1.5	43.2	0.7	0.3	29.6
2003	43.3	0.2	47.7	0.9	0.6	22.1
2008	40.4	0.2	53.6	0.3	0.3	23.1
2013	42.3	0.8	45.1	0.1	0.2	27.8
2018	35.7	0.2	58.1	0.3	0.1	37.3
2023	37.0	0.1	57.9	0.1	0.1	30.4

**Table 27-06.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1992	-	30	-	48
1997	1	49	-	27
2003	2	22	-	17
2008	3	24	-	73
2013	1	13	1	28
2018	1	8	1	31
2023	2	25	-	13
Year	Days Use Per Acre (ha)			
1992	-	-	-	-
1997	-	-	-	-
2003	8.7 (21.5)	71.7 (177.1)	-	-
2008	2.9 (7.2)	42.9 (105.9)	-	-
2013	11.6 (28.7)	20.8 (51.3)	-	-
2018	2.2 (5.4)	48.9 (120.8)	-	-
2023	2.2 (5.4)	34.9 (86.1)	-	-

**Table 27-06.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Muhlenbergia pungens (sandhill muhly)	Poa fendleriana (nuttongrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency									
1992	11	-	16	-	-	90	-	2	10	14
1997	10	4	24	-	-	113	-	-	9	192
2003	-	-	3	-	-	33	-	-	6	5
2008	3	-	-	-	-	31	-	-	4	16
2013	10	-	1	7	0	48	9	1	9	45
2018	9	-	-	-	-	66	-	-	3	4
2023	11	8	9	8	-	69	2	-	4	8
year	Average Cover (%)									
1992	0.1	-	0.3	-	-	3.5	-	0.0	0.4	0.0
1997	0.1	0.0	0.2	-	-	3.8	-	-	0.1	1.3
2003	-	-	0.0	-	-	0.6	-	-	0.1	0.0
2008	0.0	-	-	-	-	1.1	-	-	0.0	0.1
2013	0.2	-	0.0	0.2	0.0	2.2	0.0	0.1	0.1	0.2
2018	0.5	-	-	-	-	3.6	-	-	0.0	0.0
2023	0.2	0.0	0.3	0.2	-	3.3	0.0	-	0.2	0.0

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

**Table 27-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Comandra umbellata (bastard toadflax)	Cryptantha gracilis <sup>a</sup> (narrowstem cryptantha)	Delphinium nuttallianum (twolobe larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lathyrus brachycalyx (Bonneville pea)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	Penstemon (beardtongue)	Plantago patagonica <sup>a</sup> (woolly plantain)	Sphaeralcea parvifolia (smallflower globemallow)	Townsendia (Townsend daisy)
year	Nested Frequency														
1992	-	-	19	-	-	5	75	-	-	77	-	-	-	3	1
1997	7	-	50	-	2	48	16	9	3	61	-	-	-	-	-
2003	-	-	42	-	-	-	-	-	-	40	-	-	-	-	-
2008	-	3	28	-	-	73	74	-	-	51	3	-	-	-	-
2013	-	-	45	-	-	15	1	-	6	45	-	1	4	4	-
2018	-	-	67	-	-	-	-	-	4	49	-	3	-	1	-
2023	0	-	64	4	-	3	7	6	-	44	-	2	-	2	-
year	Average Cover (%)														
1992	-	-	0.2	-	-	0.0	0.2	-	-	0.4	-	-	-	0.0	0.0
1997	0.0	-	0.9	-	0.0	0.3	0.0	0.0	0.0	0.5	-	-	-	-	-
2003	-	-	0.8	-	-	-	-	-	-	1.5	-	-	-	-	-
2008	-	0.0	0.1	-	-	0.3	0.1	-	-	0.7	0.0	-	-	-	-
2013	-	-	0.9	-	-	0.1	0.0	-	0.0	0.4	-	0.0	0.0	0.0	-
2018	-	-	2.6	-	-	-	-	-	0.0	1.0	-	0.0	-	0.0	-
2023	0.0	-	2.2	0.0	-	0.0	0.0	0.0	-	1.2	-	0.0	-	0.1	-

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



**Table 27-06.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ephedra viridis <sup>p</sup> (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)						
1992	-	-	-	-	-	-	-
1997	-	-	-	-	-	-	-
2003	8	7.3	-	0.1	1.4	-	5.8
2008	8.5	8.9	0.1	-	3.7	-	6.2
2013	12	7.9	-	1	7	0.1	8
2018	9.8	7.9	4.5	0.7	7.4	-	8.8
2023	10.8	6.8	-	0.7	10.3	-	11.1
year	Quadrat Cover (%)						
1992	3.5	19.6	-	1.4	1.0	-	2.9
1997	2.3	14.4	-	1.8	0.6	-	2.3
2003	2.6	13.4	-	0.2	0.8	-	2.6
2008	4.5	9.2	0.0	0.1	2.5	0.0	3.9
2013	6.2	8.8	-	0.5	3.0	0.0	4.5
2018	8.3	7.3	0.8	1.4	5.3	-	7.8
2023	4.1	7.3	-	0.4	6.1	-	7.9

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

**Table 27-06.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1992	500	40	88	8	4	8	0	40	- / -
1997	300	-	67	33	0	7	0	0	242/281
2003	100	-	0	100	0	0	20	0	199/195
2008	540	-	48	48	4	0	4	4	227/254
2013	260	140	54	46	0	46	0	0	208/274
2018	340	20	47	53	0	0	0	0	242/271
2023	420	-	67	24	10	10	0	14	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1992	3000	20	8	41	51	31	1	9	- / -
1997	2100	40	3	57	40	18	7	32	99/120
2003	1620	-	0	9	91	15	3	47	104/113
2008	1200	20	0	25	75	25	20	52	113/124
2013	1040	-	10	37	54	46	12	44	94/130
2018	920	-	0	48	52	11	0	52	90/119
2023	900	20	4	29	67	2	0	62	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	93/121
2008	20	-	0	100	0	100	0	0	147/165
2013	20	-	0	100	0	0	0	0	124/134
2018	60	-	0	100	0	0	0	0	106/132
2023	20	-	0	100	0	0	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1992	1480	340	15	82	3	3	1	0	-/-
1997	3500	-	3	97	0	0	0	0	34/28
2003	320	-	0	100	0	0	0	0	19/24
2008	40	-	50	50	0	0	0	0	11/12
2013	1000	200	36	64	0	0	0	0	26/33
2018	2180	-	10	83	7	0	1	8	14/19
2023	800	-	15	83	3	0	0	3	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1992	40	-	50	50	0	0	0	0	-/-
1997	40	-	0	100	0	0	0	0	-/-
2003	40	-	0	100	0	0	0	0	-/-
2008	60	-	0	100	0	0	0	0	-/-
2013	40	-	0	100	0	0	0	0	-/-
2018	60	20	0	100	0	0	0	0	-/-
2023	40	-	0	100	0	0	0	0	-/-
<b>Krascheninnikovia lanata<sup>P</sup> -- (winterfat)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	33/34
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	40	-	50	50	0	0	0	0	7/17
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	5/9
2013	20	-	0	100	0	0	0	0	10/30
2018	-	-	-	-	-	-	-	-	7/18
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1992	540	340	11	56	33	52	19	4	-/-
1997	460	-	4	56	39	52	26	17	68/126
2003	620	-	0	81	19	32	68	7	80/126
2008	620	-	13	68	19	19	3	3	84/139
2013	740	-	8	87	5	60	5	22	79/160
2018	980	-	14	86	0	31	43	12	82/153
2023	1300	-	14	83	3	5	74	3	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Yucca -- (yucca)									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	151/187
2008	-	-	-	-	-	-	-	-	136/112
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	40/39

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

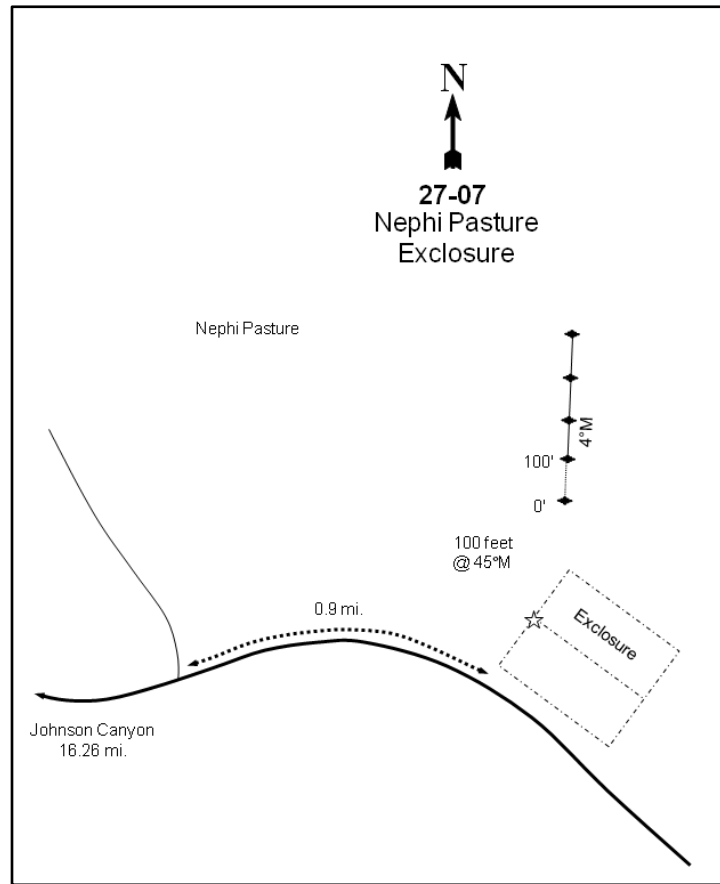
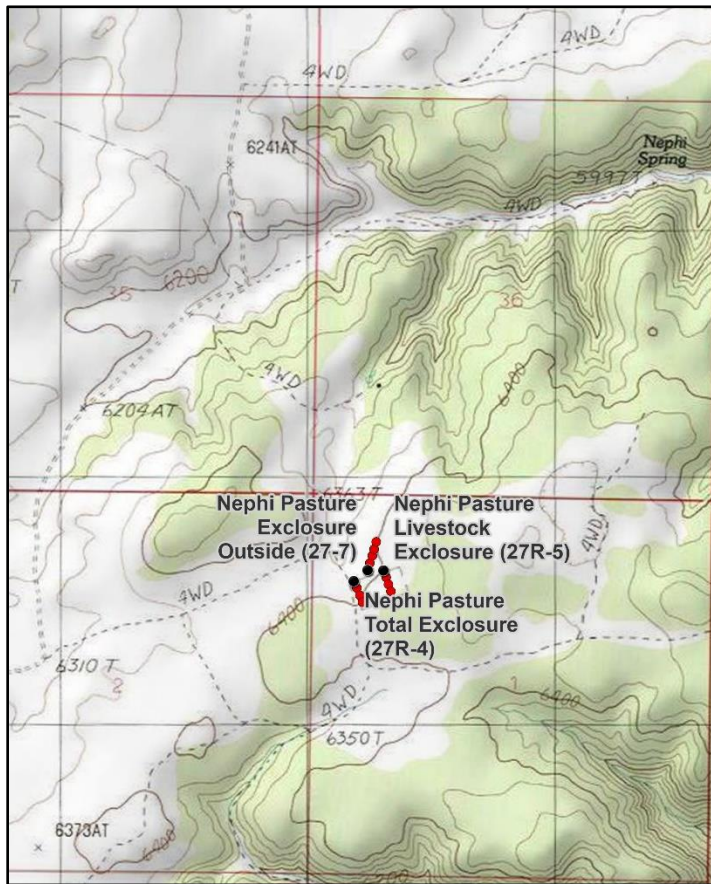
**Table 27-06.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2008	21	-	-	50	10	40	19.4
2018	23	-	-	18	18	64	23.1
2023	22	-	-	9	27	64	22.6

**Table 27-06.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1992	30.0	2.1	9.5	8.8	0.0	1.1	0.0	<b>51.6</b>	Poor-Fair
1997	24.8	4.5	5.3	8.3	-1.0	2.8	0.0	<b>44.7</b>	Poor
2003	29.8	3.9	0.0	1.4	0.0	4.7	0.0	<b>39.8</b>	Poor
2008	30.0	4.6	10.3	2.3	0.0	1.6	0.0	<b>48.8</b>	Poor-Fair
2013	30.0	10.0	14.1	5.7	-0.2	2.6	0.0	<b>62.2</b>	Fair
2018	30.0	11.0	9.5	8.2	0.0	7.3	0.0	<b>66.0</b>	Fair-Good
2023	30.0	8.8	15.0	8.5	0.0	7.0	0.0	<b>69.3</b>	Good

## NEPHI PASTURE EXCLOSURE OUTSIDE - STUDY NO. 27-7



### Location Information

USGS 7.5 min Map Info      Nephi Point NW; Township 42S, Range 4W, Section 01  
 GPS (0' Stake)              NAD 83 UTM ZONE 12, 394191 East 4116824 North

### Transect Information

Browse Tag # (0' Stake)      7808  
 Transect Bearing              4° magnetic  
 Length                          400ft  
 Belt Placement                Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
 Belt Marker Placement      Standard

### Directions to Site

From Kanab, travel east on US-89 for 9.4 miles to Johnson Canyon. Proceed north up Johnson Canyon for 9.75 miles to the Lock Ridge-Nephi Pasture road: turn right. Go 16.25 miles (see directions for study 27-06 for more detail) on the main road to a major intersection in Nephi Pasture. Continue straight towards Nephi Point, going 0.9 miles to an exclosure. Walk east along the fence on the north side of the exclosure to the inner fence. From the northeast corner of the tallest fence, walk 100 feet northeast to the 0-foot baseline stake, a cut fencepost tagged #7808.

### Site Information

Land Ownership                Federal  
 Land Administrator          BLM  
 Allotment                        VERMILION  
 Elevation                        6,400ft (1,951m)  
 Aspect                            Northwest  
 Slope                              5-9%  
 Sample Dates                 08/15/1992, 08/06/1997, 08/12/1998, 07/30/2003, 07/29/2008, 07/23/2013, 06/26/2018, 07/11/2023

**Wildlife Habitat and Vegetation History**

**Table 27-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 27-07.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mixed Mountain Brush	Phase I
1992	Mixed Mountain Brush	Phase I
1997	Mixed Mountain Brush	Phase I
1998	Mixed Mountain Brush	Phase I
2003	Mixed Mountain Brush	Phase I
2008	Mixed Mountain Brush	Phase I
2013	Mixed Mountain Brush	Phase I
2018	Mixed Mountain Brush	Phase I
2023	Mixed Mountain Brush	Phase I

**Site Notes**

This transect was established to sample the outside of an enclosure in conjunction with two other studies that were established inside the enclosure: one in the total enclosure (27R-04) and the other in the livestock enclosure (27R-05). This study complex is part of a three-way comparison between the different enclosure grazing treatments. A few deer shed antlers were found east of the enclosure in 2013.

**Soils**

**Table 27-07.5 - 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
Loamy Fine Sand	5.9	87.0	7.4	5.6	0.7	0.8	38.4	0.2	08/06/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation 12 inches  
 NRCS Ecological Site Upland Sand (Mountain Big Sagebrush)  
 NRCS Ecological Site # R035XY307UT  
 States and Transitions 1987-2023 - State Undefined: Community Phase Undefined

This site has been dominated by a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), Utah serviceberry (*Amelanchier utahensis*), and antelope bitterbrush (*Purshia tridentata*) since study establishment in 1987 (Photos, Pre-1992 Data, Table 27-07.12, Table 27-07.13). The herbaceous understory has remained limited, with the native perennial forb bastard toadflax (*Comandra umbellata*) contributing the most cover of any single species since 2003. Annual grasses were observed in moderate amounts in 1998, but have remained rare since that time (Table 27-07.7, Table 27-07.10, Table 27-07.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) are present on this site, and juniper density has slowly increased over the study period (Photos, Table 27-07.13, Table 27-07.14). This study site was considered to fall within Phase I of woodland succession as of the 2023 sample year (Table 27-07.4), but will likely continue to be encroached without a tree-removing disturbance.

Deer winter range condition on this site has ranged between poor and fair since 1992; as of 2023, winter range condition was considered to be fair. Improvements to deer winter range could be achieved through efforts that increase recruitment of young and decrease decadence within the preferred browse community. Increasing diversity and cover of perennial grasses and forbs while removing cheatgrass would also benefit deer winter range (Table 27-07.15). Additionally, pellet group data suggests that deer presence has remained moderate in most sample years, but was high in 1998, 2003 and 2018 (27-07.9).

**Trend Summary Tables**

**Table 27-07.6 - 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
1992	29.1	1.6	-	-	-	-
1997	20.1	0.3	-	-	-	-
1998	14.1	0.9	-	-	-	-
2003	18.5	0.1	-	23.9	0.1	-
2008	17.7	0.0	0.0	26.0	-	2.8
2013	20.4	0.2	-	35.4	0.3	2.2
2018	29.1	0.7	0.8	37.0	0.1	2.2
2023	27.2	1.0	-	36.2	1.3	-

**Table 27-07.7 - 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
1992	31	135	141	85	0.1	1.9	1.2	1.1
1997	168	170	134	153	2.7	1.8	0.9	2.2
1998	289	168	244	135	5.1	2.0	5.6	1.7
2003	-	43	21	107	-	0.4	0.4	1.6
2008	6	9	106	115	0.0	0.0	0.5	3.0
2013	1	30	79	193	0.0	0.4	0.5	3.5
2018	1	8	5	167	0.0	0.1	0.0	4.7
2023	62	14	204	179	0.7	0.2	2.9	5.7

**Table 27-07.8 - 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
1992	26.7	2.0	54.1	-	0.0	34.3
1997	35.5	1.9	47.6	0.0	0.1	27.2
1998	30.5	8.5	48.1	0.0	-	34.6
2003	45.0	0.7	46.9	0.0	0.0	20.4
2008	34.6	0.3	54.6	0.1	0.0	22.0
2013	39.0	0.6	49.2	0.1	0.0	25.6
2018	39.2	1.3	57.6	0.1	-	35.1
2023	36.2	0.6	53.9	0.0	-	33.5

**Table 27-07.9 - 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			
1992	3	26	-	49
1997	5	32	-	20
1998	5	27	-	25
2003	5	23	-	8
2008	4	9	-	77
2013	2	24	-	27
2018	-	22	-	40
2023	-	21	-	15
Year	Days Use Per Acre (ha)			
1992	-	-	-	-
1997	-	-	-	-
1998	16.7 (41.2)	64.3 (158.9)	1.3 (3.3)	-
2003	23.2 (57.4)	71.1 (175.5)	-	-
2008	-	37.5 (92.7)	-	-
2013	0.7 (1.8)	36.8 (91.0)	-	-
2018	4.4 (10.8)	59.0 (145.7)	-	-
2023	2.9 (7.2)	36.2 (89.4)	-	-

**Table 27-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
1992	26	3	60	24	4	12	-	34	28
1997	21	129	68	26	52	17	-	14	82
1998	15	167	42	23	75	17	-	32	165
2003	16	-	-	7	10	3	-	10	-
2008	2	6	-	0	2	-	-	5	-
2013	6	1	4	3	-	2	3	12	-
2018	3	-	5	0	-	-	-	-	1
2023	-	46	5	3	4	-	-	2	25
year	Average Cover (%)								
1992	0.3	0.0	0.5	0.3	0.0	0.1	-	0.6	0.1
1997	0.1	2.3	0.8	0.1	0.3	0.4	-	0.1	0.3
1998	0.3	3.2	0.6	0.2	0.5	0.1	-	0.3	1.9
2003	0.2	-	-	0.0	0.1	0.0	-	0.1	-
2008	0.0	0.0	-	0.0	0.0	-	-	0.0	-
2013	0.2	0.0	0.1	0.0	-	0.0	0.0	0.1	-
2018	0.0	-	0.0	0.0	-	-	-	-	0.0
2023	-	0.3	0.0	0.0	0.1	-	-	0.0	0.3

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

**Table 27-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Abrotia fragrans (snowball sand verbena)	Arabis (rockcress)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce glyptosperma <sup>a</sup> (ribseed sandmat)	Chenopodium pratericola <sup>a</sup> (desert goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Collomia linearis <sup>a</sup> (tiny trumpet)	Comandra umbellata (bastard toadflax)	Delphinium nuttallianum (two-lobed larkspur)	Descurainia incana <sup>a</sup> (mountain tansymustard)	Draba <sup>a</sup> (draba)	Erigeron (fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Frasera albomarginata (desert fraser)
year	Nested Frequency																
1992	-	-	2	-	2	8	-	-	-	61	-	17	17	-	33	-	-
1997	-	6	1	1	1	-	-	1	3	125	3	31	-	1	11	8	2
1998	-	3	1	-	11	-	-	-	-	103	-	28	9	4	1	4	-
2003	-	-	3	4	-	-	-	2	-	95	-	-	-	-	2	-	-
2008	-	-	-	-	-	-	-	1	-	112	-	45	-	-	55	1	3
2013	-	-	-	-	-	2	3	-	-	166	-	22	-	-	11	-	-
2018	8	-	-	-	-	-	-	-	-	151	-	-	-	-	2	-	-
2023	19	-	-	1	-	-	-	-	-	155	-	42	-	-	3	5	3
year	Average Cover (%)																
1992	-	-	0.0	-	0.0	0.0	-	-	-	0.5	-	0.4	0.0	-	0.2	-	-
1997	-	0.0	0.0	0.0	0.0	-	-	0.1	0.0	1.8	0.0	0.1	-	0.0	0.1	0.0	0.0
1998	-	0.0	0.0	-	0.2	-	-	-	-	1.0	-	0.1	0.0	0.0	0.0	0.0	-
2003	-	-	0.0	0.0	-	-	-	0.0	-	1.4	-	-	-	-	0.0	-	-
2008	-	-	-	-	-	-	-	0.0	-	2.9	-	0.2	-	-	0.2	0.0	0.0
2013	-	-	-	-	-	0.0	0.0	-	-	2.6	-	0.1	-	-	0.1	-	-
2018	0.0	-	-	-	-	-	-	-	-	4.4	-	-	-	-	0.0	-	-
2023	0.3	-	-	0.0	-	-	-	-	-	4.4	-	0.4	-	-	0.0	0.0	0.0

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

FORB SPECIES	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lupinus argenteus (silvery lupine)	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera pallida <sup>a</sup> (pale evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon comarthenus (dusty beardtongue)	Penstemon pseudoputus (Kaibab Plateau beardtongue)	Phlox austromontana (mountain phlox)	Plantago patagonica <sup>a</sup> (woolly plantain)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea parvifolia (smallflower globemallow)	unknown annual forb <sup>a</sup> (unknown forb)
year	Nested Frequency														
1992	-	-	-	0	21	3	-	10	-	-	15	94	16	3	3
1997	-	24	4	1	36	-	1	-	-	-	23	49	28	1	-
1998	-	-	-	-	-	3	-	8	-	-	15	230	-	1	-
2003	-	12	-	-	-	3	-	-	-	-	10	2	-	3	-
2008	-	-	-	-	-	-	-	1	-	-	2	25	3	-	-
2013	-	-	-	-	-	-	-	25	-	-	3	51	3	22	-
2018	-	-	-	-	-	-	-	19	-	-	-	3	-	-	-
2023	19	14	-	-	3	-	-	-	9	9	5	185	-	1	-
year	Average Cover (%)														
1992	-	-	-	0.0	0.0	0.0	-	0.2	-	-	0.3	0.4	0.0	0.0	0.0
1997	-	0.1	0.0	0.0	0.2	-	0.0	-	-	-	0.2	0.2	0.0	0.0	-
1998	-	-	-	-	-	0.0	-	0.0	-	-	0.4	5.4	-	0.0	-
2003	-	0.3	-	-	-	0.0	-	-	-	-	0.1	0.0	-	0.0	-
2008	-	-	-	-	-	-	-	0.0	-	-	0.0	0.1	0.0	-	-
2013	-	-	-	-	-	-	-	0.7	-	-	0.0	0.3	0.0	0.1	-
2018	-	-	-	-	-	-	-	0.3	-	-	-	0.0	-	-	-
2023	0.1	0.1	-	-	0.0	-	-	-	0.5	0.4	0.2	2.3	-	0.0	-

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

**Table 27-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia filifolia (sand sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)									
1992	-	-	-	-	-	-	-	-	-	-
1997	-	-	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-	-	-
2003	8.2	-	8	-	0.1	-	-	-	-	7.7
2008	10.8	-	5.1	-	-	-	2.8	-	-	10.1
2013	9.6	-	9.8	-	-	0.3	2.2	-	-	16
2018	11.1	-	9.5	-	-	-	2.2	0.1	-	16.4
2023	9.7	-	9.2	-	-	0.8	-	0.2	0.3	17.3
year	Quadrat Cover (%)									
1992	12.0	-	11.8	-	-	1.5	-	0.1	-	5.3
1997	8.4	-	5.2	0.0	-	0.3	-	0.1	-	6.5
1998	3.3	0.2	3.2	-	-	0.7	-	-	-	7.6
2003	5.7	-	5.4	-	0.0	0.0	-	0.1	-	7.5
2008	7.0	-	4.8	-	-	0.0	0.0	0.0	0.0	6.0
2013	6.2	-	6.5	-	-	0.0	0.0	0.1	0.1	7.7
2018	8.3	-	10.3	-	-	0.6	0.8	0.0	0.0	10.4
2023	6.9	-	9.3	-	-	0.5	-	0.3	0.2	11.1

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



**Table 27-07.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1992	980	120	45	45	10	18	18	10	- / -
1997	340	-	29	59	12	47	18	18	207/235
1998	380	20	32	58	11	26	21	0	171/192
2003	300	-	27	53	20	60	7	7	173/177
2008	360	-	17	50	33	33	17	28	193/193
2013	340	-	24	71	6	29	0	29	195/223
2018	420	-	5	91	5	0	0	10	179/192
2023	320	-	0	81	19	19	0	38	- / -
<b>Artemisia filifolia -- (sand sagebrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
1998	260	60	54	46	0	0	0	0	22/37
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	39/53
2023	20	-	0	0	100	0	0	100	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1992	2720	200	29	38	33	15	2	28	- / -
1997	1700	20	19	35	46	53	11	46	91/117
1998	1880	100	13	42	46	40	9	23	79/96
2003	1240	-	0	37	63	14	0	37	80/88
2008	1260	-	3	33	64	18	10	52	100/104
2013	1640	20	38	44	18	23	1	10	92/118
2018	940	20	2	77	21	2	2	30	86/97
2023	1280	80	11	72	17	3	0	16	- / -
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	20	-	0	100	0	0	0	0	18/17
1998	20	-	0	100	0	0	0	0	46/32
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
1998	20	-	0	100	0	0	100	0	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1992	1180	200	10	88	2	0	0	0	-/-
1997	1280	20	14	83	3	0	0	0	27/32
1998	1280	20	3	97	0	0	0	0	27/31
2003	120	-	33	67	0	0	0	0	28/33
2008	40	40	0	100	0	0	0	0	16/14
2013	320	-	13	88	0	0	0	0	33/43
2018	800	20	13	88	0	0	0	0	12/13
2023	600	-	10	90	0	0	0	0	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1992	340	-	6	94	0	0	0	0	-/-
1997	280	-	0	100	0	0	0	7	34/41
1998	-	-	-	-	-	-	-	-	-/-
2003	180	-	0	100	0	0	0	0	12/18
2008	80	-	0	25	75	0	75	25	5/8
2013	80	-	50	50	0	0	0	0	20/21
2018	40	-	0	100	0	0	0	0	5/13
2023	60	-	0	100	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
1992	40	-	50	0	50	0	0	50	-/-
1997	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	10/32
2003	20	-	0	100	0	0	0	0	5/8
2008	20	-	100	0	0	0	0	0	9/31
2013	20	-	0	100	0	0	0	0	8/17
2018	20	-	0	0	100	0	0	100	7/11
2023	60	-	0	100	0	0	33	0	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1992	1700	40	25	49	26	13	48	17	-/-
1997	1240	-	7	86	8	36	55	8	53/107
1998	1220	-	10	77	13	18	74	2	52/110
2003	960	-	0	67	33	29	71	8	50/94
2008	880	-	2	71	27	18	23	7	64/115
2013	1380	80	4	90	6	56	1	13	68/142
2018	1340	-	3	96	2	30	8	8	75/132
2023	1780	-	6	88	7	34	16	7	-/-
<b>Ribes<sup>P</sup> -- (currant)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	75/63
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	49/17
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Yucca -- (yucca)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	67/111

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

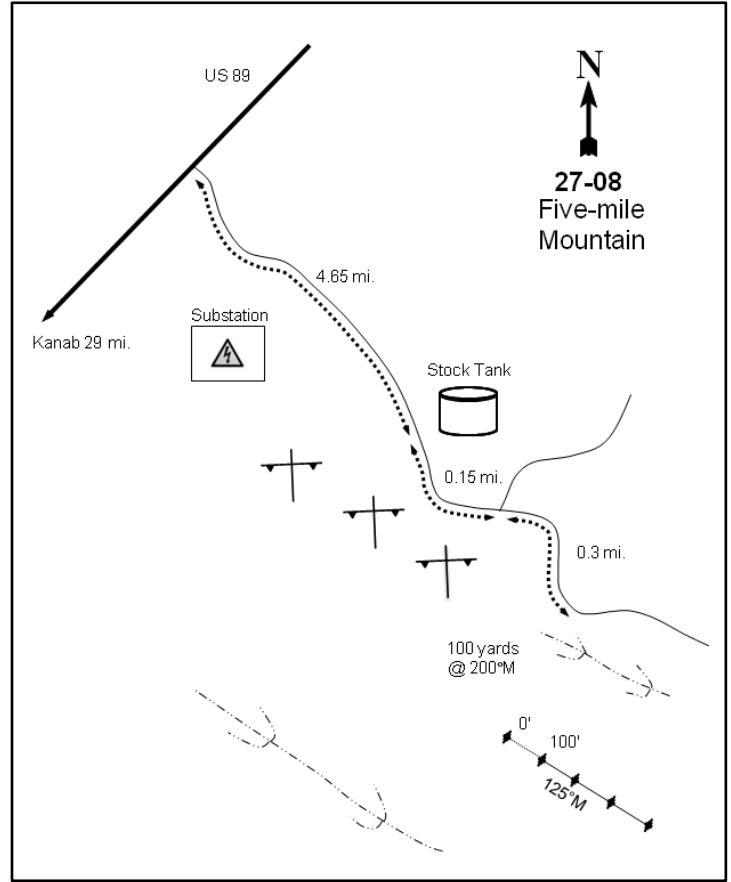
**Table 27-07.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2008	8	-	50	25	-	25	9.8
2013	8	-	-	83	-	17	13.8
2018	10	-	14	43	29	14	11.6
2023	10	-	-	29	57	14	13.6
<b>Pinus edulis (twoneedle pinyon)</b>							
2013	4	-	33	-	-	67	25.3
2018	7	-	33	-	-	67	21.7
2023	4	-	33	-	-	67	30.0

**Table 27-07.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1992	30.0	8.3	15.0	3.9	-0.1	2.2	0.0	<b>59.3</b>	Fair
1997	28.9	9.2	9.6	3.7	-2.0	4.3	0.0	<b>53.7</b>	Fair
1998	20.3	9.0	7.8	4.0	-3.8	3.3	0.0	<b>40.5</b>	Poor
2003	30.0	3.4	4.6	0.8	0.0	3.1	0.0	<b>41.9</b>	Poor
2008	30.0	3.9	4.2	0.1	0.0	6.0	0.0	<b>44.2</b>	Poor
2013	30.0	12.2	9.4	0.7	0.0	6.9	0.0	<b>59.2</b>	Fair
2018	30.0	12.7	1.7	0.1	0.0	9.4	0.0	<b>54.0</b>	Fair

## FIVEMILE MOUNTAIN - STUDY NO. 27-8



### Location Information

USGS 7.5 min Map Info Pine Hollow Canyon N; Township 43S, Range 2W, Section 03  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 410777 East 4107024 North

### Transect Information

Browse Tag # (0' Stake) Not Available  
 Transect Bearing 125° magnetic  
 Length 400ft  
 Belt Placement Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
 Belt Marker Placement Standard

### Directions to Site

From the 90-degree turn in US-89 in the center of Kanab, travel 29.0 miles south on US-89 to the turnoff to Fivemile Mountain. Turn right (southeast) and travel for 4.6 miles on the graded road (BLM Road #710) to a stock tank. Continue on a dirt road for 0.15 miles to a fork and bear right. Continue up and over the mountain for 0.3 miles to a bend in the road. Stop here and walk about 100 yards south to the crest of a small ridge and the 0-foot baseline stake. The study runs east-southeast down the ridge.

### Site Information

Land Ownership Federal  
 Land Administrator BLM  
 Allotment FIVE MILE MOUNTAIN  
 Elevation 5,850ft (1,783m)  
 Aspect Southeast  
 Slope 5-10%  
 Sample Dates 08/16/1992, 08/06/1997, 08/05/2003, 07/30/2008, 08/06/2013, 07/10/2018, 07/12/2023

**Wildlife Habitat and Vegetation History**

**Table 27-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
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**Table 27-08.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Black Sagebrush	Phase I
1992	Black Sagebrush	Phase I
1997	Black Sagebrush	Phase I
2003	Black Sagebrush	Phase I
2008	Black Sagebrush	Phase I
2013	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I
2023	Black Sagebrush	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation                      10 inches  
 NRCS Ecological Site    Semidesert Shallow Loam (Black Sagebrush)  
 NRCS Ecological Site #    R035XY226UT  
 States and Transitions    No state and transition model is available for this ecological site.

The dominant browse species on this site has been black sagebrush (*Artemisia nova*) since 1987; other shrub species are present, but contribute less cover (Photos, Pre-1992 Data, Table 27-08.12, Table 27-08.13). The herbaceous understory has remained moderately diverse throughout the history of the study, with native perennial grasses such as blue grama (*Bouteloua gracilis*) and needle and thread (*Hesperostipa comata*) contributing a majority of the cover in many sample years. However, the introduced annual grass species cheatgrass (*Bromus tectorum*) has fluctuated in cover from year to year, and was a major herbaceous component in 1997, 2003, and 2023 (Table 27-08.7, Table 27-08.10, Table 27-08.11). Utah juniper (*Juniperus osteosperma*) is scattered across the site, but has been slow to increase (Table 27-08.12, Table 27-08.14). Although currently in Phase I as of 2023 (Table 27-08.4), this study site has the potential to progress through the stages of woodland succession in future sample years if a tree-removing disturbance does not take place.

Deer wintering range condition has ranged between poor and good since 1992. As of 2023, deer winter range condition was considered to be fair. Improvements to winter habitat could be accomplished through efforts that decrease decadence in the preferred browse community and increase cover and diversity of the perennial grass and forb components; efforts to decrease cheatgrass would also improve winter range (Table 27-08.15). Pellet group data suggests that deer presence for all sample years has been low to moderate (Table 27-08.9).

**Trend Summary Tables**

**Table 27-08.6 - 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
1992	22.4	2.5	2.1	-	-	-
1997	12.9	1.7	-	-	-	-
2003	12.1	1.5	1.9	14.5	0.7	2.6
2008	14.7	1.6	2.7	18.2	1.3	1.5
2013	13.7	2.3	2.0	23.0	2.7	2.2
2018	16.6	2.6	3.0	23.2	2.2	2.2
2023	13.8	3.5	1.7	17.9	2.5	3.3

**Table 27-08.7 - 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
1992	118	136	227	85	0.4	2.5	1.2	0.5
1997	231	154	41	51	2.6	2.4	0.3	0.2
2003	283	100	129	6	7.5	2.4	4.0	0.1
2008	88	110	36	18	0.5	2.4	0.2	0.1
2013	18	120	4	53	0.1	3.5	0.0	0.4
2018	93	130	4	53	1.2	4.8	0.0	0.3
2023	312	110	112	22	10.2	4.4	1.4	0.6

**Table 27-08.8 - 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
1992	8.1	1.3	29.3	0.0	44.6	30.6
1997	12.3	2.5	27.8	18.0	18.2	23.4
2003	11.4	0.8	25.9	21.2	21.5	30.3
2008	14.0	1.2	28.4	24.8	21.4	23.3
2013	23.8	1.1	23.7	20.6	19.7	22.1
2018	27.8	0.9	31.8	19.1	25.0	29.5
2023	28.8	0.5	29.2	8.0	24.6	30.4

**Table 27-08.9 - 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	Rabbit
	Quadrat Frequency		
1992	-	16	8
1997	2	28	9
2003	2	26	8
2008	1	29	44
2013	-	29	10
2018	1	14	10
2023	3	7	5
Year	Days Use Per Acre (ha)		
1992	-	-	-
1997	-	-	-
2003	5.1 (12.6)	26.8 (66.2)	-
2008	5.1 (12.6)	34.9 (86.1)	-
2013	3.6 (9.0)	14.7 (36.4)	-
2018	8.7 (21.5)	9.4 (23.2)	-
2023	5.8 (14.3)	9.4 (23.2)	-

**Table 27-08.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum speciosum (desert needlegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James galleta)	Poa fendleriana (nuttongrass)	Poa secunda (Sandberg bluegrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency									
1992	39	1	47	18	22	26	3	3	15	109
1997	32	5	47	206	16	42	-	4	38	61
2003	11	5	45	228	2	32	3	3	7	118
2008	10	1	42	81	21	45	-	1	7	9
2013	9	3	51	18	1	50	5	13	6	-
2018	13	-	61	90	18	64	1	0	1	6
2023	17	6	51	306	7	39	-	-	1	33
year	Average Cover (%)									
1992	0.5	0.0	1.3	0.1	0.1	0.4	0.0	0.0	0.1	0.3
1997	0.2	0.1	0.9	2.4	0.4	0.3	-	0.0	0.4	0.1
2003	0.2	0.2	1.4	6.6	0.0	0.5	0.1	0.0	0.1	1.0
2008	0.0	0.1	0.8	0.5	0.3	1.1	-	0.0	0.0	0.0
2013	0.2	0.3	1.4	0.1	0.0	1.3	0.0	0.2	0.1	-
2018	0.2	-	3.1	1.2	0.3	1.3	0.0	0.0	0.0	0.0
2023	0.8	0.3	2.2	10.0	0.2	1.0	-	-	0.0	0.1

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

**Table 27-08.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus lentiginosus (freckled milkvetch)	Brassicaceae <sup>a</sup> (mustard family)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba cuneifolia <sup>a</sup> (wedgeleaf draba)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenoxys richardsonii (pingue rubberweed)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium ramosissimum <sup>a</sup> (manybranched pepperweed)	Lomatium (desertparsley)	Mentzelia <sup>a</sup> (blazingstar)
year	Nested Frequency																
1992	41	6	9	-	-	8	19	2	2	-	-	144	-	152	-	5	-
1997	21	-	3	-	2	4	-	15	1	13	-	18	-	6	-	1	-
2003	-	-	1	-	5	10	8	-	-	36	-	62	-	-	17	-	16
2008	10	-	0	-	3	-	1	-	11	-	-	-	-	15	-	2	9
2013	40	-	-	-	2	-	2	3	-	-	-	-	-	-	-	-	-
2018	45	-	-	-	-	-	4	3	-	-	-	-	3	-	-	-	-
2023	1	-	9	1	-	8	2	4	5	14	3	9	-	4	87	-	-
year	Average Cover (%)																
1992	0.1	0.0	0.0	-	-	0.0	0.1	0.0	0.0	-	-	0.5	-	0.5	-	0.0	-
1997	0.1	-	0.0	-	0.0	0.0	-	0.0	0.0	0.2	-	0.0	-	0.0	-	0.0	-
2003	-	-	0.0	-	0.0	0.1	0.0	-	-	1.7	-	1.1	-	-	0.1	-	1.0
2008	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	-	-	-	0.1	-	0.0	0.1
2013	0.2	-	-	-	0.0	-	0.0	0.0	-	-	-	-	-	-	-	-	-
2018	0.2	-	-	-	-	-	0.0	0.0	-	-	-	-	0.0	-	-	-	-
2023	0.0	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.3	0.0	0.0	-	0.0	1.0	-	-

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

FORB SPECIES	Penstemon thompsoniae (Thompson's beardtongue)	Phlox longifolia (longleaf phlox)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	unknown annual forb <sup>a</sup> (unknown forb)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency				
1992	1	27	3	5	1
1997	1	16	-	-	-
2003	-	5	0	-	-
2008	-	7	-	-	-
2013	-	11	1	-	-
2018	-	4	1	-	-
2023	-	1	7	-	-
year	Average Cover (%)				
1992	0.0	0.3	0.0	0.0	0.0
1997	0.0	0.1	-	-	-
2003	-	0.1	0.0	-	-
2008	-	0.0	-	-	-
2013	-	0.0	0.1	-	-
2018	-	0.0	0.0	-	-
2023	-	0.0	0.5	-	-

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

**Table 27-08.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Echinocereus engelmannii (Engelmann's hedgehog cactus)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	Sclerocactus (fishhook cactus)
year	Line Intercept Cover (%)							
1992	-	-	-	-	-	-	-	-
1997	-	-	-	-	-	-	-	-
2003	14.5	0.6	-	-	2.6	0	-	0.1
2008	18.2	1.2	-	-	1.5	-	-	0.1
2013	23	2.6	-	-	2.2	0.1	-	-
2018	23.2	1.8	0.1	0.2	2.2	0.1	-	-
2023	17.9	0.7	0.1	1.5	3.3	0.2	-	-
year	Quadrat Cover (%)							
1992	22.4	2.1	-	0.2	2.1	-	-	0.2
1997	12.9	1.2	-	0.0	-	0.4	-	0.1
2003	12.1	0.7	-	0.3	1.9	0.4	-	0.1
2008	14.7	1.3	-	0.0	2.7	0.2	-	0.1
2013	13.7	1.8	-	0.0	2.0	0.4	-	0.2
2018	16.6	2.4	0.1	0.2	3.0	0.0	-	-
2023	13.8	1.5	0.0	1.9	1.7	0.0	0.0	-

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



**Table 27-08.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1992	5980	160	12	64	24	22	0	9	- / -
1997	4420	100	2	67	31	32	2	13	40/70
2003	5260	-	2	38	61	7	0	30	34/57
2008	4800	120	2	39	60	42	25	18	40/71
2013	3840	20	9	73	18	36	17	18	40/75
2018	4900	-	3	82	15	17	9	10	37/71
2023	3820	640	2	54	45	4	0	39	- / -
<b>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	69/69
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	87/82
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1992	780	-	5	82	13	0	0	10	- / -
1997	660	-	3	64	33	0	0	9	27/50
2003	560	-	0	54	46	0	0	29	29/49
2008	740	-	3	70	27	0	0	16	33/52
2013	540	-	4	82	15	11	0	30	33/59
2018	580	-	0	62	38	0	0	10	29/54
2023	280	-	0	79	21	0	0	21	- / -
<b>Echinocereus engelmannii -- (Engelmann's hedgehog cactus)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	80	-	0	100	0	0	0	0	17/18
2023	140	-	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1992	100	80	0	100	0	0	0	0	- / -
1997	220	-	0	82	18	0	0	0	16/15
2003	140	-	0	100	0	0	0	0	19/21
2008	140	20	14	57	29	0	0	29	22/32
2013	120	-	33	67	0	0	0	17	15/18
2018	620	20	7	74	19	0	0	19	14/20
2023	380	-	5	90	5	0	0	5	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1992	40	-	50	50	0	0	0	0	- / -
1997	40	-	50	50	0	0	0	0	- / -
2003	40	-	0	100	0	0	0	0	- / -
2008	40	-	50	50	0	0	0	0	- / -
2013	60	-	67	33	0	0	0	0	- / -
2018	40	20	50	50	0	0	0	0	- / -
2023	60	-	67	33	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Krascheninnikovia lanata<sup>p</sup> -- (winterfat)</b>									
1992	20	20	0	100	0	0	0	0	- / -
1997	40	-	0	100	0	0	0	0	23/18
2003	40	-	0	100	0	50	0	0	28/21
2008	-	-	-	-	-	-	-	-	46/33
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	18/33
2023	60	-	0	100	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1992	20	-	0	100	0	0	0	0	- / -
1997	60	-	0	100	0	0	0	0	22/69
2003	100	-	20	80	0	0	0	0	26/62
2008	100	-	20	40	40	0	0	20	22/39
2013	120	-	17	50	33	0	0	33	26/39
2018	180	-	22	78	0	0	0	0	19/38
2023	140	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1992	-	-	-	-	-	-	-	-	- / -
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	5/8
2018	20	-	0	100	0	0	0	0	4/5
2023	-	-	-	-	-	-	-	-	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
1992	-	-	-	-	-	-	-	-	- / -
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	199/257
2008	-	-	-	-	-	-	-	-	168/216
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	159/178
2023	-	20	0	0	0	0	0	0	- / -
<b>Sclerocactus -- (fishhook cactus)</b>									
1992	100	-	40	40	20	0	0	20	- / -
1997	60	-	33	67	0	0	0	0	13/21
2003	100	-	20	40	40	0	0	40	10/12
2008	120	-	17	83	0	0	0	0	14/15
2013	100	-	0	80	20	0	0	20	16/21
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Yucca -- (yucca)</b>									
1992	-	-	-	-	-	-	-	-	- / -
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	48/63
2008	-	-	-	-	-	-	-	-	55/57
2013	20	-	0	100	0	0	0	0	47/54
2018	20	-	0	100	0	0	0	0	61/62

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

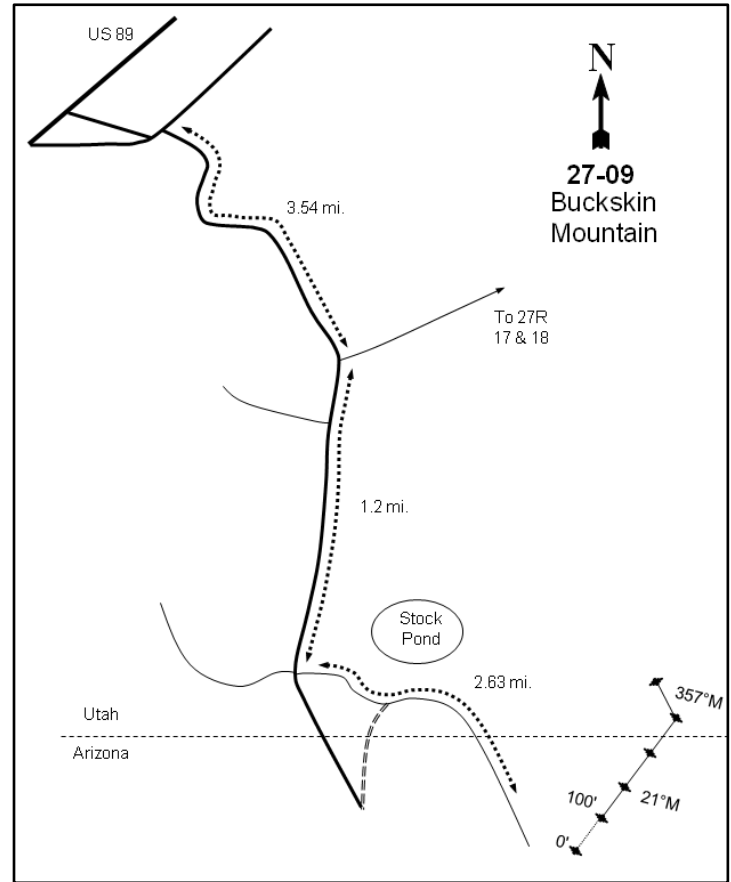
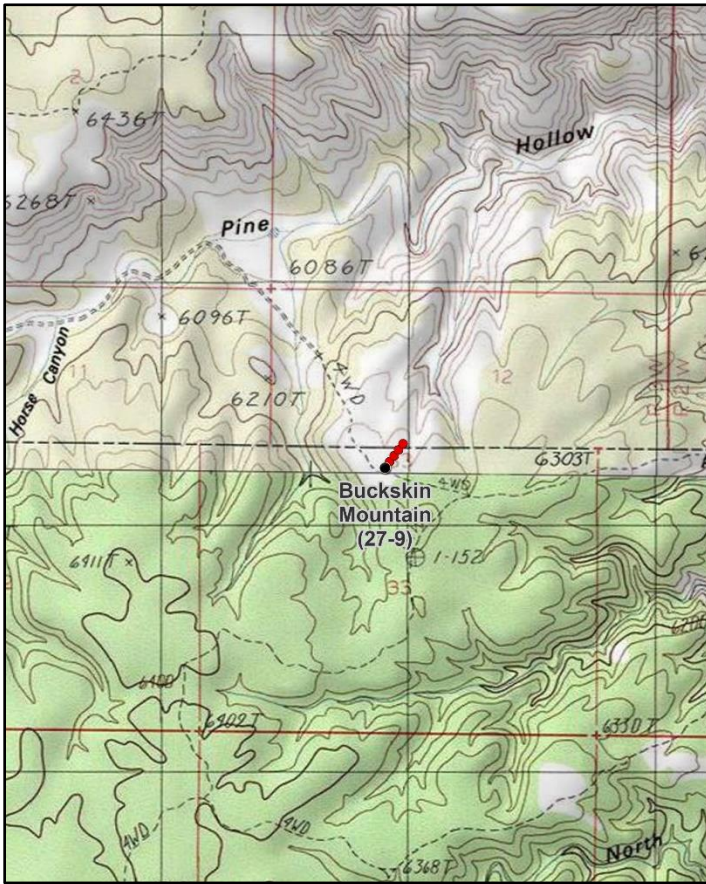
**Table 27-08.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2003	37	-	39	28	33	-	23.2
2008	41	11	28	39	17	6	30.1
2013	40	18	24	12	35	12	24.2
2018	48	6	50	22	22	-	20.4
2023	45	12	41	29	18	-	24.3

**Table 27-08.15 - Deer Desirable Components Index: Semidesert Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1992	28.0	7.8	6.2	4.9	-0.3	1.0	0.0	<b>47.6</b>	Good
1997	16.1	5.8	0.9	4.8	-1.9	0.4	0.0	<b>26.1</b>	Poor-Fair
2003	18.1	-3.2	0.8	4.9	-5.6	0.2	0.0	<b>15.0</b>	Poor
2008	22.8	-2.9	0.9	4.8	-0.4	0.1	0.0	<b>25.3</b>	Poor-Fair
2013	28.8	9.7	4.5	6.9	-0.1	0.8	0.0	<b>50.6</b>	Good
2018	29.0	10.5	1.5	9.7	-0.9	0.6	0.0	<b>50.2</b>	Good
2023	22.4	1.7	0.8	8.8	-7.6	1.2	0.0	<b>27.2</b>	Fair

## BUCKSKIN MOUNTAIN - STUDY NO. 27-9



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Pine Hollow Canyon S; Township 44S, Range 3W, Section 12  
NAD 83 UTM ZONE 12, 403929 East 4095567 North

### Transect Information

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

Not Available  
26° magnetic (Line 5: 357° magnetic)  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (94.5ft)  
Belt 3: No Rebar

### Directions to Site

From Kanab, travel east on US-89 to mile marker 44. Go 0.6 miles south of the mile marker to a road on the right (BLM Road #730). Turn onto this road and drive 1.2 miles to a fork on the right. Go right (on the main road) for 1.4 miles to a left turn (BLM Road #723). Travel 1.7 miles to another fork and continue straight (left), then drive 2.9 miles to another fork. Stay on the main road (right) for 0.75 miles to a fork. Go straight at the fork and continue for 1.95 miles to another right fork. Go 0.1 miles to a right fork, then proceed for 0.7 miles to the Arizona/Utah border sign. From this sign, walk 50 feet at 326 degrees magnetic to the 0-foot stake. The transect is marked by green, steel fenceposts approximately 12-18 inches in height.

### Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	No data
Elevation	6,340ft (1,932m)
Aspect	Northwest
Slope	3-4%
Sample Dates	08/12/1997, 08/05/2003, 07/30/2008, 08/06/2013, 07/11/2018, 07/12/2023

**Table 27-09.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Pine Hollow	-	July-September 2020	11405
Seeding - Aerial Before	Wire Pass/Pine Hollow Fire ESR	5498	December 2020	3015
Chaining - Two-Way Ely	Wire Pass/Pine Hollow Fire ESR	5498	December 2020-March 2021	1235
Seeding - Aerial After	Wire Pass/Pine Hollow Fire ESR	5498	Spring 2021	3917

**Table 27-09.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Pine Hollow Fire			Aerial	Dec 2020	3917
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.79	0.72
G	Agropyron cristatum	Crested Wheatgrass	Hycrest	1.25	1.17
G	Agropyron fragile	Siberian Wheatgrass	Vavilov II	0.75	0.70
G	Agropyron fragile	Siberian Wheatgrass	Vavilov II	0.50	0.48
G	Elymus lanceolatus	Thickspike Wheatgrass	Schwendimar	1.00	0.85
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.00	0.81
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.40	0.36
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.60	0.54
G	Psathyrostachys juncea	Russian Wildrye	'Bozoisky' NC	0.78	0.63
G	Psathyrostachys juncea	Russian Wildrye	'Bozoisky' NC	0.22	0.21
F	Medicago sativa	Alfalfa	Ladak	0.50	0.48
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.49
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.85
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver, UT	0.11	0.02
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver, UT	0.77	0.12
S	Artemisia tridentata ssp. wyomingensis	Wyoming Big Sagebrush	Beaver, UT	0.13	0.06
S	Bassia prostrata	Forage Kochia	Millard, UT	0.05	0.03
S	Bassia prostrata	Forage Kochia	Eureka, NV	0.13	0.07
S	Bassia prostrata	Forage Kochia	Elmore, ID	0.51	0.28
S	Bassia prostrata	Forage Kochia	Rocky Mountain	0.31	0.16
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.13	0.11
S	Purshia stansburiana	Stansbury Cliffrose	Millard UT	0.19	0.16

**Wildlife Habitat and Vegetation History****Table 27-09.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season	Brood/Young Rearing
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**Table 27-09.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1997	Mountain Big Sagebrush/Stansbury Cliffrose/Juniper	Phase I transitioning to Phase II
2003	Mountain Big Sagebrush/Stansbury Cliffrose/Juniper	Phase I transitioning to Phase II
2008	Mountain Big Sagebrush/Stansbury Cliffrose/Juniper	Phase I transitioning to Phase II
2013	Mountain Big Sagebrush/Stansbury Cliffrose/Juniper	Phase I transitioning to Phase II
2018	Mountain Big Sagebrush/Stansbury Cliffrose/Juniper	Phase I transitioning to Phase II
2023	Annual Grass	No Encroachment

**Site Notes**

This transect crosses the Utah/Arizona border. The browse tag number needs to be collected during the next sampling. As this site crosses into Arizona, the UTM coordinates are for the 500-foot stake, which is in Utah. Chaining as part of the fire rehabilitation treatment (Table 27-9.1) occurred on the Arizona portion of the transect, but not on the Utah portion. As a result, burnt pinyon and juniper skeletons were left standing on line 5, but not on lines 1-4. The 100 and 300-foot stakes were out of the ground in 2023 following treatment and were reset using the transect azimuth and GPS points. It was also noted in 2023 that there was no center rebar on belts 1 and 2.

**Soils****Table 27-09.5 - 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	7.4	41.7	32.7	25.6	2.6	25.7	121.6	0.4	08/12/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Shallow Loam (Cliffrose)
NRCS Ecological Site #	R035XY313UT
States and Transitions	1997-2018 - Current Potential State: Community Phase 2.1 2023 - Current Potential State: Community Phase 2.2

From study establishment in 1997 through the 2018 sample year, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Stansbury cliffrose (*Purshia stansburiana*) dominated the browse community. The Pole Hollow wildfire in 2020 removed almost all of the existing browse component, and forage kochia (*Bassia prostrata*) became the most abundant shrub in 2023 following a post-fire chaining and seeding treatment (Table 27-09.1, Table 27-09.12, Table 27-09.13). Pellet group data indicates that as of 2023, deer presence has decreased significantly following the fire and removal of the initial browse component (Table 27-09.9). The herbaceous understory has remained abundant throughout the study period. However, the introduced annual grass species cheatgrass (*Bromus tectorum*) has provided the most cover in all sample years and was the dominant vegetation component in the most recent sample year (Table 27-09.7, Table 27-09.10, Table 27-09.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were scattered across the site and increased in size and cover through the 2018 sampling. Although the fire removed trees from the site itself (Table 27-09.12, Table 27-09.14), extant pinyon and juniper in the immediate vicinity (Photos) indicate that there may be potential for infilling in future sample years.

Deer wintering range condition has ranged between very poor and poor since 1997. As of 2023, deer winter range condition was considered to be very poor. Improvements to winter habitat could be accomplished through efforts that increase cover in the preferred browse community, and increase cover and diversity of the perennial grass and forb components; decreasing cheatgrass cover would also greatly improve winter range for mule deer (Table 27-09.15). Pellet group data suggests that deer presence for all sample years has been moderate to high, and was considered to be moderate in 2023 (Table 27-09.9).

**Trend Summary Tables****Table 27-09.6 - 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
1997	18.7	1.1	3.6	-	-	-
2003	11.9	0.1	3.4	15.7	0.1	7.2
2008	7.5	-	2.8	12.8	-	9.3
2013	12.2	0.1	4.1	27.5	-	11.0
2018	13.7	1.8	6.5	18.2	0.4	12.8
2023	2.0	0.2	-	1.1	-	-

**Table 27-09.7 - 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
1997	453	48	14	18	25.4	0.4	0.0	0.0
2003	377	7	202	10	20.4	0.0	4.3	0.0
2008	353	8	72	5	7.6	0.0	0.2	0.0
2013	280	46	93	10	3.0	0.9	0.3	0.2
2018	391	29	34	-	15.6	0.5	0.1	-
2023	395	74	181	83	34.5	2.8	3.2	11.5

**Table 27-09.8 - 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
1997	5.8	0.6	47.8	19.4	4.4	38.2
2003	8.6	0.0	43.3	21.1	5.3	37.4
2008	7.9	0.3	67.4	13.7	5.2	20.0
2013	14.1	0.2	52.4	20.7	3.8	19.5
2018	13.7	1.4	57.2	21.4	9.1	33.9
2023	6.7	-	21.8	19.1	8.6	53.1

**Table 27-09.9 - 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			
1997	1	49	5	24
2003	3	31	1	14
2008	1	28	-	69
2013	-	26	-	11
2018	-	16	-	41
2023	-	5	-	1
Year	Days Use Per Acre (ha)			
1997	-	-	-	-
2003	4.4 (10.8)	98.5 (243.3)	0.7 (1.7)	-
2008	2.9 (7.2)	100.5 (248.3)	0.7 (1.7)	-
2013	0.7 (1.8)	38.2 (94.4)	-	-
2018	-	20.8 (51.3)	-	-
2023	0.7 (1.8)	2.7 (6.6)	-	-

**Table 27-09.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency												
1997	-	-	1	453	26	7	-	-	6	10	-	-	-
2003	-	-	-	368	1	1	-	-	-	5	-	-	38
2008	-	-	-	352	5	-	-	-	-	3	-	-	4
2013	-	-	-	280	32	-	2	-	1	14	-	-	1
2018	-	-	2	391	9	3	7	-	-	9	-	-	-
2023	35	1	-	395	6	-	-	8	-	-	6	24	1
year	Average Cover (%)												
1997	-	-	0.0	25.4	0.1	0.0	-	-	0.2	0.0	-	-	-
2003	-	-	-	20.2	0.0	0.0	-	-	-	0.0	-	-	0.2
2008	-	-	-	7.6	0.0	-	-	-	-	0.0	-	-	0.0
2013	-	-	-	3.0	0.8	-	0.0	-	0.0	0.1	-	-	0.0
2018	-	-	0.0	15.6	0.2	0.0	0.1	-	-	0.0	-	-	-
2023	1.1	0.1	-	34.5	0.2	-	-	0.3	-	-	0.1	1.0	0.0

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

**Table 27-09.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Erigeron (fleabane)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lomatium (desertparsley)	Microsteris gracilis <sup>a</sup> (slender phlox)	Phlox longifolia (longleaf phlox)	Plantago patagonica <sup>a</sup> (woolly plantain)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Silene antirrhina <sup>a</sup> (sleepy silene)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested Frequency																
1997	-	6	1	-	-	6	-	11	-	-	-	2	5	-	-	-	1
2003	-	-	28	5	46	-	25	138	-	23	-	16	-	2	-	2	10
2008	1	-	60	-	-	-	-	7	-	7	-	8	1	-	-	1	-
2013	-	-	86	-	-	-	3	2	-	1	-	3	2	-	4	-	7
2018	-	-	29	-	-	-	-	-	-	-	-	5	-	-	-	-	-
2023	11	5	85	19	4	-	53	16	1	6	1	11	-	-	44	1	70
year	Average Cover (%)																
1997	-	0.0	0.0	-	-	0.0	-	0.0	-	-	-	0.0	0.0	-	-	-	0.0
2003	-	-	0.1	0.0	0.3	-	1.0	2.7	-	0.1	-	0.1	-	0.0	-	0.0	0.0
2008	0.0	-	0.2	-	-	-	-	0.0	-	0.0	-	0.0	0.0	-	-	0.0	-
2013	-	-	0.2	-	-	-	0.0	0.0	-	0.0	-	0.0	0.0	-	0.0	-	0.2
2018	-	-	0.1	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-
2023	0.1	0.0	0.2	0.1	0.0	-	1.2	0.5	0.0	0.0	0.0	0.0	-	-	1.0	0.0	11.4

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

FORB SPECIES	unknown annual forb <sup>a</sup> (unknown forb)	Zigadenus paniculatus (foothill deathcamas)
year	Nested	
1997	-	-
2003	6	-
2008	-	3
2013	-	1
2018	-	-
2023	-	1
year	Average Cover (%)	
1997	-	-
2003	0.0	-
2008	-	0.0
2013	-	0.0
2018	-	-
2023	-	0.0

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



**Table 27-09.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Cylindropuntia whipplei (Whipple cholla)	Ephedra viridis <sup>p</sup> (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)								
1997	-	-	-	-	-	-	-	-	-
2003	7.3	-	-	-	0.1	7.2	-	8.4	-
2008	7.1	-	-	0.1	-	9.3	-	5.6	-
2013	12.2	-	-	0.3	-	11	-	15	-
2018	12.2	-	-	0.4	0.4	12.8	0	5.6	-
2023	-	1.1	-	-	-	-	-	-	-
year	Quadrat Cover (%)								
1997	12.1	-	-	0.1	1.1	3.6	0.0	6.5	-
2003	8.7	-	-	0.4	0.1	3.4	0.0	2.8	-
2008	6.4	-	-	0.4	-	2.8	-	0.8	-
2013	10.8	-	-	0.5	0.1	4.1	-	0.9	-
2018	10.1	-	0.0	0.4	1.6	6.5	0.1	3.1	0.1
2023	-	1.7	0.1	0.4	0.0	-	0.0	-	-

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

**Table 27-09.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1997	2920	640	25	41	34	30	9	15	74/94
2003	2180	-	10	46	44	4	0	12	80/81
2008	1700	-	0	25	75	25	18	55	84/91
2013	1980	140	18	51	31	30	0	32	87/105
2018	2100	-	6	66	29	16	22	33	80/91
2023	40	-	0	0	100	0	0	100	- / -
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	1080	13540	22	78	0	0	0	0	- / -
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	37/59
2008	-	-	-	-	-	-	-	-	28/66
2013	20	-	100	0	0	0	0	0	28/93
2018	20	-	0	100	0	0	0	0	28/90
2023	20	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
1997	60	-	0	100	0	0	0	0	72/77
2003	-	-	-	-	-	-	-	-	89/122
2008	40	-	0	50	50	50	0	0	91/129
2013	40	-	0	100	0	0	0	0	92/131
2018	40	-	0	100	0	0	0	0	86/114
2023	40	-	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	1120	-	5	86	9	0	0	9	21/26
2003	860	400	51	49	0	0	0	0	16/17
2008	-	-	-	-	-	-	-	-	- / -
2013	300	-	0	93	7	0	0	27	20/26
2018	1080	-	2	83	15	6	0	22	13/17
2023	120	-	17	83	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1997	140	-	14	86	0	0	0	0	- / -
2003	100	-	0	100	0	0	0	0	- / -
2008	120	-	17	67	17	0	0	0	- / -
2013	120	-	0	100	0	0	0	0	- / -
2018	140	-	29	71	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Opuntia -- (pricklypear)</b>									
1997	80	-	50	50	0	0	0	0	16/37
2003	40	-	0	100	0	0	0	0	15/46
2008	40	-	0	100	0	0	0	0	12/18
2013	60	-	0	67	33	0	0	0	20/46
2018	60	-	0	100	0	0	0	0	56/79
2023	20	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	19/60
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	7/10
2018	-	-	-	-	-	-	-	-	146/54
2023	-	-	-	-	-	-	-	-	- / -
<b>Purshia stansburiana<sup>P</sup> -- (Stansbury cliffrose)</b>									
1997	240	20	8	75	17	17	0	8	260/256
2003	360	-	6	78	17	6	17	0	244/252
2008	220	-	9	18	73	18	0	55	219/206
2013	200	-	0	80	20	20	10	10	254/254
2018	160	-	13	63	25	0	0	25	244/224
2023	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	29/65
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Sclerocactus -- (fishhook cactus)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	23/65
2013	-	-	-	-	-	-	-	-	17/37
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Yucca -- (yucca)</b>									
1997	-	-	-	-	-	-	-	-	52/82
2003	-	-	-	-	-	-	-	-	77/101
2008	-	-	-	-	-	-	-	-	51/72
2013	-	-	-	-	-	-	-	-	67/88
2018	-	-	-	-	-	-	-	-	76/79

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

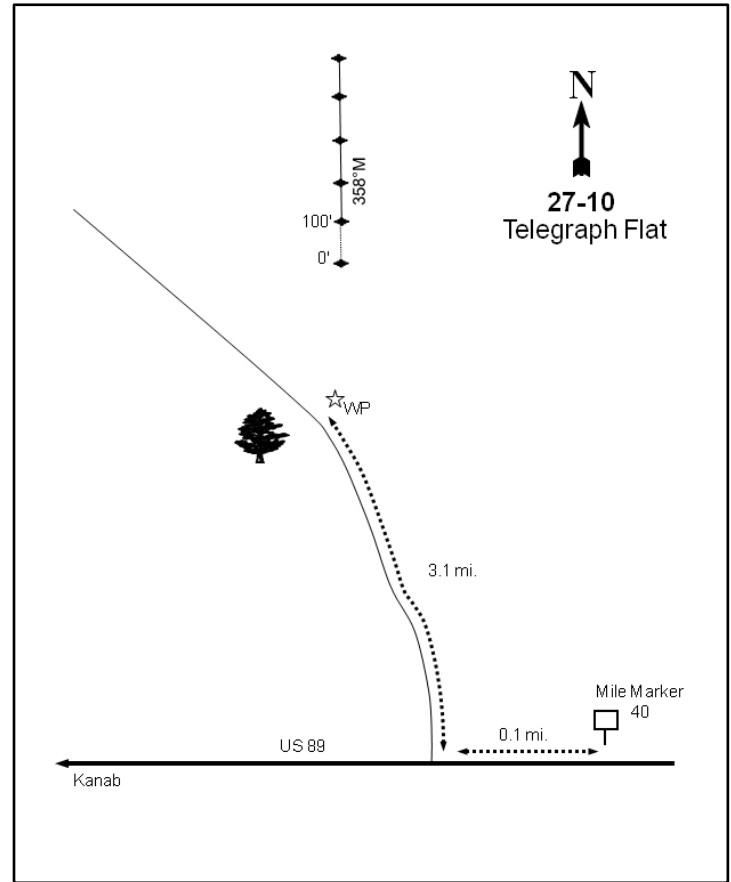
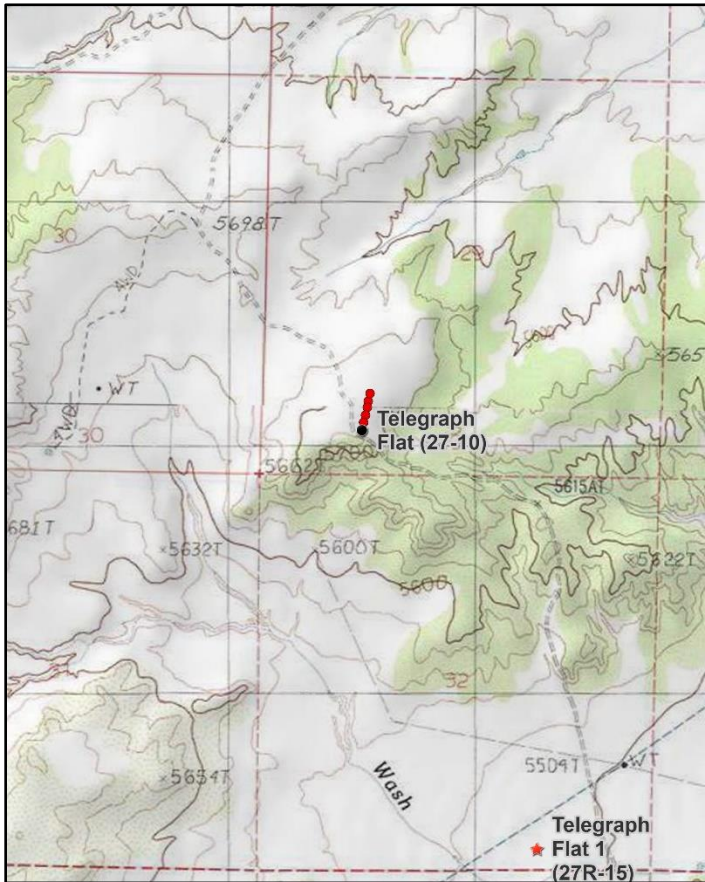
**Table 27-09.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2003	76	-	5	47	21	26	17.3
2008	72	6	22	44	17	11	19.9
2013	68	-	5	26	42	26	20.9
2018	96	-	10	35	30	25	19.7
<b>Pinus edulis (twoneedle pinyon)</b>							
2013	3	-	33	-	33	33	23.0
2018	17	-	100	-	-	-	3.0
<b>Purshia stansburiana (Stansbury cliffrose)</b>							
2003	58	-	11	22	56	11	25.8
2008	66	-	22	33	33	11	30.7

**Table 27-09.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	25.0	6.7	9.6	0.7	-19.0	0.1	0.0	<b>23.1</b>	Very Poor
2003	21.7	6.2	3.8	0.1	-15.3	0.0	0.0	<b>16.6</b>	Very Poor
2008	17.4	-7.2	2.0	0.1	-5.7	0.0	0.0	<b>6.6</b>	Very Poor
2013	30.0	7.6	4.0	1.8	-2.3	0.4	0.0	<b>41.5</b>	Poor
2018	24.2	6.9	3.8	0.9	-11.7	0.0	0.0	<b>24.2</b>	Very Poor
2023	1.7	0.0	0.0	5.7	-20.0	10.0	0.0	<b>-2.7</b>	Very Poor

## TELEGRAPH FLAT - STUDY NO. 27-10

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Petrified Hollow NE; Township 42S, Range 3W, Section 29  
NAD 83 UTM ZONE 12, 397490 East 4109264 North

**Transect Information**

Browse Tag # (0' Stake)	664
Transect Bearing	0° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

From mile marker #40 on Highway 89 east of Kanab, travel east for 0.1 mile to a road on the north side of the highway. Turn right (north) and travel for 2.7 miles to a witness post on the right (northeast) side of the road. From the witness post walk 14 paces at 0 degrees magnetic to the 0-foot stake marked with browse tag #664. The study runs north and is marked by green, steel fenceposts approximately 12-18 inches in height.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	MOLLIES NIPPLE
Elevation	5,710ft (1,740m)
Aspect	Northwest
Slope	2%
Sample Dates	08/12/1997, 08/05/2003, 07/28/2008, 08/06/2013, 07/11/2018, 07/11/2023

**Table 27-10.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Jenny Clay Flex Harrow	3786	December 2017-February 2018	1342
Seeding - Aerial Before	Jenny Clay Flex Harrow	3786	December 2017-February 2018	1342
Chaining - Two-Way Chain Unknown	Clay Hole Chaining	-	1966	-
Seeding - Aerial Before	Clay Hole Chaining	-	1966	-
Hand Crew - Lop and Scatter	Five Mile Mountain Habitat Restoration Phase III	1169	Fall 2008-Spring 2009	1043

**Table 27-10.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Jenny Clay			Aerial	Feb 2018	1550
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Paloma	1.03	1.00
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	1.97	1.89
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	2.00	1.90
G	Elymus wawawaiensis	Snake River Wheatgrass	Discovery	2.00	1.76
G	Pascopyrum smithii	Western Wheatgrass	Recovery	2.00	1.78
G	Sporobolus cryptandrus	Sand Dropseed		0.10	0.09
F	Achillea millefolium	Western Yarrow	Eagle	0.10	0.09
F	Linum perenne	Blue Flax	Appar	0.26	0.22
F	Melilotus officinalis	Yellow Sweetclover		0.52	0.48
F	Penstemon palmeri	Palmer Penstemon	Carbon UT	0.01	0.01
F	Penstemon palmeri	Palmer Penstemon	Sevier UT	0.06	0.05
S	Atriplex canescens	Fourwing Saltbush	Kane UT	0.26	0.15
S	Purshia tridentata	Bitterbrush	Elko NV	0.45	0.44
S	Purshia tridentata	Bitterbrush	Rocky Mountain	0.06	0.04

**Wildlife Habitat and Vegetation History****Table 27-10.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 27-10.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1997	Wyoming Big Sagebrush	Phase I
2003	Wyoming Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Wyoming Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Wyoming Big Sagebrush/Stansbury Cliffrose	Phase I
2018	Wyoming Big Sagebrush	Phase I
2023	Wyoming Big Sagebrush	Phase I

**Site Notes**

In 2018 it was found that the area had been chained and that nearly all stakes had been removed. New stakes were placed (where necessary) using photos and GPS points to match the original transect as closely as possible.

**Soils****Table 27-10.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	7.2	62.4	19.1	18.6	1.3	20.2	124.8	0.6	08/11/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation	10 inches
NRCS Ecological Site	Upland Shallow Loam (Cliffrose)
NRCS Ecological Site #	R035XY313UT
States and Transitions	1997-2013 - Current Potential State: Community Phase 2.3 2018 - Current Potential State: Community Phase Undefined 2023 - Current Potential State: Community Phase 2.2

From study establishment in 1997 through the 2013 sample year, this site was dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) with a minor component of Stansbury cliffrose (*Purshia stansburiana*). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were also present, and the study was considered to be within Phase I transitioning to Phase II of woodland succession in 2003 and 2008. Most of the trees were removed by a 2008/2009 lop and scatter treatment, and the site was classified as being in Phase I of woodland succession in 2013. A chaining and seeding treatment in the winter of 2017/2018 (Table 27-10.1) further removed the tree component and a majority of the shrubs; although cover and density decreased significantly in 2018, sagebrush was still the dominant vegetation component that year. In addition, sagebrush cover and density increased between 2018 and 2023, indicating that the community is recovering (Table 27-10.4, Table 27-10.12, Table 27-10.13, Table 27-10.14). The herbaceous understory was comprised mostly of the introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) in 1997, but crested wheatgrass was not observed and understory vegetation was limited through the 2018 year. However, cover, abundance, and diversity of the herbaceous understory increased between the two most recent samplings; native perennial grass species such as sand dropseed (*Sporobolus cryptandrus*), Indian ricegrass (*Achnatherum hymenoides*), and squirreltail (*Elymus elymoides*) were the dominant herbaceous component in 2023. The introduced annual grass species cheatgrass (*Bromus tectorum*) was observed in 2023 for the first time since 1997, but in low amounts (Table 27-10.7, Table 27-10.10, Table 27-10.11). A limited number of small trees have remained following the chaining, indicating the potential for future infilling (Table 27-10.14).

Condition of deer winter range on this site has varied between very poor and fair since 1997; as of 2023, deer winter range was considered to be in fair condition. Improving this range could be accomplished through efforts that increase preferred browse cover and recruitment of young. Diversifying and increasing cover of the perennial forb and grass components while removing cheatgrass would also be beneficial for deer winter range (Table 27-10.15). Pellet group data indicates that deer presence was low in 2023 (Table 27-10.9).

**Trend Summary Tables****Table 27-10.6 - 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
1997	13.4	0.4	2.9	-	-	-
2003	15.6	0.2	4.6	17.5	-	6.6
2008	14.9	0.0	6.0	23.9	-	7.8
2013	16.4	0.0	0.1	29.4	0.1	0.7
2018	2.3	0.3	-	1.8	-	-
2023	11.2	2.7	-	15.2	4.6	-

**Table 27-10.7 - 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
1997	12	264	11	15	0.0	6.1	0.0	0.2
2003	-	33	29	101	-	0.3	1.0	2.6
2008	4	13	2	23	0.0	0.1	0.0	0.1
2013	3	13	-	3	0.0	0.2	-	0.0
2018	-	-	1	10	-	-	0.0	0.0
2023	47	127	148	120	0.2	7.4	2.2	1.0

**Table 27-10.8 - 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
1997	49.4	4.7	28.0	0.1	-	22.5
2003	48.3	6.7	34.1	0.1	-	24.4
2008	49.4	3.3	38.4	0.1	-	21.5
2013	50.9	3.1	37.0	1.0	0.1	16.3
2018	79.3	0.0	29.2	0.3	0.1	3.0
2023	50.0	0.0	43.1	0.2	0.0	21.7

**Table 27-10.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency					
1997	-	-	19	3	-	18
2003	7	-	24	-	-	19
2008	7	-	20	1	-	78
2013	2	-	13	-	-	13
2018	-	-	3	-	-	3
2023	-	-	5	1	-	18
Year	Days Use Per Acre (ha)					
1997	-	-	-	-	-	-
2003	16.7 (41.2)	-	28.1 (69.5)	-	-	-
2008	2.2 (5.4)	8.7 (21.5)*	28.8 (71.2)	-	-	-
2013	1.5 (3.6)	-	7.4 (18.2)	-	-	-
2018	-	-	-	-	-	-
2023	2.9 (7.2)	-	7.4 (18.2)	-	0.6 (1.4)	-

\*Pellets per acre (ha)

**Table 27-10.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency											
1997	8	252	8	2	3	-	-	8	-	-	-	10
2003	6	-	21	-	6	-	-	-	-	-	-	-
2008	1	-	-	-	12	-	-	-	-	-	-	4
2013	1	-	-	-	8	-	-	-	4	-	-	3
2018	-	-	-	-	-	-	-	-	-	-	-	-
2023	10	-	-	9	29	12	11	-	2	15	66	38
year	Average Cover (%)											
1997	0.1	5.8	0.2	0.0	0.0	-	-	0.0	-	-	-	0.0
2003	0.0	-	0.2	-	0.0	-	-	-	-	-	-	-
2008	0.0	-	-	-	0.1	-	-	-	-	-	-	0.0
2013	0.0	-	-	-	0.1	-	-	-	0.2	-	-	0.0
2018	-	-	-	-	-	-	-	-	-	-	-	-
2023	1.5	-	-	0.1	1.1	0.5	0.7	-	0.0	0.7	2.8	0.1

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

**Table 27-10.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Castilleja (Indian paintbrush)	Chamaesyce (sandmat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Frasera albomarginata (desert frasera)	Gilia inconspicua <sup>a</sup> (shy gilia)	Ipomopsis congesta (ballhead ipomopsis)	Linum perenne <sup>i</sup> (blue flax)	Machaeranthera canescens (hoary tansyaster)	Melilotus officinalis <sup>i</sup> (sweetclover)	Microsteris gracilis <sup>a</sup> (slender phlox)	Phlox austromontana (mountain phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Silene antirrhina <sup>a</sup> (sleepy silene)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested Frequency																
1997	1	5	0	1	-	-	-	2	-	-	-	-	3	8	-	3	-
2003	-	-	3	-	-	1	-	29	89	-	1	-	-	7	-	-	1
2008	-	-	-	-	-	1	4	-	18	-	-	-	2	-	-	-	-
2013	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	1
2018	-	2	-	-	2	1	-	-	3	1	-	1	-	-	1	-	-
2023	3	-	4	-	-	6	2	109	104	-	-	-	-	2	55	13	2
year	Average Cover (%)																
1997	0.0	0.0	0.0	0.0	-	-	-	0.0	-	-	-	-	0.0	0.2	-	0.0	-
2003	-	-	0.0	-	-	0.0	-	1.0	2.5	-	0.0	-	-	0.1	-	-	0.0
2008	-	-	-	-	-	0.0	0.0	-	0.0	-	-	-	0.0	-	-	-	-
2013	-	-	0.0	-	-	0.0	-	-	-	-	-	-	-	-	-	-	0.0
2018	-	0.0	-	-	0.0	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	-	-
2023	0.0	-	0.0	-	-	0.2	0.0	1.0	0.7	-	-	-	-	0.0	1.1	0.2	0.0

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

FORB SPECIES	Stephanomeria exigua (small wirelettuce)	unknown annual forb <sup>a</sup> (unknown forb)
year	Nested	
1997	-	3
2003	2	-
2008	-	-
2013	-	-
2018	-	-
2023	3	-
year	Average Cover (%)	
1997	-	0.0
2003	0.0	-
2008	-	-
2013	-	-
2018	-	-
2023	0.0	-

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



**Table 27-10.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Ephedra viridis <sup>p</sup> (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	Yucca (yuca)
year	Line Intercept Cover (%)							
1997	-	-	-	-	-	-	-	-
2003	-	13.6	-	-	2.6	4	3.9	-
2008	-	19.5	-	-	3.4	4.4	4.4	-
2013	-	21.2	-	0.1	0.7	-	8.2	-
2018	-	1.7	-	-	-	-	0.1	-
2023	-	14.7	-	4.6	-	-	0.5	-
year	Quadrat Cover (%)							
1997	0.0	11.5	-	-	1.3	1.7	1.9	0.4
2003	-	13.2	-	0.2	2.0	2.6	2.3	-
2008	-	13.4	0.0	0.0	3.1	2.9	1.5	-
2013	-	14.2	0.4	0.0	0.1	-	1.9	-
2018	-	2.3	-	0.3	-	-	0.0	-
2023	-	11.2	-	2.7	-	-	0.0	-

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

**Table 27-10.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	30/28
2013	-	-	-	-	-	-	-	-	109/105
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	60/53
2018	-	-	-	-	-	-	-	-	33/58
2023	40	-	0	100	0	0	0	0	-/-
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
1997	12760	140	50	40	10	55	12	4	49/71
2003	8340	-	1	57	42	13	30	21	43/57
2008	9180	1480	12	37	50	48	30	10	52/68
2013	6960	20	28	63	9	66	12	10	58/93
2018	2200	40	8	56	36	0	0	24	25/32
2023	2900	700	19	80	1	0	0	1	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	55/40
2008	20	-	0	0	100	0	0	100	57/36
2013	40	-	50	50	0	0	0	0	69/48
2018	-	-	-	-	-	-	-	-	42/46
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1997	80	-	100	0	0	100	0	0	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	100	-	0	80	20	0	0	0	24/26
2003	280	-	7	93	0	0	0	0	19/22
2008	100	-	20	60	20	0	0	0	20/22
2013	100	100	20	80	0	0	0	0	23/23
2018	240	-	0	100	0	0	0	0	14/17
2023	4440	40	13	80	7	0	0	7	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1997	80	-	25	75	0	0	0	0	-/-
2003	60	-	0	100	0	0	0	0	-/-
2008	80	-	50	50	0	0	0	0	-/-
2013	40	-	100	0	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	9/22
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
1997	40	-	0	100	0	0	0	0	-/-
2003	40	-	0	100	0	0	0	0	-/-
2008	20	-	0	100	0	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia stansburiana<sup>P</sup> -- (Stansbury cliffrose)</b>									
1997	400	-	55	40	5	60	0	0	143/160
2003	320	-	25	56	19	13	69	0	128/150
2008	380	-	5	26	68	26	53	21	120/138
2013	360	-	22	44	33	22	33	28	136/151
2018	120	-	50	17	33	0	0	33	37/65
2023	140	-	14	86	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Yucca -- (yucca)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	48/60
2008	-	-	-	-	-	-	-	-	54/58
2013	-	-	-	-	-	-	-	-	59/73
2018	-	-	-	-	-	-	-	-	27/41

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

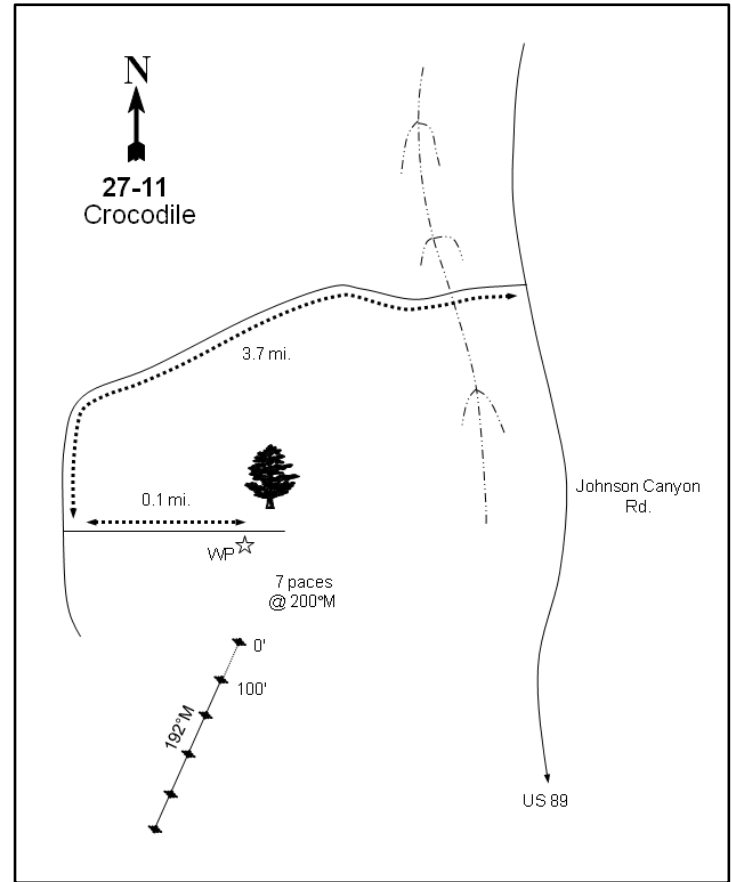
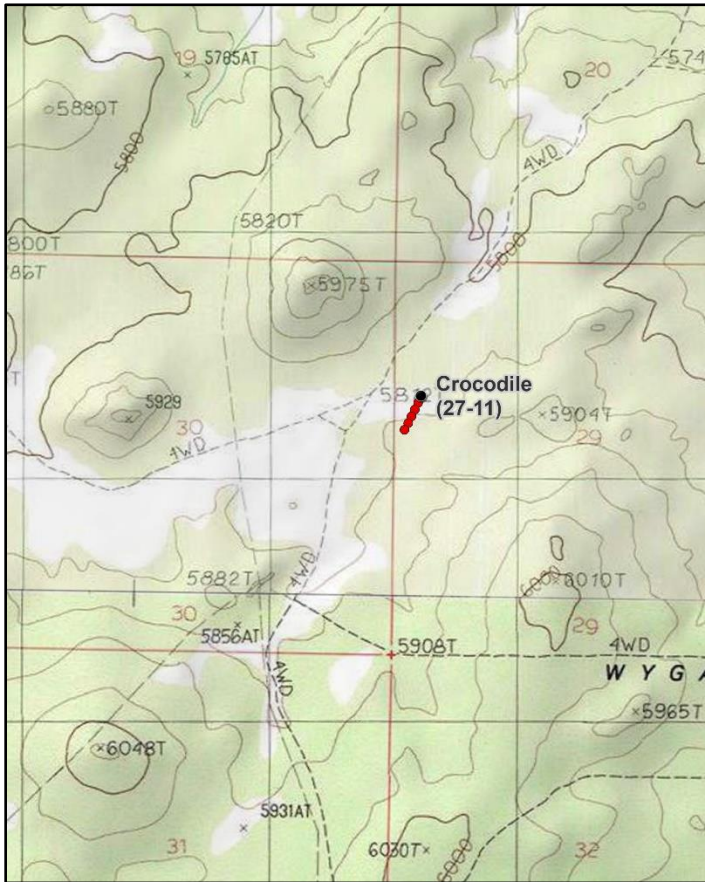
**Table 27-10.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2003	28	21	36	43	-	-	6.8
2008	26	-	62	31	8	-	15.1
2018	12	-	100	-	-	-	3.0
2023	5	20	80	-	-	-	6.8
<b>Pinus edulis (twoneedle pinyon)</b>							
2003	16	-	-	82	18	-	13.7
2008	17	-	23	46	31	-	12.8
2018	5	-	100	-	-	-	6.0
2023	1	-	100	-	-	-	4.0

**Table 27-10.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	17.3	12.2	15.0	12.3	0.0	0.5	0.0	<b>57.2</b>	Fair
2003	22.9	3.9	3.2	0.6	0.0	5.2	0.0	<b>35.7</b>	Very Poor-Poor
2008	30.0	-1.1	5.5	0.2	0.0	0.2	0.0	<b>34.8</b>	Very Poor-Poor
2013	30.0	10.3	13.3	0.5	0.0	0.1	0.0	<b>54.1</b>	Fair
2018	2.3	0.0	0.0	0.0	0.0	0.1	0.0	<b>2.3</b>	Very Poor
2023	19.1	14.6	9.2	14.7	-0.2	2.0	0.0	<b>59.5</b>	Fair

## CROCODILE - STUDY NO. 27-11

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Cutler Point SW; Township 42S, Range 5W, Section 29  
NAD 83 UTM ZONE 12, 371555 East 4110527 North

**Transect Information**

Browse Tag # (0' Stake)	59
Transect Bearing	192° 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 Church of Jesus Christ of Latter Day Saints meetinghouse in Alton, travel south for 10.8 miles to an intersection. Turn left at this intersection and continue towards Kanab. Continue for 6.8 miles to another intersection, then turn south on the pavement and go 9.8 miles to another intersection. Turn right (west) and travel for 0.1 miles to a left fork. Take this fork and travel for 3.7 miles across a large wash to a two-track road on the left. Continue for 0.1 miles to a witness post on the right (south) side of the road. From the witness post, walk 7 paces at 200 degrees magnetic to the 0-foot stake which is marked with browse tag #59.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	OAK SPRINGS
Elevation	5,820ft (1,774m)
Aspect	North-Northwest
Slope	3-10%
Sample Dates	08/19/1997, 07/15/2003, 07/15/2008, 07/31/2013, 07/11/2018, 07/12/2023

**Table 27-11.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Seed Unknown	-	-	1960s	-

**Wildlife Habitat and Vegetation History****Table 27-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 27-11.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1997	Mountain Big Sagebrush/Bitterbrush	Phase I
2003	Mountain Big Sagebrush/Bitterbrush	Phase I
2008	Mountain Big Sagebrush/Bitterbrush	Phase I
2013	Mountain Big Sagebrush/Bitterbrush	Phase I
2018	Mountain Big Sagebrush/Bitterbrush	Phase I
2023	Mountain Big Sagebrush/Bitterbrush	Phase I

**Site Notes**

In 1997, it was noted that the herbaceous vegetation was heavily utilized. A water trough is located approximately a quarter of a mile to the west of the site.

**Soils****Table 27-11.5 - 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
Fine Sand	5.8	91.7	2.4	5.9	0.3	9.6	19.2	0.2	08/19/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Upland Sand (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY307UT
States and Transitions	1997-2023 - State Undefined: Community Phase Undefined

Since study establishment in 1997, the plant community of this site has remained in a stable state as a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*). Other shrub species are present, but provide less cover (Table 27-11.12, Table 27-11.13). The herbaceous understory has fluctuated in abundance throughout the study period. Native perennial grasses have comprised much of the herbaceous component over the study years, with species such as sand dropseed (*Sporobolus cryptandrus*), western wheatgrass (*Pascopyrum smithii*), and sandhill muhly (*Muhlenbergia pungens*) contributing the most cover in 2023. The introduced annual grass species cheatgrass (*Bromus tectorum*) was present in 2013 and 2018 in low amounts, but was not observed in 2023 (Table 27-11.7, Table 27-11.10, Table 27-11.11). Utah juniper (*Juniperus osteosperma*) is scattered across the site, but is more prevalent in areas adjacent to the transect (Photos, Table 27-11.14). Without a tree-removing disturbance, juniper will likely continue to encroach over time.

Deer winter range condition on this site has ranged between very poor and fair since 1997. Condition of winter habitat was considered to be fair as of 2023. Improvements to deer winter range could be achieved by increasing recruitment of young and decreasing decadence in the preferred browse community. In addition, improvement could also come from diversifying and increasing the cover of perennial grasses and forbs (Table 27-11.15). Pellet group data suggests that deer presence has been high in most sample years (Table 27-11.9).

## Trend Summary Tables

**Table 27-11.6 - 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
1997	14.1	1.4	-	-	-	-
2003	15.0	1.2	-	22.3	1.7	-
2008	14.4	0.8	-	24.5	1.4	-
2013	18.9	2.2	-	24.6	2.7	-
2018	16.4	1.1	-	27.8	0.8	-
2023	15.9	1.4	-	22.6	2.0	-

**Table 27-11.7 - 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
1997	54	226	11	27	0.1	4.1	0.0	0.1
2003	-	140	42	34	-	2.5	0.6	0.5
2008	-	89	1	3	-	1.0	0.0	0.0
2013	16	119	140	73	0.2	3.1	2.6	1.1
2018	1	150	15	39	0.0	6.6	0.3	0.4
2023	-	269	46	79	-	11.6	0.6	0.8

**Table 27-11.8 - 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
1997	54.8	0.3	33.9	0.1	0.0	18.7
2003	55.4	1.1	39.4	0.0	0.1	20.5
2008	53.9	0.5	44.1	0.3	0.1	17.2
2013	44.2	0.7	36.0	0.2	0.0	29.6
2018	55.9	2.4	41.2	0.1	0.0	25.3
2023	45.9	0.6	45.8	0.1	0.0	26.3

**Table 27-11.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
1997	6	44	8	-	29
2003	2	37	-	-	16
2008	2	34	-	-	81
2013	1	39	2	1	12
2018	1	36	-	-	28
2023	3	61	5	-	6
Year	Days Use Per Acre (ha)				
1997	-	-	-	-	-
2003	12.3 (30.5)	88.5 (218.5)	-	-	-
2008	5.8 (14.3)	21.5 (53.0)	-	-	-
2013	1.5 (3.6)	60.3 (149.0)	-	-	-
2018	1.5 (3.6)	74.4 (183.7)	-	-	-
2023	9.4 (23.3)	83.1 (205.3)	-	-	-

**Table 27-11.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Muhlenbergia pungens (sandhill muly)	Pascopyrum smithii (western wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency										
1997	0	43	-	19	-	10	106	49	-	60	54
2003	31	-	2	15	-	2	73	26	-	8	-
2008	17	-	-	13	-	1	13	39	-	10	-
2013	18	-	-	26	5	5	16	18	13	51	11
2018	43	-	-	45	1	2	21	27	-	47	-
2023	12	-	-	45	-	0	12	22	50	181	-
year	Average Cover (%)										
1997	0.0	0.3	-	0.1	-	0.1	1.5	1.6	-	0.4	0.1
2003	0.4	-	0.0	0.3	-	0.1	1.3	0.4	-	0.0	-
2008	0.2	-	-	0.1	-	0.0	0.1	0.6	-	0.1	-
2013	0.5	-	-	0.9	0.0	0.2	0.1	1.0	0.1	0.3	0.2
2018	0.9	-	-	1.7	0.0	0.0	0.1	3.0	-	0.8	-
2023	0.7	-	-	0.9	-	0.0	0.6	1.7	1.8	5.9	-

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

**Table 27-11.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Abronia fragrans (snowball sand verbena)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Chamaesyce (sandmat)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Delphinium nuttallianum (two-lobed larkspur)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lotus utahensis (Utah bird's-foot trefoil)	Oenothera pallida <sup>a</sup> (pale evening primrose)	Plantago patagonica <sup>a</sup> (woolly plantain)	Psoraleidum tenuiflorum (slimflower scurfpea)	Senecio spartioides (broom-like ragwort)
year	Nested Frequency																
1997	-	-	14	-	-	6	-	-	3	-	-	3	-	-	5	4	-
2003	-	3	-	-	-	10	-	-	-	12	-	-	-	10	27	6	-
2008	-	-	-	-	-	-	1	-	-	1	-	-	0	-	-	-	-
2013	-	-	-	-	52	18	3	-	1	-	1	-	-	109	34	6	-
2018	3	5	14	-	-	12	2	-	4	-	1	4	-	1	7	-	1
2023	5	10	2	5	-	1	8	1	2	2	15	-	-	41	4	4	-
year	Average Cover (%)																
1997	-	-	0.0	-	-	0.1	-	-	0.0	-	-	0.0	-	-	0.0	0.0	-
2003	-	0.0	-	-	-	0.3	-	-	-	0.1	-	-	-	0.2	0.3	0.0	-
2008	-	-	-	-	-	-	0.0	-	-	0.0	-	-	0.0	-	-	-	-
2013	-	-	-	-	0.3	0.4	0.0	-	0.0	-	0.0	-	-	2.5	0.1	0.1	-
2018	0.0	0.0	0.0	-	-	0.2	0.0	-	0.0	-	0.0	0.0	-	0.2	0.0	-	0.0
2023	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.1	-	-	0.5	0.0	0.3	-

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

FORB SPECIES	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested
1997	3
2003	19
2008	2
2013	28
2018	5
2023	38
year	Average Cover (%)
1997	0.0
2003	0.1
2008	0.0
2013	0.2
2018	0.0
2023	0.3

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

**Table 27-11.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia filifolia (sand sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca <sup>p</sup> (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Linanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Yucca (yucca)
year	Line Intercept Cover (%)								
1997	-	-	-	-	-	-	-	-	-
2003	0.6	11.6	0.4	0.7	-	0	-	10	0.7
2008	0.7	14.4	-	1.4	0.1	-	-	8.7	0.6
2013	1.1	14.4	-	2.2	1.6	-	-	8	-
2018	0.5	12.5	-	2.2	0.2	0.1	-	13.1	-
2023	0.9	11.9	1	0.9	0.1	-	-	9.8	-
year	Quadrat Cover (%)								
1997	0.1	7.9	-	0.3	1.1	0.0	0.0	6.0	0.1
2003	0.8	8.9	0.0	0.1	0.1	0.1	-	5.9	0.1
2008	0.4	9.5	-	0.3	0.1	0.0	-	4.6	0.4
2013	0.8	11.6	0.0	1.0	1.3	0.0	-	6.3	-
2018	0.6	7.4	-	1.1	0.4	0.0	0.0	7.9	-
2023	0.6	8.0	0.2	0.4	0.5	0.0	-	7.5	-

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



**Table 27-11.13 - 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 (%)				
<b>Artemisia filifolia -- (sand sagebrush)</b>									
1997	60	-	0	100	0	0	0	0	51/50
2003	120	-	0	67	33	0	0	0	58/46
2008	80	-	0	25	75	100	0	0	87/86
2013	100	-	20	80	0	0	0	20	72/83
2018	60	-	0	100	0	0	0	0	75/106
2023	60	-	0	100	0	0	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1997	2860	280	28	60	12	32	7	8	88/109
2003	2340	-	13	30	57	53	1	27	83/90
2008	1860	40	5	53	42	31	5	18	101/123
2013	1520	-	3	70	28	58	21	21	86/125
2018	1680	20	7	57	36	5	0	13	89/108
2023	1740	-	5	51	45	13	2	45	- / -
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	54/57
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	18/39
2018	-	-	-	-	-	-	-	-	47/69
2023	40	-	0	100	0	0	0	0	- / -
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	111/116
2008	-	-	-	-	-	-	-	-	140/183
2013	-	-	-	-	-	-	-	-	105/158
2018	-	-	-	-	-	-	-	-	144/171
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1997	400	-	15	70	15	0	0	5	62/78
2003	280	-	0	57	43	0	0	7	75/89
2008	240	-	0	0	100	25	8	17	83/119
2013	260	-	8	77	15	15	15	31	73/106
2018	200	-	20	80	0	0	0	20	77/110
2023	60	-	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	1620	-	9	85	6	0	0	6	19/27
2003	1020	-	73	24	4	0	0	0	21/23
2008	680	-	6	68	27	15	3	24	13/16
2013	2320	40	23	74	3	1	0	1	20/31
2018	720	20	11	81	8	0	0	8	19/17
2023	180	-	11	89	0	0	0	0	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1997	120	-	0	100	0	0	0	0	14/8
2003	340	-	0	100	0	0	0	0	12/15
2008	80	-	25	50	25	0	0	25	- / -
2013	100	140	0	100	0	80	0	0	18/23
2018	140	-	0	100	0	57	43	0	11/15
2023	160	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1997	60	-	0	100	0	0	0	0	9/17
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	10/23
2013	-	-	-	-	-	-	-	-	-/-
2018	60	-	33	67	0	0	0	67	8/22
2023	80	-	25	50	25	0	0	25	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1997	900	-	9	89	2	36	56	2	89/129
2003	1160	-	2	71	28	10	86	10	88/130
2008	780	-	8	44	49	23	10	36	82/133
2013	780	-	8	82	10	31	56	10	88/152
2018	1000	-	6	84	10	32	16	2	87/120
2023	1300	-	12	57	31	20	43	34	-/-
<b>Yucca -- (yucca)</b>									
1997	20	-	0	100	0	0	0	0	51/94
2003	20	-	0	100	0	0	0	0	99/145
2008	20	-	0	100	0	100	0	0	102/106
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	41/43

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

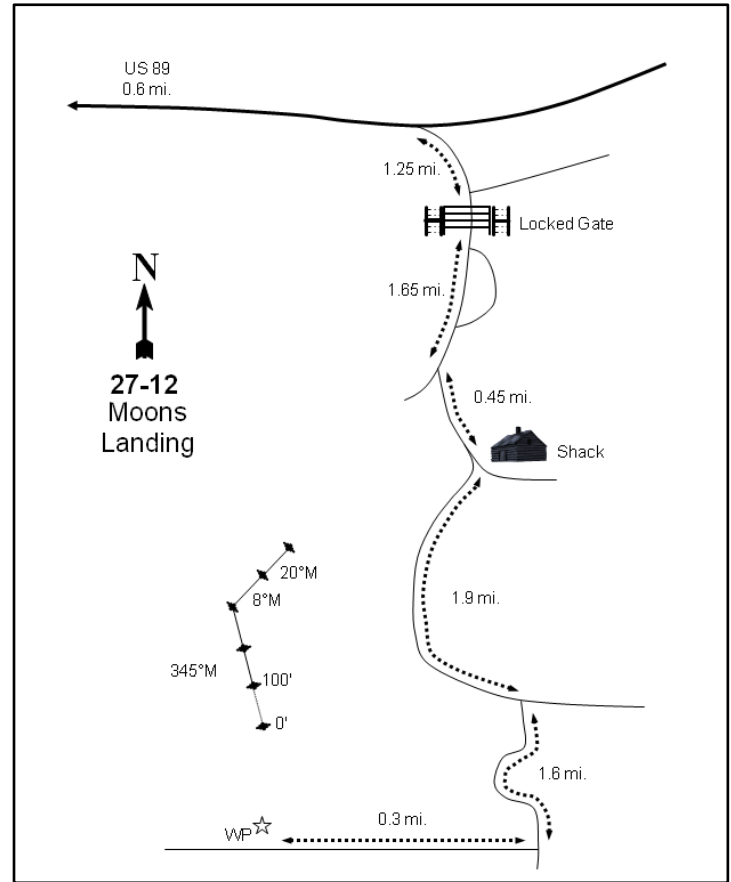
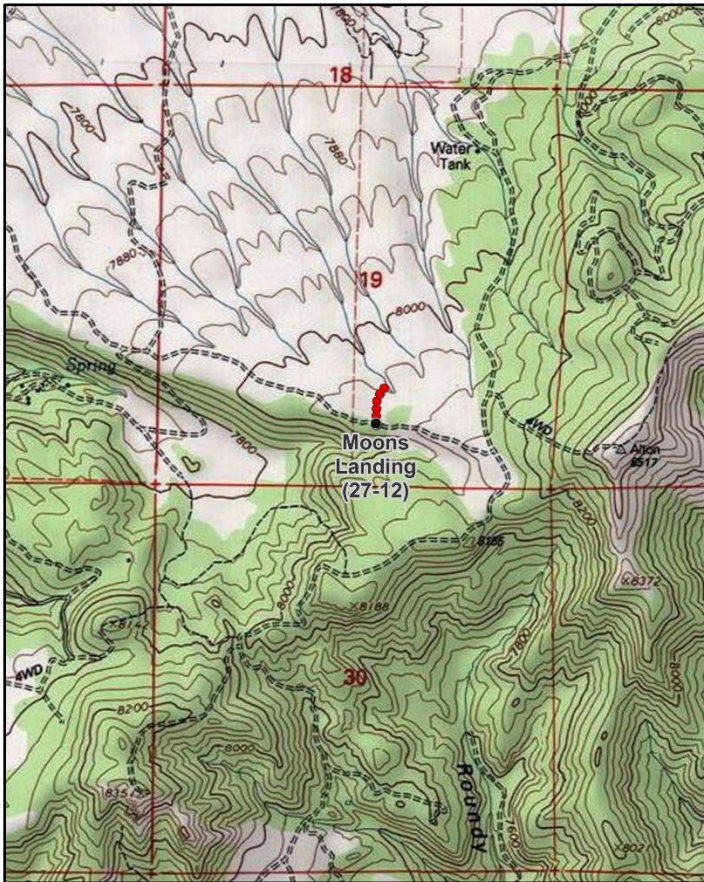
**Table 27-11.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2013	5	-	17	17	33	33	25.5
2018	6	-	14	29	14	43	22.3
2023	5	-	-	17	17	67	33.0

**Table 27-11.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1997	19.2	12.7	9.9	8.2	-0.1	0.3	0.0	<b>50.1</b>	Poor-Fair
2003	30.0	1.9	3.7	5.0	0.0	1.0	0.0	<b>41.7</b>	Poor
2008	30.0	0.7	3.0	2.0	0.0	0.1	0.0	<b>35.8</b>	Very Poor-Poor
2013	30.0	8.7	2.4	6.3	-0.1	2.1	0.0	<b>49.3</b>	Poor-Fair
2018	30.0	8.8	3.8	13.3	0.0	0.7	0.0	<b>56.5</b>	Fair
2023	30.0	3.9	3.9	23.1	0.0	1.7	0.0	<b>62.6</b>	Fair

## MOONS LANDING - STUDY NO. 27-12

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Alton NW; Township 38S, Range 5W, Section 19  
NAD 83 UTM ZONE 12, 371047 East 4149892 North

**Transect Information**

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

Not Available  
350° magnetic (Line 4: 8° magnetic, Line 5: 20° magnetic)  
500ft  
line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

**Directions to Site**

From US-89, go approximately 0.4 miles south of mile marker #111 to a road on the left. Turn left and proceed for 0.6 miles to a fork. Stay on Bryce Woodland Road (right) and go 1.0 mile to a fork. Stay right on the two-track and go 0.25 to a locked gate (you will need to get the combination). Go through the gate and continue for 1.65 miles, staying on the main road, to a fork. Proceed left and travel for 0.45 miles to another fork with a shack on the left. Stay to the right and drive for 1.9 miles to another fork. Turn right and go 1.6 miles to a two-track road on the right. Travel for 0.3 miles on the two-track to a witness post on the right (north) side of the road; the 0-foot stake is 15 feet north of the witness post. The study site is marked by green, steel fenceposts approximately 12-18 inches in height.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	8,090ft (2,466m)
Aspect	Northwest
Slope	4-7%
Sample Dates	08/19/1997, 07/09/2003, 08/05/2008, 08/07/2013, 07/10/2018, 06/27/2023

**Table 27-12.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Harrow - Two-Way Chain	Sevy Bench Habitat Improvement Project	4958	November 2020	242
Seeding - Aerial Before	Sevy Bench Habitat Improvement Project	4958	October 2020	242

**Table 27-12.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Sevy Bench			Aerial	Oct 2020	249
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	1.00	0.92
G	Agropyron cristatum	Crested Wheatgrass	Ephraim	0.50	0.45
G	Bromus biebersteinii	Meadow Brome	Cache	1.00	0.97
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock II	0.80	0.77
G	Poa secunda	Canby Bluegrass	Canbar	0.08	0.06
G	Thinopyrum intermedium	Intermediate Wheatgrass	Rush	1.00	0.88
F	Achillea millefolium	Western Yarrow	Eagle	0.02	0.02
F	Balsamorhiza sagittata	Arrowleaf Balsamroot	Box Elder UT	1.65	1.05
F	Balsamorhiza sagittata	Arrowleaf Balsamroot	Wasatch UT	0.36	0.35
F	Heliomeris multiflora var. nevadensis	Nevada Showy Goldeneye	Lincoln NV	0.20	0.14
F	Linum perenne	Blue Flax	Appar	0.20	0.17
F	Medicago sativa	Alfalfa	Ladak DL	0.80	0.68
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.49
F	Onobrychis viciifolia	Sainfoin	Shoshone	3.01	2.83
F	Penstemon comarrhenus	Dusty Penstemon	Kane UT	0.04	0.04
F	Penstemon pachyphyllus	Thickleaf Penstemon	White Pine NV	0.16	0.14
F	Ratibida columnifera	Prairie Coneflower	Stillwater	0.20	0.18
F	Sanguisorba minor	Small Burnet	Delar	0.80	0.71

### Wildlife Habitat and Vegetation History

**Table 27-12.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 27-12.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1997	Bitterbrush/Mixed Mountain Brush	Phase I
2003	Bitterbrush/Mixed Mountain Brush	Phase I
2008	Bitterbrush/Mixed Mountain Brush	Phase I
2013	Bitterbrush/Mixed Mountain Brush	Phase I
2018	Bitterbrush/Mixed Mountain Brush	Phase I
2023	Perennial Grass/Mixed Mountain Brush	Phase I

### Site Notes

The site is privately owned and is part of the Alton CWMU. Several deer have been seen near the study site and their presence was noted in the 1997 and 2013 sample years.

### Soils

**Table 27-12.5 - 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	5.9	64.0	16.1	19.9	2.6	0.1	134.4	0.4	08/14/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation	22 inches
NRCS Ecological Site	Mountain Stony Loam (Antelope Bitterbrush)
NRCS Ecological Site #	R047XB456UT
States and Transitions	No state and transition model is available for this ecological site.

From study establishment in 1997 through 2018, this site was dominated by antelope bitterbrush (*Purshia tridentata*) and a mixture of other mountain brush species including black sagebrush (*Artemisia nova*), mountain big sagebrush (*A. tridentata* ssp. *vaseyana*), Gambel oak (*Quercus gambelii*), and mountain snowberry (*Symphoricarpos oreophilus*). However, a harrow and seeding treatment in 2020 (Table 27-12.1) removed much of the browse community; antelope bitterbrush cover in particular decreased significantly between the two most recent samplings (Table 27-12.12, Table 27-12.13). The herbaceous understory has remained diverse and abundant throughout the sample years. Mainly native perennial grasses such as muttongrass (*Poa fendleriana*), Letterman's needlegrass (*Achnatherum lettermanii*), and needle and thread (*Hesperostipa comata*) have provided the most herbaceous cover and were considered to be co-dominant with mixed mountain brush species in 2023. Perennial and annual forbs were moderately abundant in 2023, with perennial species contributing more cover than their annual counterparts. The introduced annual grass species cheatgrass (*Bromus tectorum*) was observed for the first time in 2023, but in low amounts (Table 27-12.7, Table 27-12.10, Table 27-12.11). The study site was considered to be within Phase I of woodland succession from 1997 through 2018, but no encroachment was observed during the most recent sampling (Table 27-12.4, Table 27-12.14). However, dense stands of conifers are present adjacent to the study (Photos) and infilling is possible over time.

This site likely serves as adequate habitat for summering deer due to the abundant and diverse shrub and herbaceous components. Pellet transect data indicates that deer presence did decrease between 2018 and 2023, but still remains high as of the most recent sample year. Elk presence has been low since 2003 (Table 27-12.9), but the ample herbaceous understory could provide forage during the summer months (Table 27-12.3; Beck & Peek, 2005).

**Trend Summary Tables****Table 27-12.6 - 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
1997	34.8	5.5	-	-	-	-
2003	30.0	4.6	-	38.3	8.1	-
2008	34.8	4.3	-	44.5	7.8	-
2013	37.2	3.5	-	43.7	6.6	-
2018	44.5	4.4	-	46.0	5.7	-
2023	13.4	5.1	-	12.0	5.3	-

**Table 27-12.7 - 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
1997	-	408	69	208	-	18.4	0.2	4.0
2003	-	370	78	211	-	9.5	0.7	3.3
2008	-	389	55	236	-	12.5	0.2	4.4
2013	-	367	50	175	-	17.3	0.2	2.7
2018	-	389	14	130	-	25.8	0.5	1.7
2023	4	421	174	278	0.2	41.3	2.3	6.8

**Table 27-12.8 - 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
1997	7.0	0.5	55.6	1.2	1.3	61.9
2003	21.4	0.0	42.0	0.9	2.3	48.8
2008	17.5	0.4	42.0	2.2	2.3	54.5
2013	11.5	0.2	49.0	1.4	2.0	60.2
2018	12.0	0.6	59.4	1.6	2.9	64.3
2023	9.8	-	35.4	1.5	1.1	60.6

**Table 27-12.9 - 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	Dusky Grouse	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1997	14	45	-	8	3
2003	4	34	-	-	11
2008	10	55	-	13	24
2013	6	44	-	-	8
2018	4	38	-	2	14
2023	-	14	-	-	-
Year	Days Use Per Acre (ha)				
1997	-	-	-	-	-
2003	14.5 (35.9)	95.8 (236.7)	-	0.7 (1.7)	-
2008	31.2 (77.1)	126.6 (312.8)	-	10.0 (24.8)	-
2013	20.3 (50.2)	113.9 (281.4)	-	4.7 (11.6)	-
2018	25.4 (62.8)	110.6 (273.1)	8.7 (21.5)*	4.7 (11.6)	-
2023	18.9 (46.6)	61.0 (150.6)	-	4.0 (9.9)	-

\*Pellets per acre (ha)

**Table 27-12.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus marginatus (mountain brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Carex geyeri (Geyer's sedge)	Carex rossii (Ross' sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency															
1997	305	-	31	2	-	19	-	-	32	50	7	95	24	47	-	133
2003	157	-	25	2	-	3	-	-	20	42	7	133	29	114	3	80
2008	248	-	53	6	-	13	-	-	10	25	2	109	70	144	5	35
2013	174	-	80	-	-	19	-	-	29	64	-	87	5	204	7	9
2018	206	-	68	1	-	-	21	8	23	46	8	80	13	236	8	-
2023	212	2	49	19	4	10	-	5	57	64	4	90	10	227	14	3
year	Average Cover (%)															
1997	11.7	-	0.9	0.0	-	0.1	-	-	0.3	0.8	0.2	1.6	0.2	1.3	-	1.3
2003	3.4	-	0.2	0.0	-	0.0	-	-	0.3	0.2	0.1	2.2	0.3	1.3	0.0	1.4
2008	4.8	-	1.4	0.0	-	0.2	-	-	0.1	0.2	0.0	1.3	1.3	2.7	0.1	0.4
2013	4.7	-	2.8	-	-	0.3	-	-	0.2	0.7	-	1.9	0.2	6.2	0.1	0.2
2018	6.0	-	2.9	0.0	-	-	0.4	0.1	0.6	0.8	0.8	2.3	0.1	11.8	0.1	-
2023	16.7	0.1	1.3	0.5	0.2	0.5	-	0.3	2.3	2.7	0.2	5.5	0.5	10.0	0.7	0.0

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

**Table 27-12.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Androsace septentrionalis <sup>ai</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Artemisia cantharii (Carruth's sagewort)	Artemisia ludoviciana (white sagebrush)	Astragalus purshii (woollypod milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cordylanthus <sup>a</sup> (bird's-beak)	Crepis acuminata (tapertip hawkbeard)	Delphinium nuttallianum (two-lobed larkspur)
year	Nested Frequency																
1997	-	3	4	-	-	1	-	3	88	-	1	-	4	-	-	-	-
2003	-	31	1	6	33	3	2	5	76	-	2	4	4	-	-	9	-
2008	-	4	2	2	4	1	4	-	94	1	1	-	2	-	-	3	-
2013	-	3	-	-	18	1	7	54	14	9	2	-	2	3	3	-	-
2018	-	10	-	-	1	3	7	42	-	1	-	-	5	-	6	8	-
2023	7	46	-	-	112	5	47	111	5	8	-	51	4	-	-	12	9
year	Average Cover (%)																
1997	-	0.0	0.0	-	-	0.0	-	0.0	1.4	-	0.1	-	0.0	-	-	-	-
2003	-	0.3	0.0	0.1	0.4	0.2	0.0	0.2	0.6	-	0.1	0.0	0.1	-	-	0.1	-
2008	-	0.0	0.0	0.0	0.0	0.1	0.0	-	1.1	0.0	0.0	-	0.1	-	-	0.1	-
2013	-	0.0	-	-	0.1	0.0	0.0	0.5	0.1	0.0	0.1	-	0.0	0.0	0.0	-	-
2018	-	0.0	-	-	0.0	0.1	0.0	0.5	-	0.0	-	-	0.0	-	0.5	0.0	-
2023	0.1	0.4	-	-	0.9	0.6	0.7	1.5	0.1	0.2	-	0.2	0.3	-	-	0.1	0.0

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

FORB SPECIES	Descurainia pinnata <sup>a</sup> (western tansymustard)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron eatonii (Eaton's fleabane)	Erigeron flagellaris (trailing fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum lewisii (Lewis flax)	Lomatium (desertparsley)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orthocarpus luteus <sup>a</sup> (yellow owl's-clover)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Pseudostellaria jamesiana (tuber starwort)	Sanguisorba minor <sup>a</sup> (small burnet)
year	Nested Frequency																
1997	-	1	-	15	118	6	-	-	-	5	-	-	33	62	1	-	-
2003	0	23	0	7	80	17	-	1	-	8	4	3	80	4	2	2	-
2008	-	-	18	2	94	15	-	-	-	-	-	2	140	44	2	-	-
2013	-	-	-	4	107	13	-	2	-	-	-	-	30	22	1	-	-
2018	-	-	8	7	76	12	-	-	-	3	-	-	5	-	-	-	-
2023	11	3	17	30	67	16	2	27	1	22	-	-	53	21	-	-	6
year	Average Cover (%)																
1997	-	0.0	-	0.4	1.5	0.2	-	-	-	0.0	-	-	0.1	0.2	0.0	-	-
2003	0.0	0.0	0.0	0.1	1.2	0.2	-	0.0	-	0.0	0.0	0.0	0.2	0.0	0.0	0.0	-
2008	-	-	0.0	0.0	1.4	0.4	-	-	-	-	-	0.0	0.6	0.1	0.0	-	-
2013	-	-	-	0.0	1.1	0.1	-	0.0	-	-	-	-	0.1	0.1	0.0	-	-
2018	-	-	0.0	0.1	0.7	0.1	-	-	-	0.0	-	-	0.0	-	-	-	-
2023	0.1	0.0	0.2	0.7	1.0	0.1	0.0	0.4	0.0	0.1	-	-	0.8	0.2	-	-	0.0

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

FORB SPECIES	Senecio flaccidus var. flaccidus (threadleaf ragwort)	Senecio spartioides (broom-like ragwort)	Silene drummondii (Drummond's campion)	Symphotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency					
1997	-	-	4	-	5	6
2003	0	-	2	-	-	9
2008	4	-	1	-	12	-
2013	-	4	-	-	4	-
2018	-	-	5	-	2	-
2023	11	-	3	1	22	0
year	Average Cover (%)					
1997	-	-	0.0	-	0.1	0.0
2003	0.0	-	0.0	-	-	0.0
2008	0.3	-	0.0	-	0.1	-
2013	-	0.5	-	-	0.0	-
2018	-	-	0.0	-	0.0	-
2023	0.1	-	0.0	0.0	0.3	0.0

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

**Table 27-12.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>a</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa ssp. nauseosa var. hololeuca <sup>p</sup> (rubber rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Mahonia repens (creeping barberry)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Ribes cereum <sup>p</sup> (wax currant)	Rosa woodsii <sup>p</sup> (Woods' rose)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)														
1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	0.1	5.3	2.9	0.6	7.7	0.2	-	0.2	-	17.5	2.8	0.7	-	8.2	0.2
2008	0.6	7.3	5.2	0.9	6.1	-	-	1.6	0	18.8	2.5	-	-	9.2	0.1
2013	-	7	3	1.3	6.5	-	-	-	0.1	21.4	2.8	0.1	-	8.1	-
2018	-	8.5	4.8	0.5	5	-	-	0.7	-	21.8	2.9	0.1	0.1	7.3	-
2023	1.8	0.2	3.4	0.3	3.3	-	-	1.1	0.2	3	1.6	-	-	1.7	0.7
year	Quadrat Cover (%)														
1997	-	2.5	2.1	0.7	5.5	0.5	-	-	0.0	17.2	1.2	0.1	0.1	10.2	-
2003	0.1	2.4	2.3	1.3	4.5	0.2	-	0.1	-	15.2	1.2	0.1	0.0	7.2	0.0
2008	0.1	4.7	3.4	1.0	3.1	0.0	-	1.0	0.0	15.6	0.7	-	0.0	9.3	0.1
2013	-	4.7	4.0	0.5	3.3	-	-	0.1	0.0	16.9	1.4	0.3	-	9.3	0.0
2018	-	7.5	5.4	0.5	3.8	-	0.1	0.4	-	21.1	1.7	0.4	0.0	8.0	-
2023	1.3	0.4	2.8	0.7	4.0	0.0	-	0.7	0.3	3.0	2.7	-	-	2.4	0.0

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



**Table 27-12.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1997	-	-	-	-	-	-	-	-	236/199
2003	40	-	50	50	0	0	50	0	11/44
2008	80	-	0	100	0	25	75	0	121/109
2013	-	-	-	-	-	-	-	-	-/-
2018	40	-	0	100	0	100	0	0	-/-
2023	420	-	19	81	0	0	33	0	-/-
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1997	980	420	47	45	8	14	4	6	47/88
2003	1540	-	33	62	5	1	1	0	58/65
2008	1660	780	19	60	21	18	0	7	50/78
2013	1380	-	4	90	6	29	6	14	41/62
2018	2240	100	20	78	3	6	1	11	44/62
2023	360	140	44	56	0	0	44	0	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1997	560	100	50	43	7	14	0	4	63/87
2003	880	40	43	46	11	14	5	5	53/61
2008	900	220	44	44	11	13	7	0	56/84
2013	740	80	19	78	3	43	16	22	51/71
2018	720	80	28	72	0	22	6	8	65/94
2023	1180	4220	22	68	10	3	7	7	-/-
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1997	760	-	24	76	0	0	0	0	9/22
2003	380	-	0	100	0	47	53	0	15/25
2008	1720	-	5	71	24	14	38	2	10/27
2013	1240	-	3	97	0	13	13	0	11/30
2018	860	-	7	93	0	86	7	0	10/23
2023	340	-	0	100	0	0	0	0	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1997	2080	-	13	88	0	0	0	0	47/67
2003	2220	-	4	96	1	0	0	0	50/66
2008	1840	-	0	98	2	7	0	2	41/59
2013	1800	20	2	98	0	7	2	12	41/58
2018	2800	-	17	81	2	12	1	9	34/54
2023	2480	100	13	86	2	0	0	2	-/-
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	16/59
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1997	360	-	6	94	0	0	0	0	36/43
2003	60	-	0	100	0	0	0	0	31/44
2008	380	-	5	90	5	0	0	0	33/31
2013	-	-	-	-	-	-	-	-	58/130
2018	-	-	-	-	-	-	-	-	50/63
2023	20	-	0	100	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	20/26
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	460	-	0	100	0	0	0	0	16/18
2008	2140	-	1	92	8	0	0	3	18/23
2013	940	-	2	98	0	0	0	0	17/24
2018	1300	-	3	97	0	0	0	0	14/17
2023	1220	-	5	95	0	0	0	0	-/-
<b>Mahonia repens -- (creeping barberry)</b>									
1997	200	-	0	100	0	0	0	0	8/14
2003	140	-	0	100	0	0	0	0	8/15
2008	340	-	0	100	0	0	0	0	8/13
2013	360	-	0	100	0	0	0	0	10/13
2018	200	20	0	100	0	30	0	0	9/17
2023	360	-	0	100	0	0	0	0	-/-
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1997	1860	20	14	80	7	25	60	1	61/179
2003	2160	-	4	85	11	16	78	2	51/118
2008	2400	160	3	73	23	13	72	6	43/113
2013	2620	80	5	94	2	4	63	12	49/117
2018	3240	-	3	94	4	39	56	4	41/89
2023	1180	20	9	81	10	9	76	17	-/-
<b>Quercus gambelii<sup>P</sup> -- (Gambel oak)</b>									
1997	500	80	72	24	4	32	0	20	250/82
2003	480	-	21	79	0	8	54	0	139/56
2008	1440	200	33	64	3	0	0	0	76/63
2013	800	60	88	13	0	0	5	0	-/-
2018	660	-	33	67	0	67	0	0	50/42
2023	180	-	56	44	0	0	0	0	-/-
<b>Ribes cereum<sup>P</sup> -- (wax currant)</b>									
1997	40	-	0	100	0	50	0	0	112/147
2003	40	-	0	50	50	50	50	0	142/141
2008	20	-	0	0	100	0	0	100	131/160
2013	40	20	0	50	50	50	0	50	108/150
2018	60	-	0	67	33	33	0	100	91/101
2023	-	-	-	-	-	-	-	-	-/-
<b>Rosa woodsii<sup>P</sup> -- (Woods' rose)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	40	-	50	50	0	0	0	0	41/23
2008	140	-	0	100	0	0	0	0	24/20
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-

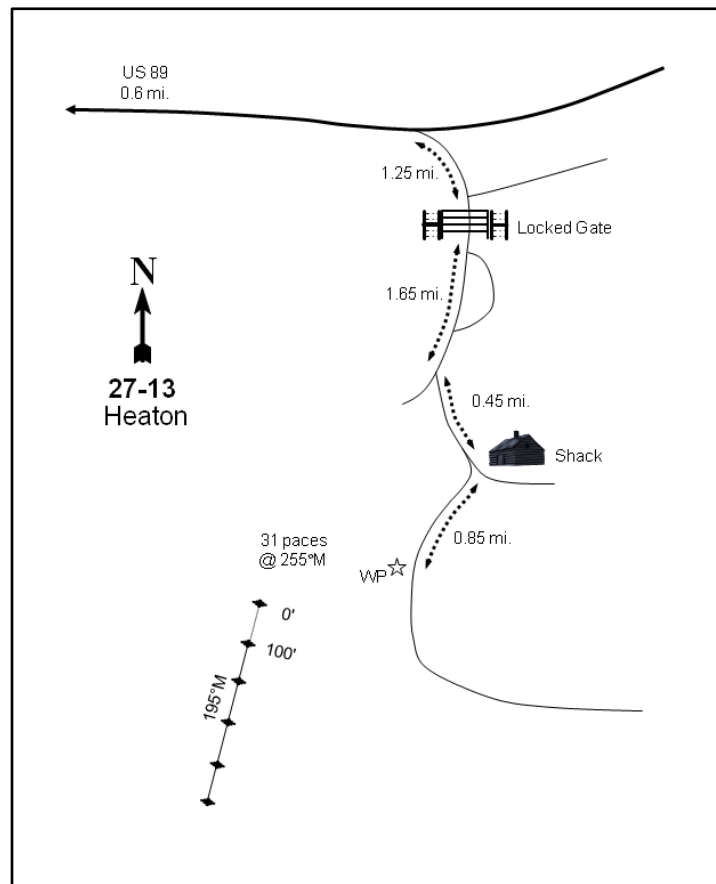
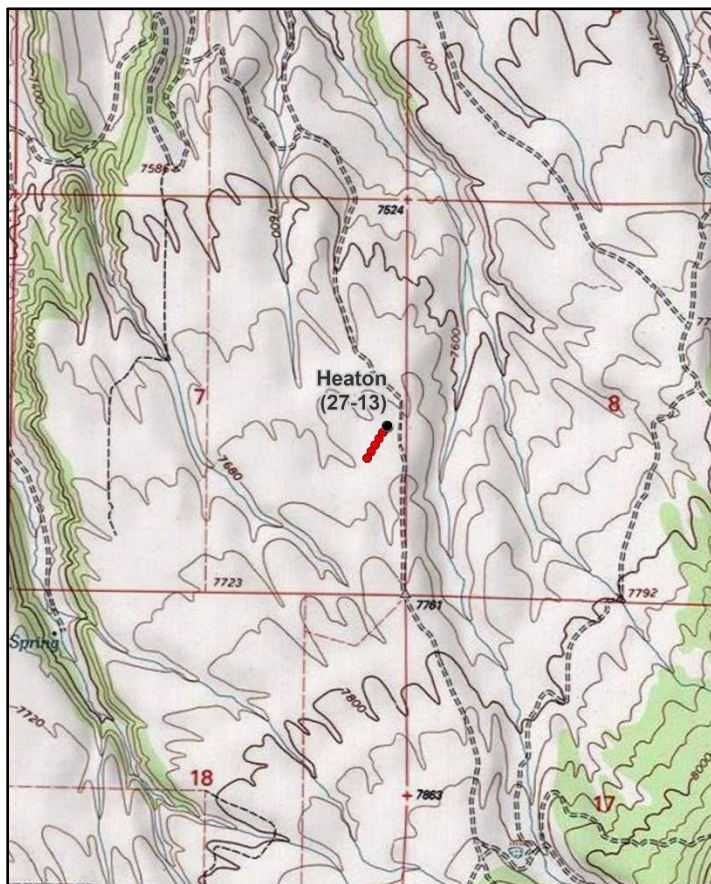
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1997	880	-	7	93	0	59	9	9	63/149
2003	1280	-	6	89	5	11	9	2	50/100
2008	1420	-	14	80	6	3	7	0	45/100
2013	1780	260	34	66	0	24	16	3	49/110
2018	2480	-	17	76	7	10	19	9	41/80
2023	1300	-	23	74	3	5	22	6	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1997	80	20	75	25	0	0	0	0	25/33
2003	160	-	38	63	0	0	0	0	34/40
2008	100	-	0	100	0	0	0	0	34/21
2013	20	-	0	100	0	0	0	0	45/44
2018	40	-	0	100	0	50	0	50	25/17
2023	400	-	15	85	0	0	0	0	- / -

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

**Table 27-12.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Abies concolor (white fir)</b>							
2018	9	-	50	50	-	-	4.0
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	4	-	-	100	-	-	7.0

## HEATON - STUDY NO. 27-13

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

George Mountain SW; Township 38S, Range 5W, Section 07  
NAD 83 UTM ZONE 12, 371747 East 4153528 North

**Transect Information**

Browse Tag # (0' Stake)	289
Transect Bearing	195° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

From US-89, go approximately 0.4 miles south of mile marker #111 to a road on the left. Turn onto this road and travel for 0.6 miles to a fork. Stay on Bryce Woodland Road (right) and go 1 mile to a fork. Continue straight and travel for 0.25 miles to a locked gate (you will need to get the combination). Go through the gate and proceed for 1.65 miles, staying on the main road, to a fork. Go left and continue for 0.45 miles to another fork with a shack on the left. Proceed right and travel for 0.85 miles to a witness post on the right (west) side of the road. From the witness post walk 31 paces at 255 degrees magnetic to the 0-foot stake which is marked by browse tag #289. The study is marked by green, steel fenceposts approximately 12-18 inches in height.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	No data
Elevation	7,680ft (2,341m)
Aspect	North
Slope	3%
Sample Dates	08/19/1997, 07/09/2003, 08/05/2008, 08/07/2013, 07/10/2018, 06/27/2023

**Table 27-13.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Seed Unknown	-	-	Historic	-
Aerator - Double Drum	-	-	Between 1997 and 2003	-
Hand Crew - Lop and Scatter	Sevy Bench Habitat Improvement Project	4958	September 2019-Spring 2020	4406
Herbicide - Herbicide Unknown	-	-	Between 2003 and 2008	-

**Wildlife Habitat and Vegetation History****Table 27-13.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 27-13.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1997	Black Sagebrush	No Encroachment
2003	Black Sagebrush	No Encroachment
2008	Black Sagebrush/Bitterbrush	Phase I
2013	Black Sagebrush/Bitterbrush	Phase I
2018	Black Sagebrush/Bitterbrush	Phase I
2023	Black Sagebrush/Bitterbrush	No Encroachment

**Site Notes**

This site is privately owned and is part of the Alton CWMU. Several deer have been seen near the study site and their presence was noted in the 1997 and 2013 sample years. Half of the site was aerated between the 1997 and 2003 sample years, and it appears that the treated half was also sprayed with herbicide to decrease sagebrush cover between 2003 and 2008.

**Soils****Table 27-13.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.1	65.0	19.2	15.8	2.1	13.4	131.2	0.4	08/19/1997

**Site Potential**

1981 - 2010 Average Annual Precipitation                      20 inches  
 NRCS Ecological Site    Mountain Loam (Black Sagebrush)  
 NRCS Ecological Site #    R047XB426UT  
 States and Transitions    No state and transition model is available for this ecological site.

When this study was established in 1997, black sagebrush (*Artemisia nova*) was the dominant browse species with antelope bitterbrush (*Purshia tridentata*) present in lesser amounts. Following the aerator and herbicide treatments (Table 27-13.1), cover of black sagebrush decreased while that of bitterbrush increased, and bitterbrush became a codominant vegetation component in 2008 (Table 27-13.4, Table 27-13.12, Table 27-13.13). The herbaceous understory has remained diverse and abundant in all sample years. Native perennial grasses have comprised most of the herbaceous component throughout the study period, with muttongrass (*Poa fendleriana*) contributing the most cover of any single species during the two most recent samplings. The introduced annual grass species cheatgrass (*Bromus tectorum*) was observed in quadrat measurements in 2018 and 2023, but in low amounts. Annual and perennial forbs have remained rare in comparison with perennial grasses (Table 27-13.7, Table 27-13.10, Table 27-13.11).

Due to the diverse and abundant shrub and herbaceous components, this site may serve as adequate habitat for summering deer. Pellet transect data indicates that deer presence was high between 2003 and 2013 and moderate in 2018 and 2023. Elk presence has remained low since 2003 and pellet groups were not observed in 2023 (Table 27-13.9). However, the ample herbaceous understory could provide forage during the summer months (Table 27-13.3; Beck & Peek, 2005).

## Trend Summary Tables

**Table 27-13.6 - 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
1997	34.9	0.7	-	-	-	-
2003	19.9	1.1	-	21.9	1.0	-
2008	14.8	1.1	-	16.8	2.3	-
2013	17.0	2.4	-	26.8	4.9	-
2018	20.5	3.1	-	25.3	5.3	-
2023	28.8	4.6	-	37.1	11.2	-

**Table 27-13.7 - 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
1997	-	395	64	155	-	12.1	0.2	1.5
2003	-	314	141	98	-	8.9	0.8	0.5
2008	-	350	119	201	-	11.2	0.9	2.2
2013	-	406	36	139	-	25.8	0.1	2.4
2018	5	425	18	119	0.0	36.5	0.1	1.5
2023	39	440	24	231	0.5	36.7	0.1	5.6

**Table 27-13.8 - 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
1997	20.7	0.1	53.1	3.0	0.1	49.4
2003	28.5	0.0	42.4	3.9	0.2	32.5
2008	28.3	0.2	51.6	1.7	0.3	28.6
2013	24.2	0.0	45.5	1.1	0.0	50.1
2018	23.0	0.0	51.9	1.5	0.2	54.5
2023	14.2	0.0	26.0	2.5	1.2	64.8

**Table 27-13.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
1997	13	-	51	8	-	3
2003	5	-	19	2	-	2
2008	16	-	42	5	-	39
2013	10	-	31	2	-	-
2018	21	-	24	6	-	23
2023	7	-	18	1	-	-
Year	Days Use Per Acre (ha)					
1997	-	-	-	-	-	-
2003	24.7 (61.0)	-	46.2 (114.2)	2.0 (5.0)	-	-
2008	92.2 (227.7)	-	83.1 (205.3)	6.7 (16.6)	43.6 (107.6)*	-
2013	43.6 (107.6)	-	55.6 (137.4)	0.7 (1.7)	-	-
2018	56.6 (139.9)	8.7 (21.5)*	36.2 (89.4)	12.8 (31.5)	52.3 (129.1)*	-
2023	33.4 (82.5)	-	30.8 (76.1)	-	-	-

\*Pellets per acre (ha)

**Table 27-13.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency											
1997	29	4	35	-	-	23	90	155	273	-	6	-
2003	-	6	15	-	2	26	103	92	194	-	4	-
2008	-	13	83	-	8	31	158	80	140	-	22	-
2013	-	11	114	-	28	74	193	31	206	5	6	9
2018	20	14	118	5	21	28	148	21	315	-	3	18
2023	99	12	64	39	51	42	104	130	289	16	-	24
year	Average Cover (%)											
1997	0.6	0.5	0.3	-	-	0.1	1.1	2.6	6.7	-	0.2	-
2003	-	0.3	0.1	-	0.1	0.5	1.6	1.7	4.6	-	0.0	-
2008	-	0.2	2.5	-	0.1	0.4	3.9	1.0	2.8	-	0.2	-
2013	-	0.3	7.4	-	0.6	0.9	8.1	0.8	7.2	0.1	0.2	0.2
2018	0.7	0.8	8.2	0.0	0.9	0.4	8.0	0.4	16.4	-	0.1	0.6
2023	4.2	0.5	2.7	0.5	1.8	1.9	4.0	5.7	14.5	0.5	-	1.0

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

**Table 27-13.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus humistratus (groundcover milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis acuminata (tapertip hawksbeard)	Delphinium (larkspur)	Erigeron (fleabane)	Erigeron flagellaris (trailing fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)
year	Nested Frequency																
1997	-	1	-	13	2	41	1	2	-	5	12	-	-	-	-	-	31
2003	13	-	-	1	-	-	-	1	-	-	123	2	-	-	-	-	20
2008	-	-	-	22	-	21	-	-	11	3	35	-	-	-	-	-	41
2013	4	2	-	7	4	23	-	3	-	22	-	-	-	3	-	-	37
2018	28	-	-	8	-	4	-	-	-	5	12	-	-	-	-	21	36
2023	36	-	2	9	18	7	-	5	-	11	5	30	1	2	2	1	32
year	Average Cover (%)																
1997	-	0.0	-	0.2	0.0	0.4	0.0	0.0	-	0.0	0.1	-	-	-	-	-	0.4
2003	0.0	-	-	0.0	-	-	-	0.0	-	-	0.5	0.0	-	-	-	-	0.3
2008	-	-	-	0.1	-	0.5	-	-	0.0	0.0	0.1	-	-	-	-	-	0.5
2013	0.0	0.0	-	0.2	0.0	0.7	-	0.0	-	0.3	-	-	-	0.0	-	-	0.4
2018	0.2	-	-	0.1	-	0.0	-	-	-	0.0	0.1	-	-	-	-	0.1	0.4
2023	0.5	-	0.0	0.4	0.3	0.1	-	0.1	-	0.6	0.0	0.9	0.0	0.2	0.0	0.0	1.0

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

FORB SPECIES	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lepidium <sup>a</sup> (pepperweed)	Lepidium ramosissimum <sup>a</sup> (manybranched pepperweed)	Lomatium (desertparsley)	Lotus utahensis (Utah bird's-foot trefoil)	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera (evening primrose)	Orthocarpus luteus <sup>a</sup> (yellow owl's-clover)	Penstemon (beardtongue)	Penstemon comarrhenus (dusty beardtongue)	Penstemon pachyphyllus (thickleaf beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)
year	Nested Frequency																
1997	7	-	8	-	-	-	3	45	-	1	3	22	-	-	43	44	-
2003	13	5	-	-	9	-	-	6	14	-	7	2	-	-	51	9	-
2008	-	68	-	-	-	-	2	15	4	-	1	-	24	2	130	48	2
2013	-	3	-	3	-	5	-	9	-	-	-	-	18	-	58	24	-
2018	-	-	3	-	-	-	-	11	1	-	-	-	9	-	-	-	-
2023	3	5	-	-	-	-	55	14	4	-	-	-	12	2	79	11	-
year	Average Cover (%)																
1997	0.0	-	0.0	-	-	-	0.0	0.2	-	0.0	0.0	0.1	-	-	0.1	0.1	-
2003	0.1	0.0	-	-	0.0	-	-	0.0	0.1	-	0.1	0.0	-	-	0.1	0.0	-
2008	-	0.6	-	-	-	-	0.0	0.1	0.0	-	0.0	-	0.1	0.0	0.7	0.1	0.0
2013	-	0.0	-	0.0	-	0.0	-	0.0	-	-	-	-	0.3	-	0.2	0.1	-
2018	-	-	0.0	-	-	-	-	0.0	0.0	-	-	-	0.3	-	-	-	-
2023	0.0	0.0	-	-	-	-	0.2	0.2	0.0	-	-	-	0.2	0.0	0.6	0.0	-

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

FORB SPECIES	Potentilla hippiana (woolly cinquefoil)	Pseudostellaria jamesiana (tuber starwort)	Senecio spartioides (broom-like ragwort)	Silene drummondii (Drummond's campion)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium (clover)
year	Nested Frequency						
1997	-	-	-	-	-	-	-
2003	-	-	-	2	-	-	-
2008	-	3	-	-	-	-	-
2013	1	-	0	-	3	5	1
2018	4	-	-	-	21	2	-
2023	2	-	5	-	16	1	-
year	Average Cover (%)						
1997	-	-	-	-	-	-	-
2003	-	-	-	0.0	-	-	-
2008	-	0.0	-	-	-	-	-
2013	0.0	-	0.0	-	0.0	0.0	0.0
2018	0.1	-	-	-	0.2	0.0	-
2023	0.1	-	0.0	-	0.1	0.0	-

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



**Table 27-13.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)									
1997	-	-	-	-	-	-	-	-	-	-
2003	-	17.9	0.2	0.9	-	-	-	3.8	-	0.1
2008	-	10.6	-	1.9	-	0.4	0	6.2	-	-
2013	-	14.9	-	4.8	-	-	-	11.9	-	0.1
2018	-	13.6	0.1	5.3	0	-	0	11.6	-	-
2023	-	22.4	-	11.2	-	-	-	14.7	-	-
year	Quadrat Cover (%)									
1997	0.0	24.4	0.2	0.6	-	-	0.2	10.2	-	-
2003	-	15.6	0.0	0.7	-	0.4	0.0	4.2	-	0.1
2008	-	10.9	0.0	1.1	-	0.0	0.0	3.9	-	-
2013	-	8.4	0.1	2.2	0.0	-	0.1	8.4	-	0.1
2018	-	11.3	0.0	3.0	0.0	0.0	0.0	9.2	0.0	-
2023	0.0	16.7	-	4.5	-	-	0.1	12.0	-	-

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

**Table 27-13.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

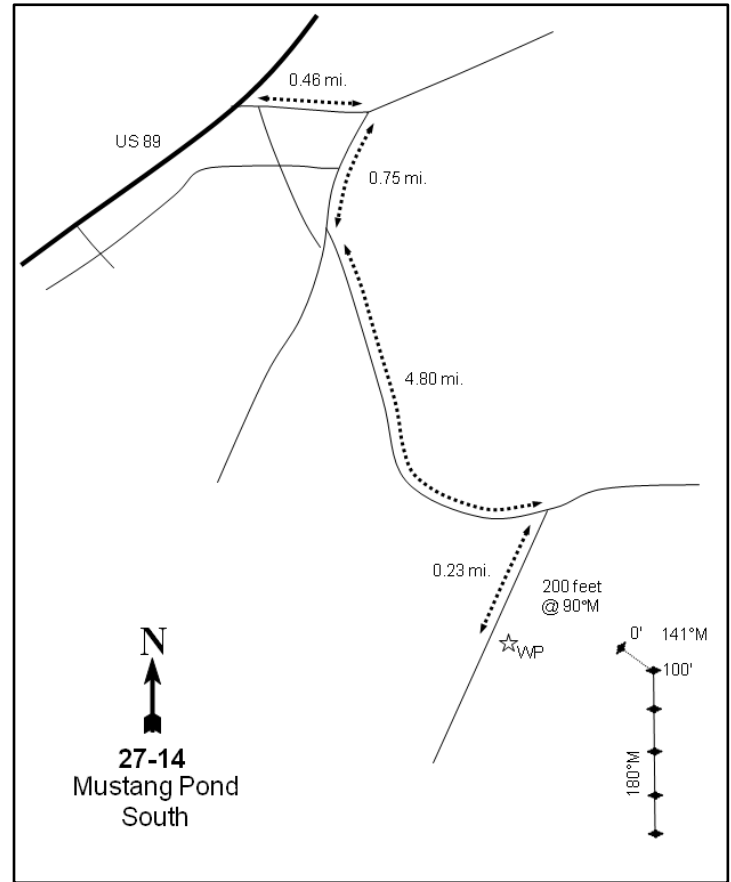
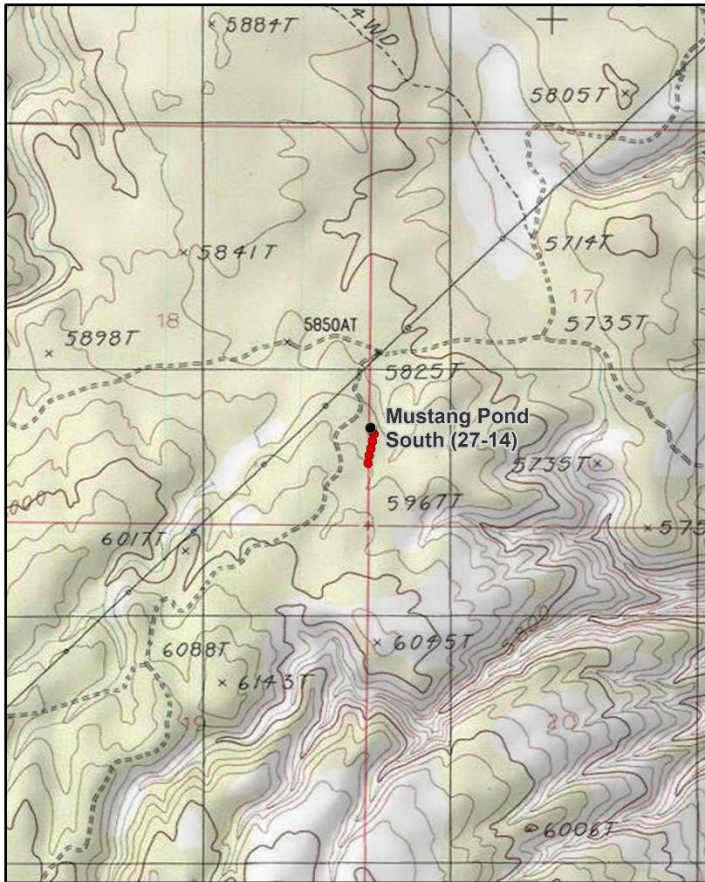
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1997	20	20	0	100	0	0	0	0	- / -
2003	40	-	50	50	0	0	50	50	65/84
2008	20	40	100	0	0	0	0	0	32/47
2013	-	-	-	-	-	-	-	-	- / -
2018	20	-	0	100	0	100	0	0	122/102
2023	20	-	100	0	0	0	100	0	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1997	8800	2180	32	56	12	11	2	8	41/74
2003	11140	20	25	66	9	4	2	29	38/54
2008	8520	2900	47	30	23	9	3	14	29/44
2013	4600	120	17	80	4	32	10	4	30/49
2018	4300	-	12	82	6	28	4	13	34/48
2023	3660	37500	2	95	3	26	20	4	- / -
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
1997	240	-	8	92	0	0	0	0	12/24
2003	60	-	0	100	0	0	100	0	14/21
2008	40	-	0	100	0	0	100	0	7/9
2013	260	20	8	92	0	39	0	62	13/14
2018	140	-	0	100	0	14	0	0	11/18
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1997	1060	-	11	89	0	0	0	0	17/33
2003	1440	-	6	92	3	0	0	14	17/30
2008	2480	-	3	82	15	8	0	11	21/43
2013	3140	-	11	89	1	17	0	28	17/34
2018	4680	-	15	85	0	12	0	1	16/32
2023	4760	20	8	92	0	1	0	0	- / -
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1997	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	3/37
2018	20	-	0	100	0	0	0	0	24/25
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1997	20	-	0	100	0	0	0	0	60/76
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	9/16
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1997	20	-	0	100	0	0	0	0	- / -
2003	360	-	0	100	0	0	0	6	13/24
2008	60	-	0	0	100	0	0	100	13/28
2013	-	-	-	-	-	-	-	-	- / -
2018	100	-	0	100	0	0	0	0	8/15
2023	20	-	0	100	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1997	160	-	25	63	13	0	0	13	11/39
2003	60	-	0	100	0	0	0	0	9/23
2008	140	20	0	100	0	0	0	0	10/40
2013	200	-	20	80	0	0	0	50	9/27
2018	40	-	0	100	0	0	0	0	14/43
2023	40	-	0	50	50	0	0	0	- / -
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1997	1220	180	12	82	7	61	21	7	55/126
2003	1280	-	5	84	11	36	61	53	37/76
2008	1280	60	3	84	13	23	63	6	44/93
2013	1620	360	14	84	3	17	68	22	48/118
2018	1580	-	3	95	3	35	56	14	55/118
2023	1580	140	4	96	0	10	77	8	- / -
<b>Rosa woodsii<sup>P</sup> -- (Woods' rose)</b>									
1997	20	-	0	0	100	0	0	100	- / -
2003	-	-	-	-	-	-	-	-	21/16
2008	-	-	-	-	-	-	-	-	18/12
2013	-	-	-	-	-	-	-	-	27/22
2018	-	-	-	-	-	-	-	-	25/21
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1997	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	100	0	31/43
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	38/66
2018	20	40	0	100	0	0	0	0	26/28
2023	-	-	-	-	-	-	-	-	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1997	20	-	0	100	0	0	0	0	- / -
2003	40	-	0	100	0	0	0	0	18/26
2008	20	-	0	0	100	0	0	100	21/31
2013	40	-	0	100	0	0	0	0	24/31
2018	60	-	0	100	0	0	0	0	23/33
2023	40	-	0	100	0	0	0	0	- / -

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

## MUSTANG POND SOUTH - STUDY NO. 27-14



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Pine Hollow Canyon N; Township 43S, Range 2W, Section 17  
NAD 83 UTM ZONE 12, 406627 East 4102963 North

### Transect Information

Browse Tag # (0' Stake)	600
Transect Bearing	141° magnetic (Lines 2-5: 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 the junction of 100 East and 300 South on US-89 in Kanab, drive north for 24.1 miles. Turn left and travel south on a dirt road. After passing the cattle guard, turn left onto County Road #4153. Keep right on this road for 0.6 miles, then turn right onto County Road #4150. Follow this road for approximately 5.5 miles and turn right onto County Road #4130. Drive 0.2 miles to a witness post on the left (south) side of the road. The transect is approximately 200 feet from the witness post at a 90 degree bearing. The 0-foot stake is marked with a browse tag #600, and the transect doglegs at the 100 foot stake.

### Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	MOLLIES NIPPLE
Elevation	5,888ft (1,795m)
Aspect	East
Slope	15-25%
Sample Dates	08/06/2013, 07/11/2018, 07/12/2023

**Table 27-14.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Buckskin Lop and Scatter FY12	2002	September-December 2011	604

**Wildlife Habitat and Vegetation History****Table 27-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 27-14.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I
2023	Black Sagebrush	Phase I

**Site Notes**

The first 100 feet of the transect is an annual habitat monitoring site. Soil data was not sampled for this study, but will be collected in the future. In 2023, it was noted that hybridization may have been occurring between black sagebrush (*Artemisia nova*) and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*).

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Upland Shallow Loam (Cliffrose)
NRCS Ecological Site #	R035XY313UT
States and Transitions	2013-2023 - Current Potential State: Community Phase 2.3

This site has been dominated by black sagebrush (*Artemisia nova*) with a lesser component of Stansbury cliffrose (*Purshia stansburiana*) and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) since study establishment in 2013; cover and density of both sagebrush species has increased each sample year (Table 27-14.12, Table 27-14.13). The herbaceous understory has also increased over the study period, but the introduced annual grass species cheatgrass (*Bromus tectorum*) provided most of the cover in all years; high amounts of cheatgrass may pose a risk to the ecological resilience of the plant community. Perennial grasses and both annual and perennial forbs have remained rare in comparison with annual grasses (Table 27-14.7, Table 27-14.10, Table 27-14.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were removed with a lop and scatter treatment prior to study establishment (Table 27-14.1). However, trees were recorded in 2018 and 2023 cover and point-quarter measurements, indicating the potential for infilling in future sample years (Table 27-14.12, Table 27-14.14).

Condition of deer winter range on this site has ranged between very poor and poor since 2013; winter range condition was considered to be poor as of 2023. Improvements to deer winter habitat could be achieved through efforts that increase preferred browse cover while decreasing decadence. Diversifying and increasing perennial grasses and forbs while decreasing cheatgrass cover would also greatly benefit deer winter range (Table 27-14.15). Pellet group transect data indicates that deer presence has been high throughout the duration of the study (Table 27-14.9).

**Trend Summary Tables****Table 27-14.6 - 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
2013	6.9	0.3	0.4	9.2	0.5	-
2018	10.3	0.7	0.4	16.8	0.7	0.2
2023	13.9	1.5	0.4	20.1	1.7	0.3

**Table 27-14.7 - 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
2013	246	92	7	10	3.9	1.5	0.2	0.5
2018	302	104	28	5	13.0	2.2	0.6	0.1
2023	388	51	36	22	22.9	2.4	0.3	0.4

**Table 27-14.8 - 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
2013	18.2	0.2	47.9	13.5	18.1	14.2
2018	16.6	0.3	49.9	17.1	20.1	26.4
2023	12.0	0.3	36.0	9.4	14.1	40.7

**Table 27-14.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2013	7	44	3
2018	7	25	22
2023	5	39	1
Year	Days Use Per Acre (ha)		
2013	5.8 (14.3)	108.6 (268.2)	-
2018	2.9 (7.2)	52.3 (129.1)	-
2023	12.3 (30.5)	116.0 (286.4)	-

**Table 27-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency						
2013	1	1	246	34	9	4	50
2018	6	4	302	28	25	-	45
2023	10	3	388	11	18	3	10
year	Average Cover (%)						
2013	0.0	0.0	3.9	0.3	1.0	0.0	0.2
2018	0.2	0.0	13.0	0.4	0.7	-	0.9
2023	0.4	0.1	22.9	0.1	1.6	0.0	0.2

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

**Table 27-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Astragalus (milkvetch)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chamaesyce (sandmat)	Draba <sup>a</sup> (draba)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Microsteris gracilis <sup>a</sup> (slender phlox)	Phlox longifolia (longleaf phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sisymbrium altissimum <sup>ai</sup> (tall tumbleweed)	Sphaeralcea parvifolia (smallflower globemallow)
year	Nested Frequency													
2013	3	-	-	3	2	6	-	-	-	-	-	-	-	4
2018	3	-	-	2	-	9	-	-	3	-	-	16	-	-
2023	8	1	3	-	1	8	1	4	-	13	2	7	2	11
year	Average Cover (%)													
2013	0.0	-	-	0.0	0.0	0.2	-	-	-	-	-	-	-	0.5
2018	0.0	-	-	0.0	-	0.2	-	-	0.0	-	-	0.4	-	-
2023	0.1	0.0	0.0	-	0.0	0.1	0.0	0.0	-	0.1	0.1	0.1	0.0	0.3

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

**Table 27-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Ephedra viridis <sup>p</sup> (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	Yucca baccata (banana yucca)
year	Line Intercept Cover (%)								
2013	7.8	1.1	0.4	-	0.1	-	0	0.3	-
2018	10.8	5	0.6	0.1	-	0.2	0.1	0.9	-
2023	13.2	5.5	1.2	0	0.1	0.3	0.2	1.4	0.2
year	Quadrat Cover (%)								
2013	5.5	1.1	0.2	-	0.1	0.4	0.0	0.3	-
2018	6.3	3.4	0.4	0.0	0.1	0.4	0.2	0.6	-
2023	8.8	4.1	1.4	0.3	0.1	0.4	0.0	0.8	0.0

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

**Table 27-14.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2013	2740	60	10	64	26	27	34	18	30/65
2018	3560	220	21	70	10	22	10	7	34/63
2023	3660	440	38	54	9	37	26	13	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2013	540	-	33	44	22	7	37	19	42/65
2018	1000	20	20	56	24	14	18	26	43/72
2023	1880	740	52	39	9	19	9	9	- / -
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2013	100	-	0	100	0	0	0	20	34/66
2018	160	-	0	100	0	0	0	63	37/71
2023	200	-	10	90	0	0	0	0	- / -
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	46/164
2023	-	-	-	-	-	-	-	-	-/-
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2013	100	-	40	60	0	0	0	20	59/98
2018	120	-	17	83	0	0	50	0	49/52
2023	180	-	33	67	0	56	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2013	220	-	0	100	0	0	0	0	22/37
2018	320	-	0	50	50	0	0	63	12/19
2023	100	-	20	40	40	0	0	40	- / -
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2013	40	-	100	0	0	0	0	0	- / -
2018	40	-	50	50	0	0	0	0	- / -
2023	40	-	0	100	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2013	160	-	13	75	13	0	0	13	22/48
2018	160	-	0	100	0	0	0	0	22/55
2023	100	-	0	80	20	0	0	20	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2013	120	-	0	50	50	33	17	67	189/134
2018	120	-	0	100	0	17	33	0	195/158
2023	140	80	43	14	43	0	29	43	- / -
<b>Sclerocactus -- (fishhook cactus)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	10/22
2023	-	-	-	-	-	-	-	-	-/-
<b>Yucca baccata -- (banana yucca)</b>									
2013	-	-	-	-	-	-	-	-	62/75
2018	-	-	-	-	-	-	-	-	53/67
2023	40	-	0	100	0	0	0	0	- / -

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



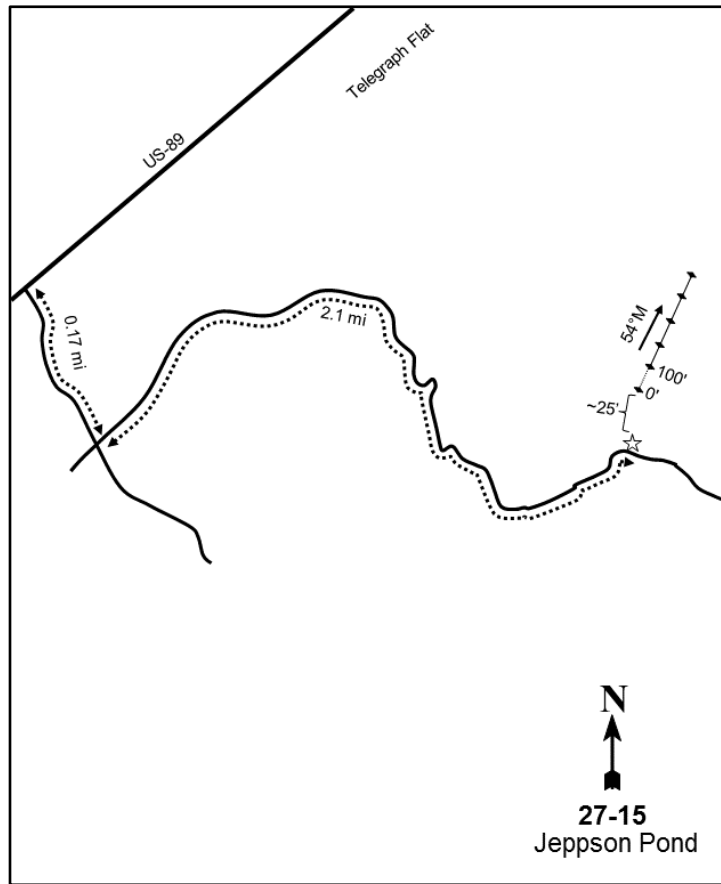
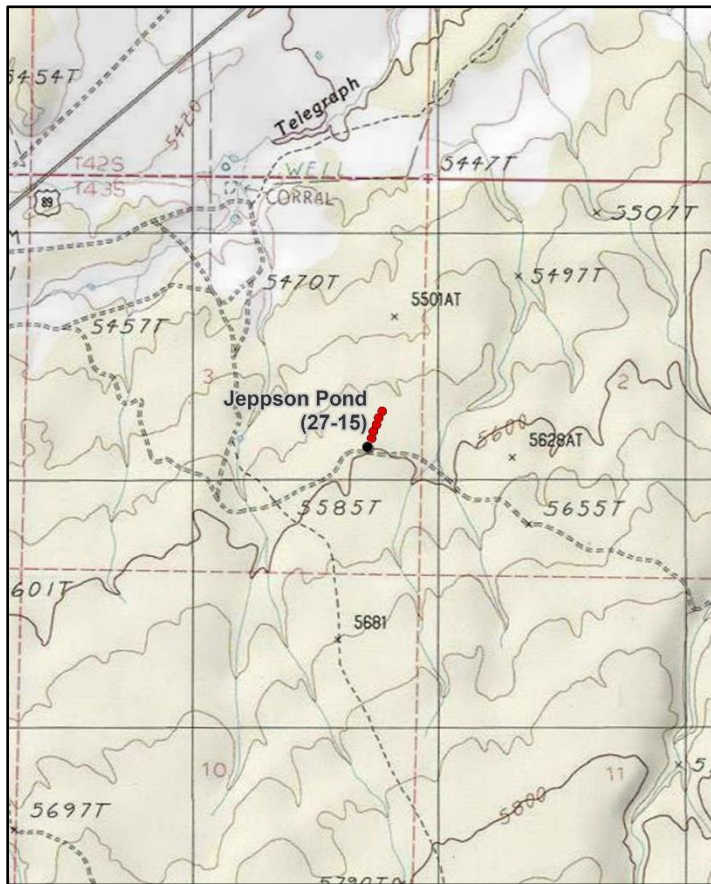
**Table 27-14.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	59	-	69	31	-	-	13.9
2023	44	7	64	29	-	-	9.9
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	18	-	50	50	-	-	7.0
2023	7	-	50	50	-	-	9.0

**Table 27-14.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	11.6	7.2	6.3	3.1	-2.9	1.0	0.0	<b>26.3</b>	Very Poor
2018	21.2	11.0	9.7	4.4	-9.8	0.1	0.0	<b>36.7</b>	Very Poor-Poor
2023	25.5	11.7	15.0	4.8	-17.2	0.9	0.0	<b>40.6</b>	Poor

## JEPPSON POND - STUDY NO. 27-15



### Location Information

USGS 7.5 min Map Info Pine Hollow Canyon N; Township 43S, Range 3W, Section 03  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 401648 East 4106337 North

### Transect Information

Browse Tag # (0' Stake) 547  
 Transect Bearing 10° magnetic  
 Length 500ft  
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
 Belt Marker Placement Belts 1-2: No Rebar

### Directions to Site

From US-89 near Telegraph Flat, turn right (south) onto a dirt road. Drive for approximately 0.17 miles to an intersection, then turn left (west). Drive for 1.0 mile to a fork. Proceed to the right, then travel for 0.6 miles to another fork; stay to the right again. Drive for 0.2 miles to a four-way intersection. Continue straight, proceed for 0.3 miles, and park; there is no witness post. The 0-foot stake is approximately 25 feet north of the road and is marked with browse tag #547.

### Site Information

Land Ownership Federal  
 Land Administrator BLM  
 Allotment MOLLIES NIPPLE  
 Elevation 5,600ft (1,707m)  
 Aspect North  
 Slope 3%  
 Sample Dates 07/11/2018, 07/12/2023

**Table 27-15.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Buckskin Lop and Scatter	823	August-December 2008	500

**Wildlife Habitat and Vegetation History**

**Table 27-15.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 27-15.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Black Sagebrush	Phase I
2023	Black Sagebrush	Phase I

**Site Notes**

No rebar was found on belts 1 and 2 in 2023, but said rebar could have been obscured by vegetation.

**Soils**

**Table 27-15.5 - 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
Loam	7.7	44.2	35.4	20.4	2.8	21.0	205.0	0.5	07/11/2018

**Site Potential**

1981 - 2010 Average Annual Precipitation 10 inches  
 NRCS Ecological Site Upland Shallow Loam (Cliffrose)  
 NRCS Ecological Site # R035XY313UT  
 States and Transitions 2018-2023 - Current Potential State: Community Phase 2.3

This site has remained dominated by black sagebrush (*Artemisia nova*) with a minor component of mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) and Stansbury cliffrose (*Purshia stansburiana*) since study establishment in 2018 (Table 27-15.12, Table 27-15.13). The herbaceous understory has been depauperate in both quantity and species diversity, with the introduced annual grass species cheatgrass (*Bromus tectorum*) as the most abundant species. Although cheatgrass has contributed little cover throughout the study period, it may affect the ecological resiliency of the study site if amounts increase in future sample years (Table 27-15.7, Table 27-15.10, Table 27-15.11). Utah juniper (*Juniperus osteosperma*) trees were scattered across the site, placing it in Phase I of woodland succession in both 2018 and 2023 (Table 27-15.4, Table 27-15.12, Table 27-15.14). In addition, dense stands of juniper surround the transect (Photos), indicating that further encroachment may be possible over time.

Deer winter range condition on this site has remained poor since 2018. Improvements to deer winter range could be achieved by increasing recruitment of young while decreasing decadence in the preferred browse community; decreasing or removing cheatgrass; and diversifying and increasing the perennial grass and forb components (Table 27-15.15). Pellet group data shows that deer presence was high in 2018 and moderate in 2023 (Table 27-15.9).

**Trend Summary Tables**

**Table 27-15.6 - 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
2018	13.8	6.8	0.4	22.3	5.8	0.4
2023	16.9	3.6	0.8	23.3	2.0	1.0

**Table 27-15.7 - 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
2018	176	4	14	-	0.8	0.1	0.1	-
2023	185	11	258	99	2.2	0.1	1.3	2.3

**Table 27-15.8 - 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
2018	33.5	1.5	37.8	14.8	19.5	23.2
2023	25.0	0.9	25.1	11.1	18.3	26.5

**Table 27-15.9 - 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	Horse	Rabbit
	Quadrat Frequency			
2018	3	43	-	24
2023	-	37	-	2
Year	Days Use Per Acre (ha)			
2018	2.2 (5.4)	77.7 (192.0)	-	-
2023	0.7 (1.8)	22.1 (54.6)	0.6 (1.4)	-

**Table 27-15.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency			
2018	176	1	1	2
2023	185	11	-	-
year	Average Cover (%)			
2018	0.8	0.0	0.0	0.0
2023	2.2	0.1	-	-

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

**Table 27-15.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenoxys cooperi var. cooperi (Cooper's rubberweed)	Orobanche fasciculata (clustered broomrape)	Phlox longifolia (longleaf phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sphaeralcea parvifolia (smallflower globemallow)
year	Nested Frequency							
2018	3	11	-	-	-	-	1	-
2023	256	8	8	2	2	4	-	95
year	Average Cover (%)							
2018	0.0	0.1	-	-	-	-	0.0	-
2023	1.3	0.0	0.0	0.0	0.0	0.0	-	2.2

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

**Table 27-15.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)								
	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cylindropuntia whipplei (Whipple cholla)	Echinocereus (hedgehog cactus)	Fallugia paradoxa (Apache plume)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Pediocactus simpsonii (mountain ball cactus)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)
year	Line Intercept Cover (%)								
2018	17.8	3.3	2.4	-	-	3.4	0.4	-	1.2
2023	17.9	4.2	1.9	-	-	0.1	1	-	1.2
year	Quadrat Cover (%)								
2018	10.0	2.8	2.6	0.1	0.3	3.8	0.4	0.0	1.0
2023	13.1	2.8	2.9	-	0.5	0.1	0.8	0.1	1.1

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

**Table 27-15.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2018	3940	-	6	76	19	32	8	27	36/64
2023	4220	340	6	78	16	27	18	16	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	1160	-	22	67	10	35	47	17	39/63
2023	760	-	5	71	24	26	13	32	- / -
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
2018	800	-	5	85	10	0	0	5	24/89
2023	1420	-	4	42	54	0	0	20	- / -
<b>Echinocereus -- (hedgehog cactus)</b>									
2018	20	-	0	100	0	0	0	0	20/31
2023	60	-	0	0	100	0	0	100	- / -
<b>Eriogonum corymbosum -- (crispleaf buckwheat)</b>									
2018	20	-	0	100	0	0	100	0	10/10
2023	-	-	-	-	-	-	-	-	- / -
<b>Fallugia paradoxa -- (Apache plume)</b>									
2018	440	-	23	73	5	9	91	0	23/25
2023	120	-	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	4500	-	2	88	9	4	0	75	17/27
2023	180	-	11	89	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2018	40	-	100	0	0	0	0	0	- / -
2023	40	-	50	50	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	20	-	0	100	0	0	0	0	23/95
2023	-	-	-	-	-	-	-	-	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2018	-	-	-	-	-	-	-	-	4/5
2023	160	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Purshia stansburiana <sup>p</sup> -- (Stansbury cliffrose)									
2018	1060	60	32	68	0	9	83	0	76/85
2023	580	-	52	45	3	17	3	14	- / -

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

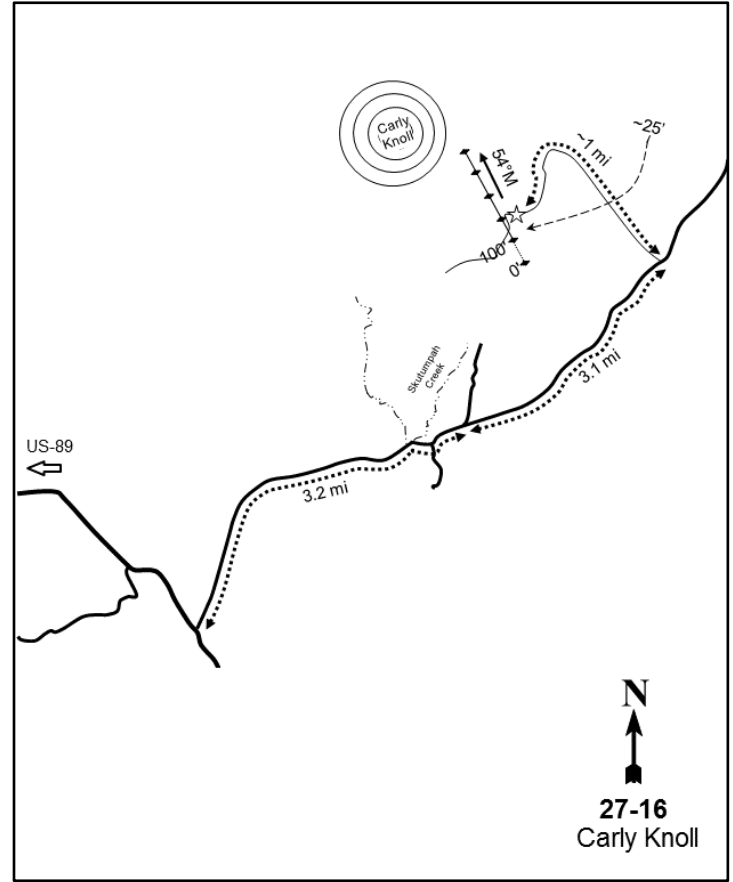
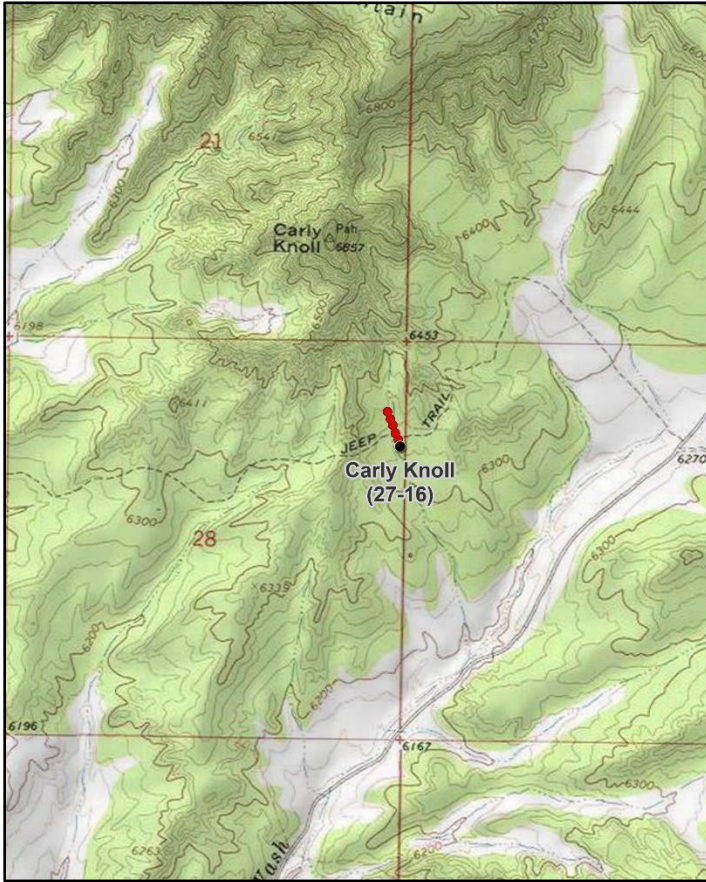
**Table 27-15.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2018	27	7	60	27	-	7	8.7
2023	28	13	27	53	-	7	11.4

**Table 27-15.15 - Deer Desirable Components Index:** Upland Potential Scale.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	28.2	10.0	4.8	0.1	-0.6	0.0	0.0	<b>42.5</b>	Poor
2023	29.4	10.0	4.0	0.2	-1.7	4.6	0.0	<b>46.5</b>	Poor

## CARLY KNOLL - STUDY NO. 27-16



### Location Information

USGS 7.5 min Map Info Skutumpah Creek SE; Township 40S, Range 4W, Section 28  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 384245 East 4129811 North

### Transect Information

Browse Tag # (0' Stake) 567  
 Transect Bearing 335° magnetic  
 Length 500ft  
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
 Belt Marker Placement Belt 2: No Rebar

### Directions to Site

From North Johnson Canyon Road east of Glendale, turn left (east) onto Skutumpah Road. Stay on this road for 6.3 miles, passing numerous intersections. At this point there will be a two-track on the left (north) side of the road. Turn left and travel for about 1.0 mile, then park; there is no witness post. The 0-foot stake is approximately 25 feet south of the road and is marked with browse tag #567.

### Site Information

Land Ownership Federal  
 Land Administrator BLM  
 Allotment MILL CREEK  
 Elevation 6,350ft (1,935m)  
 Aspect South  
 Slope 5%  
 Sample Dates 06/25/2018, 07/12/2023

**Table 27-16.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	UKC - Carly Knoll/Mill Creek	3279	Winter 2015-Spring 2016	548
Seeding - Aerial After	UKC - Carly Knoll/Mill Creek	3279	Winter 2016	548
Mechanical - Bullhog	UKC - Carly Knoll/Mill Creek	3279	Winter 2015-2016	548

**Table 27-16.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Carly Knoll/Mill Creek Bullhog			Aerial	Oct 2015	685
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	1.02	0.95
G	Agropyron cristatum	Crested Wheatgrass	Douglas	1.04	0.81
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.02	0.93
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky II	1.02	0.97
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	1.31	0.72
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.15	0.09
F	Achillea millefolium	Western Yarrow	Lincoln WA	0.15	0.13
F	Linum perenne	Blue Flax	Appar	0.29	0.24
F	Medicago sativa	Alfalfa	Ladak +	1.02	0.91
F	Onobrychis viciifolia	Sainfoin	Eski	2.04	1.98
F	Penstemon palmeri	Palmer Penstemon	Sevier UT	0.44	0.41
F	Sanguisorba minor	Small Burnet	Delar	2.04	1.91

Mix Name			Application Type	Application Date	Acres
Carly Knoll/Mill Creek Bullhog Kochia			Aerial	Jan 2016	685
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Medicago sativa	Alfalfa	Ladak	0.51	0.47
F	Medicago sativa	Alfalfa	Ranger	0.51	0.47
S	Bassia prostrata	Forage Kochia	Millard/Beaver UT	0.51	0.38

**Wildlife Habitat and Vegetation History**

**Table 27-16.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 27-16.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Bitterbrush	Phase I
2023	Bitterbrush	Phase I

**Site Notes**

No Notes

**Soils**

**Table 27-16.5 - 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
Sandy Loam	7.8	74.2	9.4	16.4	0.9	7.0	166.0	0.3	06/25/2018

**Site Potential**

1981 - 2010 Average Annual Precipitation 14 inches  
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site # R035XY308UT  
 States and Transitions 2018-2023 - State Undefined: Community Phase Undefined

This site has remained dominated by antelope bitterbrush (*Purshia tridentata*) since study establishment in 2018. Other browse species such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and forage kochia (*Bassia prostrata*) have also been observed, but in lesser amounts (Table 27-16.12, Table 27-16.13). The herbaceous understory has remained moderately diverse and abundant. Perennial forbs provided a majority of the herbaceous cover in 2018, while mainly seeded perennial grasses were the dominant herbaceous component in 2023 (Table 27-16.7, Table 27-16.10, Table 27-16.11). The area was bullhogged and seeded during the



winter of 2015/2016 (Table 27-16.1). However, small twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees have been recorded in cover and point-quarter measurements in both sample years (Table 27-16.12, Table 27-16.14). The presence of these trees indicates that the study site was within Phase I of woodland succession as of 2023 (Table 27-16.4) and may be prone to infilling in future sample years.

Deer winter range condition on this site was considered to be fair to good in 2018 and good in 2023. Further improvement to wintering range could be accomplished through efforts that increase preferred browse reproduction, diversify and increase perennial grasses and forbs, and decrease or remove cheatgrass (Table 27-16.15). According to pellet transect data, deer presence has remained low since 2018. Elk presence was also low in 2018 and elk pellet groups were not observed in 2023 (Table 27-16.9). However, sagebrush could provide browse during the winter months, and the herbaceous understory could serve as forage during the summer (Table 27-16.3; Beck & Peek, 2005; Wambolt, 1996).

**Trend Summary Tables**

**Table 27-16.6 - 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
2018	22.7	0.9	0.9	23.7	1.0	0.2
2023	27.6	0.8	0.7	40.0	0.4	1.0

**Table 27-16.7 - 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
2018	10	41	29	107	0.3	2.1	0.6	6.3
2023	18	158	56	35	0.5	8.3	2.4	2.1

**Table 27-16.8 - 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
2018	34.9	0.4	54.6	0.0	1.0	32.1
2023	31.7	-	50.4	0.0	0.0	40.8

**Table 27-16.9 - 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			
2018	-	13	2	28
2023	1	11	1	4
Year	Days Use Per Acre (ha)			
2018	-	15.4 (38.1)	6.0 (14.9)	-
2023	8.0 (19.7)	4.0 (9.9)	-	-

**Table 27-16.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Elymus wawawaiensis (Snake River wheatgrass)	Poa fendleriana (muttongrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency									
2018	-	12	10	6	-	1	3	1	-	18
2023	2	27	18	33	3	7	11	19	13	65
year	Average Cover (%)									
2018	-	0.4	0.3	0.3	-	0.0	0.2	0.1	-	1.2
2023	0.2	1.4	0.5	0.9	0.3	0.0	1.0	1.4	0.1	3.0

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

**Table 27-16.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Astragalus convallarius (lesser rushy milkvetch)	Chamaesyce (sandmat)	Cryptantha (cryptantha)	Cryptantha gracilis <sup>ai</sup> (narrowstem cryptantha)	Cryptantha pterocarya <sup>a</sup> (wingnut cryptantha)	Cryptantha setosissima <sup>a</sup> (bristly cryptantha)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca scariola <sup>ai</sup> (prickly lettuce)	Linum perenne <sup>i</sup> (blue flax)	Medicago sativa <sup>i</sup> (alfalfa)	Onobrychis vicifolia <sup>i</sup> (sainfoin)	Packera multilobata (lobeleaf groundsel)	Penstemon eatonii (firecracker penstemon)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)
year	Nested Frequency																
2018	5	2	14	38	-	-	-	-	-	21	4	34	7	10	0	12	8
2023	23	-	12	4	6	1	39	3	4	1	-	2	-	-	-	23	-
year	Average Cover (%)																
2018	0.8	0.0	0.5	2.4	-	-	-	-	-	0.4	0.0	1.5	0.6	0.1	0.0	0.2	0.6
2023	1.4	-	0.6	0.0	0.2	0.0	2.1	0.0	0.0	0.0	-	0.1	-	-	-	0.1	-

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

<b>FORB SPECIES</b>	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested
2018	-
2023	0
year	Average Cover (%)
2018	-
2023	0.0

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

**Table 27-16.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)							
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia polyacantha (platins pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)							
2018	1.7	0.1	-	0.7	-	0.3	0.2	21.9
2023	8.4	0.3	0.3	0.1	0.6	-	0.4	31.3
year	Quadrat Cover (%)							
2018	2.3	0.2	-	0.7	0.2	0.1	0.7	20.1
2023	4.8	0.3	0.0	0.8	0.4	-	0.2	22.5

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

**Table 27-16.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	1340	-	46	51	3	0	0	3	53/57
2023	1300	60	29	71	0	0	0	0	- / -
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2018	320	-	63	38	0	0	0	0	35/32
2023	100	-	20	80	0	20	20	0	- / -
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
2018	-	-	-	-	-	-	-	-	64/133
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2018	20	-	0	100	0	100	0	0	69/119
2023	20	-	0	100	0	0	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2018	20	-	0	100	0	0	0	0	57/74
2023	20	-	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	320	20	6	88	6	0	0	6	29/43
2023	60	-	0	100	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
2018	100	20	100	0	0	0	0	0	- / -
2023	120	-	100	0	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	60	-	0	33	67	0	0	67	11/39
2023	20	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	120	20	100	0	0	0	0	17	- / -
2023	120	-	67	33	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	1080	20	7	93	0	41	4	0	82/168
2023	1360	-	0	100	0	40	21	0	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2018	-	-	-	-	-	-	-	-	67/65
2023	20	-	100	0	0	100	0	0	- / -
<b>Yucca -- (yucca)</b>									
2018	20	-	0	100	0	0	0	0	33/42
2023	80	-	0	100	0	0	0	0	- / -

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

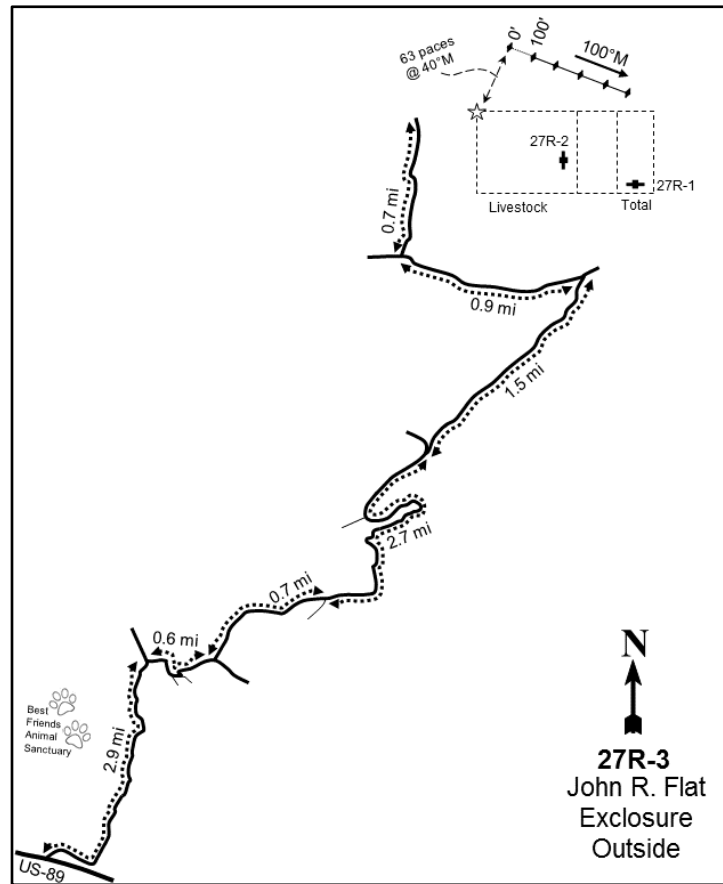
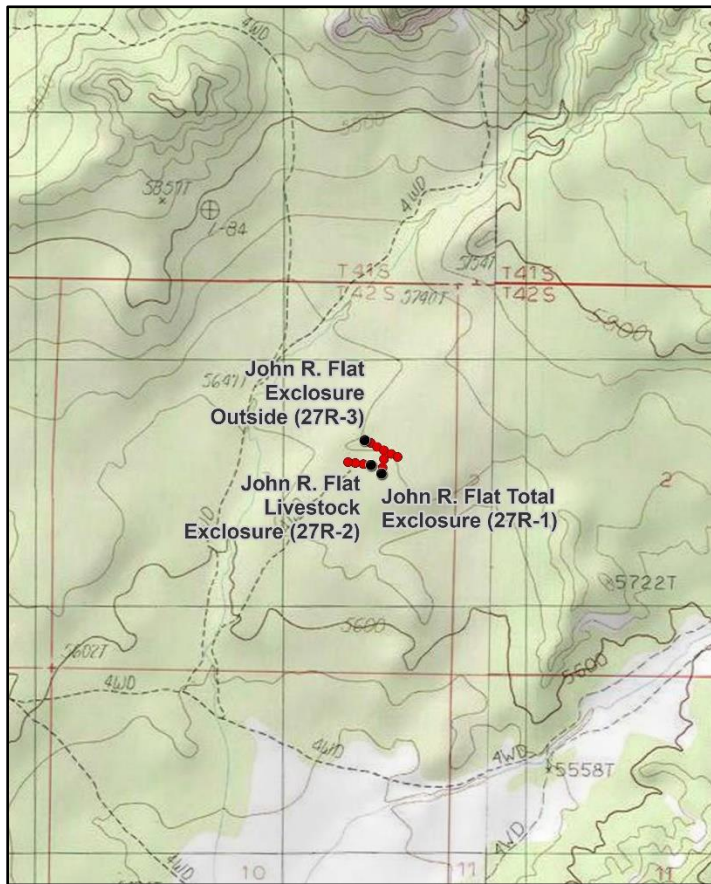
**Table 27-16.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	28	63	38	-	-	-	1.6
2023	42	67	33	-	-	-	2.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	59	17	83	-	-	-	2.7
2023	39	29	71	-	-	-	2.9

**Table 27-16.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	30.0	14.9	5.2	4.2	-0.2	10.0	0.0	<b>64.1</b>	Fair-Good
2023	30.0	15.0	3.1	16.7	-0.4	4.2	0.0	<b>68.6</b>	Good

## JOHN R. FLAT ENCLOSURE OUTSIDE - STUDY NO. 27R-3



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

White Tower NE; Township 42S, Range 6W, Section 03  
NAD 83 UTM ZONE 12, 366286 East 4116873 North

### Transect Information

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

115 (Red)  
100° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### Directions to Site

From Kanab, travel north on Highway 89 to the Kanab Creek turnoff. Turn right and go 2.9 miles to another turnoff (you will pass the Best Friends Animal Sanctuary). Turn right, crossing Kanab Creek, and travel 0.5 miles to a fork. Stay left and continue for approximately 100 feet to another fork. Stay left again and continue 0.2 miles to the next fork. Stay left and travel 0.7 miles to another fork. Stay left again and travel 1.9 miles to another fork. Go right at this fork and proceed for 1.5 miles to yet another fork. At this fork, turn left, cross the drainage, and go 0.9 miles to another fork. Go right and continue for 0.75 miles to the enclosure. From the northwest corner of the enclosure, walk 63 paces at 40 degrees magnetic to the 0-foot stake of the baseline; the 0-foot stake is marked with a red browse tag #115.

**Note:** The distances provided by these written directions may not exactly match those displayed in the location map as different reference points were used. However, both the directions and map should be generally correct.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	JOHN R. FLAT
Elevation	5,670ft (1,728m)
Aspect	West
Slope	3-5%
Sample Dates	08/11/1998, 07/15/2003, 07/15/2008, 07/09/2018, 07/10/2023

**Wildlife Habitat and Vegetation History****Table 27R-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 27R-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1998	Juniper/Bitterbrush	Phase II
2003	Juniper/Bitterbrush	Phase II
2008	Juniper/Bitterbrush	Phase II
2018	Juniper/Bitterbrush	Phase II
2023	Juniper/Bitterbrush	Phase II

**Site Notes**

No Notes

**Soils****Table 27R-03.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Fine Sand	5.6	92.2	2.0	5.8	0.5	5.1	3.2	0.2	08/11/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Sand (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY307UT
States and Transitions	1998-2023 - State Undefined: Community Phase Undefined

Since study establishment in 1998, this site has been dominated by a mixture of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) with bitterbrush contributing more cover (Table 27R-03.12, Table 27R-03.13). Cover of preferred browse has increased over time (Table 27R-03.6). The herbaceous understory has been sparse in most sample years. However, perennial grasses, mainly blue grama (*Bouteloua gracilis*) and sandhill muhly (*Muhlenbergia pungens*), provided moderate cover in 2018 and 2023 (Table 27R-03.7, Table 27R-03.10). Forbs have remained depauperate, providing little cover. The native perennial broom-like ragwort (*Senecio spartioides*) contributed the most cover of any single forb species through 2018, but the annual species pale evening primrose (*Oenothera pallida*) provided more cover in 2023 (Table 27R-03.11). Utah juniper (*Juniperus osteosperma*) density has steadily increased over the duration of the study period and it is likely that encroachment will continue if a tree-removing disturbance does not occur (Table 27R-03.14).

Deer winter range condition has fluctuated between very poor and fair since 1998. As of 2023, habitat for wintering deer was considered to be in fair condition. Improvements to this winter range could be achieved through efforts that increase preferred browse cover and reproduction while decreasing decadence; diversifying and increasing cover of perennial grasses and forbs would also be beneficial for deer winter range (Table 27R-03.15). Pellet transect data indicates that deer presence was moderate in 2023 (Table 27R-03.9).

**Trend Summary Tables****Table 27R-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	6.6	1.5	0.1	-	-	0.2
2003	5.4	1.2	0.4	5.1	1.1	3.4
2018	10.8	1.5	0.6	10.6	2.7	0.8
2023	10.3	2.0	0.0	11.5	1.9	0.3

**Table 27R-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	25	70	124	28	0.1	3.2	0.7	1.1
2003	-	61	11	14	-	2.2	0.0	0.3
2018	-	148	6	63	-	7.2	0.0	1.7
2023	1	170	63	55	0.0	10.3	1.4	1.3

**Table 27R-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	60.4	6.2	28.5	0.0	0.0	14.7
2003	66.3	1.7	27.4	0.0	-	9.8
2018	65.6	3.0	33.7	0.1	0.0	22.5
2023	52.7	3.4	38.4	0.0	0.0	22.2

**Table 27R-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	-	32	1	17
2003	-	23	-	15
2008	-	-	-	-
2018	-	15	-	31
2023	-	31	-	15
Year	Days Use Per Acre (ha)			
1998	-	40.2 (99.3)	-	-
2003	1.5 (3.6)	22.1 (54.6)	-	-
2008	2.9 (7.2)	14.7 (36.4)	-	-
2018	2.2 (5.4)	16.8 (41.4)	0.7 (1.7)	-
2023	-	32.8 (81.1)	-	-

**Table 27R-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Elymus elymoides (squirreltail)	Muhlenbergia pungens (sandhill muhly)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency						
1998	6	-	37	-	8	20	25
2003	0	5	29	-	25	4	-
2018	1	2	59	-	89	9	-
2023	9	-	60	5	95	17	1
year	Average Cover (%)						
1998	0.1	-	1.9	-	0.8	0.4	0.1
2003	0.1	0.0	0.8	-	1.3	0.0	-
2018	0.0	0.0	3.1	-	4.0	0.0	-
2023	0.5	-	2.4	0.0	7.2	0.2	0.0

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

**Table 27R-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce parryi <sup>a</sup> (Parry's sandmat)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Linum kingii (King's flax)	Machaeranthera canescens (hoary tansyaster)	Oenothera albicaulis <sup>a</sup> (whitest evening primrose)	Oenothera pallida <sup>a</sup> (pale evening primrose)	Senecio spartioides (broom-like ragwort)	Sphaeralcea parvifolia (smallflower globemallow)	unknown annual forb <sup>a</sup> (unknown forb)
year	Nested Frequency											
1998	13	6	115	5	-	-	0	-	4	17	1	-
2003	-	-	-	-	-	-	-	3	3	12	2	5
2018	-	-	4	-	11	14	-	0	2	42	-	-
2023	14	-	-	-	7	3	-	-	63	32	-	-
year	Average Cover (%)											
1998	0.4	0.0	0.5	0.0	-	-	0.0	-	0.0	0.8	0.0	-
2003	-	-	-	-	-	-	-	0.0	0.0	0.3	0.0	0.0
2018	-	-	0.0	-	0.4	0.0	-	0.0	0.0	1.2	-	-
2023	0.1	-	-	-	0.2	0.0	-	-	1.4	0.9	-	-

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



**Table 27R-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia filifolia (sand sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ephedra viridis <sup>p</sup> (mormon tea)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum nummulare (money buckwheat)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)							
1998	-	-	-	-	-	-	-	-
2003	0.9	1.6	0.9	0.2	-	3.4	-	2.6
2018	0.9	1.6	1.6	0.4	0.1	0.8	1.3	7.4
2023	1.7	0.7	2.1	0.2	-	0.3	-	8.7
year	Quadrat Cover (%)							
1998	0.7	3.8	0.6	0.7	0.0	0.1	-	2.2
2003	0.6	3.0	0.4	0.6	0.0	0.4	-	1.9
2018	1.0	2.0	0.9	0.3	0.2	0.6	0.0	7.9
2023	1.4	1.3	0.8	0.1	0.4	0.0	0.0	8.3

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

**Table 27R-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia filifolia -- (sand sagebrush)</b>									
1998	380	40	11	79	11	0	0	5	55/56
2003	460	-	9	70	22	0	0	4	55/67
2018	440	-	14	46	41	0	0	36	59/63
2023	480	-	4	29	67	0	0	54	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	1540	-	10	36	53	46	9	20	65/84
2003	900	-	0	11	89	9	0	73	49/61
2018	780	-	0	62	39	5	0	21	63/76
2023	460	-	0	22	78	44	0	74	- / -
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
1998	160	40	63	38	0	75	0	0	112/160
2003	240	-	17	75	8	17	0	8	71/85
2018	60	-	0	100	0	0	0	0	69/108
2023	380	-	11	79	11	0	0	16	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1998	200	-	10	70	20	0	0	0	73/108
2003	180	-	11	56	33	0	0	0	72/99
2018	100	-	0	80	20	0	0	20	70/88
2023	80	-	50	25	25	0	0	50	- / -
<b>Eriogonum nummulare -- (money buckwheat)</b>									
1998	60	-	33	67	0	0	0	0	34/56
2003	80	-	50	50	0	0	50	0	29/35
2018	60	-	0	33	67	0	0	0	37/51
2023	60	-	67	33	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	20	-	0	100	0	0	0	0	17/22
2003	-	-	-	-	-	-	-	-	24/45
2018	-	-	-	-	-	-	-	-	22/35
2023	-	-	-	-	-	-	-	-	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	100	0	0	0	0	0	-/-
2018	20	-	100	0	0	0	0	0	-/-
2023	20	-	100	0	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
1998	20	-	0	100	0	0	0	0	12/34
2003	40	-	0	0	100	0	0	50	-/-
2018	60	-	0	100	0	0	0	0	10/23
2023	100	-	0	40	60	0	0	60	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	240	-	50	50	0	25	0	0	78/133
2003	260	-	8	69	23	8	54	8	56/100
2018	520	-	0	100	0	8	4	0	76/116
2023	560	-	11	75	14	11	61	11	-/-
<b>Rhus trilobata var. trilobata<sup>p</sup> -- (skunkbush sumac)</b>									
1998	-	-	-	-	-	-	-	-	45/75
2003	-	-	-	-	-	-	-	-	32/73
2018	-	-	-	-	-	-	-	-	85/209
2023	-	-	-	-	-	-	-	-	-/-
<b>Ribes<sup>p</sup> -- (currant)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	56/150
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Yucca -- (yucca)</b>									
1998	-	-	-	-	-	-	-	-	77/63
2003	-	-	-	-	-	-	-	-	44/91
2018	-	-	-	-	-	-	-	-	56/76

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

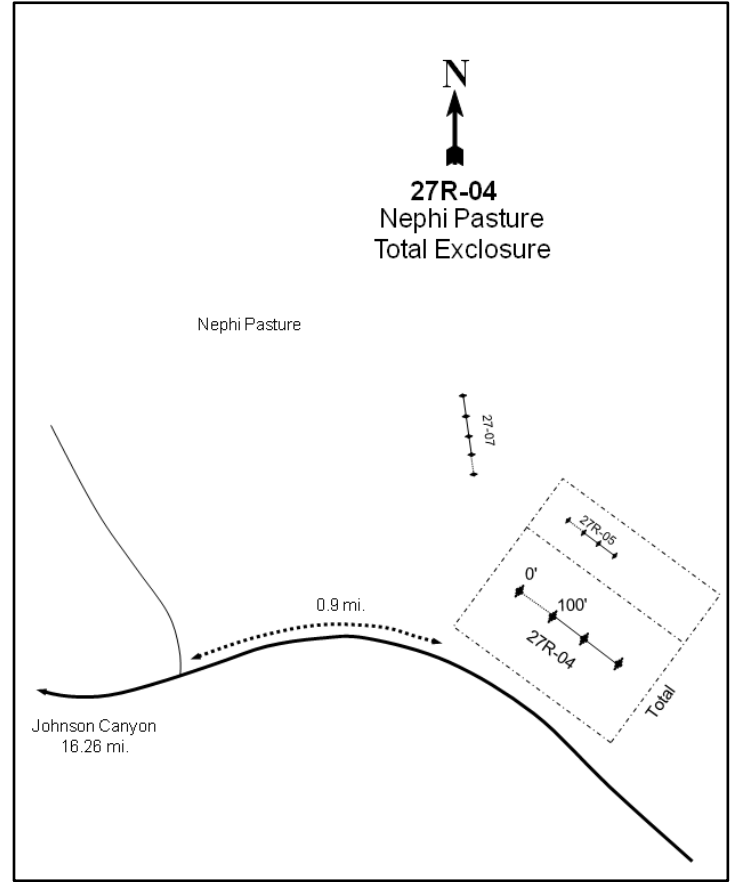
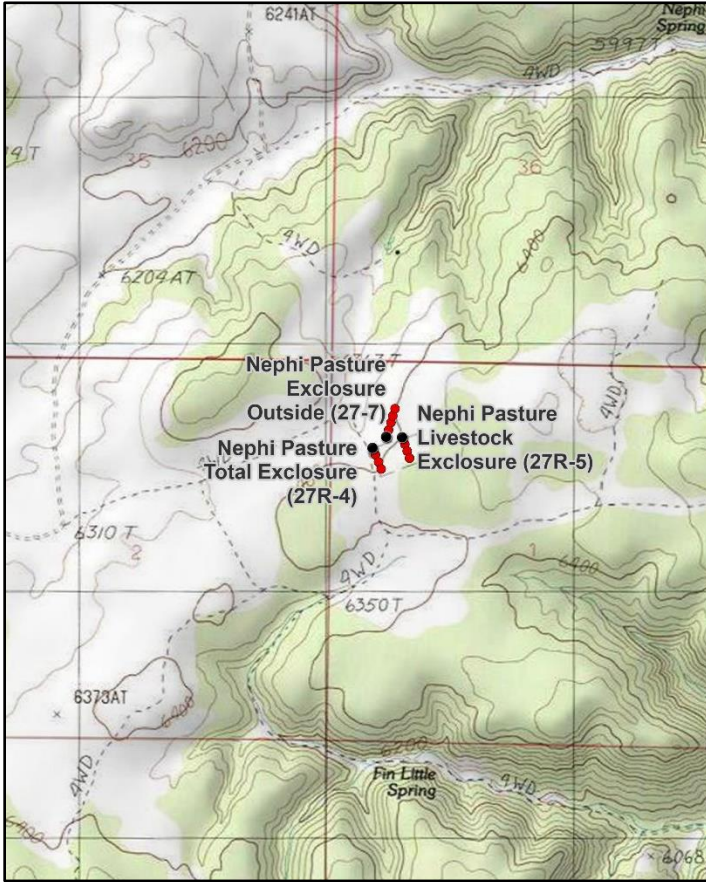
**Table 27R-03.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	17	-	-	-	-	-	26.3
2003	21	7	20	20	7	47	29.2
2018	27	-	29	12	12	47	31.5
2023	24	-	25	19	13	44	26.6

**Table 27R-03.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	8.8	5.7	14.0	6.4	0.0	2.3	0.0	<b>37.2</b>	Poor
2003	7.0	2.7	3.4	4.4	0.0	0.5	0.0	<b>18.1</b>	Very Poor
2018	15.1	13.3	0.0	14.4	0.0	3.3	0.0	<b>46.1</b>	Poor
2023	16.6	9.7	5.0	20.7	0.0	2.6	0.0	<b>54.6</b>	Fair

## NEPHI PASTURE TOTAL EXCLOSURE - STUDY NO. 27R-4



### Location Information

USGS 7.5 min Map Info Nephi Point NW; Township 42S, Range 4W, Section 01  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 394135 East 4116779 North

### Transect Information

Browse Tag # (0' Stake) Not Available  
 Transect Bearing 142° magnetic  
 Length 300ft  
 Belt Placement Line 1 (11ft & 95ft), Line 2 (59ft), Line 3 (34ft & 71ft)  
 Belt Marker Placement Standard

### Directions to Site

From Kanab, travel east on US-89 for 9.4 miles to Johnson Canyon Road. Proceed north on Johnson Canyon Road for 9.75 miles to the Lock Ridge-Nephi Pasture road. Turn right and go 16.25 miles (see directions for study 27-06 for more detail) on the main road to a major intersection in Nephi Pasture. Continue straight towards Nephi Point, going 0.9 miles to an exclosure. From the northwest corner of the exclosure, count up five posts to the 0 foot baseline on the inside of the exclosure. The baseline runs at 142 degrees magnetic.

### Site Information

Land Ownership Federal  
 Land Administrator BLM  
 Allotment VERMILION  
 Elevation 6,380ft (1,945m)  
 Aspect Northwest  
 Slope 11-13%  
 Sample Dates 08/12/1998, 07/30/2003, 07/31/2008, 07/23/2013, 07/10/2023

**Wildlife Habitat and Vegetation History**

**Table 27R-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 27R-04.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1998	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2023	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II

**Site Notes**

This transect was established inside the total enclosure in 1998 as part of a three-way comparison between the different enclosure grazing treatments; no grazing in the total enclosure, wildlife use in the livestock enclosure, and open to all grazing animals outside the enclosure. Deer generally utilize the area at high levels during the winter. The total enclosure is designed to exclude all animals, but due to a hole in the fence, some deer were able to access the enclosure prior to both the 1998 and 2003 surveys, and had moderately hedged many of the preferred shrubs. One side of the fence was falling down in 2023, causing the total enclosure to be more like a livestock enclosure.

**Soils**

**Table 27R-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	5.9	74.2	18.0	7.8	0.7	8.2	25.6	0.4	08/12/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation 12 inches  
 NRCS Ecological Site Upland Sand (Mountain Big Sagebrush)  
 NRCS Ecological Site # R035XY307UT  
 States and Transitions 1998-2023 - State Undefined: Community Phase Undefined

Since study establishment in 1998, the vegetation on this site has existed as a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*), and Utah serviceberry (*Amelanchier utahensis*) (Photos, Table 27R-04.12, Table 27R-04.13). The herbaceous understory has remained comparatively limited, with the native perennial forb bastard toadflax (*Comandra umbellata*) contributing the most cover of any single herbaceous species throughout the study period. The introduced annual grass species (*Bromus tectorum*) has fluctuated over time, but cover remained low overall as of 2023 (Table 27R-04.7, Table 27R-04.10, Table 27R-04.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have slowly increased over the sample period (Photos, Table 27R-04.12, Table 27R-04.13, Table 27R-04.14). Although the site has been considered to be within Phase I transitioning to Phase II of woodland succession since 1998 (Table 27R-04.4), encroachment will likely continue without a major disturbance.

Deer winter range on this site has varied between being in very poor and fair condition since 1998; winter range condition was considered to be poor to fair as of 2023. Deer wintering habitat could be improved by increasing recruitment of young and decreasing decadence in the preferred browse community; decreasing or removing cheatgrass; and diversifying and increasing cover of perennial grasses and forbs (Table 27R-04.15). Deer presence has remained low since 1998 according to pellet transect data, with days use per acre being only 0.7 in 2023 (Table 27R-04.9).

**Trend Summary Tables**

**Table 27R-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
1998	19.5	1.4	-	-	-	-
2003	17.5	0.1	0.6	19.8	0.1	1.0
2008	18.6	0.0	2.0	24.7	-	4.0
2013	18.0	0.0	1.4	22.8	0.2	4.1
2023	15.6	0.0	3.1	23.6	-	8.0

**Table 27R-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
1998	380	151	88	180	8.8	3.4	0.9	3.6
2003	-	55	48	141	-	0.9	1.3	3.1
2008	15	4	123	185	0.0	0.0	1.0	4.7
2013	24	32	115	195	0.1	0.5	2.2	3.8
2023	126	7	229	213	1.5	0.0	4.3	6.7

**Table 27R-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
1998	23.0	11.4	42.4	0.0	-	41.2
2003	34.7	3.0	54.0	-	-	23.7
2008	29.1	2.6	58.7	0.1	0.0	27.5
2013	35.5	0.8	51.7	0.0	-	26.4
2023	30.7	4.0	60.7	0.0	0.5	26.8

**Table 27R-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	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency		
1998	21	1	14
2003	14	-	31
2008	10	-	88
2013	-	-	46
2023	1	-	13
Days Use Per Acre (ha)			
1998	-	-	-
2003	-	-	-
2008	-	-	-
2013	-	-	-
2023	0.7 (1.7)	-	-

**Table 27R-04.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
1998	3	321	8	60	56	37	2	3	144
2003	6	-	-	12	29	8	-	5	-
2008	-	7	1	2	-	1	-	-	11
2013	-	13	8	-	-	13	-	12	11
2023	-	111	5	-	-	2	-	-	20
year	Average Cover (%)								
1998	0.2	7.4	0.0	1.9	0.8	0.4	0.0	0.1	1.4
2003	0.2	-	-	0.3	0.3	0.1	-	0.0	-
2008	-	0.0	0.0	0.0	-	0.0	-	-	0.0
2013	-	0.1	0.2	-	-	0.1	-	0.1	0.0
2023	-	1.4	0.0	-	-	0.0	-	-	0.0

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

**Table 27R-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Calochortus nuttallii (sego lily)	Chamaesyce (sandmat)	Chenopodium pratericola <sup>a</sup> (desert goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Descurainia incana <sup>a</sup> (mountain tansymustard)	Erigeron (fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lupinus (lupine)	Microsteris gracilis <sup>a</sup> (slender phlox)	Penstemon comarrhenus (dusty beardtongue)	Phlox austromontana (mountain phlox)	Plantago patagonica <sup>a</sup> (woolly plantain)
year	Nested Frequency																
1998	-	-	-	-	167	11	6	5	-	-	-	-	5	6	-	4	66
2003	11	-	-	-	132	-	-	-	8	-	42	-	0	6	-	5	1
2008	-	13	-	3	179	68	-	35	-	-	2	6	-	-	2	-	16
2013	1	4	5	-	192	74	-	10	8	-	-	1	-	-	2	-	39
2023	11	-	2	22	208	35	-	1	2	28	41	11	-	12	1	-	192
year	Average Cover (%)																
1998	-	-	-	-	3.3	0.1	0.1	0.0	-	-	-	-	0.2	0.0	-	0.0	0.8
2003	0.1	-	-	-	2.8	-	-	-	0.0	-	1.2	-	0.1	0.0	-	0.0	0.0
2008	-	0.0	-	0.0	4.7	0.7	-	0.1	-	-	0.0	0.0	-	-	0.0	-	0.0
2013	0.0	0.0	0.2	-	3.7	1.8	-	0.0	0.0	-	-	0.0	-	-	0.0	-	0.2
2023	0.1	-	0.0	0.1	6.6	0.4	-	0.0	0.0	0.1	0.1	0.1	-	0.0	0.1	-	3.3

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

FORB SPECIES		
	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea parvifolia (smallflower globemallow)
year	Nested	
1998	3	1
2003	-	-
2008	25	1
2013	-	2
2023	-	-
year	Average Cover (%)	
1998	0.0	0.0
2003	-	-
2008	0.1	0.0
2013	-	0.0
2023	-	-

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

**Table 27R-04.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)					
1998	-	-	-	-	-	-
2003	5.4	8.6	0.1	1	-	5.8
2008	4.3	12	-	4	-	8.4
2013	4.6	8.8	0.2	4.1	-	9.4
2023	4.5	12.4	-	8	0	6.7
year	Quadrat Cover (%)					
1998	1.0	10.6	1.4	-	0.0	7.8
2003	3.7	7.3	0.1	0.6	-	6.4
2008	3.1	8.6	0.0	2.0	-	7.0
2013	2.7	9.3	0.0	1.4	-	5.9
2023	4.0	6.6	0.0	3.1	0.0	5.1

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

**Table 27R-04.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1998	80	-	25	50	25	0	0	0	224/269
2003	60	-	0	67	33	33	0	0	212/223
2008	40	-	0	50	50	0	0	0	213/224
2013	60	-	0	100	0	0	0	33	175/225
2023	60	-	0	67	33	33	0	67	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	2820	-	12	24	64	32	0	46	81/94
2003	1780	-	0	46	54	2	0	18	88/94
2008	1500	360	5	25	69	8	1	31	101/109
2013	1660	320	11	54	35	0	1	29	94/118
2023	1620	1080	10	72	19	0	0	25	- / -
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
1998	-	-	-	-	-	-	-	-	99/124
2003	-	-	-	-	-	-	-	-	131/103
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	1580	-	5	92	3	0	0	3	31/31
2003	60	-	0	100	0	0	0	0	28/30
2008	20	-	100	0	0	0	0	0	- / -
2013	240	-	58	42	0	0	0	0	25/33
2023	260	-	0	100	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>t</sup> -- (Utah juniper)</b>									
1998	40	-	100	0	0	0	0	0	- / -
2003	60	-	33	67	0	0	0	0	- / -
2008	60	-	33	67	0	0	0	0	- / -
2013	80	-	50	50	0	0	0	0	- / -
2023	60	-	0	100	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1998	20	-	0	0	100	0	0	100	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	3/31
2023	40	-	0	100	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	920	-	20	78	2	28	0	2	106/149
2003	740	-	0	70	30	14	5	3	81/126
2008	860	-	0	37	63	21	0	14	81/127
2013	800	-	3	75	23	3	0	40	85/141
2023	640	-	13	47	41	3	13	31	- / -

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

**Table 27R-04.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

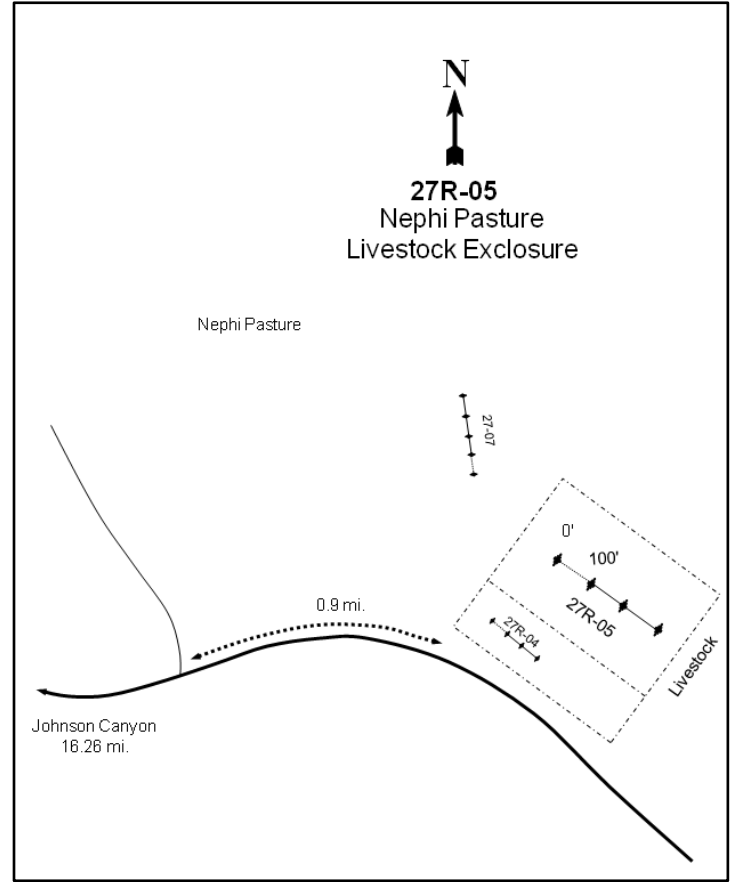
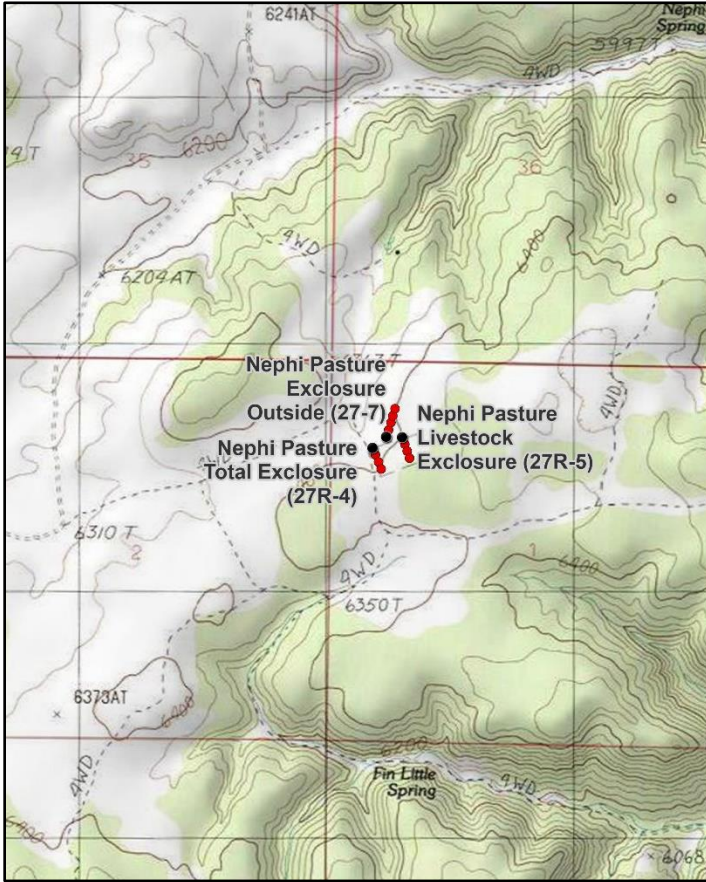
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2023	37	-	-	17	42	42	23.2



**Table 27R-04.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	26.6	3.9	7.9	6.9	-6.6	7.2	0.0	<b>45.9</b>	Poor
2003	27.6	2.6	0.0	1.7	0.0	6.1	0.0	<b>38.0</b>	Poor
2008	30.0	-4.1	1.3	0.0	0.0	9.4	0.0	<b>36.6</b>	Very Poor-Poor
2013	30.0	8.2	2.6	0.9	-0.1	7.5	0.0	<b>49.2</b>	Poor-Fair
2023	30.0	6.7	4.4	0.1	-1.1	10.0	0.0	<b>50.1</b>	Poor-Fair

## NEPHI PASTURE LIVESTOCK EXCLOSURE - STUDY NO. 27R-5



### Location Information

USGS 7.5 min Map Info      Nephi Point NW; Township 42S, Range 4W, Section 01  
 GPS (0' Stake)              NAD 83 UTM ZONE 12, 394255 East 4116822 North

### Transect Information

Browse Tag # (0' Stake)      Not Available  
 Transect Bearing              147° magnetic  
 Length                          300ft  
 Belt Placement                Line 1 (11ft & 95ft), Line 2 (59ft), Line 3 (34ft & 71ft)  
 Belt Marker Placement      No Rebar

### Directions to Site

From Kanab, travel east on US-89 for 9.4 miles to Johnson Canyon Road. Proceed north on Johnson Canyon Road for 9.75 miles to the Lock Ridge-Nephi Pasture road. Turn right and go 16.25 miles (see directions for study 27-06 for more detail) on the main road to a major intersection in Nephi Pasture. Continue straight towards Nephi Point, going 0.9 miles to an exclosure. Walk east along the fence on the north side of the exclosure to the beginning of the livestock exclosure (lower fence). From here, walk down to the midpoint of the fenceposts. The baseline starts on the inside of the livestock exclosure at the midpoint, and runs at an azimuth of 147 degrees magnetic.

### Site Information

Land Ownership                Federal  
 Land Administrator          BLM  
 Allotment                      VERMILION  
 Elevation                      6,380ft (1,945m)  
 Aspect                         Northwest  
 Slope                          5-10%  
 Sample Dates                 08/12/1998, 07/30/2003, 07/29/2008, 07/23/2013, 07/11/2023

**Wildlife Habitat and Vegetation History****Table 27R-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 27R-05.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1998	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2023	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II

**Site Notes**

This transect was established inside the livestock enclosure in 1998 as part of a three-way comparison between the different enclosure grazing treatments. This transect is within 300 feet of the original Nephi Pasture study that samples outside the enclosure complex (27-07). The livestock enclosure is approximately 200 feet by 300 feet in size (about 1.4 acres). Deer presence within this enclosure has been significant throughout the study period (Table 27R-05.9)

**Soils****Table 27R-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
Fine Sand	5.8	90.2	2.0	7.8	0.8	6.9	12.8	0.2	08/12/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Sand (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY307UT
States and Transitions	1998-2023 - State Undefined: Community Phase Undefined

Since study establishment in 1998, the vegetation on this site has existed as a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*), and Utah serviceberry (*Amelanchier utahensis*) (Photos, Table 27R-05.12, Table 27R-05.13). The herbaceous understory has remained limited, with the native perennial forb bastard toadflax (*Comandra umbellata*) contributing the most cover of any single herbaceous species throughout the study period. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed in most years, but cover remained low in 2023 (Table 27R-05.7, Table 27R-05.10, Table 27R-05.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have slowly increased over the sample period (Photos, Table 27R-05.12, Table 27R-05.13, Table 27R-05.14). Although the site has been considered to be within Phase I transitioning to Phase II of woodland succession since 1998 (Table 27R-05.4), encroachment will likely continue without a major disturbance.

Condition of deer winter range on this site has ranged between poor and good since 1998, with condition being considered poor to fair in 2023. Improvements to this wintering range could be accomplished through efforts that increase recruitment of young and decrease decadence in the preferred browse community. Diversifying and increasing cover of the perennial grass component would also greatly improve deer winter range (Table 27R-05.15). According to pellet transect data, deer presence has remained high since 1998 (Table 27R-05.9).

## Trend Summary Tables

**Table 27R-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
1998	22.4	2.2	1.9	-	-	-
2003	21.5	0.1	1.3	23.0	0.1	2.9
2008	20.2	0.0	1.2	31.9	-	4.9
2013	22.6	0.0	1.7	29.1	-	4.6
2023	24.3	0.8	8.5	33.2	0.6	11.0

**Table 27R-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
1998	235	200	71	171	6.7	6.8	0.8	3.8
2003	-	20	17	52	-	0.7	0.7	0.7
2008	22	1	38	84	0.0	0.0	0.1	1.6
2013	3	12	24	112	0.0	0.3	0.1	1.7
2023	68	15	107	167	0.6	1.0	0.7	4.5

**Table 27R-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
1998	23.3	1.7	66.4	-	-	47.0
2003	32.5	1.3	58.0	-	0.0	25.6
2008	27.7	0.2	60.3	0.0	-	24.7
2013	33.7	0.3	53.4	0.0	-	26.9
2023	22.0	0.7	66.1	-	-	36.1

**Table 27R-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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	-	39	1	27
2003	-	34	-	23
2008	-	34	-	73
2013	-	26	-	26
2023	-	22	1	10
Year	Days Use Per Acre (ha)			
1998	17.4 (43.0)*	111.3 (274.8)	-	-
2003	-	169.6 (418.8)	-	-
2008	-	75.7 (187.0)	-	-
2013	-	57.0 (140.7)	-	-
2023	-	55.6 (137.4)	-	-

\*Pellets per acre (ha)

**Table 27R-05.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency									
1998	28	177	23	14	99	41	-	20	1	124
2003	2	-	1	0	9	8	-	-	0	-
2008	-	10	-	-	-	-	1	-	-	12
2013	-	2	-	-	-	-	11	-	1	1
2023	1	43	7	-	-	7	2	-	-	39
year	Average Cover (%)									
1998	0.6	4.7	0.7	0.1	2.8	2.1	-	0.6	0.0	2.0
2003	0.1	-	0.0	0.0	0.0	0.5	-	-	0.0	-
2008	-	0.0	-	-	-	-	0.0	-	-	0.0
2013	-	0.0	-	-	-	-	0.3	-	0.0	0.0
2023	0.1	0.5	0.2	-	-	0.6	0.0	-	-	0.1

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

**Table 27R-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Chamaesyce (sandmat)	Chenopodium pratericola <sup>a</sup> (desert goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha gracilis <sup>a</sup> (narrowstem cryptantha)	Descurainia incana <sup>a</sup> (mountain tansymustard)	Draba <sup>a</sup> (draba)	Erigeron (fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lupinus argenteus (silvery lupine)
year	Nested Frequency																
1998	5	7	-	-	-	-	143	-	11	7	3	-	5	-	-	5	8
2003	-	-	5	-	-	-	47	-	-	-	-	-	-	-	17	-	-
2008	-	-	-	-	-	-	78	-	15	-	-	14	-	-	-	5	-
2013	-	-	-	3	3	-	95	-	14	-	-	-	-	-	-	1	-
2023	-	-	9	-	-	3	163	5	11	-	-	-	-	32	33	-	-
year	Average Cover (%)																
1998	0.0	0.0	-	-	-	-	3.2	-	0.1	0.0	0.0	-	0.0	-	-	0.0	0.6
2003	-	-	0.0	-	-	-	0.7	-	-	-	-	-	-	-	0.7	-	-
2008	-	-	-	-	-	-	1.5	-	0.1	-	-	0.0	-	-	-	0.0	-
2013	-	-	-	0.0	0.0	-	1.5	-	0.1	-	-	-	-	-	-	0.0	-
2023	-	-	0.0	-	-	0.0	4.5	0.2	0.0	-	-	-	-	0.1	0.1	-	-

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

FORB SPECIES	Nested Frequency				
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)	11	14	45	1	-
<i>Penstemon comarrhenus</i> (dusty beardtongue)	-	-	-	-	-
<i>Plantago patagonica</i> <sup>a</sup> (woolly plantain)	-	4	12	2	3
<i>Polygonum douglasii</i> <sup>a</sup> (Douglas' knotweed)	-	8	8	-	10
<i>Sphaeralcea parvifolia</i> (smallflower globemallow)	5	-	50	-	8
year	Average Cover (%)				
1998	0.0	0.1	0.6	0.0	-
2003	-	-	-	-	-
2008	-	0.1	0.0	0.0	0.0
2013	-	0.2	0.0	-	0.0
2023	0.0	-	0.3	-	0.0

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

**Table 27R-05.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)							
<i>Amelanchier utahensis</i> <sup>p</sup> (Utah serviceberry)	-	-	-	-	-	-	-	
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)	10.3	7.9	0.1	2.9	-	-	4.8	
<i>Gutierrezia sarothrae</i> (broom snakeweed)	10.9	14.2	-	4.9	-	-	6.8	
<i>Juniperus osteosperma</i> <sup>t</sup> (Utah juniper)	9.6	15.7	-	4.6	-	-	3.8	
<i>Opuntia</i> (pricklypear)	5.4	18.2	0.6	9	-	2	9.6	
<i>Pinus edulis</i> <sup>t</sup> (twoneedle pinyon)	Quadrat Cover (%)							
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)	1998	6.4	10.7	2.2	1.7	0.0	0.1	5.3
	2003	8.6	7.7	0.1	1.2	-	0.1	5.2
	2008	6.5	9.9	0.0	1.2	-	-	3.9
	2013	7.9	10.5	0.0	1.3	-	0.4	4.2
	2023	5.5	14.5	0.6	6.3	0.2	2.2	4.4

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

**Table 27R-05.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1998	740	100	27	62	11	30	3	8	131/150
2003	540	40	22	70	7	7	22	7	157/162
2008	1000	-	26	52	22	20	12	4	155/144
2013	940	20	28	72	0	19	0	4	142/162
2023	720	-	22	31	47	8	0	53	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	3340	180	22	44	34	27	13	18	74/77
2003	2420	-	3	31	66	12	4	52	82/87
2008	1820	80	1	34	65	15	6	24	108/110
2013	1940	80	11	63	26	30	4	23	96/116
2023	2280	240	4	70	26	4	0	26	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	1780	40	2	98	0	0	0	0	28/30
2003	120	-	0	83	17	0	0	17	25/27
2008	20	-	100	0	0	0	0	0	19/13
2013	80	-	50	50	0	0	0	0	27/36
2023	460	-	0	100	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>I</sup> -- (Utah juniper)</b>									
1998	60	-	100	0	0	0	0	0	- / -
2003	60	-	67	0	33	0	0	0	- / -
2008	60	-	0	100	0	0	0	0	- / -
2013	80	-	25	75	0	25	0	25	- / -
2023	100	-	20	80	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1998	20	-	0	100	0	0	0	0	16/10
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	0	0	0	17/53
2023	80	-	0	100	0	0	0	0	- / -
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1998	800	20	28	63	10	38	0	8	82/123
2003	840	-	7	76	17	29	69	5	78/118
2008	980	-	0	51	49	31	14	31	66/88
2013	1040	-	25	62	14	56	4	23	84/120
2023	1000	-	10	64	26	26	24	26	- / -
<b>Ribes<sup>P</sup> -- (currant)</b>									
1998	40	-	0	100	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	164/114
2013	-	-	-	-	-	-	-	-	- / -
2023	40	-	50	50	0	50	50	0	- / -

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

**Table 27R-05.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

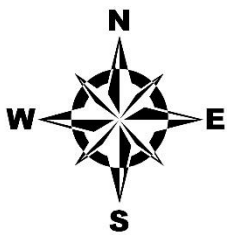
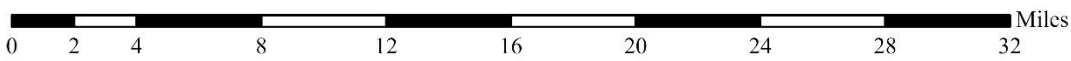
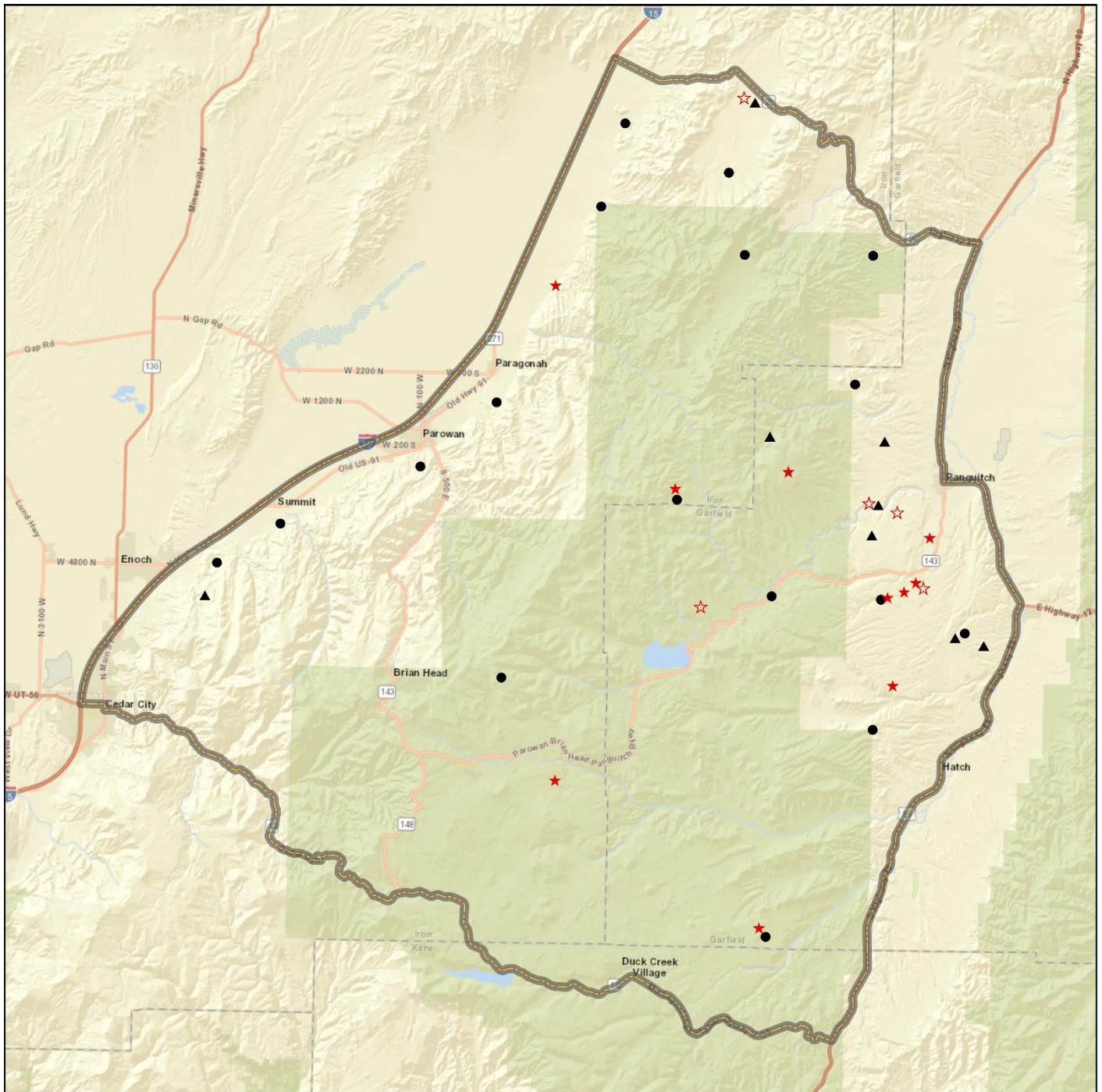
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	17	-	-	-	-	-	17.8
2023	28	-	10	10	10	70	29.1
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	5	-	-	-	-	-	19.0
2023	13	-	-	-	25	75	22.5

**Table 27R-05.15 - Deer Desirable Components Index: Upland Potential Scale.**

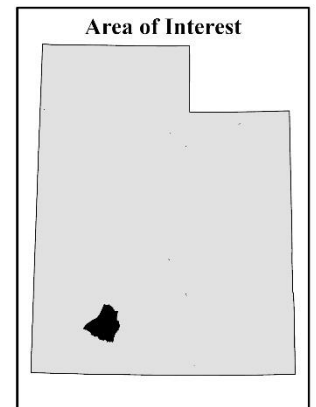
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	30.0	8.5	12.4	13.7	-5.0	7.6	0.0	<b>67.2</b>	Good
2003	30.0	6.1	6.1	1.4	0.0	1.4	0.0	<b>45.1</b>	Poor
2008	30.0	1.0	4.7	0.0	0.0	3.2	0.0	<b>38.8</b>	Poor
2013	30.0	10.3	9.2	0.6	0.0	3.4	0.0	<b>53.5</b>	Fair
2023	30.0	6.1	4.2	1.9	-0.4	9.1	0.0	<b>50.9</b>	Poor-Fair



# WILDLIFE MANAGEMENT UNIT 28 – PANGUITCH LAKE

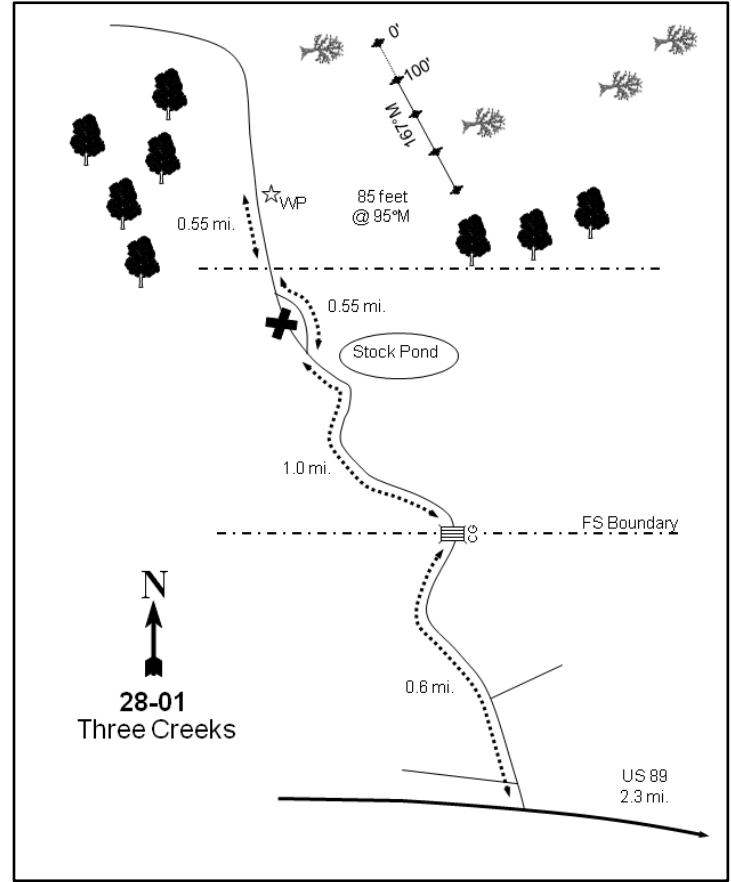
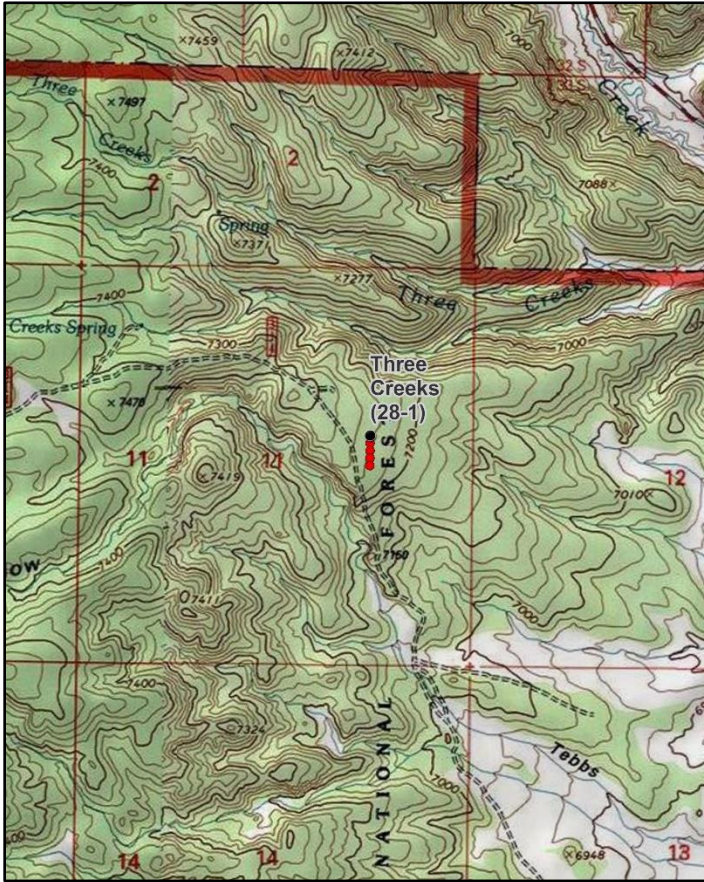


Study Locations Project, Status	Unit Boundary
● RT, Active	▭ Unit - 28
★ RT, Suspended	
▲ WRI, Active	
☆ WRI, Suspended	



Credits: Bureau of Land Management, Utah AGRC, Esri, HERE, Garmin, NGA, USGS, NPS

## THREE CREEKS - STUDY NO. 28-1

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Panguitch NW NW; Township 33S, Range 6W, Section 11  
NAD 83 UTM ZONE 12, 368985 East 4202060 North

**Transect Information**

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

7164  
167° magnetic  
400ft  
Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
Belt 4: 2ft, Belt 2: 1ft

**Directions to Site**

From the SR-20 - US-89 junction, proceed south on US-89 for 3.1 miles to Three Creeks Road. Travel west on this road (**do not take the north fork by the gate**) for 0.5 miles to a fork. Bear right and travel 1.85 miles to Three Forks, taking the right-most fork. Travel 0.6 miles to a cattle guard and continue 1.0 mile to a stock pond. Proceed up the washed-out road for 0.55 miles to a fence, continuing right at the fork after 0.3 miles. Continue 0.55 miles up to the chaining and to the witness post on the right (east) side of the road which is a short yellow fencepost. From the witness post, walk 185 feet east to the 400-foot stake. The 0-foot baseline stake is 400 feet north of the witness post and is a short green fencepost marked by browse tag #7164.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Three Creeks
Elevation	7,250ft (2,210m)
Aspect	East
Slope	8%
Sample Dates	08/03/1992, 07/08/1998, 06/26/2003, 06/24/2008, 06/05/2013, 06/11/2018, 06/12/2023

**Table 28-01.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1967	-
Seeding - Seed Unknown	-	-	1967	-
Hand Crew - Lop and Scatter	-	-	Between 1987 and 1992	-
Fire - Prescribed Fire	-	-	2003	-
Hand Crew - Lop and Scatter	-	-	Between 2003 and 2008	-
Seeding - Hopper	Tebbs Hollow/Mud Springs Sagebrush and PJ Treatment	458	July-September 2006	400

**Table 28-01.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Tebbs Hollow			Broadcast	Jul 2006	400
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Elymus trachycaulus	Slender Wheatgrass		3.38	2.98
G	Pascopyrum smithii	Western Wheatgrass	Arriba	2.63	1.99
G	Poa secunda	Sandberg Bluegrass	Toole MT	0.56	0.51
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Goldar	2.19	1.87
F	Achillea millefolium	Western Yarrow		0.13	0.10
F	Balsamorhiza sagittata	Arrowleaf Balsamroot	Sevier UT	0.14	0.12
F	Linum perenne	Blue Flax		0.56	0.51
S	Cercocarpus ledifolius	Curlleaf Mountain Mahogany		0.25	0.24
S	Purshia tridentata	Antelope Bitterbrush	Millard UT	0.50	0.46

**Wildlife Habitat and Vegetation History****Table 28-01.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-01.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Perennial Grass/Mountain Big Sagebrush	Phase I
1992	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

This study is on the northeast edge of the Markagunt Plateau and drains easterly into the Sevier River. Several intermittent streams are nearby with a stock pond one mile to the south. There was a prescribed fire on the site in 2003 before it was read, but not all of the sagebrush was burned.

**Soils****Table 28-01.5 - 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	7.1	54.2	38.0	7.8	2.1	7.3	28.8	0.5	07/07/1998

**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 the study was established in 1987, this browse component of this site was likely dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with young twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) encroaching in the area (Photos, Pre-1992 Data). The herbaceous understory was mainly comprised of the introduced perennial grass crested wheatgrass (*Agropyron cristatum*), a species that was seeded as part of the 1967 chaining and seeding treatment. A prescribed fire in 2003 reduced the cover of the shrub and herbaceous components, while trees were removed by the 2003 burn and a lop and scatter treatment that occurred between 2003 and 2008 (Table 28-01.1). Shrub and herbaceous cover have steadily increased following treatment, and the site has transitioned to one dominated by sagebrush, although crested wheatgrass remains abundant (Table 28-01.7, Table 28-01.10, Table 28-01.12). Pinyon and juniper have persisted in low amounts (Table 28-01.14); although the site was within Phase I of woodland succession as of 2023 (Table 28-01.4), there could be potential for infilling in the future. Healthy populations of preferred browse like sagebrush and antelope bitterbrush (*Purshia tridentata*) are important to maintain as they are essential winter forage components for big game and important for other sagebrush obligates as well.

Deer winter range condition has ranged between very poor and excellent since 1992, and condition was considered to be good to excellent in 2023. Further improvement to deer wintering habitat could be achieved through efforts that increase preferred browse cover and reproduction while decreasing decadence; diversifying and increasing cover of perennial forbs would also be beneficial for deer winter range (Table 28-01.15). Pellet transect data indicates that deer presence on this site has been low since 1998. Elk presence has also remained low since 1998, and no elk pellet groups were observed in 2023 (Table 28-01.9). However, the sagebrush component of this site could provide valuable browse for elk during the winter months (Table 28-01.3; Wambolt, 1996).

**Trend Summary Tables****Table 28-01.6 - 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
1992	6.9	0.8	1.3	-	-	-
1998	8.3	0.5	1.0	-	-	-
2003	2.7	1.2	1.0	5.0	0.9	0.1
2008	4.5	1.3	-	8.2	1.2	-
2013	9.2	0.4	-	12.0	1.4	-
2018	12.0	3.9	-	13.7	2.3	-
2023	13.6	2.6	0.1	16.2	2.9	0.2

**Table 28-01.7 - 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
1992	-	357	17	91	-	22.7	0.3	3.0
1998	2	391	10	120	0.0	21.1	0.0	3.0
2003	-	190	5	91	-	5.0	0.0	3.1
2008	14	341	43	122	0.1	14.4	0.2	2.5
2013	-	347	14	103	-	18.1	0.1	2.1
2018	-	345	5	58	-	24.4	0.0	0.9
2023	26	325	103	199	0.1	25.2	0.8	4.5

**Table 28-01.8 - 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
1992	35.2	0.0	36.4	0.0	12.8	31.6
1998	29.9	0.3	46.1	5.9	3.9	34.8
2003	60.7	0.0	26.9	2.9	3.4	13.5
2008	47.5	0.0	27.1	5.4	3.1	24.5
2013	38.5	-	32.2	4.3	2.7	31.4
2018	50.6	0.0	36.4	4.3	3.4	38.0
2023	39.9	0.2	26.7	10.7	4.8	38.0

**Table 28-01.9 - 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	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1992	5	-	18	-	61
1998	16	-	17	7	28
2003	22	-	15	15	31
2008	12	-	5	6	87
2013	3	-	6	5	8
2018	3	-	8	6	51
2023	13	-	14	3	17
Year	Days Use Per Acre (ha)				
1992	-	-	-	-	-
1998	45.0 (111.2)	-	16.1 (39.7)	9.4 (23.2)	-
2003	29.0 (71.7)	-	15.4 (38.1)	8.7 (21.5)	-
2008	10.2 (25.1)	-	16.1 (39.7)	7.4 (18.2)	-
2013	5.1 (12.6)	-	2.0 (5.0)	6.0 (14.9)	-
2018	8.7 (21.5)	8.7 (21.5) <sup>a</sup>	11.4 (28.1)	10.0 (24.8)	-
2023	0.7 (1.8)	-	8.7 (21.5)	-	-

<sup>a</sup>Pellets per acre (ha)**Table 28-01.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex obtusata (obtusate sedge)	Elymus elymoides (squirreltail)	Hesperosipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency												
1992	28	243	59	-	12	6	7	41	5	-	4	1	164
1998	14	327	58	2	24	15	6	39	13	5	-	9	66
2003	4	118	29	-	-	-	14	60	1	3	-	-	7
2008	16	263	40	14	42	-	30	96	1	-	3	-	9
2013	7	286	48	-	33	2	28	28	1	1	5	5	33
2018	17	268	50	-	32	1	63	44	-	-	-	-	25
2023	17	278	78	26	19	-	54	33	2	-	-	-	1
year	Average Cover (%)												
1992	0.6	12.8	2.3	-	0.3	0.3	0.2	1.3	0.0	-	0.1	0.0	4.8
1998	0.1	17.7	0.6	0.0	0.3	0.1	0.2	0.7	0.1	0.0	-	0.1	1.3
2003	0.0	3.3	0.5	-	-	-	0.3	0.8	0.0	0.0	-	-	0.0
2008	0.2	8.8	1.9	0.1	0.6	-	0.7	1.9	0.1	-	0.0	-	0.2
2013	0.2	13.3	1.7	-	1.1	0.0	0.8	0.2	0.1	0.0	0.0	0.0	0.5
2018	0.4	14.8	3.7	-	1.5	0.0	1.8	1.8	-	-	-	-	0.4
2023	0.3	18.9	2.4	0.1	0.3	-	2.6	0.7	0.0	-	-	-	0.0

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

**Table 28-01.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Amaranthus <sup>ai</sup> (pigweed)	Arabis holboellii <sup>a</sup> (Holboell's rockress)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)	Cryptantha fulvocanescens (tawny cryptantha)	Cymopterus purpureus (purple springparsley)	Descurainia <sup>a</sup> (tansymustard)	Draba <sup>a</sup> (draba)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)
year	Nested Frequency																
1992	-	-	-	-	1	-	-	4	-	-	14	-	17	-	-	-	3
1998	-	3	-	-	-	2	-	3	-	-	5	-	-	1	-	-	-
2003	-	-	3	-	-	5	1	3	-	-	0	0	-	-	-	-	-
2008	-	-	-	-	-	-	-	3	-	-	9	-	3	-	-	3	1
2013	-	-	-	3	1	-	-	1	0	-	9	-	-	-	-	-	-
2018	-	-	-	5	-	4	-	12	-	-	13	1	-	-	-	-	-
2023	8	3	-	5	1	0	6	3	-	1	19	5	-	-	1	38	7
year	Average Cover (%)																
1992	-	-	-	-	0.0	-	-	0.0	-	-	0.1	-	0.2	-	-	-	0.0
1998	-	0.0	-	-	-	0.0	-	0.0	-	-	0.0	-	-	0.0	-	-	-
2003	-	-	0.0	-	-	0.1	0.0	0.0	-	-	0.0	0.0	-	-	-	-	-
2008	-	-	-	-	-	-	-	0.1	-	-	0.0	-	0.0	-	-	0.0	0.0
2013	-	-	-	0.0	0.0	-	-	0.0	0.0	-	0.0	-	-	-	-	-	-
2018	-	-	-	0.0	-	0.1	-	0.2	-	-	0.1	0.0	-	-	-	-	-
2023	0.2	0.0	-	0.0	0.0	0.0	0.0	0.1	-	0.0	0.2	0.1	-	-	0.0	0.4	0.2

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

FORB SPECIES	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera (evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon comarthenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)	Pleiocanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Senecio integerrimus <sup>a</sup> (lambstongue ragwort)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius <sup>ai</sup> (yellow safsify)	Trifolium gymnocarpon (hollyleaf clover)	unknown annual forb <sup>a</sup> (unknown forb)
year	Nested Frequency																
1992	-	-	53	-	-	-	4	5	11	2	-	-	6	-	-	-	2
1998	3	-	56	4	-	-	3	5	40	2	3	-	5	-	0	1	-
2003	1	2	19	-	-	-	31	-	25	5	-	1	6	1	-	-	-
2008	25	2	36	-	2	2	58	5	14	6	8	-	21	1	7	2	-
2013	12	-	35	-	-	3	35	2	24	7	-	-	7	5	-	1	-
2018	-	-	12	-	-	-	4	-	-	12	-	-	12	1	-	2	-
2023	50	-	91	-	14	-	35	-	28	15	22	-	75	2	-	4	-
year	Average Cover (%)																
1992	-	-	2.6	-	-	-	0.0	0.1	0.1	0.0	-	-	0.1	-	-	-	0.0
1998	0.0	-	2.6	0.0	-	-	0.0	0.0	0.2	0.0	0.0	-	0.0	-	0.0	0.0	-
2003	0.0	0.0	2.1	-	-	-	0.4	-	0.1	0.3	-	0.0	0.1	0.0	-	-	-
2008	0.1	0.0	1.4	-	0.0	0.0	0.5	0.0	0.0	0.2	0.0	-	0.1	0.0	0.1	0.0	-
2013	0.1	-	1.4	-	-	0.0	0.3	0.0	0.1	0.1	-	-	0.1	0.0	-	0.0	-
2018	-	-	0.2	-	-	-	0.0	-	-	0.2	-	-	0.0	0.0	-	0.0	-
2023	0.2	-	2.0	-	0.0	-	0.1	-	0.2	0.6	0.1	-	0.4	0.0	-	0.3	-

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

FORB SPECIES		
	unknown perennial forb (unknown forb)	Zigadenus paniculatus (foothill deathcamas)
year	Nested	
1992	3	-
1998	6	-
2003	-	1
2008	-	0
2013	-	-
2018	-	0
2023	-	5
year	Average Cover (%)	
1992	0.0	-
1998	0.0	-
2003	-	0.0
2008	-	0.0
2013	-	-
2018	-	0.0
2023	-	0.1

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

**Table 28-01.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>a</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>a</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Linanthus pungens (granite prickly phlox)	Opuntia polyacantha (plains pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>a</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)									
1992	-	-	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-	-	-
2003	-	5	-	-	0.9	-	-	-	0.1	-
2008	-	8.1	-	-	1.2	-	-	-	-	0.1
2013	-	11.8	0.5	0.2	0.7	-	-	-	-	0.2
2018	-	13.3	-	-	2.3	-	-	-	-	0.4
2023	-	16	0.2	-	2.7	-	-	-	0.2	0.2
year	Quadrat Cover (%)									
1992	-	6.8	-	-	0.5	1.1	-	0.3	0.1	0.2
1998	0.0	7.6	0.0	-	0.4	0.8	-	0.1	0.2	0.7
2003	-	2.7	-	-	1.2	-	-	0.1	1.0	0.0
2008	-	4.2	0.4	-	1.0	-	-	-	-	0.3
2013	-	9.0	0.0	0.0	0.4	-	-	-	-	0.2
2018	-	11.7	-	0.0	3.9	-	0.0	-	-	0.4
2023	-	13.2	0.0	-	2.5	-	-	0.0	0.1	0.4

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

**Table 28-01.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1992	40	-	0	100	0	0	100	0	- / -
1998	20	-	0	100	0	0	0	0	47/75
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1992	1860	20	37	51	13	65	8	2	- / -
1998	1460	20	30	69	1	10	0	0	61/85
2003	700	-	6	69	26	11	6	6	51/70
2008	1620	2200	35	59	6	7	0	1	56/84
2013	3040	120	18	78	4	49	1	7	51/78
2018	2380	40	9	83	8	2	1	33	60/93
2023	2440	3480	17	74	9	7	2	10	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1992	20	-	0	100	0	0	0	0	- / -
1998	20	-	0	100	0	0	0	0	47/107
2003	20	-	0	100	0	0	0	0	47/69
2008	-	-	-	-	-	-	-	-	34/53
2013	20	-	0	100	0	0	0	0	23/23
2018	-	-	-	-	-	-	-	-	21/29
2023	20	-	0	100	0	0	0	100	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	23/30
2013	20	-	0	100	0	0	0	0	54/51
2018	20	-	0	0	100	0	0	100	71/39
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1992	4300	320	47	53	0	0	0	0	- / -
1998	900	120	18	80	2	0	0	0	22/17
2003	1640	-	4	78	18	0	0	5	23/24
2008	5460	1260	14	79	8	12	3	1	20/20
2013	2200	480	57	38	5	0	0	14	16/17
2018	8580	20	12	86	2	0	0	4	15/16
2023	29520	200	98	2	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1992	120	-	67	33	0	0	0	0	- / -
1998	80	-	75	25	0	0	0	0	- / -
2003	20	-	100	0	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	14/25
2003	-	-	-	-	-	-	-	-	19/22
2008	-	-	-	-	-	-	-	-	12/16
2013	-	-	-	-	-	-	-	-	14/22
2018	20	-	0	100	0	0	0	0	13/18
2023	60	-	0	100	0	0	33	0	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1992	400	-	20	60	20	0	0	20	-/-
1998	140	-	0	86	14	0	0	0	13/19
2003	220	-	0	100	0	0	0	0	15/30
2008	120	-	0	100	0	0	0	0	13/29
2013	80	-	0	100	0	0	0	25	10/24
2018	160	-	0	100	0	0	0	50	12/32
2023	260	-	39	62	0	0	0	15	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1992	100	-	80	20	0	0	40	0	-/-
1998	120	-	67	33	0	0	0	0	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	60	-	100	0	0	0	0	0	-/-
2023	40	-	100	0	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1992	60	-	0	100	0	0	33	67	-/-
1998	100	-	20	80	0	60	20	0	33/70
2003	80	-	0	75	25	25	75	0	19/60
2008	100	-	0	100	0	20	80	0	43/90
2013	100	-	0	100	0	0	80	20	30/88
2018	220	-	0	91	9	0	100	0	23/63
2023	120	20	0	100	0	0	100	0	-/-

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

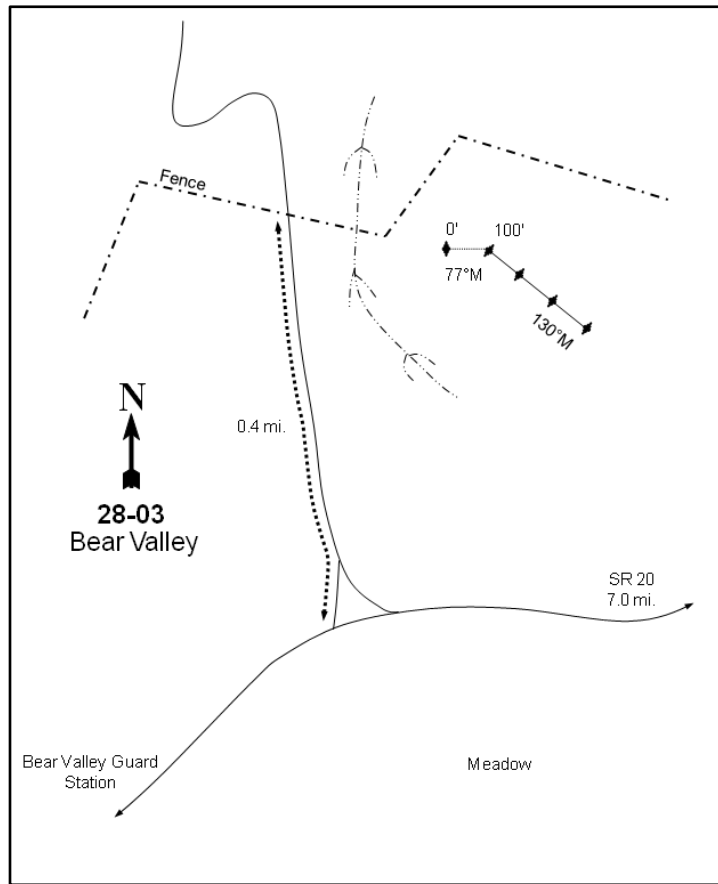
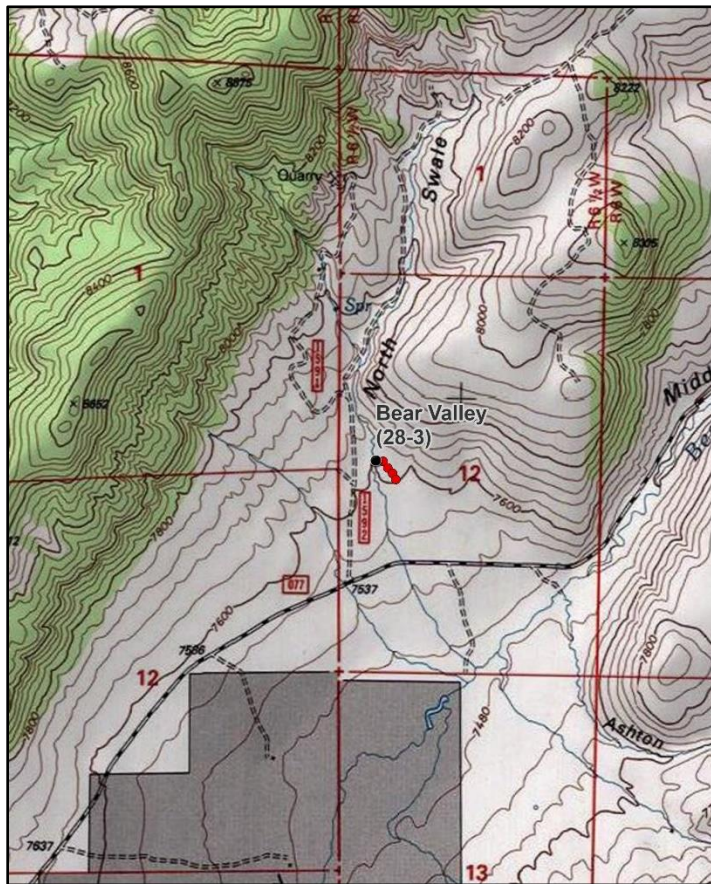
**Table 28-01.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1992	56	-	56	44	-	-	-
1998	49	-	-	-	-	-	7.1
2003	12	-	33	56	11	-	8.0
2008	8	-	-	50	50	-	17.5
2013	9	-	50	50	-	-	13.5
2018	33	-	-	100	-	-	21.0
2023	13	-	-	67	33	-	15.0
<b>Pinus edulis (twoneedle pinyon)</b>							
1992	70	-	88	12	-	-	-
1998	88	-	-	-	-	-	4.3
2003	29	-	40	50	10	-	5.4
2008	10	17	50	33	-	-	5.3
2013	7	-	25	75	-	-	10.0
2018	10	-	33	67	-	-	6.2
2023	9	17	17	17	50	-	9.3

**Table 28-01.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1992	8.7	11.3	15.0	30.0	0.0	5.9	0.0	<b>70.9</b>	Good
1998	10.5	14.5	14.6	30.0	0.0	6.0	0.0	<b>75.6</b>	Good
2003	6.3	0.0	0.0	10.0	0.0	6.1	0.0	<b>22.4</b>	Very Poor
2008	10.3	13.2	15.0	28.9	0.0	5.1	0.0	<b>72.3</b>	Good
2013	15.1	13.8	9.0	30.0	0.0	4.1	0.0	<b>72.1</b>	Good
2018	17.2	12.7	4.5	30.0	0.0	1.7	0.0	<b>66.1</b>	Fair-Good
2023	20.3	12.3	8.5	30.0	0.0	9.0	0.0	<b>80.1</b>	Good-Excellent

### BEAR VALLEY - STUDY NO. 28-3



#### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Little Creek Peak NW; Township 33S, Range 6W, Section 12  
NAD 83 UTM ZONE 12, 360495 East 4202117 North

#### Transect Information

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

7163  
77° magnetic (Lines 2-4: 130° magnetic)  
400ft  
Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
Standard

#### Directions to Site

From the US-89 - SR-20 Junction, go approximately 7.0 miles west on SR-20 to a corral past mile marker 14. Turn left onto Little Creek Road that leads to Bear Valley, then travel 7.0 miles south on the main road to a minor fork. Proceed to the right and continue for 0.4 miles to a fence and wire gate: stop here and walk east along the fenceline to the corner. Walk 4 paces east from the fence corner to a short red fencepost tagged #7163 which is the 0-foot baseline stake. The 100-foot stake is rebar.

#### Site Information

Land Ownership	Federal
Land Administrator	USFS
Allotment	Red Creek
Elevation	7,620ft (2,323m)
Aspect	Southeast
Slope	3-5%
Sample Dates	07/31/1992, 07/07/1998, 06/26/2003, 06/24/2008, 07/15/2013, 06/14/2018, 06/28/2023

**Table 28-03.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Historic	-
Seeding - Seed Unknown	-	-	Historic	-

**Wildlife Habitat and Vegetation History****Table 28-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	summer
Rocky Mountain Elk	substantial	summer
Greater Sage-Grouse		

**Table 28-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Perennial Grass	No Encroachment
1992	Perennial Grass	No Encroachment
1998	Perennial Grass	No Encroachment
2003	Perennial Grass	No Encroachment
2008	Perennial Grass/Mountain Big Sagebrush	No Encroachment
2013	Perennial Grass/Mountain Big Sagebrush	No Encroachment
2018	Perennial Grass/Mountain Big Sagebrush	No Encroachment
2023	Perennial Grass/Mountain Big Sagebrush	No Encroachment

**Site Notes**

This site is located in the bottom of a large valley at the north end of Upper Bear Valley. Several cabins can be found a few miles from the transect and a stream and stock pond are found within a half mile.

**Soils****Table 28-03.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	5.8	64.2	20.0	15.8	2.3	19.9	1542.4	0.3	07/06/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      19 inches  
 NRCS Ecological Site    Mountain Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site #    R047XB430UT  
 States and Transitions    No state and transition model is available for this ecological site.

This site has been dominated by the historically-seeded perennial grass species crested wheatgrass (*Agropyron cristatum*) since study establishment in 1987. The introduced annual grass species cheatgrass (*Bromus tectorum*) has also been observed in most sample years, but in low amounts; forbs have generally contributed little cover (Photos, Table 28-03.1, Table 28-03.7, Table 28-03.10, Table 28-03.11). Yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*) was the dominant shrub species during the initial sample year, but mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was also present in lesser amounts (Pre-1992 Data). Sagebrush increased in abundance and cover over time and has been codominant along with perennial grasses since 2008 (Table 28-03.4, Table 28-03.12, Table 28-03.13). Barring a major disturbance, this site can reasonably be expected to remain in this or a similar state in future sample years and remain as valuable habitat to big game due to the presence of a vigorous population of sagebrush and associated cohort species.

Due to ample herbaceous and shrub components, this site could serve as adequate range for summering deer. Pellet transect data indicates that deer presence on this site was low from 1998 through 2018, but was moderate in 2023. Elk presence has remained low since 1998 (Table 28-03.9). However, the abundant herbaceous understory could provide forage for elk that may use the area during the summer months (Table 28-03.3; Beck & Peek, 2005).

## Trend Summary Tables

**Table 28-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1992	0.1	5.1	-	-	-	-
1998	1.3	12.4	-	-	-	-
2003	2.8	2.9	-	1.3	2.2	-
2008	4.3	2.9	-	4.9	3.2	-
2013	8.7	4.0	-	8.5	6.5	-
2018	10.3	2.5	-	10.8	2.3	-
2023	16.2	3.1	-	13.4	2.6	-

**Table 28-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1992	-	372	79	164	-	19.1	0.2	4.0
1998	20	365	367	228	0.5	18.7	10.1	3.6
2003	42	384	16	45	0.8	26.6	0.0	1.1
2008	78	401	223	142	0.6	29.6	1.9	2.6
2013	92	393	184	202	1.1	21.5	1.6	3.9
2018	36	387	264	137	0.3	36.3	2.5	2.4
2023	12	366	291	125	0.2	25.2	1.9	2.0

**Table 28-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1992	36.8	0.0	25.7	0.0	6.3	28.3
1998	28.6	0.0	48.4	11.1	0.3	44.9
2003	42.4	-	24.0	5.5	0.3	34.3
2008	27.1	0.0	34.4	7.4	0.0	41.8
2013	26.2	0.0	41.0	6.6	2.0	41.3
2018	29.0	0.0	55.8	2.2	0.1	50.1
2023	19.0	0.0	30.3	15.3	1.0	43.1

**Table 28-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency				
1992	3	10	-	-	88
1998	26	23	2	-	19
2003	8	9	-	-	82
2008	25	2	1	-	96
2013	20	6	11	-	22
2018	10	5	4	-	70
2023	9	5	2	-	5
Year	Days Use Per Acre (ha)				
1992	-	-	-	-	-
1998	65.3 (161.4)	18.7 (46.3)	3.4 (8.3)	-	-
2003	22.5 (55.6)	11.4 (28.1)	-	-	-
2008	10.9 (26.9)	4.7 (11.6)	3.4 (8.3)	17.4 (43.0)*	-
2013	47.9 (118.4)	2.0 (5.0)	10.7 (26.5)	-	-
2018	37.7 (93.2)	4.0 (9.9)	0.7 (1.7)	-	-
2023	35.6 (87.9)	30.8 (76.1)	16.8 (41.4)	-	-

\*Pellets per acre (ha)

**Table 28-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)
year	Nested Frequency									
1992	355	28	-	-	11	48	-	79	2	1
1998	347	8	-	20	-	15	-	63	12	2
2003	375	3	-	42	3	9	-	45	-	4
2008	392	4	5	78	-	15	-	32	17	-
2013	379	3	5	92	10	31	3	20	5	7
2018	366	14	15	36	8	56	0	19	20	5
2023	341	-	14	12	-	45	0	30	-	4
year	Average Cover (%)									
1992	17.2	0.4	-	-	0.0	1.1	-	0.3	0.0	0.0
1998	17.3	0.2	-	0.5	-	0.4	-	0.5	0.4	0.0
2003	25.7	0.1	-	0.8	0.0	0.3	-	0.3	-	0.1
2008	28.1	0.0	0.2	0.6	-	0.4	-	0.7	0.2	-
2013	19.3	0.1	0.4	1.1	0.1	0.7	0.0	0.1	0.4	0.3
2018	33.3	0.2	0.6	0.3	0.2	1.4	0.0	0.1	0.5	0.0
2023	22.2	-	0.6	0.2	-	1.5	0.1	0.7	-	0.0

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

**Table 28-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Androsace septentrionalis <sup>a</sup> (pygmy flower rockjasmine)	Artemisia carruthii (Carruth's sagewort)	Artemisia ludoviciana (white sagebrush)	Astragalus argophyllus var. panguiensis (silverleaf milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chamaesyce (sandmat)	Cirsium (thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis acuminata (tapertip hawkbeard)	Delphinium nuttallianum (two-lobed larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Dracocephalum parviflorum (American dragonhead)	Epiobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)
year	Nested Frequency																
1992	-	-	16	-	4	9	-	-	9	-	-	-	-	-	-	-	5
1998	2	-	172	-	12	2	-	3	4	121	4	-	2	3	1	-	-
2003	2	-	-	-	3	-	11	-	5	-	-	-	1	-	-	2	-
2008	43	-	13	-	7	5	-	-	9	92	-	2	-	-	-	-	1
2013	27	-	92	-	14	2	1	-	7	24	-	-	3	11	-	-	-
2018	30	3	14	4	9	-	-	-	22	195	18	-	-	-	-	-	-
2023	13	1	15	-	28	-	2	-	16	154	8	-	-	-	-	3	-
year	Average Cover (%)																
1992	-	-	0.0	-	0.0	0.0	-	-	0.0	-	-	-	-	-	-	-	0.0
1998	0.0	-	2.8	-	0.6	0.0	-	0.0	0.2	0.9	0.0	-	0.0	0.0	0.0	-	-
2003	0.0	-	-	-	0.0	-	0.2	-	0.0	-	-	-	0.0	-	-	0.0	-
2008	0.2	-	0.1	-	0.1	0.0	-	-	0.4	0.2	-	0.0	-	-	-	-	0.0
2013	0.4	-	0.6	-	0.5	0.0	0.0	-	0.3	0.1	-	-	0.0	0.0	-	-	-
2018	0.1	0.0	0.0	0.1	0.1	-	-	-	0.9	1.1	0.1	-	-	-	-	-	-
2023	0.0	0.0	0.1	-	0.6	-	0.0	-	0.5	0.7	0.0	-	-	-	-	0.0	-

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

FORB SPECIES	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium <sup>a</sup> (pepperweed)	Lupinus argenteus (silvery lupine)	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera pallida <sup>a</sup> (pale evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Senecio spartioides (broom-like ragwort)	Silene drummondii (Drummond's campion)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)
year	Nested Frequency																
1992	-	-	-	13	2	77	3	11	-	-	63	19	34	28	-	-	5
1998	-	1	-	130	-	113	248	44	1	1	149	15	104	-	-	10	12
2003	-	-	-	12	-	7	3	-	-	-	8	13	-	-	-	-	-
2008	115	-	1	36	-	10	132	4	2	-	69	11	13	21	-	2	0
2013	-	4	2	73	1	36	11	23	-	-	139	11	12	10	-	4	-
2018	93	-	4	19	-	6	66	12	-	-	20	14	-	24	2	5	10
2023	71	-	-	4	-	9	214	-	-	-	50	9	13	3	-	-	-
year	Average Cover (%)																
1992	-	-	-	0.0	0.0	3.0	0.0	0.1	-	-	0.1	0.3	0.1	0.5	-	-	0.0
1998	-	0.0	-	1.9	-	1.4	2.3	0.4	0.0	0.0	0.9	0.4	1.0	-	-	0.1	0.1
2003	-	-	-	0.0	-	0.3	0.0	-	-	-	0.2	0.4	-	-	-	-	-
2008	0.8	-	0.0	0.2	-	0.0	0.5	0.0	0.0	-	0.5	0.6	0.0	0.7	-	0.0	0.0
2013	-	0.0	0.0	0.5	0.0	1.0	0.0	0.1	-	-	0.6	0.1	0.0	0.8	-	0.0	-
2018	0.4	-	0.0	0.1	-	0.1	0.6	0.0	-	-	0.1	0.3	-	0.7	0.0	0.0	0.1
2023	0.3	-	-	0.0	-	0.1	0.8	-	-	-	0.3	0.2	0.0	0.2	-	-	-

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

FORB SPECIES	Tragopogon dubius <sup>ai</sup> (yellow salsify)	unknown annual forb <sup>a</sup> (unknown forb)
year	Nested	
1992	1	-
1998	57	39
2003	-	-
2008	-	-
2013	13	-
2018	9	-
2023	-	-
year	Average Cover (%)	
1992	0.0	-
1998	0.6	0.1
2003	-	-
2008	-	-
2013	0.1	-
2018	0.2	-
2023	-	-

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

**Table 28-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)				
1992	-	-	-	-	-
1998	-	-	-	-	-
2003	1.3	2.1	-	-	0.1
2008	4.9	3	-	-	0.2
2013	8.5	5.9	0.2	-	0.4
2018	10.8	1.8	-	-	0.5
2023	13.4	2.1	-	0.1	0.4
year	Quadrat Cover (%)				
1992	0.1	4.6	0.1	-	0.4
1998	1.3	10.9	1.2	-	0.2
2003	2.8	2.6	-	0.0	0.3
2008	4.3	2.6	-	0.0	0.3
2013	8.7	3.6	0.0	-	0.5
2018	10.3	1.8	-	-	0.7
2023	16.2	1.7	0.0	0.3	1.0

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

**Table 28-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

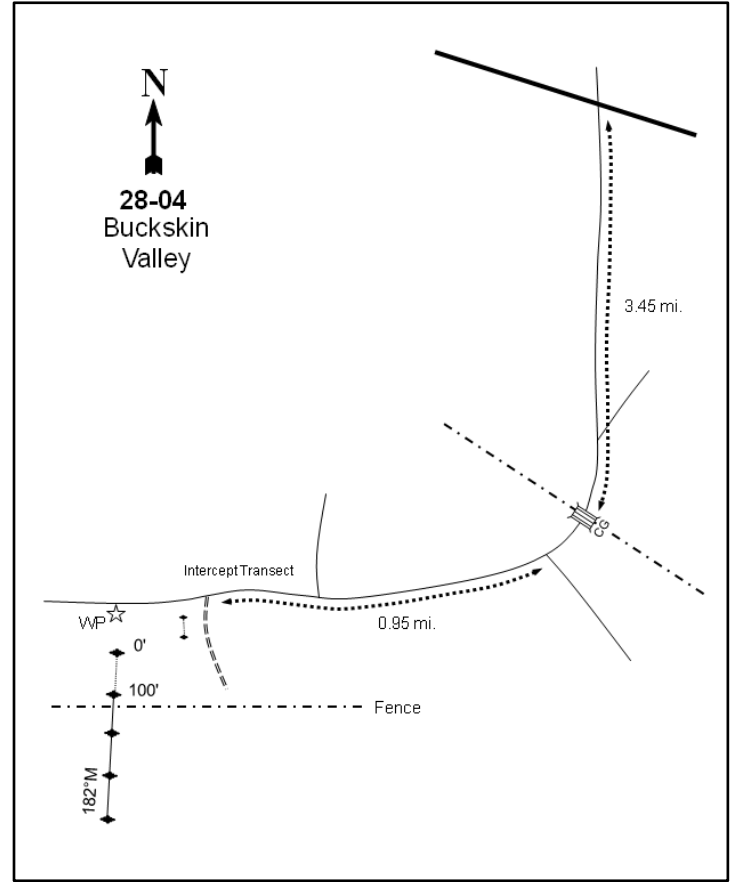
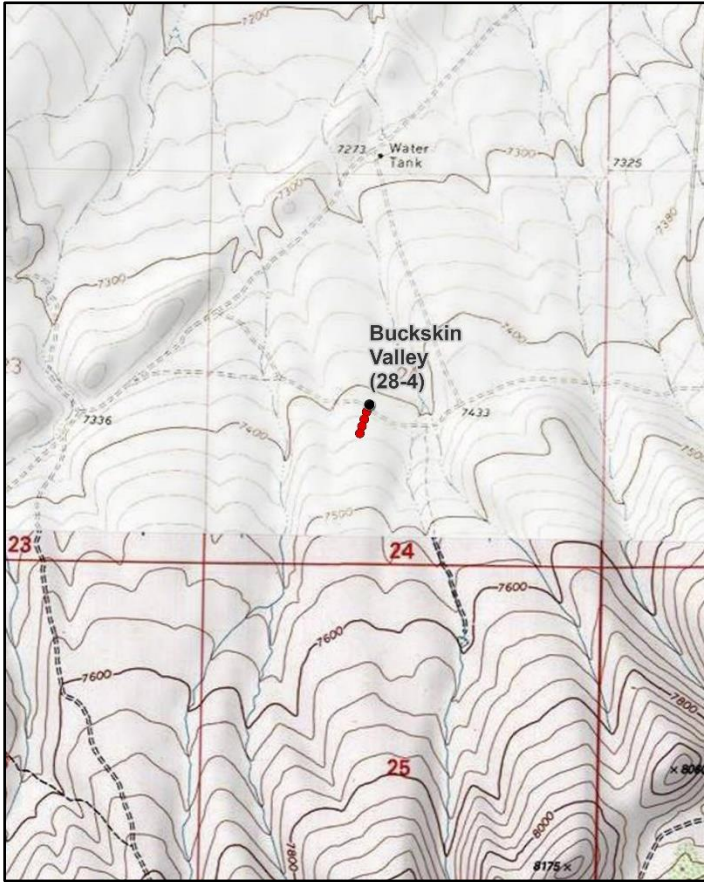
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1992	120	40	17	83	0	50	0	0	- / -
1998	1540	160	78	22	0	9	0	21	48/60
2003	940	20	2	57	40	26	17	2	56/68
2008	700	60	23	66	11	3	6	9	64/87
2013	4280	560	57	40	3	10	28	7	42/67
2018	3080	120	14	79	7	23	5	1	46/65
2023	2960	1860	20	72	9	3	14	7	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1992	17080	480	53	44	3	12	1	1	- / -
1998	11320	160	38	61	2	3	0	32	34/42
2003	6580	20	14	73	13	2	11	4	23/21
2008	5880	80	17	67	17	12	10	5	22/29
2013	4860	-	10	90	0	0	0	0	27/38
2018	3720	60	15	83	2	11	18	2	21/21
2023	2560	-	13	87	0	0	0	0	- / -



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1992	20	-	0	100	0	100	0	100	- / -
1998	560	-	18	82	0	0	0	0	30/41
2003	-	-	-	-	-	-	-	-	62/86
2008	-	-	-	-	-	-	-	-	95/142
2013	80	-	0	100	0	0	0	0	80/110
2018	20	-	0	100	0	0	0	0	79/84
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1992	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	100	-	0	100	0	0	0	0	8/9
2008	100	-	20	80	0	0	0	0	8/7
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	180	-	0	100	0	0	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1992	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	41/35
2003	-	-	-	-	-	-	-	-	95/209
2008	-	-	-	-	-	-	-	-	81/156
2013	-	-	-	-	-	-	-	-	- / -
2018	20	-	100	0	0	0	100	0	48/76
2023	-	-	-	-	-	-	-	-	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1992	240	-	33	58	8	8	0	0	- / -
1998	180	-	11	89	0	11	0	0	35/54
2003	200	-	0	70	30	10	10	0	27/33
2008	320	-	19	63	19	6	0	0	22/31
2013	200	-	0	100	0	20	0	0	32/50
2018	160	-	0	100	0	0	63	0	30/48
2023	140	-	0	100	0	0	0	0	- / -

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

## BUCKSKIN VALLEY - STUDY NO. 28-4

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Burnt Peak SW; Township 32S, Range 7W, Section 24  
NAD 83 UTM ZONE 12, 359445 East 4207552 North

**Transect Information**

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

9005  
182° magnetic  
400ft  
Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
Belt 4: 10ft

**Directions to Site**

From SR-20 just west of mile marker 7, turn south onto Buckskin Valley Road and travel 3.45 miles to a cattle guard. Just beyond the fence and cattle guard, bear right and proceed west for 0.95 miles to an intersection where a very faint road goes to the south. About 60 feet west of this intersection is the witness post on the south (left) side of the road. The 0-foot stake, a 2-foot-tall green fencepost marked by a red browse tag #9005, is 6 feet southeast of the witness post. The frequency baseline runs south-southwest from here. The old line-intercept transect 57A-7-78 is marked by a red-painted steel fencepost 10 feet east of this study.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BUCKSKIN MOUNTAIN
Elevation	7,410ft (2,259m)
Aspect	North
Slope	4-5%
Sample Dates	08/02/1992, 07/07/1998, 06/26/2003, 06/04/2008, 06/04/2013, 06/14/2018, 06/12/2023

**Table 28-04.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Little Bear Valley to Fremont Canyon Sagebrush Steppe Habitat Restoration	4402	November 2018-January 2019	4095

**Wildlife Habitat and Vegetation History****Table 28-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-04.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush	No Encroachment
1992	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

The lower portions of the general area have been treated by the BLM to enhance livestock grazing.

**Soils****Table 28-04.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	5.9	44.2	30.0	25.8	3.8	22.7	236.8	0.4	07/07/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Loam (Shrub)
NRCS Ecological Site #	R047XA434UT
States and Transitions	No state and transition model is available for this ecological site.

This site has remained in a stable state as a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) dominated plant community mixed with lesser amounts of antelope bitterbrush (*Purshia tridentata*) since study establishment in 1987. Density of sagebrush has steadily decreased since 2008. However, a flush of sagebrush seedlings occurred in 2023 that may contribute to an increase in density in future samplings (Photos, Pre-1992 Data, Table 28-04.12, Table 28-04.13). The understory has remained diverse and abundant, although composition has fluctuated over the study years. The introduced annual grass species cheatgrass (*Bromus tectorum*) increased in cover from 1992 to 2013, when it contributed the most cover. In 2018, however, cheatgrass decreased, and cover was moderate during the most recent sampling. The resilience of this sagebrush community may be at risk if cheatgrass increases in the future. Perennial grasses were the dominant herbaceous component in 2023, with western wheatgrass (*Pascopyrum smithii*) providing the most cover of any single grass species (Table 28-04.7, Table 28-04.10, Table 28-04.11). The study area has been in Phase I of woodland succession since 1992 due to the presence of Rocky Mountain juniper (*Juniperus scopulorum*). Rocky Mountain juniper was removed by a 2018-2019 lop and scatter treatment (Table 28-4.1), but the site remained in Phase I as of 2023 due to the presence of twoneedle pinyon (*Pinus edulis*) (Table 28-04.4). However, both strip and point-quarter densities of trees have remained similar overall, indicating that further encroachment may not be an immediate concern (Table 28-04.13, Table 28-03.14). Keeping conifer trees from encroaching in the area will help maintain this healthy sagebrush community, in turn sustaining sagebrush-dependent/obligated species like mule deer and greater sage-grouse.

Deer winter range condition has varied between poor and good since 1992. As of 2023, deer wintering range was considered to be in good condition. Further improvement to this winter range could be achieved by increasing recruitment of young and decreasing decadence in the preferred browse community; increasing perennial grass cover; and decreasing or removing cheatgrass. Pellet group transect data shows that deer presence was high in 2023. Elk presence has remained low since 1998 with no pellet groups observed in many years, including 2023 (Table 28-04.9). However, the diverse herbaceous understory could provide some forage for summering elk (Table 28-04.3; Beck & Peek, 2005).

## Trend Summary Tables

**Table 28-04.6 - 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
1992	32.0	1.3	-	-	-	-
1998	36.7	1.0	0.0	-	-	-
2003	35.7	0.6	0.5	43.9	0.3	0.7
2008	25.9	1.9	0.6	42.8	1.4	0.9
2013	29.1	1.0	0.8	57.0	0.8	1.1
2018	37.6	1.7	1.2	47.2	1.2	1.3
2023	28.3	2.6	-	41.0	2.3	-

**Table 28-04.7 - 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
1992	44	335	198	285	0.1	8.4	1.1	5.3
1998	193	303	311	240	2.9	6.4	2.6	6.0
2003	159	191	417	160	1.6	2.7	10.2	2.9
2008	195	279	371	266	2.7	6.4	4.8	8.1
2013	339	262	261	245	11.9	6.1	1.0	5.8
2018	160	306	244	272	1.2	10.1	0.9	9.4
2023	221	309	340	231	6.0	12.7	7.7	7.6

**Table 28-04.8 - 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
1992	14.4	1.6	58.8	0.9	5.5	42.7
1998	16.1	1.0	66.3	1.7	4.9	49.7
2003	18.2	0.2	52.7	0.6	3.5	48.1
2008	19.0	0.5	56.8	0.9	4.2	44.4
2013	15.1	0.8	46.9	0.2	5.1	51.7
2018	12.3	0.3	70.3	0.6	4.3	51.7
2023	8.5	0.4	45.1	0.8	3.6	53.6

**Table 28-04.9 - 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/Domestic Sheep	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency					
1992	-	-	28	-	-	44
1998	2	-	36	1	-	22
2003	1	-	24	-	-	37
2008	4	-	26	-	-	69
2013	-	-	15	-	-	7
2018	-	-	34	2	-	39
2023	3	-	17	-	-	-
Year	Days Use Per Acre (ha)					
1992	-	-	-	-	-	-
1998	7.2 (17.9)	-	48.9 (120.8)	-	-	-
2003	0.7 (1.8)	-	62.3 (153.9)	-	-	-
2008	5.8 (14.3)	8.7 (21.5)*	42.9 (105.9)	1.3 (3.3)	-	-
2013	4.4 (10.8)	-	50.2 (124.1)	-	-	-
2018	5.1 (12.6)	-	39.6 (97.7)	3.4 (8.3)	-	-
2023	12.3 (30.5)	-	77.1 (190.4)	-	0.6 (1.4)	-

\*Pellets per acre (ha)

**Table 28-04.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus ciliatus (fringed brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency										
1992	31	-	2	44	129	36	216	52	-	3	-
1998	36	8	-	193	95	2	154	35	51	2	2
2003	6	-	-	159	69	3	112	14	15	-	3
2008	4	7	-	195	26	3	208	19	63	6	-
2013	10	-	-	339	65	4	116	24	86	-	-
2018	25	2	-	160	69	1	190	20	72	6	-
2023	14	4	-	221	47	2	204	38	51	-	-
year	Average Cover (%)										
1992	0.5	-	0.0	0.1	2.2	0.2	4.0	1.5	-	0.0	-
1998	0.2	0.1	-	2.9	1.4	0.0	1.6	0.9	2.2	0.0	0.0
2003	0.2	-	-	1.6	0.8	0.0	0.9	0.4	0.3	-	0.0
2008	0.2	0.1	-	2.7	0.4	0.0	3.7	0.3	1.7	0.0	-
2013	0.3	-	-	11.9	0.6	0.2	2.5	0.5	1.9	-	-
2018	0.6	0.0	-	1.2	1.2	0.0	5.0	0.8	2.4	0.2	-
2023	0.5	0.1	-	6.0	2.0	0.1	7.8	0.9	1.2	-	-

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

**Table 28-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Astragalus argophyllus var. panguiensis (silverleaf milkvetch)	Astragalus convallarius (lesser rusby milkvetch)	Astragalus oophorus (egg milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Cirsium wheeleri (Wheeler's thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cordylanthus kingii <sup>a</sup> (King's bird's-beak)	Crepis acuminata (tapertip hawksbeard)	Cryptantha (cryptantha)
year	Nested Frequency																
1992	-	3	-	30	9	9	17	-	-	-	34	26	122	9	-	9	-
1998	4	1	-	2	28	5	1	2	5	-	13	17	306	7	-	6	-
2003	6	-	-	-	-	10	-	-	4	-	-	1	400	12	5	5	1
2008	27	6	-	6	-	8	23	2	10	3	-	4	364	8	-	11	1
2013	33	6	10	3	-	4	36	3	7	7	-	20	185	5	-	30	-
2018	45	1	9	12	1	2	37	7	1	6	-	32	163	20	3	4	-
2023	42	-	26	7	0	-	1	3	14	-	-	19	276	13	-	18	-
year	Average Cover (%)																
1992	-	0.0	-	0.1	0.0	0.7	0.1	-	-	-	0.2	0.4	0.6	0.0	-	0.0	-
1998	0.0	0.0	-	0.0	0.4	0.1	0.1	0.0	0.0	-	0.0	0.4	2.2	0.0	-	0.1	-
2003	0.1	-	-	-	-	0.1	-	-	0.0	-	-	0.0	9.0	0.1	0.0	0.1	0.0
2008	0.5	0.0	-	0.0	-	0.1	0.7	0.2	0.1	0.0	-	0.2	4.5	0.1	-	0.3	0.0
2013	0.3	0.0	0.0	0.0	-	0.0	1.2	0.0	0.0	0.0	-	0.6	0.5	0.0	-	0.2	-
2018	0.5	0.0	0.0	0.1	0.0	0.1	1.4	0.2	0.0	0.0	-	1.1	0.5	0.1	0.0	0.2	-
2023	0.8	-	0.4	0.1	0.0	-	0.0	0.4	0.0	-	-	1.0	6.6	0.1	-	0.7	-

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

FORB SPECIES	Delphinium nuttallianum (two-lobed larkspur)	Erigeron eatonii (Eaton's fleabane)	Eriogonum alatum (winged buckwheat)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Heterotheca villosa (hairy false goldenaster)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum lewisii (Lewis flax)	Lithospermum (stoneseed)	Lomatium (desertparsley)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	Packera multilobata (lobeleaf groundsel)
year	Nested Frequency																
1992	-	-	-	35	18	-	-	-	-	-	-	9	47	5	122	-	-
1998	-	2	-	24	8	-	-	-	-	2	4	-	59	2	73	-	1
2003	-	1	-	9	3	9	-	-	2	-	-	0	38	-	148	2	-
2008	21	-	-	23	11	13	-	-	12	2	-	61	24	-	51	1	-
2013	1	-	3	8	12	4	-	2	8	0	-	25	55	-	122	-	1
2018	-	4	-	16	5	-	2	-	-	-	-	16	45	1	148	-	-
2023	13	13	1	11	7	14	-	-	21	-	-	40	23	-	54	-	3
year	Average Cover (%)																
1992	-	-	-	0.3	0.1	-	-	-	-	-	-	0.0	1.4	0.0	0.4	-	-
1998	-	0.0	-	0.1	0.1	-	-	-	-	0.0	0.0	-	3.2	0.0	0.3	-	0.0
2003	-	0.0	-	0.1	0.0	0.0	-	-	0.0	-	-	0.0	1.6	-	1.1	0.0	-
2008	0.1	-	-	0.2	0.1	0.0	-	-	0.0	0.0	-	0.5	0.9	-	0.2	0.0	-
2013	0.0	-	0.0	0.1	0.2	0.0	-	0.0	0.1	0.0	-	0.1	1.2	-	0.4	-	0.0
2018	-	0.0	-	0.1	0.0	-	0.0	-	-	-	-	0.1	3.0	0.0	0.3	-	-
2023	0.0	0.4	0.0	0.1	0.1	0.1	-	-	0.1	-	-	0.2	0.5	-	0.4	-	0.0

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

FORB SPECIES	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Senecio spartioides var. multicapitatus (broom-like ragwort)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>a</sup> (yellow salsify)	Trifolium (clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency								
1992	-	188	-	1	4	1	2	43	40
1998	-	127	4	-	4	-	7	45	6
2003	2	56	-	-	4	-	-	31	39
2008	2	109	5	-	-	-	-	70	79
2013	-	71	-	-	-	1	5	52	39
2018	-	76	-	-	5	20	1	84	78
2023	7	32	3	-	-	9	10	32	91
year	Average Cover (%)								
1992	-	1.0	-	0.0	0.0	0.0	0.0	0.2	0.8
1998	-	1.0	0.0	-	0.0	-	0.0	0.3	0.0
2003	0.0	0.2	-	-	0.0	-	-	0.1	0.4
2008	0.0	0.9	0.0	-	-	-	-	0.8	2.6
2013	-	0.5	-	-	-	0.0	0.0	0.2	1.0
2018	-	0.6	-	-	0.1	0.3	0.0	0.4	1.3
2023	0.0	0.4	0.0	-	-	0.1	0.0	0.4	2.4

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

**Table 28-04.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Juniperus scopulorum <sup>t</sup> (Rocky Mountain juniper)	Mahonia repens (creeping barberry)	Opuntia polyacantha (plains pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Symphoricarpos oreophilius <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)							
1992	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-
2003	34.7	-	0.7	-	0.3	6.6	1	1.6
2008	30.7	-	0.9	-	1.4	8.3	0.8	3
2013	35.2	-	1.1	-	0.8	14.1	1.2	6.5
2018	32.7	-	1.3	-	1.2	8.6	1.5	4.4
2023	20.7	-	-	-	2.3	9.9	1.2	9.2
year	Quadrat Cover (%)							
1992	24.1	-	-	-	1.3	5.5	1.6	0.8
1998	24.7	-	0.0	-	1.0	8.2	0.6	3.2
2003	27.2	-	0.5	0.0	0.6	6.4	0.4	1.7
2008	18.8	0.0	0.6	-	1.9	4.6	0.0	2.5
2013	19.2	-	0.8	-	1.0	6.4	0.2	3.3
2018	24.1	-	1.2	0.1	1.5	9.0	1.3	3.2
2023	14.9	-	-	-	2.6	6.8	0.8	5.9

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

**Table 28-04.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1992	8980	160	3	41	56	49	32	18	- / -
1998	5160	200	4	71	26	40	5	9	73/93
2003	4620	-	1	55	44	10	3	13	88/94
2008	5620	460	3	47	51	5	3	18	85/89
2013	4020	140	6	68	26	35	15	10	91/97
2018	3800	40	1	83	16	1	0	10	94/102
2023	3540	8540	12	66	23	44	19	20	- / -
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
1992	-	20	0	0	0	0	0	0	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1992	20	-	0	100	0	0	0	0	- / -
1998	-	-	-	-	-	-	-	-	21/71
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	14/41
2018	-	-	-	-	-	-	-	-	9/20
2023	-	-	-	-	-	-	-	-	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1992	40	-	100	0	0	0	0	0	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	60	0	0	0	0	0	0	15/26
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	0	0	- / -
<b>Juniperus scopulorum<sup>1</sup> -- (Rocky Mountain juniper)</b>									
1992	20	-	100	0	0	100	0	0	- / -
1998	20	-	0	100	0	0	0	0	- / -
2003	20	-	0	100	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
1992	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	0	0	7/10
2008	20	-	0	0	100	0	0	100	7/14
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1992	2140	100	38	52	9	0	2	20	- / -
1998	740	-	16	76	8	0	3	5	16/34
2003	840	-	5	79	17	0	2	5	16/33
2008	980	60	0	90	10	0	2	14	15/44
2013	580	20	0	97	3	7	7	14	13/42
2018	1160	-	3	97	0	2	0	0	17/48
2023	1300	-	3	92	5	0	0	2	- / -
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1992	3080	140	34	55	10	34	53	3	- / -
1998	1900	180	15	82	3	36	47	2	56/89
2003	1860	-	3	73	24	13	72	4	56/89
2008	1760	140	0	68	32	22	57	7	56/84
2013	1640	80	10	72	18	18	40	44	72/100
2018	1860	-	9	85	7	28	58	4	68/93
2023	1960	-	2	86	12	17	72	13	- / -



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1992	460	120	22	70	9	44	0	9	- / -
1998	400	20	10	90	0	0	0	0	182/99
2003	380	-	47	0	53	0	0	0	150/78
2008	200	-	70	10	20	0	0	10	140/41
2013	220	-	9	91	0	0	0	0	111/42
2018	400	-	0	100	0	100	0	0	125/59
2023	80	-	0	0	100	100	0	100	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1992	700	100	29	69	3	57	11	9	- / -
1998	720	-	17	83	0	33	0	0	40/65
2003	980	-	2	98	0	6	29	0	28/43
2008	780	80	10	90	0	3	8	0	34/53
2013	1000	-	0	100	0	2	0	2	44/93
2018	1120	-	21	79	0	9	2	0	49/75
2023	1060	-	6	94	0	13	2	0	- / -
<b>Yucca -- (yucca)</b>									
1992	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	100	0	100	- / -

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

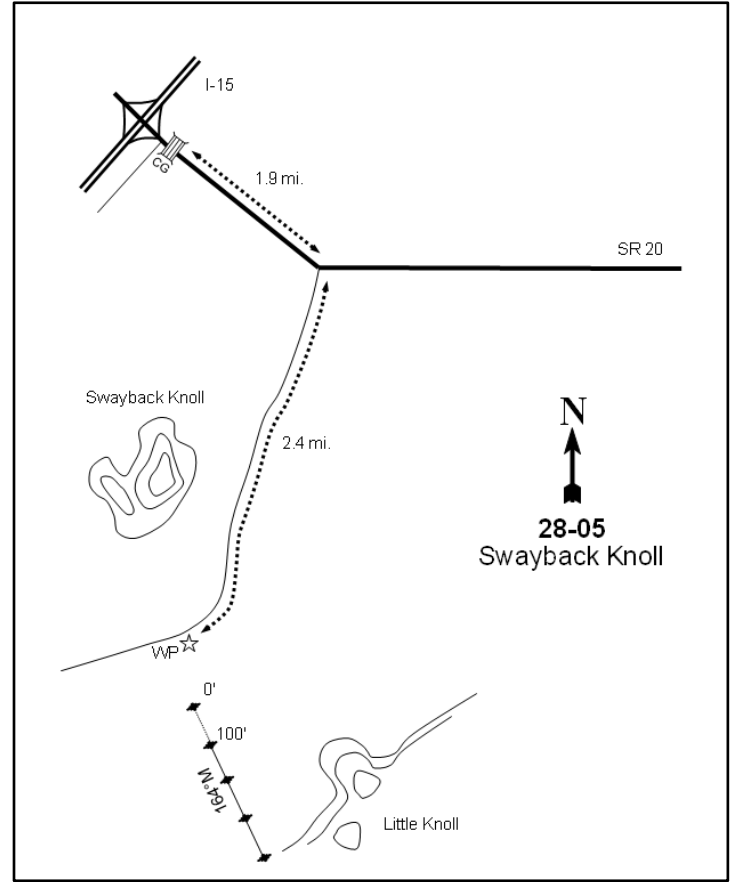
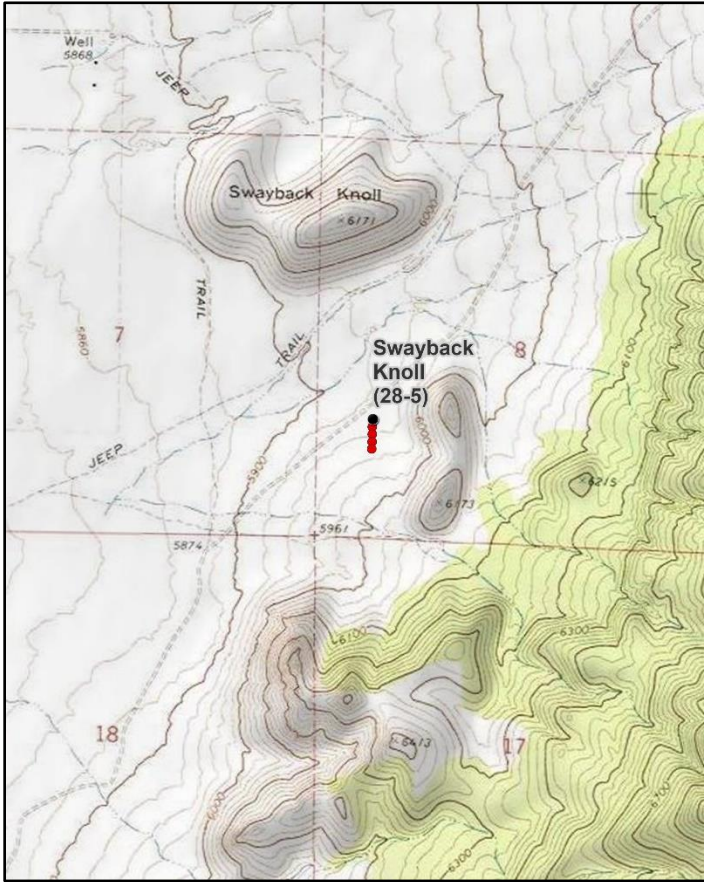
**Table 28-04.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	1	-	-	100	-	-	23.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2023	4	-	100	-	-	-	3.0

**Table 28-04.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1992	30.0	1.7	5.1	16.9	-0.1	10.0	0.0	<b>63.6</b>	Fair
1998	30.0	9.6	3.8	12.9	-2.2	10.0	0.0	<b>64.1</b>	Fair
2003	30.0	3.2	1.2	5.3	-1.2	5.7	0.0	<b>44.2</b>	Poor
2008	30.0	2.1	1.9	12.8	-2.0	10.0	0.0	<b>54.8</b>	Poor-Fair
2013	30.0	8.8	3.2	12.1	-8.9	10.0	0.0	<b>55.2</b>	Poor-Fair
2018	30.0	11.3	2.0	20.1	-0.9	10.0	0.0	<b>72.5</b>	Good
2023	30.0	9.8	3.9	25.4	-4.5	10.0	0.0	<b>74.6</b>	Good

## SWAYBACK KNOLL - STUDY NO. 28-5



### Location Information

USGS 7.5 min Map Info      Buckhorn Flat SE; Township 32S, Range 7W, Section 08  
 GPS (0' Stake)              NAD 83 UTM ZONE 12, 352598 East 4210821 North

### Transect Information

Browse Tag # (0' Stake)      477  
 Transect Bearing              164° magnetic  
 Length                          400ft  
 Belt Placement                Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
 Belt Marker Placement      Standard

### Directions to Site

From the cattle guard off of SR-20 and I-15, travel 1.9 miles on SR-20 to a dirt road on the right. Turn onto this road and travel south for 2.4 miles to a sage flat west of rocky knolls; there is a witness post on the left (east) side of the road. The 0-foot baseline stake is 200 feet away from the witness post at a bearing of 118 degrees magnetic and is marked by browse tag #477.

### Site Information

Land Ownership                Federal  
 Land Administrator        BLM  
 Allotment                      BONE HOLLOW  
 Elevation                      5,940ft (1,811m)  
 Aspect                          Northwest  
 Slope                            6%  
 Sample Dates                07/30/1992, 06/22/1998, 06/10/2003, 06/04/2008, 06/04/2013, 05/31/2018, 05/31/2023

**Table 28-05.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Laub	-	Summer 2012	40
Seeding - Broadcast After	Laub and Cotton Fire Rehab	2469	August-September 2012	43
Seeding - Browse Seed Planter	Laub and Cotton Fire Rehab	2469	August-September 2012	43

**Table 28-05.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Leub Fire			Broadcast	Sep 2012	40
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.50	0.47
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.87
F	Sanguisorba minor	Small Burnet	Delar	1.00	0.89
S	Atriplex canescens	Fourwing Saltbush	Beaver UT	0.50	0.28
S	Purshia tridentata	Bitterbrush	Elko NV	2.50	2.12

**Wildlife Habitat and Vegetation History**

**Table 28-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-05.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Wyoming Big Sagebrush	No Encroachment
1992	Wyoming Big Sagebrush	No Encroachment
1998	Wyoming Big Sagebrush	No Encroachment
2003	Wyoming Big Sagebrush	No Encroachment
2008	Wyoming Big Sagebrush	No Encroachment
2013	Annual Grass	No Encroachment
2018	Annual Grass	No Encroachment
2023	Annual Grass	No Encroachment

**Site Notes**

This study is located on an alluvial fan which is at the base of the foothills east of I-15 and just south of Highway 20. This study samples one of the key wintering areas for mule deer on the east side of I-15, and has been used by as many as 400 deer during winter months. Winter range in this particular area is limited by the deer-proof fence along I-15 as well as agricultural land that is also being fenced to prevent deer depredation. This area is bordered by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*)-covered hills which provide the nearest protective cover.

**Soils**

**Table 28-05.5 - 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
Loam	6.7	49.8	30.4	19.8	1.1	9.7	67.2	0.4	06/22/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation 12 inches  
 NRCS Ecological Site Upland Loam (Bonneville Big Sagebrush)  
 NRCS Ecological Site # R028AY310UT  
 States and Transitions 1987-2008 - Current Potential State: Community Phase 2.1  
 2013-2023 - Rabbitbrush/Invasive Annuals State: Community Phase 4.2

Upon study establishment in 1987, this vegetation on this site was predominantly a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) plant community with a small component of perennial grasses that provided limited cover (Photos, Pre-1992 Data). The introduced annual grass species cheatgrass (*Bromus tectorum*) has varied in frequency and cover. Cheatgrass provided particularly high cover in 1998, but native shrubs and perennial forbs and grasses were still the dominant site components. However, a wildfire in 2012 removed a majority of the shrub component (Table 28-05.12, Table 28-05.13), allowing cheatgrass to increase and dominate the plant community despite rehabilitation efforts (Table 28-05.1, Table 28-05.7, Table 28-05.10, Table 28-05.11). The increased amount of cheatgrass may pose a threat to the ecological resilience of the area and has the potential to influence fire regimes. Increased fire frequency results in preventing woody plant species, like sagebrush, from reestablishing and the community from developing past an early seral state that lacks a diversified structure suitable for deer winter range.

Deer winter range condition on this site has generally remained very poor since 1992. Increasing preferred browse cover and reproduction, diversity and cover of perennial grasses and forbs, and decreasing cheatgrass would greatly improve this area's condition as deer winter range. Deer presence has remained low since 2013 according to pellet transect data, and elk presence has been low since 1998 (Table 28-05.9). Increasing sagebrush cover and density could make this site more valuable to elk that may use the area during the winter (Table 28-05.3; Wambolt, 1996).

**Trend Summary Tables**

**Table 28-05.6 - 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
1992	11.0	1.2	-	-	-	-
1998	12.4	0.6	-	-	-	-
2003	18.6	1.1	-	16.3	1.2	-
2008	12.0	1.9	-	11.1	1.1	-
2013	0.5	-	-	0.8	-	-
2018	0.0	0.0	-	0.2	-	-
2023	0.2	0.0	-	0.5	-	-

**Table 28-05.7 - 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
1992	246	154	206	25	1.2	3.2	0.6	0.1
1998	443	133	96	12	19.4	3.4	0.8	0.1
2003	217	124	85	4	2.2	3.2	0.7	0.0
2008	299	137	344	28	2.3	4.8	2.2	0.1
2013	404	80	293	8	20.0	1.9	3.2	0.2
2018	425	191	273	6	22.6	9.5	9.3	0.0
2023	467	206	234	73	34.0	9.6	1.5	0.6

**Table 28-05.8 - 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
1992	31.5	0.2	21.9	9.9	17.9	15.7
1998	16.0	0.5	34.3	21.0	8.1	34.6
2003	21.5	0.1	25.3	25.6	13.0	28.2
2008	19.1	1.0	35.4	18.3	12.0	23.7
2013	43.4	0.0	12.1	12.6	13.0	26.8
2018	18.7	0.0	54.8	6.5	8.2	38.9
2023	16.3	0.8	35.1	8.3	9.7	46.8

**Table 28-05.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1992	-	59	-	68
1998	-	31	1	18
2003	-	38	1	30
2008	-	54	-	89
2013	-	13	-	33
2018	-	13	-	68
2023	2	13	-	22
Year	Days Use Per Acre (ha)			
1992	-	-	-	-
1998	0.7 (1.8)	81.7 (201.9)	-	-
2003	-	83.8 (206.9)	0.7 (1.7)	-
2008	-	93.2 (230.1)	-	-
2013	-	14.1 (34.8)	-	-
2018	4.4 (10.8)	14.7 (36.4)	-	-
2023	4.4 (10.8)	0.7 (1.7)	1.3 (3.3)	-

**Table 28-05.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
1992	5	46	-	184	77	11	52	-	146
1998	6	31	4	442	63	15	35	-	63
2003	9	30	1	110	63	12	27	-	181
2008	2	30	-	299	86	10	34	3	46
2013	3	5	9	401	37	4	29	-	144
2018	6	92	-	423	10	11	95	1	87
2023	0	110	-	466	2	25	82	10	25
year	Average Cover (%)								
1992	0.1	1.3	-	0.7	0.7	0.2	0.9	-	0.5
1998	0.2	0.9	0.1	19.2	1.4	0.3	0.4	-	0.2
2003	0.2	0.6	0.0	1.0	1.3	0.4	0.8	-	1.2
2008	0.0	0.5	-	2.2	2.9	0.1	1.3	0.0	0.1
2013	0.0	0.1	0.2	19.6	0.9	0.0	0.6	-	0.5
2018	0.1	4.6	-	22.3	0.1	0.4	4.3	0.0	0.3
2023	0.0	4.2	-	34.0	0.0	1.0	4.2	0.2	0.1

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

**Table 28-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Calochortus flexuosus (winding mariposa lily)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Crepis acuminata (tapertip hawkbeard)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hackelia patens (spotted stickseed)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	Orobanche fasciculata (clustered broomrape)
year	Nested Frequency																
1992	1	-	8	12	-	17	-	24	-	-	173	5	-	-	12	-	-
1998	-	-	2	50	-	2	3	-	-	-	-	-	1	-	-	-	1
2003	-	-	3	-	-	9	4	3	-	-	65	-	3	-	-	4	-
2008	-	-	20	328	-	7	-	14	-	25	11	-	36	0	-	12	-
2013	-	-	3	225	-	15	24	20	-	16	123	-	21	15	-	20	-
2018	-	3	3	68	-	-	-	5	14	-	-	-	110	-	-	-	-
2023	-	3	18	175	46	-	-	19	10	-	10	-	53	-	7	-	0
year	Average Cover (%)																
1992	0.0	-	0.0	0.0	-	0.0	-	0.1	-	-	0.4	0.0	-	-	0.0	-	-
1998	-	-	0.0	0.3	-	0.0	0.0	-	-	-	-	-	0.0	-	-	-	0.0
2003	-	-	0.0	-	-	0.1	0.0	0.0	-	-	0.6	-	0.0	-	-	0.0	-
2008	-	-	0.1	1.8	-	0.0	-	0.1	-	0.1	0.0	-	0.1	0.0	-	0.0	-
2013	-	-	0.0	1.3	-	0.1	0.1	0.3	-	0.1	0.6	-	0.1	0.2	-	0.1	-
2018	-	0.0	0.0	0.3	-	-	-	0.2	0.1	-	-	-	2.0	-	-	-	-
2023	-	0.0	0.1	0.7	0.2	-	-	0.3	0.0	-	0.0	-	0.2	-	0.0	-	0.0

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Plantago patagonica <sup>a</sup> (woolly plantain)	Sisymbrium altissimum <sup>ai</sup> (tall tumbled mustard)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Stephanomeria minor var. minor (narrowleaf wirelettuce)
year	Nested Frequency				
1992	5	13	-	6	-
1998	5	57	-	4	-
2003	-	6	-	1	-
2008	5	5	9	4	-
2013	1	15	18	3	1
2018	-	45	188	3	-
2023	-	-	42	12	-
year	Average Cover (%)				
1992	0.0	0.0	-	0.0	-
1998	0.0	0.4	-	0.1	-
2003	-	0.0	-	0.0	-
2008	0.0	0.0	0.1	0.0	-
2013	0.0	0.0	0.3	0.2	0.0
2018	-	0.1	6.6	0.0	-
2023	-	-	0.3	0.2	-

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

**Table 28-05.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cylindropuntia whipplei (Whipple cholla)	Opuntia (pricklypear)
year	Line Intercept Cover		
1992	-	-	-
1998	-	-	-
2003	16.3	1.2	-
2008	11.1	1.1	-
2013	0.8	-	-
2018	0.2	-	-
2023	0.5	-	-
year	Quadrat Cover (%)		
1992	11.0	1.2	-
1998	12.4	0.6	-
2003	18.6	1.1	-
2008	12.0	1.8	0.1
2013	0.5	-	-
2018	0.0	0.0	-
2023	0.2	0.0	0.0

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

**Table 28-05.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

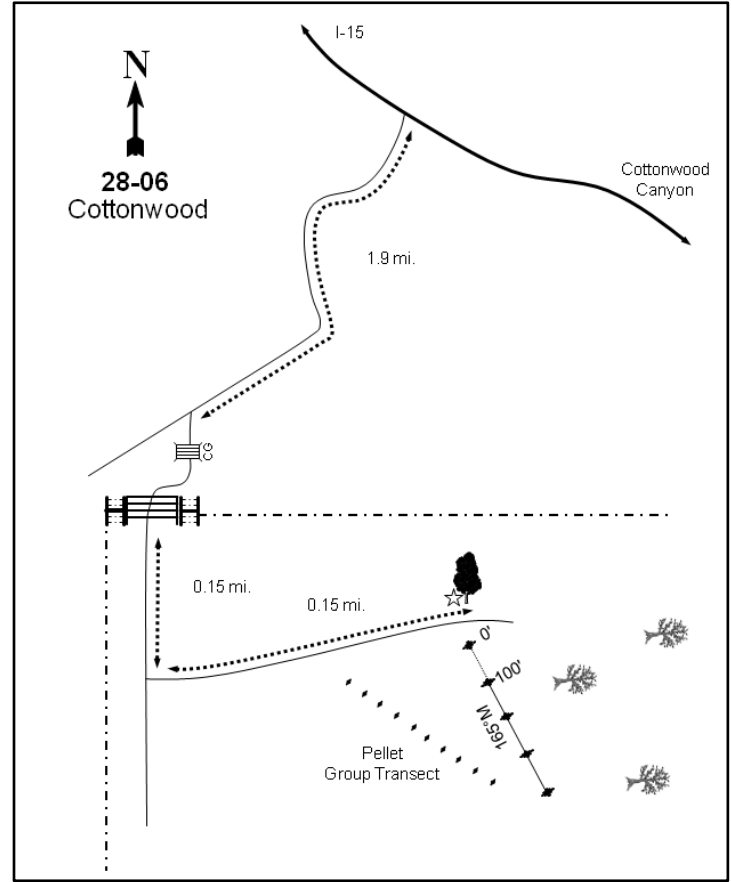
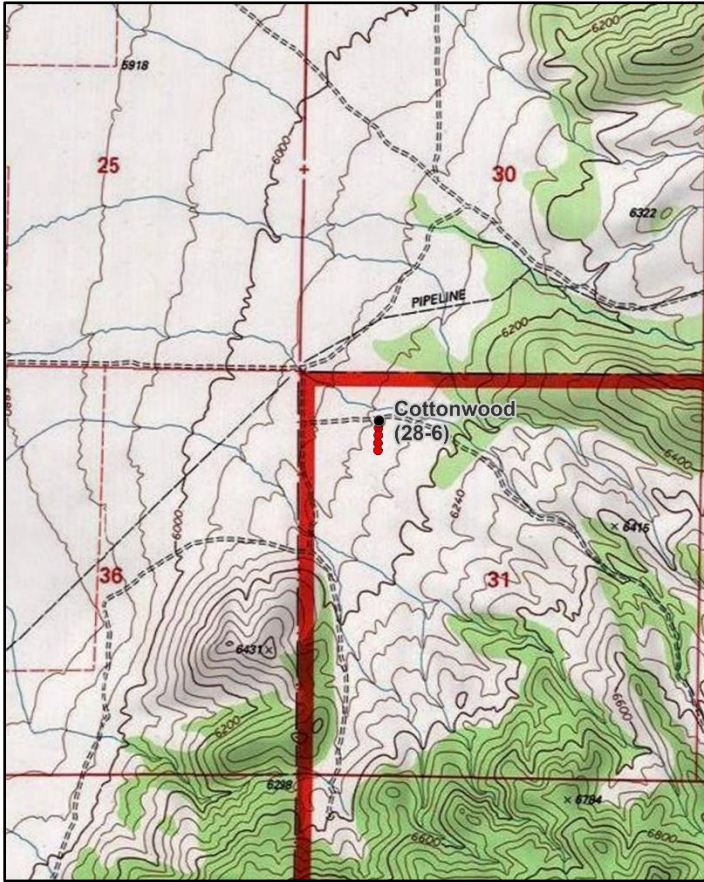
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1992	5900	480	16	55	29	52	22	9	- / -
1998	4240	540	12	66	22	42	8	4	54/70
2003	5220	-	4	63	33	48	37	12	52/62
2008	4520	1260	7	42	51	42	44	20	47/65
2013	440	-	0	59	41	0	82	23	28/66
2018	220	-	0	0	100	0	100	36	41/52
2023	200	-	0	70	30	10	60	30	- / -
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
1992	660	100	3	88	9	0	0	0	- / -
1998	360	-	6	89	6	6	0	6	35/84
2003	320	-	0	75	25	0	0	13	31/66
2008	260	-	0	46	54	0	0	23	31/77
2013	20	-	0	100	0	0	0	0	19/77
2018	40	-	0	0	100	0	0	0	28/65
2023	40	-	50	50	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1992	-	-	-	-	-	-	-	-	- / -
1998	-	-	-	-	-	-	-	-	- / -
2003	40	-	0	100	0	0	0	0	11/16
2008	40	-	0	0	100	0	0	100	17/39
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	14/36
2023	20	20	0	100	0	0	0	0	- / -

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

**Table 28-05.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1992	13.8	6.3	8.0	6.3	-0.9	0.1	0.0	<b>33.6</b>	Very Poor-Poor
1998	15.5	8.3	5.9	6.8	-14.6	0.2	0.0	<b>22.1</b>	Very Poor
2003	20.4	5.2	2.1	6.4	-1.7	0.0	0.0	<b>32.4</b>	Very Poor
2008	13.9	-0.4	3.3	9.6	-1.7	0.3	0.0	<b>24.9</b>	Very Poor
2013	1.0	0.0	0.0	3.8	-15.0	0.5	0.0	<b>-9.7</b>	Very Poor
2018	0.3	0.0	0.0	18.9	-16.9	0.0	0.0	<b>2.3</b>	Very Poor
2023	0.6	0.0	0.0	19.1	-20.0	1.2	0.0	<b>0.9</b>	Very Poor

## COTTONWOOD - STUDY NO. 28-6

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Cottonwood Mountain ; Township 32S, Range 7W, Section 31  
NAD 83 UTM ZONE 12, 351003 East 4205317 North

**Transect Information**

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

9006  
165° magnetic  
400ft  
Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
Belt 1: 2ft; Belt 3: 2ft

**Directions to Site**

From the intersection of SR-20 and the frontage road along the east side of I-15, travel south on the frontage road for 6.6 miles to a gate on the left. Go through the gate and travel east for 1.9 miles to a cattle guard on the right. From the cattle guard, go 0.15 miles south along the fence. Turn left onto an old road going up into the chaining, then continue 0.15 miles to the study site on the south side of the road and stop next to a large pinyon. From the large pinyon, walk 75 feet at 130 degrees magnetic. The 0-foot baseline stake is a 2-foot tall fencepost 20 feet south of the road that is marked with browse tag #9006.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Red Creek
Elevation	6,110ft (1,862m)
Aspect	West
Slope	3-5%
Sample Dates	07/30/1992, 06/26/1998, 06/10/2003, 06/04/2008, 06/04/2013, 06/04/2018, 06/05/2023



**Table 28-06.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1970	-
Seeding - Seed Unknown	-	-	1970	-

**Wildlife Habitat and Vegetation History****Table 28-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-06.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush	Phase I
1992	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush/Annual Grass	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush/Annual Grass	Phase I
2013	Mountain Big Sagebrush/Annual Grass	Phase I
2018	Mountain Big Sagebrush/Annual-Perennial Grass	Phase I
2023	Annual Grass/Mountain Big Sagebrush	Phase I

**Site Notes**

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was heavily utilized in 1987.

**Soils****Table 28-06.5 - 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	7.5	61.4	20.4	18.2	1.3	7.8	147.2	0.5	06/26/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation 13 inches  
 NRCS Ecological Site Upland Loam (Mountain Big Sagebrush)  
 NRCS Ecological Site # R028AY310UT  
 States and Transitions 1987 - State Undefined: Community Phase Undefined  
 1992-2023 - Current Potential State: Community Phase 2.2

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been the dominant vegetation component on this site since study establishment in 1987 (Photos, Pre-1992 Data, Table 28-06.12, Table 28-06.13). The herbaceous understory has remained abundant and diverse, but the introduced annual grass cheatgrass (*Bromus tectorum*) has contributed a majority of the cover in numerous sample years; persistently high amounts of cheatgrass may pose a threat to the resilience of this sagebrush community. Perennial grasses, namely purple threeawn (*Aristida purpurea*) and needle and thread (*Hesperostipa comata*), increased in cover in 2018 and were together codominant with cheatgrass. However, perennial grasses decreased again in 2023 and cheatgrass became the dominant species in the herbaceous understory. Perennial forbs have generally contributed more cover than their annual counterparts, with scarlet globemallow (*Sphaeralcea coccinea*) providing the most cover of any single species since 1992 (Table 28-06.7, Table 28-06.10, Table 28-06.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been observed in most study years (Photos, Table 28-06.14), placing this site in Phase I of woodland succession as of 2023 (Table 28-06.4) and indicating the potential for further encroachment.

Deer winter range condition has generally remained very poor since 1992. Increasing cover and recruitment of young in the preferred browse community while decreasing decadence; diversifying and increasing cover of perennial grasses and forbs; and decreasing cheatgrass on this site would greatly improve deer winter range condition (Table 28-06.15). Mule deer presence has been high in most sample years since 1998 according to pellet transect data. Conversely, elk presence has remained low over the same time period with no pellet groups being observed in 2013 or 2018 (Table 28-06.9). However, the sagebrush component of this site could provide valuable browse for wintering elk (Table 28-06.3; Wambolt, 1996).

## Trend Summary Tables

**Table 28-06.6 - 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
1992	9.8	0.2	-	-	-	-
1998	7.5	0.0	-	-	-	-
2003	12.1	-	-	8.2	-	-
2008	8.8	-	-	8.7	-	-
2013	8.3	0.1	-	8.3	-	-
2018	7.9	0.0	-	7.8	-	-
2023	9.3	-	-	8.2	-	-

**Table 28-06.7 - 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
1992	357	127	150	124	8.2	5.1	2.2	2.6
1998	461	172	2	139	17.8	6.9	0.0	2.3
2003	50	126	31	149	0.3	3.5	0.5	4.4
2008	421	97	158	247	12.0	4.9	1.3	8.0
2013	476	123	80	230	15.1	5.4	0.2	5.7
2018	424	217	50	214	18.1	17.4	0.2	5.0
2023	442	169	160	176	22.9	5.9	0.6	3.5

**Table 28-06.8 - 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
1992	20.9	0.0	25.6	24.7	5.7	24.8
1998	23.5	0.3	38.0	16.6	4.5	34.0
2003	26.1	0.1	28.6	30.3	5.3	22.2
2008	17.0	0.1	40.2	20.2	3.5	33.4
2013	15.1	0.1	51.3	8.6	4.2	34.0
2018	16.2	-	58.6	10.6	3.8	47.9
2023	20.2	0.1	32.7	12.8	2.5	41.6

**Table 28-06.9 - 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				
1992	2	57	-	-	61
1998	-	45	1	-	37
2003	2	28	-	-	35
2008	2	65	1	-	88
2013	2	29	-	-	17
2018	-	28	-	-	48
2023	12	45	-	-	19
Year	Days Use Per Acre (ha)				
1992	-	-	-	-	-
1998	2.2 (5.4)	40.9 (101.0)	7.4 (18.2)	0.6 (1.4)	-
2003	5.1 (12.6)	60.3 (149.0)	2.7 (6.6)	-	-
2008	4.4 (10.8)	121.3 (299.6)	0.7 (1.7)	-	-
2013	5.1 (12.6)	77.1 (190.4)	-	-	-
2018	2.9 (7.2)	22.8 (56.3)	-	-	-
2023	20.3 (50.2)	59.0 (145.7)	2.7 (6.6)	-	-

**Table 28-06.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency										
1992	7	25	56	357	49	7	-	-	-	-	-
1998	8	27	82	461	49	23	-	1	-	3	-
2003	2	20	77	50	17	13	-	1	-	0	-
2008	7	17	28	421	29	20	-	3	-	-	-
2013	9	25	22	476	32	40	2	4	2	1	-
2018	17	14	115	424	25	54	-	15	0	-	-
2023	22	19	60	442	27	54	-	4	-	12	2
year	Average Cover (%)										
1992	0.1	0.9	3.0	8.2	0.9	0.2	-	-	-	-	-
1998	0.1	1.0	4.5	17.8	0.9	0.4	-	0.0	-	0.0	-
2003	0.0	0.6	2.4	0.3	0.2	0.2	-	0.0	-	0.0	-
2008	0.4	0.5	2.2	12.0	0.7	1.1	-	0.0	-	-	-
2013	0.5	0.8	1.1	15.1	0.3	2.4	0.0	0.0	0.1	0.1	-
2018	1.9	0.5	9.2	18.1	0.7	5.0	-	0.1	0.0	-	-
2023	1.6	0.4	1.3	22.9	0.5	2.0	-	0.0	-	0.1	0.0

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

**Table 28-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Ambrosia <sup>a</sup> (ragweed)	Calochortus flexuosus (winding mariposa lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cryptantha <sup>a</sup> (annual cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Epiobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron aphanactis <sup>a</sup> (rayless shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)
year	Nested Frequency																
1992	-	5	-	-	-	3	-	-	-	43	-	-	6	-	120	3	-
1998	-	-	-	-	1	-	-	-	-	-	-	2	-	-	-	-	-
2003	-	-	-	-	-	1	-	-	-	1	-	-	-	-	29	-	-
2008	-	-	12	36	3	-	9	-	19	1	-	0	9	37	43	-	7
2013	-	-	3	46	3	-	-	1	-	-	1	1	12	4	19	-	9
2018	43	-	5	7	-	-	-	-	2	-	-	-	-	-	-	-	6
2023	73	-	41	56	-	-	4	-	12	-	-	-	-	11	54	-	7
year	Average Cover (%)																
1992	-	0.0	-	-	-	0.0	-	-	-	1.5	-	-	0.0	-	0.7	0.0	-
1998	-	-	-	-	0.0	-	-	-	-	-	-	0.0	-	-	-	-	-
2003	-	-	-	-	-	0.0	-	-	-	0.0	-	-	-	-	0.5	-	-
2008	-	-	0.0	0.1	0.0	-	0.0	-	0.1	0.0	-	0.0	0.0	0.1	0.2	-	0.2
2013	-	-	0.0	0.1	0.0	-	-	0.0	-	-	0.0	0.0	0.0	0.0	0.1	-	0.0
2018	0.2	-	0.0	0.0	-	-	-	-	0.0	-	-	-	-	-	-	-	0.0
2023	0.2	-	0.1	0.1	-	-	0.0	-	0.0	-	-	-	-	0.0	0.1	-	0.0

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

FORB SPECIES	Lygodesmia (skeletonplant)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Phlox longifolia (longleaf phlox)	Polygonum (knotweed)	Senecio spartioides var. multicapitatus (broom-like ragwort)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency							
1992	-	-	-	3	2	-	116	-
1998	-	-	-	-	-	-	139	-
2003	-	-	7	-	-	-	145	-
2008	1	49	21	5	-	0	217	1
2013	-	-	12	-	-	0	220	8
2018	12	-	2	-	-	-	206	7
2023	-	10	12	-	-	0	143	3
year	Average Cover (%)							
1992	-	-	-	0.0	0.0	-	2.6	-
1998	-	-	-	-	-	-	2.3	-
2003	-	-	0.2	-	-	-	4.3	-
2008	0.0	0.6	0.1	0.0	-	0.0	7.8	0.0
2013	-	-	0.0	-	-	0.0	5.5	0.2
2018	0.1	-	0.0	-	-	-	4.8	0.0
2023	-	0.0	0.2	-	-	0.0	3.1	0.0

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

**Table 28-06.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Lilanthus pungens (granite prickly phlox)	Opuntia (pricklypear)
year	Line Intercept Cover		
1992	-	-	-
1998	-	-	-
2003	8.2	-	-
2008	8.7	-	-
2013	8.3	-	-
2018	7.8	-	-
2023	8.2	-	-
year	Quadrat Cover (%)		
1992	9.8	0.1	0.0
1998	7.5	0.0	-
2003	12.1	-	-
2008	8.8	-	-
2013	8.3	-	0.1
2018	7.9	0.0	-
2023	9.3	-	-

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

**Table 28-06.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1992	1920	-	6	78	16	57	14	14	- / -
1998	1560	140	6	64	30	64	6	14	65/94
2003	1620	-	1	49	49	37	42	17	68/90
2008	1580	120	5	56	39	10	42	20	57/84
2013	1020	20	0	77	24	24	73	14	58/92
2018	1140	-	4	61	35	44	35	21	57/89
2023	1100	260	0	73	27	22	66	29	- / -
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	25/31
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1992	60	-	0	100	0	0	0	0	- / -
1998	20	-	0	100	0	0	0	0	7/26
2003	20	-	0	100	0	0	0	0	17/25
2008	20	-	0	100	0	0	0	0	10/20
2013	100	-	0	100	0	0	0	0	14/24
2018	20	-	0	100	0	0	100	0	9/25
2023	-	20	0	0	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1992	40	20	50	50	0	0	0	0	- / -
1998	20	-	0	100	0	0	0	0	12/23
2003	20	-	100	0	0	0	0	0	- / -
2008	20	-	0	100	0	0	0	0	16/35
2013	20	-	0	100	0	100	0	100	- / -
2018	-	-	-	-	-	-	-	-	21/51
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	67/128

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

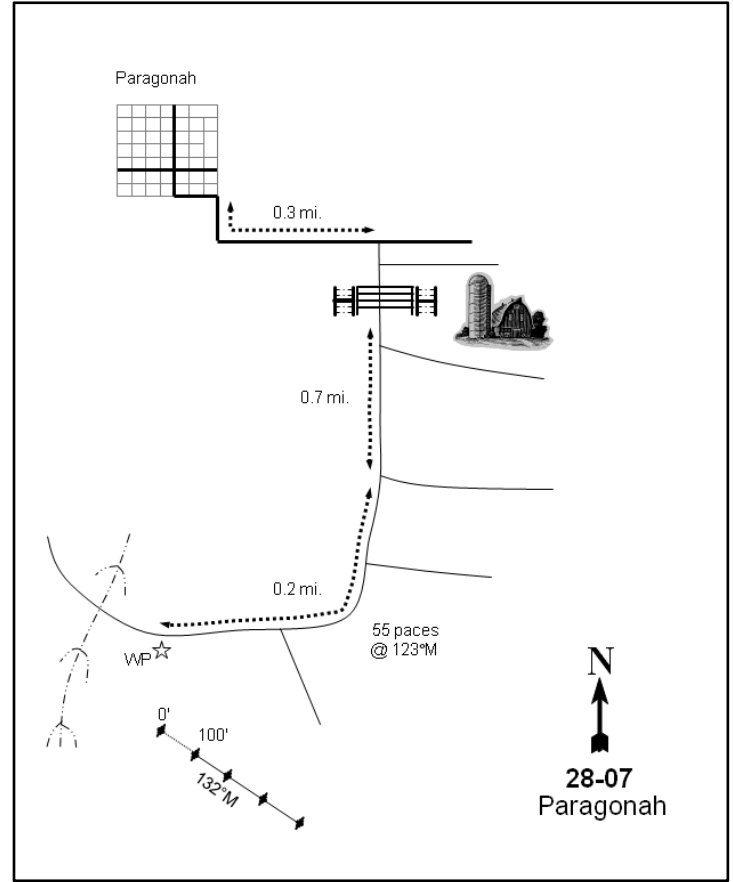
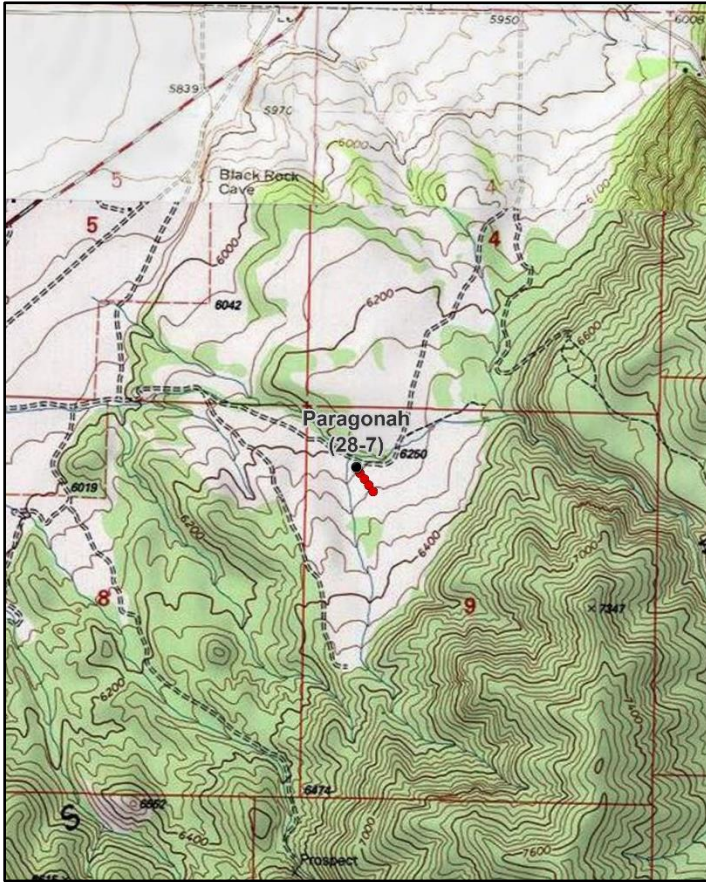
**Table 28-06.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	3	-	-	100	-	-	20.5
2023	3	-	-	100	-	-	10.3
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	4	-	100	-	-	-	2.0
2023	4	-	100	-	-	-	2.0

**Table 28-06.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1992	12.3	10.3	3.2	10.2	-6.1	5.2	0.0	<b>35.1</b>	Very Poor-Poor
1998	9.4	6.2	3.2	13.8	-13.4	4.6	0.0	<b>23.8</b>	Very Poor
2003	10.3	0.2	0.6	6.9	-0.3	8.8	0.0	<b>26.5</b>	Very Poor
2008	10.9	3.2	2.6	9.7	-9.0	10.0	0.0	<b>27.4</b>	Very Poor
2013	10.4	8.0	0.0	10.8	-11.3	10.0	0.0	<b>27.8</b>	Very Poor
2018	9.8	4.5	1.8	30.0	-13.6	9.9	0.0	<b>42.3</b>	Poor
2023	10.3	6.8	0.0	11.8	-17.2	7.1	0.0	<b>18.7</b>	Very Poor

## PARAGONAH - STUDY NO. 28-7



### Location Information

USGS 7.5 min Map Info Parowan NE; Township 34S, Range 8W, Section 09  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 344092 East 4192360 North

### Transect Information

Browse Tag # (0' Stake) Not Available  
 Transect Bearing 132° magnetic  
 Length 400ft  
 Belt Placement Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
 Belt Marker Placement Standard

### Directions to Site

From 200 South and 300 East in Paragonah, continue south on 300 East for 0.3 miles to where the road turns south, then drive 0.1 miles to a gate and a barn. Pass through a series of two gates and travel to a fork, then stay right on the road that goes south and drive for 0.7 miles to another fork. Continue south for 0.2 miles (the road will bend and go west) to the witness post on the left (south) side of the road (just beyond the witness post is a large gully). The baseline starts 92 feet away at 188 degrees magnetic from the witness post. The study is marked by short fenceposts.

### Site Information

Land Ownership Federal  
 Land Administrator BLM  
 Allotment No data  
 Elevation 6,230ft (1,899m)  
 Aspect Northwest  
 Slope 12%  
 Sample Dates 07/28/1992, 07/09/1998, 06/11/2003, 06/03/2008, 06/06/2013, 06/07/2018, 06/08/2023

**Table 28-07.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Historic	-
Seeding - Seed Unknown	-	-	Historic	-
Hand Crew - Lop and Scatter	-	-	Between 1998 and 2003	-
Hand Crew - Lop and Scatter	-	-	Between 2008 and 2013	-

**Wildlife Habitat and Vegetation History****Table 28-07.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 28-07.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Pinyon-Juniper/Black Sagebrush	Phase II
1992	Pinyon-Juniper/Black Sagebrush	Phase II
1998	Pinyon-Juniper/Black Sagebrush	Phase II
2003	Black Sagebrush	Phase I
2008	Black Sagebrush	Phase I
2013	Black Sagebrush	Phase I
2018	Black Sagebrush	Phase I
2023	Black Sagebrush	Phase I

**Site Notes**

There are inactive gullies on both sides of the study area.

**Soils****Table 28-07.5 - 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	6.3	65.4	20.4	14.2	2.2	6.0	3.2	0.4	07/08/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Stony Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB332UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 1987, this site was dominated by a mixed stand of twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) and was in Phase II of woodland succession. The shrub component was primarily composed of black sagebrush (*Artemisia nova*) with a diverse mixture of other species present that provided limited cover. The introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) made up a majority of the herbaceous understory with a small number of other grasses and forbs also present (Photos, Pre-1992 Data). A lop and scatter treatment occurred between 1998 and 2003 and again between 2008 and 2013 (Table 28-07.1), removing most of the trees. Black sagebrush has increased in cover since that time and became the dominant vegetation component in 2003 (Table 28-07.12). Crested wheatgrass has remained the dominant herbaceous species, but the diversity of grasses and forbs has increased (Table 28-07.10, Table 28-07.11). Although this study site was considered to be within Phase I of woodland succession as of 2023 (Table 28-07.4), the continued presence of pinyon and juniper (Table 28-07.12, Table 28-07.13, Table 28-07.14) indicates that further encroachment is possible in future sample years. Barring a major disturbance, this site can reasonably be expected to remain in this or a similar state in future sample years. Furthermore, this site will likely continue to remain as valuable habitat to big game due to the presence of a vigorous population of sagebrush and associated cohort species.

Deer winter range condition on this site has varied between very poor and excellent since 1992. As of 2023, deer winter range condition was considered to be good. Further improvement to winter habitat could be accomplished through efforts that increase preferred browse reproduction. Increasing perennial grass and forb diversity and cover while reducing or removing cheatgrass would also benefit deer winter range (Table 28-07.15). Pellet transect data shows that deer presence on this site was moderate from 1998 through 2008, but has remained low and steadily decreasing since 2013 (Table 28-07.9).



**Trend Summary Tables**

**Table 28-07.6 - 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
1992	9.9	1.8	10.6	-	-	-
1998	10.7	1.2	10.8	0.5	-	2.0
2003	7.3	1.4	0.4	8.6	0.6	0.9
2008	10.9	1.9	0.2	10.0	0.6	2.9
2013	13.3	1.8	0.0	17.3	2.5	-
2018	20.2	4.8	2.1	24.9	2.7	0.5
2023	18.0	2.1	0.4	24.8	2.3	0.9

**Table 28-07.7 - 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
1992	48	184	23	120	0.3	4.0	0.1	1.8
1998	256	238	20	92	3.4	7.4	0.1	1.6
2003	105	126	117	85	0.4	1.0	0.8	0.9
2008	170	231	75	127	1.0	9.3	0.3	2.4
2013	62	228	146	162	0.1	5.6	0.4	2.6
2018	26	225	76	150	0.0	8.6	0.5	2.7
2023	65	221	231	156	0.4	9.7	1.2	2.1

**Table 28-07.8 - 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
1992	24.2	2.0	34.4	0.0	29.8	25.6
1998	17.4	2.2	47.6	18.3	9.7	34.9
2003	20.2	1.3	57.0	9.1	7.3	11.7
2008	17.9	0.4	51.9	12.0	6.8	22.8
2013	12.7	0.1	51.1	9.6	8.1	27.6
2018	18.4	1.4	44.8	17.9	9.5	33.5
2023	17.4	0.5	32.8	19.0	14.2	31.9

**Table 28-07.9 - 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			
1992	-	27	-	84
1998	-	28	1	53
2003	-	4	-	24
2008	-	26	-	50
2013	-	15	-	10
2018	-	8	-	30
2023	1	18	-	6
Year	Days Use Per Acre (ha)			
1992	-	-	-	-
1998	-	23.4 (57.9)	-	-
2003	-	23.4 (57.9)	-	-
2008	-	29.5 (72.8)	-	-
2013	-	19.4 (48.0)	1.3 (3.3)	-
2018	-	11.4 (28.1)	-	-
2023	-	7.4 (18.2)	0.7 (1.7)	-

**Table 28-07.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency													
1992	9	159	-	-	48	0	-	-	-	3	-	-	30	-
1998	5	172	-	-	256	7	3	12	-	25	-	-	63	-
2003	1	94	-	-	98	5	-	-	-	22	-	-	16	13
2008	6	156	8	-	170	38	-	-	-	27	1	1	31	-
2013	27	133	2	3	62	32	1	-	4	40	-	9	32	-
2018	7	129	6	-	26	48	1	2	1	27	-	5	57	-
2023	5	164	0	-	62	23	7	-	7	21	-	17	36	3
year	Average Cover (%)													
1992	0.1	3.4	-	-	0.3	0.0	-	-	-	0.0	-	-	0.5	-
1998	0.2	4.7	-	-	3.4	0.2	0.0	0.0	-	0.2	-	-	2.1	-
2003	0.1	0.7	-	-	0.3	0.0	-	-	-	0.1	-	-	0.1	0.0
2008	0.2	6.9	0.2	-	1.0	0.9	-	-	-	0.3	0.0	0.1	0.6	-
2013	0.2	3.6	0.1	0.1	0.1	0.5	0.0	-	0.0	0.4	-	0.3	0.4	-
2018	0.2	5.2	0.1	-	0.0	0.8	0.0	0.0	0.0	0.3	-	0.1	2.0	-
2023	0.0	7.6	0.0	-	0.4	0.3	0.0	-	0.0	0.5	-	0.3	1.0	0.0

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

**Table 28-07.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis (rockcross)	Artemisia dracunculus (tarragon)	Astragalus lentiginosus (freckled milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Calochortus flexuosus (winding mariposa lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaetopappa ericoides (rose heath)	Chamaesyce fendleri (Fendler's sandmat)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis acuminata (tapertip hawkbeard)	Delphinium nuttallianum (two-lobed larkspur)	Draba <sup>a</sup> (draba)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)
year	Nested Frequency																
1992	3	3	-	2	4	-	-	19	13	81	-	-	-	-	12	2	1
1998	7	-	4	-	3	-	-	7	10	58	-	-	-	-	4	-	-
2003	11	-	-	-	-	-	-	107	19	41	5	-	2	7	-	-	3
2008	36	-	-	5	8	21	2	46	26	52	-	-	13	2	4	-	4
2013	96	2	-	2	12	7	-	89	25	92	-	-	8	-	7	-	1
2018	15	-	-	5	12	1	2	64	31	79	-	4	3	1	1	-	5
2023	65	-	-	5	14	6	4	217	24	96	1	-	12	-	1	1	5
year	Average Cover (%)																
1992	0.0	0.0	-	0.0	0.0	-	-	0.1	0.2	1.1	-	-	-	-	0.0	0.0	0.0
1998	0.0	-	0.0	-	0.0	-	-	0.0	0.3	0.9	-	-	-	-	0.0	-	-
2003	0.0	-	-	-	-	-	-	0.7	0.4	0.4	0.0	-	0.0	0.0	-	-	0.0
2008	0.1	-	-	0.1	0.0	0.3	0.0	0.1	1.1	0.2	-	-	0.2	0.0	0.0	-	0.1
2013	0.2	0.0	-	0.0	0.1	0.0	-	0.2	0.5	1.3	-	-	0.0	-	0.2	-	0.0
2018	0.0	-	-	0.7	0.1	0.0	0.1	0.4	0.5	0.8	-	0.0	0.0	0.0	0.0	-	0.1
2023	0.1	-	-	0.0	0.1	0.0	0.0	1.0	0.7	0.8	0.0	-	0.0	-	0.0	0.0	0.1

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

FORB SPECIES	Eriogonum umbellatum (sulphur-flower buckwheat)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lithospermum ruderale (western stoneseed)	Lygodesmia (skeletonplant)	Machaeranthera canescens (hoary fansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Oenothera (evening primrose)	Penstemon (beardtongue)	Penstemon eatonii (firecracker penstemon)	Petroradia pumila (rock goldenrod)	Phlox longifolia (longleaf phlox)	Physalis (groundcherry)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	Streptanthus cordatus (heartleaf twistflower)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency																
1992	1	1	13	-	3	-	-	-	-	-	-	-	10	-	8	-	-
1998	3	6	2	-	-	-	-	-	0	-	7	-	2	-	11	-	-
2003	4	-	4	-	-	5	-	-	-	-	7	-	1	-	10	-	-
2008	6	-	1	1	3	4	-	-	-	-	5	-	12	-	13	5	0
2013	4	-	15	-	3	1	-	-	-	2	3	-	5	1	13	-	8
2018	-	1	30	6	-	1	-	-	-	4	2	1	8	2	6	-	1
2023	1	-	7	5	1	22	3	3	-	2	2	3	2	1	13	-	-
year	Average Cover (%)																
1992	0.0	0.0	0.1	-	0.0	-	-	-	-	-	-	-	0.2	-	0.0	-	-
1998	0.0	0.0	0.1	-	-	-	-	-	0.0	-	0.0	-	0.0	-	0.1	-	-
2003	0.0	-	0.0	-	-	0.0	-	-	-	-	0.0	-	0.0	-	0.0	-	-
2008	0.0	-	0.0	0.0	0.2	0.0	-	-	-	-	0.0	-	0.1	-	0.1	0.0	0.0
2013	0.0	-	0.1	-	0.0	0.0	-	-	-	0.0	0.0	-	0.0	0.0	0.1	-	0.0
2018	-	0.0	0.2	0.0	-	0.0	-	-	-	0.1	0.0	0.0	0.1	0.0	0.1	-	0.0
2023	0.0	-	0.1	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.1	-	-

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

**Table 28-07.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Brickellia (brickellbush)	Ericameria nauseosa (rubber rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>a</sup> (Utah juniper)	Lilanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus edulis <sup>s</sup> (twoneedle pinyon)	Quercus gambelii <sup>p</sup> (Gambel oak)
year	Line Intercept Cover (%)											
1992	-	-	-	-	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-	-	-	-	-
2003	3.3	-	-	-	-	0.6	0.4	0	-	-	0.5	5.3
2008	8.5	0.1	-	0.1	-	0.3	-	0.2	0	-	2.9	1.4
2013	10.3	1.3	-	0.7	0.2	1.2	-	0.6	-	-	-	5.5
2018	15.8	2.1	-	0.5	-	1.6	-	0.6	-	0	0.5	7
2023	17.2	0.4	-	0.7	0.1	0.6	-	1	0	-	0.9	7.1
year	Quadrat Cover (%)											
1992	4.3	0.0	-	0.0	1.1	1.5	1.9	0.3	0.0	-	8.7	4.5
1998	5.8	0.1	-	-	0.1	0.8	1.3	0.4	0.0	-	9.6	4.7
2003	3.9	-	-	-	0.0	1.1	0.0	0.1	0.1	-	0.4	3.4
2008	9.3	0.1	-	0.1	0.0	1.2	-	0.4	0.2	-	0.2	1.5
2013	8.9	0.3	-	0.4	0.0	0.6	-	0.6	0.1	0.0	0.0	4.0
2018	11.1	3.4	0.0	0.4	0.0	3.1	-	1.1	0.1	0.0	2.1	5.8
2023	14.5	1.3	-	0.6	0.0	0.6	-	0.7	0.1	0.0	0.4	2.2

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

**Table 28-07.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	39/71
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1992	4300	440	20	51	29	54	22	1	- / -
1998	2540	100	19	61	20	13	0	3	29/54
2003	2960	-	5	53	43	9	4	12	24/38
2008	4480	3040	33	55	13	28	4	3	26/55
2013	4940	180	30	66	3	20	1	6	25/53
2018	5120	300	11	87	2	3	0	2	28/56
2023	6160	32140	16	76	8	20	2	8	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1992	280	40	43	36	21	21	14	0	- / -
1998	240	20	25	50	25	25	0	0	36/66
2003	60	-	0	33	67	0	33	33	56/86
2008	180	-	56	33	11	11	0	11	59/90
2013	340	60	35	65	0	18	6	35	32/48
2018	760	140	13	84	3	0	0	3	46/94
2023	480	20	4	83	13	17	25	13	- / -
<b>Brickellia -- (brickellbush)</b>									
1992	20	-	0	100	0	0	0	0	- / -
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	22/25
2018	20	-	0	100	0	0	0	0	11/20
2023	-	-	-	-	-	-	-	-	-/-
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	20/24
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	39/64
2018	80	-	0	100	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1992	520	20	23	77	0	4	8	0	- / -
1998	140	-	57	29	14	0	29	29	18/27
2003	80	-	0	100	0	0	25	0	12/14
2008	80	20	25	50	25	0	25	25	10/16
2013	280	-	7	93	0	64	0	7	19/26
2018	180	-	0	100	0	0	0	0	18/16
2023	380	-	11	84	5	32	58	11	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1992	20	20	100	0	0	0	0	0	- / -
1998	40	-	0	100	0	0	0	0	21/30
2003	-	-	-	-	-	-	-	-	- / -
2008	80	-	0	50	50	0	0	25	25/20
2013	20	-	0	100	0	0	0	0	88/107
2018	40	-	50	50	0	0	0	0	- / -
2023	40	-	50	50	0	50	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1992	4320	120	38	62	1	0	0	0	- / -
1998	1320	20	30	68	2	0	0	2	23/24
2003	2560	60	16	83	1	0	0	1	16/15
2008	3040	1000	26	59	14	0	0	11	14/16
2013	3940	60	53	46	1	0	0	1	18/22
2018	4940	40	5	81	15	0	0	14	15/17
2023	860	160	7	88	5	0	0	5	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1992	80	20	0	100	0	0	0	0	- / -
1998	40	-	0	100	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1992	600	-	13	87	0	3	0	0	- / -
1998	360	-	11	83	6	0	0	0	17/28
2003	320	-	19	75	6	0	0	6	10/15
2008	820	40	32	49	20	0	0	0	17/22
2013	860	-	19	67	14	0	0	35	17/26
2018	1240	-	11	89	0	0	0	0	13/26
2023	1680	-	1	96	2	0	0	2	- / -
<b>Opuntia -- (pricklypear)</b>									
1992	100	20	20	60	20	0	0	20	- / -
1998	60	20	33	33	33	0	0	67	11/19
2003	60	-	0	100	0	0	0	0	16/27
2008	160	-	25	75	0	0	0	0	10/16
2013	200	-	20	80	0	0	0	10	8/21
2018	120	-	17	83	0	0	0	0	8/18
2023	80	-	0	75	25	0	0	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 (%)				
<b>Peraphyllum ramosissimum<sup>p</sup> -- (wild crab apple)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	63/72
2018	-	-	-	-	-	-	-	-	63/85
2023	-	-	-	-	-	-	-	-	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	40	-	0	100	0	0	0	0	3/6
2013	40	-	50	50	0	0	0	0	2/5
2018	20	-	0	100	0	0	0	0	3/5
2023	40	-	50	50	0	0	0	0	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1992	400	-	60	40	0	0	0	0	-/-
1998	300	60	27	73	0	0	0	0	-/-
2003	-	80	0	0	0	0	0	0	-/-
2008	80	80	100	0	0	0	0	0	-/-
2013	100	60	100	0	0	0	0	0	-/-
2018	140	60	86	14	0	0	0	0	-/-
2023	180	-	78	22	0	11	0	0	-/-
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1992	2620	400	71	20	9	9	18	8	-/-
1998	1020	-	63	37	0	0	0	0	255/78
2003	2160	-	34	62	4	0	0	2	125/70
2008	3280	-	43	57	0	0	0	0	160/80
2013	1960	-	80	20	0	0	0	0	100/48
2018	1780	60	57	43	0	0	0	0	71/54
2023	1440	-	11	86	3	0	0	3	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	42/75
2018	-	-	-	-	-	-	-	-	33/95

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

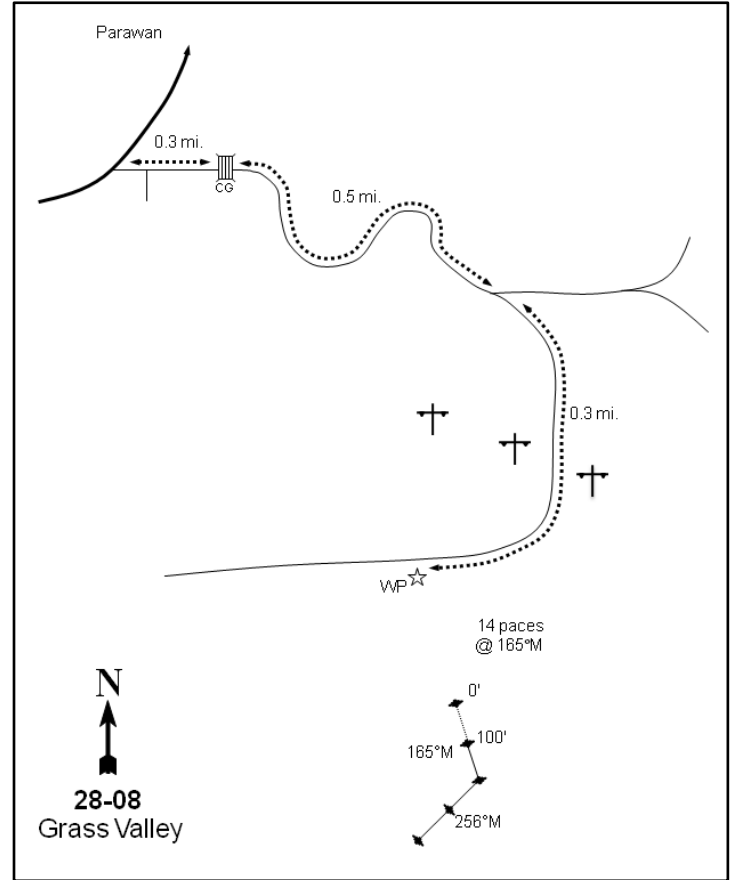
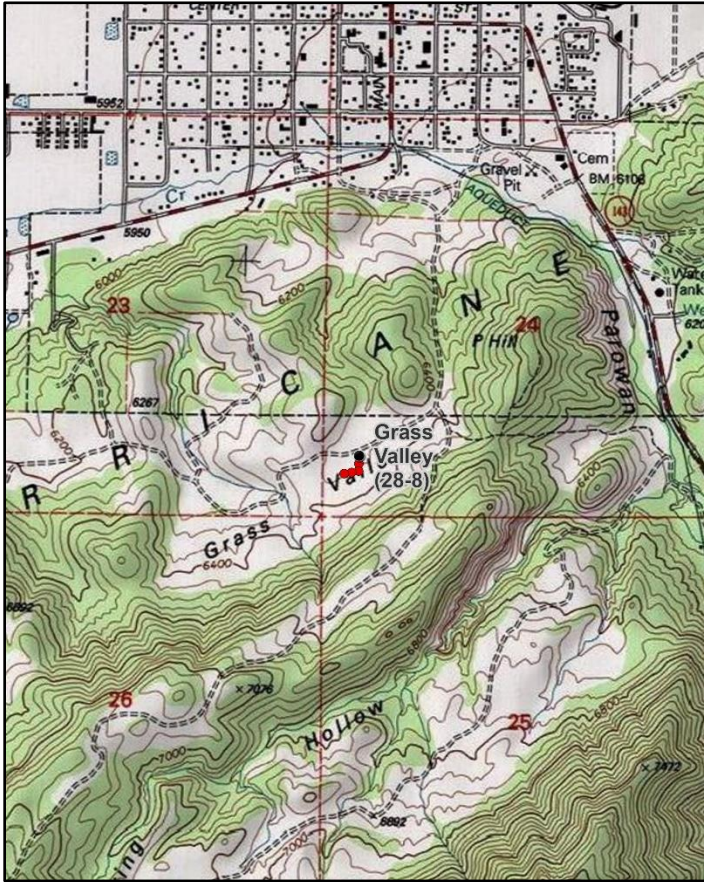
**Table 28-07.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1992	45	-	20	60	20	-	-
1998	54	-	-	-	-	-	11.4
2008	4	-	100	-	-	-	2.8
2013	24	33	67	-	-	-	3.3
2018	36	25	42	33	-	-	3.8
2023	15	-	25	63	13	-	5.3
<b>Pinus edulis (twoneedle pinyon)</b>							
1992	241	5	10	45	40	-	-
1998	315	-	-	-	-	-	13.0
2003	21	-	29	-	43	29	12.7
2008	40	6	47	6	6	35	8.2
2013	57	44	44	-	-	13	3.9
2018	86	28	72	-	-	-	2.2
2023	90	26	58	11	-	5	4.5

**Table 28-07.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1992	11.2	9.9	15.0	7.9	-0.2	3.6	0.0	<b>47.3</b>	Poor
1998	12.2	11.7	15.0	14.9	-2.6	3.1	0.0	<b>54.3</b>	Fair
2003	9.4	9.4	11.5	2.1	-0.3	1.7	0.0	<b>33.8</b>	Very Poor-Poor
2008	12.2	11.7	15.0	18.6	-0.8	4.8	0.0	<b>61.5</b>	Fair
2013	20.3	14.4	15.0	11.3	-0.1	5.2	0.0	<b>66.1</b>	Fair-Good
2018	29.4	14.6	12.2	17.1	0.0	5.4	0.0	<b>78.7</b>	Good-Excellent
2023	29.2	13.0	7.3	19.3	-0.3	4.3	0.0	<b>72.8</b>	Good

## GRASS VALLEY - STUDY NO. 28-8

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Parowan NW; Township 34S, Range 9W, Section 24  
NAD 83 UTM ZONE 12, 339053 East 4188117 North

**Transect Information**

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

Not Available  
165° magnetic  
400ft  
Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
Standard

**Directions to Site**

From I-15, take the north Parowan exit and travel south into town. Continue on Main Street to a big gradual curve on the south end of town. Just past the Parowan Heritage Park, turn east off of the highway across from a log house onto a road. Drive past other houses, staying on the main road for 0.3 miles to a cattle guard. From the cattle guard, continue 0.5 miles to a fork and bear right. Proceed 0.3 miles, passing underneath the powerlines to a witness post on left (south) side of the road. The baseline starts 68 feet away from the witness post at a bearing of 165 degrees magnetic. The transect is marked by 2-foot tall fenceposts; there is no browse tag.

**Site Information**

Land Ownership Federal  
Land Administrator BLM  
Allotment P HILL  
Elevation 6,360ft (1,939m)  
Aspect Northwest  
Slope 5%  
Sample Dates 07/28/1992, 07/09/1998, 06/11/2003, 06/03/2008, 06/06/2013, 06/07/2018, 06/01/2023



**Table 28-08.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Mid-1960s	-
Seeding - Seed Unknown	-	-	Mid-1960s	-
Hand Crew - Lop and Scatter	-	-	Between 1998 and 2003	-
Hand Crew - Lop and Scatter	Parowan Front P-Hill	5758	April-September 2022	671

**Wildlife Habitat and Vegetation History****Table 28-08.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-08.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush	Phase I
1992	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I
2023	Mountain Big Sagebrush/Perennial Grass	Phase I

**Site Notes**

This site is surrounded by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*)-covered hills. There is a three-way enclosure that was built in the late 1970s approximately 0.3 miles west of the site.

**Soils****Table 28-08.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.4	60.7	20.7	18.6	1.7	9.4	192.0	0.4	07/09/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      13 inches  
 NRCS Ecological Site    Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)  
 NRCS Ecological Site #    R047XB308UT  
 States and Transitions    No state and transition model is available for this ecological site.

This site has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since study establishment in 1987 with other shrubs offering limited cover. Although it also provided limited cover, Utah juniper (*Juniperus osteosperma*) was present in increasing amounts, much of which was removed by an initial lop and scatter treatment between 1998 and 2003 and a subsequent lop and scatter in 2022 (Photos, Pre-1992 Data, Table 28-08.1, Table 28-08.12, Table 28-08.13, Table 28-08.14). The herbaceous understory has remained diverse and abundant. Introduced perennial grass species such as intermediate wheatgrass (*Thinopyrum intermedium*), crested wheatgrass (*Agropyron cristatum*), and bulbous bluegrass (*Poa bulbosa*) have dominated the understory in all sample years and were a codominant vegetation component in 2018 and 2023. A number of native perennial grass species have also been present in lesser amounts, and annual and perennial forbs have remained rare (Pre-1992 Data, Table 28-08.7, Table 28-08.10, Table 28-08.11). Although juniper density decreased following the lop and scatter treatments, it is still present in the study area (Photos, Table 28-08.14). While the site was considered to be within Phase I of woodland succession as of 2023 (Table 28-08.4), further encroachment is possible due to nearby seed sources. Active tree maintenance will need to be considered in the future to maintain a sagebrush community and ensure that this remains a productive source for valuable winter forage.

Condition of deer winter range on this site has ranged between poor and fair since 1992; as of 2023, deer winter range was considered to be in poor to fair condition. Improvements to deer winter range could be achieved by increasing cover and reproduction of preferred browse while decreasing decadence; diversifying and increasing cover of native perennial forbs; and decreasing or removing cheatgrass. Mule deer presence was high from 1998 through 2013 according to pellet transect data, but has remained low since 2018. Elk pellet groups have not been observed since 2008 (Table 28-08.9). However, sagebrush could provide valuable browse if wintering elk were to use the area in the future (Table 28-08.3; Wambolt, 1996).

## Trend Summary Tables

**Table 28-08.6 - 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
1992	16.4	0.3	0.0	-	-	-
1998	13.6	0.3	0.9	-	-	-
2003	16.0	0.2	0.2	12.8	-	-
2008	10.4	0.2	0.0	12.5	0.1	-
2013	11.7	0.6	-	14.1	0.1	-
2018	10.9	1.0	0.1	12.4	0.3	-
2023	9.8	0.1	0.1	10.3	0.1	-

**Table 28-08.7 - 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
1992	144	309	60	4	2.3	17.8	0.5	0.0
1998	219	327	24	9	2.1	19.3	0.1	0.1
2003	305	320	79	11	5.7	13.9	0.3	0.0
2008	43	368	94	18	0.1	21.7	0.4	0.1
2013	26	387	80	17	0.1	19.6	0.2	0.1
2018	121	411	32	13	1.3	42.2	0.1	0.0
2023	23	399	102	11	0.2	25.5	0.4	0.2

**Table 28-08.8 - 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
1992	16.9	0.2	31.3	23.4	1.9	32.2
1998	21.7	0.5	47.7	20.3	3.2	37.4
2003	28.2	0.1	34.4	11.5	3.1	35.3
2008	17.5	0.3	38.4	20.1	2.2	35.2
2013	15.5	0.2	45.6	12.3	0.9	36.5
2018	20.2	0.0	54.8	11.4	2.7	51.4
2023	24.7	0.5	36.0	18.8	2.6	33.2

**Table 28-08.9 - 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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1998	3	-	45	-	48
2003	3	-	30	1	30
2008	1	-	56	-	71
2013	-	-	18	1	13
2018	-	-	14	-	30
2023	7	-	13	-	24
Year	Days Use Per Acre (ha)				
1998	9.4 (23.3)	-	62.3 (153.9)	0.7 (1.7)	-
2003	10.9 (26.9)	-	57.0 (140.7)	1.3 (3.3)	-
2008	4.4 (10.8)	8.7 (21.5)*	95.8 (236.7)	-	-
2013	0.7 (1.8)	-	59.6 (147.3)	-	-
2018	-	-	10.0 (24.8)	-	-
2023	18.1 (44.8)	8.7 (21.5)*	8.7 (21.5)	-	-

\*Pellets per acre (ha)

**Table 28-08.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency											
Achnatherum hymenoides (Indian ricegrass)												
Agropyron cristatum <sup>i</sup> (crested wheatgrass)												
Aristida purpurea (purple threeawn)												
Bromus inermis <sup>i</sup> (smooth brome)												
Bromus tectorum <sup>ai</sup> (cheatgrass)												
Elymus elymoides (squirreltail)												
Hesperostipa comata (needle and thread)												
Poa bulbosa <sup>i</sup> (bulbous bluegrass)												
Poa secunda (Sandberg bluegrass)												
Sporobolus cryptandrus (sand dropseed)												
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)												
year	Average Cover (%)											
1992	10	124	-	17	144	51	32	7	4	-	182	
1998	5	153	0	20	219	62	14	88	14	-	134	
2003	2	107	0	5	305	29	14	104	17	-	167	
2008	8	113	12	3	43	1	38	136	18	25	215	
2013	6	96	4	21	26	11	48	148	13	4	235	
2018	6	108	19	28	121	16	55	180	12	3	259	
2023	4	64	16	34	23	9	20	302	-	50	213	
year	Average Cover (%)											
1992	0.2	6.8	-	0.3	2.3	1.9	0.7	0.1	0.0	-	7.9	
1998	0.0	10.1	0.1	0.2	2.1	2.0	0.7	1.1	0.1	-	4.9	
2003	0.0	5.3	0.0	0.1	5.7	0.6	0.4	1.7	0.3	-	5.6	
2008	0.4	7.3	0.2	0.0	0.1	0.0	1.5	3.0	0.1	0.2	9.0	
2013	0.1	3.9	0.2	0.7	0.1	0.2	1.9	4.1	0.1	0.0	8.5	
2018	0.4	7.2	0.9	1.3	1.3	0.7	4.3	6.1	0.2	0.0	21.1	
2023	0.3	1.9	1.2	1.2	0.2	0.3	1.3	8.3	-	0.6	10.4	

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

**Table 28-08.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																
Agoseris glauca (pale agoseris)																	
Alyssum desertorum <sup>ai</sup> (desert madwort)																	
Arabis (rockcross)																	
Astragalus (milkvetch)																	
Astragalus purshii (woollypod milkvetch)																	
Brassicaceae <sup>a</sup> (mustard family)																	
Calochortus nuttallii (sego lily)																	
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)																	
Chaenactis douglasii (Douglas' dustymaiden)																	
Draba <sup>a</sup> (draba)																	
Erigeron divergens <sup>a</sup> (spreading fleabane)																	
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)																	
Eriogonum umbellatum (sulphur-flower buckwheat)																	
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																	
Machaeranthera canescens (hoary tansyaster)																	
Microsteris gracilis <sup>a</sup> (slender phlox)																	
Orobanche fasciculata (clustered broomrape)																	
year	Average Cover (%)																
1992	-	-	-	-	-	10	-	-	-	-	-	7	-	-	-	-	-
1998	-	1	-	4	-	4	-	12	2	1	-	-	-	-	9	2	
2003	2	1	-	-	-	-	-	53	-	-	-	-	-	7	-	37	-
2008	12	9	1	3	-	-	3	76	-	-	-	-	-	22	-	16	-
2013	5	23	-	4	-	-	-	55	3	-	-	-	-	5	3	10	-
2018	4	23	-	-	-	-	1	11	-	-	-	-	-	-	3	-	-
2023	2	35	-	-	1	-	1	14	-	-	2	-	0	10	2	66	3
year	Average Cover (%)																
1992	-	-	-	-	-	0.0	-	-	-	-	-	0.4	-	-	-	-	-
1998	-	0.0	-	0.1	-	0.0	-	0.0	0.0	0.0	-	-	-	-	-	0.0	0.0
2003	0.0	0.0	-	-	-	-	-	0.2	-	-	-	-	-	0.0	-	0.1	-
2008	0.1	0.0	0.0	0.0	-	-	0.0	0.3	-	-	-	-	-	0.1	-	0.0	-
2013	0.0	0.0	-	0.0	-	-	-	0.1	0.0	-	-	-	-	0.0	0.0	0.0	-
2018	0.0	0.1	-	-	-	-	0.0	0.0	-	-	-	-	-	-	0.0	-	-
2023	0.0	0.1	-	-	0.1	-	0.0	0.0	-	-	0.0	-	0.0	0.1	0.0	0.2	0.0

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

FORB SPECIES	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea coccinea (scarlet globemallow)	Streptanthus cordatus (heartleaf twistflower)	Taraxacum officinale (common dandelion)	unknown annual forb <sup>a</sup> (unknown forb)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency						
1992	-	1	-	-	4	42	-
1998	-	4	-	-	1	-	-
2003	3	-	-	3	3	-	-
2008	1	12	-	-	-	-	0
2013	2	9	-	-	-	-	-
2018	4	-	-	-	-	-	1
2023	1	-	2	-	-	-	-
year	Average Cover (%)						
1992	-	0.0	-	-	0.0	0.1	-
1998	-	0.0	-	-	0.0	-	-
2003	0.0	-	-	0.0	0.0	-	-
2008	0.0	0.0	-	-	-	-	0.0
2013	0.0	0.0	-	-	-	-	-
2018	0.0	-	-	-	-	-	0.0
2023	0.0	-	0.0	-	-	-	-

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

**Table 28-08.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Lilanthus pungens (granite prickly phlox)	Opuntia (pricklypear)	Pinus edulis <sup>t</sup> (twonneedle pinyon)
year	Line Intercept Cover (%)						
1992	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-
2003	12.8	-	-	-	-	-	-
2008	12.5	-	-	-	0.1	-	-
2013	14.1	-	-	-	0.1	-	-
2018	12.4	-	-	-	0.2	0.1	-
2023	10.3	-	-	-	0.1	-	-
year	Quadrat Cover (%)						
1992	16.4	0.0	-	0.0	0.3	-	-
1998	13.6	-	-	0.9	0.3	-	-
2003	16.0	-	-	0.1	0.2	-	0.0
2008	10.4	-	-	0.0	0.2	-	-
2013	11.7	-	-	-	0.6	-	-
2018	10.9	-	-	0.1	1.0	0.0	-
2023	9.8	-	0.0	0.1	0.1	-	-

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

**Table 28-08.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1992	4480	240	7	33	60	41	40	17	- / -
1998	3460	100	9	57	34	47	3	5	63/90
2003	3280	-	2	51	47	35	24	21	56/73
2008	3280	120	4	47	49	49	13	33	56/83
2013	2400	120	6	48	46	52	21	29	46/75
2018	2480	-	4	57	39	23	2	8	59/90
2023	2340	11740	2	68	30	25	28	28	- / -
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	83/74
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
1992	20	-	100	0	0	0	0	0	- / -
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	38/43
2013	-	-	-	-	-	-	-	-	61/100
2018	-	-	-	-	-	-	-	-	49/73
2023	20	-	0	100	0	0	0	0	- / -
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	29/58
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	100	0	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1992	-	40	0	0	0	0	0	0	- / -
1998	40	20	0	100	0	0	0	0	- / -
2003	20	-	0	100	0	0	0	0	89/28
2008	20	-	0	100	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Linanthus pungens -- (granite prickly phlox)</b>									
1992	920	20	17	83	0	11	9	4	- / -
1998	320	-	0	100	0	0	0	0	16/24
2003	300	-	0	87	13	0	0	7	15/21
2008	340	-	6	88	6	0	0	6	12/21
2013	360	20	0	100	0	0	0	0	16/22
2018	340	-	0	100	0	0	35	0	15/23
2023	280	-	0	71	29	0	0	14	- / -
<b>Opuntia -- (pricklypear)</b>									
1992	60	-	0	100	0	0	0	0	- / -
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	8/19
2008	-	-	-	-	-	-	-	-	15/37
2013	40	-	0	100	0	0	0	50	9/24
2018	40	-	0	100	0	0	0	0	13/27
2023	-	-	-	-	-	-	-	-	-/-
<b>Peraphyllum ramosissimum<sup>p</sup> -- (wild crab apple)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	20	-	0	100	0	0	100	0	65/76
2003	20	-	0	100	0	0	100	0	74/102
2008	-	-	-	-	-	-	-	-	104/183
2013	20	-	100	0	0	100	0	0	106/199
2018	20	-	0	100	0	100	0	0	86/134
2023	20	-	0	100	0	100	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	100	0	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	20	0	0	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	106/205
2008	-	-	-	-	-	-	-	-	71/100
2013	-	-	-	-	-	-	-	-	53/110
2018	-	-	-	-	-	-	-	-	132/148

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

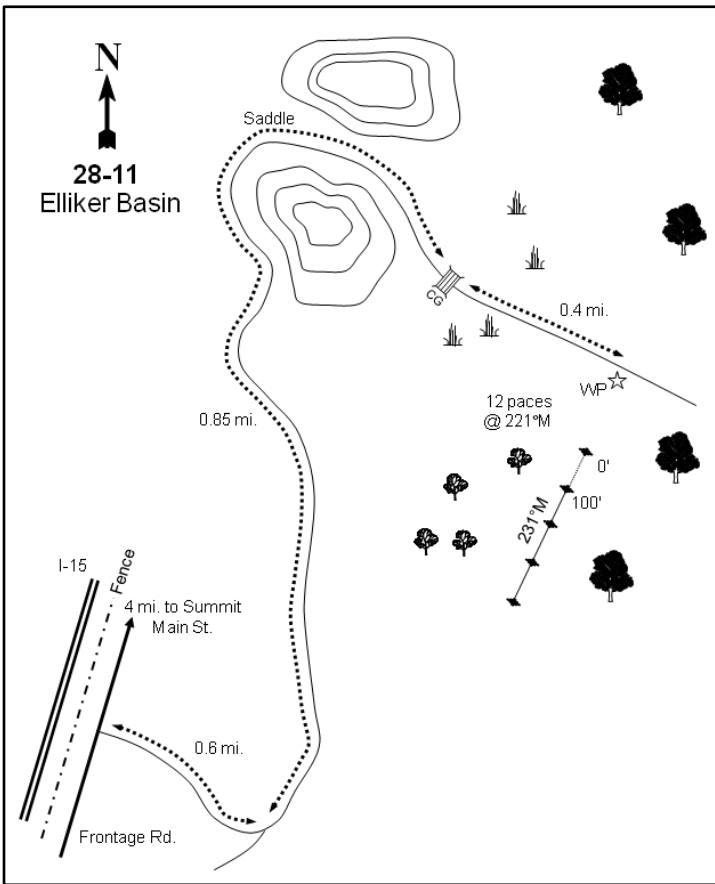
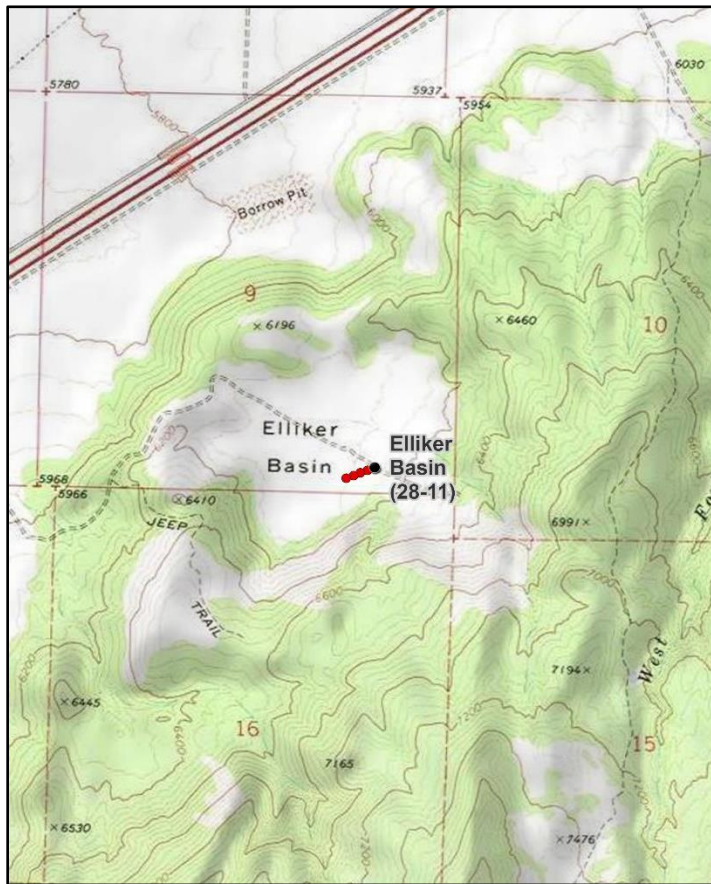
**Table 28-08.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	19	-	-	-	-	-	8.7
2003	12	-	100	-	-	-	4.2
2008	27	-	73	27	-	-	6.5
2013	14	-	100	-	-	-	2.8
2018	9	-	63	38	-	-	9.0
2023	5	75	25	-	-	-	2.0
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	5	-	-	-	-	-	8.8
2003	3	-	100	-	-	-	3.0
2008	5	33	67	-	-	-	3.0
2013	11	-	100	-	-	-	2.7
2018	9	-	71	29	-	-	5.1
2023	1	100	-	-	-	-	1.0

**Table 28-08.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1992	20.6	-3.1	3.3	30.0	-1.7	0.0	0.0	<b>49.1</b>	Poor-Fair
1998	17.0	4.8	4.6	30.0	-1.6	0.2	0.0	<b>54.9</b>	Fair
2003	16.0	0.9	1.2	24.4	-4.3	0.1	0.0	<b>38.3</b>	Poor
2008	15.6	0.2	1.9	30.0	-0.1	0.2	0.0	<b>47.8</b>	Poor
2013	17.6	1.3	2.9	30.0	0.0	0.1	0.0	<b>51.9</b>	Poor-Fair
2018	15.5	3.4	2.0	30.0	-0.9	0.1	0.0	<b>50.0</b>	Poor-Fair
2023	12.9	6.0	0.9	30.0	-0.2	0.5	0.0	<b>50.1</b>	Poor-Fair

## ELLIKER BASIN - STUDY NO. 28-11



### Location Information

USGS 7.5 min Map Info Summit SW; Township 35S, Range 10W, Section 09  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 325607 East 4181759 North

### Transect Information

Browse Tag # (0' Stake) 495  
 Transect Bearing 231° magnetic  
 Length 400ft  
 Belt Placement Line 1 (11ft & 71ft), Line 2 (34ft), Line 3 (59ft), Line 4 (95ft)  
 Belt Marker Placement Belts 1, 2, 4: 3ft; Belts 3, 5: 1ft

### Directions to Site

At the I-15 interchange (exit #71) in Summit, travel south on the frontage road (Summer Tree Drive) on the east side of the freeway for 4.0 miles. Turn left onto a dirt road, proceed through a gate, and drive east for 0.6 miles. Bear left at the fork and continue for 1.25 miles to Elliker Basin and up to a half-high witness post in the sagebrush on the right (south) side of the road. The transect starts 12 paces away from the witness post at a bearing of 221 degrees magnetic. The 0-foot stake is marked with browse tag #495.

### Site Information

Land Ownership State  
 Land Administrator UDWR  
 Allotment WEST FORK  
 Elevation 6,170ft (1,881m)  
 Aspect West  
 Slope 15%  
 Sample Dates 07/31/1992, 06/03/1998, 06/11/2003, 06/03/2008, 06/06/2013, 06/05/2018, 06/06/2023



**Table 28-11.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Parowan Front WMA Arc for Bullhog and Lop and Scatter	3435	Fall 2017-Summer 2018	1674
Seeding - Seed Unknown	-	-	Historic	-
Hand Crew - Lop and Scatter	-	-	Spring 1992	-

**Wildlife Habitat and Vegetation History**

**Table 28-11.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 28-11.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1987	Mountain Big Sagebrush	No Encroachment
1992	Mountain Big Sagebrush/Annual Grass	No Encroachment
1998	Mountain Big Sagebrush	No Encroachment
2003	Mountain Big Sagebrush/Annual Grass	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush/Perennial Grass	Phase I
2023	Mountain Big Sagebrush/Perennial Grass	No Encroachment

**Site Notes**

The transect is located on the southeastern slope of the basin just below the line of twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees which continue up the cliffs.

**Soils**

**Table 28-11.5 - 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	5.8	50.7	31.5	17.8	2.8	10.6	99.2	0.5	06/03/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      13 inches  
 NRCS Ecological Site    Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)  
 NRCS Ecological Site #    R047XB308UT  
 States and Transitions    No state and transition model is available for this ecological site.

The site has remained dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since study establishment in 1987. Cover and density of sagebrush, however, have exhibited an overall decrease since 1998 (Photos, Pre-1992 Data, Table 28-11.12, Table 28-11.13). The herbaceous understory has fluctuated in abundance and composition. The introduced annual grass species cheatgrass (*Bromus tectorum*) provided significant cover in 1992, 2003, 2018 and 2023; elevated amounts of cheatgrass may pose a threat to the resilience of this study site and could possibly influence the fire regime. Perennial grasses have contributed the most herbaceous cover since 2008. Although native species were abundant in many sample years, the introduced species intermediate wheatgrass (*Thinopyrum intermedium*) contributed a majority of the perennial grass cover in 2018 and 2023. Forbs have generally remained rare (Table 28-11.7, Table 28-11.10, Table 28-11.11). An additional potential threat is posed by the presence of Utah juniper (*Juniperus osteosperma*) and twoneedle pinyon (*Pinus edulis*) on and in the area surrounding the transect. Although density was low in 2018 and undetectable in 2023 due to an earlier lop and scatter treatment (Table 28-11.14), this tree presence indicates the possibility of further encroachment in future sample years. Control of cheatgrass and conifer encroachment will aid in the community's resilience and resistance to a disturbance that may change community structure and negatively impact wildlife use due to the loss of valuable forage.

Condition of deer winter range on this site has varied between very poor and good since 1992. Deer winter range condition was considered to be very poor to poor in 2023. Improvements to this winter range could be accomplished through efforts that increase preferred browse cover and reproduction while decreasing decadence. Diversifying and increasing cover of perennial forbs while decreasing cheatgrass would also greatly benefit deer winter range (Table 28-11.15). Pellet group transect data indicates that deer presence was high in 2023 (Table 28-11.9).

**Trend Summary Tables**

**Table 28-11.6 - 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
1992	23.8	0.3	-	-	-	-
1998	23.2	0.3	-	-	-	-
2003	20.4	0.2	-	15.2	-	-
2008	13.9	0.0	-	12.0	0.1	-
2013	10.4	0.0	-	12.3	0.6	-
2018	13.0	1.3	-	14.0	1.0	-
2023	9.5	-	-	8.9	0.2	-

**Table 28-11.7 - 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
1992	471	104	90	4	32.8	4.9	0.3	0.0
1998	409	136	104	32	8.0	7.6	0.3	0.4
2003	439	149	150	7	27.3	6.3	0.6	0.0
2008	29	226	67	26	0.2	12.4	0.1	0.2
2013	157	310	57	12	0.5	16.7	0.1	0.2
2018	330	324	10	6	16.9	26.0	0.1	0.2
2023	307	352	43	18	17.2	23.8	1.2	0.3

**Table 28-11.8 - 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
1992	4.5	0.0	23.8	0.0	47.9	47.6
1998	9.8	0.1	40.9	27.2	11.0	37.8
2003	4.1	-	30.8	22.0	8.8	52.0
2008	6.1	0.3	51.7	24.2	9.3	26.4
2013	3.7	0.1	53.2	15.3	9.2	29.5
2018	2.0	0.0	60.7	16.2	10.8	53.8
2023	0.8	0.0	48.2	13.2	7.2	46.1

**Table 28-11.9 - 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	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency			
1992	27	-	-	26
1998	45	1	-	18
2003	31	1	-	13
2008	70	-	-	54
2013	50	-	1	18
2018	21	-	2	20
2023	33	9	-	4
Year	Days Use Per Acre (ha)			
1992	-	-	-	-
1998	44.2 (109.2)	0.7 (1.7)	-	-
2003	151.5 (374.1)	-	-	-
2008	105.9 (261.5)	16.8 (41.4)	-	-
2013	153.5 (379.1)	3.4 (8.3)	-	-
2018	46.9 (115.9)	-	-	-
2023	79.8 (197.0)	2.0 (5.0)	-	-

**Table 28-11.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James galleta)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency										
1992	1	36	465	13	3	23	-	-	33	19	170
1998	-	9	402	9	1	34	-	7	50	44	163
2003	-	9	428	17	6	33	20	4	4	75	197
2008	1	41	29	34	0	49	-	3	26	94	-
2013	9	29	157	41	0	66	39	21	30	149	2
2018	16	33	323	31	2	54	65	12	47	176	12
2023	-	29	307	25	7	45	160	1	78	192	10
year	Average Cover (%)										
1992	0.0	0.4	32.0	0.5	0.1	1.7	-	-	1.2	0.9	0.8
1998	-	0.2	7.4	0.1	0.1	1.9	-	0.2	2.5	2.6	0.6
2003	-	0.1	24.9	0.4	0.2	2.2	0.2	0.1	0.2	2.9	2.3
2008	0.0	0.5	0.2	0.6	0.0	5.3	-	0.0	1.2	4.7	-
2013	0.2	0.6	0.5	1.8	0.0	5.8	1.0	0.2	1.9	5.3	0.0
2018	0.2	1.4	16.9	2.5	0.4	3.9	1.7	0.2	2.7	13.1	0.1
2023	-	0.9	17.2	1.6	0.5	3.1	3.5	0.0	1.6	12.6	0.0

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

**Table 28-11.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Artemisia ludoviciana (white sagebrush)	Astragalus (milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Chenopodium <sup>a</sup> (goosefoot)	Crepis acuminata (tapertip hawkbeard)	Draba <sup>a</sup> (draba)	Erigeron divergens <sup>a</sup> (spreading fleabane)	Lactuca serriolata <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orobanche fasciculata (clustered broomrape)	Phacelia heterophylla <sup>a</sup> (varileaf phacelia)	Phlox longifolia (longleaf phlox)	Physalis (groundcherry)
year	Nested Frequency																
1992	-	-	1	2	-	-	1	-	-	-	-	-	85	1	-	-	-
1998	15	-	7	-	6	23	-	-	55	-	-	-	39	4	-	-	-
2003	6	-	-	-	-	20	-	1	75	-	-	7	103	-	-	-	-
2008	21	-	2	-	1	66	-	-	-	-	-	-	-	2	-	-	-
2013	3	-	6	1	-	50	-	-	3	-	-	-	2	-	2	2	-
2018	-	-	4	-	-	3	-	-	-	-	-	-	-	-	-	-	2
2023	10	6	7	-	-	19	-	-	3	9	3	-	12	-	-	-	1
year	Average Cover (%)																
1992	-	-	0.0	0.0	-	-	0.0	-	-	-	-	-	0.2	0.0	-	-	-
1998	0.1	-	0.2	-	0.0	0.1	-	-	0.1	-	-	-	0.1	0.0	-	-	-
2003	0.0	-	-	-	-	0.0	-	0.0	0.2	-	-	0.0	0.3	-	-	-	-
2008	0.1	-	0.0	-	0.0	0.1	-	-	-	-	-	-	-	0.0	-	-	-
2013	0.0	-	0.2	0.0	-	0.1	-	-	0.0	-	-	-	0.0	-	0.0	0.0	-
2018	-	-	0.1	-	-	0.0	-	-	-	-	-	-	-	-	-	-	0.0
2023	0.1	0.0	0.2	-	-	0.1	-	-	0.0	1.1	0.0	-	0.0	-	-	-	0.0

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

FORB SPECIES			
	Plantago patagonica <sup>a</sup> (woolly plantain)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency		
1992	9	-	-
1998	4	-	5
2003	-	-	-
2008	4	-	-
2013	-	-	-
2018	5	2	2
2023	-	-	-
year	Average Cover (%)		
1992	0.0	-	-
1998	0.0	-	0.0
2003	-	-	-
2008	0.0	-	-
2013	-	-	-
2018	0.0	0.0	0.0
2023	-	-	-

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

**Table 28-11.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)
year	Line Intercept Cover (%)			
1992	-	-	-	-
1998	-	-	-	-
2003	15.2	-	-	-
2008	12	-	0	0.1
2013	12.3	-	0.2	0.4
2018	14	-	1	-
2023	8.9	-	0.2	-
year	Quadrat Cover (%)			
1992	23.8	-	0.1	0.1
1998	23.2	0.1	0.0	0.1
2003	20.4	-	0.1	0.0
2008	13.9	-	0.0	0.0
2013	10.4	-	0.0	0.0
2018	13.0	-	1.2	0.2
2023	9.5	-	0.0	-

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

**Table 28-11.13 - 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 (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	204/180
2008	-	-	-	-	-	-	-	-	126/134
2013	-	-	-	-	-	-	-	-	101/164
2018	-	-	-	-	-	-	-	-	159/174
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1992	3400	20	6	44	51	44	16	31	- / -
1998	3120	3480	4	71	25	31	0	5	58/99
2003	2520	-	2	41	57	37	46	11	61/96
2008	2220	3000	3	33	64	38	30	39	52/87
2013	2840	360	35	37	28	21	42	19	68/95
2018	2940	40	23	58	19	17	3	9	57/90
2023	2580	20	7	49	44	43	43	46	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	60	-	0	100	0	0	0	0	15/12
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	100	0	0	0	0	0	- / -
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	60	-	0	0	100	100	0	0	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	100	0	0	0	100	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1992	180	-	0	89	11	0	0	0	- / -
1998	160	-	38	63	0	0	0	0	18/22
2003	380	-	0	100	0	0	0	0	17/18
2008	140	-	14	71	14	0	0	14	17/21
2013	120	-	17	83	0	0	0	0	18/28
2018	720	-	6	94	0	0	0	0	24/33
2023	100	-	0	60	40	0	0	40	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1992	40	-	50	50	0	0	0	0	- / -
1998	40	-	0	50	50	0	0	50	13/31
2003	40	-	0	100	0	0	0	0	13/22
2008	60	-	0	100	0	0	0	0	17/40
2013	80	-	0	100	0	0	0	25	15/54
2018	60	20	0	100	0	0	0	33	13/44
2023	20	-	0	100	0	0	0	100	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	11/10
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	56/101
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	71/103
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	21/69
2003	-	-	-	-	-	-	-	-	56/94
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	67/120
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Yucca -- (yucca)</b>									
1992	-	-	-	-	-	-	-	-	-/-
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	61/53
2008	-	-	-	-	-	-	-	-	59/75
2013	-	-	-	-	-	-	-	-	41/50

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

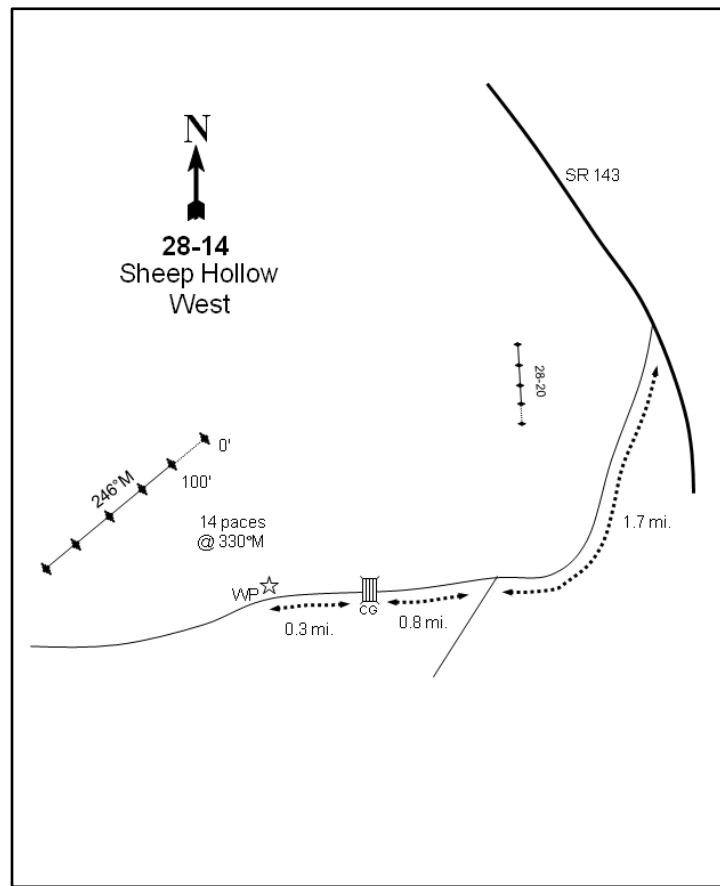
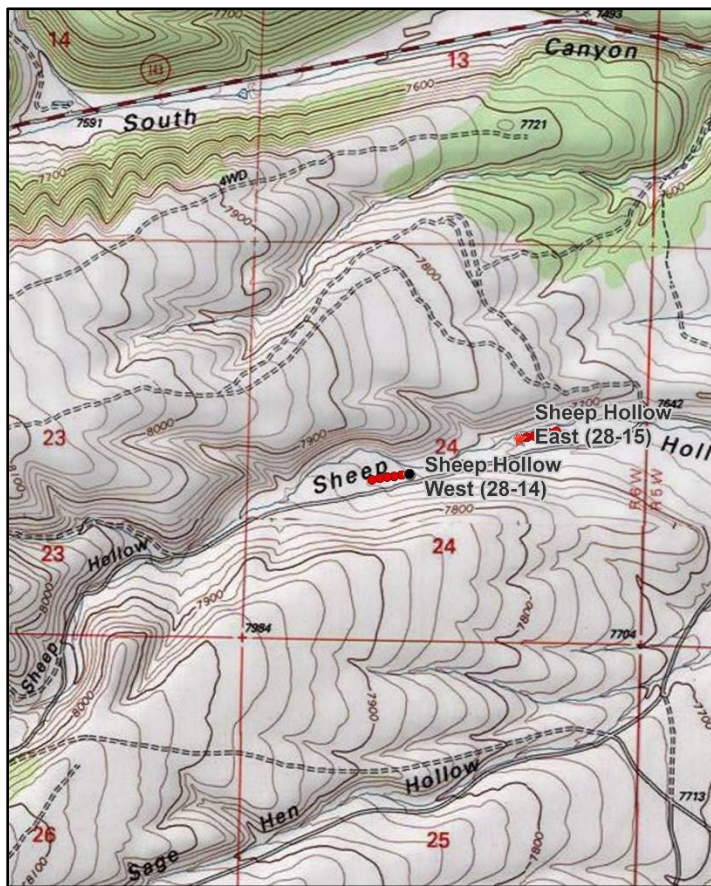
**Table 28-11.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	1	-	50	50	-	-	8.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	2	50	50	-	-	-	2.0

**Table 28-11.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
29.7	-0.2	2.9	9.8	-20.0	0.1	0.0	22.4	<b>Very Poor</b>	29.7
29.0	7.5	1.9	15.3	-6.0	0.7	0.0	48.4	<b>Poor-Fair</b>	29.0
19.0	-2.1	0.8	12.0	-20.0	0.0	0.0	9.7	<b>Very Poor</b>	19.0
15.0	-4.2	1.4	24.8	-0.2	0.4	0.0	37.2	<b>Poor</b>	15.0
15.4	6.8	15.0	30.0	-0.3	0.4	0.0	67.2	<b>Good</b>	15.4
17.5	9.3	11.6	30.0	-12.7	0.3	0.0	56.0	<b>Fair</b>	17.5
11.1	1.7	3.5	30.0	-12.9	0.5	0.0	34.0	<b>Very Poor-Poor</b>	11.1

## SHEEP HOLLOW WEST - STUDY NO. 28-14

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Panguitch SW; Township 35S, Range 6W, Section 24  
NAD 83 UTM ZONE 12, 369494 East 4179303 North

**Transect Information**

Browse Tag # (0' Stake)	500
Transect Bearing	246° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 4: 1ft

**Directions to Site**

Travel south on SR-143 from the town of Panguitch to mile marker 47. Travel 0.1 mile west of mile marker 47 and turn south onto a dirt road heading towards Sheep Hollow, then drive 1.7 miles to a fork. Stay right and continue for 0.8 miles to a fence and cattle guard. Cross the cattle guard and go 0.3 miles to a witness post on the right (north) side of the road. The 0-foot baseline stake is 14 paces from the witness post at 330 degrees magnetic and is marked by browse tag #500.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SAGEHEN HOLLOW
Elevation	7,730ft (2,356m)
Aspect	East
Slope	3%
Sample Dates	08/20/1998, 06/25/2003, 06/26/2008, 07/15/2013, 06/20/2018, 06/27/2023



**Table 28-14.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	South Canyon Lop and Scatter	2987	August-October 2014	5390
Hand Crew - Lop and Scatter	-	-	Between 1996 and 1997	-

**Wildlife Habitat and Vegetation History****Table 28-14.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-14.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1998	Black Sagebrush/Perennial Grass	No Encroachment
2003	Black Sagebrush/Perennial Grass	Phase I
2008	Black Sagebrush	Phase I
2013	Black Sagebrush	Phase I
2018	Black Sagebrush/Perennial Grass	Phase I
2023	Black Sagebrush	Phase I

**Site Notes**

This site was established in 1998 to monitor important winter range on the east side of the management unit. Much of the winter range on this part of Unit 28 is being affected by twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) encroachment.

**Soils****Table 28-14.5 - 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
Clay Loam	6.3	40.7	27.5	31.8	2.2	18.4	131.2	0.3	08/20/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	18 inches
NRCS Ecological Site	Mountain Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB426UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 1998, this site has remained dominated by black sagebrush (*Artemisia nova*) with various other shrub species such as antelope bitterbrush (*Purshia tridentata*) providing less cover (Table 28-14.12, Table 28-14.13). The herbaceous understory has been diverse and has mainly consisted of native perennial grass species such as muttongrass (*Poa fendleriana*) and Letterman's needlegrass (*Achnatherum lettermanii*). Perennial grasses were a codominant vegetation component in 2018, but did not provide enough cover to be considered codominant in 2023: fluctuations in muttongrass are the primary cause for this trend. Annual grasses have never been particularly abundant and were not observed in 2008, 2018, or 2023. Perennial forbs have consistently provided more cover than their annual counterparts (Table 28-14.7, Table 28-14.10, Table 28-14.11). Twoneedle pinyon (*Pinus edulis*) and Rocky Mountain juniper (*Juniperus scopulorum*) have been present in low amounts since 2003 (Photos, Table 28-14.14). Although the site was considered to be within Phase I of woodland succession as of 2023 (Table 28-14.4), further tree encroachment is possible in future sample years.

In 2023, deer winter range condition was considered to be good. Improvement to deer winter range can be accomplished through efforts that increase perennial forb cover while diversifying age classes of shrubs preferred by mule deer (Table 28-14.15). According to pellet transect data, deer presence on this site has ranged from low to moderate since 1998 and was low in 2023. Elk presence has also remained low since 1998 (Table 28-14.9). However, the herbaceous understory could provide forage for summering elk while sagebrush could provide browse during the winter months (Table 28-14.3; Beck & Peek, 2005; Wambolt, 1996).

## Trend Summary Tables

**Table 28-14.6 - 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
1998	18.4	3.0	-	-	-	-
2003	20.8	4.5	-	20.3	2.0	-
2008	18.9	3.7	-	33.6	4.4	-
2013	22.6	3.4	-	51.1	5.4	-
2018	25.6	4.7	-	35.1	4.2	-
2023	28.3	6.5	-	30.5	5.6	-

**Table 28-14.7 - 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
1998	-	368	15	246	-	15.9	0.1	4.8
2003	4	315	98	128	0.0	8.4	0.5	1.4
2008	-	321	37	202	-	15.0	0.1	3.0
2013	2	336	5	101	0.0	18.1	0.0	1.1
2018	-	362	3	117	-	31.0	0.0	2.0
2023	-	373	48	165	-	22.8	0.4	4.2

**Table 28-14.8 - 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
1998	17.9	3.5	39.5	6.8	5.7	50.8
2003	35.1	1.5	34.2	3.7	5.8	34.8
2008	20.3	1.0	32.4	7.7	5.9	43.4
2013	27.3	0.9	32.7	3.1	5.8	43.5
2018	33.2	0.7	38.6	4.8	5.8	54.0
2023	23.3	1.1	22.7	9.3	6.0	49.9

**Table 28-14.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer/Pronghorn	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	1	11	5	5
2003	3	11	2	2
2008	5	4	1	70
2013	-	5	1	10
2018	-	13	1	7
2023	1	8	-	1
Year	Days Use Per Acre (ha)			
1998	11.6 (28.7)	16.8 (41.4)	7.4 (18.2)	-
2003	7.2 (17.9)	32.2 (79.5)	0.7 (1.7)	-
2008	4.4 (10.8)	16.1 (39.7)	0.7 (1.7)	-
2013	-	5.3 (13.2)	0.7 (1.7)	-
2018	-	22.1 (54.6)	-	-
2023	10.2 (25.1)	16.1 (39.7)	0.7 (1.7)	-

**Table 28-14.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency															
1998	2	183	8	4	5	-	21	74	4	12	27	3	232	-	6	-
2003	4	102	-	7	-	4	-	71	3	13	64	4	186	-	-	8
2008	5	186	6	6	-	-	53	24	-	8	48	2	163	-	-	-
2013	14	68	5	7	5	2	22	14	-	20	16	2	285	-	4	-
2018	8	81	-	5	23	-	22	17	-	9	-	21	328	2	5	-
2023	9	57	-	5	4	-	57	77	-	2	8	25	292	-	-	35
year	Average Cover (%)															
1998	0.0	4.9	0.2	0.0	0.0	-	0.6	1.0	0.0	0.1	0.4	0.0	8.6	-	0.0	-
2003	0.2	1.1	-	0.1	-	0.0	-	0.9	0.0	0.3	1.5	0.0	4.2	-	-	0.1
2008	0.0	5.9	0.0	0.0	-	-	1.1	0.2	-	0.1	0.7	0.0	6.9	-	-	-
2013	0.4	1.6	0.0	0.0	0.1	0.0	0.2	0.2	-	0.3	0.1	0.0	15.0	-	0.1	-
2018	0.1	2.0	-	0.2	1.0	-	0.6	0.3	-	0.5	-	0.6	25.6	0.1	0.1	-
2023	0.1	1.1	-	0.5	0.1	-	2.2	2.1	-	0.2	0.2	0.8	14.2	-	-	1.5

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

**Table 28-14.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androsace septentrionalis <sup>ai</sup> (pygmyflower rockjasmine)	Antennaria rosea (rosy pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium (thistle)	Crepis acuminata (tapertip hawkbeard)	Erigeron eatonii (Eaton's fleabane)	Erigeron flagellaris (trailing fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)
year	Nested Frequency																
1998	-	16	1	3	8	-	-	49	-	-	-	63	9	25	55	46	-
2003	-	9	-	-	-	-	-	2	15	-	-	5	-	-	54	33	87
2008	-	1	2	-	20	22	-	37	3	1	-	28	-	3	70	30	-
2013	-	7	6	-	-	-	-	9	-	-	-	11	-	6	36	18	-
2018	-	2	4	-	11	-	13	4	-	7	-	6	20	4	24	28	-
2023	1	9	9	-	2	14	29	-	6	9	6	18	15	12	39	26	35
year	Average Cover (%)																
1998	-	0.4	0.0	0.0	0.2	-	-	1.2	-	-	-	0.6	0.1	0.0	0.5	0.8	-
2003	-	0.0	-	-	-	-	-	0.0	0.1	-	-	0.0	-	-	0.5	0.6	0.4
2008	-	0.0	0.0	-	0.5	0.1	-	0.6	0.0	0.0	-	0.1	-	0.0	0.6	0.4	-
2013	-	0.1	0.0	-	-	-	-	0.1	-	-	-	0.1	-	0.1	0.3	0.1	-
2018	-	0.1	0.1	-	0.1	-	0.1	0.0	-	0.1	-	0.2	0.1	0.0	0.2	0.5	-
2023	0.0	0.6	0.1	-	0.2	0.0	0.4	-	0.0	0.2	0.1	0.4	0.5	0.1	0.6	0.2	0.1

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

FORB SPECIES	Hymenoxys richardsonii (pingue rubberweed)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum lewisii (Lewis flax)	Lomatium (desertparsley)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus kingii <sup>a</sup> (King's lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon caespitosus (mat penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Silene drummondii (Drummond's campion)	Tragopogon dubius <sup>a</sup> (yellow salsify)	Trifolium (clover)
year	Nested Frequency															
1998	1	-	46	-	35	4	5	-	-	3	3	58	11	7	-	-
2003	-	-	14	-	-	-	-	-	-	4	-	56	5	-	-	-
2008	2	1	9	5	3	11	4	3	16	1	-	74	21	-	-	5
2013	5	5	-	-	-	-	10	-	5	-	1	13	-	-	-	-
2018	3	-	9	1	4	-	-	-	1	-	3	17	-	1	3	-
2023	-	-	13	2	-	5	9	-	8	-	-	19	4	-	-	-
year	Average Cover (%)															
1998	0.0	-	0.3	-	0.4	0.0	0.1	-	-	0.0	0.0	0.2	0.0	0.0	-	-
2003	-	-	0.1	-	-	-	-	-	-	0.0	-	0.2	0.0	-	-	-
2008	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-	0.2	0.1	-	-	0.0
2013	0.0	0.0	-	-	-	-	0.2	-	0.0	-	0.0	0.1	-	-	-	-
2018	0.0	-	0.1	0.0	0.0	-	-	-	0.0	-	0.0	0.4	-	0.0	0.0	-
2023	-	-	0.3	0.0	-	0.2	0.2	-	0.1	-	-	0.3	0.0	-	-	-

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

**Table 28-14.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)									
1998	-	-	-	-	-	-	-	-	-	-
2003	-	16.7	-	0.1	-	1.9	0.1	-	3.5	-
2008	-	27.9	-	0.3	-	4.4	-	-	5.4	-
2013	-	35	-	0.2	-	5.4	-	-	15.9	-
2018	-	24.1	-	0.1	-	3.9	0.3	-	10.9	-
2023	-	23.3	-	0.2	-	5.3	0.3	0	7	-
year	Quadrat Cover (%)									
1998	-	13.6	-	0.4	-	2.8	0.2	-	4.4	-
2003	-	16.9	0.4	0.1	-	4.2	0.3	-	3.4	-
2008	-	15.2	-	0.2	-	3.6	0.0	0.0	3.5	0.1
2013	-	17.4	-	0.2	-	3.4	-	-	5.0	-
2018	-	20.2	0.3	0.4	-	4.3	0.3	-	4.7	0.1
2023	0.1	22.8	-	0.4	1.2	4.9	0.5	0.0	4.9	-

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

**Table 28-14.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	29/31
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	160	-	13	88	0	0	100	0	-/-
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1998	8560	380	7	55	39	43	13	3	40/56
2003	8160	-	5	61	34	25	2	14	37/51
2008	9440	540	5	54	41	27	13	13	36/59
2013	7760	300	4	87	9	37	4	6	35/64
2018	8520	-	4	77	19	12	12	12	33/51
2023	7640	16420	3	92	6	17	31	7	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	60	-	33	67	0	0	33	0	-/-
2003	560	-	0	57	43	21	0	25	50/67
2008	40	-	0	0	100	0	100	100	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1998	240	20	17	83	0	0	0	0	19/27
2003	340	-	6	82	12	71	12	0	15/22
2008	380	-	5	79	16	21	47	0	14/19
2013	360	-	17	83	0	22	6	6	14/27
2018	360	-	17	83	0	61	11	0	14/18
2023	400	-	0	100	0	0	0	0	-/-
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	200	-	0	100	0	10	0	0	14/28
2023	460	-	0	100	0	0	0	0	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	2740	-	12	88	0	0	0	0	19/29
2003	4120	-	5	93	2	0	0	1	19/29
2008	3960	120	4	78	18	30	8	1	17/33
2013	3360	20	8	91	1	13	0	1	19/38
2018	4060	-	7	93	0	0	0	0	17/34
2023	3580	60	8	92	1	0	1	1	-/-
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	100	0	0	0	0	0	17/23
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	23/39
2023	100	-	0	100	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	80	-	0	100	0	0	0	0	17/23
2003	260	-	0	100	0	0	0	0	17/18
2008	100	60	20	60	20	0	0	0	14/11
2013	120	-	50	50	0	0	0	0	24/20
2018	360	-	0	100	0	0	0	0	19/21
2023	620	20	32	68	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1998	20	-	0	100	0	0	0	0	18/30
2003	40	-	0	100	0	0	0	0	14/25
2008	40	-	0	50	50	0	0	0	15/29
2013	20	-	0	100	0	0	0	0	10/24
2018	20	-	0	100	0	0	0	0	14/29
2023	40	-	50	50	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	540	-	15	82	4	59	19	0	60/99
2003	480	-	4	58	38	71	29	21	74/116
2008	460	20	9	61	30	48	35	52	69/121
2013	660	40	15	82	3	3	0	3	93/154
2018	1160	40	28	62	10	31	21	14	69/113
2023	1620	60	28	62	10	12	58	21	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	40	-	0	50	50	100	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	80	-	25	75	0	0	0	0	16/21

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

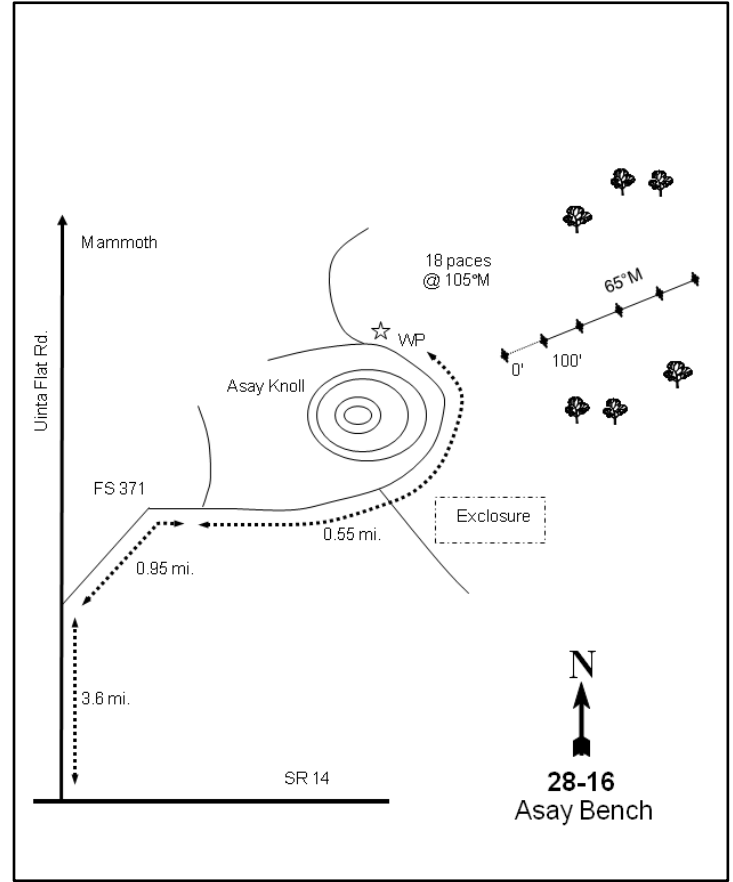
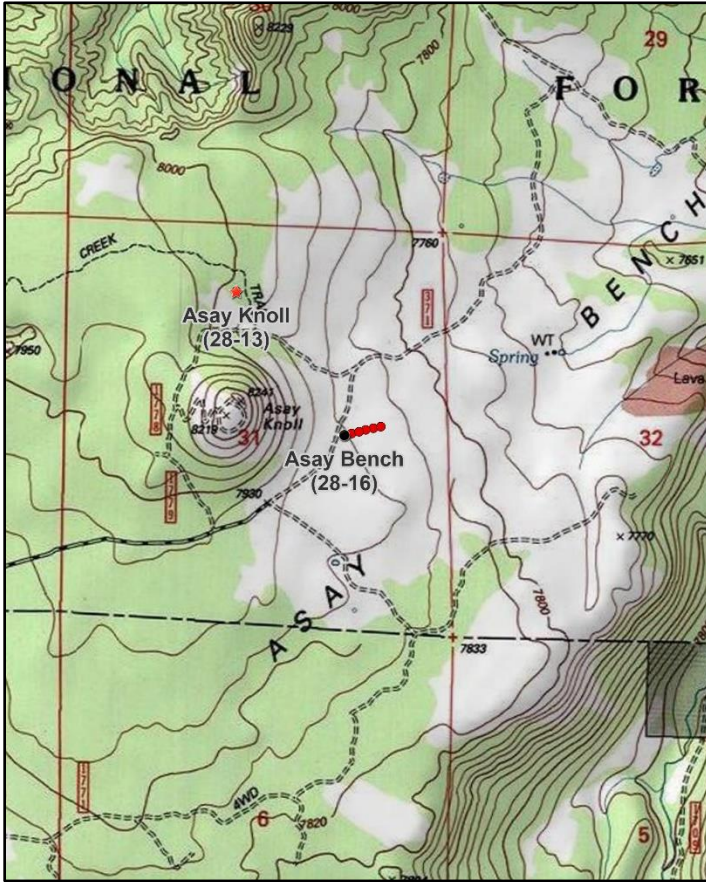
**Table 28-14.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	6	-	100	-	-	-	3.0
2023	5	-	100	-	-	-	3.7
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	11	11	89	-	-	-	2.0
2023	14	33	67	-	-	-	2.6

**Table 28-14.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	24.1	6.2	4.5	30.0	0.0	9.6	0.0	<b>74.3</b>	Good
2003	26.3	4.6	2.4	16.8	0.0	2.9	0.0	<b>52.9</b>	Poor
2008	30.0	3.4	2.8	30.0	0.0	6.0	0.0	<b>72.1</b>	Good
2013	30.0	12.9	3.7	30.0	0.0	2.2	0.0	<b>78.8</b>	Good
2018	30.0	10.2	5.8	30.0	0.0	4.0	0.0	<b>80.0</b>	Good
2023	30.0	13.0	4.3	30.0	0.0	8.5	0.0	<b>85.7</b>	Good

## ASAY BENCH - STUDY NO. 28-16



### Location Information

USGS 7.5 min Map Info                      Asay Bench SW; Township 37S, Range 6W, Section 31  
 GPS (0' Stake)                                NAD 83 UTM ZONE 12, 361875 East 4157011 North

### Transect Information

Browse Tag # (0' Stake)                      165  
 Transect Bearing                              65° magnetic  
 Length    500ft  
 Belt Placement                                Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
 Belt Marker Placement                      Belt 3 and 5: 1ft

### Directions to Site

Start at the junction of Highway 14 and Uinta Flat Road, which is just east of mile post 33 on Highway 14. Drive north on Uinta Flat Road for 3.6 miles to a fork going east (Forest Service Road #371). Drive east for 1.0 miles, crossing over a cattle guard and coming to a fork on the left (north). Continue straight (right) for 0.55 miles to another fork (an enclosure should be passed on the right before the fork). The witness post is on the right (east) side of the road just past the right fork. From the witness post, the 0-foot stake is 18 paces away at 105 degrees magnetic and is marked with browse tag #165.

### Site Information

Land Ownership                                Federal  
 Land Administrator                            USFS  
 Allotment                                        Asay Bench  
 Elevation                                        7,880ft (2,402m)  
 Aspect    Northeast  
 Slope    4-5%  
 Sample Dates                                   07/16/2003, 07/01/2008, 07/30/2013, 06/20/2018, 06/21/2023

**Wildlife Habitat and Vegetation History****Table 28-16.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-16.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2003	Mountain Big Sagebrush/Antelope Bitterbrush	No Encroachment
2008	Mountain Big Sagebrush/Antelope Bitterbrush	No Encroachment
2013	Antelope Bitterbrush/Mountain Big Sagebrush	No Encroachment
2018	Antelope Bitterbrush/Mountain Big Sagebrush	No Encroachment
2023	Mountain Big Sagebrush/Antelope Bitterbrush	No Encroachment

**Site Notes**

This study was established in 2003 to replace trend study 28-09 which sampled marginal big game transitional range.

**Site Potential**

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Loam (Shrub)
NRCS Ecological Site #	R047XA434UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2003, the plant community on this site has existed as a stable stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) with a number of other shrub species present providing limited cover (Table 28-16.12, Table 28-16.13). Native perennial grass species such as muttongrass (*Poa fendleriana*) have made up most of the herbaceous understory. Forbs have remained diverse but have generally contributed little cover (Table 28-16.7, Table 28-16.10, Table 28-16.11). Without disturbance and/or tree encroachment, the site will likely remain in this or a similar state in future sample years.

Due to the abundance and diversity of the shrub and herbaceous communities, this site likely serves as adequate habitat for summering mule deer. Deer presence on this site was moderate in 2023 according to pellet transect data. Elk presence was low in 2023, but has been moderate in some sample years (Table 28-16.9). The herbaceous understory could provide forage for elk during the summer months (Table 28-16.3; Beck & Peek, 2005).

**Trend Summary Tables****Table 28-16.6 - 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
2003	29.7	4.8	-	28.7	2.6	-
2008	26.9	3.7	-	40.4	4.7	-
2013	28.4	3.9	-	48.4	3.2	-
2018	32.1	5.6	-	41.8	3.8	-
2023	27.4	5.5	-	37.0	7.7	-

**Table 28-16.7 - 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
2003	-	355	281	106	-	13.1	1.8	0.5
2008	-	394	208	155	-	21.3	0.9	1.2
2013	-	396	-	79	-	20.2	-	1.4
2018	-	436	55	105	-	33.2	0.1	1.2
2023	-	427	116	230	-	34.2	0.4	4.1



**Table 28-16.8 - 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
2003	23.5	0.1	40.0	1.4	5.6	49.0
2008	13.1	0.0	36.0	4.6	3.0	59.1
2013	16.4	0.0	50.8	1.1	3.6	57.4
2018	17.7	-	55.6	1.3	5.0	59.1
2023	13.7	0.0	30.6	2.9	4.6	64.4

**Table 28-16.9 - 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			
2003	5	5	12	2
2008	8	16	18	8
2013	-	11	16	1
2018	5	25	11	18
2023	5	16	3	-
Year	Days Use Per Acre (ha)			
2003	7.2 (17.9)	19.4 (48.0)	20.1 (49.7)	-
2008	11.6 (28.7)	61.0 (150.6)	13.4 (33.1)	-
2013	10.9 (26.9)	45.6 (112.6)	36.8 (91.0)	-
2018	11.6 (28.7)	44.9 (110.9)	34.9 (86.1)	-
2023	2.9 (7.2)	22.8 (56.3)	8.1 (19.9)	-

**Table 28-16.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Bouteloua gracilis (blue grama)	Bromus inermis <sup>i</sup> (smooth brome)	Carex (sedge)	Carex obtusata (obtusate sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency													
2003	41	1	-	3	-	3	3	24	109	-	249	11	29	3
2008	94	6	6	8	-	-	17	45	73	-	339	-	3	10
2013	44	9	-	7	-	-	100	1	76	-	325	-	-	-
2018	44	7	-	13	3	21	45	18	26	-	398	-	-	40
2023	49	22	-	16	-	-	5	19	195	34	316	16	1	4
year	Average Cover (%)													
2003	0.6	0.0	-	0.1	-	0.0	0.1	0.3	1.5	-	9.3	0.6	0.6	0.0
2008	2.1	0.2	0.0	0.1	-	-	0.2	0.8	0.7	-	17.0	-	0.0	0.3
2013	0.9	0.6	-	0.2	-	-	1.8	0.0	1.4	-	15.3	-	-	-
2018	1.6	0.3	-	0.3	0.0	0.6	0.8	0.9	1.7	-	26.7	-	-	0.4
2023	3.4	0.7	-	0.5	-	-	0.2	1.0	5.8	0.9	20.7	1.1	0.0	0.0

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

**Table 28-16.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Antennaria rosulata (Kaibab pussytoes)	Arabis (rockcress)	Artemisia carruthii (Carruth's sagewort)	Astragalus argophyllus (silverleaf milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Delphinium nuttallianum (two-lobed larkspur)	Erigeron flagellaris (trailing fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinon groundsmoke)	Lactuca serriola <sup>ai</sup> (prickly lettuce)
year	Nested Frequency																
2003	25	7	13	15	-	18	-	167	3	3	2	1	35	6	2	85	2
2008	42	7	4	24	11	99	-	167	-	-	4	-	16	8	-	2	-
2013	-	16	12	36	-	-	-	-	-	-	-	-	15	13	-	-	-
2018	38	19	4	19	5	11	1	24	-	1	-	-	11	16	-	-	-
2023	73	21	-	18	2	111	-	26	-	-	8	-	61	30	-	58	-
year	Average Cover (%)																
2003	0.1	0.0	0.0	0.1	-	0.0	-	0.7	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0
2008	0.2	0.2	0.0	0.1	0.1	0.4	-	0.6	-	-	0.0	-	0.1	0.1	-	0.0	-
2013	-	1.0	0.1	0.1	-	-	-	-	-	-	-	-	0.1	0.1	-	-	-
2018	0.1	0.8	0.0	0.1	0.0	0.0	0.0	0.1	-	0.0	-	-	0.0	0.1	-	-	-
2023	1.0	0.7	-	0.5	0.2	0.9	-	0.1	-	-	0.0	-	0.7	0.2	-	0.2	-

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

FORB SPECIES	Microsteris gracilis <sup>ai</sup> (slender phlox)	Plantago patagonica <sup>a</sup> (woolly plantain)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)
year	Nested Frequency		
2003	166	-	5
2008	60	32	6
2013	-	-	-
2018	33	-	-
2023	24	-	61
year	Average Cover (%)		
2003	0.8	-	0.0
2008	0.1	0.1	0.0
2013	-	-	-
2018	0.1	-	-
2023	0.0	-	0.2

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

**Table 28-16.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)										
	year										
Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	2003	0.1	-	17.1	1.9	0.7	-	10.1	0	1.4	-
Artemisia nova <sup>p</sup> (black sagebrush)	2008	0	-	20.9	4.7	-	-	18.8	-	0.7	-
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	2013	-	3.3	15.1	3.2	-	-	29.2	-	0.8	-
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	2018	-	2	16.1	3.7	-	0	23.1	-	0.6	0.1
Gutierrezia sarothrae (broom snakeweed)	2023	-	-	20.4	7.6	-	0.1	16.6	-	0	-
Opuntia (pricklypear)	year	Quadrat Cover (%)									
Purshia tridentata <sup>p</sup> (antelope bitterbrush)	2003	0.0	-	13.7	3.5	1.3	-	14.1	0.0	1.9	0.0
Rosa woodsii <sup>p</sup> (Wood's rose)	2008	0.0	-	11.3	3.7	-	-	15.1	0.0	0.5	0.0
Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	2013	-	2.1	8.6	3.9	-	-	17.2	-	0.6	0.0
Tetradymia canescens (spineless horsebrush)	2018	-	1.6	12.5	5.2	-	0.3	17.3	0.0	0.7	0.1
	2023	0.4	0.1	14.0	5.5	-	0.0	12.8	-	0.0	-

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

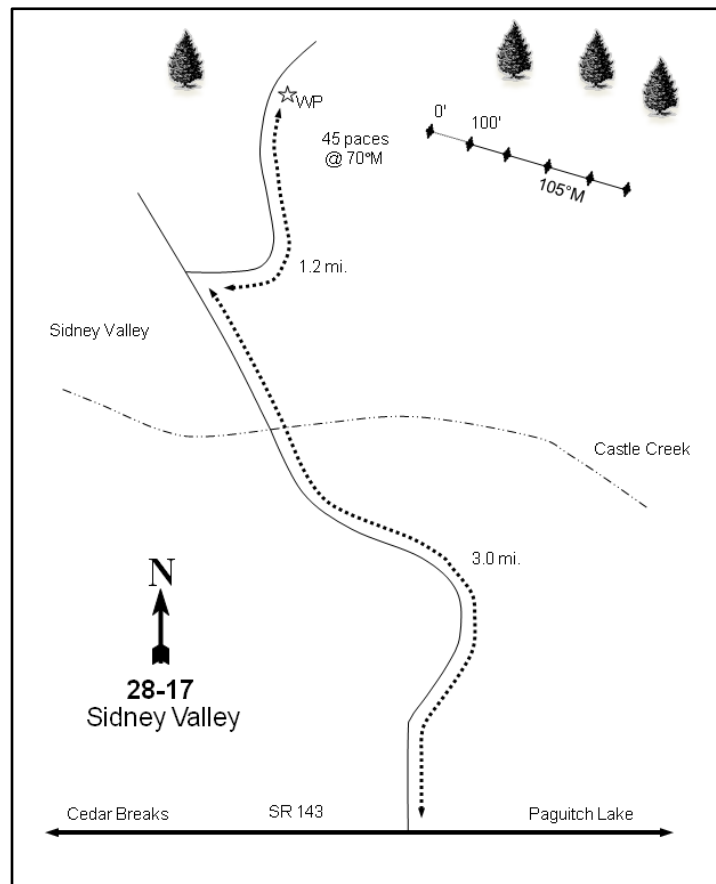
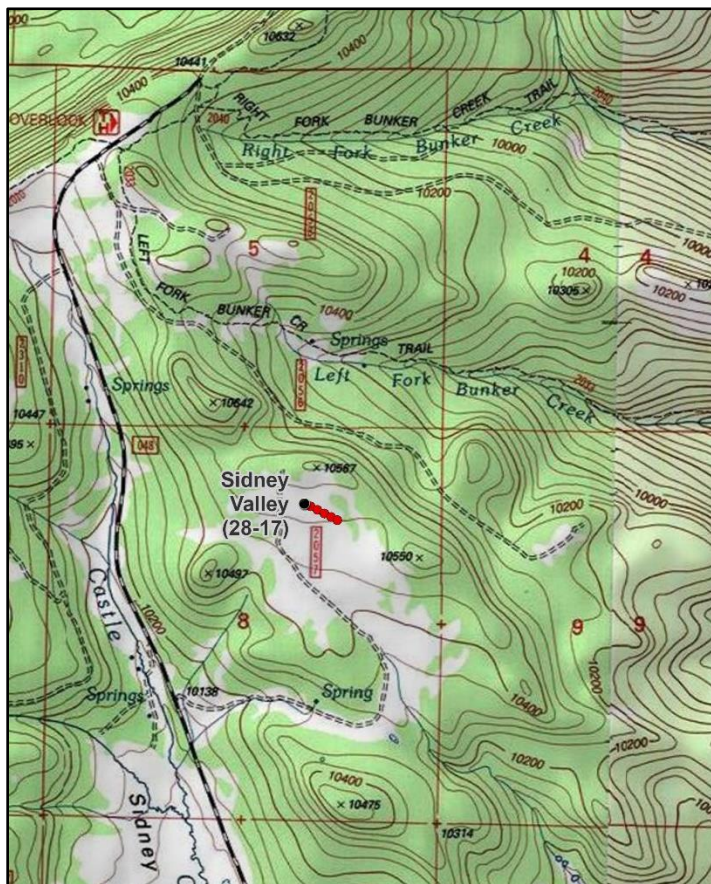
**Table 28-16.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2003	40	-	0	0	100	0	0	50	- / -
2008	20	-	0	0	100	0	0	100	45/52
2013	20	-	0	100	0	0	100	0	54/59
2018	-	-	-	-	-	-	-	-	- / -
2023	40	20	0	50	50	0	100	50	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	840	-	0	93	7	43	0	2	40/66
2018	180	-	0	100	0	22	0	0	43/86
2023	100	-	0	80	20	40	0	20	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2003	6760	-	9	77	14	33	2	3	47/50
2008	6440	100	11	25	65	27	4	19	47/62
2013	4020	240	14	76	10	51	16	13	47/65
2018	4000	60	9	86	6	6	1	4	56/72
2023	3960	13580	4	89	7	33	4	6	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2003	5080	-	2	94	4	1	0	2	20/28
2008	5320	40	7	74	19	23	1	6	16/31
2013	3800	-	16	84	0	21	3	1	21/29
2018	4320	-	4	96	0	0	19	1	21/33
2023	4780	20	1	99	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2003	2640	-	0	100	0	0	0	0	14/18
2008	-	-	-	-	-	-	-	-	-/-
2013	40	-	0	100	0	0	0	0	-/-
2018	100	-	0	100	0	0	0	0	18/29
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2003	-	-	-	-	-	-	-	-	7/24
2008	60	-	0	100	0	0	0	33	11/28
2013	60	-	0	100	0	33	0	67	9/25
2018	120	-	0	100	0	0	17	67	7/22
2023	160	-	0	100	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2003	2120	-	4	18	78	20	77	32	52/86
2008	2380	20	4	51	45	62	5	15	58/107
2013	2780	220	11	89	1	53	26	12	67/113
2018	3020	20	10	85	5	16	49	6	55/93
2023	3280	740	2	87	10	15	81	12	-/-
<b>Ribes cereum var. pedicellare<sup>p</sup> -- (whisky currant)</b>									
2003	-	-	-	-	-	-	-	-	104/136
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	73/167
2018	20	-	0	100	0	0	100	0	88/78
2023	40	-	0	100	0	0	100	0	-/-
<b>Rosa woodsii<sup>p</sup> -- (Woods' rose)</b>									
2003	80	-	100	0	0	0	0	0	14/10
2008	40	-	100	0	0	0	0	0	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	100	0	0	0	0	0	29/7
2023	-	-	-	-	-	-	-	-	-/-
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2003	200	-	10	80	10	0	0	10	47/71
2008	180	20	0	44	56	11	11	11	44/78
2013	220	-	27	73	0	27	0	9	39/61
2018	120	-	0	100	0	0	17	0	36/60
2023	100	-	0	100	0	20	20	0	-/-
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2003	20	-	0	100	0	0	0	0	23/33
2008	20	-	0	0	100	100	0	0	-/-
2013	20	-	0	100	0	100	0	100	-/-
2018	120	20	50	50	0	0	0	0	14/17

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

## SIDNEY VALLEY - STUDY NO. 28-17

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Brian Head NE; Township 36S, Range 8W, Section 08  
NAD 83 UTM ZONE 12, 344406 East 4174160 North

**Transect Information**

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

164  
105° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

**Directions to Site**

Start at the junction of Highway 143 and Sidney Valley Road; this junction is between Cedar Breaks and Panguitch Lake. Drive north on Sidney Valley Road for 3.0 miles to a fork on the right (east) side of the road (Castle Creek will be crossed). Take the right fork and continue for 1.2 miles to the witness post on the right (east) side of the road. The 0-foot stake is 54 paces at 70 degrees magnetic from the witness post and is marked with browse tag #164.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Warren Bunker-Castle Val
Elevation	10,510ft (3,203m)
Aspect	South-Southeast
Slope	3-5%
Sample Dates	07/16/2003, 07/03/2008, 07/30/2013, 06/27/2018, 07/05/2023

**Table 28-17.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Brian Head	-	June-July 2017	71692

**Wildlife Habitat and Vegetation History****Table 28-17.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-17.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2003	Dry Meadow	NA
2008	Dry Meadow	NA
2013	Dry Meadow	NA
2018	Dry Meadow	NA
2023	Dry Meadow	NA

**Site Notes**

This study was established in 2003 to monitor elk use in a dry alpine meadow which had shown increased use in years prior to study establishment. Although the Brian Head Fire appears to have burned some of the trees on the perimeter of the meadow, the meadow itself does not appear to have been burned.

**Site Potential**

1981 - 2010 Average Annual Precipitation	36 inches
NRCS Ecological Site	Subalpine Loam (Geranium)
NRCS Ecological Site #	R047BY614UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2003, this site has existed as a stable dry meadow community. Most of the vegetation cover has been provided by native perennial grasses such as Letterman's needlegrass (*Achnatherum lettermanii*), Columbia needlegrass (*A. nelsonii*), and mountain muhly (*Muhlenbergia montana*); introduced grasses have remained rare (Table 28-17.7, Table 28-17.10). Forb diversity and cover have also remained high with native perennial forbs such as common dandelion (*Taraxacum officinale*) and common yarrow (*Achillea millefolium*) as the most abundant species (Table 28-17.11). Shrubs have contributed no cover on this site and were only recorded in height crown measurements in 2018 (Table 28-17.13).

Due to the abundance of the herbaceous community, this site likely serves as adequate habitat for summering mule deer. Mule deer presence has been absent in pellet hoop data since 2018, while elk have consistently been present on this site. There was a marked decrease in elk pellet observations between 2008 and 2023, but presence was still considered to be moderate in 2023 (Table 28-17.9). The abundant and diverse grass and forb components could provide forage for elk during the summer months (Table 28-17.3; Beck & Peek, 2005).

**Trend Summary Tables**

**Table 28-17.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree

**Table 28-17.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2003	-	389	21	319	-	27.9	0.1	10.1
2008	-	413	283	409	-	22.6	1.9	27.5
2013	-	380	361	428	-	27.2	4.2	34.5
2018	-	400	306	385	-	30.2	5.9	20.2
2023	-	398	346	385	-	33.8	4.3	18.0

**Table 28-17.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2003	18.8	-	30.0	13.1	7.0	40.8
2008	15.8	0.0	24.4	5.2	2.3	59.5
2013	14.0	-	18.7	5.6	2.1	67.7
2018	32.8	0.6	26.0	8.2	3.9	51.5
2023	16.4	-	19.5	14.0	3.0	50.3

**Table 28-17.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2003	3	10	28	5
2008	3	8	47	-
2013	5	13	36	-
2018	-	6	14	2
2023	-	4	8	-
Year	Days Use Per Acre (ha)			
2003	-	26.8 (66.2)	97.2 (240.0)	-
2008	-	2.7 (6.6)	134.7 (332.7)	-
2013	4.4 (10.8)	13.4 (33.1)	44.9 (110.9)	-
2018	-	-	32.8 (81.1)	-
2023	-	-	34.9 (86.1)	-

**Table 28-17.10 - 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)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Festuca idahoensis (Idaho fescue)	Koeleria macrantha (prairie Junegrass)	Muhlenbergia montana (mountain muhly)	Poa fendleriana (muttongrass)	Poa glauca (glaucous bluegrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)
year	Nested Frequency											
2003	167	272	-	13	5	54	11	-	100	-	10	-
2008	224	300	-	21	7	91	9	-	107	-	-	2
2013	199	200	1	18	24	128	39	3	78	-	5	7
2018	187	160	54	17	55	155	40	5	100	20	22	35
2023	249	69	112	36	47	55	8	3	112	39	60	15
year	Average Cover (%)											
2003	4.2	15.8	-	0.2	0.1	0.8	0.1	-	6.2	-	0.4	-
2008	4.5	12.1	-	0.3	0.1	1.0	0.3	-	4.3	-	-	0.0
2013	6.3	10.2	0.0	0.6	0.7	4.4	1.6	0.2	3.0	-	0.1	0.1
2018	5.1	6.1	1.8	0.4	1.3	5.1	1.0	0.0	7.3	0.6	0.4	1.2
2023	10.7	2.6	4.8	1.3	1.5	1.9	0.4	0.0	6.4	1.5	2.1	0.6

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

**Table 28-17.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris aurantiaca (orange agoseris)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis (rockerness)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Collomia linearis <sup>a</sup> (tiny trumpet)	Cryptantha (cryptantha)	Erigeron (fleabane)	Fritillaria atropurpurea (spotted fritillary)	Geum triflorum (old man's whiskers)	Mertensia (bluebells)	Noccaea fendleri ssp. glauca (alpine pennycress)	Penstemon (beardtongue)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Ranunculus inamoenus (graceful buttercup)
year	Nested Frequency																
2003	218	6	1	-	6	-	-	-	19	-	-	-	28	-	-	2	-
2008	317	26	153	-	160	11	-	-	96	4	2	-	45	-	221	7	-
2013	358	0	303	2	82	23	2	-	7	-	0	-	78	1	186	6	6
2018	308	5	276	-	11	75	5	-	34	-	-	2	12	1	31	-	43
2023	283	9	301	-	32	86	13	2	4	1	-	0	14	-	111	-	10
year	Average Cover (%)																
2003	3.7	0.1	0.0	-	0.0	-	-	-	0.2	-	-	-	0.2	-	-	0.0	-
2008	9.1	0.2	0.9	-	1.0	0.0	-	-	0.8	0.1	0.0	-	0.3	-	0.7	0.0	-
2013	17.4	0.0	3.0	0.0	0.4	0.1	0.0	-	0.2	-	0.0	-	0.3	0.0	1.1	0.0	0.1
2018	7.2	0.2	4.5	-	0.1	1.0	0.0	-	0.3	-	-	0.0	0.0	0.0	0.1	-	0.6
2023	8.6	0.1	2.9	-	0.2	0.6	0.1	0.0	0.2	0.0	-	0.0	0.3	-	0.5	-	0.3

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



FORB SPECIES	Senecio integerrimus <sup>a</sup> (lambstongue ragwort)	Silene drummondii (Drummond's campion)	Solidago (goldenrod)	Symphotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium (clover)	unknown perennial forb (unknown forb)
year	Nested Frequency							
2003	19	-	-	16	245	1	11	-
2008	14	-	-	6	329	-	21	15
2013	-	15	-	42	343	-	12	-
2018	14	4	3	8	302	4	7	-
2023	9	1	-	9	295	-	4	-
year	Average Cover (%)							
2003	0.1	-	-	0.2	5.7	0.0	0.1	-
2008	0.3	-	-	0.2	15.5	-	0.2	0.1
2013	-	0.1	-	1.3	14.6	-	0.1	-
2018	0.3	0.0	0.0	0.2	11.5	0.0	0.1	-
2023	0.3	0.0	-	0.3	8.1	-	0.0	-

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

**Table 28-17.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	No Shrubs Found
year	Line
year	Quadrat Cover (%)

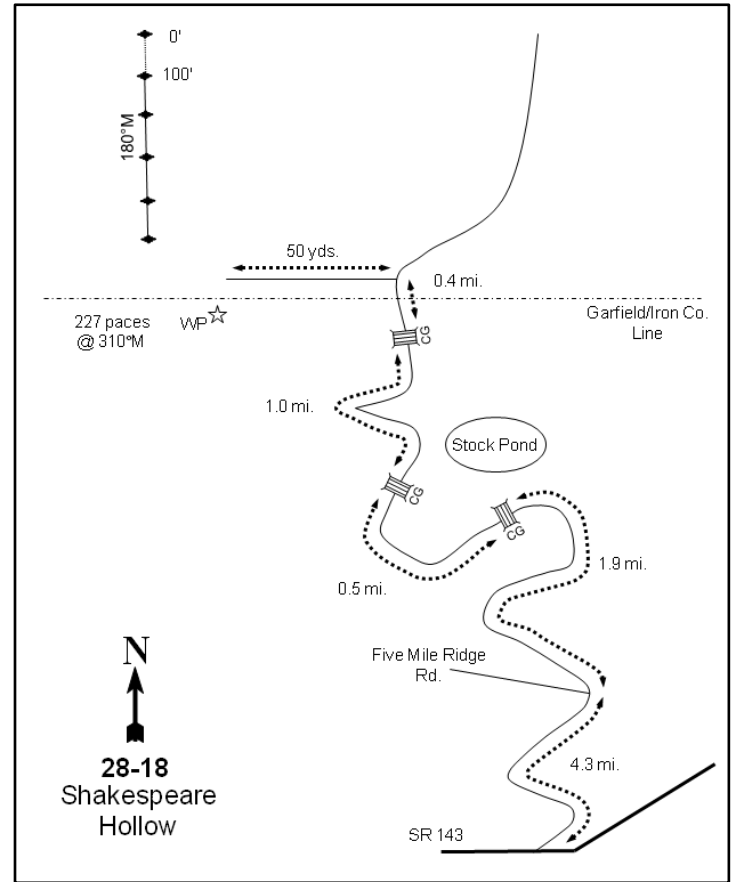
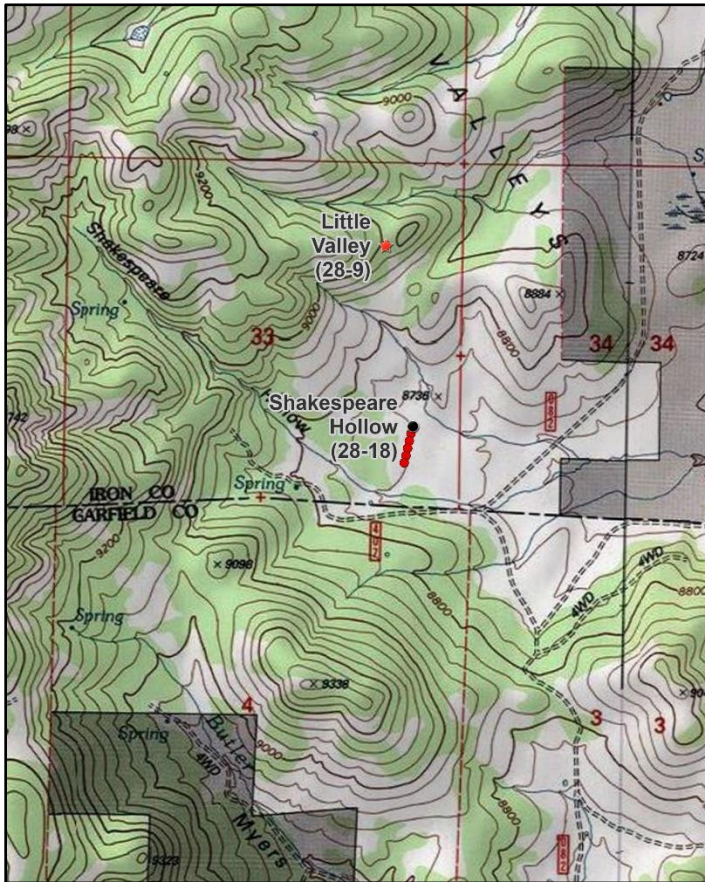
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 28-17.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ribes<sup>p</sup> -- (currant)</b>									
2018	-	-	-	-	-	-	-	-	50/71
<b>Sambucus<sup>p</sup> -- (elderberry)</b>									
2018	-	-	-	-	-	-	-	-	49/79

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

## SHAKESPEARE HOLLOW - STUDY NO. 28-18

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Red Creek Reservoir ; Township 34S, Range 7W, Section 33  
NAD 83 UTM ZONE 12, 356018 East 4185925 North

**Transect Information**

Browse Tag # (0' Stake)	780
Transect Bearing	180° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft) (See "Site Notes")
Belt Marker Placement	Belts 1 and 4: 5ft

**Directions to Site**

From Panguitch, travel south towards Panguitch Lake; at mile marker 41, turn right onto a dirt road. Proceed up Pole Hollow for 4.3 miles to Five Mile Ridge Road, then continue straight for 1.9 miles to a cattle guard. Continue 0.5 miles to another cattle guard and a stockpond, then proceed 1.0 miles to another cattle guard. Drive for 0.4 miles to a fork at the Iron County-Garfield County line. Bear right, go 50 yards, and park by a witness post and aspen on the left (south) side of the road. From the witness post, walk 227 paces at 310 degrees magnetic to another witness post. The 0-foot stake is west-southwest of the witness post and is marked with browse tag #780.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Little Valleys
Elevation	8,750ft (2,667m)
Aspect	East
Slope	2-4%
Sample Dates	07/16/2003, 06/23/2008, 06/05/2013, 06/26/2018, 06/27/2023

**Wildlife Habitat and Vegetation History****Table 28-18.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-18.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2003	Silver Sagebrush/Bitterbrush	NA
2008	Silver Sagebrush/Bitterbrush	NA
2013	Silver Sagebrush/Bitterbrush	NA
2018	Silver Sagebrush/Bitterbrush	NA
2023	Silver Sagebrush/Bitterbrush	NA

**Site Notes**

This study was established in 2003 about one-half mile south of the Little Valley (28-09) study and samples a mountain brush community surrounded by pockets of aspen (*Populus tremuloides*); this study replaces the Little Valley transect, which was no longer representative of important summer range. The Little Valley transect was placed inside a thick aspen clone with a very dense mountain snowberry (*Symphoricarpos oreophilus*) understory that received very little use by big game or livestock. The new transect was left in the general area because of its importance to deer, elk, and sage-grouse.

**Belt placement:** Site reports in previous years have stated that belt placement for this site should be as it is listed above (that of a standard 500-foot transect). However, belt four was set up on line five and vice versa in 2023, possibly due to rebar placement. Effort should be made during the next sample year to find rebar and ascertain which transect setup is correct.

**Site Potential**

1981 - 2010 Average Annual Precipitation	25 inches
NRCS Ecological Site	High Mountain Loam (Silver Sagebrush)
NRCS Ecological Site #	R047XB517UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2003, the plant community on this site has remained dominated by silver sagebrush (*Artemisia cana*) and antelope bitterbrush (*Purshia tridentata*) with a small number of other shrubs contributing cover. Antelope bitterbrush exhibited a significant increase in cover in 2023, while sagebrush density significantly decreased. However, it is probable that these fluctuations in bitterbrush and sagebrush are largely due to discrepancies in belt placement between 2018 and 2023 (Site Notes, Table 28-18.12, Table 28-18.13). The herbaceous understory has remained abundant and diverse with native and introduced perennial grasses, mainly Kentucky bluegrass (*Poa pratensis*) and mutton grass (*P. fendleriana*), contributing a majority of the cover in most sample years. A diverse number of perennial and annual forbs provided relatively little cover from 2003 through 2013. However, perennial forb cover more than doubled between 2013 and 2018 and remained high in 2023. Annual grasses have not been observed in any sample year (Table 28-18.7, Table 28-18.10, Table 28-18.11). Barring a major disturbance or conifer encroachment, this site can reasonably be expected to remain in this or a similar state in future sample years.

Due to the abundance and diversity of the shrub and herbaceous communities, this site likely serves as adequate habitat for summering mule deer. Pellet transect data shows that deer presence has remained low since 2013. Elk presence has also been low in most sample years and no pellet groups were observed in 2023 (Table 28-18.9). However, the abundant herbaceous understory on this site could provide forage for elk during the summer months (Table 28-18.3; Beck & Peek, 2005).

## Trend Summary Tables

**Table 28-18.6 - 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
2003	20.8	4.3	-	24.4	5.2	-
2008	18.4	3.3	-	23.3	6.0	-
2013	18.2	2.7	-	24.9	4.1	-
2018	21.2	2.3	-	23.7	4.4	-
2023	28.3	4.6	-	35.4	6.3	-

**Table 28-18.7 - 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
2003	-	322	148	273	-	8.9	0.8	7.2
2008	-	397	295	305	-	22.6	2.5	9.6
2013	-	404	219	300	-	23.6	1.5	7.7
2018	-	424	82	354	-	28.8	0.5	18.0
2023	-	360	266	305	-	27.5	4.6	14.3

**Table 28-18.8 - 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
2003	30.3	0.2	33.2	3.3	9.7	39.4
2008	22.9	0.2	21.4	3.5	6.4	55.4
2013	17.6	0.0	45.3	1.0	6.2	55.6
2018	17.2	0.9	46.3	3.9	5.1	56.2
2023	19.3	0.1	19.1	5.0	6.8	60.4

**Table 28-18.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2003	5	17	8	2
2008	9	15	4	2
2013	-	4	15	-
2018	3	11	2	-
2023	2	12	-	-
Year	Days Use Per Acre (ha)			
2003	16.0 (39.5)	22.8 (56.3)	24.1 (59.6)	-
2008	11.6 (28.7)	23.4 (57.9)	4.0 (9.9)	-
2013	5.1 (12.6)	9.4 (23.2)	19.4 (48.0)	-
2018	6.5 (16.1)	14.7 (36.4)	4.7 (11.6)	-
2023	2.9 (7.2)	16.8 (41.4)	-	-

**Table 28-18.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency											
Achnatherum lettermanii (Letterman's needlegrass)	63	10	10	-	36	-	66	-	38	214	8	
Achnatherum nelsonii (Columbia needlegrass)	119	4	10	-	65	-	90	-	48	174	198	
Bouteloua gracilis (blue grama)	113	27	13	-	77	-	18	-	21	143	269	
Carex (sedge)	111	3	-	-	46	-	67	3	56	165	249	
Elymus elymoides (squirreltail)	122	2	13	1	113	5	42	-	26	173	70	
Elymus trachycaulus (slender wheatgrass)	Average Cover (%)											
Hesperostipa comata (needle and thread)	2003	1.0	0.2	0.4	-	0.4	-	1.4	-	0.3	5.0	0.2
Juncus (rush)	2008	4.1	0.2	0.5	-	1.3	-	3.0	-	0.8	6.3	6.3
Koeleria macrantha (prairie Junegrass)	2013	3.2	0.7	0.8	-	1.0	-	0.7	-	0.3	6.7	10.2
Poa fendleriana (muttongrass)	2018	2.7	0.2	-	-	1.1	-	3.0	0.0	0.9	7.2	13.6
Poa pratensis <sup>i</sup> (Kentucky bluegrass)	2023	6.5	0.1	1.2	0.0	4.6	0.1	2.0	-	1.4	8.5	3.2

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

**Table 28-18.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency																	
Achillea millefolium (Common yarrow)	31	2	-	-	10	-	-	2	79	-	11	-	127	-	4	-	79	
Agoseris glauca (pale agoseris)	42	38	-	6	30	9	-	1	138	4	23	2	228	-	14	-	51	
Allium (onion)	55	21	-	34	6	11	-	-	92	-	5	-	163	-	21	-	5	
Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	49	1	-	14	20	7	-	-	67	-	-	-	26	-	2	-	132	
Antennaria (pussytoes)	32	10	5	12	13	5	20	2	54	-	5	33	50	1	101	2	62	
Arabis (rockcress)	Average Cover (%)																	
Artemisia canthioides (Carruth's sawewort)	2003	0.1	0.0	-	-	0.1	-	-	0.0	0.8	-	0.0	-	0.6	-	0.0	-	1.1
Artemisia dracunculoides (tarragon)	2008	1.0	0.1	-	0.0	0.5	0.1	-	0.0	2.1	0.1	0.1	0.0	1.2	-	0.1	-	0.5
Artemisia ludoviciana (white sagebrush)	2013	1.0	0.1	-	0.1	0.1	0.0	-	-	1.0	-	0.0	-	0.3	-	0.0	-	0.1
Astragalus (milkvetch)	2018	0.5	0.0	-	0.1	0.9	0.0	-	-	1.9	-	-	-	0.0	-	0.0	-	2.4
Calochortus nuttallii (sego lily)	2023	1.4	0.4	0.0	0.1	0.3	0.0	0.7	0.0	2.2	-	0.0	0.7	0.5	0.1	0.4	0.0	1.7
Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)																		
Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)																		
Cryptantha (cryptantha)																		
Delphinium nuttallianum (twolobe larkspur)																		
Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)																		
Erigeron flagellaris (trailing fleabane)																		

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

FORB SPECIES	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lewisia pygmaea (alpine lewisia)	Lomatium (desertparsley)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navarretia breweri <sup>a</sup> (Brewer's navarretia)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla (cinquefoil)	Potentilla gracilis (slender cinquefoil)	Potentilla hippiana (woolly cinquefoil)	Senecio integerrimus <sup>a</sup> (lambstongue ragwort)	Silene drummondii (Drummond's campion)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)
year	Nested Frequency																
2003	133	65	34	-	-	-	19	-	12	21	-	8	-	-	3	-	1
2008	42	92	29	-	1	3	53	62	7	22	73	18	-	-	52	-	-
2013	104	88	19	-	21	-	-	42	2	14	12	-	13	12	60	-	-
2018	77	63	19	1	9	-	7	2	2	48	-	-	20	56	2	38	-
2023	3	50	18	-	23	2	-	108	-	24	148	-	26	12	57	9	-
year	Average Cover (%)																
2003	2.1	1.6	0.6	-	-	-	0.1	-	0.1	0.2	-	0.1	-	-	0.0	-	0.0
2008	0.3	1.8	0.5	-	0.0	0.0	0.1	0.2	0.1	0.2	0.2	0.4	-	-	0.7	-	-
2013	1.3	1.4	0.1	-	0.1	-	-	0.1	0.0	0.1	0.0	-	0.2	0.4	0.9	-	-
2018	1.5	1.0	0.6	0.0	0.0	-	0.0	0.0	0.0	0.4	-	-	0.2	1.1	0.1	0.1	-
2023	0.0	0.9	0.8	-	0.1	0.0	-	0.5	-	0.1	1.2	-	0.7	0.8	1.6	0.0	-

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

FORB SPECIES	Symphoricarum ascendens (western aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium (clover)
year	Nested Frequency			
2003	15	-	20	21
2008	54	4	5	58
2013	57	10	11	41
2018	128	6	47	66
2023	77	7	4	25
year	Average Cover (%)			
2003	0.1	-	0.1	0.4
2008	0.7	0.0	0.0	0.9
2013	0.8	0.1	0.1	0.7
2018	5.7	0.1	0.3	1.5
2023	2.7	0.3	0.1	0.4

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

**Table 28-18.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)						
	year	Line Intercept Cover (%)					
Artemisia cana <sup>p</sup> (silver sagebrush)	2003	11.2	3.8	1.4	-	13.1	0.1
	2008	13.1	5.9	0.1	-	9.9	0.3
	2013	10.2	4.1	-	-	14.6	0.1
	2018	15.8	3.3	1.1	-	7.9	-
	2023	13.3	6.3	-	-	21.2	0.9
	year	Quadrat Cover (%)					
Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	2003	11.5	3.6	0.7	-	9.3	0.0
	2008	12.0	3.1	0.2	-	6.2	0.3
	2013	7.5	2.4	-	0.3	10.2	0.5
	2018	13.2	2.1	0.2	-	8.0	-
	2023	9.7	4.6	-	-	17.6	1.0
	year	Quadrat Cover (%)					
Ericameria parryi var. parryi (Parry's rabbitbrush)	2003	11.5	3.6	0.7	-	9.3	0.0
	2008	12.0	3.1	0.2	-	6.2	0.3
	2013	7.5	2.4	-	0.3	10.2	0.5
	2018	13.2	2.1	0.2	-	8.0	-
	2023	9.7	4.6	-	-	17.6	1.0
	year	Quadrat Cover (%)					
Gutierrezia sarothrae (broom snakeweed)	2003	11.5	3.6	0.7	-	9.3	0.0
	2008	12.0	3.1	0.2	-	6.2	0.3
	2013	7.5	2.4	-	0.3	10.2	0.5
	2018	13.2	2.1	0.2	-	8.0	-
	2023	9.7	4.6	-	-	17.6	1.0
	year	Quadrat Cover (%)					
Purshia tridentata <sup>p</sup> (antelope bitterbrush)	2003	11.5	3.6	0.7	-	9.3	0.0
	2008	12.0	3.1	0.2	-	6.2	0.3
	2013	7.5	2.4	-	0.3	10.2	0.5
	2018	13.2	2.1	0.2	-	8.0	-
	2023	9.7	4.6	-	-	17.6	1.0
	year	Quadrat Cover (%)					
Ribes <sup>p</sup> (currant)	2003	11.5	3.6	0.7	-	9.3	0.0
	2008	12.0	3.1	0.2	-	6.2	0.3
	2013	7.5	2.4	-	0.3	10.2	0.5
	2018	13.2	2.1	0.2	-	8.0	-
	2023	9.7	4.6	-	-	17.6	1.0
	year	Quadrat Cover (%)					

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

**Table 28-18.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

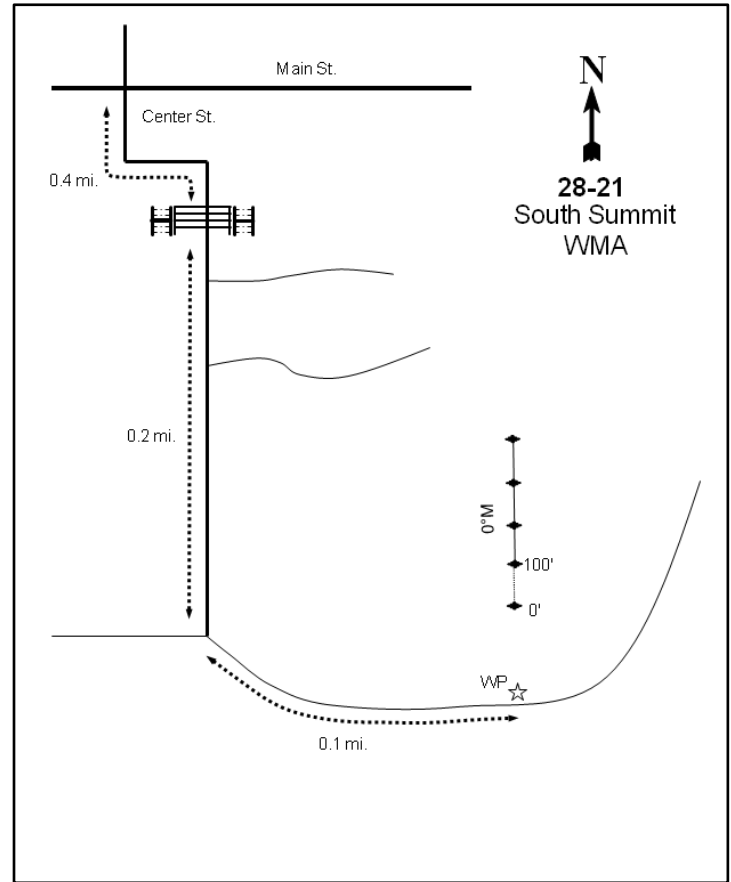
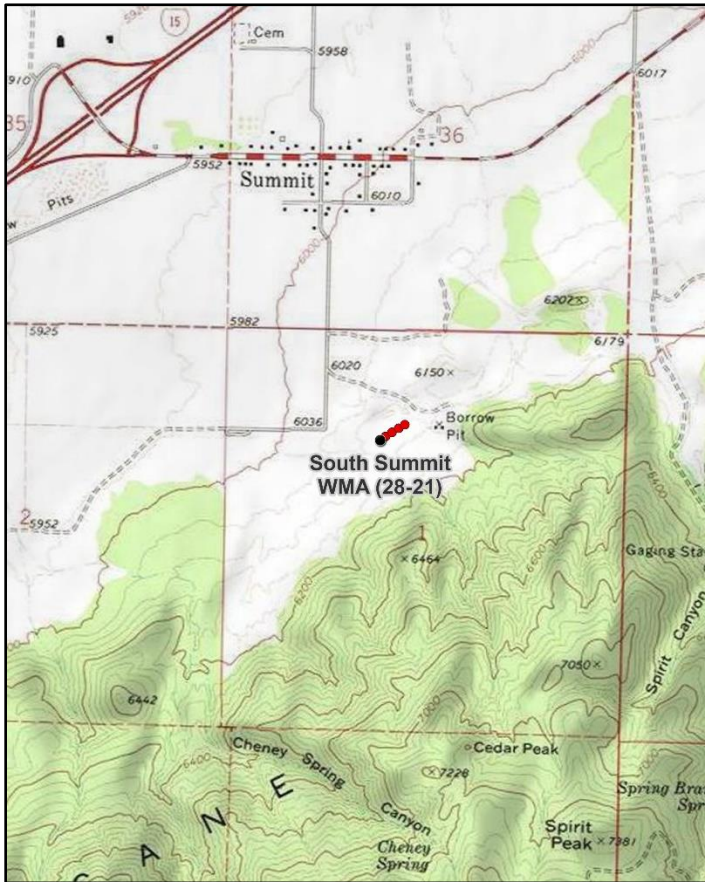
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia cana<sup>p</sup> -- (silver sagebrush)</b>									
2003	6400	-	1	80	19	14	2	6	30/49
2008	8480	1260	13	49	38	4	0	9	29/55
2013	7200	-	18	74	8	10	0	13	29/48
2018	10880	-	17	79	4	1	0	2	27/41
2023	4440	1700	4	95	1	1	0	1	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2003	3020	-	0	89	11	0	0	3	32/39
2008	3040	140	8	72	20	0	0	5	27/44
2013	2720	-	24	71	5	9	0	17	27/41
2018	2920	-	7	93	0	0	0	0	28/36
2023	2760	20	7	93	1	3	0	1	- / -
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
2003	1240	-	0	94	7	32	2	0	23/28
2008	280	-	14	57	29	21	0	7	27/38
2013	-	-	-	-	-	-	-	-	14/45
2018	340	-	0	100	0	24	0	0	19/29
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2003	60	-	0	100	0	0	0	0	15/14
2008	-	-	-	-	-	-	-	-	24/31
2013	100	-	0	100	0	0	0	0	25/43
2018	20	-	0	100	0	0	0	0	21/26
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2003	1000	-	2	90	8	20	80	0	53/152
2008	1060	80	13	55	32	40	55	11	52/122
2013	1520	40	12	84	4	37	20	4	59/139
2018	1400	-	13	86	1	36	40	1	59/139
2023	1940	-	3	95	2	33	62	2	- / -
<b>Ribes<sup>p</sup> -- (currant)</b>									
2003	20	-	0	100	0	0	0	0	81/62
2008	20	-	0	100	0	0	0	0	86/130
2013	40	-	50	50	0	0	0	0	86/118
2018	-	-	-	-	-	-	-	-	- / -
2023	40	-	0	100	0	50	0	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2003	-	-	-	-	-	-	-	-	39/46
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	64/72

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



## SOUTH SUMMIT WMA - STUDY NO. 28-21

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Summit SE; Township 35S, Range 10W, Section 01  
NAD 83 UTM ZONE 12, 329793 East 4184348 North

**Transect Information**

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

193  
0° magnetic  
400ft  
Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

From the intersection of Center Street and Main Street in the city of Summit, travel south for 0.4 miles to a WMA gate. From the gate, continue for 0.2 miles to a "T" in the road. Take the fork on the left and travel for 0.1 miles to the witness post on the left (north) side of the road. From the witness post, walk 12 paces at 25 degrees magnetic to the 0-foot stake which is marked by browse tag number #193.

**Site Information**

Land Ownership	State
Land Administrator	UDWR
Allotment	WEST FORK
Elevation	6,100ft (1,859m)
Aspect	Southwest
Slope	10%
Sample Dates	07/14/2008, 06/06/2013, 06/05/2018, 06/06/2023

**Table 28-21.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	Parowan Front (Cottonwood and Summit) Chaining)	3070	July 2014-June 2015	1109
Chaining - Chain Unknown	-	-	Historic	-
Seeding - Seed Unknown	-	-	Historic	-
Herbicide - Herbicide Unknown	-	-	Historic	-
Hand Crew - Lop and Scatter	-	-	Historic	-
Hand Crew - Lop and Scatter	Parowan Front WMA Arc for Bullhog and Lop and Scatter	3435	September 2017-June 2018	1674

**Wildlife Habitat and Vegetation History****Table 28-21.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-21.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

The transect lies one mile south of Summit in a wildlife management area.

**Site Potential**

1981 - 2010 Average Annual Precipitation	12 inches
NRCS Ecological Site	Upland Loam (Mountain Big Sagebrush-Indian Ricegrass)
NRCS Ecological Site #	R047XB308UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2008, this site has remained in a stable state with a plant community dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). Sagebrush cover exhibited a notable decrease between 2018 and 2023, but a slight increase in density was observed over the same time period (Table 28-21.12, Table 28-21.13). Introduced and native perennial grasses make up the majority of the herbaceous understory. Although the native species purple threeawn (*Aristida purpurea*) provided the most cover of any single herbaceous species in most years, the introduced perennial grass species bulbous bluegrass (*Poa bulbosa*) has increased over time; in 2023, bulbous bluegrass provided as much cover as and was more abundant than purple threeawn (Table 28-21.7, Table 28-21.10). Perennial and annual forbs have remained rare (Table 28-21.11). Utah juniper (*Juniperus osteosperma*) trees have been present in all sample years, placing the site within Phase I of woodland succession (Photos). Although tree cover and density were low in 2023 (Table 28-21.12, 28-21.14), further encroachment is possible over time.

Since site establishment, deer winter range has generally remained between poor and fair in condition. Improvement to deer wintering range could be achieved by efforts that support browse production through age class diversification, and diversifying and increasing cover of native forbs while reducing cheatgrass and bulbous bluegrass (Table 28-21.15). Pellet transect data indicates that mule deer presence was high in 2023. Elk pellet groups have not been observed since 2013 (Table 28-21.9), but the sagebrush component of this site could provide browse during the winter months (Table 28-21.3; Wambolt, 1996).

**Trend Summary Tables****Table 28-21.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2008	7.4	1.6	-	11.2	1.9	-
2013	7.2	1.1	-	12.6	1.6	-
2018	8.0	4.8	-	11.9	4.5	-
2023	7.8	1.9	-	7.5	1.3	0.2

**Table 28-21.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2008	122	407	11	5	1.0	21.9	0.0	0.0
2013	41	427	49	4	0.1	32.6	0.3	0.2
2018	85	438	15	9	1.1	41.0	0.1	0.3
2023	143	450	165	8	4.3	37.3	2.0	0.1

**Table 28-21.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2008	15.3	0.3	44.1	17.0	1.8	34.1
2013	13.5	0.9	45.1	9.5	1.7	42.7
2018	11.8	1.7	54.4	9.7	1.2	54.5
2023	6.9	2.3	41.4	8.2	1.7	51.8

**Table 28-21.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency					
2008	5	-	32	-	-	95
2013	4	-	10	-	-	34
2018	6	-	5	-	-	54
2023	4	-	21	1	-	11
Year	Days Use Per Acre (ha)					
2008	11.6 (28.7)	8.7 (21.5)*	91.8 (226.8)	0.7 (1.7)	-	-
2013	24.7 (61.0)	-	35.5 (87.7)	-	-	-
2018	7.2 (17.9)	-	12.8 (31.5)	-	-	-
2023	5.8 (14.3)	-	69.7 (172.1)	-	1.2 (2.9)	-

Pellets per acre (ha)

**Table 28-21.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Nested Frequency								
Agropyron cristatum <sup>i</sup> (crested wheatgrass)									
Aristida purpurea (purple threeawn)									
Bromus tectorum <sup>ai</sup> (cheatgrass)									
Elymus elymoides (squirreltail)									
Elymus lanceolatus (thickspike wheatgrass)									
Poa bulbosa <sup>i</sup> (bulbous bluegrass)									
Sporobolus cryptandrus (sand dropseed)									
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)									
Vulpia octoflora <sup>a</sup> (sixweeks fescue)									
year	Average Cover (%)								
2008	140	243	122	3	0	144	62	70	-
2013	147	200	41	6	21	331	88	54	-
2018	130	249	81	-	5	324	120	79	7
2023	109	248	143	10	-	374	121	121	-
year	Average Cover (%)								
2008	4.8	11.1	1.0	0.1	0.0	2.9	1.2	1.7	-
2013	4.8	12.4	0.1	0.0	0.2	11.9	2.1	1.2	-
2018	6.9	16.3	1.0	-	0.1	13.1	2.6	2.0	0.2
2023	5.8	12.3	4.3	0.1	-	12.8	2.7	3.6	-

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

**Table 28-21.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Nested Frequency										
Alyssum desertorum <sup>ai</sup> (desert madwort)											
Astragalus lentiginosus (freckled milkvetch)											
Calochortus nuttallii (sego lily)											
Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)											
Erigeron (fleabane)											
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)											
Phlox austromontana (mountain phlox)											
Phlox longifolia (longleaf phlox)											
Physalis (groundcherry)											
Sphaeralcea coccinea (scarlet globemallow)											
Tragopogon dubius <sup>ai</sup> (yellow salsify)											
year	Average Cover (%)										
2008	-	2	-	8	-	3	-	-	-	3	-
2013	-	2	-	-	-	49	2	-	-	-	-
2018	8	3	-	-	3	5	1	-	1	2	2
2023	5	-	1	3	-	165	-	2	-	6	-
year	Average Cover (%)										
2008	-	0.0	-	0.0	-	0.0	-	-	-	0.0	-
2013	-	0.1	-	-	-	0.3	0.0	-	-	-	-
2018	0.0	0.3	-	-	0.0	0.0	0.0	-	0.0	0.0	0.0
2023	0.0	-	0.0	0.0	-	2.0	-	0.0	-	0.0	-

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

**Table 28-21.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cylindropuntia whipplei (Whipple cholla)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)
year	Line Intercept Cover (%)				
2008	11.2	0.2	1.2	-	0.5
2013	12.6	1.3	0.3	-	-
2018	11.9	0.8	3.7	-	-
2023	7.5	0.7	0.4	0.2	0.2
year	Quadrat Cover (%)				
2008	7.4	0.3	1.1	-	0.2
2013	7.2	0.9	0.2	-	-
2018	8.0	0.6	4.2	-	0.0
2023	7.8	0.9	0.8	0.0	0.2

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

**Table 28-21.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2008	20	-	0	100	0	0	0	0	68/68
2013	-	-	-	-	-	-	-	-	26/63
2018	-	-	-	-	-	-	-	-	25/62
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2008	2000	20	3	38	59	30	3	43	95/119
2013	1660	-	4	72	24	17	21	39	86/105
2018	1400	820	6	77	17	6	0	10	84/114
2023	1700	-	13	53	34	38	25	34	-/-
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
2008	120	-	17	83	0	0	0	0	36/85
2013	140	-	0	100	0	0	0	0	39/106
2018	200	-	0	90	10	0	0	10	36/97
2023	120	-	0	100	0	0	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2008	2720	-	21	72	7	2	0	2	18/23
2013	560	20	18	82	0	0	4	4	14/21
2018	4120	20	14	86	0	0	0	2	23/34
2023	1660	2760	27	71	2	0	0	2	-/-
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	20	0	0	0	0	0	0	-/-
2023	20	-	100	0	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
2008	40	-	0	50	50	0	0	50	30/80
2013	-	-	-	-	-	-	-	-	20/86
2018	-	-	-	-	-	-	-	-	18/55
2023	60	-	0	67	33	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2008	20	-	0	100	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	40	-	0	100	0	0	0	0	- / -
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
2008	-	-	-	-	-	-	-	-	49/180

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

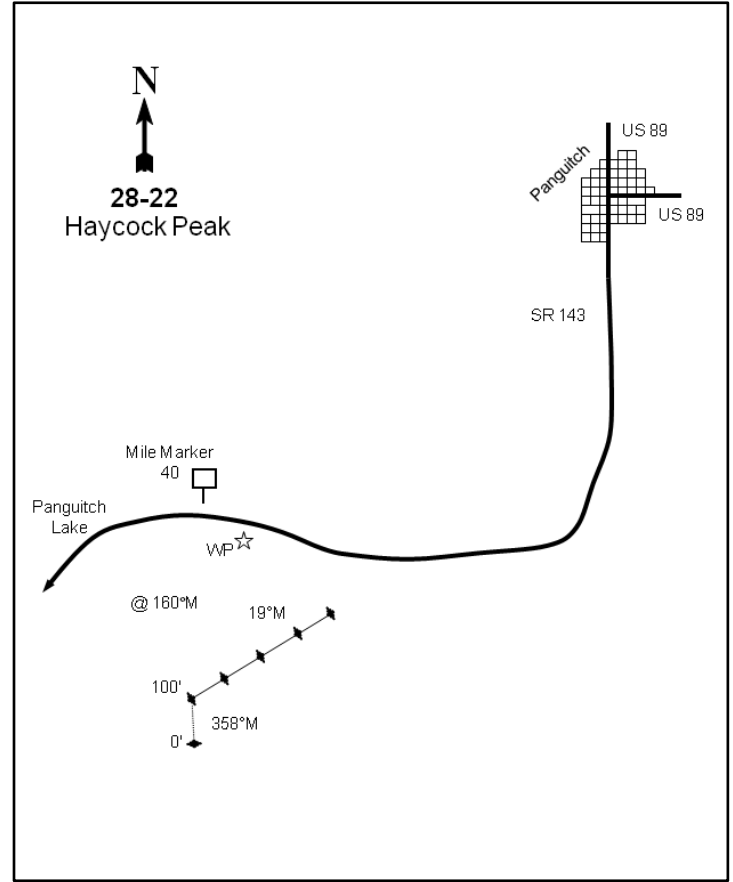
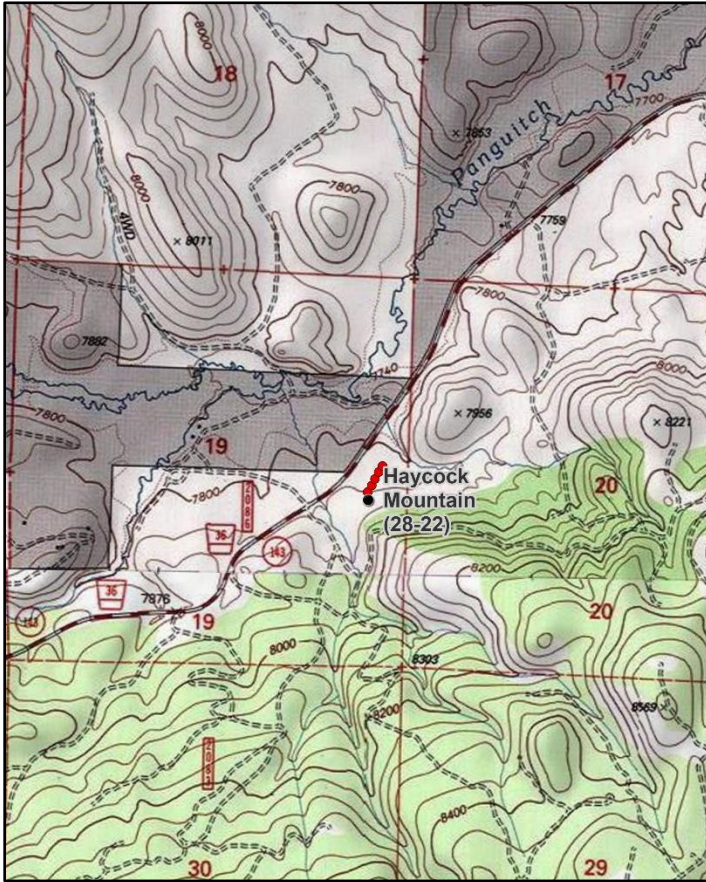
**Table 28-21.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	4	100	-	-	-	-	1.0
2023	6	17	67	17	-	-	2.8

**Table 28-21.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2008	14.0	-2.7	1.5	30.0	-0.7	0.0	0.0	<b>42.1</b>	Poor
2013	15.8	7.8	1.8	30.0	-0.1	0.3	0.0	<b>55.5</b>	Fair
2018	14.9	9.9	2.9	30.0	-0.9	0.7	0.0	<b>57.4</b>	Fair
2023	9.4	4.8	6.5	30.0	-3.3	0.1	0.0	<b>47.4</b>	Poor

## HAYCOCK MOUNTAIN - STUDY NO. 28-22



### Location Information

USGS 7.5 min Map Info      Fivemile Ridge SW; Township 35S, Range 6W, Section 19  
 GPS (0' Stake)              NAD 83 UTM ZONE 12, 362276 East 4179533 North

### Transect Information

Browse Tag # (0' Stake)      175  
 Transect Bearing              358° magnetic (Lines 2-5: 19° magnetic)  
 Length                          500ft  
 Belt Placement                Line 1 (11ft), Line 2 (34ft), Line 3 (95ft), Line 4 (71ft), Line 5 (59ft)  
 Belt Marker Placement      Line 2: 2ft, Line 5: 1ft

### Directions to Site

Traveling from the town of Panguitch at the intersection of US-89 and SR-143, travel south on SR-143 for approximately 10.95 miles and pull off to the side of the road. Using a GPS unit, navigate to the 0-foot stake which is identified by browse tag #175.

### Site Information

Land Ownership                Federal  
 Land Administrator          USFS  
 Allotment                        Haycock Mtn-Brian Head  
 Elevation                        7,874ft (2,400m)  
 Aspect                            North  
 Slope                              7%  
 Sample Dates                  07/24/2013, 06/20/2018, 06/21/2023

**Wildlife Habitat and Vegetation History****Table 28-22.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	year-long
Rocky Mountain Elk	substantial	summer

**Table 28-22.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Bitterbrush	Phase I
2018	Bitterbrush/Mountain Big Sagebrush	Phase I
2023	Bitterbrush/Mountain Big Sagebrush	Phase I

**Site Notes**

Soils need to be sampled in the next rotation. The nearest water source is 0.25 miles away. A dead fawn was found on the site in 2013.

**Site Potential**

1981 - 2010 Average Annual Precipitation	20 inches
NRCS Ecological Site	Mountain Stony Loam (Antelope Bitterbrush)
NRCS Ecological Site #	R047XB456UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 2013, this site has been dominated by bitterbrush (*Purshia tridentata*) with a diverse component of other shrub species providing moderate amounts of cover (Table 28-22.12, Table 28-22.13). The herbaceous understory has primarily been composed of perennial grasses such as muttongrass (*Poa fendleriana*), blue grama (*Bouteloua gracilis*), Kentucky bluegrass (*P. pratensis*), and/or needle and thread (*Hesperostipa comata*). The introduced annual grass species cheatgrass (*Bromus tectorum*) was sampled in 2018 and again in 2023, but in low amounts. While diverse in composition, forbs have contributed little cover in comparison with grasses (Table 28-22.7, Table 28-22.10, Table 28-22.11). Rocky Mountain juniper (*Juniperus scopulorum*) has been observed in both 2018 and 2023, indicating that there may be potential for future tree encroachment (Photos, Table 28-22.14).

Although this area is considered to be year-long range for mule deer, when used as deer winter range this site is considered to be in good condition. Improvement to deer wintering range can be achieved by efforts that support preferred browse reproduction, and by increasing native perennial forb cover (Table 22-22.15). Pellet transect data shows that deer presence has been high in all sample years. Elk presence has remained low since 2018 (Table 28-22.9), but the diverse and abundant herbaceous understory could provide forage during the summer months (Table 23-22.3; Beck & Peek, 2005).

**Trend Summary Tables****Table 28-22.6 - 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
2013	18.2	2.5	-	26.4	2.0	-
2018	17.0	2.5	-	21.7	2.1	-
2023	20.3	4.0	0.3	24.1	3.4	2.1

**Table 28-22.7 - 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
2013	-	346	94	79	-	18.6	0.8	0.8
2018	3	393	156	183	0.0	30.4	2.1	1.7
2023	28	361	211	160	0.2	28.2	5.6	3.1

**Table 28-22.8 - 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
2013	20.7	1.4	37.3	8.2	2.8	45.2
2018	18.7	0.5	51.3	7.7	3.1	51.7
2023	12.2	0.7	33.4	9.5	2.3	54.3



**Table 28-22.9 - 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	Coyote	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
2013	-	-	38	16	7
2018	-	-	31	10	22
2023	1	1	29	9	6
Year	Days Use Per Acre (ha)				
2013	0.7 (1.8)	-	59.6 (147.3)	32.8 (81.1)	-
2018	-	-	49.6 (122.5)	5.3 (13.2)	-
2023	-	-	56.3 (139.0)	11.4 (28.1)	-

**Table 28-22.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus marginatus (mountain brome)	Bromus porteri (Porter brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus lanceolatus (thickspike wheatgrass)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)
year	Nested Frequency															
2013	2	60	3	27	99	3	32	-	62	63	10	38	124	43	5	22
2018	4	55	4	16	152	3	10	3	69	70	33	66	157	98	14	4
2023	1	54	24	33	132	22	5	28	29	85	64	67	132	18	-	2
year	Average Cover (%)															
2013	0.0	2.4	0.2	0.4	2.8	0.1	0.8	-	1.8	1.6	0.2	1.6	4.4	1.3	0.2	0.7
2018	0.0	2.2	0.2	0.4	6.6	0.0	0.2	0.0	2.0	1.6	0.6	3.4	7.7	5.1	0.1	0.2
2023	0.0	2.8	1.2	1.0	7.0	0.3	0.0	0.2	0.7	3.0	2.8	4.5	4.8	0.1	-	0.0

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

**Table 28-22.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Androsace septentrionalis <sup>a</sup> (pygmyflower rockjasmine)	Antennaria (pussytoes)	Arabis (rockcress)	Astragalus (milkvetch)	Castilleja (Indian paintbrush)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha <sup>a</sup> (annual cryptantha)	Descurainia incana <sup>a</sup> (mountain tansymustard)	Erigeron divergens <sup>a</sup> (spreading fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Euphorbia brachycera (horned spurge)
year	Nested Frequency																
2013	-	17	-	-	2	-	-	-	-	-	-	1	77	6	19	-	8
2018	1	125	-	1	2	5	-	-	4	-	1	21	3	134	-	1	
2023	-	37	4	8	2	-	1	7	24	2	4	1	185	10	79	3	2
year	Average Cover (%)																
2013	-	0.0	-	-	0.0	-	-	-	-	-	-	0.0	0.7	0.0	0.1	-	0.1
2018	0.0	1.4	-	0.0	0.0	0.0	-	-	0.0	-	0.0	0.0	0.4	0.0	1.3	-	0.0
2023	-	0.4	0.1	0.0	0.0	-	0.0	0.0	0.1	0.0	0.0	0.0	5.0	0.0	1.6	0.0	0.0

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

FORB SPECIES	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium ramosissimum <sup>a</sup> (manybranched pepperweed)	Linum lewisii (Lewis flax)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Oenothera pallida <sup>a</sup> (pale evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon comarrhenus (dusty beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Potentilla gracilis (slender cinquefoil)	Potentilla hippiana (woolly cinquefoil)	Silene antirrhina <sup>a</sup> (sleepy silene)	Silene drummondii (Drummond's campion)
year	Nested Frequency																
2013	-	5	-	6	2	9	-	-	8	9	9	6	-	1	6	-	-
2018	15	-	12	22	2	4	-	2	3	1	2	47	2	1	8	-	-
2023	9	1	6	-	-	5	1	-	18	-	5	48	-	-	3	4	18
year	Average Cover (%)																
2013	-	0.0	-	0.0	0.0	0.0	-	-	0.0	0.1	0.1	0.0	-	0.0	0.2	-	-
2018	0.1	-	0.1	0.1	0.0	0.0	-	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	-	-
2023	0.0	0.0	0.0	-	-	0.0	0.0	-	0.1	-	0.1	0.4	-	-	0.0	0.0	0.5

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

FORB SPECIES	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium (clover)	Verbascum thapsus <sup>ai</sup> (common mullein)
year	Nested Frequency			
2013	-	-	-	1
2018	2	3	4	-
2023	12	-	3	-
year	Average Cover (%)			
2013	-	-	-	0.0
2018	0.0	0.0	0.0	-
2023	0.1	-	0.0	-

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

**Table 28-22.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia frigida <sup>p</sup> (prairie sagewort)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. tridentata <sup>p</sup> (basin big sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pediocactus simpsonii (mountain ball cactus)	Pinus ponderosa <sup>i</sup> (ponderosa pine)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)											
2013	-	5.3	-	4.5	1.9	-	0.1	-	-	-	16.6	-
2018	-	6.4	-	2.5	1.7	0.3	0.1	-	-	-	12.8	-
2023	-	7.6	0.4	1.7	2.7	0.6	-	0	0.1	2.1	14.4	-
year	Quadrat Cover (%)											
2013	0.0	2.6	-	3.6	2.0	0.2	0.1	0.2	-	-	11.9	0.0
2018	0.2	4.5	0.2	2.3	2.1	0.2	0.2	0.1	-	-	10.0	-
2023	-	6.9	0.7	2.6	3.3	0.3	0.0	0.3	0.0	0.3	10.1	-

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

**Table 28-22.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2013	20	-	0	100	0	100	0	100	50/42
2018	20	-	0	100	0	0	100	100	47/57
2023	20	-	0	100	0	100	0	0	- / -
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
2013	-	-	-	-	-	-	-	-	- / -
2018	40	20	0	100	0	0	0	0	17/34
2023	-	-	-	-	-	-	-	-	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2013	3020	180	26	61	13	37	12	26	30/49
2018	2740	-	12	65	23	18	10	10	33/49
2023	3140	1880	13	74	13	15	25	11	- / -
<b>Artemisia tridentata ssp. tridentata<sup>p</sup> -- (basin big sagebrush)</b>									
2013	60	-	0	100	0	100	0	33	82/100
2018	140	-	0	71	29	29	0	29	86/138
2023	80	-	0	100	0	0	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2013	1180	180	27	51	22	49	19	12	66/82
2018	1020	-	26	63	12	12	4	4	65/68
2023	1680	3660	26	66	8	7	1	7	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2013	2080	20	4	95	1	18	6	8	18/36
2018	3060	-	20	80	0	1	5	0	20/31
2023	3000	20	7	93	0	0	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2013	160	-	25	38	38	13	13	63	82/77
2018	140	-	0	43	57	14	0	29	74/61
2023	120	-	0	83	17	0	0	17	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2013	280	-	0	100	0	0	0	0	19/24
2018	400	-	75	25	0	0	0	0	11/25
2023	40	-	50	50	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2013	60	-	0	100	0	0	0	0	14/28
2018	100	-	40	60	0	0	0	0	13/18
2023	60	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	6/18
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2013	1780	100	2	88	10	62	34	16	78/119
2018	1740	-	0	72	28	37	49	9	69/106
2023	2360	-	6	81	14	31	55	14	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2013	80	-	0	100	0	0	75	0	29/45
2018	60	-	0	100	0	0	0	0	23/25
2023	40	-	0	100	0	50	0	0	- / -

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

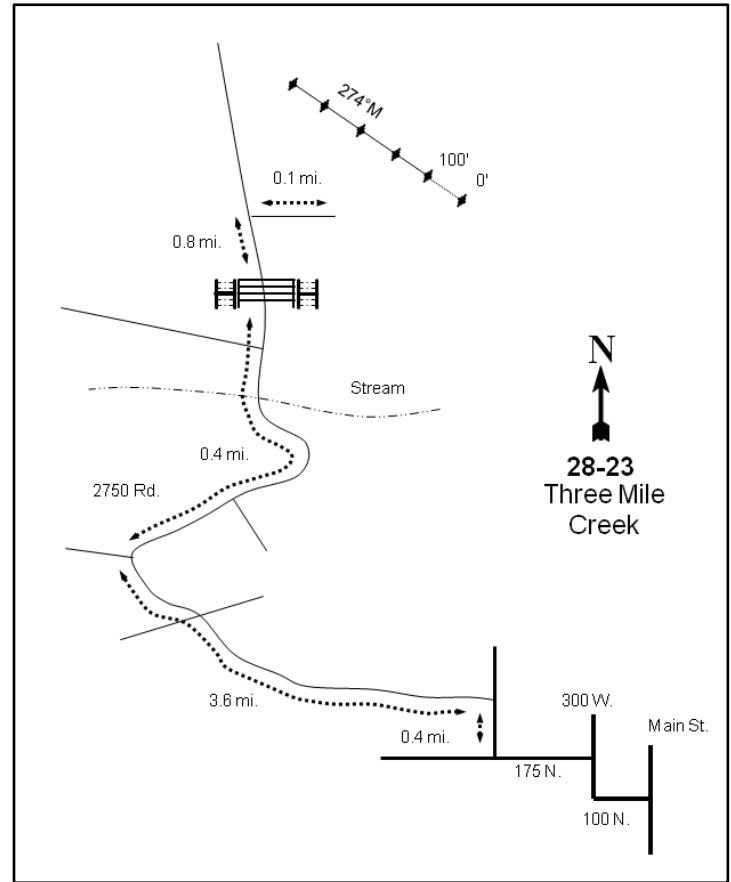
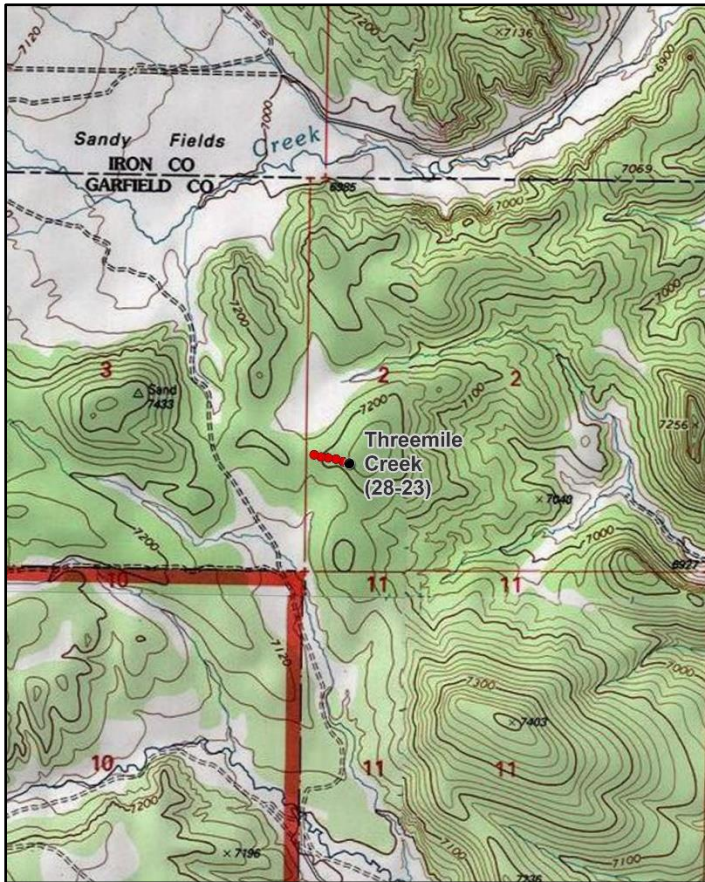
**Table 28-22.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2018	8	-	25	75	-	-	6.5
2023	5	-	40	60	-	-	8.3
<b>Pinus ponderosa (ponderosa pine)</b>							
2018	13	-	50	-	-	50	14.0
2023	1	-	-	-	-	100	28.0

**Table 28-22.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	30.0	11.2	5.6	30.0	0.0	1.5	0.0	<b>78.3</b>	Good
2018	30.0	7.6	3.2	30.0	0.0	3.4	0.0	<b>74.3</b>	Good
2023	30.0	11.1	4.7	30.0	-0.1	6.2	0.0	<b>81.9</b>	Good

## THREEMILE CREEK - STUDY NO. 28-23

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Little Creek Peak SE; Township 34S, Range 6W, Section 02  
NAD 83 UTM ZONE 12, 367790 East 4193548 North

**Transect Information**

Browse Tag # (0' Stake)	149
Transect Bearing	274° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Belt 1: 2ft

**Directions to Site**

Travel 0.4 miles from the town of Panguitch, and at the intersection of 175 North (Pigweed Lane) and 700 West, turn left onto Mud Spring Road. Travel 3.6 miles to an intersection and stay to the right. Drive 0.4 miles to a gate. Continue through the gate, travel 0.8 miles, and turn right. Proceed for another 0.1 miles and park. Navigate to the 0-foot stake using a GPS. The 0-foot stake is marked by browse tag #149.

**Site Information**

Land Ownership	State
Land Administrator	SITLA
Allotment	SANDY CREEK
Elevation	7,244ft (2,208m)
Aspect	Southwest
Slope	10-15%
Sample Dates	07/24/2013, 08/25/2016, 06/19/2018, 06/20/2023

**Table 28-23.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Two-Way Ely	Panguitch West Bench Habitat Improvement	2373	September-November 2012	276
Seeding - Aerial Before	Panguitch West Bench Habitat Improvement	2373	September 2012	276
Seeding - Dribbler	Panguitch West Bench Habitat Improvement	2373	September-November 2012	276
Seeding - Aerial After	Panguitch West Bench Habitat Improvement	2373	February 2013	276

**Table 28-23.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Panguitch West Bench			Aerial	Sep 2012	276
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	0.72	0.68
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Douglas	0.54	0.52
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest II	0.54	0.48
G	<i>Poa secunda</i>	Canby Bluegrass	Canbar	0.49	0.26
G	<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Anatone	0.54	0.53
G	<i>Thinopyrum ponticum</i>	Tall Wheatgrass	Alkar	1.00	0.94
F	<i>Achillea millefolium</i>	Western Yarrow	Eagle Mountain	0.09	0.08
F	<i>Astragalus cicer</i>	Cicer Milkvetch	Lutana	1.45	1.05
F	<i>Medicago sativa</i>	Alfalfa	Ladak DL	1.99	1.85
F	<i>Melilotus officinalis</i>	Yellow Sweetclover		0.54	0.51
F	<i>Penstemon palmeri</i>	Palmer Penstemon	Carbon/Emery UT	0.25	0.20
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.63	1.46

Mix Name			Application Type	Application Date	Acres
Panguitch West Bench - Dribbler Mix			Dribbler	Sep 2012	276
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	<i>Balsamorhiza sagittata</i>	Arrowleaf Balsamroot	Piute UT	0.04	0.03
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	0.36	0.32
S	<i>Ephedra viridis</i>	Green Ephedra	Emery UT	0.11	0.10
S	<i>Purshia tridentata</i>	Bitterbrush	Garfield UT	0.18	0.15

Mix Name			Application Type	Application Date	Acres
Panguitch West Bench - Browse Mix			Aerial	Sep 2012	276
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
		Rice Hulls		0.25	0.00
S	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	Mountain Big Sagebrush	Sevier UT	0.22	0.06
S	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming Big Sagebrush	Piute UT	0.43	0.13
S	<i>Bassia prostrata</i>	Forage Kochia	Beaver UT	0.22	0.15

**Wildlife Habitat and Vegetation History****Table 28-23.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28-23.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Perennial Grass	Phase I
2016	Perennial Grass	Phase I
2018	Perennial Grass	Phase I
2023	Perennial Grass	Phase I

**Site Notes**

The site was treated the year prior to study establishment.

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Stony Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB332UT
States and Transitions	No state and transition model is available for this ecological site.

When this study was established in 2013, the site had recently undergone a chaining and seeding treatment (Table 28-23.1) and twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees provided low cover, although many of the young trees were not affected by the chaining. Trees have remained low in cover, but density has slightly increased since 2016. With the presence of the young pinyon and juniper trees which were not affected by or survived the treatment, this site has the potential for infilling. Total shrub cover has fluctuated, but cover of preferred browse species has remained low throughout the study years (Photos, Table 28-23.6, Table 28-23.12, Table 28-23.13, Table 28-23.14). Herbaceous vegetation was initially sparse, but has exhibited a substantial increase overall. Perennial grasses have been the dominant vegetation component throughout the study period, with the native species squirreltail (*Elymus elymoides*) and Indian ricegrass (*Achnatherum hymenoides*) contributing a majority of the perennial grass cover in 2023. The introduced annual grass species cheatgrass (*Bromus tectorum*) was present in low amounts in 2016 and 2018, but increased and provided moderate cover during the most recent sample year (Table 28-23.7, 28-23.10).

Deer winter range condition has generally remained very poor since study establishment. As of 2023, condition of deer winter range has not changed. Improvement to this range can be accomplished through efforts that support the growth of more preferred browse species that are already on, or have been sampled on the site in the past, while diversifying their age classes. In addition, increasing cover of the already diverse native forb community while reducing cheatgrass would also improve winter range condition (Table 22-23.15). According to pellet transect data, deer presence has been low in most sample years including 2023. Elk presence has also been low (Table 28-23.9), but the limited sagebrush component could have some forage value during the winter months (Table 28-23.3; Wambolt, 1996).

**Trend Summary Tables****Table 28-23.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	0.1	0.3	0.5	0.2	0.1	1.4
2016	1.1	3.0	0.6	0.3	5.3	0.9
2018	0.9	1.3	0.9	0.8	0.4	1.4
2023	0.7	2.0	0.2	1.5	1.5	2.8

**Table 28-23.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2013	-	72	35	20	-	1.5	0.3	0.2
2016	13	294	139	12	0.3	13.0	2.9	0.1
2018	3	239	5	2	0.0	11.9	0.0	0.1
2023	180	214	208	44	7.5	13.0	4.3	0.7

**Table 28-23.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2013	20.6	0.2	52.7	5.3	21.0	2.7
2016	18.8	0.0	42.6	6.5	15.0	20.1
2018	28.3	0.0	50.2	5.6	18.5	13.9
2023	13.4	0.0	43.3	12.9	21.2	25.1

**Table 28-23.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2013	-	1	-	3
2016	-	18	2	54
2018	1	16	3	38
2023	1	13	3	4
Year	Days Use Per Acre (ha)			
2013	-	0.7 (1.7)	-	-
2016	1.5 (3.6)	21.5 (53.0)	7.4 (18.2)	-
2018	5.8 (14.3)	18.1 (44.7)	0.7 (1.7)	-
2023	4.4 (10.8)	13.4 (33.1)	5.3 (13.2)	-

**Table 28-23.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Carex obtusata (obtusate sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency												
2013	2	-	51	-	2	-	6	-	-	16	-	-	-
2016	16	10	85	13	-	15	212	-	1	15	8	21	3
2018	12	-	87	3	14	34	93	-	4	37	-	42	1
2023	13	13	57	180	19	51	97	2	4	9	-	29	3
year	Average Cover (%)												
2013	0.0	-	1.2	-	0.0	-	0.0	-	-	0.3	-	-	-
2016	0.3	0.4	3.6	0.3	-	0.2	6.8	-	0.0	0.5	0.0	0.9	0.2
2018	0.7	-	3.8	0.0	0.2	0.5	4.0	-	0.2	0.9	-	1.6	0.0
2023	2.9	0.6	1.3	7.5	0.1	1.2	3.5	0.1	0.1	0.2	-	2.7	0.2

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



**Table 28-23.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Ambrosia <sup>a</sup> (ragweed)	Arenaria (sandwort)	Astragalus (milkvetch)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium arvense <sup>ai</sup> (Canada thistle)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hedysarum boreale (Utah sweetvetch)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Packera multilobata (lobeleaf groundsel)	Penstemon caespitosus (mat penstemon)
year	Nested Frequency																
2013	-	-	-	-	-	-	-	1	3	-	-	1	-	-	-	-	7
2016	-	29	-	1	52	-	-	-	2	2	-	-	2	5	11	-	-
2018	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-
2023	4	20	5	-	35	-	4	-	8	2	22	10	-	-	153	18	-
year	Average Cover (%)																
2013	-	-	-	-	-	-	-	0.0	0.2	-	-	0.0	-	-	-	-	0.0
2016	-	0.2	-	0.0	1.1	-	-	-	0.0	0.0	-	-	0.0	0.0	0.1	-	-
2018	-	-	-	0.0	-	0.0	-	-	-	-	-	-	-	-	-	-	-
2023	0.0	0.3	0.0	-	0.3	-	0.1	-	0.2	0.0	0.1	0.0	-	-	2.6	0.2	-

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

FORB SPECIES	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Portulaca oleracea <sup>ai</sup> (little hogweed)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>a</sup> (small burnet)	Sphaeralcea coccinea (scarlet globemallow)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Verbascum thapsus <sup>ai</sup> (common mullein)
year	Nested Frequency									
2013	4	-	3	30	-	8	-	-	-	-
2016	-	-	3	67	7	4	-	3	-	-
2018	-	-	-	-	3	-	1	-	-	-
2023	3	1	11	4	23	-	9	-	13	1
year	Average Cover (%)									
2013	0.1	-	0.0	0.1	-	0.0	-	-	-	-
2016	-	-	0.0	0.6	0.9	0.1	-	0.0	-	-
2018	-	-	-	-	0.0	-	0.0	-	-	-
2023	0.0	0.0	0.0	0.0	0.6	-	0.2	-	0.2	0.0

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

**Table 28-23.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)							
2013	0.2	-	-	0.1	0.4	-	1	-
2016	0.2	0.1	0.5	4.8	0.5	0	0.4	0
2018	0.2	0.6	-	0.4	0.6	-	0.8	-
2023	0.3	0.8	-	1.5	0.7	-	2.1	0.4
year	Quadrat Cover (%)							
2013	0.1	-	-	0.1	0.3	0.2	0.2	-
2016	1.1	0.0	0.3	2.7	0.1	0.0	0.4	0.0
2018	0.9	0.0	-	1.3	0.4	0.0	0.6	-
2023	0.3	0.4	-	2.0	0.0	0.0	0.2	0.0

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

**Table 28-23.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2013	180	-	0	44	56	11	0	22	27/47
2016	200	-	10	70	20	30	30	20	27/49
2018	160	-	13	75	13	25	13	0	20/39
2023	400	180	10	90	0	10	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2013	20	-	0	100	0	0	0	0	28/44
2016	20	-	0	100	0	0	0	0	37/74
2018	60	-	0	100	0	0	0	0	66/75
2023	20	-	0	100	0	0	0	0	- / -
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
2013	-	-	-	-	-	-	-	-	79/84
2016	-	-	-	-	-	-	-	-	86/150
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2013	-	-	-	-	-	-	-	-	- / -
2016	180	-	0	100	0	0	0	0	35/58
2018	20	-	0	100	0	0	0	0	43/41
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	28/37
2023	80	-	25	75	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2013	200	-	50	50	0	0	0	0	24/26
2016	4240	20	6	93	1	0	0	1	28/36
2018	1900	-	25	66	8	4	1	2	18/21
2023	4720	7300	31	69	1	0	0	1	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2013	60	-	0	33	67	0	0	67	- / -
2016	40	-	0	50	50	0	0	0	- / -
2018	40	-	0	100	0	0	0	0	- / -
2023	60	-	33	67	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
2013	120	20	0	83	17	0	0	17	12/29
2016	140	-	0	100	0	0	0	14	10/22
2018	60	-	0	100	0	0	0	0	10/21
2023	80	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
2013	180	40	67	33	0	0	0	44	- / -
2016	140	160	43	57	0	0	0	29	- / -
2018	200	80	80	20	0	0	0	0	- / -
2023	240	-	33	67	0	8	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2013	20	-	100	0	0	0	0	0	- / -
2016	20	-	0	100	0	0	100	0	31/26
2018	20	-	0	100	0	0	0	0	28/57
2023	20	-	0	100	0	0	0	0	- / -

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

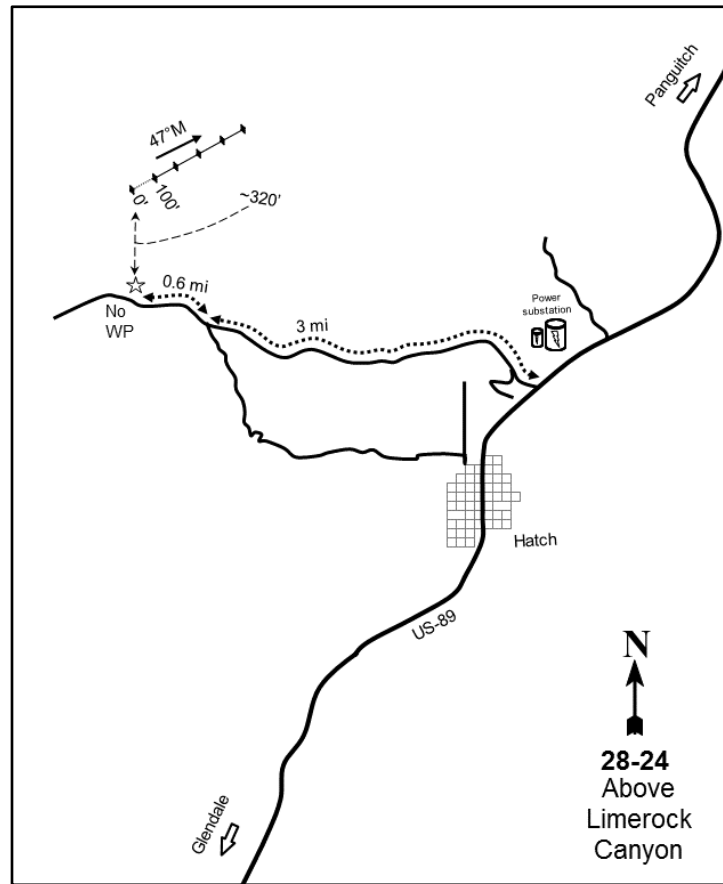
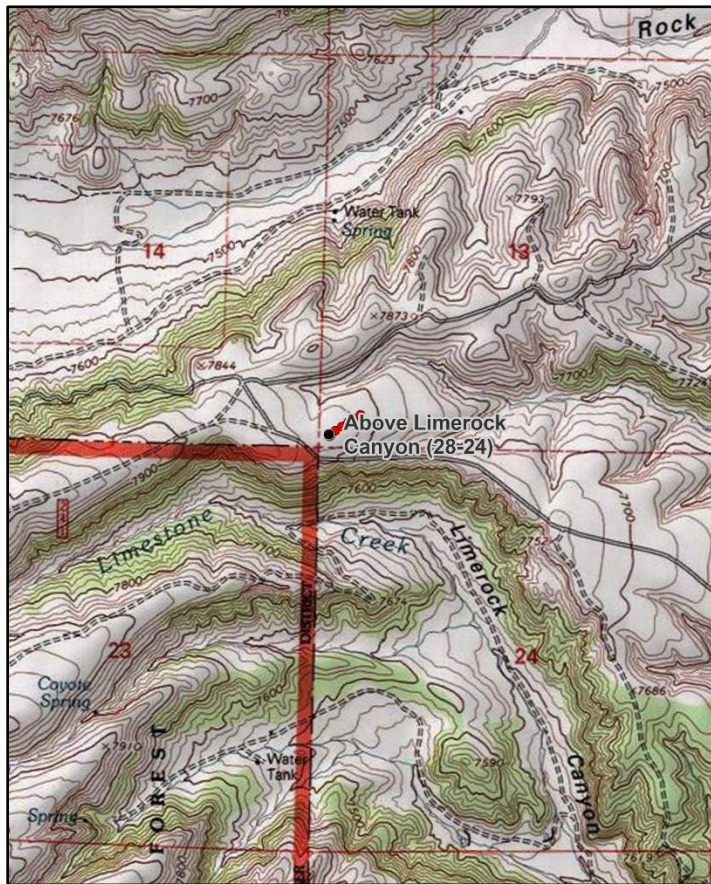
**Table 28-23.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2013	76	11	50	17	22	-	8.2
2016	51	13	56	31	-	-	6.4
2018	69	6	82	12	-	-	10.4
2023	73	-	67	33	-	-	6.5
<b>Pinus edulis (twoneedle pinyon)</b>							
2013	89	10	55	20	15	-	5.5
2016	71	15	45	40	-	-	4.3
2018	79	26	53	21	-	-	4.2
2023	73	21	47	32	-	-	5.1
<b>Pinus ponderosa (ponderosa pine)</b>							
2023	7	-	100	-	-	-	2.0

**Table 28-23.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	0.3	0.0	0.0	3.1	0.0	0.4	0.0	<b>3.8</b>	Very Poor
2016	0.4	0.0	0.0	25.9	-0.2	0.3	0.0	<b>26.4</b>	Very Poor
2018	1.0	0.0	0.0	23.9	0.0	0.1	0.0	<b>25.0</b>	Very Poor
2023	2.0	0.0	0.0	25.9	-5.6	1.0	-2.0	<b>21.3</b>	Very Poor

## ABOVE LIMEROCK CANYON - STUDY NO. 28-24



### Location Information

USGS 7.5 min Map Info Hatch SW; Township 36S, Range 6W, Section 13  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 368953 East 4170701 North

### Transect Information

Browse Tag # (0' Stake) 571  
 Transect Bearing 47° 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: 1ft

### Directions to Site

Driving north from the town of Hatch, turn left onto Pass Creek Road (in between two power substations). Continue east on this road for about 3 miles to a fork with the "To Hatch" road. Proceed straight for 0.6 miles and park; there is no witness post. The 0-foot stake is approximately 320 feet north of the road and is marked by browse tag #571.

### Site Information

Land Ownership Federal  
 Land Administrator BLM  
 Allotment ROCK CANYON  
 Elevation 7,800ft (2,377m)  
 Aspect Northeast  
 Slope 2%  
 Sample Dates 06/20/2018, 06/21/2023

**Table 28-24.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	South Canyon (Limestone)	3264	November 2015	1694
Mechanical - Bullhog	South Canyon (Limestone)	3264	October 2015-January 2016	1694

**Table 28-24.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Canyon Limestone			Aerial	Nov 2015	1694
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	2.51	2.33
G	Agropyron cristatum	Crested Wheatgrass	Nordan	1.48	1.19
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.53	1.40
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.89
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.36	0.30
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.15	0.13
G	Psathyrostachys juncea	Russian Wildrye	Bozoisky	1.00	0.89
F	Linum perenne	Blue Flax	Appar	1.00	0.84
F	Medicago sativa	Alfalfa	Ladak +	1.24	1.15
F	Onobrychis viciifolia	Sainfoin	Eski	1.77	1.72
F	Penstemon palmeri	Palmer Penstemon	Rocky Mountain	0.30	0.14
F	Penstemon palmeri	Palmer Penstemon	Carbon/Emery	0.21	0.18
F	Sanguisorba minor	Small Burnet		1.65	1.36
F	Sphaeralcea grossulariifolia	Gooseberryleaf Globemallow	Iron	0.06	0.05

**Wildlife Habitat and Vegetation History**

**Table 28-24.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter
Greater Sage-Grouse		

**Table 28-24.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Bitterbrush/Mountain Big Sagebrush	Phase I
2023	Bitterbrush/Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Soils**

**Table 28-24.5 - 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
Loam	6.4	50.2	29.4	20.4	3.1	43.0	300.0	0.3	06/20/2018

**Site Potential**

1981 - 2010 Average Annual Precipitation 17 inches  
 NRCS Ecological Site Mountain Stony Loam (Antelope Bitterbrush)  
 NRCS Ecological Site # R047XB456UT  
 States and Transitions No state and transition model is available for this ecological site.

Since study establishment in 2018, the plant community on this site has existed as a stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*) with a minor component of black sagebrush (*A. nova*) (Photos, Table 28-24.12, Table 28-24.13). The herbaceous understory has remained abundant and mainly composed of perennial grasses, with the introduced and seeded species crested wheatgrass (*Agropyron cristatum*) providing most of the cover in both sample years; forbs have lacked in diversity and abundance (Table 28-24.7, Table 28-24.10, Table 28-24.11). Although the area underwent a bullhog and seeding treatment in the winter of 2015 (Table 28-24.1), small twoneedle pinyon (*Pinus edulis*) were observed in cover and density measurements in both 2018 and 2023 (Table 28-24.12, Table 28-24.13, Table 28-24.14), indicating that there may be potential for infilling in future sample years.

Deer winter range has remained in good condition since study establishment. Improvement to deer wintering range can be accomplished through efforts that support preferred browse recruitment while increasing native perennial forb cover (Table 28-24.15). According to pellet transect data, deer presence was moderate in 2018 and low in 2023 (Table 28-24.9).

**Trend Summary Tables**

**Table 28-24.6 - 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
2018	31.7	0.1	0.0	41.3	0.2	0.1
2023	35.1	-	0.2	46.0	-	0.5

**Table 28-24.7 - 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
2018	-	280	1	16	-	18.4	0.0	0.2
2023	-	326	62	25	-	16.9	0.2	0.2

**Table 28-24.8 - 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
2018	12.9	0.2	61.9	6.9	11.5	42.4
2023	4.2	-	49.9	9.9	8.1	46.0

**Table 28-24.9 - 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			
2018	1	7	2	30
2023	-	12	1	5
Days Use Per Acre (ha)				
2018	2.2 (5.4)	20.1 (49.7)	2.7 (6.6)	-
2023	-	10.7 (26.5)	0.7 (1.7)	-

**Table 28-24.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	<i>Achnatherum hymenoides</i> (Indian ricegrass)	<i>Achnatherum lettermanii</i> (Letterman's needlegrass)	<i>Agropyron cristatum</i> <sup>1</sup> (crested wheatgrass)	<i>Bouteloua gracilis</i> (blue grama)	<i>Elymus elymoides</i> (squirreltail)	<i>Elymus trachycaulus</i> (slender wheatgrass)	<i>Hesperostipa comata</i> (needle and thread)	<i>Poa fendleriana</i> (muttongrass)	<i>Poa pratensis</i> <sup>1</sup> (Kentucky bluegrass)	<i>Poa secunda</i> (Sandberg bluegrass)
year	Nested Frequency									
2018	3	16	147	41	121	-	7	2	2	-
2023	7	12	227	40	94	4	14	2	-	1
year	Average Cover (%)									
2018	0.4	0.7	8.9	2.6	5.2	-	0.5	0.1	0.0	-
2023	0.5	0.4	10.6	2.6	2.5	0.0	0.3	0.0	-	0.0

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

**Table 28-24.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Calochortus nuttallii (sego lily)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lotus utahensis (Utah bird's-foot trefoil)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)	Sanguisorba minor <sup>a</sup> (small burnet)	Trifolium (clover)
year	Nested Frequency										
2018	-	-	1	-	-	-	-	-	8	3	5
2023	0	2	-	2	2	62	4	4	4	-	7
year	Average Cover (%)										
2018	-	-	0.0	-	-	-	-	-	0.1	0.1	0.0
2023	0.0	0.0	-	0.0	0.0	0.2	0.0	0.0	0.0	-	0.1

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

**Table 28-24.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Opuntia polyacantha (plains pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)				
2018	5.6	15.9	0.2	0.1	19.8
2023	8	14.4	-	0.5	23.6
year	Quadrat Cover (%)				
2018	3.4	12.6	0.1	0.0	15.8
2023	6.9	11.0	-	0.2	17.3

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

**Table 28-24.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2018	1200	-	0	92	8	15	0	5	43/74
2023	1580	20	0	90	10	25	3	9	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	3740	220	10	80	11	2	0	5	55/68
2023	3200	1180	1	92	7	24	1	7	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2018	140	-	71	29	0	57	0	0	12/18
2023	40	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	40	-	0	100	0	0	0	50	14/27
2023	80	-	0	100	0	0	0	0	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2018	-	-	-	-	-	-	-	-	- / -
2023	20	-	0	100	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	80	80	75	25	0	0	0	0	- / -
2023	160	-	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	2060	-	15	85	0	39	21	0	71/122
2023	3160	340	3	97	0	23	46	0	- / -

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

**Table 28-24.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

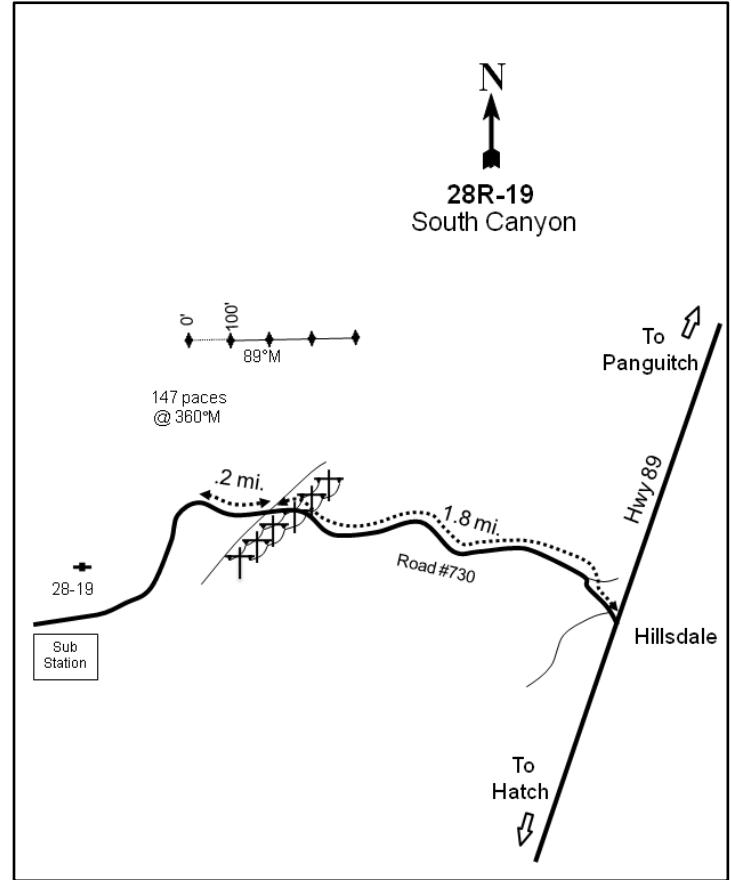
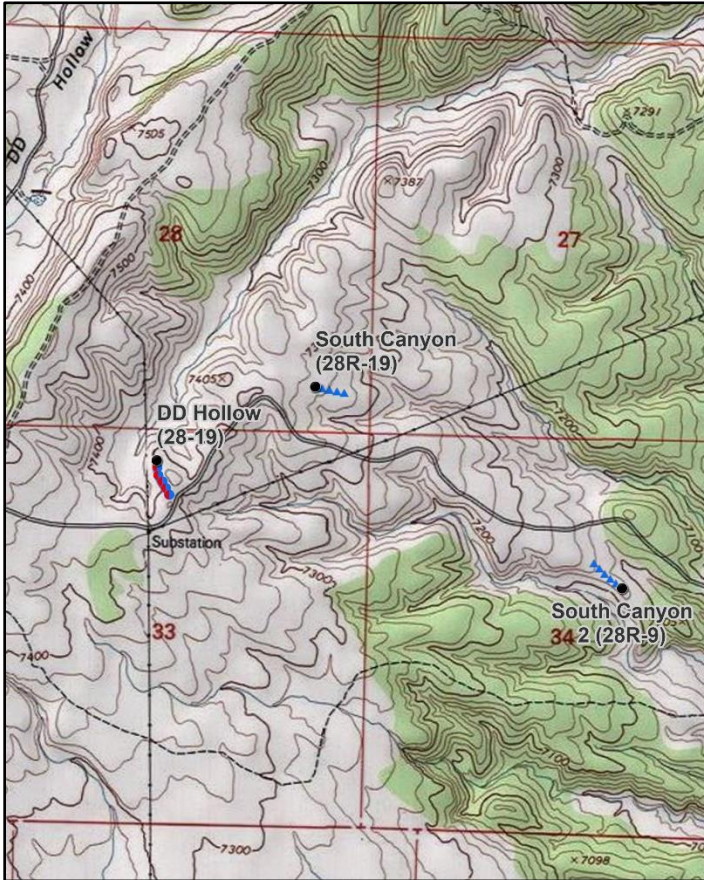
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2023	3	-	100	-	-	-	2.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	78	80	20	-	-	-	1.1
2023	43	15	85	-	-	-	1.9

**Table 28-24.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	30.0	13.4	5.3	30.0	0.0	0.3	0.0	<b>79.1</b>	Good
2023	30.0	13.8	1.0	30.0	0.0	0.4	0.0	<b>75.2</b>	Good



## SOUTH CANYON - STUDY NO. 28R-19

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Hatch NE; Township 35S, Range 5W, Section 28  
NAD 83 UTM ZONE 12, 375044 East 4177068 North

**Transect Information**

Browse Tag # (0' Stake)	193
Transect Bearing	89° magnetic
Length	400ft
Belt Placement	Line 1 (11ft & 95ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

**Directions to Site**

From the turnoff to Red Canyon, drive south for 2 miles towards Hatch. Turn right and proceed west on road #730, then drive 1.8 miles to a road and powerlines: continue on the same road for another 0.2 miles. The 0-foot stake is about 147 paces north of the road and is marked with browse tag #193.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	SOUTH CANYON
Elevation	7,278ft (2,218m)
Aspect	East
Slope	4-5%
Sample Dates	07/12/2011, 08/13/2014, 08/14/2018, 08/22/2023

**Table 28R-19.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	South Canyon Year 2	2027	October 2011-January 2012	1901
Seeding - Aerial Before	South Canyon Year 2	2027	October 2011	1901

**Table 28R-19.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
South Canyon Year 2			Aerial	Oct 2011	1900
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	<i>Achnatherum hymenoides</i>	Indian Ricegrass	Rimrock	1.95	1.85
G	<i>Agropyron cristatum</i>	Crested Wheatgrass	Hycrest II	2.45	2.16
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.58	0.46
G	<i>Elymus wawawaiensis</i>	Snake River Wheatgrass	Secar	0.92	0.85
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	0.11	0.11
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	0.53	0.39
G	<i>Leymus cinereus</i>	Great Basin Wildrye	Trailhead	0.82	0.75
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Luna	0.42	0.39
G	<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass		1.58	1.47
F	<i>Linum perenne</i>	Blue Flax	Appar	1.00	0.73
F	<i>Medicago sativa</i>	Alfalfa	Nomad	0.23	0.21
F	<i>Medicago sativa</i>	Alfalfa	Nomad	0.26	0.24
F	<i>Medicago sativa</i>	Alfalfa	Ladak +	0.50	0.48
F	<i>Onobrychis viciifolia</i>	Sainfoin	Eski	1.00	0.95
F	<i>Sanguisorba minor</i>	Small Burnet	Delar	1.50	1.41

**Wildlife Habitat and Vegetation History****Table 28R-19.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 28R-19.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2011	Pinyon	Phase III
2014	Black Sagebrush/Perennial Grass	Phase I
2018	Black Sagebrush/Perennial Grass	Phase I
2023	Black Sagebrush/Perennial Grass	Phase I

**Site Notes**

No Notes

**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 2011, this site was dominated by twoneedle pinyon (*Pinus edulis*) and considered to be within Phase III of woodland succession (Table 28R-19.4). Browse species such as black sagebrush (*Artemisia nova*) and antelope bitterbrush (*Purshia tridentata*) were present, but provided little cover. The herbaceous understory was sparse. A bullhog and seeding treatment in the Fall of 2011 removed most of the trees (Table 28R-19.1), and black sagebrush and perennial grasses have been the the major vegetation components since 2014 (Table 28R-19.7, Table 28R-19.12, Table 28R-19.13, Table 28R-19.14). In 2023, the introduced species intermediate wheatgrass (*Thinopyrum intermedium*) and native species squirreltail (*Elymus elymoides*) provided the most perennial grass cover; forbs have remained rare. (Table 28R-19.10, Table 28R-19.11). Although the study site was considered to be within Phase I of woodland succession in 2023, point-quarter density of pinyon has slightly increased overall since 2014, indicating that there may be potential for infilling over time (Table 28R-19.4, Table 28R-19.14).

Deer winter range condition has ranged from poor to excellent since study establishment. Prior to treatment, this site was considered to be poor for wintering range, but preferred browse cover has increased overall since 2011. As of 2023, deer winter range condition was considered to be good to excellent. Further improvement to deer wintering range can be accomplished through efforts that diversify and increase cover of native perennial forbs (Table 28R-19.15). According to pellet transect data, deer presence has remained low since study establishment (Table 28R-19.9).

### Trend Summary Tables

**Table 28R-19.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2011	7.1	0.0	11.6	9.9	-	32.0
2014	6.2	0.2	0.0	8.9	-	0.2
2018	7.0	0.6	1.0	8.2	0.5	1.0
2023	16.1	0.9	1.4	19.8	0.7	1.6

**Table 28R-19.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2011	1	101	167	15	0.0	1.4	0.5	0.4
2014	-	310	8	67	-	19.3	0.1	2.5
2018	4	332	-	28	0.0	16.4	-	0.3
2023	-	339	10	28	-	20.5	0.2	0.6

**Table 28R-19.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2011	20.0	0.6	52.8	16.4	4.8	21.3
2014	6.5	0.4	62.1	9.1	1.5	30.8
2018	14.3	-	63.0	8.0	3.5	27.5
2023	15.3	0.1	44.9	10.1	1.7	33.4

**Table 28R-19.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2011	1	1	-	17
2014	1	6	-	7
2018	3	3	-	44
2023	7	7	-	10
Year	Days Use Per Acre (ha)			
2011	-	6.0 (14.9)	0.7 (1.7)	-
2014	-	12.8 (31.5)	-	-
2018	5.8 (14.3)	12.1 (29.8)	-	-
2023	13.8 (34.1)	2.0 (5.0)	-	-

**Table 28R-19.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex douglasii (Douglas' sedge)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Elymus wawawaiensis (Snake River wheatgrass)	Hesperostipa comata (needle and thread)	Leymus cinereus (basin wildrye)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency														
2011	-	-	30	1	-	-	75	-	-	-	-	-	3	-	-
2014	14	38	87	-	-	-	203	76	0	0	4	-	9	-	-
2018	10	20	81	4	9	1	233	97	7	4	8	1	7	-	-
2023	9	24	61	-	6	-	187	-	-	7	1	-	5	3	195
year	Average Cover (%)														
2011	-	-	0.6	0.0	-	-	0.8	-	-	-	-	-	0.0	-	-
2014	0.4	1.4	2.9	-	-	-	11.8	2.3	0.1	0.0	0.1	-	0.1	-	-
2018	0.4	0.7	3.8	0.0	0.2	0.0	8.0	2.5	0.2	0.3	0.3	0.0	0.0	-	-
2023	0.8	1.3	1.9	-	0.1	-	6.9	-	-	0.2	0.1	-	0.3	0.0	8.9

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

**Table 28R-19.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis demissa (nodding rockcress)	Astragalus lentiginosus (freckled milkvetch)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cirsium (thistle)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Linum perenne <sup>i</sup> (blue flax)	Lithospermum incisum (narrowleaf stoneseed)	Lotus utahensis (Utah bird's-foot trefoil)	Medicago sativa <sup>i</sup> (alfalfa)	Phlox longifolia (longleaf phlox)	Pleiacanthus spinosus (thorn skeletonweed)	Polygonum douglasii <sup>ai</sup> (Douglas' knotweed)	Sanguisorba minor <sup>i</sup> (small burnet)
year	Nested Frequency																
2011	-	3	2	6	2	49	7	120	3	-	-	-	-	3	-	10	-
2014	-	2	-	-	-	6	-	2	-	46	2	6	1	-	-	-	25
2018	-	2	-	-	4	-	-	-	-	4	-	1	-	-	3	-	10
2023	1	0	-	-	3	5	-	-	-	-	-	8	1	-	-	5	-
year	Average Cover (%)																
2011	-	0.0	0.0	0.3	0.1	0.2	0.0	0.3	0.0	-	-	-	-	0.0	-	0.0	-
2014	-	0.0	-	-	-	0.0	-	0.0	-	1.9	0.1	0.0	0.0	-	-	-	0.4
2018	-	0.2	-	-	0.0	-	-	-	-	0.0	-	0.0	-	-	0.0	-	0.0
2023	0.0	0.0	-	-	0.0	0.0	-	-	-	-	-	0.2	0.1	-	-	0.2	-

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

FORB SPECIES		
	Sphaeralcea coccinea (scarlet globemallow)	
	Zigadenus paniculatus (foothill deathcamas)	
year	Nested	
2011	-	1
2014	2	-
2018	5	-
2023	15	-
year	Average Cover (%)	
2011	-	0.0
2014	0.0	-
2018	0.0	-
2023	0.2	-

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

**Table 28R-19.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES										
Artemisia frigida <sup>a</sup> (prairie sagewort)										
Artemisia nova <sup>a</sup> (black sagebrush)										
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)										
Ericameria nauseosa (rubber rabbitbrush)										
Gutierrezia sarothrae (broom snakeweed)										
Juniperus scopulorum <sup>i</sup> (Rocky Mountain juniper)										
Opuntia polyacantha (plains pricklypear)										
Pinus edulis <sup>i</sup> (twoneedle pinyon)										
Purshia tridentata <sup>p</sup> (antelope bitterbrush)										
year	Line Intercept Cover (%)									
2011	-	6.9	-	-	-	2.4	-	29.6	3	
2014	-	8.1	-	-	-	0.2	-	-	0.8	
2018	-	8	-	0.5	-	0.7	-	0.3	0.2	
2023	-	17.8	-	0.3	0.3	0.9	0.1	0.7	2	
year	Quadrat Cover (%)									
2011	-	5.5	-	-	-	1.0	0.0	10.6	1.6	
2014	-	5.9	-	-	0.0	0.0	0.1	0.0	0.4	
2018	0.4	5.8	0.1	0.6	-	0.6	-	0.4	0.7	
2023	0.1	12.7	-	0.8	0.0	0.8	0.0	0.5	3.2	

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

**Table 28R-19.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia frigida<sup>p</sup> -- (prairie sagewort)</b>									
2011	-	-	-	-	-	-	-	-	15/22
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	0	100	0	0	0	0	-/-
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2011	3400	1840	22	49	29	5	0	15	30/59
2014	3880	40	27	71	2	45	20	2	28/53
2018	5000	40	22	76	2	6	0	2	28/49
2023	4140	640	14	83	2	18	7	2	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2011	20	-	0	100	0	0	0	0	61/78
2014	40	-	0	100	0	50	0	0	49/98
2018	20	-	0	100	0	0	0	0	26/51
2023	20	-	0	100	0	100	0	0	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2011	-	-	-	-	-	-	-	-	74/100
2014	20	-	0	100	0	0	0	0	37/32
2018	20	-	0	100	0	0	0	0	53/80
2023	20	-	0	100	0	0	0	0	-/-
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
2011	-	-	-	-	-	-	-	-	-/-
2014	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	32/40
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2011	-	-	-	-	-	-	-	-	21/26
2014	20	-	0	100	0	0	0	0	27/40
2018	20	-	0	100	0	0	0	0	20/21
2023	60	-	0	100	0	0	0	0	-/-
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
2011	20	-	0	100	0	0	0	0	-/-
2014	40	60	100	0	0	0	0	0	-/-
2018	20	-	100	0	0	0	0	0	-/-
2023	20	-	0	100	0	0	0	0	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2011	60	-	0	100	0	0	0	0	14/27
2014	40	-	0	100	0	0	0	0	10/17
2018	40	-	0	100	0	0	0	0	11/21
2023	40	-	0	100	0	0	0	0	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2011	400	140	35	45	20	0	0	10	-/-
2014	60	-	100	0	0	0	0	0	-/-
2018	60	20	67	33	0	0	0	0	-/-
2023	60	-	33	67	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2011	420	-	57	33	10	43	0	5	93/160
2014	260	-	69	31	0	31	23	8	60/84
2018	340	-	12	88	0	24	53	0	42/77
2023	340	-	24	77	0	12	53	0	-/-

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

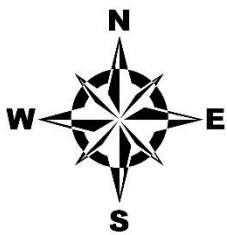
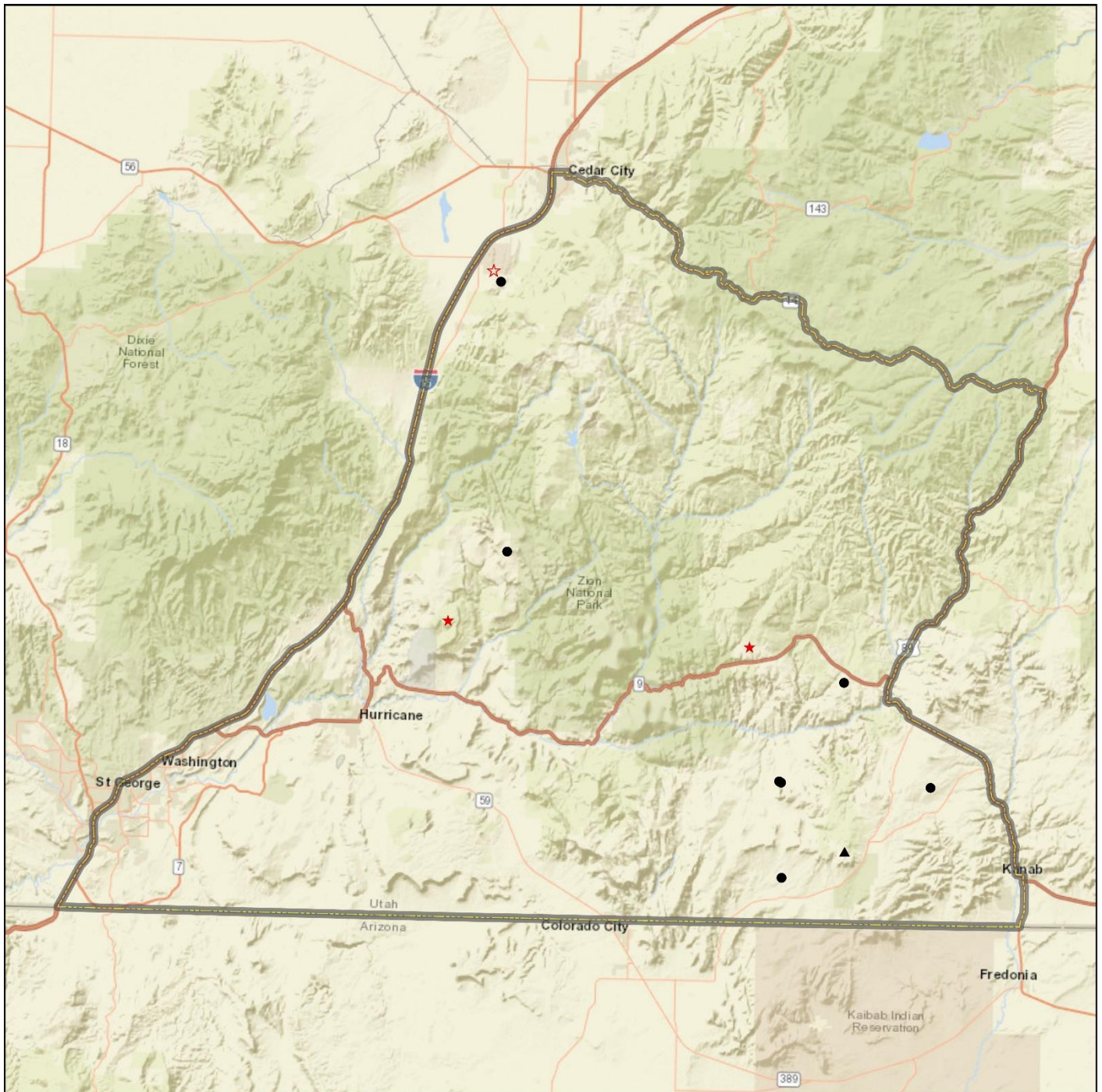
**Table 28R-19.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2011	4	-	-	-	-	100	17.0
2023	1	-	100	-	-	-	5.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2011	285	5	10	30	10	45	14.4
2014	21	14	86	-	-	-	3.0
2018	30	29	71	-	-	-	2.6
2023	28	21	79	-	-	-	3.6

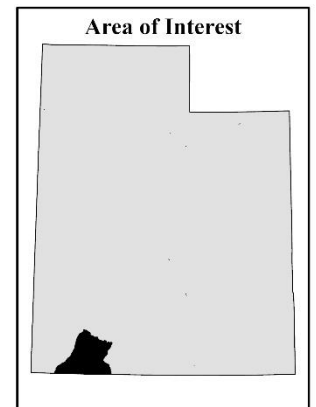
**Table 28R-19.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2011	13.1	8.0	15.0	2.8	0.0	0.9	0.0	<b>39.8</b>	Poor
2014	11.3	14.6	15.0	30.0	0.0	5.0	0.0	<b>75.9</b>	Good
2018	10.3	14.5	11.1	30.0	0.0	0.7	0.0	<b>66.5</b>	Fair-Good
2023	25.3	14.4	7.7	30.0	0.0	1.3	0.0	<b>78.6</b>	Good-Excellent

# WILDLIFE MANAGEMENT UNIT 29 – ZION



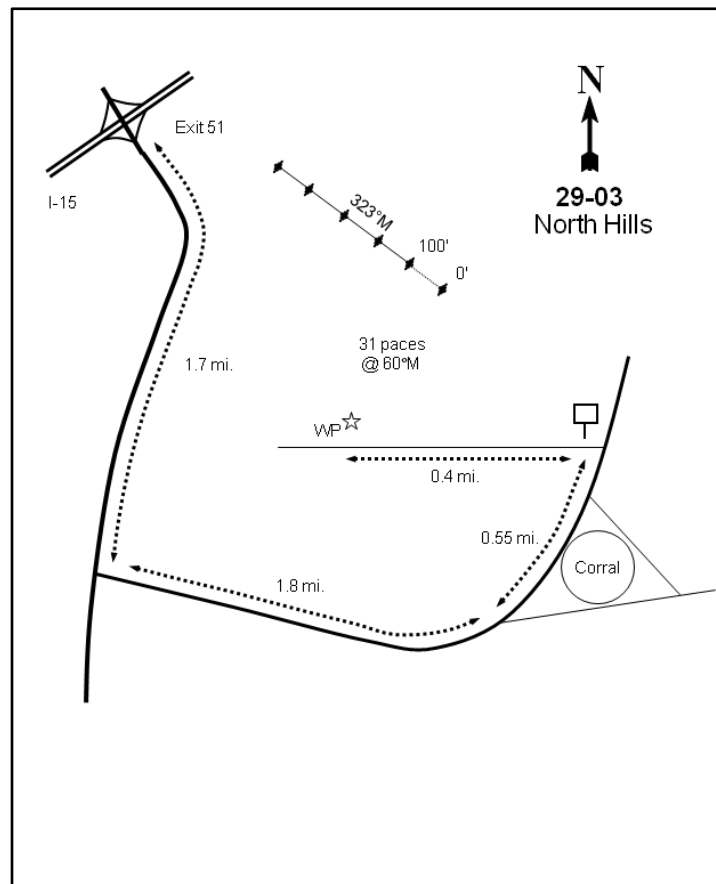
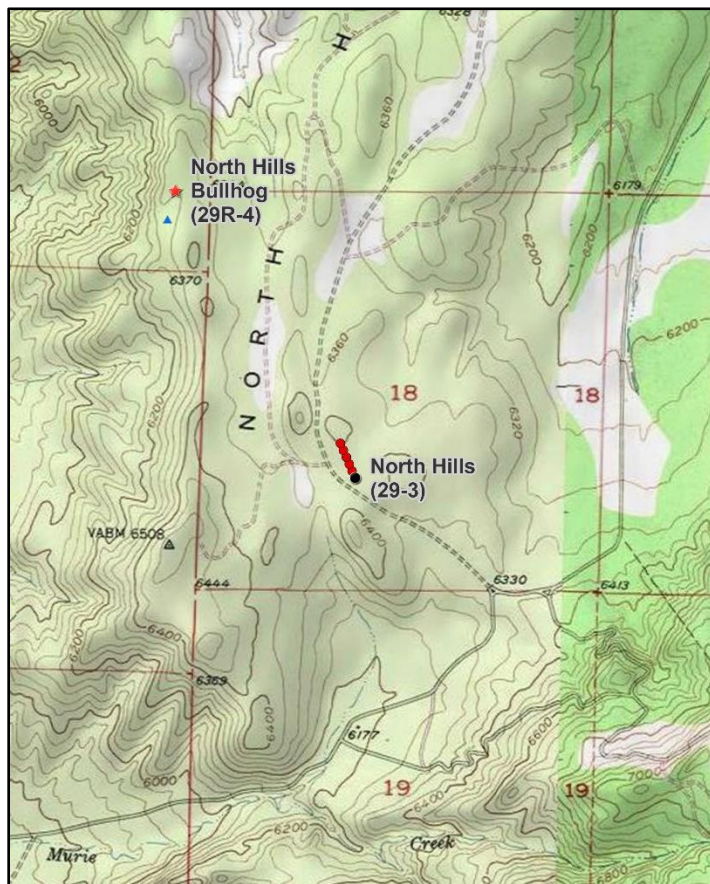
Study Locations Project, Status	Unit Boundary
● RT, Active	▭ Unit - 29
★ RT, Suspended	
▲ WRI, Active	
☆ WRI, Suspended	



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



## NORTH HILLS - STUDY NO. 29-3

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Kanarrville NE; Township 37S, Range 11W, Section 18  
NAD 83 UTM ZONE 12, 311446 East 4161328 North

**Transect Information**

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

133  
323° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Belt 4: 1ft; Belt 5: No Rebar

**Directions to Site**

From Exit #51 (Hamilton Fort), cross under the highway and proceed south on the east side of the freeway for 1.7 miles. Turn left and continue for 1.8 miles to a corral. Stay left and proceed for 0.55 miles to a turnoff into the chaining with a sign that says "North Hills Reseeding." Continue 0.4 miles to a witness post on the right (north) side of the road. Walk 31 paces at 60 degrees magnetic from the witness post to the 0-foot stake, which is marked by browse tag #133.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	HAMILTON FORT
Elevation	6,390ft (1,948m)
Aspect	East-Southeast
Slope	5%
Sample Dates	07/16/1998, 07/08/2003, 07/08/2008, 05/20/2013, 05/17/2018, 05/17/2023

**Table 29-03.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	1967	-
Seeding - Seed Unknown	-	-	1967	-
Hand Crew - Lop and Scatter	-	-	Between 2008 and 2013	-

**Wildlife Habitat and Vegetation History****Table 29-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

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

**Table 29-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1998	Mixed Mountain Brush	Phase I
2003	Mixed Mountain Brush	Phase I
2008	Mixed Mountain Brush	Phase I
2013	Mixed Mountain Brush	Phase I
2018	Mixed Mountain Brush	Phase I
2023	Mixed Mountain Brush	Phase I

**Site Notes**

In 2013, cattle were seen on site, and wheatgrass species (*Agropyron cristatum*, *Thinopyrum intermedium*) were heavily grazed. Utah serviceberry (*Amelanchier utahensis*) had a minor infestation of tent caterpillars in 2013. A four-point set of deer antler sheds were found on the site in 2018.

**Soils****Table 29-03.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Loam	6.8	70.0	14.2	15.8	3.1	9.4	16.0	0.5	07/16/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      13 inches  
 NRCS Ecological Site    Mountain Loam (Browse)  
 NRCS Ecological Site #    R047XB420UT  
 States and Transitions    No state and transition model is available for this ecological site.

Since study establishment in 1998, this site has maintained a stable stand of mixed mountain brush that includes species such as Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and Gambel oak (*Quercus gambelii*) as the dominant species (Table 29-03.12, Table 29-03.13). The introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) has remained a major component of the herbaceous understory over the duration of the study, although a number of other grass species have also been present. Forbs have remained rare (Table 29-03.7, Table 29-03.10, Table 29-03.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been a minor component in all sample years, placing the site within Phase I of woodland succession (Table 29-03.4, Table 29-03.14). However, pinyon and juniper woodlands have dominated the areas surrounding the transect, indicating that there may be potential for continued encroachment over time (Photos).

Deer winter range condition has ranged between fair and good since study establishment; as of 2023, deer winter range condition was considered to be good. Improvement to deer wintering range can be accomplished through efforts that support diversification and increased cover of native perennial forbs and grasses while reducing cheatgrass (Table 29-03.15). According to pellet transect data, deer presence was high in 2018 and 2023. Elk pellet groups have not been observed since 2013 (Table 29-03.9). However, the sagebrush component of this site could provide valuable browse for elk during the winter months (Table 29-03.3; Wambolt, 1996).

## Trend Summary Tables

**Table 29-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	17.7	0.0	-	-	-	-
2003	16.7	-	-	16.8	-	-
2008	17.8	0.1	-	25.0	-	-
2013	21.7	0.0	-	21.3	-	-
2018	25.5	0.0	-	27.0	-	-
2023	26.6	0.8	-	28.7	0.6	-

**Table 29-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	27	344	1	21	0.2	23.8	0.0	0.3
2003	17	281	13	24	0.1	9.2	0.1	0.5
2008	120	259	18	30	0.6	5.4	0.0	0.1
2013	208	243	16	50	1.0	8.1	0.0	0.6
2018	114	172	3	35	0.7	5.4	0.0	0.3
2023	198	170	53	38	2.4	10.1	0.1	0.5

**Table 29-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	21.3	0.4	51.5	12.2	6.7	39.3
2003	33.8	0.0	36.8	17.1	5.6	24.6
2008	25.2	0.0	34.2	24.9	6.5	22.5
2013	41.9	0.0	38.2	5.6	5.0	28.6
2018	44.9	0.2	39.9	9.5	8.2	29.2
2023	33.4	0.4	36.5	14.1	7.2	33.6

**Table 29-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rocky Mountain Elk	Greater Sage-Grouse	Rabbit
	Quadrat Frequency					
1998	1	-	56	5	-	27
2003	2	-	34	-	-	32
2008	5	-	28	2	-	78
2013	2	-	22	-	-	51
2018	-	-	31	1	-	58
2023	-	-	24	3	-	30
Year	Days Use Per Acre (ha)					
1998	3.6 (9.0)	-	103.2 (254.9)	6.0 (14.9)	-	-
2003	5.1 (12.6)	-	117.9 (291.3)	0.7 (1.7)	-	-
2008	10.2 (25.1)	8.7 (21.5)*	59.6 (147.3)	2.7 (6.6)	26.2 (64.6)*	-
2013	2.2 (5.4)	-	23.4 (57.9)	-	-	-
2018	-	8.7 (21.5)*	69.0 (170.5)	-	-	-
2023	0.7 (1.8)	-	42.9 (105.9)	-	-	-

\*Pellets per acre (ha)

**Table 29-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency											
1998	3	271	-	-	24	21	-	6	-	10	142	3
2003	-	233	4	-	17	6	-	6	-	-	86	-
2008	-	231	0	-	120	3	5	3	-	2	43	-
2013	-	204	-	-	208	-	1	7	2	5	62	-
2018	-	128	4	-	114	13	-	17	-	-	37	-
2023	-	141	5	11	198	-	-	-	5	-	35	-
year	Average Cover (%)											
1998	0.0	19.5	-	-	0.2	0.5	-	0.4	-	0.3	3.0	0.0
2003	-	7.7	0.1	-	0.1	0.1	-	0.2	-	-	1.1	-
2008	-	4.4	0.0	-	0.6	0.0	0.0	0.0	-	0.0	0.9	-
2013	-	7.2	-	-	1.0	-	0.0	0.1	0.1	0.2	0.4	-
2018	-	4.6	0.0	-	0.7	0.3	-	0.1	-	-	0.4	-
2023	-	8.4	0.1	0.2	2.4	-	-	-	0.3	-	1.1	-

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

**Table 29-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Androstegium breviflorum (pink funnel lily)	Arabis (rockcress)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus lentiginosus (freckled milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chamaesyce (sandmat)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Draba <sup>a</sup> (draba)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (sty gilia)	Hymenoxys richardsonii (pingue rubberweed)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Lithospermum incisum (narrowleaf stoneseed)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)
year	Nested Frequency																
1998	-	1	-	12	-	-	-	-	-	-	-	-	-	-	10	-	1
2003	-	-	-	9	-	4	1	-	-	2	-	3	-	-	9	4	-
2008	-	-	-	12	-	18	-	-	-	-	-	-	-	-	4	-	-
2013	-	-	-	20	-	4	3	-	2	1	-	-	2	1	9	8	-
2018	-	1	-	12	4	2	-	3	-	-	-	-	-	-	5	-	-
2023	4	-	1	1	5	28	-	-	-	-	8	3	5	-	-	22	-
year	Average Cover (%)																
1998	-	0.0	-	0.3	-	-	-	-	-	-	-	-	-	-	0.0	-	0.0
2003	-	-	-	0.4	-	0.0	0.0	-	-	0.0	-	0.0	-	-	0.1	0.0	-
2008	-	-	-	0.1	-	0.0	-	-	-	-	-	-	-	-	0.0	-	-
2013	-	-	-	0.1	-	0.0	0.0	-	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-
2018	-	0.0	-	0.2	0.0	0.0	-	0.0	-	-	-	-	-	-	0.0	-	-
2023	0.0	-	0.0	0.0	0.0	0.1	-	-	-	-	0.0	0.0	0.2	-	-	0.0	-

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

FORB SPECIES	Oenothera caespitosa (tufted evening primrose)	Packera multilobata (lobeleaf groundsel)	Phlox longifolia (longleaf phlox)	Physalis crassifolia (yellow nightshade groundcherry)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency					
1998	-	-	-	-	-	-
2003	3	-	-	-	2	-
2008	8	-	4	-	2	-
2013	22	-	3	-	-	-
2018	10	-	-	3	-	1
2023	14	2	8	-	-	-
year	Average Cover (%)					
1998	-	-	-	-	-	-
2003	0.0	-	-	-	0.0	-
2008	0.0	-	0.0	-	0.0	-
2013	0.4	-	0.0	-	-	-
2018	0.1	-	-	0.0	-	0.0
2023	0.1	0.1	0.0	-	-	-

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

**Table 29-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)
year	Line Intercept Cover (%)							
1998	-	-	-	-	-	-	-	-
2003	4	0.2	8.2	-	-	-	-	4.4
2008	4.7	0.7	12.2	-	-	-	0	7.4
2013	6.4	0.7	10.1	-	-	-	-	4.1
2018	8.5	0.7	11.4	-	-	-	-	6.4
2023	9.5	1.5	12.9	-	0.6	-	-	4.8
year	Quadrat Cover (%)							
1998	2.3	0.3	12.9	0.0	-	-	-	2.2
2003	2.6	0.0	11.4	-	-	-	-	2.8
2008	4.5	0.2	11.4	0.1	-	-	0.0	1.7
2013	7.0	0.1	12.1	0.0	-	-	0.1	2.3
2018	6.7	1.2	11.8	-	0.0	-	-	5.9
2023	9.4	0.8	12.0	-	0.7	0.0	-	4.4

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

**Table 29-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1998	1040	-	37	60	4	21	2	0	93/136
2003	560	-	50	50	0	29	14	0	104/127
2008	740	20	65	35	0	22	22	3	114/133
2013	600	20	47	53	0	30	40	0	121/164
2018	780	780	44	56	0	31	3	0	137/181
2023	580	20	38	62	0	38	7	0	- / -
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1998	120	-	0	83	17	83	0	0	31/59
2003	20	-	0	100	0	0	0	0	33/71
2008	120	-	33	67	0	17	33	0	36/71
2013	100	-	20	80	0	20	0	0	43/69
2018	300	-	47	47	7	13	7	7	39/63
2023	160	-	13	75	13	0	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	1860	120	5	63	31	56	14	13	67/94
2003	1820	-	4	47	48	48	37	9	63/83
2008	2240	580	14	62	24	39	21	7	68/107
2013	2420	240	24	60	16	37	16	12	61/103
2018	2240	100	16	71	13	14	2	12	60/91
2023	2340	1020	22	59	19	3	1	18	- / -
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
1998	-	20	0	0	0	0	0	0	- / -
2003	20	-	100	0	0	0	0	0	- / -
2008	20	-	0	100	0	0	0	0	14/17
2013	20	-	100	0	0	0	0	0	12/12
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	106/66
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	-	-	-	-	-	-	-	-	31/23
2003	20	-	0	100	0	0	0	0	21/28
2008	100	-	20	80	0	0	0	0	13/12
2013	20	-	0	100	0	0	0	0	14/22
2018	140	-	0	71	29	0	0	0	12/18
2023	880	40	9	91	0	0	0	0	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	20	-	100	0	0	0	0	0	- / -
2008	20	-	100	0	0	0	0	0	- / -
2013	20	20	0	100	0	0	0	0	- / -
2018	-	20	0	0	0	0	0	0	- / -
2023	20	-	100	0	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1998	40	-	0	50	50	0	0	50	11/15
2003	-	-	-	-	-	-	-	-	13/33
2008	-	-	-	-	-	-	-	-	9/29
2013	-	-	-	-	-	-	-	-	13/29
2018	-	-	-	-	-	-	-	-	14/49
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	20	-	0	100	0	100	0	0	92/178
2003	20	-	0	100	0	0	100	0	91/136
2008	20	80	0	100	0	0	0	0	78/134
2013	20	-	0	100	0	100	0	0	127/235
2018	20	-	0	0	100	0	100	100	112/172
2023	-	-	-	-	-	-	-	-	-/-
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	940	60	36	64	0	0	0	0	120/73
2003	1420	-	16	85	0	0	0	0	95/66
2008	1900	140	26	74	0	5	0	0	107/60
2013	960	-	46	54	0	2	23	0	86/43
2018	1520	-	36	65	0	0	21	0	110/73
2023	1420	-	45	16	39	0	0	21	-/-

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

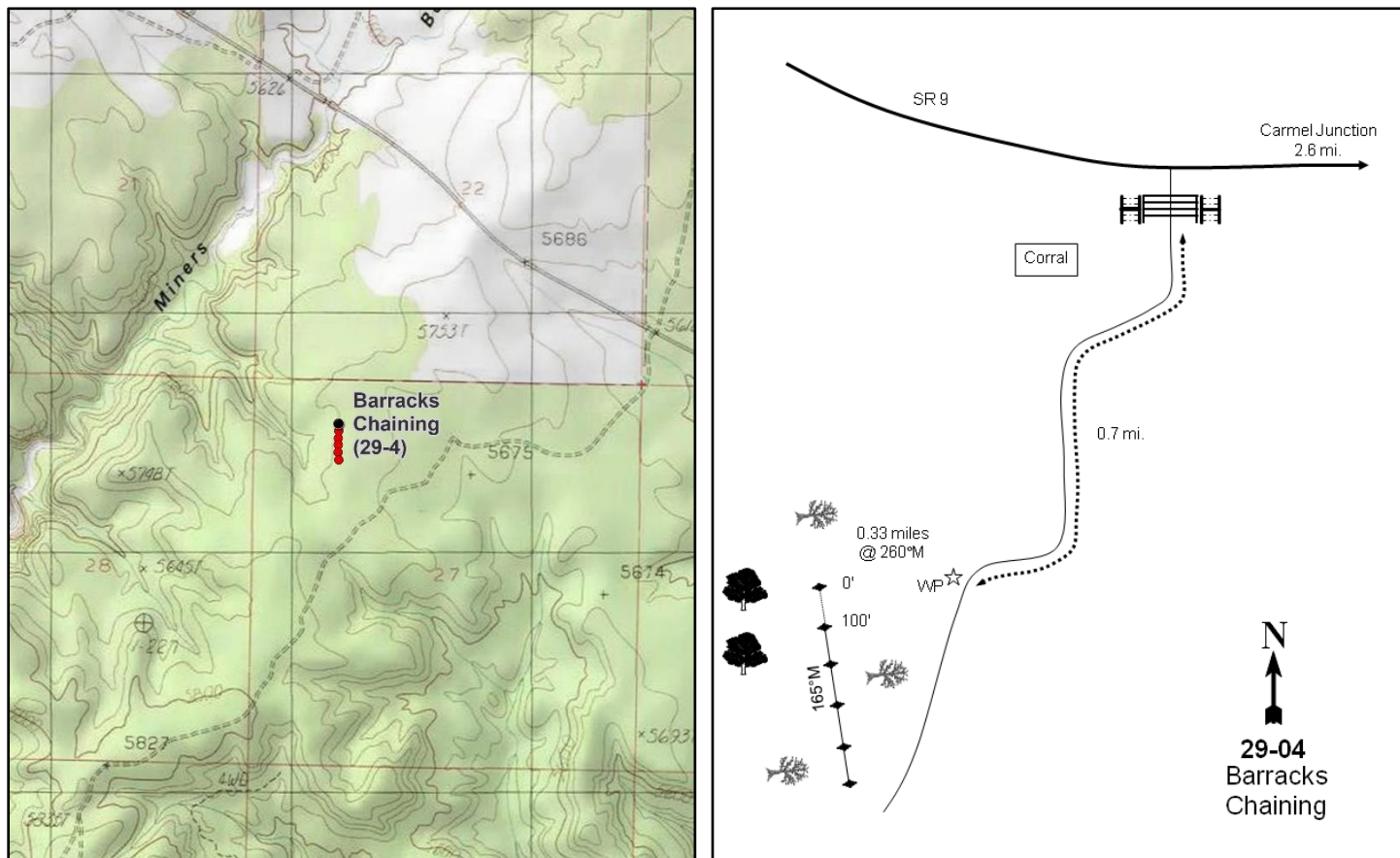
**Table 29-03.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	26	-	-	-	-	-	3.2
2003	18	-	100	-	-	-	3.1
2008	35	-	36	64	-	-	6.6
2013	15	-	71	29	-	-	5.3
2018	29	11	11	67	11	-	7.2
2023	25	-	13	50	38	-	18.6
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	5	-	-	-	-	-	6.0
2003	4	-	100	-	-	-	1.0
2008	9	17	33	33	-	17	5.5
2013	8	-	67	33	-	-	7.0
2018	9	-	80	-	20	-	5.8
2023	9	-	80	-	20	-	8.4

**Table 29-03.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	22.2	7.9	6.6	30.0	-0.2	0.7	0.0	<b>67.2</b>	Fair
2003	20.9	7.9	9.1	18.4	0.0	1.0	0.0	<b>57.3</b>	Fair
2008	30.0	11.5	13.9	10.9	-0.5	0.3	0.0	<b>66.1</b>	Fair
2013	27.2	12.8	15.0	16.2	-0.7	1.2	0.0	<b>71.6</b>	Fair-Good
2018	30.0	13.3	15.0	10.8	-0.5	0.6	0.0	<b>69.2</b>	Fair-Good
2023	30.0	10.3	15.0	20.2	-1.8	1.0	0.0	<b>74.7</b>	Good

## BARRACKS CHAINING - STUDY NO. 29-4

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Carmel NW; Township 41S, Range 8W, Section 27  
NAD 83 UTM ZONE 12, 346134 East 4120740 North

**Transect Information**

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

Not Available  
165° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

**Directions to Site**

From the junction of US-89 and SR-9 (Carmel Junction), proceed west on SR-9 for 2.6 miles to a road on the left (south) side of the highway. Turn left onto this road and go through a gate. Proceed for 0.7 miles, passing a corral on the right, to a witness post on the right (west) side of the road. From the witness post, walk one-third to one-half of a mile at 260 degrees magnetic to the 0-foot stake; there is no browse tag.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BARRACKS POINT
Elevation	5,730ft (1,747m)
Aspect	West
Slope	7%
Sample Dates	07/29/2003, 07/01/2008, 07/30/2013, 07/10/2018, 07/10/2023



**Table 29-04.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Historic	-
Seeding - Seed Unknown	-	-	Historic	-
Hand Crew - Lop and Scatter	-	-	Between 2013 and 2018	-

**Wildlife Habitat and Vegetation History****Table 29-04.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 29-04.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2003	Perennial Grass/Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Perennial Grass/Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Perennial Grass/Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2018	Perennial Grass/Mixed Mountain Brush	Phase I
2023	Perennial Grass/Mixed Mountain Brush	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation                      15 inches  
 NRCS Ecological Site    Mountain Loam (Browse)  
 NRCS Ecological Site #    R047XB420UT  
 States and Transitions    No state and transition model is available for this ecological site.

From study establishment in 2003 through the 2013 sample year, antelope bitterbrush (*Purshia tridentata*) was the dominant browse species on this site; cover of Utah serviceberry (*Amelanchier utahensis*) increased and it became codominant along with bitterbrush in 2018 (Table 29-04.12). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) were codominant vegetation components and the site was considered to be within Phase I transitioning to Phase II of woodland succession through the 2013 sample year. A lop and scatter treatment between 2013 and 2018 removed most of the trees, and the site was classified as being in Phase I in 2023 (Table 29-04.1, Table 29-04.4, Table 29-04.14). However, the treated area is surrounded on three sides by pinyon and juniper, making it susceptible to infilling by these species in future years (Photos). The introduced perennial grass species crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*Thinopyrum intermedium*) have contributed a majority of the herbaceous cover and have been codominant vegetation components in all years. Forbs have fluctuated, but perennial forbs -- particularly the native species Searls' prairie clover (*Dalea searlsiae*) -- provided moderate cover in 2023 (Table 29-04.7, Table 29-04.10, Table 29-04.11).

Deer winter range condition has ranged between poor and good since study establishment. However, preferred browse cover has increased in total since 2003, which has led to an overall improvement to deer winter range. In 2023, deer winter range condition was considered to be good. Improvement to deer wintering range can be accomplished through efforts that support mature preferred browse reproduction while reducing cheatgrass (Table 29-04.15). Pellet transect data indicates that deer presence has been high in most sample years (Table 29-04.9).

## Trend Summary Tables

**Table 29-04.6 - 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
2003	5.1	-	2.6	6.0	-	3.0
2008	5.1	0.0	4.2	7.9	-	4.2
2013	5.1	0.4	5.7	12.9	-	6.6
2018	5.5	0.0	-	9.6	-	-
2023	8.2	-	-	12.9	-	-

**Table 29-04.7 - 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
2003	10	199	32	114	0.6	5.5	2.7	7.5
2008	148	302	124	155	1.4	14.0	3.3	6.8
2013	75	328	36	131	0.3	14.7	0.2	1.5
2018	54	352	4	70	1.1	26.2	0.0	0.9
2023	176	382	60	143	5.4	28.4	0.8	8.4

**Table 29-04.8 - 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
2003	46.9	0.2	42.0	0.0	0.0	22.3
2008	36.1	0.1	46.5	0.0	-	34.8
2013	25.2	0.2	59.7	-	-	31.1
2018	37.7	0.4	55.3	0.2	0.1	32.6
2023	21.7	0.9	40.8	0.3	0.0	47.6

**Table 29-04.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2003	9	31	1	1	35
2008	6	24	-	-	89
2013	1	23	1	-	55
2018	6	6	-	-	28
2023	3	17	-	-	10
Year	Days Use Per Acre (ha)				
2003	13.8 (34.1)	44.9 (110.9)	-	-	-
2008	24.7 (61.0)	56.3 (139.0)	-	-	-
2013	10.9 (26.9)	62.3 (153.9)	-	0.6 (1.4)	-
2018	5.1 (12.6)	14.7 (36.4)	0.7 (1.7)	-	-
2023	13.8 (34.1)	42.9 (105.9)	-	1.2 (2.9)	-

**Table 29-04.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency										
2003	5	46	-	1	9	2	-	-	48	117	2
2008	-	108	-	60	146	7	1	-	8	213	9
2013	-	134	1	8	75	-	11	7	22	229	-
2018	5	114	4	9	53	4	1	-	63	254	4
2023	0	128	4	69	170	-	-	-	112	246	9
year	Average Cover (%)										
2003	0.0	1.2	-	0.1	0.6	0.0	-	-	0.7	3.4	0.0
2008	-	3.9	-	0.4	1.4	0.0	0.0	-	0.0	9.6	0.0
2013	-	5.0	0.0	0.4	0.3	-	0.1	0.4	0.4	8.3	-
2018	0.0	6.6	0.0	0.7	1.0	0.2	0.0	-	1.4	17.3	0.0
2023	0.0	7.2	0.1	1.7	5.4	-	-	-	2.9	16.5	0.1

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

**Table 29-04.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Amaranthus blitoides <sup>ai</sup> (mat amaranth)	Asclepias subverticillata (horsetail milkweed)	Astragalus (milkvetch)	Chaenactis douglasii (Douglas' dusty maiden)	Chamaesyce (sandmat)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Dalea searlsiae (Searls' prairie clover)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron divergens <sup>a</sup> (spreading fleabane)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus (lupine)
year	Nested Frequency																
2003	4	-	-	-	27	0	-	33	-	1	-	-	-	5	-	2	-
2008	-	-	-	5	50	1	11	31	4	6	-	6	7	-	99	-	1
2013	-	-	-	-	37	-	-	19	-	-	-	-	-	9	34	-	-
2018	-	-	-	-	22	-	-	10	-	1	-	-	-	4	-	-	-
2023	-	5	3	-	44	-	-	41	3	35	2	-	-	6	8	-	3
year	Average Cover (%)																
2003	0.0	-	-	-	0.6	0.1	-	2.5	-	0.0	-	-	-	0.1	-	0.1	-
2008	-	-	-	0.0	0.8	0.0	0.1	2.0	0.0	0.0	-	0.0	0.0	-	3.1	-	0.0
2013	-	-	-	-	0.3	-	-	0.3	-	-	-	-	-	0.0	0.1	-	-
2018	-	-	-	-	0.3	-	-	0.1	-	0.0	-	-	-	0.0	-	-	-
2023	-	0.2	0.0	-	1.6	-	-	4.2	0.0	0.5	0.0	-	-	0.1	0.0	-	0.0

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

FORB SPECIES	Medicago sativa <sup>i</sup> (alfalfa)	Microsteris gracilis <sup>a</sup> (slender phlox)	Nicotiana attenuata <sup>a</sup> (coyote tobacco)	Penstemon humilis (low beardtongue)	Penstemon leonardii (Leonard's beardtongue)	Phlox longifolia (longleaf phlox)	Plantago patagonica <sup>a</sup> (woolly plantain)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Psoraleidium tenuiflorum (slimflower scurfpea)	Solanum triflorum <sup>a</sup> (cutleaf nightshade)	Sphaeralcea parvifolia (smallflower globemallow)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency											
2003	-	-	6	1	1	9	-	-	15	23	66	0
2008	-	-	-	1	8	3	-	-	11	-	113	-
2013	-	-	-	6	5	-	-	1	4	-	93	2
2018	0	2	1	-	3	-	-	-	-	-	44	-
2023	-	3	-	-	-	3	3	-	5	7	97	-
year	Average Cover (%)											
2003	-	-	1.0	0.0	0.0	0.0	-	-	1.6	1.4	2.6	0.0
2008	-	-	-	0.0	0.0	0.0	-	-	0.3	-	3.7	-
2013	-	-	-	0.1	0.0	-	-	0.0	0.0	-	0.7	0.0
2018	0.0	0.0	0.0	-	0.0	-	-	-	-	-	0.5	-
2023	-	0.0	-	-	-	0.0	0.0	-	0.2	0.2	2.1	-

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

**Table 29-04.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Rhus trilobata <sup>p</sup> (skunkbush sumac)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)											
2003	1.6	0.7	-	-	1.8	-	1.2	-	3.7	-	-	-
2008	3.3	1	-	-	2.5	-	1.7	-	3.6	-	-	-
2013	1.2	3.3	-	-	4	0	2.6	-	4.4	1.4	0.1	2.5
2018	4.4	0.5	-	-	-	-	-	0	4.7	-	-	-
2023	5.1	0.2	-	-	-	-	-	-	7.6	-	-	-
year	Quadrat Cover (%)											
2003	1.7	0.4	-	-	1.6	-	1.0	-	3.0	-	-	-
2008	1.5	0.8	-	-	2.1	0.0	2.1	-	2.8	-	-	-
2013	0.1	1.6	0.0	-	3.4	0.4	2.4	-	2.3	0.6	0.0	0.5
2018	2.3	0.2	-	0.0	-	-	-	0.0	3.1	-	-	-
2023	5.7	0.5	-	-	-	-	-	-	2.0	-	-	-

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

**Table 29-04.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
2003	100	-	40	60	0	40	0	0	213/247
2008	20	-	0	100	0	0	0	0	246/257
2013	20	-	0	100	0	0	0	0	209/206
2018	120	100	33	67	0	0	0	0	234/331
2023	240	-	50	50	0	25	25	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2003	60	-	0	67	33	33	33	0	40/67
2008	740	5300	84	11	5	5	0	0	45/52
2013	780	140	44	54	3	23	18	0	46/64
2018	260	-	39	39	23	15	69	23	41/50
2023	200	-	0	100	0	50	20	30	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	42/25
2013	20	-	100	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	20	0	0	0	0	0	0	- / -
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	41/51
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	88/91
2018	-	-	-	-	-	-	-	-	97/131
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	37/58
2018	20	-	0	100	0	0	0	0	17/19
2023	-	-	-	-	-	-	-	-	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2003	120	-	100	0	0	0	0	0	- / -
2008	60	-	33	67	0	0	0	0	- / -
2013	60	-	0	100	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Opuntia -- (pricklypear)</b>									
2003	-	-	-	-	-	-	-	-	- / -
2008	20	-	0	100	0	0	0	0	13/23
2013	20	-	0	100	0	0	0	0	14/77
2018	-	-	-	-	-	-	-	-	- / -
2023	20	20	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Peraphyllum ramosissimum<sup>p</sup> -- (wild crab apple)</b>									
2003	-	-	-	-	-	-	-	-	187/220
2008	20	-	0	100	0	0	0	0	150/200
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	157/174
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2003	60	-	33	67	0	0	0	0	-/-
2008	60	-	0	100	0	0	0	0	-/-
2013	60	-	33	67	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	92/74
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2003	180	-	0	67	33	56	44	11	136/218
2008	160	-	13	38	50	38	0	25	139/207
2013	120	-	0	100	0	83	17	0	153/217
2018	160	-	13	75	13	0	0	0	144/214
2023	200	-	40	50	10	0	70	10	-/-
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2003	-	-	-	-	-	-	-	-	65/64
2008	-	-	-	-	-	-	-	-	111/79
2013	100	-	0	100	0	0	0	0	-/-
2018	-	-	-	-	-	-	-	-	137/88
2023	-	-	-	-	-	-	-	-	-/-
<b>Rhus trilobata<sup>p</sup> -- (skunkbush sumac)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	214/276
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	271/313

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

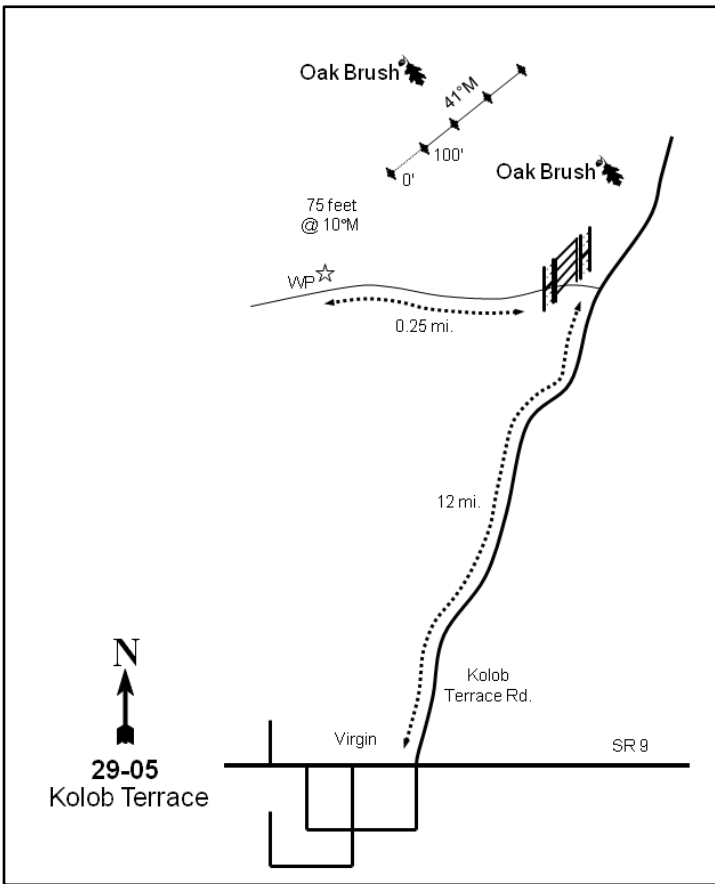
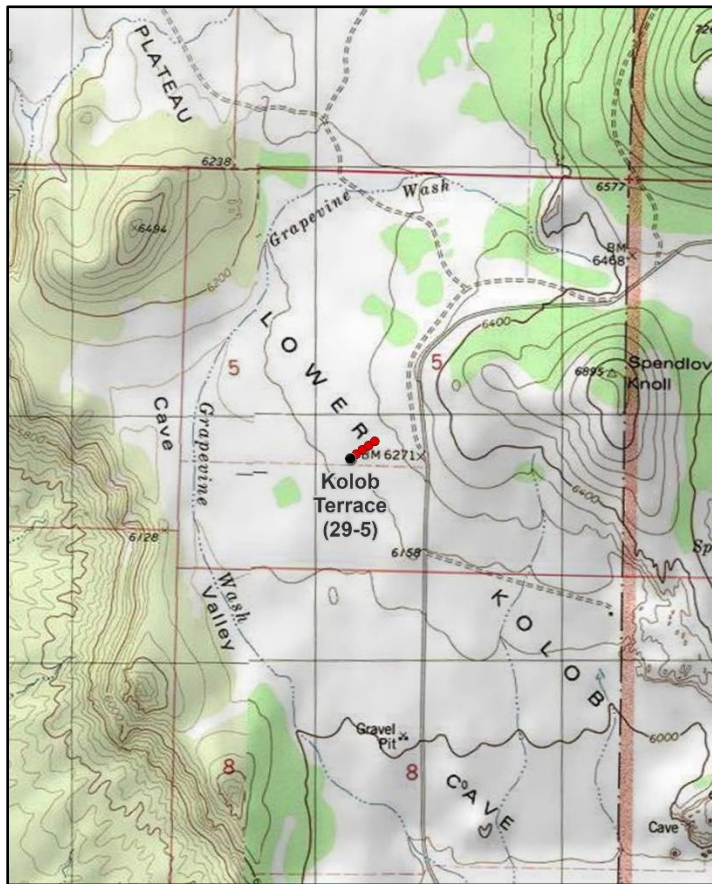
**Table 29-04.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2003	55	13	44	44	-	-	7.0
2008	28	-	23	54	23	-	16.9
2013	29	-	-	69	31	-	15.3
2018	4	-	100	-	-	-	3.0
<b>Pinus edulis (twoneedle pinyon)</b>							
2003	46	7	36	36	14	7	8.2
2008	35	-	33	25	17	25	12.3
2013	35	-	8	54	15	23	12.3
2018	12	-	100	-	-	-	1.0

**Table 29-04.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2003	8.8	7.7	5.3	11.1	-0.4	10.0	0.0	<b>42.5</b>	Poor
2008	11.6	8.0	8.2	27.9	-1.0	10.0	0.0	<b>64.6</b>	Fair
2013	16.5	14.7	5.6	29.3	-0.2	2.9	0.0	<b>68.8</b>	Fair-Good
2018	14.3	12.8	11.7	30.0	-0.8	1.8	0.0	<b>69.8</b>	Fair-Good
2023	19.3	13.2	15.0	30.0	-4.1	10.0	0.0	<b>83.5</b>	Good

## KOLOB TERRACE - STUDY NO. 29-5



### Location Information

USGS 7.5 min Map Info      The Guardian Angels ; Township 40S, Range 11W, Section 05  
 GPS (0' Stake)              NAD 83 UTM ZONE 12, 312071 East 4134023 North

### Transect Information

Browse Tag # (0' Stake)      116  
 Transect Bearing              41° 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

Traveling east out of the town of Virgin on SR-9, turn left (north) onto Kolob Terrace Road. Travel 12 miles to a dirt road with a gate on the left side of the road: turn here. Travel a quarter of a mile to a witness post on the right (north) side of the road. From the witness post, the 0-foot stake is 75 feet away at 10 degrees magnetic and is identified by the browse tag labeled #116.

### Site Information

Land Ownership                Federal  
 Land Administrator          BLM  
 Allotment                      KOLOB TERRACE  
 Elevation                      6,197ft (1,889m)  
 Aspect                          South  
 Slope                            6%  
 Sample Dates                 05/22/2013, 05/30/2018, 05/30/2023



**Wildlife Habitat and Vegetation History**

**Table 29-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	winter

**Table 29-05.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Mixed Mountain Brush	No Encroachment
2018	Mixed Mountain Brush	No Encroachment
2023	Mixed Mountain Brush	No Encroachment

**Site Notes**

A soil sample needs to be taken for analysis during the next sampling. In 2013, tent caterpillars were observed and seemed to only infest Utah serviceberry (*Amelanchier utahensis*). Deer pellet groups were heavily concentrated near Gambel oak (*Quercus gambelii*) stands in the same year.

**Site Potential**

1981 - 2010 Average Annual Precipitation 17 inches  
 NRCS Ecological Site Upland Sand (Mountain Big Sagebrush)  
 NRCS Ecological Site # R035XY307UT  
 States and Transitions 2013-2023 - State Undefined: Community Phase Undefined

The plant community on this site has existed as a mixed stand of mountain brush that includes mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), Gambel oak (*Quercus gambelii*), and antelope bitterbrush (*Purshia tridentata*) since study establishment in 2013 (Photos, Table 29-05.12, Table 29-05.13). The introduced annual grass species cheatgrass (*Bromus tectorum*) has occurred in patches and has been the dominant herbaceous component over the same timeframe. Perennial grass and forb species have remained infrequent, but cover increased slightly in 2023 and they became codominant with cheatgrass (Table 29-05.10, Table 29-05.11). This site can be expected to remain in this or a similar state in future sample years, but cheatgrass may threaten the ecological resistance of the plant community to disturbance.

Deer winter range condition has generally remained fair since study establishment. As of 2023, deer winter range condition was considered to be poor to fair. Improvement to deer wintering range can be accomplished through efforts that support mature preferred browse plants and their reproduction; diversifying and increasing cover of native perennial forbs and grasses while reducing cheatgrass would also improve winter range conditions (Table 29-05.15). Deer presence has increased each sample year and was high in 2023 according to pellet transect data (Table 29-05.9).

**Trend Summary Tables**

**Table 29-05.6 - 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
2013	28.4	0.0	-	40.0	-	-
2018	29.6	0.9	-	39.9	0.1	-
2023	31.6	0.3	-	35.9	0.1	-

**Table 29-05.7 - 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
2013	232	44	28	75	3.2	1.3	0.3	2.3
2018	223	57	9	84	3.3	3.8	0.0	3.0
2023	226	62	27	61	5.7	3.0	0.4	2.1

**Table 29-05.8 - 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
2013	29.2	0.2	56.1	0.1	4.0	35.2
2018	28.5	0.9	56.2	0.2	3.3	36.3
2023	23.2	0.4	56.2	0.4	3.8	40.1

**Table 29-05.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2013	-	35	-	5
2018	-	25	-	28
2023	2	32	1	13
Year	Days Use Per Acre (ha)			
2013	2.9 (7.2)	36.2 (89.4)	-	-
2018	-	48.9 (120.8)	-	-
2023	2.2 (5.4)	54.9 (135.7)	4.0 (9.9)	-

**Table 29-05.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency				
2013	38	224	4	2	24
2018	19	221	3	35	9
2023	18	224	6	38	9
year	Average Cover (%)				
2013	1.2	3.2	0.0	0.1	0.1
2018	1.2	3.3	0.1	2.4	0.0
2023	1.0	5.7	0.0	2.0	0.0

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

**Table 29-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Calochortus flexuosus (winding mariposa lily)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Cryptantha <sup>a</sup> (annual cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Dichelostemma capitatum (blue dicks)	Erigeron (fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Erysimum capitatum <sup>a</sup> (sanddune wallflower)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Heterotheca villosa (hairy false goldenaster)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus caudatus (tailcup lupine)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	
year	Nested Frequency																	
2013	1	-	-	2	8	-	-	25	-	-	2	6	-	46	9	1	5	
2018	2	-	2	-	11	-	-	-	10	2	3	-	-	44	4	5	3	
2023	-	8	-	-	-	10	1	23	-	-	1	5	3	20	2	12	-	
year	Average Cover (%)																	
2013	0.0	-	-	0.0	0.0	-	-	0.1	-	-	0.0	0.1	-	2.0	0.2	0.0	0.0	
2018	0.0	-	0.0	-	0.0	-	-	-	0.2	0.0	0.0	-	-	1.6	0.2	0.8	0.0	
2023	-	0.0	-	-	-	0.0	0.0	0.1	-	-	0.0	0.0	0.0	0.2	0.0	1.7	-	

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

FORB SPECIES							
<i>Oenothera pallida</i> <sup>a</sup> (pale evening primrose)							
<i>Packera multilobata</i> (lobeleaf groundsel)							
<i>Physalis</i> (groundcherry)							
<i>Polygonum douglasii</i> <sup>a</sup> (Douglas' knotweed)							
<i>Senecio spartioides</i> (broom-like ragwort)							
<i>Sphaeralcea parvifolia</i> (smallflower globemallow)							
<i>Tragopogon dubius</i> <sup>ai</sup> (yellow salsify)							
year	Nested Frequency						
2013	13	-	-	1	-	4	3
2018	2	-	6	-	2	-	-
2023	8	1	-	1	-	-	0
year	Average Cover (%)						
2013	0.1	-	-	0.0	-	0.0	0.1
2018	0.0	-	0.1	-	0.1	-	-
2023	0.3	0.0	-	0.0	-	-	0.0

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

**Table 29-05.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
<i>Artemisia tridentata</i> ssp. <i>vaseyana</i> <sup>p</sup> (mountain big sagebrush)				
<i>Opuntia basilaris</i> (beavertail pricklypear)				
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)				
<i>Quercus gambelii</i> <sup>p</sup> (Gambel oak)				
year	Line Intercept Cover (%)			
2013	26.9	-	3	10.1
2018	27.2	0.1	3.1	9.6
2023	24.1	0.1	2.2	9.6
year	Quadrat Cover (%)			
2013	19.8	0.0	2.2	6.4
2018	19.2	0.9	1.2	9.1
2023	20.6	0.3	3.0	8.0

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

**Table 29-05.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
2013	-	-	-	-	-	-	-	-	184/233
2018	60	-	0	100	0	100	0	0	172/170
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata</b> ssp. <i>vaseyana</i> <sup>p</sup> -- (mountain big sagebrush)									
2013	2360	20	4	64	31	25	4	23	69/96
2018	2320	20	7	75	18	1	0	9	104/118
2023	2400	2780	0	83	18	40	10	16	-/-

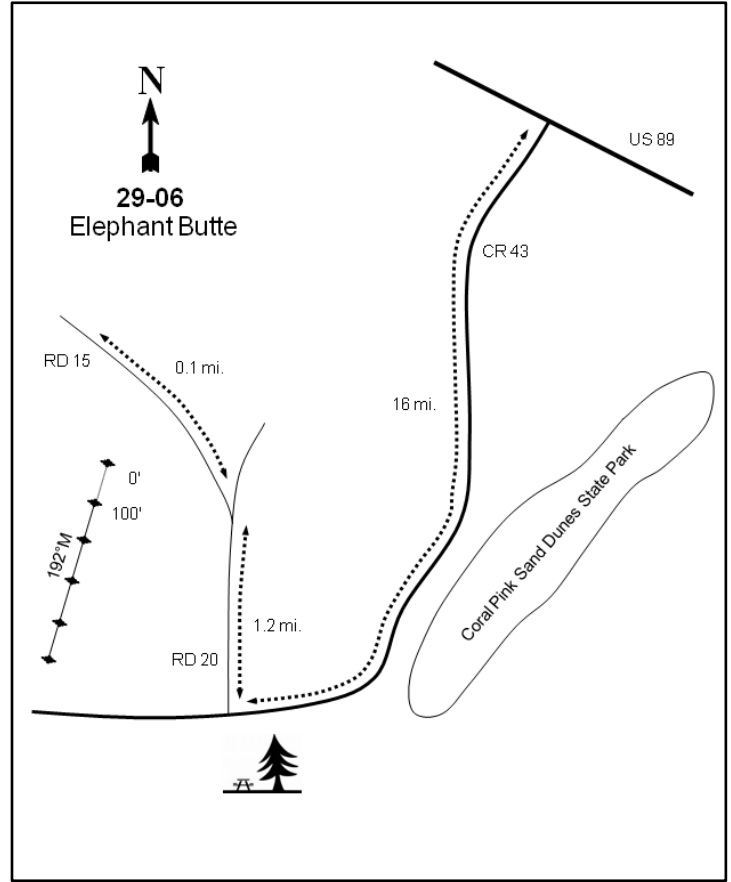
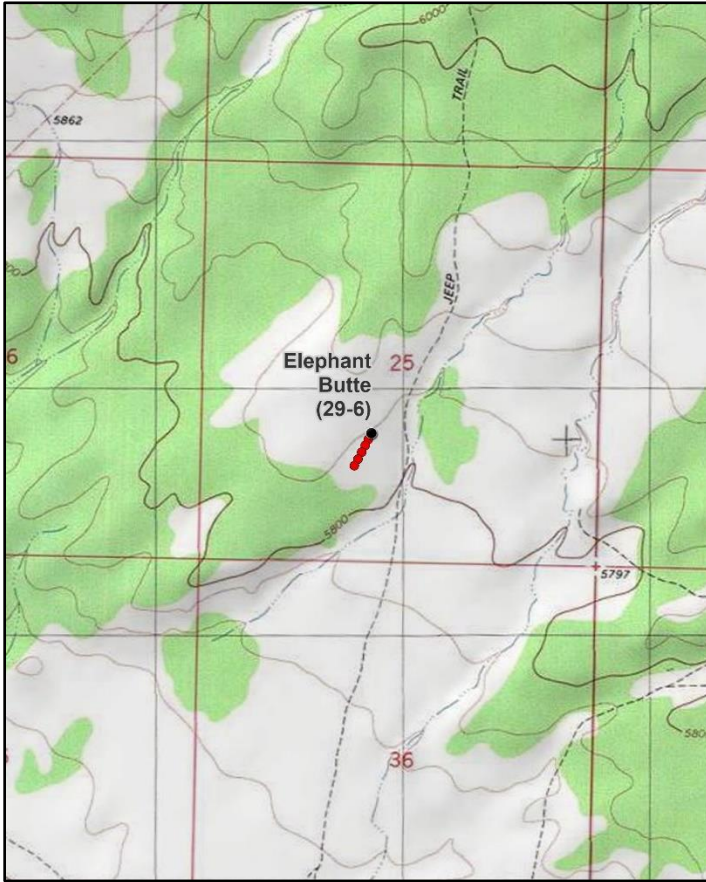
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
2013	-	-	-	-	-	-	-	-	68/107
2018	20	-	0	100	0	0	0	0	62/69
2023	20	-	0	100	0	0	0	0	- / -
<b>Gutierrezia microcephala -- (threadleaf snakeweed)</b>									
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	38/54
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia basilaris -- (beavertail pricklypear)</b>									
2013	60	20	0	100	0	0	33	33	13/33
2018	160	-	0	100	0	0	0	0	20/73
2023	160	-	13	88	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2013	220	-	9	73	18	64	0	9	59/137
2018	280	-	21	79	0	0	0	0	82/145
2023	340	-	0	88	12	0	100	6	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
2013	2040	20	95	3	2	14	3	2	80/72
2018	2780	100	27	72	1	7	0	0	91/86
2023	2840	40	38	59	4	46	25	4	- / -

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

**Table 29-05.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	30.0	8.1	13.8	2.6	-2.4	4.7	0.0	<b>56.7</b>	Fair
2018	30.0	11.2	6.4	7.6	-2.5	6.1	0.0	<b>58.8</b>	Fair
2023	30.0	11.0	5.1	6.0	-4.3	4.2	0.0	<b>52.0</b>	Poor-Fair

## ELEPHANT BUTTE - STUDY NO. 29-6



### Location Information

USGS 7.5 min Map Info	Elephant Butte SE; Township 43S, Range 9W, Section 25
GPS (0' Stake)	NAD 83 UTM ZONE 12, 339814 East 4101011 North

### Transect Information

Browse Tag # (0' Stake)	110
Transect Bearing	192° 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-89, turn south onto CR-43 and travel 16 miles to an intersection with a picnic area to the south. Turn right (north) onto road number 20 and travel 1.2 miles to another intersection, staying to the left. Travel 0.10 miles and park. The 0-foot stake is on the left (west) side of the road and is identified by a browse tag labeled #110.

### Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	PINE SPRINGS
Elevation	5,842ft (1,781m)
Aspect	South
Slope	2%
Sample Dates	07/30/2013, 06/26/2018, 07/11/2023

**Table 29-06.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Yellowjacket Rosy Canyon (Proposed)	5884	Fall 2023	577
Harrow - Two-Way Chain	Yellowjacket Rosy Canyon (Proposed)	5884	Fall 2023	577
Mechanical - Bullhog	Yellowjacket Rosy Canyon (Proposed)	5884	Fall 2023	577

**Table 29-06.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Yellowjacket Rosey Canyon				Sep 2023	2380
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.35	0.32
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.24	0.21
G	Achnatherum hymenoides	Indian Ricegrass	White River	0.42	0.42
G	Agropyron fragile	Siberian Wheatgrass	Vavilov II	1.74	1.57
G	Elymus lanceolatus	Thickspick Wheatgrass	Bannock II	0.90	0.82
G	Elymus wawawaiensis	Snake River Wheatgrass	Secar	1.74	1.70
G	Pascopyrum smithii	Western Wheatgrass	Arriba	0.88	0.77
G	Poa fendleriana	Muttongrass	Montezuma	0.02	0.02
G	Poa fendleriana	Muttongrass	Montezuma	0.02	0.02
G	Poa secunda	Bluegrass, Nevada	Opportunity	0.08	0.08
G	Poa secunda	Bluegrass, Nevada	Opportunity	0.06	0.05
G	Sporobolus cryptandrus	Sand Dropseed	Washington	0.11	0.08
F	Linum perenne	Blue Flax	Appar	0.17	0.15
F	Medicago sativa	Alfalfa	Big Sky Ladak	0.53	0.53
F	Medicago sativa	Alfalfa	Ladak	0.05	0.05
F	Medicago sativa	Alfalfa	Don	0.25	0.24
F	Onobrychis viciifolia	Sainfoin	Shoshone	0.50	0.47
F	Penstemon palmeri	Palmer Penstemon	Cedar	0.25	0.23
F	Ratibida columnifera	Praire Coneflower	Stillwater	0.34	0.25
F	Sanguisorba minor	Small Burnet	Delar	1.01	0.94
S	Purshia tridentata	Bitterbrush, Antelope	Bingham	0.02	0.02
S	Purshia tridentata	Bitterbrush, Antelope	Moffat	0.21	0.19
S	Purshia tridentata	Bitterbrush, Antelope	Rocky Mountain	0.21	0.19
S	Purshia tridentata	Bitterbrush, Antelope	Millard	0.32	0.28

**Wildlife Habitat and Vegetation History**

**Table 29-06.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 29-06.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Basin Big Sagebrush/Sand Sagebrush/Juniper	Phase I transitioning to Phase II
2018	Basin Big Sagebrush/Sand Sagebrush/Juniper	Phase I transitioning to Phase II
2023	Basin Big Sagebrush/Sand Sagebrush/Juniper	Phase I transitioning to Phase II

**Site Notes**

A soil sample needs to be taken for analysis during the next rotation. During the 2013 sampling, perennial grasses and forbs were observed to be robust with abundant seed and flower production. One fawn and young buck carcass was found on site in 2013, and a rattlesnake was observed in the area in 2018. Basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) is found mainly in the bottom areas, while sand sagebrush (*A. filifolia*) is found mainly on the upper slopes of the study area. Rebar was not found on belt 1 in 2023 and may actually be present, but obscured by debris and/or vegetation.

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 inches
NRCS Ecological Site	Upland Sand (Mountain Big Sagebrush)
NRCS Ecological Site #	R035XY307UT
States and Transitions	2013-Present - State Undefined: Community Phase Undefined

Since study establishment in 2013, basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and sand sagebrush (*A. filifolia*) have codominated the shrub component on this site. Cover of both species decreased between 2013 and 2018, but basin big sagebrush rebounded in cover in 2023; density for both species has continually decreased each sample year. Utah juniper (*Juniperus osteosperma*) has also codominated the plant community, and the site has been considered to be within Phase I transitioning to Phase II of woodland succession throughout the study period (Photos, Table 29-06.4, Table 29-06.12, Table 29-06.13, Table 29-06.14). The herbaceous understory of perennial and annual grasses and forbs has remained sparse. The introduced annual grass species cheatgrass (*Bromus tectorum*) was observed for the first time in 2023, but in low amounts (Table 29-06.7, Table 29-06.10, Table 29-06.11). Without a tree-removing disturbance, juniper would likely continue to increase on this study site, causing it to progress through the phases of woodland succession and exhibit a gradual loss of the shrub and herbaceous understory. However, a bullhog and seeding treatment scheduled for fall of 2023 (Table 29-06.1) will likely reduce or remove the tree component and augment shrubs and herbaceous species.

Deer winter range condition has generally remained very poor since study establishment. Decadence of preferred browse has increased since 2013 and appears to be the main driver for this trend. Improvement to deer wintering range can be accomplished through efforts that support mature preferred browse and reproduction; diversifying and increasing cover of native perennial forbs while reducing cheatgrass would also improve winter range conditions (Table 29-06.15). According to pellet transect data, deer presence on this site has remained very high since study establishment (Table 29-06.9).

**Trend Summary Tables**

**Table 29-06.6 - 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
2013	10.3	3.2	6.0	10.2	6.9	17.9
2018	8.8	3.5	2.1	7.5	5.5	20.3
2023	9.6	4.8	7.5	9.9	7.7	13.5

**Table 29-06.7 - 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
2013	2	51	74	160	0.0	0.9	1.2	1.9
2018	-	54	8	47	-	2.6	0.2	1.3
2023	77	118	40	90	1.0	4.7	1.1	3.1

**Table 29-06.8 - 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
2013	39.3	1.5	47.9	0.0	0.6	24.0
2018	48.7	4.1	48.8	0.0	0.6	16.9
2023	31.6	1.6	51.4	0.0	-	30.0

**Table 29-06.9 - 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	Rabbit
	Quadrat Frequency			
2013	-	-	56	22
2018	-	-	44	24
2023	2	1	64	8
Year	Days Use Per Acre (ha)			
2013	-	-	162.2 (400.6)	-
2018	0.7 (1.8)	-	171.6 (423.8)	-
2023	0.7 (1.8)	-	272.8 (673.7)	-

**Table 29-06.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Muhlenbergia pungens (sandhill mubly)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency						
2013	4	4	-	-	16	29	2
2018	3	15	-	-	3	39	-
2023	3	29	15	1	-	93	71
year	Average Cover (%)						
2013	0.1	0.3	-	-	0.1	0.4	0.0
2018	0.0	0.8	-	-	0.0	1.7	-
2023	0.0	2.0	0.2	0.1	-	2.5	0.8

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

**Table 29-06.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Ambrosia artemisiifolia <sup>a</sup> (annual ragweed)	Artemisia dracunculus (tarragon)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chamaesyce (sandmat)	Cryptantha (cryptantha)	Cryptantha <sup>a</sup> (annual cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Hymenopappus filifolius (fineleaf hymenopappus)	Lathyrus brachycalyx (Bonneville pea)	Linum aristatum <sup>a</sup> (bristle flax)	Machaeranthera (tansyaster)	Oenothera pallida <sup>a</sup> (pale evening primrose)	Portulaca oleracea <sup>ai</sup> (little hogweed)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea parvifolia (smallflower globemallow)
year	Nested Frequency																
2013	11	17	2	138	-	-	-	25	3	2	4	12	-	3	30	1	16
2018	-	17	3	-	-	-	-	5	1	3	21	3	-	-	-	-	4
2023	-	10	10	-	2	2	11	1	-	3	11	16	22	11	-	-	38
year	Average Cover (%)																
2013	0.1	0.4	0.8	0.5	-	-	-	0.3	0.0	0.0	0.0	0.5	-	0.0	0.3	0.0	0.1
2018	-	0.6	0.3	-	-	-	-	0.2	0.0	0.1	0.2	0.0	-	-	-	-	0.1
2023	-	0.6	0.9	-	0.0	0.0	0.2	0.0	-	0.0	0.8	0.4	0.2	0.5	-	-	0.7

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



**Table 29-06.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia filifolia (sand sagebrush)	Artemisia tridentata ssp. tridentata <sup>p</sup> (basin big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Yucca (yucca)
year	Line Intercept Cover (%)							
2013	5.9	6.7	-	1	17.9	-	3.5	-
2018	4.9	4.9	-	0.6	20.3	-	2.6	-
2023	4.3	7	1.8	1.6	13.5	0	2.9	0
year	Quadrat Cover (%)							
2013	2.6	7.4	-	0.6	6.0	-	2.9	-
2018	2.7	6.1	-	0.6	2.1	0.1	2.7	0.0
2023	3.5	5.8	0.4	0.9	7.5	0.0	3.8	0.0

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

**Table 29-06.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia filifolia -- (sand sagebrush)</b>									
2013	700	-	14	83	3	3	17	3	80/106
2018	660	-	15	76	9	0	3	18	65/95
2023	520	-	4	50	46	4	0	31	- / -
<b>Artemisia tridentata ssp. tridentata<sup>p</sup> -- (basin big sagebrush)</b>									
2013	1560	40	9	71	21	36	50	12	71/81
2018	1540	40	8	61	31	14	12	53	71/81
2023	1260	-	5	24	71	60	11	84	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
2013	60	-	0	100	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	120	-	17	83	0	0	0	0	- / -
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2013	-	-	-	-	-	-	-	-	82/76
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2013	540	-	70	26	4	0	0	7	62/65
2018	40	-	0	100	0	50	50	0	67/111
2023	60	-	0	0	100	100	0	100	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2013	40	-	0	100	0	0	0	50	- / -
2018	40	-	0	100	0	0	0	0	- / -
2023	40	-	0	100	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2013	20	-	0	100	0	0	0	0	12/49
2018	40	-	50	50	0	0	0	50	11/43
2023	60	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2013	240	20	8	92	0	0	92	0	104/136
2018	160	-	13	88	0	38	38	0	96/137
2023	320	-	19	44	38	38	6	38	- / -
<b>Ribes<sup>p</sup> -- (currant)</b>									
2013	-	-	-	-	-	-	-	-	8/122
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Yucca -- (yucca)</b>									
2013	40	-	0	100	0	0	0	0	73/116
2018	40	-	0	100	0	0	0	0	60/76
2023	40	-	0	100	0	0	0	0	- / -

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

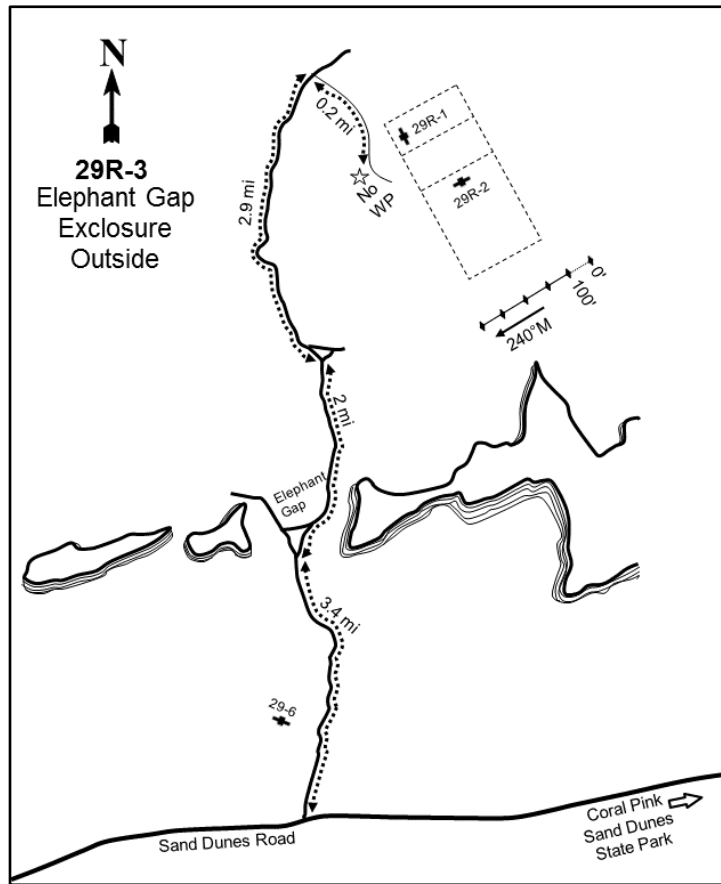
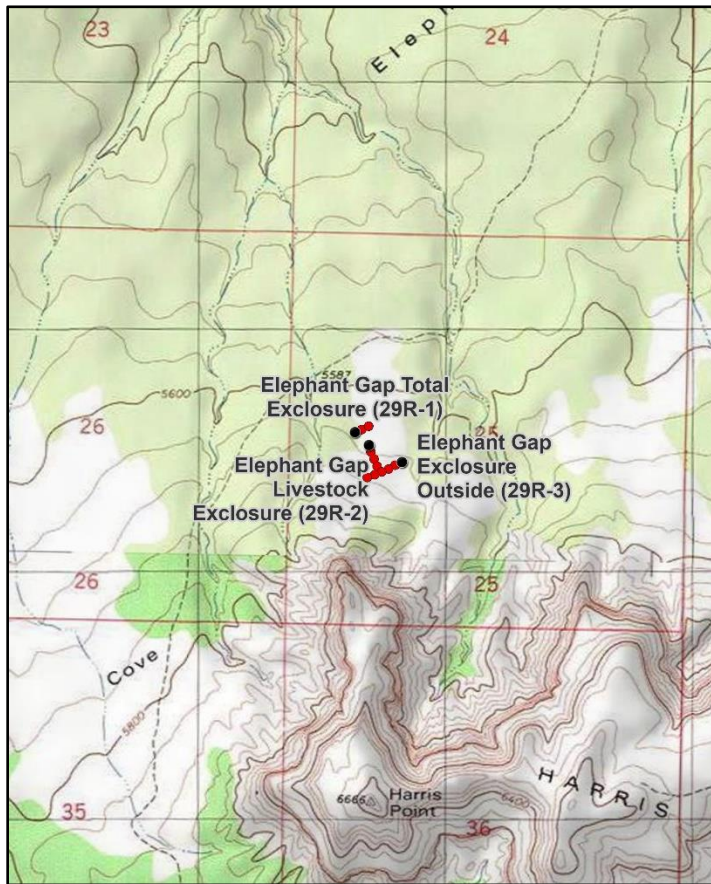
**Table 29-06.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2013	23	-	21	21	14	43	23.4
2018	25	-	20	13	13	53	26.1
2023	26	7	-	43	7	43	20.2

**Table 29-06.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	13.6	11.0	4.4	1.7	0.0	3.9	0.0	<b>34.5</b>	Very Poor-Poor
2018	10.0	8.9	4.7	5.1	0.0	2.6	0.0	<b>31.3</b>	Very Poor
2023	13.1	-3.4	4.5	9.4	-0.7	6.2	0.0	<b>29.0</b>	Very Poor

## ELEPHANT GAP EXCLOSURE OUTSIDE - STUDY NO. 29R-3



### Location Information

USGS 7.5 min Map Info      The Barracks SE; Township 42S, Range 9W, Section 25  
 GPS (0' Stake)              NAD 83 UTM ZONE 12, 339767 East 4110650 North

### Transect Information

Browse Tag # (0' Stake)      117  
 Transect Bearing              240° magnetic  
 Length                          500ft  
 Belt Placement                Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
 Belt Marker Placement      Standard

### Directions to Site

The starting point for directions to this site is the entry to Coral Pink Sand Dunes State Park off of Highway 89. From the entry of the park, travel south for 4.2 miles, then turn right and go 3.55 miles to a fork. Stay right and continue 2.7 for miles to a cattle guard. Continue on the main road for another 0.65 miles to another cattle guard, then drive another 1.85 miles to a faint road to the right (south). Drive on this road for 0.2 miles to the exclosure. From the southeast corner of the livestock exclosure, the 500-foot stake of the baseline is located 25 paces away at an azimuth of 186 degrees magnetic. From there, the 0-foot stake is located 500 feet to the northeast at a bearing of 128 degrees magnetic and is marked by browse tag #117.

### Site Information

Land Ownership                Federal  
 Land Administrator          BLM  
 Allotment                        ELEPHANT COVE  
 Elevation                        5,660ft (1,725m)  
 Aspect                            North  
 Slope                              5%  
 Sample Dates                 08/11/1998, 07/16/2003, 07/02/2008, 06/19/2018, 07/11/2023

**Wildlife Habitat and Vegetation History****Table 29R-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 29R-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1998	Basin Big Sagebrush/Mormon Tea	Phase I transitioning to Phase II
2003	Basin Big Sagebrush/Mormon Tea	Phase I transitioning to Phase II
2008	Basin Big Sagebrush/Mormon Tea	Phase I transitioning to Phase II
2018	Basin Big Sagebrush/Mormon Tea	Phase I transitioning to Phase II
2023	Basin Big Sagebrush/Mormon Tea	Phase I transitioning to Phase II

**Site Notes**

No Notes

**Soils****Table 29R-03.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Fine Sand	5.4	90.7	2.7	6.6	1.3	3.5	51.2	0.1	08/11/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation 15 inches  
 NRCS Ecological Site Upland Sand (Mountain Big Sagebrush)  
 NRCS Ecological Site # R035XY307UT  
 States and Transitions 1998-2023 - State Undefined: Community Phase Undefined

Since study establishment in 1998, this site has remained dominated by basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and mormon tea (*Ephedra viridis*) (Photos, Table 29R-03.12, Table 29R-03.13). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees have been present throughout the study period, and the site was considered to be within Phase I transitioning to Phase II of woodland succession in 2023 (Table 29R-03.4, Table 29R-03.12, Table 29R-03.14). Perennial forbs, particularly milkvetch (*Astragalus* sp.) have contributed a majority of the herbaceous cover in most sample years; grasses have generally remained rare. The introduced annual species grass cheatgrass (*Bromus tectorum*) increased significantly in both cover and abundance between 2018 and 2023, but both values still remained low overall (Table 29R-03.7, Table 29R-03.10, Table 29R-03.11). Trees will likely continue to encroach on this study site in the future if a tree-removing disturbance does not occur, causing this site to progress in the phases of woodland succession.

Deer winter range condition has generally remained very poor since study establishment. Improvement to deer wintering range can be accomplished through efforts that support mature preferred browse and reproduction; diversifying and increasing cover of native perennial forbs while reducing cheatgrass would also improve winter range condition (Table 29R-03.15). According to pellet transect data, deer presence on this site has remained high since 1998 (Table 29R-03.9).

## Trend Summary Tables

**Table 29R-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	6.6	1.8	5.1	-	-	0.4
2003	5.2	1.0	2.4	4.3	0.4	10.2
2008	4.3	0.2	3.6	6.4	0.1	9.0
2018	9.5	0.9	3.5	7.6	0.6	11.3
2023	7.4	1.0	5.3	7.8	2.1	11.2

**Table 29R-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	120	52	252	115	0.8	1.3	9.1	3.1
2003	43	17	84	130	0.7	0.0	1.9	6.8
2008	68	49	93	168	0.2	0.2	0.3	6.8
2018	17	49	1	138	0.1	1.5	0.0	4.7
2023	221	60	51	168	2.2	1.2	0.8	5.6

**Table 29R-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	46.0	10.7	37.8	0.1	0.0	28.4
2003	54.0	6.6	33.7	0.0	0.2	17.5
2008	52.7	3.9	38.9	0.2	0.2	15.2
2018	59.0	3.8	38.0	0.1	0.1	20.1
2023	50.3	3.3	35.3	0.2	0.2	21.3

**Table 29R-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rabbit
	Quadrat Frequency			
1998	1	-	44	10
2003	1	-	37	22
2008	-	-	58	89
2018	1	-	29	28
2023	-	-	43	14
Year	Days Use Per Acre (ha)			
1998	-	-	95.1 (235.0)	-
2003	4.4 (10.8)	-	46.2 (114.2)	-
2008	2.2 (5.4)	-	54.3 (134.1)	-
2018	2.9 (7.2)	8.7 (21.5)*	49.6 (122.5)	-
2023	0.7 (1.8)	-	103.9 (256.6)	-

\*Pellets per acre (ha)

**Table 29R-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency					
1998	1	10	20	1	40	106
2003	3	7	0	-	7	43
2008	1	41	49	-	7	28
2018	1	20	17	-	29	-
2023	3	11	140	-	48	155
year	Average Cover (%)					
1998	0.0	0.5	0.1	0.0	0.7	0.7
2003	0.0	0.0	0.0	-	0.0	0.7
2008	0.0	0.2	0.1	-	0.0	0.1
2018	0.0	0.9	0.1	-	0.5	-
2023	0.0	0.5	1.4	-	0.6	0.8

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

**Table 29R-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Ambrosia <sup>a</sup> (ragweed)	Artemisia canthioides (Carruth's sagewort)	Artemisia dracunculoides (tarragon)	Astragalus (milkvetch)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chaenactis douglasii (Douglas' dusty-aiden)	Chamaesyce (sandmat)	Comandra umbellata (bastard toadflax)	Cordylanthus <sup>a</sup> (bird's-beak)	Cryptantha (cryptantha)	Cryptantha <sup>a</sup> (annual cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Dimorphocarpa wislizeni <sup>a</sup> (touristplant)	Draba <sup>a</sup> (draba)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hymenopappus filifolius (fineleaf hymenopappus)
year	Nested Frequency																
1998	0	-	14	40	0	-	26	40	-	28	-	26	28	3	92	15	-
2003	-	-	-	118	-	-	-	20	-	-	-	-	-	-	-	17	-
2008	-	-	-	135	1	3	-	20	-	2	-	31	2	14	8	4	-
2018	-	-	-	110	-	-	-	29	-	1	-	-	-	-	-	-	2
2023	-	9	-	134	-	-	-	13	0	-	11	4	5	-	-	10	2
year	Average Cover (%)																
1998	0.0	-	0.5	1.8	0.0	-	0.1	0.4	-	0.3	-	0.1	0.9	0.0	0.6	0.1	-
2003	-	-	-	6.5	-	-	-	0.1	-	-	-	-	-	-	-	0.3	-
2008	-	-	-	6.2	0.0	0.0	-	0.4	-	0.0	-	0.1	0.0	0.0	0.0	0.0	-
2018	-	-	-	3.3	-	-	-	1.0	-	0.0	-	-	-	-	-	-	0.3
2023	-	0.1	-	5.4	-	-	-	0.1	0.0	-	0.2	0.0	0.0	-	-	0.0	0.0

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

FORB SPECIES	Nested Frequency							
<i>Lappula occidentalis</i> <sup>a</sup> (flatspine stickseed)								
<i>Linum kingii</i> (King's flax)								
<i>Machaeranthera canescens</i> (hoary tansyaster)								
<i>Oenothera albicauli</i> <sup>a</sup> (whitest evening primrose)								
<i>Oenothera pallida</i> <sup>a</sup> (pale evening primrose)								
<i>Plantago patagonica</i> <sup>a</sup> (woolly plantain)								
<i>Sphaeralcea parvifolia</i> (smallflower globemallow)								
<i>Stephanomeria exigua</i> (small wirelettuce)								
year	Average Cover (%)							
1998	5	-	-	40	140	-	7	-
2003	-	-	-	-	73	-	-	5
2008	57	1	21	-	-	-	11	-
2018	-	-	2	-	1	-	16	-
2023	-	-	5	-	25	4	21	-
year	Average Cover (%)							
1998	0.0	-	-	1.8	5.5	-	0.0	-
2003	-	-	-	-	1.6	-	-	0.2
2008	0.2	0.0	0.1	-	-	-	0.0	-
2018	-	-	0.0	-	0.0	-	0.1	-
2023	-	-	0.0	-	0.4	0.0	0.1	-

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

**Table 29R-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)										
<i>Artemisia filifolia</i> (sand sagebrush)											
<i>Artemisia frigida</i> <sup>p</sup> (prairie sagewort)											
<i>Artemisia tridentata</i> ssp. <i>tridentata</i> <sup>p</sup> (basin big sagebrush)											
<i>Ephedra viridis</i> <sup>p</sup> (mormon tea)											
<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>hololeuca</i> <sup>p</sup> (rubber rabbitbrush)											
<i>Eriogonum nummulare</i> (money buckwheat)											
<i>Juniperus osteosperma</i> <sup>i</sup> (Utah juniper)											
<i>Opuntia polyacantha</i> (plains pricklypear)											
<i>Pinus edulis</i> <sup>i</sup> (twoneedle pinyon)											
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)											
<i>Tetradymia canescens</i> (spineless horsebrush)											
year	Quadrat Cover (%)										
1998	-	-	-	-	-	-	-	-	-	-	-
2003	-	-	1.4	2.9	-	-	9	-	1.2	-	0.4
2008	-	-	1.8	4.5	0.1	-	8	0.1	1	-	-
2018	0.4	0.4	4.3	2.1	0.8	-	9.8	0.2	1.5	-	-
2023	0.8	-	3.5	3.5	0.8	0.5	9.9	0.1	1.3	-	0.7
year	Quadrat Cover (%)										
1998	0.2	-	4.8	1.5	0.1	0.0	4.4	0.0	0.7	0.1	1.6
2003	-	-	2.3	2.7	0.0	0.0	1.8	0.4	0.6	0.1	0.7
2008	0.1	0.1	1.2	2.4	0.6	-	3.5	0.0	0.2	0.0	-
2018	0.4	0.7	5.9	2.4	0.6	0.2	3.1	0.4	0.4	-	-
2023	0.6	-	3.6	2.6	1.1	0.3	5.1	0.0	0.2	-	0.1

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

**Table 29R-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia filifolia -- (sand sagebrush)</b>									
1998	-	20	0	0	0	0	0	0	98/98
2003	-	-	-	-	-	-	-	-	122/121
2008	20	-	100	0	0	0	0	0	96/95
2018	80	-	0	100	0	0	0	0	88/128
2023	60	-	0	67	33	0	33	33	- / -
<b>Artemisia frigida<sup>P</sup> -- (prairie sagewort)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2018	5060	-	24	75	1	0	0	0	40/17
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. tridentata<sup>P</sup> -- (basin big sagebrush)</b>									
1998	1520	80	14	41	45	28	3	28	106/112
2003	540	-	11	15	74	19	30	44	82/76
2008	360	-	6	28	67	6	0	78	87/90
2018	520	20	4	89	8	19	0	27	80/98
2023	440	220	0	36	64	50	14	36	- / -
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
1998	-	-	-	-	-	-	-	-	61/64
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	61/58
2023	-	-	-	-	-	-	-	-	-/-
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
1998	320	-	44	38	19	25	0	6	108/222
2003	500	-	16	52	32	28	0	12	95/137
2008	480	-	8	75	17	8	0	0	90/127
2018	680	-	0	94	6	0	0	3	85/107
2023	620	-	0	90	10	10	26	13	- / -
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1998	20	-	0	0	100	0	0	0	114/155
2003	60	-	0	67	33	33	0	0	101/137
2008	80	20	25	25	50	0	0	25	82/115
2018	260	-	46	39	15	8	31	8	63/86
2023	220	140	9	27	64	9	0	73	- / -
<b>Eriogonum nummulare -- (money buckwheat)</b>									
1998	-	20	0	0	0	0	0	0	91/125
2003	40	-	0	100	0	50	0	0	54/76
2008	-	-	-	-	-	-	-	-	67/99
2018	220	-	0	100	0	0	0	0	36/40
2023	180	-	0	100	0	0	0	0	- / -



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	20	-	0	100	0	0	0	0	- / -
2003	40	-	0	100	0	0	0	0	- / -
2008	20	-	0	100	0	0	0	0	- / -
2018	40	20	0	100	0	0	0	0	- / -
2023	40	-	0	100	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1998	180	-	11	78	11	0	0	11	10/31
2003	180	-	0	89	11	0	0	0	9/24
2008	180	-	22	67	11	0	0	44	9/30
2018	320	-	0	94	6	0	0	13	9/37
2023	200	-	0	90	10	0	0	10	- / -
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1998	20	-	0	100	0	0	100	0	28/66
2003	20	-	0	0	100	0	100	100	- / -
2008	-	-	-	-	-	-	-	-	22/29
2018	-	-	-	-	-	-	-	-	30/78
2023	-	-	-	-	-	-	-	-	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	40	-	0	50	50	0	0	0	134/166
2003	20	-	0	0	100	0	0	0	132/190
2008	-	-	-	-	-	-	-	-	112/134
2018	80	-	0	100	0	0	0	0	90/134
2023	100	-	20	0	80	40	0	80	- / -
<b>Yucca -- (yucca)</b>									
1998	-	-	-	-	-	-	-	-	73/71
2003	-	-	-	-	-	-	-	-	68/80
2008	-	-	-	-	-	-	-	-	87/96
2018	-	-	-	-	-	-	-	-	75/92

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

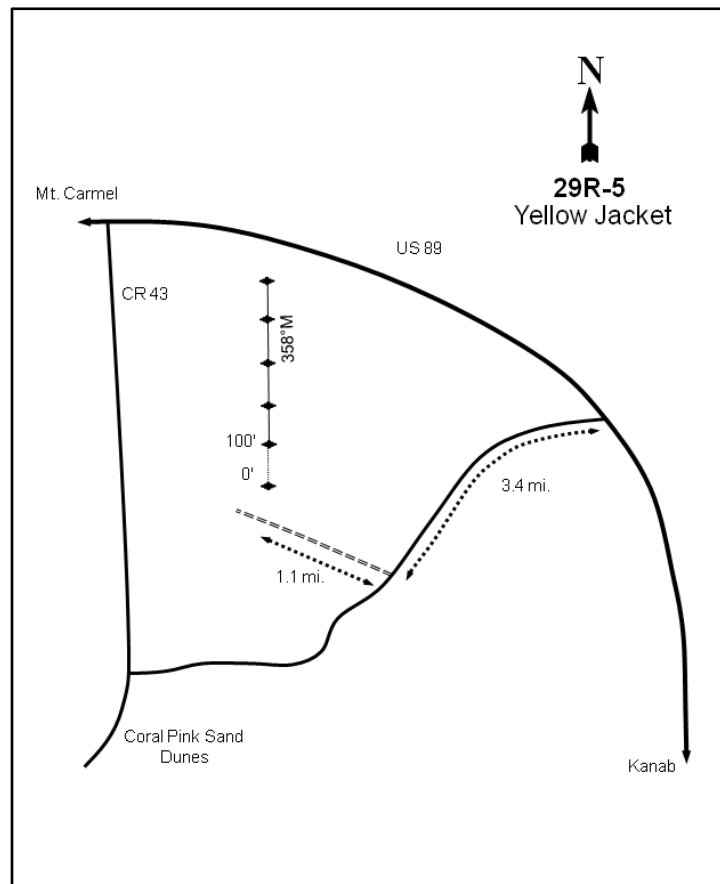
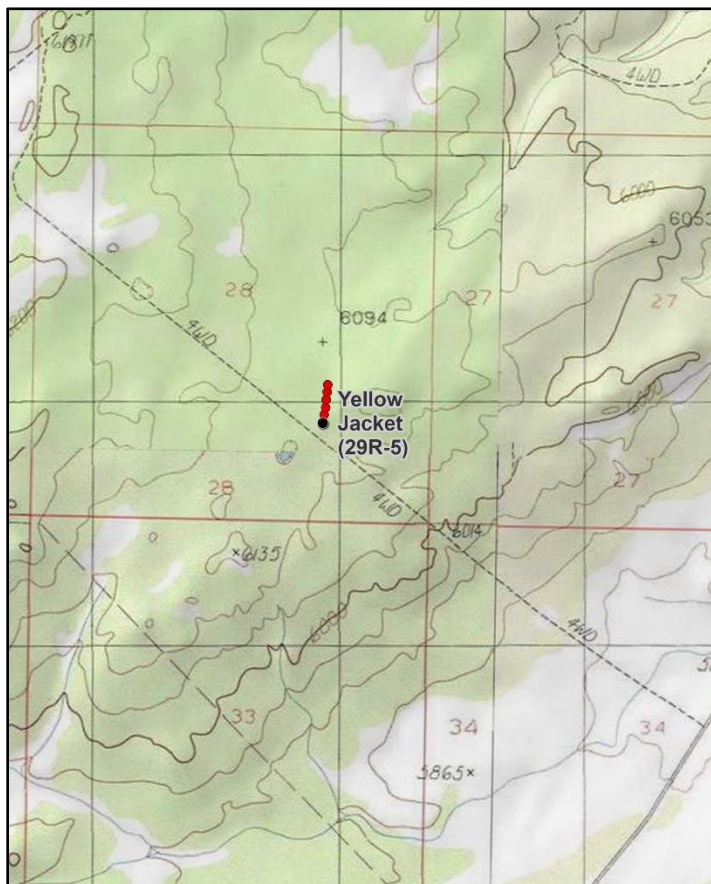
**Table 29R-03.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	18	-	-	-	-	-	25.3
2003	26	8	-	8	8	77	26.0
2008	23	-	8	-	15	77	27.5
2018	28	7	13	-	13	67	27.9
2023	20	-	8	-	23	69	31.1
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	17	-	-	-	-	-	14.0
2003	20	-	-	-	40	60	18.2
2008	9	-	-	-	25	75	17.3
2018	21	-	25	-	-	75	20.3
2023	14	-	-	-	-	100	29.7

**Table 29R-03.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	8.3	3.3	10.2	2.5	-0.6	6.1	0.0	29.9	Very Poor
2003	5.4	0.0	0.0	0.1	-0.5	10.0	0.0	14.9	Very Poor
2008	8.0	5.6	3.9	0.4	-0.2	10.0	0.0	27.7	Very Poor
2018	9.4	12.7	4.1	2.9	-0.1	9.4	0.0	38.5	Poor
2023	9.8	3.2	0.5	2.3	-1.6	10.0	0.0	24.1	Very Poor

## YELLOW JACKET - STUDY NO. 29R-5

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Carmel SE; Township 42S, Range 7W, Section 28  
NAD 83 UTM ZONE 12, 354878 East 4110107 North

**Transect Information**

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

39  
358° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

**Directions to Site**

On US-89 between Kanab and Mt. Carmel, turn west on the road to the Coral Pink Sand Dunes. Continue on this road for 3.4 miles and turn right onto a sandy two-track road. Drive for 1.1 miles and the study will be to the north on the right side of the road.

**Site Information**

Land Ownership  
Land Administrator  
Allotment  
Elevation  
Aspect  
Slope  
Sample Dates

Federal  
BLM  
KINNIKINNIC SPRING  
6,089ft (1,856m)  
South  
2%  
07/30/2013, 08/22/2016, 07/28/2021, 07/11/2023

**Table 29R-05.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Mechanical - Bullhog	Yellowjacket (Kinnickinnic)	2687	2014	2147
Seeding - Aerial Before	Yellowjacket (Kinnickinnic)	2687	January 2014	2147

**Table 29R-05.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Yellowjacket			Aerial	Jan 2014	2146
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.26	0.25
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.12	0.11
G	Achnatherum hymenoides	Indian Ricegrass	Rimrock	0.93	0.84
G	Achnatherum hymenoides	Indian Ricegrass	Rio Grande CO	1.06	1.00
G	Achnatherum hymenoides	Indian Ricegrass	Emery UT	0.02	0.02
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	0.58	0.55
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	1.30	1.09
G	Agropyron fragile	Siberian Wheatgrass	Vavilov	0.75	0.68
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.49	1.30
G	Sporobolus cryptandrus	Sand Dropseed	Washington CO	0.12	0.11
G	Thinopyrum intermedium	Pubescent Wheatgrass	Luna	0.91	0.77
F	Linum perenne	Blue Flax	Appar	1.03	0.92
F	Onobrychis viciifolia	Sainfoin	Eski	0.04	0.03
F	Onobrychis viciifolia	Sainfoin	Eski	1.00	0.92
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.05	0.04
F	Penstemon palmeri	Palmer Penstemon	Washington UT	0.09	0.06
F	Penstemon palmeri	Palmer Penstemon	White Pine NV	0.14	0.12
F	Sanguisorba minor	Small Burnet		1.03	0.93

**Wildlife Habitat and Vegetation History****Table 29R-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 29R-05.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Juniper/Mountain Big Sagebrush	Phase II
2016	Perennial Grass/Mountain Big Sagebrush	Phase I
2021	Perennial Grass/Mountain Big Sagebrush	Phase I
2023	Perennial Grass/Mountain Big Sagebrush	Phase I

**Site Notes**

No Notes

**Site Potential**

1981 - 2010 Average Annual Precipitation 15 inches  
 NRCS Ecological Site Upland Sand (Mountain Big Sagebrush)  
 NRCS Ecological Site # R035XY307UT  
 States and Transitions 2013-2023 - State Undefined: Community Phase Undefined

This site was established in 2013 and was dominated by a mixed community of Utah juniper (*Juniperus osteosperma*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a fairly sparse herbaceous understory. The majority of trees were removed by a bullhog and seeding treatment in 2014 (Table 29R-05.1). Following treatment, native and introduced perennial grasses have retained codominance along with sagebrush scattered throughout the area (Photos, Table 29R-05.7, Table 29R-05.10, Table 29R-05.12, Table 29R-05.13). Sagebrush and herbaceous cover are expected to continue to increase as time since treatment passes. Although the site was considered to be within Phase I of woodland succession in 2023 (Table 29R-05.14), point-quarter density shows that juniper is still present in low amounts (Table 29R-05.14). This extant tree component indicates that there may be potential for infilling in future sample years.

Deer winter range condition has ranged between very poor and good since study establishment. As of 2023, deer winter range condition was considered to be good. Improvement to deer wintering range can be accomplished through efforts that support mature preferred browse and reproduction. While improvement to deer winter range has been made by increasing perennial grass cover, diversifying and increasing cover of native perennial forbs and reducing cheatgrass will also improve winter range conditions for mule deer (Table 29R-05.15). Pellet transect data shows that deer presence on this site has increased each year since 2016 and that presence was moderate in 2023 (Table 29R-05.9).

### Trend Summary Tables

**Table 29R-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
2013	3.6	0.8	5.2	4.6	0.9	19.9
2016	1.4	1.7	-	2.1	0.9	-
2021	2.1	1.1	-	3.7	1.3	-
2023	3.0	1.1	-	5.4	2.0	-

**Table 29R-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
2013	30	200	116	93	0.1	5.8	0.6	1.2
2016	18	257	240	119	0.1	12.9	4.0	2.6
2021	14	288	16	118	0.2	11.0	0.3	1.2
2023	74	318	215	213	0.8	15.1	6.9	4.7

**Table 29R-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
2013	56.2	2.2	29.5	-	-	17.0
2016	46.5	0.3	38.6	0.0	-	19.9
2021	49.2	0.1	40.3	0.1	-	15.7
2023	39.5	-	35.1	0.1	-	30.8

**Table 29R-05.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Horse	Rabbit
	Quadrat Frequency				
2013	2	9	-	-	14
2016	-	11	1	-	25
2021	3	25	1	-	16
2023	4	18	-	-	5
Year	Days Use Per Acre (ha)				
2013	10.9 (26.9)	6.7 (16.6)	-	-	-
2016	2.2 (5.4)	6.0 (14.9)	0.7 (1.7)	-	-
2021	14.5 (35.9)	17.4 (43.0)	3.4 (8.3)	1.2 (2.9)	-
2023	8.0 (19.7)	26.2 (64.6)	-	-	-

**Table 29R-05.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Muhlenbergia pungens (sandhill muly)	Pascopyrum smithii (western wheatgrass)	Phleum alpinum (alpine timothy)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency													
2013	33	-	14	67	8	9	11	54	27	6	5	27	-	22
2016	14	4	32	81	15	20	33	63	54	1	-	36	25	12
2021	60	21	24	60	14	7	13	51	71	-	-	10	48	-
2023	30	21	34	41	54	11	39	71	57	-	-	21	83	34
year	Average Cover (%)													
2013	0.4	-	0.3	1.7	0.0	0.3	0.2	2.4	0.1	0.0	0.0	0.3	-	0.1
2016	0.5	0.2	1.1	2.6	0.1	0.4	1.5	2.6	2.1	0.0	-	0.9	1.0	0.0
2021	1.1	0.4	1.0	1.2	0.2	0.0	0.3	2.4	1.6	-	-	0.0	3.1	-
2023	1.1	0.8	0.9	0.6	0.6	0.1	2.5	4.3	1.6	-	-	0.3	2.8	0.3

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

**Table 29R-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Abrotona fragrans (snowball sand verbena)	Arabis (rockcress)	Artemisia dracunculus (tarragon)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chamaesyce (sandmat)	Comandra umbellata (bastard toadflax)	Cryptantha (cryptantha)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron (fleabane)	Erigeron divergens <sup>a</sup> (spreading fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum racemosum (redroot buckwheat)	Erysimum capitatum <sup>a</sup> (sanddune wallflower)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Heterotheca villosa (hairy false goldenaster)
year	Nested Frequency																
2013	6	5	5	-	-	12	1	-	-	4	-	-	-	7	-	-	-
2016	6	1	-	-	-	8	-	1	0	5	3	10	-	-	-	-	-
2021	3	-	-	-	2	72	-	1	-	16	1	3	1	-	-	-	2
2023	14	1	14	3	-	12	-	6	24	2	6	6	-	-	12	6	8
year	Average Cover (%)																
2013	0.5	0.0	0.0	-	-	0.0	0.0	-	-	0.0	-	-	-	0.0	-	-	-
2016	0.0	0.0	-	-	-	0.0	-	0.0	0.0	0.3	0.1	0.2	-	-	-	-	-
2021	0.0	-	-	-	0.0	0.1	-	0.0	-	0.3	0.0	0.0	0.0	-	-	-	0.1
2023	0.2	0.0	0.1	0.0	-	0.2	-	0.0	0.3	0.0	0.0	0.1	-	-	0.1	0.2	0.1

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

FORB SPECIES	Nest Frequency																
year	Average Cover (%)																
Hymenopappus filifolius (fineleaf hymenopappus)	33	32	-	-	-	-	-	4	-	6	111	4	-	-	1	-	20
Linum kingii (King's flax)	69	8	8	1	-	-	-	44	-	1	202	4	0	1	7	3	25
Linum perenne <sup>i</sup> (blue flax)	31	-	-	-	-	-	6	-	-	-	-	-	-	-	-	6	19
Lygodesmia (skeletonplant)	96	10	-	3	17	4	-	29	3	-	173	19	-	3	25	-	77
Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	0.2	0.1	-	-	-	-	-	0.0	-	0.0	0.5	0.0	-	-	0.0	-	0.2
Microsteris gracilis <sup>a</sup> (slender phlox)	1.5	0.1	0.0	0.0	-	-	-	2.0	-	0.0	1.6	0.1	0.1	0.1	0.1	0.0	0.3
Nama densum var. parviflorum <sup>a</sup> (leafy fiddleleaf)	0.4	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	0.2	0.2
Oenothera pallida <sup>a</sup> (pale evening primrose)	2.1	0.2	-	0.0	0.6	0.0	-	1.3	0.0	-	4.2	0.2	-	0.0	0.1	-	1.7
Orobanche fasciculata (clustered broomrape)																	
Phemeranthus confertiflorus (New Mexico fameflower)																	
Plantago patagonica <sup>a</sup> (woolly plantain)																	
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)																	
Sanguisorba minor <sup>i</sup> (small burnet)																	
Senecio spartioides (broom-like ragwort)																	
Sphaeralcea parvifolia (smallflower globemallow)																	
Townsendia annua <sup>a</sup> (annual Townsend daisy)																	
Tradescantia occidentalis (prairie spiderwort)																	

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

**Table 29R-05.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)								
year	Quadrat Cover (%)								
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	4	0.4	-	0.8	19.9	-	0.1	0.2	-
Ephedra viridis <sup>p</sup> (mormon tea)	1.3	-	0.1	0.4	-	0.4	-	0.8	-
Ericameria nauseosa (rubber rabbitbrush)	2.9	0.1	0.6	0.2	-	0.4	-	0.7	0.1
Gutierrezia sarothrae (broom snakeweed)	3.8	0.7	0.8	0.1	-	1.1	-	0.9	-
Juniperus osteosperma <sup>i</sup> (Utah juniper)	2.9	0.6	-	0.8	5.2	0.0	0.0	0.0	-
Linanthus pungens (granite prickly phlox)	0.8	0.2	0.4	1.1	-	0.2	0.0	0.4	-
Opuntia (pricklypear)	0.8	0.5	0.9	0.0	-	0.2	0.0	0.8	0.0
Purshia tridentata <sup>p</sup> (antelope bitterbrush)	2.9	0.6	-	0.8	5.2	0.0	0.0	0.0	-
Tetradymia canescens (spineless horsebrush)	1.7	0.8	0.9	0.0	-	0.2	-	0.6	-

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

**Table 29R-05.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2013	780	240	13	64	23	28	3	23	76/100
2016	320	-	13	81	6	13	0	6	52/88
2021	420	20	19	76	5	0	0	5	- / -
2023	560	60	14	86	0	36	0	7	- / -
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2013	40	-	0	100	0	0	100	0	88/146
2016	120	-	0	83	17	0	0	17	66/105
2021	60	-	0	100	0	0	0	0	- / -
2023	140	-	43	57	0	0	0	0	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
2013	-	-	-	-	-	-	-	-	53/86
2016	60	-	0	100	0	0	0	0	63/101
2021	40	-	0	100	0	0	0	50	- / -
2023	60	-	0	0	100	0	0	100	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2013	800	340	38	60	3	0	0	3	22/26
2016	860	40	12	88	0	0	0	0	28/44
2021	160	-	0	38	63	0	0	63	- / -
2023	140	-	71	0	29	0	0	43	- / -
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2013	180	-	22	78	0	0	0	11	- / -
2016	-	-	-	-	-	-	-	-	- / -
2021	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Linanthus pungens -- (granite prickly phlox)</b>									
2013	40	-	0	100	0	0	0	0	19/12
2016	380	-	0	100	0	0	0	0	20/31
2021	560	20	4	89	7	0	0	61	- / -
2023	440	-	5	73	23	0	0	23	- / -
<b>Opuntia -- (pricklypear)</b>									
2013	60	20	0	100	0	0	0	0	8/23
2016	-	-	-	-	-	-	-	-	7/19
2021	20	-	100	0	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2013	20	-	0	100	0	100	0	0	40/133
2016	80	-	0	100	0	0	25	0	84/148
2021	20	-	0	100	0	100	0	0	- / -
2023	40	-	0	100	0	100	0	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
2013	-	-	-	-	-	-	-	-	- / -
2016	-	-	-	-	-	-	-	-	- / -
2021	20	-	0	100	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Yucca -- (yucca)</b>									
2013	-	-	-	-	-	-	-	-	25/47
2016	-	-	-	-	-	-	-	-	62/94

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

**Table 29R-05.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

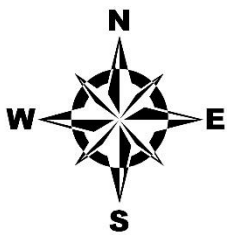
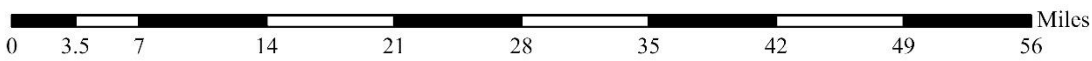
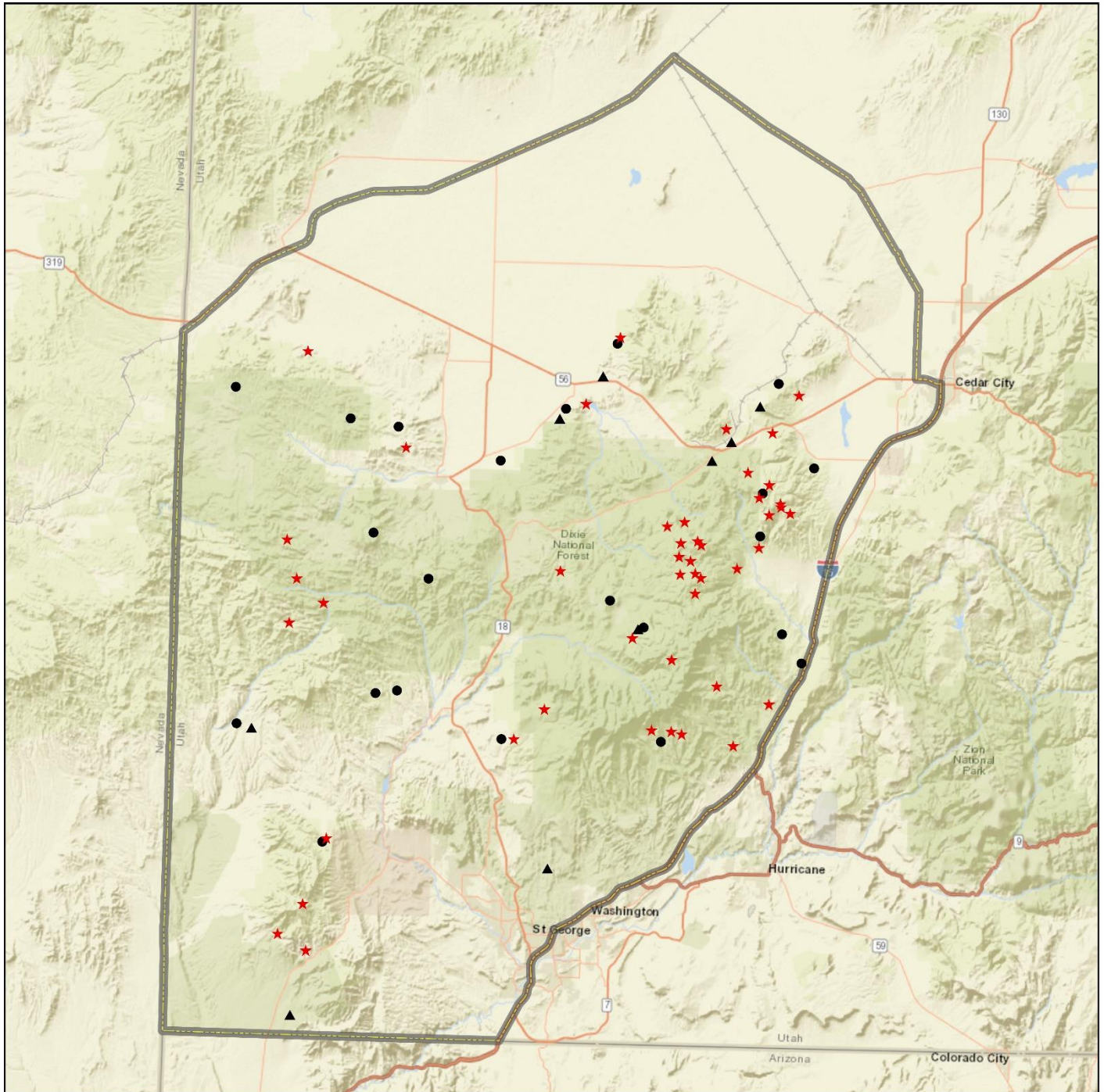
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2013	84	-	21	5	21	53	38.2
2016	4	50	50	-	-	-	2.0
2021	8	13	63	25	-	-	3.7
2023	9	-	75	25	-	-	5.3
<b>Pinus edulis (twoneedle pinyon)</b>							
2016	5	-	100	-	-	-	2.0

**Table 29R-05.15 - Deer Desirable Components Index: Upland Potential Scale.**

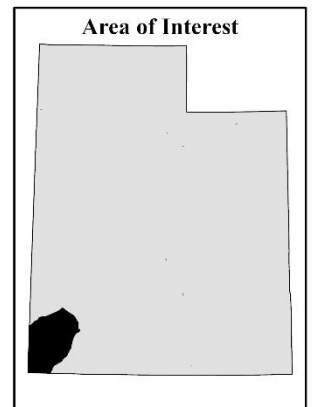
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	5.8	0.0	0.0	11.5	-0.1	2.4	0.0	<b>19.6</b>	Very Poor
2016	2.8	0.0	0.0	25.9	-0.1	5.2	0.0	<b>33.8</b>	Very Poor-Poor
2021	4.8	0.0	0.0	22.1	-0.1	2.5	0.0	<b>29.2</b>	Very Poor
2023	7.0	15.0	7.8	30.0	-0.6	9.5	0.0	<b>68.6</b>	Good



# WILDLIFE MANAGEMENT UNIT 30 – PINE VALLEY

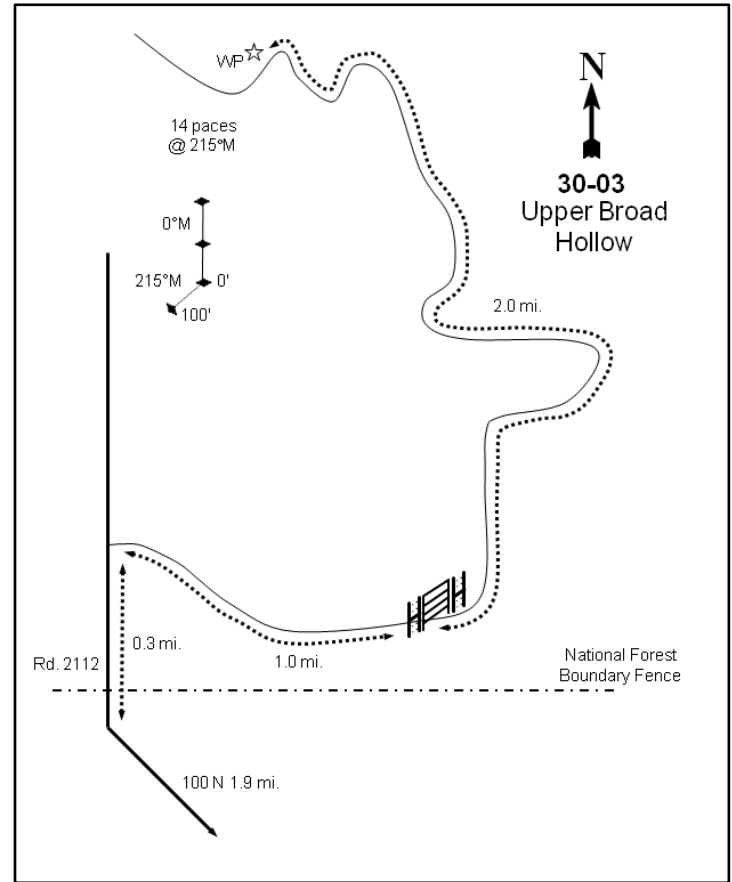
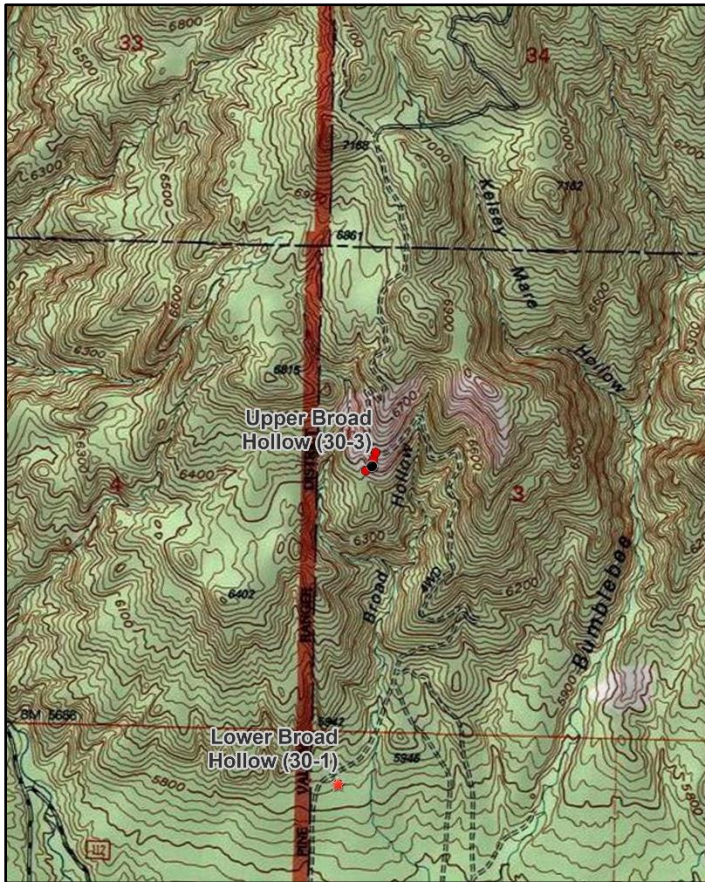


Study Locations Project, Status		Unit Boundary
●	RT, Active	Unit - 30
★	RT, Suspended	
▲	WRI, Active	



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

## UPPER BROAD HOLLOW - STUDY NO. 30-3

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Stoddard Mountain SE; Township 38S, Range 13W, Section 03  
NAD 83 UTM ZONE 12, 296193 East 4155175 North

**Transect Information**

Browse Tag # (0' Stake)	Not Available
Transect Bearing	215° magnetic (Lines 2-3: 0° magnetic)
Length	300ft
Belt Placement	Line 1 (8ft & 89ft), Line 2 (34ft & 71ft), Line 3 (59ft)
Belt Marker Placement	Belt 3: 1ft

**Directions to Site**

From the intersection of Harmony Drive and 100 North in New Harmony, drive north for 1.9 miles to the Dixie National Forest boundary. From the boundary, proceed north on Pace Draw Road (Road #2112) for 0.30 miles. Turn right onto Harmony Mountain Road and travel 1.0 miles, at which point there will be a gate. Go through the gate, turn left, and travel 2.0 miles to a sharp right-hand turn in the road. On the southwestern side of the road is a witness post. Walk 14 paces at 215 degrees magnetic from the witness post to the 300-foot stake. The study is marked by green steel "T" fence posts approximately 18 to 24 inches in height.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	NEW HARMONY
Elevation	6,510ft (1,984m)
Aspect	South
Slope	35%
Sample Dates	05/28/1998, 06/04/2003, 05/21/2008, 05/22/2013, 06/06/2018, 06/06/2023

**Wildlife Habitat and Vegetation History****Table 30-03.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30-03.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1982	Mixed Mountain Brush	Phase I
1992	Mixed Mountain Brush	Phase I
1998	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2018	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II
2023	Mixed Mountain Brush/Pinyon-Juniper	Phase I transitioning to Phase II

**Site Notes**

Historic pellet group data from 1981-1997 is available from a DWR Broad Hollow pellet group transect that is located near the study site (Jense et al., 1992). A few deer shed antlers were found on the site in 2013.

**Site Potential**

1981 - 2010 Average Annual Precipitation	19 inches
NRCS Ecological Site	Upland Stony Loam (Shrub Liveoak)
NRCS Ecological Site #	R029XY330UT
States and Transitions	1982-2023 - State Undefined: Community Phase Undefined

Since study establishment in 1982, this site has remained in a stable state as a mixed mountain brush plant community containing (among others) mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), Utah serviceberry (*Amelanchier utahensis*), antelope bitterbrush (*Purshia tridentata*), and shrub live oak (*Quercus turbinella*) (Photos, Pre-1992 Data, Table 30-03.12, Table 30-03.13). The herbaceous understory has been diverse, moderately abundant, and dominated by perennial grasses over the sample years; the native perennial grass species muttongrass (*Poa fendleriana*) has contributed the most cover of any single species since 1998. The introduced annual grass species cheatgrass (*Bromus tectorum*) has fluctuated in cover and abundance throughout the study period, and was codominant in the understory in the 1998 sample year. Although moderately abundant in 2023, cheatgrass may pose a threat to the ecological resiliency of the site should it increase in the future (Table 30-03.7, Table 30-03.10, Table 30-03.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have slowly increased over the study period in both cover and density, and the site has been considered to be within Phase I transitioning to Phase II of woodland succession since 1998 (Table 30-03.4, Table 30-03.14). Without a tree-removing disturbance, it is likely that pinyon and juniper will continue to increase and become the dominant components of the plant community.

Deer winter range condition has ranged between good and excellent since 1998, while generally improving due to increases in perennial grass cover. In 2023, deer winter range condition was considered to be excellent. Further improvement to deer wintering range can be accomplished through efforts that support preferred browse reproduction; reducing annual grasses from the understory would also improve winter range condition (Table 30-03.15). Pellet transect data shows that deer presence has been high in almost every sample year since 1998 (Table 30-03.9).

**Trend Summary Tables****Table 30-03.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	27.3	0.6	3.8	-	-	0.7
2003	22.8	2.7	4.9	24.4	2.1	14.0
2008	24.5	2.7	7.5	26.5	3.2	11.8
2013	20.1	1.5	4.3	32.6	3.1	14.8
2018	24.2	2.6	6.7	27.5	3.1	16.2
2023	24.3	2.7	5.3	33.2	4.3	21.3

**Table 30-03.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	311	281	89	134	9.4	14.7	1.0	3.5
2003	133	207	203	78	2.7	8.8	3.1	1.9
2008	142	219	77	118	1.6	11.1	0.2	1.6
2013	152	247	43	122	1.0	12.3	0.1	2.0
2018	43	253	7	64	1.1	13.0	0.0	1.7
2023	132	229	109	155	3.7	14.4	0.8	4.3

**Table 30-03.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	7.4	0.0	45.7	5.3	27.3	50.4
2003	8.5	-	47.4	3.9	20.8	44.3
2008	11.3	0.0	43.4	6.0	21.4	43.1
2013	6.8	-	51.7	2.2	16.8	46.2
2018	15.6	0.0	52.4	6.0	20.9	41.9
2023	11.0	0.0	50.0	5.6	20.1	46.0

**Table 30-03.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
1998	-	55	28
2003	-	32	10
2008	-	38	38
2013	-	24	8
2018	-	22	18
2023	-	25	12
Year	Days Use Per Acre (ha)		
1998	-	109.9 (271.5)	-
2003	-	87.1 (215.2)	-
2008	2.9 (7.2)	159.5 (394.0)	-
2013	-	68.3 (168.8)	-
2018	-	34.9 (86.1)	-
2023	-	67.7 (167.2)	-

**Table 30-03.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Festuca idahoensis (Idaho fescue)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)
year	Nested Frequency							
1998	0	3	311	21	3	7	33	245
2003	-	2	133	27	-	11	29	173
2008	1	3	142	32	-	5	21	177
2013	-	4	152	9	-	22	11	226
2018	-	6	43	13	-	9	26	213
2023	-	4	132	36	-	14	16	182
year	Average Cover (%)							
1998	0.0	0.1	9.4	0.3	0.0	0.4	0.8	13.0
2003	-	0.0	2.7	0.9	-	0.4	0.9	6.6
2008	0.0	0.0	1.6	0.6	-	0.1	0.8	9.5
2013	-	0.0	1.0	0.2	-	1.3	0.1	10.7
2018	-	0.2	1.1	0.7	-	0.5	1.1	10.7
2023	-	0.3	3.7	1.2	-	0.3	0.9	11.6

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

**Table 30-03.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Arabis (rockcress)	Arenaria macradenia (Mojave sandwort)	Artemisia cantharii (Carruth's sagewort)	Astragalus (milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Collomia linearis <sup>a</sup> (tiny trumpet)	Comandra umbellata (bastard toadflax)	Cryptantha gracilis <sup>a</sup> (narrowstem cryptantha)	Cymopterus (springparsley)	Descurainia incana <sup>a</sup> (mountain tansymustard)	Dichelostemma capitatum (bluedicks)	Draba <sup>a</sup> (draba)
year	Nested Frequency																
1998	47	10	-	-	-	19	0	-	6	17	-	-	-	9	58	36	2
2003	28	-	2	17	-	5	-	2	1	60	22	6	-	-	73	-	6
2008	47	-	-	1	7	10	-	1	4	31	-	-	-	3	6	45	6
2013	33	4	-	12	9	41	3	-	2	27	-	-	-	-	7	1	-
2018	5	-	-	12	11	6	7	-	5	-	-	-	-	-	3	-	-
2023	68	-	-	33	11	5	2	20	3	31	0	-	6	0	5	23	-
year	Average Cover (%)																
1998	0.6	0.0	-	-	-	0.9	0.0	-	0.1	0.0	-	-	-	0.1	0.4	1.6	0.0
2003	0.2	-	0.0	1.1	-	0.0	-	0.0	0.0	0.6	0.4	0.1	-	-	1.0	-	0.0
2008	0.4	-	-	0.1	0.0	0.2	-	0.0	0.0	0.1	-	-	-	0.0	0.0	0.2	0.0
2013	0.3	0.0	-	0.4	0.0	0.9	0.0	-	0.0	0.1	-	-	-	-	0.0	0.0	-
2018	0.0	-	-	0.4	0.2	0.0	0.1	-	0.2	-	-	-	-	-	0.0	-	-
2023	0.8	-	-	1.7	0.3	0.0	0.2	0.1	0.2	0.2	0.0	-	0.1	0.0	0.0	0.2	-

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

FORB SPECIES	Erigeron divergens <sup>a</sup> (spreading fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum (buckwheat)	Eriogonum racemosum (redroot buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Erysimum capitatum <sup>a</sup> (sanddune wallflower)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orobanche fasciculata (clustered broomrape)	Packera multilobata (lobeleaf groundsel)	Phlox hoodii (spiny phlox)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	Stephanomeria minor var. minor (narrowleaf wirelettuce)	Symphotrichum (aster)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency															
1998	-	8	-	-	13	3	-	-	11	-	-	-	7	18	1	3
2003	-	8	1	1	-	-	113	3	32	-	4	1	4	8	-	1
2008	-	5	-	-	1	-	24	7	6	2	5	5	8	-	-	-
2013	-	7	-	-	3	-	-	-	10	-	7	6	5	13	3	-
2018	-	7	-	3	-	4	-	-	-	-	-	13	2	-	-	-
2023	1	6	-	-	20	-	13	-	47	-	-	3	9	7	-	-
year	Average Cover (%)															
1998	-	0.1	-	-	0.5	0.0	-	-	0.0	-	-	-	0.1	0.1	0.0	0.0
2003	-	0.2	0.0	0.0	-	-	1.0	0.0	0.1	-	0.0	0.0	0.0	0.2	-	0.0
2008	-	0.2	-	-	0.0	-	0.1	0.0	0.0	0.0	0.1	0.2	0.2	-	-	-
2013	-	0.2	-	-	0.0	-	-	-	0.0	-	0.0	0.0	0.0	0.1	0.0	-
2018	-	0.2	-	0.0	-	0.0	-	-	-	-	-	0.5	0.0	-	-	-
2023	0.0	0.5	-	-	0.3	-	0.1	-	0.1	-	-	0.2	0.1	0.0	-	-

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

**Table 30-03.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Garrya flavescens (ashy silktassel)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Pinus monophylla <sup>i</sup> (singleleaf pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus turbinella <sup>p</sup> (Sonoran scrub oak)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)													
1998	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	11.8	-	6	0.4	0.9	0.8	-	8	-	6	-	5.1	1.5	-
2008	9.5	-	9	0.6	0.3	1.9	0.2	6.7	-	5.1	-	6.8	1.2	0.2
2013	13.4	-	8.8	0.4	0.4	2.3	-	7.4	-	7.4	-	9.3	1.1	-
2018	12.5	-	5.8	-	0.7	2.3	0.1	7.6	-	8.6	-	6.9	2.3	-
2023	16.3	-	8.6	0.5	-	3.6	-	11.2	-	10.1	-	5.3	3	0.2
year	Quadrat Cover (%)													
1998	12.8	-	8.7	0.1	0.3	-	-	0.8	0.2	3.0	-	5.4	0.4	0.0
2003	11.1	0.1	6.1	0.0	1.3	1.0	0.2	1.8	0.1	3.1	-	3.8	1.6	0.0
2008	10.0	-	8.0	0.7	0.6	1.5	0.0	4.5	-	3.0	-	5.1	1.5	0.0
2013	7.5	-	5.5	0.4	0.3	0.8	-	1.0	-	3.4	-	5.1	2.0	-
2018	12.2	-	4.7	-	0.6	1.9	0.1	2.2	-	4.5	-	5.4	2.0	0.0
2023	10.1	-	6.9	0.4	-	2.3	-	0.9	-	4.3	0.0	5.2	2.1	0.0

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

**Table 30-03.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1998	1880	320	16	79	5	27	2	2	124/142
2003	740	20	30	68	3	32	11	3	127/173
2008	740	180	27	60	14	8	3	3	127/161
2013	1160	60	28	72	0	22	5	7	118/144
2018	2120	-	41	57	2	21	11	2	116/145
2023	2000	80	13	80	7	31	36	7	- / -
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	40	-	0	100	0	0	0	0	16/37
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	24/64
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	2300	120	16	60	24	24	1	9	53/74
2003	1720	-	6	58	36	11	0	15	54/76
2008	1700	20	1	71	28	14	2	23	57/88
2013	1860	40	17	62	20	13	13	20	54/83
2018	1520	-	11	63	26	3	0	34	54/89
2023	1600	20	4	78	19	19	0	15	- / -
<b>Cercocarpus ledifolius<sup>P</sup> -- (curl-leaf mountain mahogany)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	152/103
2008	-	-	-	-	-	-	-	-	83/103
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	282/271
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	160	-	25	75	0	0	0	0	37/60
2003	-	-	-	-	-	-	-	-	38/72
2008	120	-	0	50	50	0	0	17	36/71
2013	-	-	-	-	-	-	-	-	49/110
2018	20	-	0	0	100	0	0	100	41/50
2023	140	-	0	86	14	14	0	0	- / -
<b>Cylindropuntia echinocarpa -- (Wiggins' cholla)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	60/97
2018	-	-	-	-	-	-	-	-	53/126
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	40/61
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1998	520	-	8	92	0	0	0	0	28/40
2003	120	-	0	100	0	0	0	0	44/68
2008	540	120	15	67	19	0	70	7	20/45
2013	200	20	60	40	0	0	0	0	26/52
2018	180	-	0	89	11	0	11	11	30/49
2023	-	-	-	-	-	-	-	-	-/-
<b>Garrya flavescens -- (ashy silktassel)</b>									
1998	200	-	0	90	10	0	0	0	133/136
2003	40	-	0	100	0	0	0	0	142/170
2008	100	-	0	100	0	20	0	20	96/145
2013	60	-	0	100	0	0	0	0	147/225
2018	100	-	0	80	20	0	0	20	133/177
2023	240	-	0	67	33	58	0	33	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	40	-	0	100	0	0	0	0	25/39
2003	100	-	0	100	0	0	0	0	28/38
2008	20	-	0	100	0	0	0	0	13/16
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	100	0	0	0	0	24/42
2023	-	-	-	-	-	-	-	-	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	20	-	0	100	0	0	0	0	-/-
2003	20	-	0	100	0	0	0	0	-/-
2008	20	-	0	100	0	0	0	0	-/-
2013	20	-	0	100	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1998	60	-	0	100	0	0	0	0	13/25
2003	100	-	0	100	0	0	0	0	18/37
2008	20	-	0	0	100	0	0	100	13/23
2013	40	-	50	50	0	0	0	0	13/22
2018	20	-	0	100	0	0	0	0	13/39
2023	20	-	0	100	0	0	0	0	-/-
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
1998	60	-	33	67	0	0	0	0	-/-
2003	20	20	0	100	0	0	0	0	-/-
2008	40	-	50	50	0	0	0	0	-/-
2013	100	-	40	60	0	0	0	0	-/-
2018	120	-	33	67	0	0	0	0	-/-
2023	120	-	33	50	17	0	0	17	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	1320	100	6	80	14	32	55	5	67/99
2003	860	20	12	79	9	44	30	7	67/129
2008	780	40	5	72	23	8	49	3	66/114
2013	1260	-	5	92	3	24	6	2	68/112
2018	940	-	0	98	2	32	17	2	62/115
2023	940	-	13	85	2	26	51	0	-/-



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Quercus turbinella<sup>p</sup> -- (Sonoran scrub oak)</b>									
1998	120	-	50	50	0	0	0	0	101/106
2003	40	-	0	100	0	0	0	0	55/95
2008	160	180	63	38	0	0	0	0	62/51
2013	60	20	33	67	0	0	0	0	105/147
2018	180	-	33	67	0	11	0	0	83/119
2023	100	-	40	60	0	0	0	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	20	-	0	100	0	0	0	0	19/20
2003	60	-	0	67	33	0	0	0	34/34
2008	120	-	33	50	17	0	0	0	25/35
2013	20	-	0	100	0	0	0	0	36/47
2018	60	-	33	67	0	0	0	0	25/49
2023	40	-	0	100	0	0	0	0	- / -
<b>Yucca baccata -- (banana yucca)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	64/80

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

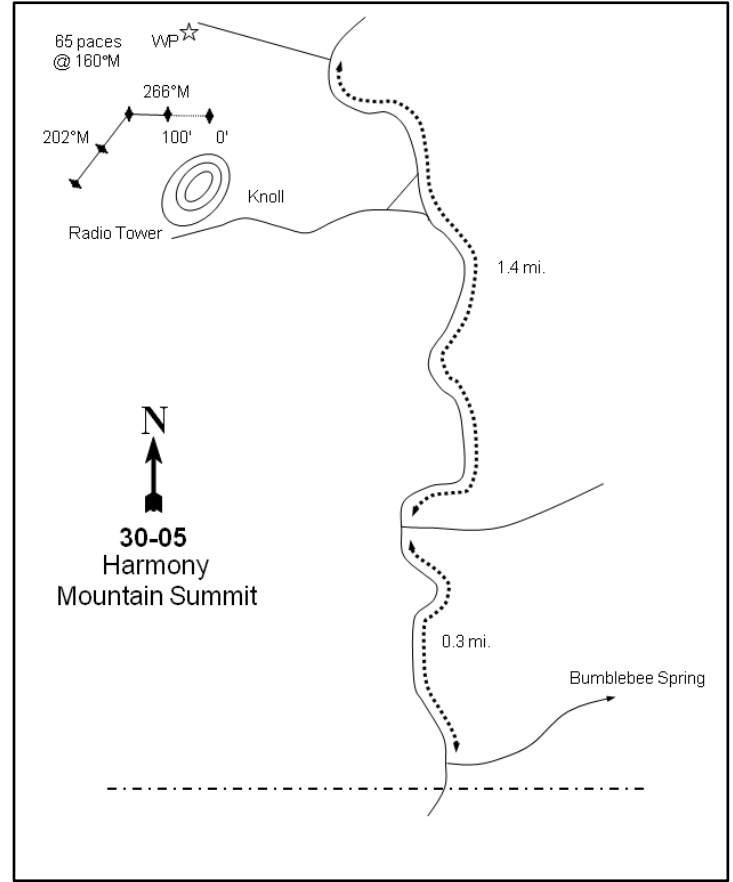
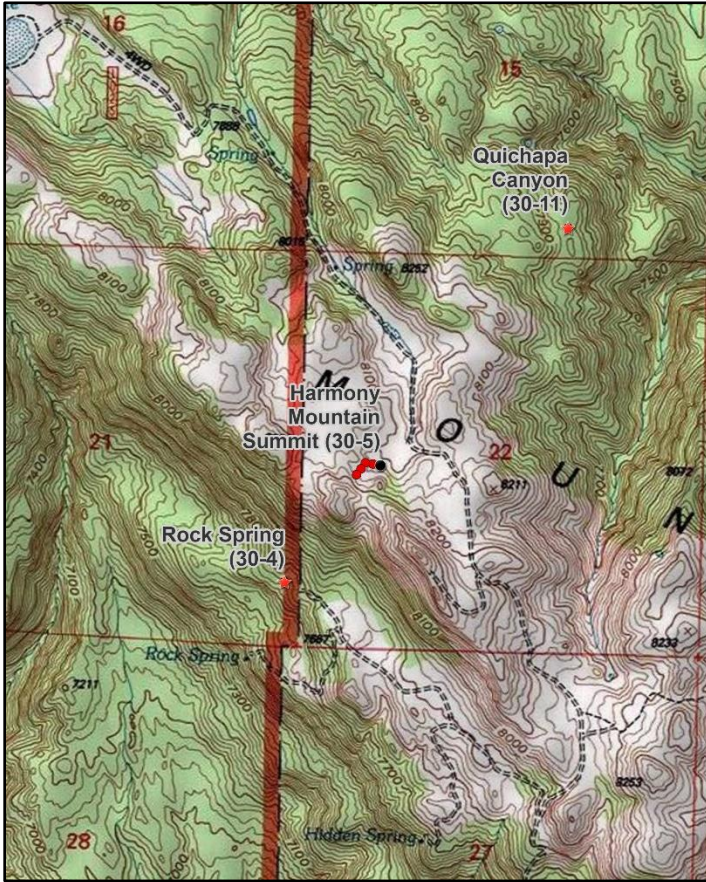
**Table 30-03.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	21	-	-	-	-	-	18.2
2003	33	-	-	-	-	-	13.7
2008	23	-	-	22	33	44	20.0
2013	24	-	-	10	60	30	13.1
2018	21	-	-	30	60	10	19.5
2023	22	-	-	30	10	60	21.4
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	15	-	-	-	-	-	22.3
2003	17	-	-	-	-	-	17.7
2008	22	9	18	9	27	36	18.1
2013	32	8	-	42	-	50	13.1
2018	27	-	8	46	8	38	16.5
2023	27	-	9	36	18	36	17.3
<b>Pinus monophylla (singleleaf pinyon)</b>							
2023	13	-	60	20	-	20	9.8

**Table 30-03.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	30.0	11.1	7.2	29.4	-7.1	7.1	0.0	<b>77.7</b>	Good
2003	30.0	11.4	9.1	17.7	-2.0	3.8	0.0	<b>69.9</b>	Good
2008	30.0	8.9	7.1	22.1	-1.2	3.3	0.0	<b>70.2</b>	Good
2013	30.0	13.1	9.2	24.6	-0.8	4.0	0.0	<b>80.2</b>	Good-Excellent
2018	30.0	12.9	11.7	26.1	-0.8	3.4	0.0	<b>83.3</b>	Excellent
2023	30.0	12.4	6.5	28.7	-2.8	8.7	0.0	<b>83.5</b>	Excellent

## HARMONY MOUNTAIN SUMMIT - STUDY NO. 30-5



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Stoddard Mountain NE; Township 37S, Range 13W, Section 22  
NAD 83 UTM ZONE 12, 296479 East 4160026 North

### Transect Information

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

612  
266° magnetic (Lines 3-4: 202° magnetic)  
400ft  
Line 1 (12ft & 87ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Belt 3: 1ft

### Directions to Site

From the Dixie National Forest boundary north of New Harmony, proceed north for 0.3 miles on Pace Draw Road. Turn right on Harmony Mountain Road and drive for 1.0 miles, at which point you should come to a gate. From the fence continue on the main road for 4.7 miles to a fork. Stay left at the fork and continue on the main road. After 0.3 miles stay left again and continue on the main road for 1.4 miles to another fork. Proceed left and travel for less that 0.1 miles to a witness post on the left (south) side of the road. From the witness post walk 65 paces at 160 degrees magnetic to the 0-foot stake which has browse tag #612 attached. The study is marked by green steel fence posts approximately 18 to 24 inches in height.

### Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	NEW HARMONY
Elevation	8,110ft (2,472m)
Aspect	Northeast
Slope	8-10%
Sample Dates	07/01/1998, 06/04/2003, 07/08/2008, 05/22/2013, 06/05/2018, 06/07/2023

**Wildlife Habitat and Vegetation History****Table 30-05.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer

**Table 30-05.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1982	Mountain Big Sagebrush/Yellow Rabbitbrush	No Encroachment
1992	Mountain Big Sagebrush/Yellow Rabbitbrush	No Encroachment
1998	Mountain Big Sagebrush/Yellow Rabbitbrush	No Encroachment
2003	Mountain Big Sagebrush/Yellow Rabbitbrush	No Encroachment
2008	Mountain Big Sagebrush/Yellow Rabbitbrush	No Encroachment
2013	Mountain Big Sagebrush/Yellow Rabbitbrush	No Encroachment
2018	Mountain Big Sagebrush/Yellow Rabbitbrush	No Encroachment
2023	Mountain Big Sagebrush/Yellow Rabbitbrush	Phase I

**Site Notes**

Several deer have been seen near the site over the study period. Two rattlesnakes were seen in 2018. Mule deer habitat maps may need to be redrawn to incorporate this area.

**Soils****Table 30-05.5 - 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	5.4	62.0	19.4	18.6	4.5	41.9	268.8	0.4	07/01/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB430UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 1982, the plant community on this site has existed as a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and yellow rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus* var. *viscidiflorus*); other shrubs have been present to a lesser extent (Photos, Pre-1992 Data, Table 30-05.12, Table 30-05.13). The herbaceous understory has remained diverse and abundant, with perennial grasses such as Letterman's needlegrass (*Achnatherum lettermanii*) and Columbia needlegrass (*A. nelsonii*) providing most of the cover. The introduced annual grass species cheatgrass (*Bromus tectorum*) was observed for the first time in 2018, but was not observed in 2023. Perennial forbs -- particularly pale agoseris (*Agoseris glauca*) and silky lupine (*Lupinus sericeus*) -- have fluctuated over the study period, but have remained moderately abundant (Table 30-05.7, Table 30-05.10, Table 30-05.11). This study site will likely continue to remain in this or a similar state in future sample years without a major disturbance.

Despite the site not falling within mule deer habitat, mule deer pellet groups have ranged between moderate and high use for many of the sample years. Elk pellet groups were only sampled in 2018 and were considered low in use presence.

## Trend Summary Tables

**Table 30-05.6 - 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
1998	14.0	23.3	0.2	-	-	-
2003	19.0	19.3	-	17.4	22.7	3.8
2008	13.8	22.5	-	19.0	32.8	-
2013	12.1	16.6	-	18.4	22.0	-
2018	22.9	23.3	-	24.1	30.9	-
2023	21.0	14.5	-	23.3	18.0	-

**Table 30-05.7 - 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
1998	-	418	194	305	-	20.1	1.0	9.9
2003	-	384	54	221	-	12.7	0.2	4.2
2008	-	390	116	145	-	14.8	0.7	4.7
2013	-	392	104	335	-	14.1	0.3	5.6
2018	4	410	59	254	0.0	25.4	0.2	6.3
2023	-	365	169	279	-	18.5	1.8	10.4

**Table 30-05.8 - 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
1998	8.6	-	63.6	1.0	2.2	60.5
2003	9.8	-	54.3	0.9	1.7	52.7
2008	7.9	-	39.9	4.5	1.7	58.0
2013	8.4	-	53.9	0.3	1.7	59.9
2018	10.0	0.0	60.9	0.3	2.3	68.0
2023	9.8	-	46.2	5.4	2.0	60.1

**Table 30-05.9 - 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	Rabbit
	Quadrat Frequency				
1998	17	41	-	-	-
2003	11	50	-	-	4
2008	24	28	-	2	1
2013	7	32	1	-	3
2018	10	25	-	-	7
2023	7	32	-	-	5
Year	Days Use Per Acre (ha)				
1998	26.2 (64.6)	73.0 (180.4)	-	-	-
2003	31.9 (78.9)	87.8 (216.8)	-	-	-
2008	26.8 (66.3)	40.2 (99.3)	-	-	-
2013	27.6 (68.1)	41.5 (102.6)	-	-	-
2018	10.9 (26.9)	28.8 (71.2)	2.7 (6.6)	-	-
2023	8.0 (19.7)	83.1 (205.3)	-	-	-

**Table 30-05.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bromus marginatus (mountain brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex occidentalis (western sedge)	Elymus lanceolatus (thickspike wheatgrass)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency										
1998	298	241	7	-	12	-	4	119	7	22	-
2003	252	287	3	-	5	-	3	55	4	13	-
2008	222	223	-	-	3	-	-	95	11	22	-
2013	275	245	1	-	15	7	3	102	16	71	-
2018	236	228	74	4	22	25	4	55	6	92	5
2023	202	218	52	-	13	-	3	44	35	27	-
year	Average Cover (%)										
1998	10.2	5.4	0.1	-	0.6	-	0.1	2.9	0.2	0.6	-
2003	6.9	4.1	0.1	-	0.4	-	0.0	1.0	0.1	0.2	-
2008	8.3	3.8	-	-	0.0	-	-	1.9	0.3	0.4	-
2013	8.3	2.6	0.0	-	0.8	0.0	0.0	1.8	0.2	0.3	-
2018	9.0	6.8	1.7	0.0	1.2	0.3	0.0	1.2	0.3	5.0	0.0
2023	7.3	6.4	0.8	-	0.8	-	0.0	1.3	1.0	0.9	-

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

**Table 30-05.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Achillea millefolium (Common yarrow)	Agoseris glauca (pale agoseris)	Antennaria rosea (rosy pussytoes)	Astragalus (milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis acuminata (tapertip hawkbeard)	Delphinium nuttallianum (two-lobed larkspur)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum racemosum (redroot buckwheat)	Fritillaria atropurpurea (spotted fritillary)	Galium multiflorum (shrubby bedstraw)
year	Nested Frequency																
1998	8	207	-	2	7	2	25	32	14	38	1	3	1	2	13	-	14
2003	3	185	-	-	-	2	1	28	3	-	16	1	8	2	10	-	-
2008	-	85	-	-	-	-	4	19	2	3	-	-	4	-	13	-	-
2013	-	297	-	-	1	8	-	37	11	23	24	19	6	8	18	-	6
2018	-	142	-	-	-	-	-	14	28	-	-	-	14	2	23	-	2
2023	-	172	1	1	-	9	10	70	31	-	19	-	5	-	18	2	13
year	Average Cover (%)																
1998	0.2	3.9	-	0.0	0.2	0.0	0.3	0.1	0.1	0.3	0.0	0.0	0.0	0.0	0.3	-	0.2
2003	0.0	2.3	-	-	-	0.0	0.0	0.1	0.0	-	0.1	0.0	0.1	0.0	0.1	-	-
2008	-	0.5	-	-	-	-	0.0	0.0	0.0	0.0	-	-	0.0	-	0.1	-	-
2013	-	3.4	-	-	0.0	0.0	-	0.1	0.0	0.1	0.2	0.0	0.0	0.0	0.2	-	0.0
2018	-	1.0	-	-	-	-	-	0.0	0.1	-	-	-	0.1	0.0	0.7	-	0.0
2023	-	3.3	0.0	0.0	-	0.0	0.2	0.6	0.2	-	0.1	-	0.1	-	0.3	0.0	0.0

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

FORB SPECIES	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hackelia patens (spotted stickseed)	Hydrophyllum occidentale (western waterleaf)	Lomatium (desertparsley)	Lupinus sericeus (silky lupine)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orogenia linearifolia (Great Basin Indian potato)	Orthocarpus <sup>a</sup> (owl's-clover)	Penstemon (beardtongue)	Phacelia heterophylla <sup>a</sup> (varileaf phacelia)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Taraxacum officinale (common dandelion)	Tetrandeum acutis (stemless four-nerve daisy)	Tragopogon dubius <sup>at</sup> (yellow salsify)	Verbascum thapsus <sup>at</sup> (common mullein)
year	Nested Frequency														
1998	-	29	-	1	92	-	-	-	3	-	174	17	6	-	-
2003	3	20	-	7	35	-	-	-	-	-	23	18	-	-	-
2008	7	18	0	-	68	-	-	24	0	-	83	9	-	-	-
2013	-	30	-	-	80	-	55	1	1	1	61	16	-	-	-
2018	7	69	-	-	106	-	8	-	0	1	15	40	-	2	-
2023	44	66	-	14	83	17	52	-	-	2	83	11	-	-	9
year	Average Cover (%)														
1998	-	0.6	-	0.0	3.6	-	-	-	0.0	-	0.7	0.2	0.0	-	-
2003	0.0	0.6	-	0.0	0.9	-	-	-	-	-	0.1	0.2	-	-	-
2008	0.0	0.6	0.0	-	3.4	-	-	0.3	0.0	-	0.3	0.0	-	-	-
2013	-	0.5	-	-	0.7	-	0.2	0.0	0.0	0.0	0.1	0.2	-	-	-
2018	0.1	1.3	-	-	2.6	-	0.0	-	0.0	0.0	0.0	0.7	-	0.0	-
2023	0.2	3.2	-	0.1	2.3	0.1	0.5	-	-	0.0	0.6	0.4	-	-	0.2

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

**Table 30-05.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Ericameria nauseosa (rubber rabbitbrush)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Mahonia repens (creeping barberry)	Populus tremuloides <sup>sp</sup> (quaking aspen)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)								
1998	-	-	-	-	-	-	-	-	-
2003	-	16.5	-	22.1	-	0.5	0.1	3.8	0.9
2008	-	17.6	-	30.3	-	2.5	-	-	1.4
2013	-	16.8	-	21.4	-	0.6	0	-	1.6
2018	-	23	-	29.4	-	1.3	0.2	-	1.1
2023	-	21.8	-	17.6	-	0.2	0.2	-	1.5
year	Quadrat Cover (%)								
1998	-	13.8	-	23.2	-	-	0.1	0.2	0.2
2003	-	18.8	-	19.0	0.0	0.3	0.0	0.0	0.2
2008	-	13.5	-	21.8	-	0.7	-	-	0.3
2013	-	11.9	0.0	16.3	-	0.2	0.0	-	0.2
2018	0.1	21.5	0.6	21.9	-	1.0	0.5	-	0.7
2023	-	20.7	-	14.3	-	0.2	0.1	-	0.2

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

**Table 30-05.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	41/49
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	40	-	0	100	0	100	0	0	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	6060	880	26	67	7	3	0	1	40/60
2003	8640	340	29	66	5	15	5	2	39/61
2008	5820	260	3	72	25	16	0	13	42/62
2013	3860	1520	11	73	16	20	3	23	39/65
2018	5860	240	27	70	3	6	0	3	41/69
2023	5160	6600	4	82	14	14	4	12	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	11140	220	17	76	8	0	0	0	32/54
2003	12100	-	14	81	6	0	0	0	28/46
2008	10280	100	2	94	4	2	0	2	37/59
2013	7460	200	11	87	1	11	0	2	32/54
2018	8820	60	8	91	1	0	0	0	34/57
2023	9320	520	7	88	6	3	0	5	-/-
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	60	-	0	100	0	0	0	0	20/15
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	60	-	0	100	0	0	0	0	45/73
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	780	-	13	69	18	36	0	3	18/20
2008	1860	120	12	88	0	0	0	1	24/30
2013	360	-	44	50	6	0	0	6	25/21
2018	1220	-	7	92	2	0	0	3	23/39
2023	120	20	0	100	0	0	0	0	-/-
<b>Mahonia repens -- (creeping barberry)</b>									
1998	120	-	0	100	0	0	0	0	12/18
2003	140	-	0	100	0	0	0	0	6/8
2008	140	-	86	14	0	0	0	0	16/14
2013	200	-	0	100	0	0	0	0	9/16
2018	700	-	0	100	0	0	0	0	10/12
2023	1080	-	0	100	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Populus tremuloides<sup>t</sup> -- (quaking aspen)</b>									
1998	20	20	100	0	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	-	-	-	-	-	-	-	-	400/268
2003	-	-	-	-	-	-	-	-	40/38
2008	-	-	-	-	-	-	-	-	42/161
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	29/29
2023	-	-	-	-	-	-	-	-	- / -
<b>Ribes viscosissimum<sup>p</sup> -- (sticky currant)</b>									
1998	-	-	-	-	-	-	-	-	78/80
2003	-	-	-	-	-	-	-	-	114/124
2008	-	-	-	-	-	-	-	-	89/98
2013	60	-	100	0	0	0	0	0	59/76
2018	-	-	-	-	-	-	-	-	127/157
2023	-	-	-	-	-	-	-	-	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1998	20	-	0	100	0	100	0	0	64/130
2003	60	-	0	100	0	0	0	0	51/113
2008	100	-	40	60	0	0	0	0	53/126
2013	200	-	30	70	0	10	60	0	55/136
2018	100	-	0	100	0	40	20	0	69/161
2023	160	-	0	100	0	63	13	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	31/42

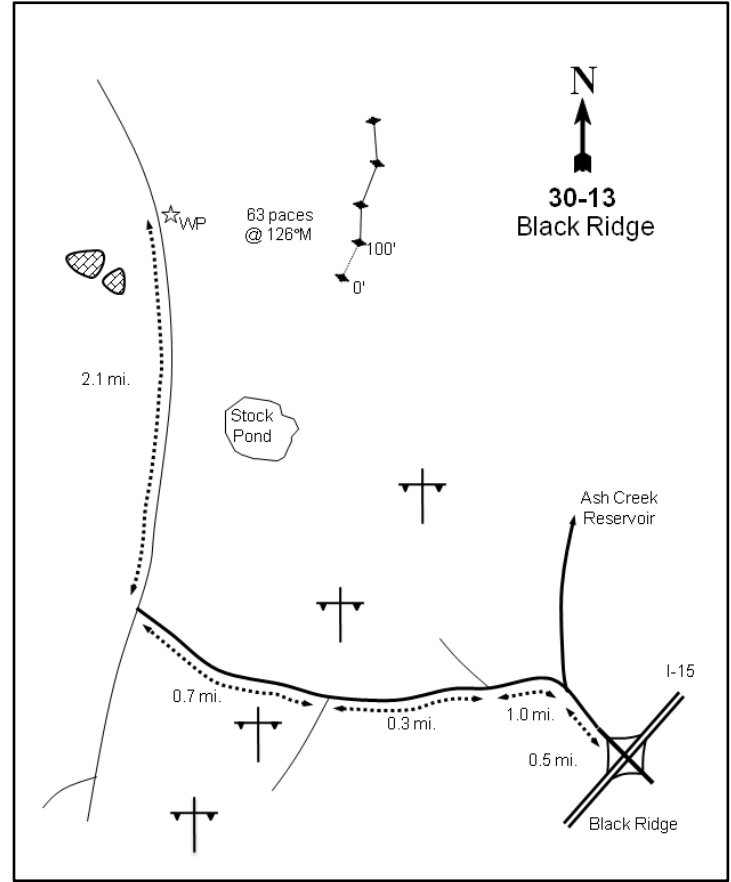
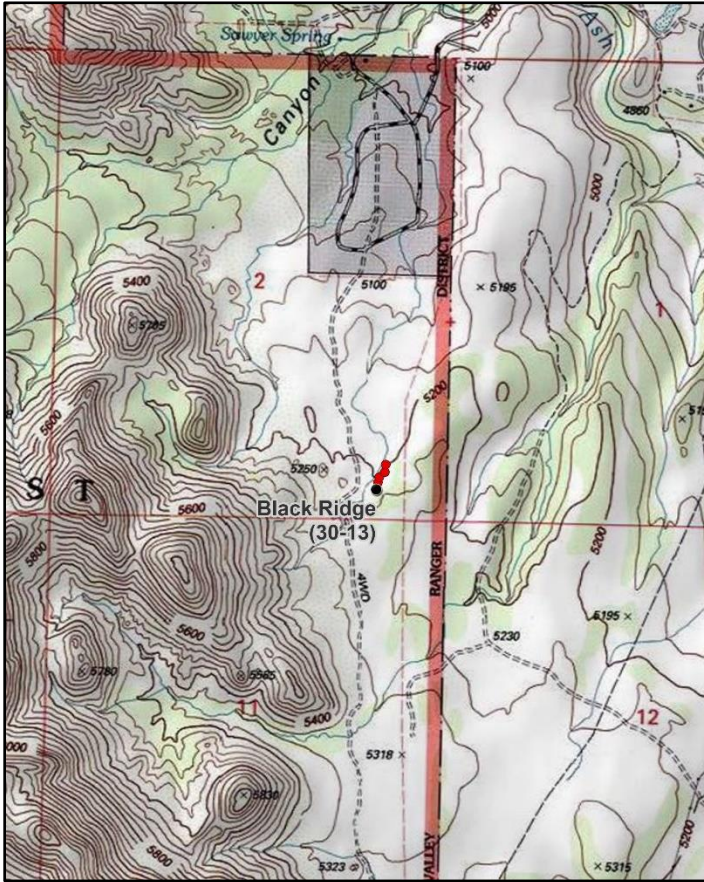
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-05.14 - 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' (%)	
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2023	3	-	50	50	-	-	6.5



## BLACK RIDGE - STUDY NO. 30-13

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

New Harmony SE; Township 39S, Range 13W, Section 02  
NAD 83 UTM ZONE 12, 298667 East 4144077 North

**Transect Information**

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

7003  
2° magnetic (The transect doglegs at the 200ft and 300ft stakes)  
400ft  
Line 1 (15ft & 84ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

Traveling south on I-15 from Cedar City, take the Black Ridge exit (exit #36), then go west for a short distance to a frontage road. Turn north (right) onto the frontage road, then take the first left to turn onto Escalante's Path in the Kolob Estates heading west. Travel for 0.5 miles and turn left onto a dirt road. Continue on this dirt road, keeping to the right at the fork. After approximately 1 mile, you will come to a corral. Stay to the left and continue on this road for 0.3 miles, then turn right at the intersection at the powerlines. Proceed on this road for another 0.7 miles, at which point there will be another intersection. Turn right at the intersection and travel 2.1 miles, then stop. On the left side of the road is a large rock outcrop, and on the right side of the road is a witness post. The 0-foot baseline stake is located 63 paces from the witness post at a bearing of 126 degrees magnetic and is marked by browse tag #7003. The study is marked by green steel "T" fence posts approximately 18 to 24 inches in height.

**Note:** These roads are not very wide, have brush encroaching on either side, and may be washed out. A UTV may be the best way to access this site (especially in the case of significant winter/spring precipitation in future years).

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	New Harmony
Elevation	5,200ft (1,585m)
Aspect	Northwest
Slope	8-10%
Sample Dates	05/22/1998, 07/08/2003, 05/28/2008, 05/14/2013, 06/06/2018, 06/07/2023

**Table 30-13.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Historic	-
Seeding - Seed Unknown	-	-	Historic	-
Mechanical - Dozer Push	-	-	Between 2013 and 2018	-
Seeding - Aerial	Pine Valley WCSL GNA with UTDWR, 10 year strategy (Proposed)	6805	Fall 2023-Unknown	3797

**Wildlife Habitat and Vegetation History****Table 30-13.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	winter

**Table 30-13.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1982	Perennial Grass	Phase I
1992	Little Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
1998	Little Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Little Sagebrush/Pinyon-Juniper	Phase II
2008	Little Sagebrush/Pinyon-Juniper	Phase II
2013	Little Sagebrush/Pinyon-Juniper	Phase II
2018	Little Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2023	Little Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II

**Site Notes**

The sagebrush on this site has been identified as a mixture of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), black sagebrush (*A. nova*) and little sagebrush (*A. arbuscula*); in future sample years, there should be an attempt to refine the distinctions between these species. It is believed that most of the sagebrush on this site is little sagebrush.

**Soils****Table 30-13.5 - 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
Clay Loam	6.0	32.0	33.4	34.6	2.1	4.2	76.8	0.5	05/02/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	16 inches
NRCS Ecological Site	Upland Stony Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB332UT
States and Transitions	No state and transition model is available for this ecological site.

When the study was established in 1982, this site was dominated by seeded perennial grasses (Photos). Little sagebrush (*Artemisia arbuscula*), singleleaf pinyon (*Pinus monophylla*), and Utah juniper (*Juniperus osteosperma*) were minor components of the plant community in 1982. However, these species increased over time and became dominant vegetation components in 1992. The study site was considered to be within Phase II of woodland succession, but a dozer treatment between 2013 and 2018 (Table 30-13.1) removed many of the trees; the study site was classified as being in Phase I transitioning to Phase II in 2023 (Table 30-13.4, Table 30-13.12, Table 30-13.13, Table 30-13.14). The herbaceous understory has remained moderately abundant since 2003, with perennial grasses contributing a majority of the cover in most sample years. In 2023, perennial forbs contributed as much cover as perennial grasses (Table 30-13.7, Table 30-13.10, Table 30-13.11). The noxious annual weed species nodding plumeless thistle (*Carduus nutans*) was observed in 2018, but in low enough amounts to not be measurable. Without another disturbance, trees will likely infill on this site and it will progress in phases of woodland succession due to active recruitment.

Deer winter range condition has ranged between poor and good since 1998. As of 2023, deer wintering range on this site was considered to be in good condition. Improvements to deer wintering range could be accomplished through efforts that encourage recruitment of young while decreasing decadence in the preferred browse community. Improvements could also be achieved by increasing cover of native perennial grasses and forbs (Table 30-13.15). Deer presence was low in 2023 according to pellet group data (Table 30-13.9).

### Trend Summary Tables

**Table 30-13.6 - 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
1998	17.8	1.7	3.6	-	-	0.5
2003	16.0	0.4	8.7	20.6	0.4	12.4
2008	17.1	0.1	6.7	23.4	0.1	14.7
2013	17.4	0.2	8.6	30.2	-	15.9
2018	19.3	0.8	6.6	28.3	0.5	8.6
2023	27.8	1.1	5.2	31.8	0.4	8.1

**Table 30-13.7 - 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
1998	132	313	152	193	1.4	10.7	1.4	3.8
2003	61	164	139	87	0.3	4.1	2.1	1.0
2008	17	163	132	114	0.0	1.7	0.6	1.0
2013	67	127	118	182	0.2	2.6	0.4	1.8
2018	3	113	58	127	0.0	4.0	0.2	1.9
2023	5	131	104	148	0.0	4.4	0.7	4.4

**Table 30-13.8 - 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
1998	6.9	0.3	39.4	11.2	40.1	35.9
2003	10.6	0.2	38.5	5.1	35.7	30.2
2008	9.8	0.1	35.0	9.9	36.4	25.6
2013	10.4	0.3	37.6	9.7	33.2	33.1
2018	23.6	0.0	50.9	4.3	30.7	28.2
2023	7.8	0.0	40.7	7.3	25.5	39.1

**Table 30-13.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rabbit
	Quadrat Frequency			
1998	-	-	17	12
2003	-	-	4	12
2008	-	-	27	72
2013	-	-	3	10
2018	-	-	11	7
2023	-	-	8	6
Year	Days Use Per Acre (ha)			
1998	-	8.7 (21.5)*	21.5 (53.0)	-
2003	-	-	18.7 (46.3)	-
2008	-	8.7 (21.5)*	30.8 (76.1)	-
2013	-	-	7.4 (18.2)	-
2018	-	-	26.8 (66.2)	-
2023	2.2 (5.4)	-	13.4 (33.1)	-

\*Pellets per acre (ha)

**Table 30-13.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum nelsonii (Columbia needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Dactylis glomerata <sup>i</sup> (orchardgrass)	Elymus elymoides (squirreltail)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octiflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency											
1998	-	219	129	-	19	69	-	63	4	3	3	12
2003	-	111	54	-	7	34	-	31	-	-	-	12
2008	-	49	17	-	52	-	-	46	50	-	12	0
2013	0	18	65	-	33	17	-	75	2	-	7	7
2018	-	8	3	3	20	17	0	67	-	7	8	-
2023	-	7	4	-	39	45	-	44	-	-	10	1
year	Average Cover (%)											
1998	-	5.5	1.3	-	0.3	2.5	-	2.1	0.1	0.0	0.0	0.1
2003	-	1.8	0.2	-	0.3	0.4	-	1.5	-	-	-	0.1
2008	-	0.4	0.0	-	0.4	-	-	0.5	0.4	-	0.0	0.0
2013	0.0	0.1	0.1	-	0.2	0.1	-	1.9	0.0	-	0.2	0.0
2018	-	0.2	0.0	0.2	0.7	0.7	0.0	1.4	-	0.7	0.1	-
2023	-	0.2	0.0	-	0.9	1.1	-	1.9	-	-	0.2	0.0

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

**Table 30-13.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Arabis (rockcross)	Astragalus (milkvetch)	Balsamorhiza hookeri (Hooker's balsamroot)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Cirsium calcaratum <sup>a</sup> (Cainville thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cordylanthus <sup>a</sup> (bird's-beak)	Crepis acuminata (tapertip hawkbeard)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron (flea-bane)	Erigeron pumilus (shaggy flea-bane)	Eriogonum racemosum (redroot buckwheat)
year	Nested Frequency																
1998	19	4	7	-	20	-	17	17	-	86	-	-	31	32	-	36	-
2003	-	-	2	0	5	-	13	7	2	46	2	3	13	-	-	4	15
2008	12	1	3	0	31	1	11	20	-	16	4	-	7	9	-	-	6
2013	21	16	1	3	7	28	11	57	-	-	-	-	4	7	5	37	5
2018	-	-	1	-	1	-	7	-	-	3	-	41	-	-	4	-	-
2023	29	3	2	-	9	24	8	2	-	15	1	-	-	-	-	-	-
year	Average Cover (%)																
1998	0.1	0.0	0.1	-	0.1	-	0.5	0.1	-	0.6	-	-	0.2	0.1	-	0.2	-
2003	-	-	0.0	0.0	0.0	-	0.6	0.0	0.0	0.7	0.1	0.0	0.0	-	-	0.0	0.1
2008	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	-	0.1	0.0	-	0.0	0.0	-	-	0.0
2013	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	-	-	-	-	0.0	0.0	0.0	0.5	0.0
2018	-	-	0.0	-	0.0	-	0.0	-	-	0.0	-	0.1	-	-	0.0	-	-
2023	0.2	0.0	0.2	-	0.1	0.2	0.0	0.0	-	0.1	0.0	-	-	-	-	-	-

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

FORB SPECIES	Eriogonum umbellatum (sulphur-flower buckwheat)	Heliomeris multiflora var. multiflora (showy goldeneye)	Lithophragma (woodland-star)	Lithospermum (stoneseed)	Lomatium (desertparsley)	Lotus denticulatus <sup>a</sup> (riverbar bird's-foot trefoil)	Lotus utahensis (Utah bird's-foot trefoil)	Lupinus argenteus (silvery lupine)	Medicago sativa <sup>i</sup> (alfalfa)	Melilotus officinalis <sup>i</sup> (sweetclover)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orobanche fasciculata (clustered broomrape)	Packera multilobata (lobeleaf groundsel)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Psoraleidium tenuiflorum (slimflower scurfpea)	Ranunculus (buttercup)
year	Nested Frequency																
1998	45	5	-	5	7	-	-	13	-	65	13	-	-	6	14	-	57
2003	19	-	-	4	10	-	-	-	-	26	78	-	-	10	-	-	-
2008	44	-	5	-	5	-	7	-	-	3	43	-	-	23	34	-	-
2013	66	-	-	-	11	-	-	6	-	26	29	-	-	32	20	41	-
2018	59	-	-	-	-	-	1	2	16	37	5	3	-	12	3	-	-
2023	69	1	-	-	13	38	2	-	9	1	51	-	3	26	19	25	-
year	Average Cover (%)																
1998	0.7	0.2	-	0.0	0.0	-	-	0.2	-	1.9	0.0	-	-	0.0	0.0	-	0.2
2003	0.1	-	-	0.1	0.0	-	-	-	-	0.3	0.6	-	-	0.0	-	-	-
2008	0.6	-	0.0	-	0.0	-	0.0	-	-	0.0	0.1	-	-	0.1	0.1	-	-
2013	0.6	-	-	-	0.0	-	-	0.0	-	0.1	0.1	-	-	0.1	0.0	0.2	-
2018	0.8	-	-	-	-	-	0.0	0.0	0.1	0.6	0.0	0.0	-	0.1	0.0	-	-
2023	2.2	0.0	-	-	0.1	0.2	0.0	-	0.0	0.0	0.1	-	0.0	0.3	0.0	1.1	-

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

FORB SPECIES	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Symphoricarum (aster)	Trifolium (clover)	unknown annual forb <sup>a</sup> (unknown forb)	Zigadenus pamiculatus (foothill deathcamas)
year	Nested Frequency				
1998	-	6	-	-	3
2003	4	3	-	-	3
2008	-	9	-	43	2
2013	-	12	-	-	12
2018	-	16	3	-	-
2023	-	13	-	-	-
year	Average Cover (%)				
1998	-	0.0	-	-	0.0
2003	0.0	0.0	-	-	0.0
2008	-	0.1	-	0.1	0.0
2013	-	0.1	-	-	0.1
2018	-	0.2	0.0	-	-
2023	-	0.1	-	-	-

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

**Table 30-13.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia arbuscula <sup>p</sup> (little sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus monophylla <sup>i</sup> (singleleaf pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Quercus turbinella <sup>p</sup> (Sonoran scrub oak)
year	Line Intercept Cover (%)								
1998	-	-	-	-	-	-	-	-	-
2003	1.4	16.3	0.4	11.8	0	0.6	0.4	1.7	0.8
2008	2.8	18.2	0.1	14	-	0.7	0.5	1.1	0.8
2013	2.7	22.8	0	15.1	-	0.8	1	1.8	1.9
2018	0.9	23.5	0.5	8.6	-	-	0.6	2.5	0.8
2023	2.1	25.9	0.4	8.1	-	0	0.3	2.5	1
year	Quadrat Cover (%)								
1998	1.1	14.8	1.7	3.6	-	0.0	0.2	1.4	0.4
2003	1.5	13.4	0.4	8.7	0.0	0.0	0.0	0.5	0.5
2008	1.2	15.5	0.1	6.7	-	0.0	0.0	0.3	0.0
2013	2.2	14.8	0.2	8.6	-	0.0	0.0	0.3	0.1
2018	0.7	15.6	0.8	6.6	-	-	0.2	2.7	0.1
2023	3.2	21.6	1.1	5.1	-	0.2	0.0	2.6	0.4

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

**Table 30-13.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1998	1140	-	33	67	0	2	0	0	102/130
2003	120	-	33	50	17	17	0	0	125/140
2008	60	140	0	100	0	0	0	33	129/155
2013	80	-	25	75	0	0	0	0	130/169
2018	560	40	71	29	0	0	4	0	121/136
2023	240	-	33	67	0	8	0	17	- / -
<b>Artemisia arbuscula<sup>p</sup> -- (little sagebrush)</b>									
1998	6080	2360	32	57	11	12	0	7	47/78
2003	7120	-	11	71	18	14	0	6	51/64
2008	6240	500	6	73	21	34	3	9	50/80
2013	6060	100	21	60	19	6	0	8	38/79
2018	5560	4640	12	81	8	2	0	12	40/69
2023	6820	2080	15	79	6	5	0	7	- / -
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	20	-	100	0	0	0	0	0	33/50
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>P</sup> -- (rubber rabbitbrush)</b>									
1998	40	-	0	0	100	0	0	100	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	40	-	0	100	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	3240	-	15	82	3	0	0	1	16/21
2003	1040	-	2	87	12	0	0	6	21/22
2008	460	60	26	70	4	0	0	4	17/15
2013	520	20	19	81	0	0	0	0	16/19
2018	680	20	9	91	0	0	0	0	21/24
2023	820	-	15	83	2	0	0	2	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	320	-	38	63	0	0	0	0	- / -
2003	420	-	19	71	10	0	0	0	- / -
2008	280	60	36	64	0	0	0	0	- / -
2013	400	20	10	90	0	0	0	5	- / -
2018	260	-	54	46	0	0	0	23	- / -
2023	220	20	36	64	0	0	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1998	40	-	0	100	0	0	0	0	10/8
2003	60	-	0	100	0	0	0	0	15/22
2008	20	-	0	100	0	0	0	0	16/32
2013	-	-	-	-	-	-	-	-	11/39
2018	-	-	-	-	-	-	-	-	15/20
2023	-	-	-	-	-	-	-	-	- / -
<b>Pinus monophylla<sup>1</sup> -- (singleleaf pinyon)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	20	0	0	0	0	0	0	- / -
2013	-	20	0	0	0	0	0	0	- / -
2018	20	20	100	0	0	0	0	0	- / -
2023	80	-	100	0	0	0	0	0	- / -
<b>Purshia tridentata<sup>P</sup> -- (antelope bitterbrush)</b>									
1998	20	-	0	100	0	100	0	0	31/254
2003	60	-	0	100	0	0	67	0	41/86
2008	40	-	0	100	0	0	50	0	49/118
2013	40	-	0	100	0	0	50	50	61/162
2018	140	-	0	100	0	0	0	0	34/76
2023	120	-	0	100	0	0	100	0	- / -
<b>Quercus gambelii<sup>P</sup> -- (Gambel oak)</b>									
1998	140	-	0	100	0	0	0	0	152/105
2003	220	-	55	46	0	0	0	0	102/58
2008	380	-	58	42	0	0	0	0	111/90
2013	120	20	83	17	0	0	0	0	100/61
2018	360	-	28	72	0	0	0	0	88/94
2023	80	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Quercus turbinella<sup>p</sup> -- (Sonoran scrub oak)</b>									
1998	200	-	0	100	0	0	0	0	154/70
2003	160	-	0	100	0	0	0	0	158/27
2008	180	20	0	100	0	0	0	0	170/66
2013	180	-	11	89	0	0	0	0	50/70
2018	20	-	0	100	0	0	0	0	88/52
2023	20	-	0	100	0	100	0	0	- / -

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

**Table 30-13.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

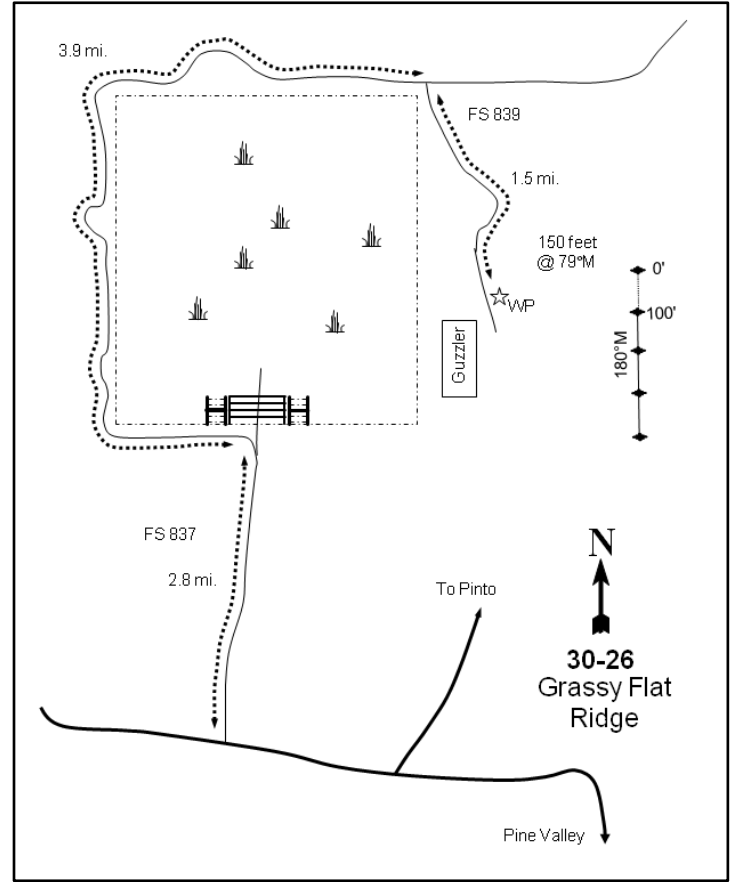
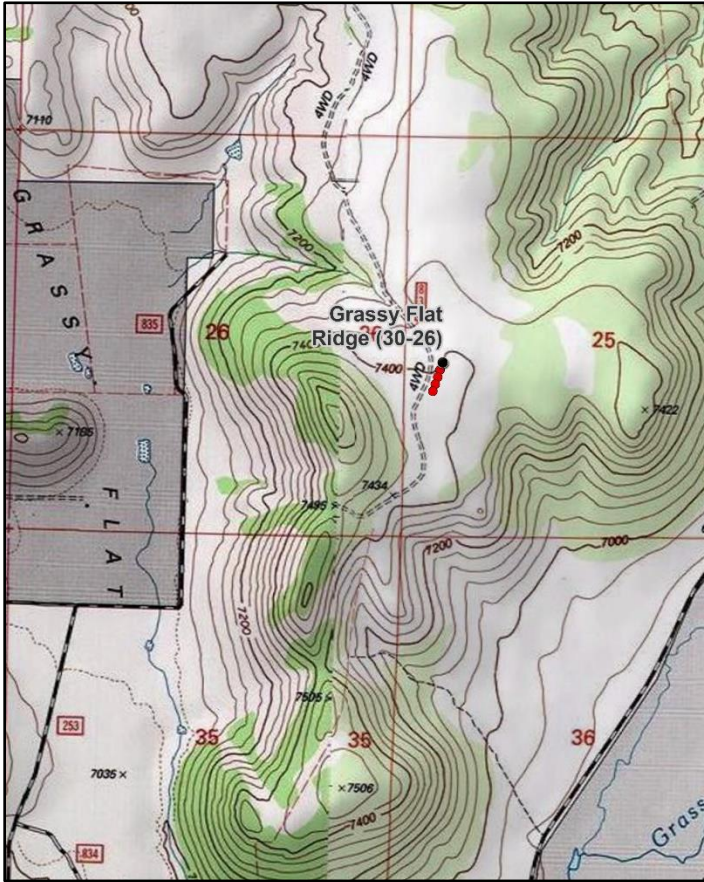
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	94	-	-	-	-	-	9.5
2003	96	-	11	33	33	22	17.2
2008	157	-	30	15	35	20	14.8
2013	168	-	35	35	25	5	8.1
2018	102	-	45	20	20	15	11.8
2023	115	-	50	25	13	13	10.7
<b>Pinus monophylla (singleleaf pinyon)</b>							
1998	17	-	-	-	-	-	9.7
2003	5	-	-	-	-	100	9.0
2008	13	29	-	14	43	14	8.7
2013	13	14	-	14	43	29	9.9
2018	10	50	50	-	-	-	1.5
2023	7	60	20	-	-	20	6.2

**Table 30-13.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	22.2	12.3	14.3	21.3	-1.0	7.6	0.0	<b>76.6</b>	Good
2003	25.6	10.4	7.7	8.2	-0.2	2.0	0.0	<b>53.7</b>	Fair
2008	29.6	10.1	3.6	3.3	0.0	2.1	0.0	<b>48.6</b>	Poor-Fair
2013	30.0	10.7	11.7	5.2	-0.1	3.6	0.0	<b>61.0</b>	Fair
2018	30.0	13.1	7.3	8.0	0.0	3.7	0.0	<b>62.2</b>	Fair
2023	30.0	13.5	7.3	8.7	0.0	8.8	0.0	<b>68.3</b>	Good



## GRASSY FLAT RIDGE - STUDY NO. 30-26

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Grass Valley NW; Township 38S, Range 15W, Section 25  
NAD 83 UTM ZONE 12, 279212 East 4147914 North

**Transect Information**

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

Not Available  
180° magnetic  
400ft  
Line 1 (16ft & 89ft), Line 2 (39ft), Line 3 (48ft), Line 4 (63ft)  
Belt 2: 1ft, Belt 3: 4ft

**Directions to Site**

From the town of Pine Valley, travel west towards Central for 1.5 miles to the dirt road to Pinto. Continue west for 0.75 miles to the Gray's Ranch-Grassy Flat Road on the north (right) side of the road. Travel north on this road for approximately 2.8 miles, then turn left. From here, continue for 3.9 miles to Forest Service Road #839. Bear right (south) and travel 1.5 miles to a witness post on the left (east) side of the road; a large guzzler can be found further down the road on the right (west) side. From the witness post, the 0-foot stake is 150 feet away at 79 degrees magnetic. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Pine Valley
Elevation	7,410ft (2,259m)
Aspect	Northwest
Slope	5-10%
Sample Dates	06/30/1998, 05/28/2003, 05/28/2008, 05/29/2013, 05/29/2018, 06/08/2023

**Table 30-26.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Seed Unknown	-	-	Historic	-
Mechanical - Brush Saw	Pine Valley WCSL GNA with UTDWR, 10 year strategy (Proposed)	6805	Fall 2023-Unknown	918

**Wildlife Habitat and Vegetation History****Table 30-26.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer

**Table 30-26.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1982	Mountain Big Sagebrush	Phase I
1992	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

A guzzler is located about 200 yards southwest of the transect. The sagebrush on this site has been identified as a mix of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), black sagebrush (*Artemisia nova*) and little sagebrush (*Artemisia arbuscula*). For the purposes of this study, mountain big sagebrush and little sagebrush have both been classified as mountain big sagebrush; hybridization is likely occurring. In future sample years, black sagebrush and mountain big sagebrush should be distinguished from each other.

**Soils****Table 30-26.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Clay Loam	5.8	36.0	31.4	32.6	2.6	7.2	83.2	0.5	06/30/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	21 inches
NRCS Ecological Site	Mountain Stony Loam (Browse)
NRCS Ecological Site #	R047XA460UT
States and Transitions	No state and transition model is available for this ecological site.

The browse component of this study site has been dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since study establishment in 1982; sagebrush has exhibited an overall decrease in both cover and density, which were at their lowest measurements in 2023 (Photos, Pre-1992 Data, Table 30-26.12, Table 30-26.13). Twoneedle pinyon (*Pinus edulis*) has increased in cover overall since 2003, but the site has been classified as being within Phase I of woodland succession throughout the study period (Table 30-26.4, Table 30-26.12). The herbaceous understory has remained abundant and diverse. Perennial grasses, particularly the native species muttongrass (*Poa fendleriana*) and the introduced species intermediate wheatgrass (*Thinopyrum intermedium*), have been the dominant herbaceous component in most sample years (Table 30-26.7, Table 30-26.10, Table 30-26.11). Twoneedle pinyon may increase and become the dominant vegetation component in the future if a tree-removing disturbance does not occur.

Due to the diversity and abundance of the shrub and herbaceous components, this site likely serves as adequate foraging range for summering mule deer (Table 30-23.3). According to pellet group data, deer presence was considered to be high in 2023 (Table 30-26.9).

## Trend Summary Tables

**Table 30-26.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	15.8	0.7	0.4	-	-	-
2003	19.2	0.7	0.4	22.5	1.4	0.3
2008	17.9	1.2	0.6	22.6	2.1	0.6
2013	15.6	0.6	0.4	24.9	1.0	1.9
2018	20.4	1.7	0.1	27.2	0.9	4.0
2023	16.4	0.2	0.1	17.1	0.3	2.6

**Table 30-26.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	6	312	155	339	0.2	13.9	0.5	5.0
2003	-	216	95	379	-	3.1	0.6	8.8
2008	5	303	228	251	0.0	10.4	1.0	2.3
2013	18	317	201	259	0.0	12.9	0.8	2.2
2018	7	329	81	152	0.0	16.8	0.3	2.8
2023	37	323	262	344	0.3	18.0	1.5	7.0

**Table 30-26.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	18.9	0.2	29.0	5.6	35.0	37.3
2003	18.1	0.1	17.6	3.0	36.4	34.9
2008	18.1	0.3	23.1	8.4	31.2	32.8
2013	17.8	0.2	25.3	1.3	27.0	39.0
2018	29.7	0.2	32.8	2.4	35.2	38.3
2023	16.5	0.8	27.7	4.7	32.5	36.3

**Table 30-26.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	4	32	-	3
2003	-	16	-	1
2008	5	24	-	29
2013	2	10	-	1
2018	5	13	-	13
2023	-	12	-	5
Year	Days Use Per Acre (ha)			
1998	-	31.5 (77.8)	-	-
2003	7.2 (17.9)	45.6 (112.6)	-	-
2008	9.4 (23.3)	69.7 (172.1)	32.8 (81.1)	-
2013	-	8.1 (19.9)	-	-
2018	8.0 (19.7)	30.8 (76.1)	-	-
2023	5.1 (12.6)	58.3 (144.0)	-	-

**Table 30-26.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus inermis <sup>i</sup> (smooth brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency											
1998	65	5	-	6	146	-	30	31	14	174	4	52
2003	21	33	-	-	33	-	11	45	27	77	8	30
2008	37	63	4	5	22	-	10	28	-	114	72	119
2013	33	13	3	18	31	-	30	55	30	161	27	96
2018	76	32	-	7	39	1	50	60	27	159	7	114
2023	48	5	-	37	48	-	38	35	65	137	3	124
year	Average Cover (%)											
1998	1.7	0.1	-	0.2	2.7	-	0.7	0.2	0.3	5.2	0.0	3.0
2003	0.1	0.3	-	-	0.3	-	0.1	0.3	0.5	0.6	0.2	0.8
2008	0.6	1.5	0.1	0.0	0.4	-	0.2	0.8	-	2.4	0.7	3.8
2013	0.6	0.3	0.0	0.0	0.4	-	0.4	0.6	1.2	3.1	0.4	5.8
2018	1.3	0.5	-	0.0	1.1	0.0	1.1	1.1	0.6	5.1	0.6	5.5
2023	1.4	0.1	-	0.3	1.2	-	1.3	0.7	1.3	4.8	0.0	7.2

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

**Table 30-26.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium acuminatum (tapertip onion)	Antennaria dimorpha (low pussytoes)	Arabis (rockcress)	Artemisia ludoviciana (white sagebrush)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus strauensis (Pine Valley milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chenopodium leptophyllum <sup>a</sup> (narrowleaf goosefoot)	Cirsium wheeleri (Wheeler's thistle)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Collomia linearis <sup>a</sup> (tiny trumpet)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawkbeard)
year	Nested Frequency																
1998	11	307	39	3	-	6	15	-	12	-	-	-	7	68	-	-	3
2003	11	363	20	2	-	-	2	2	79	1	8	-	-	74	-	7	4
2008	14	185	24	6	1	-	1	-	57	-	1	5	0	110	-	-	-
2013	27	165	26	3	-	3	4	-	20	-	4	-	-	155	-	-	3
2018	18	15	24	8	-	-	4	-	30	-	2	-	9	47	-	-	-
2023	14	308	41	-	-	1	8	-	33	-	-	-	2	101	5	-	-
year	Average Cover (%)																
1998	0.1	2.5	0.7	0.0	-	0.0	0.1	-	0.1	-	-	-	0.1	0.2	-	-	0.0
2003	0.1	6.2	0.2	0.0	-	-	0.0	0.0	0.4	0.0	0.0	-	-	0.3	-	0.1	0.0
2008	0.1	0.7	0.2	0.0	0.0	-	0.0	-	0.3	-	0.0	0.0	0.0	0.4	-	-	-
2013	0.1	0.4	0.4	0.0	-	0.0	0.2	-	0.1	-	0.0	-	-	0.5	-	-	0.0
2018	0.1	0.1	0.3	0.0	-	-	0.3	-	0.1	-	0.0	-	0.1	0.1	-	-	-
2023	0.1	3.8	0.5	-	-	0.0	0.0	-	0.1	-	-	-	0.1	0.3	0.0	-	-

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

FORB SPECIES	Delphinium nuttallianum (two-lobed larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron divergens <sup>a</sup> (spreading fleabane)	Erigeron eatonii (Eaton's fleabane)	Erigeron pumilus (shaggy fleabane)	Eriogonum umbellatum (sulphur-flower buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Ipomopsis aggregata (scarlet gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lomatium nevadense (Nevada biscuitroot)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navarretia breweri <sup>a</sup> (Brewer's navarretia)	Orogenia linearifolia (Great Basin Indian potato)	Packera multilobata (lobeleaf groundsel)
year	Nested Frequency																
1998	-	-	30	-	7	13	30	-	-	-	6	-	-	1	-	-	-
2003	7	3	-	-	2	4	25	4	-	-	107	-	2	-	-	-	-
2008	9	-	29	-	-	-	7	6	21	1	45	-	1	40	-	-	-
2013	2	-	50	-	-	4	11	2	-	7	62	-	2	9	-	-	-
2018	-	-	15	-	6	-	17	4	8	3	35	-	1	4	-	-	1
2023	6	-	19	16	16	2	17	11	-	11	45	3	-	31	4	6	-
year	Average Cover (%)																
1998	-	-	0.1	-	0.2	0.1	0.4	-	-	-	0.0	-	-	0.0	-	-	-
2003	0.0	0.1	-	-	0.0	0.0	0.1	0.0	-	-	0.7	-	0.0	-	-	-	-
2008	0.0	-	0.1	-	-	-	0.0	0.0	0.0	0.0	0.2	-	0.0	0.1	-	-	-
2013	0.0	-	0.1	-	-	0.0	0.1	0.0	-	0.0	0.2	-	0.0	0.0	-	-	-
2018	-	-	0.1	-	0.0	-	0.1	0.0	0.0	0.0	0.1	-	0.0	0.0	-	-	0.0
2023	0.0	-	0.1	0.1	0.0	0.0	0.1	0.0	-	0.0	0.3	0.0	-	0.1	0.0	0.0	-

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

FORB SPECIES	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea coccinea (scarlet globemallow)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Streptanthus cordatus (heartleaf twistflower)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Trifolium gymnocarpon (hollyleaf clover)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency									
1998	-	7	84	1	-	-	-	3	-	70
2003	-	3	12	-	-	-	-	-	-	101
2008	2	4	138	12	-	-	-	-	2	50
2013	3	9	46	1	-	2	2	-	1	48
2018	-	-	9	1	-	-	-	5	2	48
2023	-	1	194	11	13	-	2	-	3	58
year	Average Cover (%)									
1998	-	0.0	0.2	0.0	-	-	-	0.0	-	0.7
2003	-	0.0	0.0	-	-	-	-	-	-	1.0
2008	0.0	0.0	0.4	0.0	-	-	-	-	0.0	0.7
2013	0.0	0.2	0.1	0.0	-	0.0	0.0	-	0.0	0.5
2018	-	-	0.0	0.0	-	-	-	0.0	0.0	1.3
2023	-	0.0	0.7	0.0	0.1	-	0.0	-	0.0	1.6

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

**Table 30-26.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus ledifolius <sup>p</sup> (curl-leaf mountain mahogany)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)										
1998	-	-	-	-	-	-	-	-	-	-	-
2003	2.4	17.2	0.5	-	0.1	0.5	0.9	0.3	1.5	0.8	-
2008	0.6	20.4	0.5	0.2	-	0.8	1.3	0.6	0.3	0.6	-
2013	1.8	19.2	0.5	0.4	0.2	0.1	0.9	1.9	0.8	2	-
2018	1.9	19.6	0.6	0.9	0	0.5	0.4	4	0.6	3.6	-
2023	2.5	10.3	0.7	-	0	-	0.3	2.6	0.6	3	-
year	Quadrat Cover (%)										
1998	1.5	9.1	0.2	-	0.4	0.4	0.3	0.4	4.1	0.6	0.0
2003	1.5	14.6	0.8	-	0.1	0.4	0.3	0.4	2.0	0.2	-
2008	0.9	16.0	0.8	0.0	0.1	0.7	0.6	0.6	0.0	0.0	-
2013	0.6	12.9	0.6	0.2	0.1	0.2	0.4	0.4	0.2	0.9	-
2018	0.9	17.1	0.8	0.4	0.2	1.3	0.4	0.1	0.2	0.8	-
2023	1.2	13.1	0.6	-	0.2	0.1	0.2	0.1	0.7	0.7	-

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

**Table 30-26.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1998	380	20	5	95	0	32	32	5	99/105
2003	360	20	22	39	39	0	94	11	78/87
2008	220	20	18	36	46	9	36	27	103/114
2013	280	-	50	36	14	29	64	43	76/93
2018	360	-	17	72	11	11	61	11	75/80
2023	140	-	29	71	0	0	100	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	7260	1400	43	53	4	22	1	4	40/57
2003	13440	620	33	63	4	11	2	1	31/54
2008	10380	4960	26	57	17	34	4	6	28/55
2013	7020	580	17	80	3	32	1	2	34/61
2018	7900	20	9	85	6	14	0	5	29/52
2023	3700	9420	3	71	27	22	2	26	- / -
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
1998	40	-	0	100	0	0	50	0	120/126
2003	40	-	50	50	0	0	50	0	154/113
2008	60	-	67	33	0	0	33	0	150/101
2013	60	-	33	33	33	33	33	0	128/122
2018	60	-	0	100	0	0	67	0	113/117
2023	40	-	50	50	0	0	50	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	0	100	0	100	0	0	-/-
2008	40	-	0	100	0	100	0	0	83/85
2013	120	40	0	50	50	0	100	33	86/97
2018	40	20	50	50	0	0	50	0	158/141
2023	40	-	0	50	50	0	100	50	-/-
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
1998	1680	40	20	76	4	17	1	0	15/27
2003	560	-	4	93	4	25	21	4	12/21
2008	180	60	0	67	33	0	78	0	11/17
2013	380	-	47	53	0	16	0	0	17/23
2018	360	-	6	94	0	11	61	0	9/15
2023	400	-	35	65	0	20	40	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	2720	-	32	68	0	2	2	0	17/14
2003	3060	-	5	92	3	0	0	2	10/11
2008	5340	400	7	89	4	1	4	1	10/12
2013	500	-	48	52	0	0	4	0	14/15
2018	1680	60	12	88	0	0	0	0	17/20
2023	900	20	87	13	0	0	0	0	-/-
<b>Opuntia -- (pricklypear)</b>									
1998	380	-	5	84	11	0	0	11	17/51
2003	420	20	0	76	24	0	0	24	14/34
2008	380	-	0	68	32	0	0	11	14/41
2013	360	-	6	67	28	0	0	33	14/35
2018	400	-	10	90	0	0	0	0	15/33
2023	300	-	0	67	33	0	0	33	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	0	100	0	0	0	0	-/-
2013	20	-	0	100	0	0	0	0	5/7
2018	20	-	0	100	0	0	0	0	6/9
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>l</sup> -- (twoneedle pinyon)</b>									
1998	40	-	50	50	0	0	0	0	-/-
2003	60	20	67	33	0	0	0	0	-/-
2008	80	-	75	25	0	0	0	0	-/-
2013	40	20	50	50	0	0	0	0	-/-
2018	20	-	0	100	0	0	0	0	-/-
2023	40	-	50	50	0	50	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	700	-	9	74	17	9	49	9	32/85
2003	580	-	0	69	31	17	76	14	24/74
2008	400	-	10	30	60	0	80	35	25/64
2013	280	-	14	86	0	36	64	21	26/56
2018	380	-	0	95	5	5	79	0	23/51
2023	340	20	0	88	12	0	100	12	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	460	-	61	9	30	35	0	17	92/98
2003	1240	-	92	8	0	0	0	0	101/96
2008	680	-	0	82	18	0	0	35	180/30
2013	480	-	83	17	0	0	0	0	59/89
2018	1220	-	38	62	0	20	72	0	72/66
2023	420	-	0	100	0	33	67	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	100	-	0	100	0	0	0	0	16/21
2003	-	-	-	-	-	-	-	-	- / -
2008	40	-	0	50	50	50	50	0	- / -

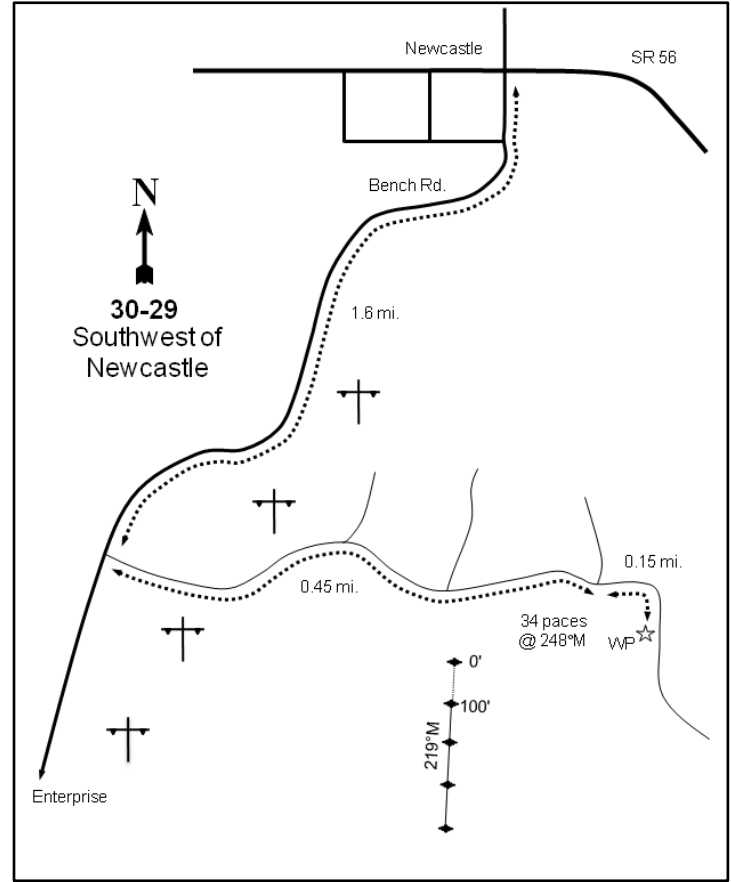
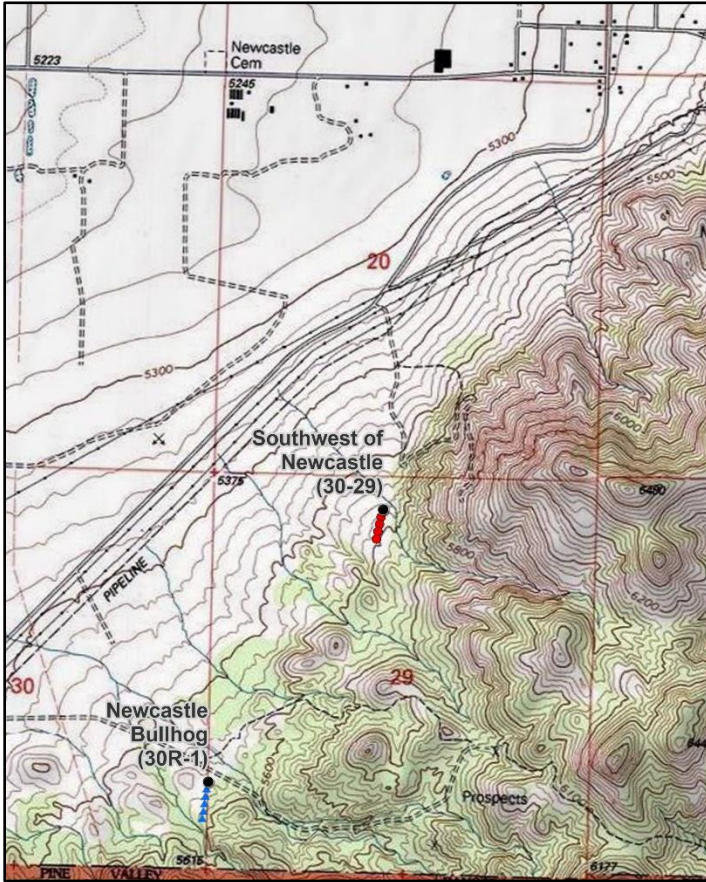
t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-26.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	87	18	59	12	12	-	5.0
2023	133	20	70	5	-	5	4.1



## SOUTHWEST OF NEWCASTLE - STUDY NO. 30-29

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Newcastle SE; Township 36S, Range 15W, Section 29  
NAD 83 UTM ZONE 12, 274236 East 4169617 North

**Transect Information**

Browse Tag # (0' Stake)  
Transect Bearing  
Length  
Belt Placement  
Belt Marker Placement

Not Available  
179° magnetic  
400ft  
Line 1 (12ft & 92ft), Line 2 (39ft), Line 3 (50ft), Line 4 (79ft)  
Standard

**Directions to Site**

From the intersection of Pinto-Canyon Road and Main Street in Newcastle, proceed south on Main Street for 1.0 mile towards Enterprise. Turn left (east) and travel for 0.45 miles until you come to a fork. Proceed right and continue for 0.15 miles to a witness post on the right (west) side of the road. From the witness post, walk 34 paces at 248 degrees magnetic to the 0-foot stake. The study is marked by green steel "T" fence posts approximately 18 to 24 inches in height.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	PINTO CREEK
Elevation	5,580ft (1,701m)
Aspect	West
Slope	10-12%
Sample Dates	05/19/1998, 05/21/2003, 07/21/2004, 05/15/2008, 05/28/2013, 05/23/2018, 05/24/2023

**Table 30-29.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	-	-	Between 2003 and 2008	-
Hand Crew - Lop and Scatter	-	-	Between 2018 and 2023	-

**Wildlife Habitat and Vegetation History****Table 30-29.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30-29.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1982	Mountain Big Sagebrush	Phase I
1992	Mountain Big Sagebrush	Phase I
1998	Mountain Big Sagebrush	Phase I
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

Pictures and pellet group data were taken in 2004 following the lop and scatter treatment.

**Soils****Table 30-29.5 - 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	6.4	54.0	21.4	24.6	1.6	9.4	105.6	0.6	05/19/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation      14 inches  
 NRCS Ecological Site                              Upland Loam (Bonneville Big Sagebrush)  
 NRCS Ecological Site #                            R028AY310UT  
 States and Transitions                            1982-2023 - Utah Juniper/Invasive Annuals State: Community Phase 3.1

The dominant browse component of this site has been mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) since study establishment in 1982; sagebrush cover has increased overall since 2003, but density has decreased. Other shrub species have also been present in lesser amounts (Photos, Pre-1992 Data, Table 30-29.12, Table 30-29.13). The introduced annual grass species cheatgrass (*Bromus tectorum*) has fluctuated in abundance and was the dominant herbaceous component in most sample years. Increased amounts of cheatgrass may put the ecological resiliency of the plant community at risk and may influence fire regimes. Perennial and annual forbs have remained rare (Table 30-29.7, Table 30-29.10, Table 30-29.11). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have been minor vegetation components throughout the study period. Pinyon and juniper have remained dominant in the areas immediately adjacent to the site, but a post-sampling 2003 lop and scatter treatment removed most of the trees on the transect itself, despite no change in estimated density and cover (Table 30-29.1). The site was treated again by an unknown lop and scatter between 2018 and 2023. Many of the mature trees were left intact while the young whips were removed, which decreased density for both juniper and pinyon, though the study site was still considered to be within Phase I of woodland succession in 2023 (Table 30-29.4), it has the potential to transition to a tree-dominated state due to the site's history of active tree encroachment (Table 30-29.14).

Deer winter range condition has remained very poor since 1998. Improvement to deer wintering range can be accomplished through efforts that support mature preferred browse populations and recruitment of young while decreasing decadence. In addition, diversifying and increasing cover of native perennial forbs and grasses and decreasing cheatgrass would greatly improve winter range condition (Table 30-29.15). According to pellet transect data, mule deer presence on this site has been considered to be high in all sample years since 1998 (Table 30-29.9).

**Trend Summary Tables****Table 30-29.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	11.5	2.6	1.4	-	-	-
2003	6.6	3.3	1.7	1.6	2.2	1.6
2008	6.2	5.4	0.7	7.3	4.5	1.0
2013	8.7	6.0	1.0	10.9	7.6	1.1
2018	9.7	6.5	1.6	9.0	7.3	1.0
2023	7.6	5.3	1.3	7.6	5.9	1.3

**Table 30-29.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	463	237	114	85	19.1	9.0	0.4	0.5
2003	37	235	53	39	0.1	5.2	0.5	0.2
2008	420	285	209	69	5.4	8.3	0.6	0.4
2013	445	212	10	38	16.6	4.1	0.0	0.2
2018	410	198	6	8	17.6	3.4	0.0	0.0
2023	412	169	50	50	13.6	6.0	0.4	0.6

**Table 30-29.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	18.1	0.4	30.8	22.4	7.6	43.5
2003	12.0	0.8	35.3	31.4	7.6	19.8
2008	7.3	0.2	50.7	23.4	6.7	28.4
2013	8.1	0.1	44.6	18.0	6.9	37.2
2018	15.6	0.2	49.8	22.9	6.2	35.3
2023	14.8	0.0	48.0	15.9	5.7	33.2

**Table 30-29.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	-	51	-	30
2003	-	51	-	22
2004	-	-	-	-
2008	-	37	-	93
2013	3	26	1	24
2018	4	32	-	44
2023	4	25	-	22
Year	Days Use Per Acre (ha)			
1998	-	67.0 (165.5)	-	-
2003	-	58.3 (144.0)	-	-
2004	-	77.7 (192.0)	-	-
2008	-	101.9 (251.6)	-	-
2013	5.8 (14.3)	57.0 (140.7)	-	-
2018	2.2 (5.4)	45.6 (112.6)	-	-
2023	27.6 (68.1)	61.0 (150.6)	-	-

**Table 30-29.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency						
1998	32	-	462	36	165	94	163
2003	20	-	37	1	168	118	-
2008	30	-	420	69	200	66	7
2013	23	-	445	78	139	24	2
2018	23	2	410	52	141	18	-
2023	15	-	412	25	137	4	3
year	Average Cover (%)						
1998	1.5	-	18.1	1.0	4.4	2.1	1.0
2003	0.3	-	0.1	0.0	3.0	1.8	-
2008	0.5	-	5.4	1.4	5.4	1.0	0.0
2013	0.6	-	16.6	1.5	1.7	0.4	0.0
2018	0.3	0.0	17.6	0.9	2.0	0.1	-
2023	0.6	-	13.6	0.4	5.0	0.0	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-29.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Arabis (rockcress)	Astragalus newberryi (Newberry's milkvetch)	Calochortus flexuosus (winding mariposa lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvedseed butterwort)	Collomia linearis <sup>a</sup> (tiny trumpet)	Cryptantha (cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriastrum sparsiflorum <sup>a</sup> (Great Basin woollystar)	Erigeron pumilus (shaggy fleabane)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Frasera albomarginata (desert frasera)	Gilia inconspicua <sup>a</sup> (shy gilia)	Heterotheca villosa (hairy false goldenaster)
year	Nested Frequency																
1998	2	-	17	1	-	3	33	9	25	14	39	7	-	2	1	51	-
2003	-	-	23	-	-	-	-	2	-	-	30	-	-	-	-	28	-
2008	-	1	14	12	-	-	9	17	-	-	186	-	3	-	-	48	1
2013	4	-	-	2	-	-	8	-	-	-	8	-	-	-	-	4	-
2018	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-	2	-
2023	-	-	30	-	3	-	-	8	-	-	2	-	-	4	3	29	-
year	Average Cover (%)																
1998	0.0	-	0.0	0.0	-	0.0	0.2	0.0	0.1	0.1	0.1	0.0	-	0.0	0.0	0.2	-
2003	-	-	0.1	-	-	-	-	0.0	-	-	0.1	-	-	-	-	0.4	-
2008	-	0.0	0.0	0.1	-	-	0.0	0.1	-	-	0.4	-	0.0	-	-	0.1	0.0
2013	0.0	-	-	0.0	-	-	0.2	-	-	-	0.0	-	-	-	-	0.0	-
2018	-	-	-	-	0.0	-	0.0	-	-	-	-	-	-	-	-	0.0	-
2023	-	-	0.3	-	0.0	-	-	0.2	-	-	0.0	-	-	0.0	0.0	0.1	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Lupinus argenteus (silvery lupine)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)	Phlox longifolia (longleaf phlox)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)
year	Nested Frequency				
1998	4	-	23	-	-
2003	-	-	15	-	-
2008	-	9	25	10	0
2013	-	-	22	-	2
2018	-	-	6	1	1
2023	-	18	13	-	-
year	Average Cover (%)				
1998	0.0	-	0.1	-	-
2003	-	-	0.1	-	-
2008	-	0.0	0.1	0.0	0.0
2013	-	-	0.1	-	0.0
2018	-	-	0.0	0.0	0.0
2023	-	0.3	0.1	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-29.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Cylindropuntia whipplei (Whipple cholla)	Ephedra nevadensis <sup>p</sup> (Nevada jointfir)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Pinus edulis <sup>t</sup> (twoneedle pinyon)
year	Line Intercept Cover (%)						
1998	-	-	-	-	-	-	-
2003	1.6	1.3	0.9	0	-	-	1.6
2008	7.1	3.3	1.2	0.2	-	-	1
2013	10.3	5.8	1.8	0.6	-	-	1.1
2018	8.7	5.9	1.4	0.3	-	-	1
2023	7.2	5.7	0.2	0.4	-	-	1.3
year	Quadrat Cover (%)						
1998	11.5	1.6	0.9	0.0	0.2	-	1.4
2003	6.5	2.5	0.7	0.1	-	-	1.7
2008	6.2	3.6	1.8	0.0	0.0	-	0.7
2013	8.4	4.4	1.6	0.3	-	-	1.0
2018	9.3	5.3	1.2	0.3	-	0.0	1.6
2023	7.0	4.9	0.4	0.5	-	-	1.3

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-29.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	4860	40	2	65	33	56	20	15	41/63
2003	3680	40	1	6	93	9	85	91	33/50
2008	2660	2640	15	31	54	37	11	21	39/58
2013	2480	20	11	74	14	20	38	19	44/68
2018	2400	-	2	88	11	37	46	8	42/64
2023	1840	540	2	65	33	49	25	29	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1998	920	-	7	94	0	0	0	0	31/45
2003	880	-	2	34	64	0	2	41	25/34
2008	2160	540	44	39	18	3	3	3	34/53
2013	1960	-	27	68	5	0	2	3	37/61
2018	2260	-	2	80	19	10	4	16	35/56
2023	1780	80	2	84	14	3	0	14	- / -
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
1998	220	-	9	91	0	0	0	0	17/34
2003	200	-	0	90	10	0	0	10	20/63
2008	180	-	0	78	22	11	0	11	24/71
2013	160	-	0	88	13	0	0	13	23/75
2018	120	-	0	33	67	0	0	67	23/64
2023	80	-	25	75	0	0	0	0	- / -
<b>Ephedra nevadensis<sup>P</sup> -- (Nevada jointfir)</b>									
1998	100	-	20	80	0	80	0	0	26/55
2003	80	-	0	100	0	0	25	25	24/40
2008	220	-	0	0	100	0	91	36	46/52
2013	160	20	63	25	13	13	0	25	46/81
2018	460	-	4	87	9	0	22	9	42/63
2023	420	-	33	52	14	10	67	24	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	40	20	0	100	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	20	-	0	100	0	0	0	0	13/10
2013	-	-	-	-	-	-	-	-	26/41
2018	-	-	-	-	-	-	-	-	19/26
2023	-	-	-	-	-	-	-	-	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	40	-	100	0	0	0	0	0	- / -
2003	80	-	100	0	0	0	0	0	- / -
2008	40	40	50	0	50	0	0	50	24/23
2013	40	-	100	0	0	0	0	0	- / -
2018	80	-	75	25	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	9/20
2018	-	-	-	-	-	-	-	-	11/21
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	60	-	0	100	0	0	0	0	4/8
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	0	100	0	0	0	0	5/8
2018	-	-	-	-	-	-	-	-	5/6
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
1998	20	-	100	0	0	0	0	0	- / -
2003	40	-	100	0	0	0	0	50	- / -
2008	20	-	0	100	0	0	0	0	44/24
2013	20	-	100	0	0	0	0	0	- / -
2018	20	-	0	100	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	-/-
<b>Sclerocactus -- (fishhook cactus)</b>									
1998	20	-	0	100	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	3/5
2008	-	-	-	-	-	-	-	-	5/5

t - Tree Species; p - Preferred Browse; i - Introduced Species

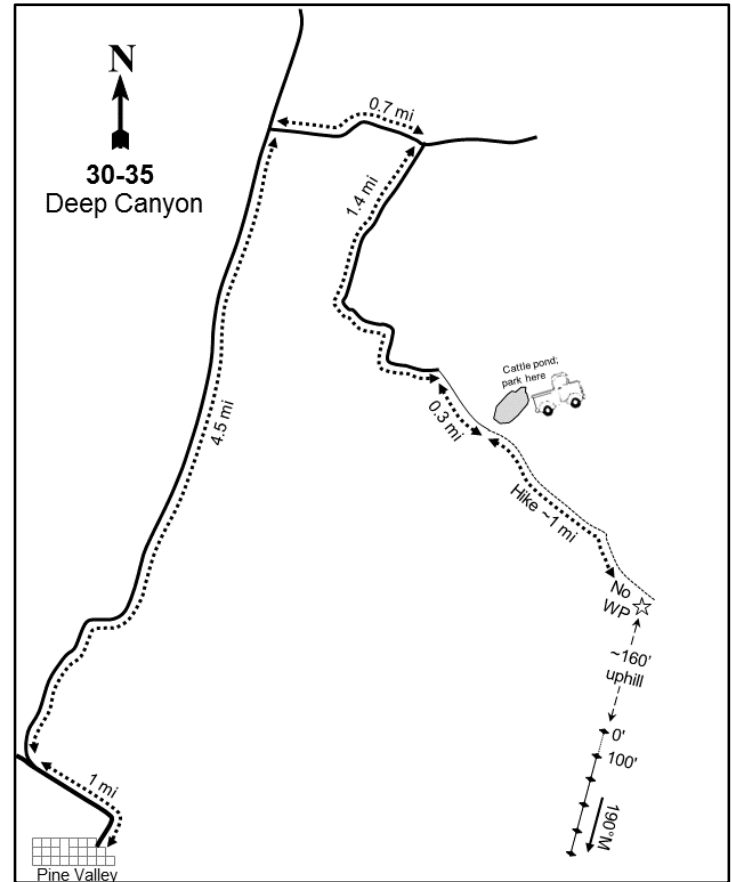
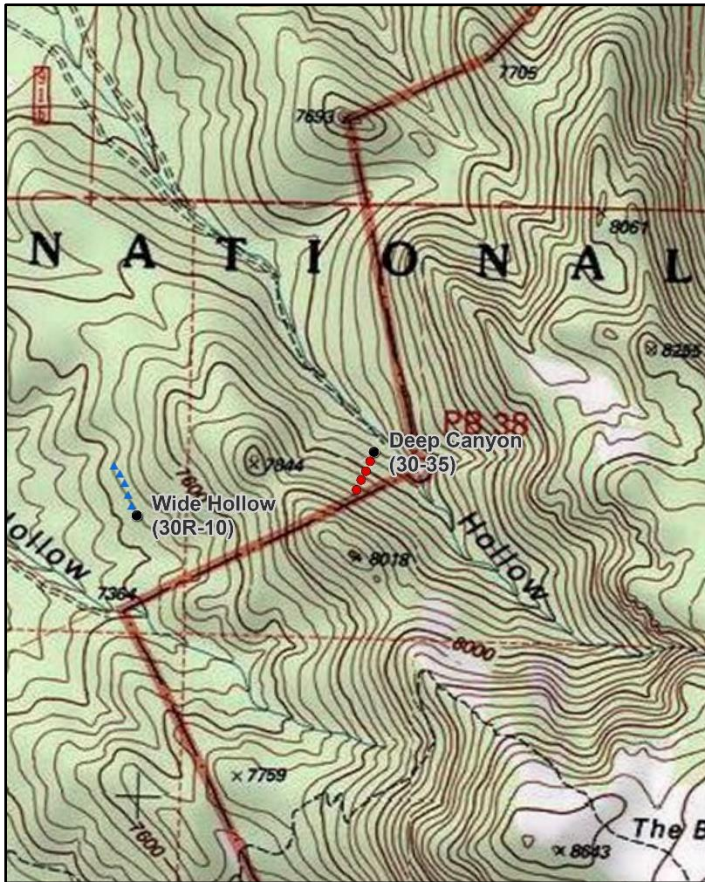
**Table 30-29.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	30	-	-	-	-	-	14.6
2003	54	16	63	11	5	5	8.2
2008	42	13	75	-	6	6	10.3
2013	63	11	79	5	-	5	4.6
2018	61	-	89	5	-	5	9.6
2023	7	-	-	25	25	50	54.0
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	20	-	-	-	-	-	5.9
2003	22	-	29	43	29	-	8.4
2008	25	50	40	10	-	-	2.5
2013	18	-	90	10	-	-	2.7
2018	31	15	77	8	-	-	3.5
2023	2	-	-	50	50	-	15.5

**Table 30-29.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	14.4	5.1	1.1	18.0	-14.3	0.9	0.0	<b>25.2</b>	Very Poor
2003	2.0	0.0	0.0	10.3	-0.1	0.3	0.0	<b>12.6</b>	Very Poor
2008	9.1	-1.6	7.3	16.6	-4.1	0.7	0.0	<b>28.0</b>	Very Poor
2013	13.6	10.7	7.1	8.3	-12.4	0.5	0.0	<b>27.7</b>	Very Poor
2018	11.3	11.8	0.9	6.7	-13.2	0.1	0.0	<b>17.6</b>	Very Poor
2023	9.5	5.5	1.9	12.0	-10.2	1.2	0.0	<b>19.9</b>	Very Poor

## DEEP CANYON - STUDY NO. 30-35

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Grass Valley SW; Township 39S, Range 14W, Section 05  
NAD 83 UTM ZONE 12, 283015 East 4144856 North

**Transect Information**

Browse Tag # (0' Stake)	7009
Transect Bearing	190° magnetic
Length	400ft
Belt Placement	Line 1 (19ft & 88ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Belt 1: No Rebar

**Directions to Site**

From Pinto, drive south for 7.1 miles toward Grass Valley. Turn left (east) on the road toward Whiterocks trail. Proceed on this road for 0.6 miles, at which point there will be an intersection. Go right (southeast) for 0.7 miles to a gate. Proceed through the gate and travel for 0.8 miles to a second gate. Go through the second gate and drive 1.25 miles to the end of the road (this road is very rocky; you may have to hike these last 1.25 miles). There will be a witness post on the right side of the road at the base of a twin trunk *Pinus flexilis* (it is recommended that one rely on GPS points for navigation at this point). From the witness post walk uphill 33 paces at 193 degrees magnetic to the 0-foot stake. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Pine Valley
Elevation	7,550ft (2,301m)
Aspect	North
Slope	40-50%
Sample Dates	06/30/1998, 05/28/2003, 05/27/2008, 06/04/2018, 06/05/2023



**Table 30-35.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Handcrew - Lop and Pile	Upper Santa Clara Watershed Restoration and Defensible Fire Space Project Phase I (Proposed)	5588	Fall 2022	43

**Wildlife Habitat and Vegetation History****Table 30-35.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	summer

**Table 30-35.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1982	Curlleaf Mountain Mahogany/Mountain Big Sagebrush	Phase I
1992	Curlleaf Mountain Mahogany/Mountain Big Sagebrush	Phase I
1998	Curlleaf Mountain Mahogany/Mountain Big Sagebrush	Phase I
2003	Curlleaf Mountain Mahogany/Mountain Big Sagebrush	Phase I
2008	Curlleaf Mountain Mahogany/Mountain Big Sagebrush	Phase I
2018	Curlleaf Mountain Mahogany/Mountain Big Sagebrush	Phase I
2023	Curlleaf Mountain Mahogany/Mountain Big Sagebrush	Phase I

**Site Notes**

Both singleleaf and twoneedle pinyon (*Pinus monophylla* and *P. edulis*) are present on this study site.

**Soils****Table 30-35.5 - 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	5.8	68.0	17.4	14.6	3.4	12.1	163.2	0.5	06/30/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	24 inches
NRCS Ecological Site	Mountain Shallow Loam (Curlleaf Mountain Mahogany)
NRCS Ecological Site #	R047XB440UT
States and Transitions	No state and transition model is available for this ecological site.

Curl-leaf mountain mahogany (*Cercocarpus ledifolius*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) have dominated the shrub component of this site since study establishment in 1982. A variety of other shrub species, such as slender buckwheat (*Eriogonum microthecum*), Gambel oak (*Quercus gambelii*), and Utah serviceberry (*Amelanchier utahensis*), have also been present in lower amounts (Photos, Pre-1992 Data, Table 30-35.12, Table 30-35.13). Perennial grasses such as muttongrass (*Poa fendleriana*), Letterman's needlegrass (*Achnatherum lettermanii*), and blue grama (*Bouteloua gracilis*) have contributed a majority of the cover in the herbaceous understory in most sample years since 1998. Perennial forbs have also remained abundant and very diverse since that time period, while frequency of annual forbs has fluctuated. The introduced annual grass species cheatgrass (*Bromus tectorum*) has been observed during multiple samplings, but in low amounts (Table 30-35.7, Table 30-35.10, Table 30-35.11). Rocky Mountain juniper (*Juniperus scopulorum*), twoneedle pinyon (*Pinus edulis*), and/or singleleaf pinyon (*P. monophylla*) have been present on this site, placing it in Phase I of woodland succession throughout the study period despite a fuel reduction project that occurred in 2023 (Table 30-05.1, Table 30-35.4, Table 30-35.12, Table 30-35.13, Table 30-35.14). However, these conifers have the potential for further encroachment, causing the study to progress through the phases of woodland succession.

This site may serve as adequate summer range for mule deer due to the diversity and abundance of the shrub and herbaceous components. Pellet group data indicates that deer have been present in moderate to high amounts in most sample years since 1998; presence was considered to be moderate in 2023 (Table 30-35.9).

## Trend Summary Tables

**Table 30-35.6 - 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
1998	20.2	0.2	0.2	2.5	-	0.1
2003	19.6	1.0	0.4	47.6	0.9	1.5
2008	14.5	0.3	0.8	51.9	0.6	3.4
2018	17.0	0.8	2.0	38.8	0.9	5.1
2023	14.3	1.2	2.3	54.7	1.5	8.7

**Table 30-35.7 - 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
1998	8	297	295	211	0.0	10.9	4.5	5.9
2003	9	266	253	204	0.0	4.8	3.1	3.7
2008	-	305	221	257	-	11.3	0.9	6.1
2018	18	307	172	215	0.4	14.3	0.8	6.9
2023	44	290	299	255	0.9	12.8	5.0	11.9

**Table 30-35.8 - 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
1998	20.1	0.5	31.5	11.6	23.8	36.0
2003	18.4	0.1	33.7	7.7	22.4	33.3
2008	15.1	0.2	34.3	12.3	20.5	33.3
2018	23.5	0.2	35.0	9.9	18.0	36.4
2023	11.3	0.2	35.0	14.9	19.3	41.1

**Table 30-35.9 - 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	Dusky Grouse	Rabbit
	Quadrat Frequency			
1998	4	26	-	1
2003	1	23	-	5
2008	1	36	-	13
2018	-	9	-	5
2023	2	9	-	5
Year	Days Use Per Acre (ha)			
1998	2.2 (5.4)	40.2 (99.3)	-	-
2003	4.4 (10.8)	75.1 (185.4)	8.7 (21.5)*	-
2008	3.6 (9.0)	40.2 (99.3)	-	-
2018	-	16.8 (41.4)	-	-
2023	2.2 (5.4)	26.8 (66.2)	-	-

\*Pellets per acre (ha)

**Table 30-35.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum nelsonii (Columbia needlegrass)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Elymus trachycaulus (slender wheatgrass)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)
year	Nested Frequency											
1998	150	9	11	8	-	79	2	-	5	169	0	36
2003	75	14	12	9	-	39	-	49	-	132	12	8
2008	19	47	15	-	3	63	26	-	-	236	-	11
2018	98	1	19	18	5	88	10	12	20	185	27	14
2023	75	42	23	44	-	36	3	-	-	177	4	-
year	Average Cover (%)											
1998	4.4	0.2	0.8	0.0	-	0.7	0.2	-	0.1	3.8	0.0	0.5
2003	1.2	0.1	0.0	0.0	-	0.3	-	0.5	-	2.6	0.1	0.0
2008	0.3	1.2	0.6	-	0.0	0.7	0.3	-	-	7.9	-	0.2
2018	2.6	0.0	1.3	0.4	0.2	1.6	0.6	0.1	0.6	6.0	1.0	0.3
2023	2.6	1.1	1.1	0.9	-	1.1	0.1	-	-	6.7	0.0	-

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-35.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria rosea (rosy pussytoes)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Astragalus argophyllus (silverleaf milkvetch)	Astragalus concordius (hairy-pod milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Chenopodium rubrum <sup>a</sup> (red goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawkbeard)	Delphinium nuttallianum (twolobe larkspur)	Descurainia incana <sup>a</sup> (mountain tansymustard)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Erigeron eatonii (Eatons fleabane)
year	Nested Frequency																
1998	19	-	18	12	2	-	3	1	-	-	179	-	28	-	-	9	88
2003	28	-	26	2	1	-	7	16	2	-	249	2	4	19	-	-	42
2008	51	-	6	24	-	7	1	8	3	-	216	-	5	24	-	3	42
2018	32	-	8	24	2	1	3	4	-	-	147	-	2	-	-	-	90
2023	20	2	21	35	5	-	-	3	-	5	209	-	-	3	6	-	94
year	Average Cover (%)																
1998	0.1	-	0.6	0.0	0.3	-	0.1	0.0	-	-	2.5	-	0.1	-	-	0.0	1.1
2003	0.2	-	0.5	0.0	0.0	-	0.1	0.1	0.0	-	3.0	0.0	0.1	0.1	-	-	0.3
2008	0.4	-	0.2	0.1	-	0.2	0.0	0.0	0.0	-	0.8	-	0.1	0.1	-	0.0	0.4
2018	0.1	-	0.0	0.1	0.0	0.0	0.0	0.0	-	-	0.6	-	0.0	-	-	-	1.1
2023	0.2	0.0	0.2	0.2	0.0	-	-	0.0	-	0.1	3.6	-	-	0.0	0.0	-	2.5

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Fritillaria atropurpurea (spotted fritillary)	Galium multiflorum (shrubby bedstraw)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Hackelia patens (spotted stickseed)	Heuchera parvifolia (litleleaf alumroot)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lathyrus brachycalyx (Bonneville pea)	Lithophragma parviflorum (smallflower woodland-star)	Lithospermum ruderale (western stoneseed)	Lomatium nevadense (Nevada biscuitroot)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	Orogenia linearifolia (Great Basin Indian potato)	Packera multilobata (lobeleaf groundsel)
year	Nested Frequency																
1998	20	4	-	8	-	18	-	31	22	-	-	4	20	0	110	-	-
2003	14	4	9	2	-	36	-	-	13	25	-	35	5	-	1	-	3
2008	31	9	1	-	-	104	6	1	14	66	0	38	3	-	3	-	2
2018	42	10	-	5	2	26	1	3	6	-	-	13	2	1	2	-	4
2023	23	-	-	23	9	70	12	5	1	72	3	34	5	-	53	12	3
year	Average Cover (%)																
1998	0.1	0.0	-	0.1	-	0.4	-	0.4	0.5	-	-	0.0	0.6	0.0	1.4	-	-
2003	0.2	0.0	0.0	0.0	-	0.5	-	-	0.1	0.1	-	0.3	0.2	-	0.0	-	0.0
2008	0.2	0.1	0.0	-	-	2.4	0.1	0.0	0.1	0.4	0.0	0.4	0.1	-	0.0	-	0.0
2018	0.6	0.1	-	0.0	0.0	0.4	0.0	0.0	0.0	-	-	0.1	0.4	0.0	0.0	-	0.0
2023	0.4	-	-	0.1	0.0	2.9	0.3	0.0	0.0	0.9	0.4	0.5	0.5	-	0.9	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Penstemon watsonii (Watson's penstemon)	Petrorhiza pumila (rock goldenrod)	Phlox austromontana (mountain phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Symphotrichum ascendens (western aster)	Taraxacum officinale (common dandelion)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency						
1998	-	20	69	41	-	18	-
2003	-	5	50	7	1	4	0
2008	-	4	62	7	17	10	-
2018	1	6	65	37	22	23	4
2023	-	14	41	36	0	25	-
year	Average Cover (%)						
1998	-	0.7	1.1	0.1	-	0.1	-
2003	-	0.0	0.7	0.1	0.0	0.0	0.0
2008	-	0.1	0.9	0.0	0.1	0.1	-
2018	0.0	0.1	2.5	0.1	0.9	0.5	0.0
2023	-	0.2	2.1	0.2	0.0	0.6	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-35.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Abies concolor <sup>t</sup> (white fir)	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus ledifolius <sup>p</sup> (curl-leaf mountain mahogany)	Ericameria parryi var. parryi (Parry's rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Juniperus scopulorum <sup>t</sup> (Rocky Mountain juniper)	Mahonia repens (creeping barberry)	Opuntia polyacantha (plains pricklypear)	Paxistima myrsinites (Oregon boxleaf)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Quercus gambelii <sup>p</sup> (Gambel oak)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)												
1998	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	0.7	-	8.7	35.5	-	1.9	-	-	0.3	0.6	0.8	0.1	1.4
2008	1.4	0.1	10	33.1	0.2	5.4	-	0.2	0.2	-	2	-	3.3
2018	1.4	0	7.8	22.4	-	4.3	-	0.6	0.3	-	3.7	1.2	3.1
2023	3.9	0.5	6.3	38.8	0.1	4.5	0.2	0.8	0.4	0.2	4.6	0.9	3.7
year	Quadrat Cover (%)												
1998	-	-	6.4	7.1	-	4.7	-	0.1	0.0	0.0	0.2	0.0	2.0
2003	0.0	0.1	11.0	4.6	-	1.9	-	0.0	0.1	0.9	0.4	0.2	1.8
2008	0.8	0.1	6.7	3.5	0.0	2.8	-	0.3	0.0	-	0.0	-	1.4
2018	1.9	0.1	5.2	4.4	0.0	5.2	-	0.7	0.1	-	0.1	0.2	1.9
2023	2.0	0.5	4.3	3.5	0.1	3.4	0.0	0.7	0.3	0.0	0.3	0.0	2.6

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-35.13 - 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 (%)				
<b>Abies concolor<sup>t</sup> -- (white fir)</b>									
1998	60	-	100	0	0	0	0	0	- / -
2003	80	40	75	25	0	0	0	0	- / -
2008	160	20	75	25	0	0	0	0	- / -
2018	100	20	60	40	0	0	0	0	- / -
2023	160	-	38	63	0	0	0	0	- / -
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1998	100	-	40	40	20	20	20	20	66/54
2003	20	-	0	100	0	0	100	0	36/43
2008	100	-	20	60	20	0	60	0	8/35
2018	80	-	0	100	0	0	50	0	68/58
2023	1080	-	4	96	0	0	4	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	3500	780	24	67	9	7	1	4	50/69
2003	4660	260	35	54	11	0	0	3	42/76
2008	4920	1400	32	47	21	19	2	12	32/57
2018	2940	40	21	74	5	3	0	6	36/57
2023	2100	20	6	78	16	11	1	15	- / -
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
1998	420	200	24	71	5	24	10	0	255/259
2003	580	100	31	69	0	14	31	0	249/217
2008	440	100	32	59	9	5	46	5	110/90
2018	500	-	48	52	0	36	0	0	230/222
2023	400	800	10	85	5	35	10	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Cercocarpus montanus<sup>p</sup> -- (alderleaf mountain mahogany)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	-	100	0	0	0	100	100	- / -
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Eriogonum microthecum<sup>p</sup> -- (slender buckwheat)</b>									
1998	4920	60	13	86	0	16	0	0	17/32
2003	3560	20	6	91	3	0	0	1	12/26
2008	5760	940	22	73	5	15	5	1	20/37
2018	4260	60	2	97	1	9	2	1	16/29
2023	3780	20	5	95	0	13	3	0	- / -
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
1998	100	-	20	80	0	20	0	0	15/25
2003	100	-	0	100	0	0	100	0	13/17
2008	80	-	0	75	25	50	25	25	16/25
2018	80	-	0	100	0	0	0	0	21/19
2023	140	-	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	14/13
2008	-	-	-	-	-	-	-	-	-/-
2018	40	-	0	100	0	0	0	0	11/28
2023	-	-	-	-	-	-	-	-	-/-
<b>Juniperus scopulorum<sup>t</sup> -- (Rocky Mountain juniper)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	0	100	0	0	0	0	- / -
<b>Mahonia repens -- (creeping barberry)</b>									
1998	180	-	0	100	0	0	0	0	13/21
2003	720	20	22	75	3	0	0	3	9/9
2008	1720	-	15	69	16	0	0	0	14/13
2018	620	-	0	100	0	0	0	0	12/14
2023	1560	-	0	100	0	0	0	0	- / -
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
1998	220	-	18	73	9	0	0	9	16/48
2003	400	-	0	70	30	0	0	30	15/36
2008	320	20	6	63	31	0	0	25	15/33
2018	200	-	0	90	10	0	0	10	15/34
2023	180	-	0	100	0	0	0	0	- / -
<b>Paxistima myrsinites -- (Oregon boxleaf)</b>									
1998	120	-	17	83	0	0	0	0	11/10
2003	880	-	0	100	0	41	36	0	8/19
2008	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	60	-	67	33	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1998	80	40	75	25	0	0	0	0	- / -
2003	40	20	50	50	0	0	0	0	- / -
2008	80	40	75	25	0	0	0	0	- / -
2018	60	40	100	0	0	0	0	0	- / -
2023	80	-	50	50	0	0	0	0	- / -

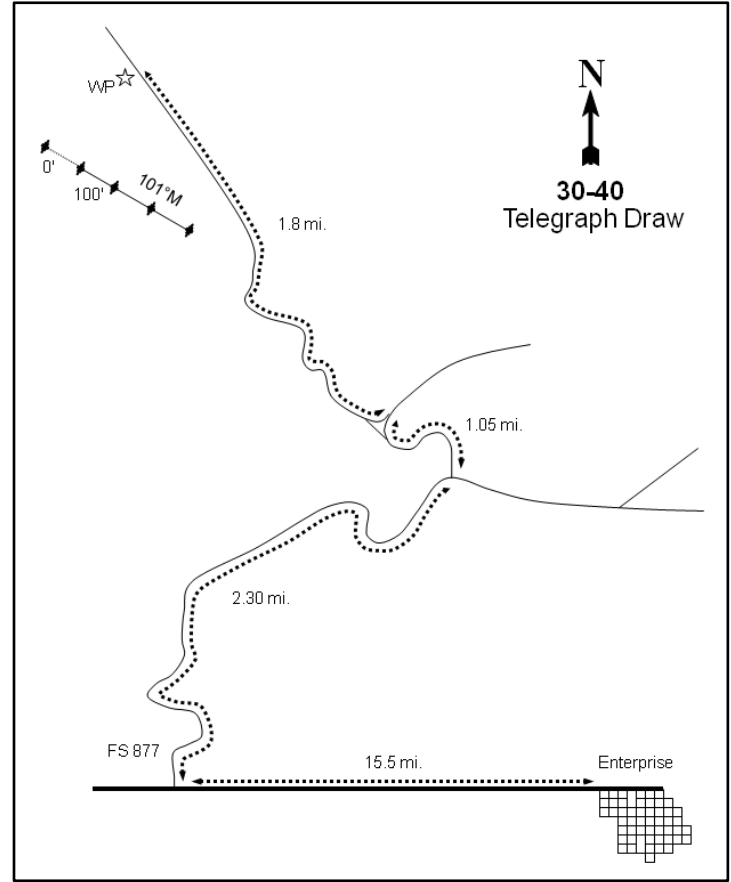
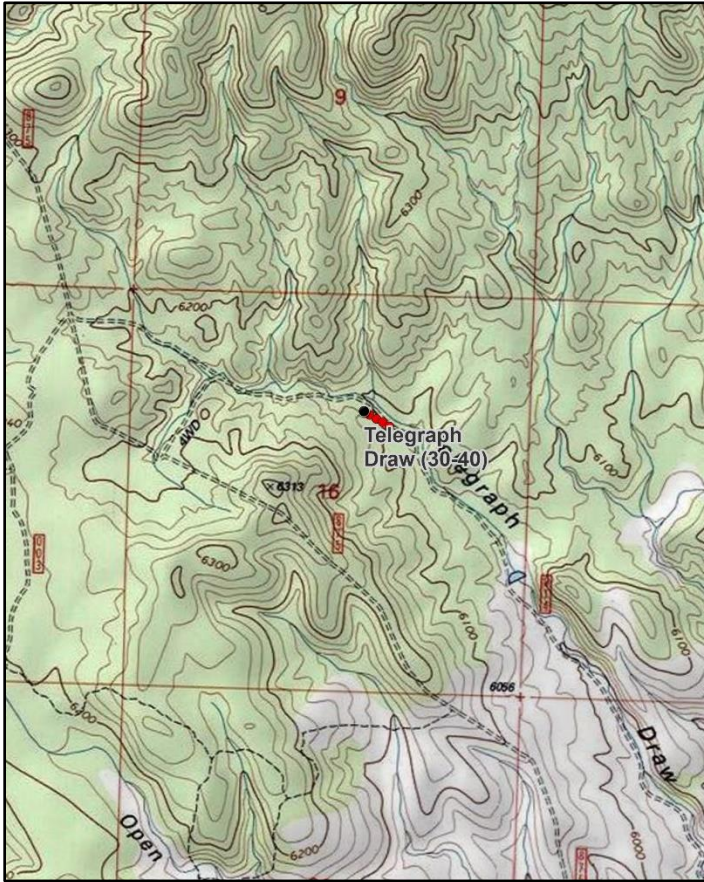
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	120	-	33	67	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	480	120	75	21	4	0	0	0	105/109
2003	60	820	100	0	0	0	0	0	41/36
2008	740	-	100	0	0	3	0	3	- / -
2018	320	-	56	44	0	13	13	0	45/78
2023	460	-	35	65	0	0	4	0	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1998	1120	180	27	61	13	13	0	0	32/65
2003	1100	100	26	73	2	4	13	2	32/67
2008	1400	100	30	57	13	26	19	4	35/66
2018	1440	-	40	60	0	1	11	0	30/63
2023	1560	100	8	92	0	0	13	0	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-35.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Abies concolor (white fir)</b>							
2018	38	22	33	11	22	11	5.4
2023	29	8	38	31	8	15	6.2
<b>Cercocarpus ledifolius (curl-leaf mountain mahogany)</b>							
2003	100	5	5	11	42	37	16.4
2008	110	5	21	32	32	11	20.5
2018	102	-	22	6	39	33	16.9
<b>Juniperus scopulorum (Rocky Mountain juniper)</b>							
2023	1	-	50	-	-	50	25.5
<b>Pinus edulis (twoneedle pinyon)</b>							
2018	16	50	-	-	-	50	17.0
2023	26	-	63	-	-	38	19.1
<b>Pinus monophylla (singleleaf pinyon)</b>							
2023	4	-	50	25	-	25	13.8

## TELEGRAPH DRAW - STUDY NO. 30-40

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Mount Escalante SW; Township 36S, Range 19W, Section 16  
NAD 83 UTM ZONE 12, 236896 East 4172114 North

**Transect Information**

Browse Tag # (0' Stake)  
Transect Bearing  
Length  
Belt Placement  
Belt Marker Placement

287  
101° magnetic  
400ft  
Line 1 (14ft & 81ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)  
Standard

**Directions to Site**

From Center Street and Main Street in Enterprise, travel west on Shoal Creek Road for 15.5 miles, then turn right (north); if you reach Clover Valley Road, you have gone 0.1 miles too far. Stay on the main road traveling north for approximately 2.3 miles (at 1.3 miles, stay to the south of the wash; the north road is washed out). At this point, there will be a fork in the road. Proceed to the left (north) on Forest Service Road #1014 for approximately 1.05 miles to a triangle of roads at the top of the ridge. Stay to the left on the road that goes down into the draw for 1.8 miles, at which point the road enters pinyon-juniper. Stop at the witness post on the left (west) side of the road just as you come to the pinyon-juniper. The 0-foot baseline stake is located 49 paces from the witness post at 139 degrees magnetic and is marked by browse tag #287. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	No Allotment
Elevation	6,100ft (1,859m)
Aspect	Northeast
Slope	10%
Sample Dates	05/29/1998, 05/29/2003, 05/13/2008, 05/23/2013, 05/29/2018, 05/30/2023



**Table 30-40.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Chaining - Chain Unknown	-	-	Historic	-
Seeding - Seed Unknown	-	-	Historic	-

**Wildlife Habitat and Vegetation History****Table 30-40.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	winter

**Table 30-40.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1982	Mountain Big Sagebrush	Phase I
1992	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
1998	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Mountain Big Sagebrush/Pinyon-Juniper	Phase II
2008	Mountain Big Sagebrush/Pinyon-Juniper	Phase II
2013	Mountain Big Sagebrush/Pinyon-Juniper	Phase II
2018	Mountain Big Sagebrush/Pinyon-Juniper	Phase II
2023	Mountain Big Sagebrush/Pinyon-Juniper	Phase II

**Site Notes**

Several wild horses were seen during the 1992, 1998, and 2013 sample years, and wild horse signs (tracks and pellet groups) have been noted on the site numerous times. Black sagebrush (*Artemisia nova*) is in the area and occurs on belt four. In all years prior to and including 2023, however, it has been misidentified as mountain big sagebrush (*A. tridentata* ssp. *vaseyana*).

**Soils****Table 30-40.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay	5.6	46.0	17.4	36.6	2.4	3.8	310.4	0.4	05/22/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	17 inches
NRCS Ecological Site	Mountain Gravelly Loam (Mountain Big Sagebrush)
NRCS Ecological Site #	R047XB406UT
States and Transitions	No state and transition model is available for this ecological site.

Upon study establishment in 1982, the plant community on this site was dominated by mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) with young singleleaf pinyon (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*) trees scattered throughout the area (Photos, Pre-1992 Data). Pinyon and juniper trees have steadily increased in size and cover since that time and became co-dominant vegetation components in 1992; the study site is considered to be within Phase II of woodland succession as of the 2023 sample year (Table 30-40.4, Table 30-40.12, Table 30-40.13, Table 30-40.14). The herbaceous understory has been diverse, but not particularly abundant; perennial forbs have contributed a majority of the cover in most sample years since 1998 (Table 30-40.7, Table 30-40.10, Table 30-40.11). Barring a major tree-removing disturbance, pinyon and juniper will likely continue to increase in size and density as the shrub and herbaceous understory decrease, causing the site to transition into one solely dominated by trees.

Deer winter range condition has ranged between poor and fair since 1998. As of 2023, deer winter range condition was considered to be poor. Improvement to deer winter range can be accomplished through efforts that support the diversification of preferred browse age class structure and encourage the recruitment of young plants; increasing cover of and diversifying native perennial grass species while reducing cheatgrass would also improve winter range condition (Table 30-40.15). According to pellet transect data, deer presence on this site has remained low since 1998 (Table 30-40.9).

**Trend Summary Tables****Table 30-40.6 - 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
1998	18.7	1.7	7.7	-	-	0.1
2003	28.3	0.9	9.1	24.3	0.5	14.9
2008	19.7	0.6	9.4	23.9	1.3	18.9
2013	18.8	0.3	9.4	28.3	1.3	22.3
2018	15.6	0.2	13.5	23.2	0.3	26.1
2023	20.3	0.3	13.9	22.9	1.9	24.9

**Table 30-40.7 - 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
1998	190	134	106	196	2.5	2.3	0.4	5.5
2003	87	71	46	141	0.4	0.5	0.1	2.9
2008	48	119	52	167	0.2	1.4	0.5	2.8
2013	193	68	26	170	2.3	1.1	0.1	3.6
2018	11	62	2	127	0.1	0.5	0.0	2.0
2023	64	70	88	153	0.8	1.4	0.4	4.9

**Table 30-40.8 - 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
1998	20.2	0.2	50.9	13.0	10.7	39.3
2003	17.8	0.1	44.7	8.3	8.9	38.8
2008	12.8	0.3	52.0	11.0	11.2	34.0
2013	14.8	0.0	54.8	9.9	10.7	36.8
2018	20.9	0.7	56.5	11.8	11.0	28.5
2023	11.5	0.2	48.2	15.0	12.0	39.0

**Table 30-40.9 - 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	Horse	Rabbit
	Quadrat Frequency		
1998	9	3	8
2003	3	4	2
2008	9	3	59
2013	1	2	-
2018	8	1	17
2023	5	-	8
Year	Days Use Per Acre (ha)		
1998	14.1 (34.8)	12.8 (31.6)	-
2003	4.0 (9.9)	9.3 (23.0)	-
2008	6.0 (14.9)	4.7 (11.5)	-
2013	0.7 (1.7)	5.2 (12.9)	-
2018	6.0 (14.9)	4.0 (10.0)	-
2023	4.0 (9.9)	1.7 (4.3)	-

**Table 30-40.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Achnatherum lettermanii (Letterman's needlegrass)	Achnatherum parishii var. depauperatum (little Parish's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pleuraphis jamesii (James' galleta)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Psathyrostachys juncea <sup>i</sup> (Russian wildrye)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency													
1998	52	-	6	13	190	47	-	-	5	33	-	2	-	-
2003	17	24	-	19	87	5	-	-	-	7	-	-	-	-
2008	30	7	3	38	48	38	25	-	-	1	-	3	-	-
2013	6	18	-	6	193	26	1	-	2	10	4	3	1	-
2018	25	13	-	-	11	20	-	-	-	5	0	-	-	3
2023	-	22	-	-	64	44	-	6	-	1	-	1	3	-
year	Average Cover (%)													
1998	1.1	-	0.1	0.1	2.5	0.6	-	-	0.0	0.5	-	0.0	-	-
2003	0.1	0.2	-	0.3	0.4	0.0	-	-	-	0.0	-	-	-	-
2008	0.2	0.1	0.0	0.4	0.2	0.5	0.1	-	-	0.0	-	0.0	-	-
2013	0.1	0.5	-	0.1	2.3	0.1	0.0	-	0.0	0.2	0.0	0.0	0.0	-
2018	0.2	0.1	-	-	0.1	0.1	-	-	-	0.1	0.0	-	-	0.0
2023	-	0.3	-	-	0.8	0.9	-	0.0	-	0.0	-	0.0	0.1	-

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-40.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Antennaria dimorpha (low pussytoes)	Astragalus (milkvetch)	Balsamorhiza hookeri (Hooker's balsamroot)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Chenopodium album <sup>a</sup> (lambsquarters)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawksbeard)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Erigeron (fleabane)	Eriogonum caespitosum (matted buckwheat)
year	Nested Frequency																
1998	-	1	1	-	2	25	-	-	-	20	-	6	32	-	-	3	7
2003	-	-	-	2	-	19	-	-	-	-	-	24	58	1	2	-	5
2008	1	-	-	10	0	11	6	-	2	-	3	38	64	3	-	-	6
2013	-	-	-	5	1	18	-	-	-	4	-	3	64	-	-	-	4
2018	-	-	-	4	-	15	-	-	-	1	-	-	43	-	-	-	2
2023	4	-	3	-	-	8	2	1	-	-	-	3	51	-	-	-	7
year	Average Cover (%)																
1998	-	0.0	0.0	-	0.0	0.6	-	-	-	0.1	-	0.0	0.2	-	-	0.0	0.2
2003	-	-	-	0.0	-	0.7	-	-	-	-	-	0.0	0.5	0.1	0.0	-	0.2
2008	0.0	-	-	0.0	0.0	0.4	0.0	-	0.0	-	0.4	0.1	0.4	0.0	-	-	0.1
2013	-	-	-	0.1	0.0	0.8	-	-	-	0.0	-	0.0	0.9	-	-	-	0.0
2018	-	-	-	0.0	-	0.5	-	-	-	0.0	-	-	0.2	-	-	-	0.0
2023	0.2	-	0.0	-	-	1.0	0.0	0.0	-	-	-	0.0	0.6	-	-	-	0.2

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES																		
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)																		
Eriogonum racemosum (redroot buckwheat)																		
Eriogonum umbellatum (sulphur-flower buckwheat)																		
Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)																		
Gilia inconspicua <sup>a</sup> (shy gilia)																		
Hymenopappus filifolius (fineleaf hymenopappus)																		
Ipomopsis aggregata (scarlet gilia)																		
Lappula occidentalis <sup>a</sup> (flatspine stickseed)																		
Lesquerella (bladderpod)																		
Lomatium foeniculaceum (desert biscuitroot)																		
Lomatium nevadense (Nevada biscuitroot)																		
Lotus utahensis (Utah bird's-foot trefoil)																		
Lupinus argenteus (silvery lupine)																		
Microsteris gracilis <sup>a</sup> (slender phlox)																		
Orobanche fasciculata (clustered broomrape)																		
Packera multilobata (lobeleaf groundsel)																		
Penstemon (beardtongue)																		
year	Nested Frequency																	
1998	5	9	41	-	6	-	-	12	-	4	-	3	4	87	-	-	7	
2003	-	-	19	-	-	-	-	16	-	13	-	-	2	6	1	-	-	
2008	10	5	24	-	-	-	4	1	1	14	-	1	3	-	-	2	6	
2013	-	7	30	-	-	1	3	-	-	11	-	-	0	23	-	18	-	
2018	-	-	40	-	-	0	4	-	-	-	-	-	-	-	-	2	8	
2023	-	1	44	6	2	-	10	7	4	2	4	-	-	70	-	1	-	
year	Average Cover (%)																	
1998	0.1	0.1	0.3	-	0.0	-	-	0.1	-	0.0	-	0.0	0.1	0.2	-	-	0.1	
2003	-	-	0.2	-	-	-	-	0.0	-	0.0	-	-	0.0	0.0	0.0	-	-	
2008	0.0	0.1	0.3	-	-	-	0.0	0.0	0.0	0.1	-	0.0	0.0	-	-	0.0	0.1	
2013	-	0.2	0.4	-	-	0.0	0.0	-	-	0.0	-	-	0.0	0.1	-	0.1	-	
2018	-	-	0.7	-	-	0.0	0.0	-	-	-	-	-	-	-	-	0.0	0.1	
2023	-	0.0	1.3	0.0	0.0	-	0.1	0.1	0.0	0.0	0.0	-	-	0.2	-	0.0	-	

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES										
Penstemon eatonii (firecracker penstemon)										
Penstemon linarioides (toadflax penstemon)										
Petrorhiza pumila (rock goldenrod)										
Phlox austromontana (mountain phlox)										
Phlox longifolia (longleaf phlox)										
Polygonum douglasii <sup>a</sup> (Douglas' knotweed)										
Sphaeralcea ambigua (desert globemallow)										
Streptanthus cordatus (heartleaf twistflower)										
Trifolium gymnocarpon (hollyleaf clover)										
year	Nested Frequency									
1998	-	-	57	80	7	-	-	32	12	
2003	-	-	39	34	7	1	-	-	14	
2008	-	9	32	29	13	-	-	4	22	
2013	-	2	30	46	-	-	2	-	12	
2018	1	-	18	23	1	2	-	-	9	
2023	2	14	12	35	5	4	-	4	14	
year	Average Cover (%)									
1998	-	-	1.4	1.6	0.0	-	-	0.6	0.1	
2003	-	-	0.7	0.4	0.0	0.0	-	-	0.1	
2008	-	0.2	0.6	0.4	0.0	-	-	0.0	0.1	
2013	-	0.0	0.6	0.5	-	-	0.0	-	0.0	
2018	0.0	-	0.1	0.4	0.0	0.0	-	-	0.0	
2023	0.1	0.1	0.2	0.7	0.0	0.0	-	0.0	0.2	

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-40.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Ceanothus greggii (desert ceanothus)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus (yellow rabbitbrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus monophylla <sup>t</sup> (singleleaf pinyon)	Polygala subspinoso (spiny milkwort)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)									
1998	-	-	-	-	-	-	-	-	-	-
2003	17	0	0.1	0.4	0.1	7.1	-	7.8	-	7.2
2008	18.2	-	0.1	1.2	0.1	7.9	-	11	-	5.6
2013	20.5	-	0.2	1.3	-	9.5	-	12.8	-	7.6
2018	18.3	-	0	0.2	0.1	9.4	-	16.7	-	4.9
2023	18.1	0.1	-	1.5	0.3	10.2	-	14.7	0	4.8
year	Quadrat Cover (%)									
1998	14.4	-	0.4	1.5	0.2	2.0	-	5.7	-	3.9
2003	21.2	0.0	0.2	0.6	0.3	4.3	-	4.8	0.0	6.8
2008	14.0	0.1	1.2	0.4	0.1	3.1	0.0	6.3	0.0	4.5
2013	14.6	-	0.3	0.3	0.0	5.1	0.0	4.3	0.0	3.9
2018	12.7	0.0	0.0	0.1	0.1	4.1	0.0	9.4	-	2.9
2023	16.3	0.0	0.0	0.1	0.2	6.6	-	7.3	0.0	4.0

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-40.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	4560	1260	26	71	4	28	1	3	50/78
2003	6740	40	18	68	14	0	0	6	50/70
2008	8160	1120	12	56	33	4	1	8	44/64
2013	5160	340	16	72	12	11	0	9	52/73
2018	5700	20	1	72	26	3	0	17	47/67
2023	5760	160	2	70	27	6	1	25	- / -
<b>Ceanothus greggii -- (desert ceanothus)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	100	0	13/31
2008	-	-	-	-	-	-	-	-	28/100
2013	-	-	-	-	-	-	-	-	- / -
2018	40	-	50	50	0	0	0	0	22/80
2023	20	-	0	100	0	0	0	0	- / -
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
1998	2300	220	28	70	3	0	0	3	10/15
2003	280	20	7	86	7	7	14	0	11/18
2008	1080	140	28	67	6	24	28	2	7/11
2013	300	-	13	87	0	0	0	0	10/16
2018	60	-	33	67	0	0	33	0	8/14
2023	140	-	0	86	14	0	0	14	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus -- (yellow rabbitbrush)</b>									
1998	1360	-	19	77	4	0	0	3	27/37
2003	520	-	15	65	19	0	4	12	27/34
2008	920	40	4	78	17	2	30	9	21/29
2013	680	40	12	88	0	0	0	9	27/38
2018	420	-	5	76	19	10	14	29	26/28
2023	520	-	39	58	4	0	0	4	- / -
<b>Cylindropuntia -- (cholla)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	5/1
2023	-	-	-	-	-	-	-	-	- / -
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	12/21
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	1420	580	21	78	1	0	0	1	16/22
2003	720	-	14	86	0	0	0	0	14/16
2008	440	40	5	86	9	41	14	0	8/9
2013	60	-	0	100	0	0	0	0	15/15
2018	200	20	20	80	0	0	0	20	12/12
2023	340	-	0	88	12	0	0	12	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	140	-	29	71	0	0	0	0	- / -
2003	220	-	36	64	0	0	0	0	- / -
2008	140	-	29	71	0	0	0	0	- / -
2013	160	-	13	88	0	0	0	13	- / -
2018	120	-	0	100	0	0	0	0	- / -
2023	120	-	17	83	0	17	0	0	- / -
<b>Opuntia -- (pricklypear)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	20	-	0	100	0	0	100	0	19/41
2008	20	-	0	0	100	0	0	0	13/32
2013	60	-	67	33	0	0	0	0	9/2
2018	20	-	100	0	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Pinus monophylla<sup>1</sup> -- (singleleaf pinyon)</b>									
1998	380	60	63	37	0	0	0	0	- / -
2003	400	40	65	30	5	0	0	10	- / -
2008	360	60	56	39	6	0	0	6	- / -
2013	280	40	64	36	0	7	0	21	- / -
2018	320	20	31	69	0	0	0	6	- / -
2023	200	-	20	70	10	0	0	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 (%)				
<b>Polygala subspinoso -- (spiny milkwort)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	140	-	14	86	0	0	0	0	7/9
2008	80	-	0	100	0	25	0	0	4/7
2013	60	-	0	67	33	0	0	33	7/7
2018	-	-	-	-	-	-	-	-	-/-
2023	160	-	0	100	0	0	0	0	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	620	240	23	71	7	48	16	0	85/114
2003	860	20	26	51	23	12	5	5	91/121
2008	780	-	13	36	51	10	3	31	68/93
2013	900	-	9	73	18	9	0	15	79/108
2018	1000	-	18	50	32	16	8	22	78/102
2023	1020	-	8	51	41	8	12	39	-/-
<b>Ribes<sup>p</sup> -- (currant)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	102/164

t - Tree Species; p - Preferred Browse; i - Introduced Species

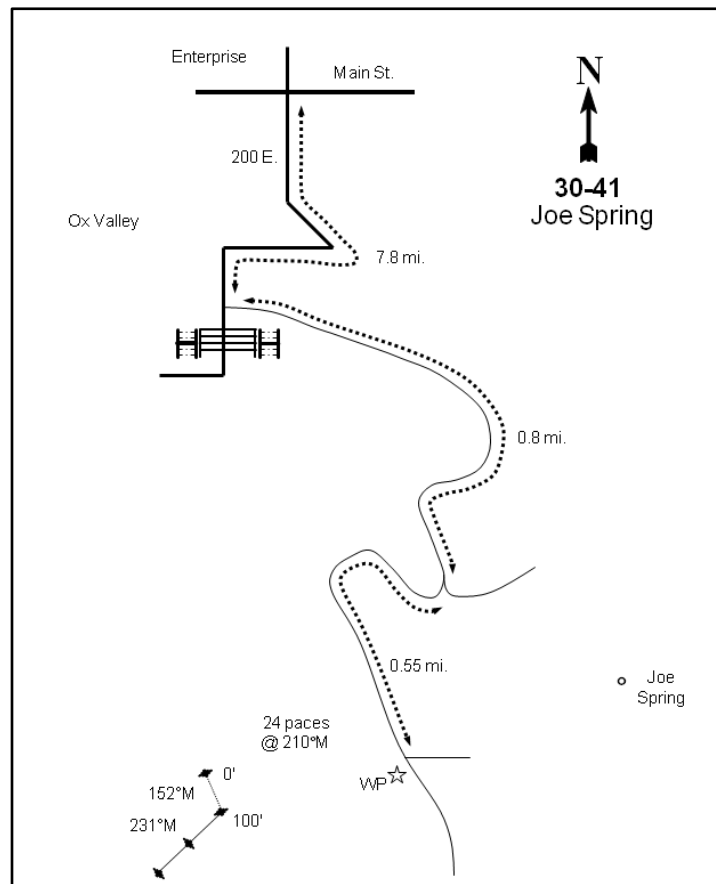
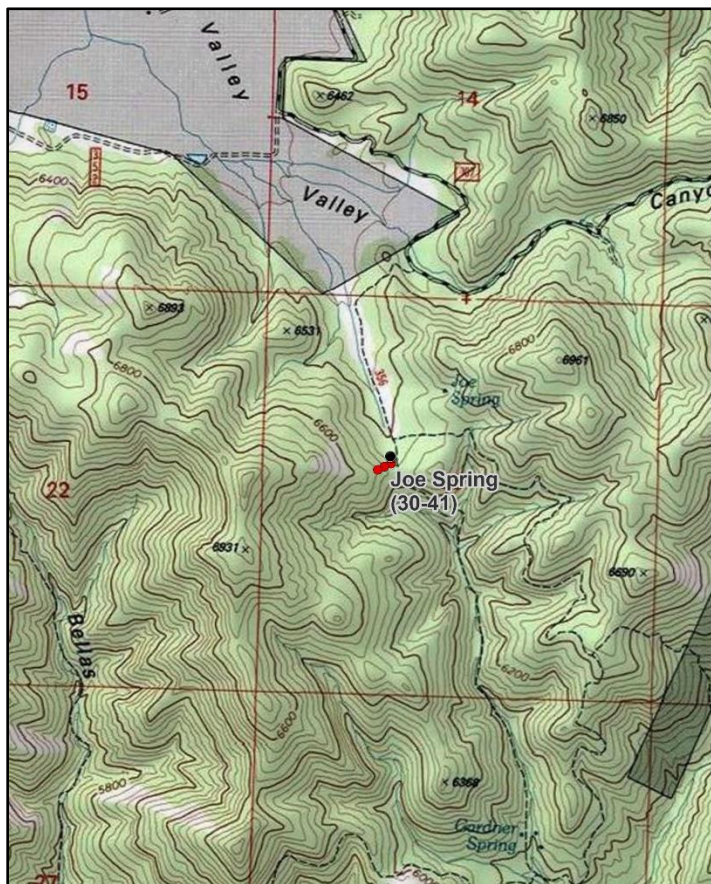
**Table 30-40.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	60	-	-	-	-	-	9.1
2003	57	-	-	47	47	6	16.7
2008	56	-	-	31	44	25	22.8
2013	63	13	13	19	38	19	13.2
2018	67	6	6	24	47	18	15.1
2023	59	6	-	6	41	47	20.4
<b>Pinus monophylla (singleleaf pinyon)</b>							
1998	161	-	-	-	-	-	6.4
2003	122	-	25	35	40	-	8.5
2008	168	5	30	30	20	15	6.7
2013	137	-	25	15	35	25	12.3
2018	166	10	15	35	10	30	9.2
2023	150	-	5	30	30	35	11.8

**Table 30-40.15 - Deer Desirable Components Index: Mountain Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	24.4	13.8	12.6	4.6	-1.9	10.0	0.0	<b>63.6</b>	Fair
2003	30.0	9.9	10.0	1.1	-0.3	5.8	0.0	<b>56.5</b>	Poor-Fair
2008	30.0	3.9	5.9	2.7	-0.1	5.5	0.0	<b>48.0</b>	Poor
2013	30.0	10.9	6.9	2.1	-1.7	7.2	0.0	<b>55.3</b>	Poor-Fair
2018	30.0	6.7	2.5	1.0	0.0	4.0	0.0	<b>44.1</b>	Poor
2023	29.8	5.9	1.8	2.9	-0.6	9.7	0.0	<b>49.5</b>	Poor

## JOE SPRING - STUDY NO. 30-41

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Central West NW; Township 38S, Range 17W, Section 23  
NAD 83 UTM ZONE 12, 258686 East 4150398 North

**Transect Information**

Browse Tag # (0' Stake)  
Transect Bearing  
Length  
Belt Placement  
Belt Marker Placement

7015  
157° magnetic (Lines 2-3: 235° magnetic)  
300ft  
Line 1 (1ft & 93ft), Line 2 (71ft), Line 3 (34ft & 59ft)  
Standard

**Directions to Site**

From 200 East and Main Street in Enterprise, travel southwest for 7.8 miles to Ox Valley. Turn left at the ranch gate and continue east and south for 0.8 miles to the next fork. Turn right on Forest Service Road #356 and travel 0.55 miles to the next fork at Joe Spring. From the intersection, walk up the right fork 32 paces to a full-high marker post on the right (west) side of the road. The 0-foot baseline is 24 paces away from the full-high post at 210 degrees magnetic and is marked by browse tag #7015. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height.

**Site Information**

Land Ownership	Federal
Land Administrator	USFS
Allotment	Gunlock
Elevation	6,440ft (1,963m)
Aspect	North
Slope	15-24%
Sample Dates	05/27/1998, 06/05/2003, 05/29/2008, 05/21/2013, 06/05/2018, 06/06/2023



**Wildlife Habitat and Vegetation History****Table 30-41.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer

**Table 30-41.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1982	Mixed Mountain Brush	No Encroachment
1992	Mixed Mountain Brush	No Encroachment
1998	Mixed Mountain Brush	No Encroachment
2003	Mixed Mountain Brush	No Encroachment
2008	Mixed Mountain Brush	No Encroachment
2013	Mixed Mountain Brush	No Encroachment
2018	Mixed Mountain Brush	No Encroachment
2023	Mixed Mountain Brush	Phase I

**Site Notes**

There is a water source and saltlick within one half of a mile of the site. Deer have been seen near the transect over the sample years and were noted in 1982 and 2008. Mormon crickets were abundant in 2003 and 2008 and were observed on the site in 2013.

**Soils****Table 30-41.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay	5.7	68.0	17.4	14.6	1.8	15.0	150.4	0.4	05/27/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      23 inches  
 NRCS Ecological Site    Mountain Loam (Oak)  
 NRCS Ecological Site #    R047XA432UT  
 States and Transitions    No state and transition model is available for this ecological site.

Since study establishment in 1982, the plant community on this site has existed as a stand of mixed mountain brush with Utah serviceberry (*Amelanchier utahensis*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and Gambel oak (*Quercus gambelii*) as the dominant species (Photos, Pre-1992 Data, Table 30-41.12, Table 30-41.13). The herbaceous understory has remained diverse and abundant. The introduced annual grass species cheatgrass (*Bromus tectorum*) was a major component of the understory between 1998 and 2008, but a decreasing trend has been noted in recent years; increased amounts of cheatgrass can threaten the ecological resilience of a plant community. Perennial forbs contributed a majority of the herbaceous cover in 2023 (30-41.7, Table 30-41.10, Table 30-41.11). Singleleaf pinyon (*Pinus monophylla*) was first sampled in 2023 and the site is currently considered to be within Phase I of woodland succession. Without a major disturbance, it is reasonable to expect this study site to remain in this or a similar state in future sample years.

As of 2023, this site may provide adequate habitat for deer during the summer months due to the abundance of the shrub and herbaceous communities (particularly perennial forbs). However, this study area may serve as better foraging range during very mild winters due to high preferred browse cover. Pellet transect data indicates that mule deer presence has ranged from moderate to high since 1998 and was considered to be moderate in 2023 (Table 30-41.9).

## Trend Summary Tables

**Table 30-41.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	29.5	1.5	-	0.9	-	-
2003	27.3	1.6	-	31.2	1.9	-
2008	24.7	2.6	-	40.4	3.0	-
2013	22.5	1.3	-	41.2	2.0	-
2018	32.9	2.2	-	40.4	2.5	-
2023	37.0	2.0	-	42.1	1.7	-

**Table 30-41.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	342	153	353	325	12.3	5.9	7.5	15.7
2003	322	152	129	223	15.3	3.5	1.5	11.2
2008	318	197	104	236	10.9	4.7	0.5	9.3
2013	255	211	238	268	3.6	3.5	1.6	9.1
2018	52	221	31	189	0.7	6.4	0.1	9.4
2023	147	157	234	257	3.6	4.3	2.8	16.5

**Table 30-41.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	20.4	-	46.6	4.9	7.6	58.9
2003	18.2	-	35.6	6.1	7.5	56.6
2008	21.2	-	39.9	6.1	6.9	48.4
2013	16.9	-	46.4	0.9	7.0	47.3
2018	29.3	-	53.5	1.4	7.2	47.8
2023	20.9	-	44.8	5.8	6.7	53.0

**Table 30-41.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
1998	2	26	2
2003	3	11	3
2008	6	37	29
2013	-	19	1
2018	3	24	3
2023	2	10	2
Year	Days Use Per Acre (ha)		
1998	10.2 (25.1)	38.9 (96.0)	-
2003	5.1 (12.6)	32.2 (79.5)	-
2008	18.1 (44.8)	43.6 (107.6)	-
2013	-	45.6 (112.6)	-
2018	3.6 (9.0)	40.2 (99.3)	-
2023	5.8 (14.3)	38.2 (94.4)	-

**Table 30-41.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bouteloua gracilis (blue grama)	Bromus marginatus (mountain brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Koeleria macrantha (prairie Junegrass)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Sporobolus cryptandrus (sand dropseed)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)
year	Nested Frequency												
1998	-	-	24	342	16	2	-	6	93	10	12	-	1
2003	-	3	3	322	32	-	54	-	55	-	1	-	23
2008	6	3	23	318	6	-	-	14	121	-	-	-	51
2013	1	3	14	255	4	-	3	77	119	5	6	-	4
2018	8	3	9	52	24	10	42	74	77	-	-	-	-
2023	4	-	3	147	25	2	1	27	87	-	-	5	26
year	Average Cover (%)												
1998	-	-	0.4	12.3	0.6	0.0	-	0.0	4.5	0.2	0.2	-	0.0
2003	-	0.1	0.0	15.3	0.6	-	0.7	-	1.7	-	0.0	-	0.3
2008	0.1	0.1	0.4	10.9	0.1	-	-	0.1	3.3	-	-	-	0.6
2013	0.0	0.0	0.1	3.6	0.0	-	0.0	0.7	2.7	0.0	0.0	-	0.0
2018	0.0	0.4	0.5	0.7	0.3	0.1	1.1	1.2	2.8	-	-	-	-
2023	0.0	-	0.0	3.6	0.5	0.0	0.0	0.3	3.0	-	-	0.1	0.5

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-41.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Arabis (rockcress)	Artemisia ludoviciana (white sagebrush)	Astragalus argophyllus (silverleaf milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Chaenactis douglasii (Douglas' dusty-maiden)	Collinsia parviflora <sup>a</sup> (maiden blue-eyed Mary)	Collomia linearis <sup>a</sup> (tiny trumpet)	Comandra umbellata (bastard toadflax)	Crepis acuminata (tapertip hawkbeard)	Cryptantha (cryptantha)	Cryptantha gracilis <sup>a</sup> (narrowstem cryptantha)	Cymopterus (springparsley)	Dichelostemma capitatum (blue-dicks)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)
year	Nested Frequency																
1998	35	66	6	3	14	34	8	-	342	-	19	12	-	-	38	-	-
2003	9	-	0	5	-	27	-	-	114	1	13	-	-	-	-	-	2
2008	17	-	4	5	5	35	3	2	74	-	9	1	2	-	15	36	-
2013	19	27	2	8	10	33	3	-	218	6	6	23	-	-	-	16	-
2018	2	-	-	9	5	44	-	-	24	-	1	-	-	-	-	-	1
2023	44	4	0	1	9	41	1	-	112	4	8	2	-	2	-	17	-
year	Average Cover (%)																
1998	0.3	0.5	0.2	0.0	0.1	2.4	0.0	-	6.5	-	0.2	0.3	-	-	0.3	-	-
2003	0.0	-	0.0	0.1	-	5.3	-	-	1.2	0.0	0.1	-	-	-	-	-	0.0
2008	0.1	-	0.0	0.1	0.0	3.9	0.0	0.0	0.3	-	0.1	0.0	0.0	-	0.1	0.1	-
2013	0.0	0.0	0.0	0.1	0.0	4.4	0.0	-	0.9	0.0	0.2	0.1	-	-	-	0.1	-
2018	0.0	-	-	0.1	0.0	4.8	-	-	0.1	-	0.0	-	-	-	-	-	0.0
2023	0.5	0.0	0.0	0.0	0.2	8.0	0.0	-	1.7	0.0	0.2	0.0	-	0.0	-	0.1	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Erigeron (fleabane)	Erigeron eatonii (Eaton's fleabane)	Eriogonum racemosum (redroot buckwheat)	Eriogonum umbellatum (sulphur-flower buckwheat)	Galium multiflorum (shrubby bedstraw)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Hackelia patens (spotted stickseed)	Heliomeris multiflora var. multiflora (showy goldeneye)	Hydrophyllum occidentale (western waterleaf)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Ligusticum porteri (Porter's licorice-root)	Linum lewisii (Lewis flax)	Lomatium nevadense (Nevada biscuitroot)	Lupinus argenteus (silvery lupine)	Machaeranthera canescens (hoary tansyaster)	Microsteris gracilis <sup>a</sup> (slender phlox)	
year	Nested Frequency																	
1998	17	16	6	-	7	-	-	23	-	-	-	-	2	1	31	3	29	
2003	2	25	3	2	14	-	-	-	-	3	5	-	-	-	17	-	12	
2008	3	15	2	-	16	7	-	3	6	-	30	-	-	-	9	4	9	
2013	1	7	3	-	7	11	8	1	-	5	14	-	-	42	15	-	71	
2018	2	10	-	-	13	1	-	-	-	-	11	-	-	-	6	-	-	
2023	-	11	-	-	10	24	-	-	-	9	14	1	-	31	20	-	124	
year	Average Cover (%)																	
1998	0.2	0.3	0.2	-	0.0	-	-	0.3	-	-	-	-	0.1	0.0	1.3	0.0	0.2	
2003	0.0	0.3	0.0	0.0	0.7	-	-	-	-	0.0	0.2	-	-	-	1.5	-	0.1	
2008	0.0	0.3	0.0	-	0.1	0.0	-	0.0	0.1	-	0.1	-	-	-	0.2	0.0	0.0	
2013	0.0	0.1	0.0	-	0.0	0.0	0.2	0.0	-	0.2	0.0	-	-	0.2	0.2	-	0.3	
2018	0.0	0.2	-	-	0.5	0.0	-	-	-	-	0.0	-	-	-	0.4	-	-	
2023	-	0.4	-	-	0.6	0.1	-	-	-	0.5	0.0	0.0	-	0.3	0.9	-	0.9	

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Packera multilobata (lobeleaf groundsel)	Penstemon comarthenus (dusty beardtongue)	Penstemon confusus (Owens Valley beardtongue)	Phacelia heterophylla <sup>a</sup> (varleaf phacelia)	Phlox austromontana (mountain phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	Stephanomeria minor var. minor (narrowleaf wirelettuce)	Symphotrichum ascendens (western aster)	unknown annual forb <sup>a</sup> (unknown forb)	unknown perennial forb (unknown forb)	Vicia americana (American vetch)
year	Nested Frequency											
1998	-	-	4	7	141	-	1	11	33	4	5	112
2003	15	-	-	-	131	2	2	-	-	-	-	30
2008	-	-	5	1	119	23	4	-	-	-	-	25
2013	-	4	9	3	126	25	8	-	-	-	-	58
2018	-	2	-	-	125	-	3	-	-	-	-	15
2023	-	-	1	-	121	24	9	-	-	-	-	34
year	Average Cover (%)											
1998	-	-	0.0	0.8	6.4	-	0.0	0.1	0.1	0.1	0.0	2.2
2003	0.1	-	-	-	2.8	0.0	0.0	-	-	-	-	0.2
2008	-	-	0.1	0.0	3.7	0.1	0.0	-	-	-	-	0.2
2013	-	0.0	0.2	0.0	2.8	0.1	0.1	-	-	-	-	0.4
2018	-	0.1	-	-	3.1	-	0.0	-	-	-	-	0.1
2023	-	-	0.1	-	4.1	0.1	0.1	-	-	-	-	0.4

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-41.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Eriogonum microthecum <sup>p</sup> (slender buckwheat)	Opuntia (pricklypear)	Peraphyllum ramosissimum <sup>p</sup> (wild crab apple)	Quercus gambelii <sup>p</sup> (Gambel oak)	Ribes montigenum <sup>p</sup> (gooseberry currant)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)	Tetradymia canescens (spineless horsebrush)
year	Line Intercept Cover (%)										
1998	-	-	-	-	-	-	-	-	-	-	-
2003	7.6	9.2	-	1.9	0.2	-	-	13.9	-	0.3	-
2008	9.7	13.9	-	3	0.1	-	-	13.7	2.5	0.5	-
2013	8.5	14	-	2	0.2	-	-	17	1.1	0.4	-
2018	9.3	15.6	-	2.5	-	-	-	14.2	1.3	0	-
2023	5.6	14.6	-	1.7	-	-	0.1	17.9	3.9	-	-
year	Quadrat Cover (%)										
1998	8.5	10.1	0.0	1.4	-	0.0	-	10.2	0.4	0.3	0.0
2003	7.1	8.7	-	1.4	0.6	0.1	-	10.9	-	0.2	0.0
2008	8.3	7.0	-	2.2	0.1	0.0	-	8.8	0.4	0.2	0.4
2013	5.7	7.2	-	1.3	0.0	-	-	9.4	0.1	0.0	0.0
2018	7.5	12.0	-	2.1	0.1	0.0	-	12.8	0.4	0.2	-
2023	6.8	14.8	-	2.0	0.0	-	0.4	12.3	2.5	0.3	-

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-41.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1998	4640	-	1	93	6	51	13	3	116/92
2003	5480	60	6	89	6	1	36	3	129/130
2008	700	200	9	71	20	26	57	14	120/126
2013	2140	140	10	84	6	30	36	5	125/133
2018	1180	-	20	76	3	10	58	3	112/120
2023	1660	160	17	78	5	40	47	12	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
1998	2220	500	21	67	13	29	5	4	58/92
2003	1980	-	0	70	30	20	9	9	60/73
2008	1700	60	11	58	32	27	18	15	54/84
2013	1780	160	19	65	16	21	2	18	57/93
2018	2000	20	7	88	5	6	1	4	59/91
2023	2660	540	1	79	20	14	2	19	- / -
<b>Cercocarpus ledifolius<sup>p</sup> -- (curl-leaf mountain mahogany)</b>									
1998	40	-	100	0	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	44/92
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
1998	20	-	0	100	0	0	100	0	36/52
2003	-	-	-	-	-	-	-	-	48/62
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus depressus<sup>P</sup> -- (longflower rabbitbrush)</b>									
1998	80	-	0	100	0	25	0	0	20/39
2003	-	-	-	-	-	-	-	-	-/-
2008	80	-	0	100	0	0	100	0	15/8
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	960	40	15	81	4	0	4	0	34/62
2003	700	-	3	94	3	0	0	0	36/48
2008	880	-	7	80	14	7	21	2	26/50
2013	780	-	23	74	3	0	0	0	27/47
2018	540	-	15	85	0	0	0	0	29/46
2023	560	220	4	89	7	0	0	4	- / -
<b>Eriogonum microthecum<sup>P</sup> -- (slender buckwheat)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	180	-	11	89	0	11	0	0	16/38
2008	60	-	0	67	33	33	33	33	21/44
2013	-	-	-	-	-	-	-	-	23/54
2018	100	-	20	80	0	0	0	0	16/24
2023	60	-	0	100	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	100	-	0	100	0	0	0	0	12/20
2013	-	-	-	-	-	-	-	-	-/-
2018	40	-	100	0	0	0	0	0	13/16
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1998	20	-	0	100	0	0	0	0	- / -
2003	20	-	0	100	0	0	0	0	8/50
2008	-	20	0	0	0	0	0	0	20/51
2013	20	-	0	0	100	0	0	100	21/46
2018	220	-	18	82	0	0	0	0	19/35
2023	-	-	-	-	-	-	-	-	-/-
<b>Peraphyllum ramosissimum<sup>P</sup> -- (wild crab apple)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	40	-	0	100	0	100	0	0	- / -

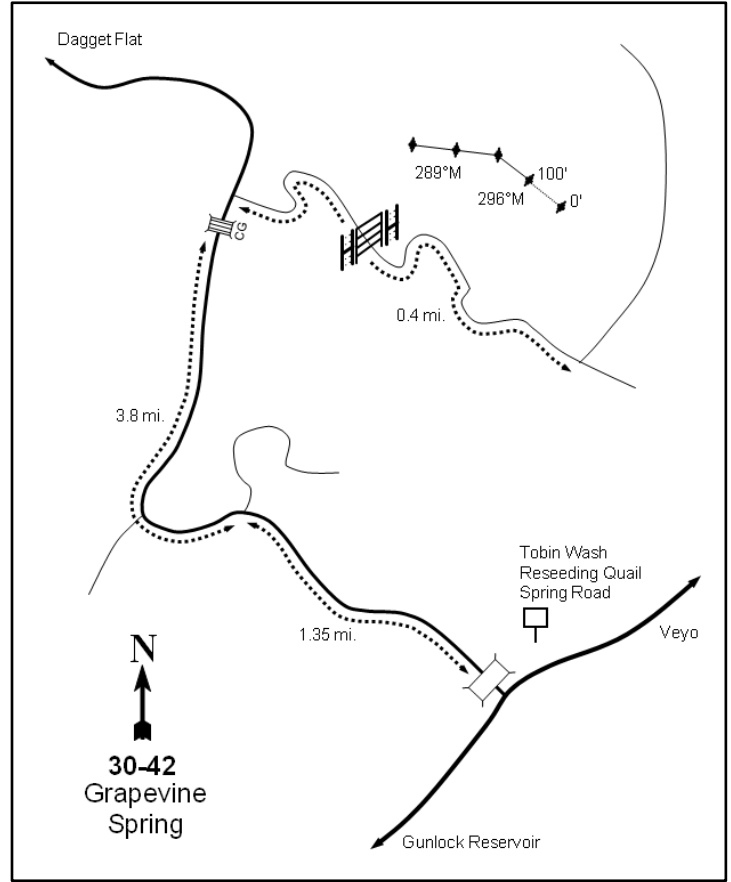
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	4920	340	24	68	8	6	0	30	109/87
2003	8720	20	22	73	6	18	1	1	94/56
2008	7500	80	20	58	22	3	7	4	83/49
2013	5280	200	36	64	1	14	0	1	79/51
2018	3940	60	47	52	1	1	0	1	66/58
2023	4400	-	10	89	1	47	9	1	- / -
<b>Quercus turbinella<sup>p</sup> -- (Sonoran scrub oak)</b>									
1998	-	-	-	-	-	-	-	-	89/52
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ribes montigenum<sup>p</sup> -- (gooseberry currant)</b>									
1998	20	-	0	100	0	0	0	0	144/147
2003	20	-	0	100	0	0	0	0	138/101
2008	20	-	0	100	0	0	0	0	127/136
2013	40	-	0	100	0	0	0	0	102/157
2018	20	-	0	100	0	0	0	0	120/128
2023	400	-	0	100	0	0	70	25	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1998	560	120	54	46	0	14	0	0	35/43
2003	80	-	0	100	0	0	0	0	52/97
2008	100	-	20	80	0	0	0	80	47/84
2013	100	-	0	100	0	0	0	0	26/42
2018	40	-	0	100	0	0	0	0	26/29
2023	220	-	0	100	0	0	0	0	- / -
<b>Tetradymia canescens -- (spineless horsebrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	80	-	75	25	0	0	0	0	81/103
2008	-	-	-	-	-	-	-	-	- / -
2013	20	-	0	100	0	0	0	0	16/51
2018	-	-	-	-	-	-	-	-	19/64
2023	20	-	0	100	0	0	0	0	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-41.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Pinus monophylla (singleleaf pinyon)</b>							
2023	1	-	-	100	-	-	12.0

## GRAPEVINE SPRING - STUDY NO. 30-42



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Gunlock NE; Township 39S, Range 17W, Section 31  
NAD 83 UTM ZONE 12, 252683 East 4137441 North

### Transect Information

Browse Tag # (0' Stake)	7098
Transect Bearing	296° magnetic (Lines 3-4: 289° magnetic)
Length	400ft
Belt Placement	Line 1 (11ft & 92ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft)
Belt Marker Placement	Standard

### Directions to Site

Proceed west on Gunlock Road (Center Street) for 5.7 miles from the town of Veyo until you come to a sign saying "Tobin Wash" and "Eagle Mountain Ranch." Turn right (west) at Eagle Mt. Ranch and travel 1.35 miles on the main road. Turn left, cross a small creek, and proceed 3.8 miles to Grapevine Spring. Just past Grapevine Spring, take the fork to the right. Travel 0.40 miles until you come to another fork in the road to the left and stop. From the fork in the road, the 0-foot baseline stake is 10 paces away at a bearing of 296 degrees magnetic and is marked with browse tag #7098. The study is marked by green steel "T" fence posts approximately 12 to 18 inches in height.

### Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	TWIN PEAKS
Elevation	4,530ft (1,381m)
Aspect	East
Slope	5-10%
Sample Dates	05/26/1998, 05/22/2003, 05/14/2008, 05/21/2013, 05/21/2018, 05/22/2023



**Table 30-42.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Tobin Wash Seeding	LTDL	July-December 1965	1925
Chaining - Chain Unknown	Tobin Wash Seeding	LTDL	July-December 1965	1925
Fire - Wildfire	Bull Complex	LTDL	2006	41500
Seeding - Aerial	Bull Complex Fire ESR	LTDL	2006-2007	29532

**Table 30-42.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Bull Complex ESR				Nov 2005	29532
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Hycrest Wheatgrass		1.00	0.00
G	Bouteloua curtipendula	Sideoats Grama		2.00	0.00
G	Bromus inermis	Smooth Brome		1.00	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		3.00	0.00
F	Medicago sativa	Alfalfa		1.00	0.00
F	Melilotus officinalis	Yellow Sweet Clover		0.50	0.00
F	Penstemon palmeri	Palmer Penstemon		1.00	0.00
F	Sanguisorba minor	Small Burnet		1.00	0.00
S	Bassia prostrata	Forage Kochia		2.00	0.00

Mix Name			Application Type	Application Date	Acres
Tobin Bench Seeding				Dec 1965	1925
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Agropyron cristatum	Crested Wheatgrass		5.00	0.00
G	Sporobolus cryptandrus	Sand Dropseed		1.00	0.00
G	Thinopyrum intermedium	Pubescent Wheatgrass		1.00	0.00
F	Medicago sativa	Alfalfa		0.25	0.00
F	Melilotus officinalis	Yellow Sweet Clover		1.00	0.00
F	Sanguisorba minor	Small Burnet		0.03	0.00
S	Atriplex canescens	Fourwing Saltbush		0.25	0.00
S	Krascheninnikovia lanata	Winterfat		0.03	0.00

**Wildlife Habitat and Vegetation History**

**Table 30-42.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30-42.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1982	Mountain Big Sagebrush/Chaparral	Phase I
1992	Mountain Big Sagebrush/Chaparral	Phase I
1998	Mountain Big Sagebrush/Chaparral/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Mountain Big Sagebrush/Chaparral/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Annual-Perennial Forb/Threadleaf Snakeweed	Phase I
2013	Threadleaf Snakeweed/Chaparral	No Encroachment
2018	Threadleaf Snakeweed/Chaparral	No Encroachment
2023	Chaparral/Threadleaf Snakeweed	No Encroachment

**Site Notes**

The seeding mentioned above is not part of the WRI database and was likely applied independently by the Bureau of Land Management (BLM). In 2013, deer tracks were observed in a nearby wash; rabbits and grasshoppers were also common.

**Soils**

**Table 30-42.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	% sand	% silt	% clay	% OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	6.7	48.0	25.4	26.6	1.8	8.5	108.8	0.6	05/26/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Stony Loam (Shrub Liveoak)
NRCS Ecological Site #	R029XY330UT
States and Transitions	1982-2023 - State Undefined: Community Phase Undefined

When the study was established in 1982, mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was the dominant browse species. Utah juniper (*Juniperus osteosperma*) and singleleaf pinyon (*Pinus monophylla*) were present in low amounts in the overstory, and the study was considered to be in Phase I of woodland succession through 1992 (Photos, Pre-1992 Data). Trees continued to encroach, and the study was a Phase I transitioning to a Phase II pinyon-juniper woodland from 1998 through 2003. Most of the trees were removed by the Bull Complex fire in 2006 (Table 30-42.1), and there has been no encroachment since 2013 (Table 30-42.4, Table 30-42.14). The burn also removed nearly all of the mountain big sagebrush which has been slow to return in subsequent sample years. Threadleaf snakeweed (*Gutierrezia microcephala*) has been the most abundant shrub since 2008 and has remained codominant along with Sonoran scrub oak (*Quercus turbinella*) (Photos, Table 30-42.12, Table 30-42.13). The introduced annual grass cheatgrass (*Bromus tectorum*) was a dominant component of the herbaceous understory from 1998 to 2008, and again in 2023. Cheatgrass was likely prominent prior to 1998. In 2018, however, no grasses were observed in the sparse understory, and perennial forbs contributed nearly all of the herbaceous cover. In 2023, introduced annual grasses returned as the most abundant grass component, but perennial forbs still provided most of the herbaceous cover (Table 30-42.7, Table 30-42.10, Table 30-42.11).

Deer winter range condition has ranged from very poor to good since the 1998 sample year; in 2023, winter range was classified as being in poor condition. Improvement to deer wintering range can be accomplished through efforts that support and increase mature preferred browse populations and recruitment of young. Diversifying and increasing cover of native perennial grasses and decreasing cheatgrass would also improve winter range conditions (Table 30-42.15). Pellet transect data indicates that deer presence was moderate in 1998 and 2003. Presence of deer has been low following the burn, but days use per acre has increased each year since 2013 (Table 30-42.9).

**Trend Summary Tables****Table 30-42.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	27.9	3.5	2.3	-	-	0.3
2003	20.6	2.7	4.6	21.2	0.9	5.1
2008	1.0	3.3	0.0	2.7	7.6	-
2013	8.5	13.1	-	10.7	18.3	-
2018	5.7	20.3	-	11.8	21.4	-
2023	11.8	28.6	-	13.0	32.9	-

**Table 30-42.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	148	67	75	102	1.4	1.2	0.5	5.4
2003	65	3	121	84	1.0	0.0	2.0	0.8
2008	117	22	216	233	1.8	0.1	11.1	11.3
2013	128	7	31	173	0.3	0.1	0.2	3.2
2018	-	-	5	46	-	-	0.0	0.4
2023	178	11	184	178	2.1	0.1	0.8	3.4

**Table 30-42.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	28.6	0.1	45.3	22.4	7.4	39.2
2003	12.6	0.2	46.0	18.7	10.2	31.1
2008	32.4	-	5.4	29.8	15.2	29.4
2013	21.3	1.0	40.3	17.3	11.5	27.2
2018	24.9	-	36.0	28.5	18.1	29.8
2023	13.5	-	30.7	23.3	15.8	42.3

**Table 30-42.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
1998	1	21	17
2003	-	18	7
2008	-	11	47
2013	-	2	13
2018	-	2	38
2023	1	8	34
Year	Days Use Per Acre (ha)		
1998	2.2 (5.4)	32.2 (79.5)	-
2003	-	30.2 (74.5)	-
2008	-	1.3 (3.3)	-
2013	1.5 (3.6)	-	-
2018	-	2.7 (6.6)	-
2023	2.9 (7.2)	12.1 (29.8)	-

**Table 30-42.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bouteloua curtipendula (sidecoats grama)	Bromus rubens <sup>ai</sup> (red brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency						
1998	6	-	12	138	53	11	14
2003	-	-	7	36	3	-	27
2008	3	7	18	115	12	-	25
2013	-	3	14	124	4	-	-
2018	-	-	-	-	-	-	-
2023	-	-	94	90	11	-	86
year	Average Cover (%)						
1998	0.2	-	0.4	1.0	1.0	0.1	0.0
2003	-	-	0.2	0.7	0.0	-	0.1
2008	0.0	0.1	0.1	1.6	0.1	-	0.1
2013	-	0.0	0.0	0.3	0.0	-	-
2018	-	-	-	-	-	-	-
2023	-	-	0.8	1.0	0.1	-	0.3

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-42.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Arabis holboellii <sup>a</sup> (Holboell's rockcress)	Calochortus flexuosus (winding mariposa lily)	Castilleja linariifolia (Wyoming Indian paintbrush)	Chamaesyce albomarginata (whitemargin sandmat)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cirsium (thistle)	Comandra umbellata (bastard toadflax)	Dalea searsiae (Searls' prairie clover)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriastrum sparsiflorum <sup>a</sup> (Great Basin woollystar)	Eriogonum (buckwheat)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Erodium cicutarium <sup>ni</sup> (redstem stork's bill)	Frasera albomarginata (desert fraseria)	Gilia inconspicua <sup>a</sup> (shy gilia)
year	Nested Frequency																
1998	-	-	17	2	29	-	1	-	34	-	72	-	-	-	-	13	-
2003	1	-	3	6	33	-	3	-	18	1	84	-	4	-	1	-	13
2008	-	-	30	-	103	-	-	-	9	19	31	-	85	-	79	4	16
2013	-	-	-	-	77	-	-	3	18	1	-	-	3	-	22	4	-
2018	-	-	-	-	5	-	-	10	2	-	-	-	-	-	5	6	-
2023	-	8	16	-	62	3	-	8	33	-	-	151	-	2	61	6	12
year	Average Cover (%)																
1998	-	-	0.0	0.0	0.3	-	0.0	-	3.8	-	0.5	-	-	-	-	0.3	-
2003	0.0	-	0.0	0.0	0.2	-	0.0	-	0.1	0.0	1.3	-	0.0	-	0.1	-	0.1
2008	-	-	0.1	-	1.1	-	-	-	0.8	1.9	0.1	-	0.5	-	7.4	0.2	0.1
2013	-	-	-	-	0.3	-	-	0.1	0.2	0.0	-	-	0.0	-	0.2	0.1	-
2018	-	-	-	-	0.0	-	-	0.1	0.0	-	-	-	-	-	0.0	0.0	-
2023	-	0.1	0.1	-	0.4	0.0	-	0.2	1.1	-	-	0.5	-	0.0	0.1	0.2	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Glandularia gooddingii (southwestern mock vervain)	Heliomeris multiflora var. multiflora (showy goldeneye)	Lactuca serriola <sup>ni</sup> (prickly lettuce)	Lomatium (desertparsley)	Lotus plebeius (New Mexico bird's-foot trefoil)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)	Medicago sativa <sup>a</sup> (alfalfa)	Microsteris gracilis <sup>ni</sup> (slender phlox)	Navaretia intertexta <sup>a</sup> (needleleaf navaretia)	Nicotiana attenuata <sup>a</sup> (coyote tobacco)	Oenothera albicaulis <sup>a</sup> (whitest evening primrose)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon humilis (low beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phacelia fremontii <sup>a</sup> (Fremont's phacelia)	Phlox austromontana (mountain phlox)
year	Nested Frequency																
1998	-	5	-	1	36	-	-	3	-	-	-	-	6	-	-	-	9
2003	-	3	-	-	8	-	-	-	32	-	-	-	12	-	-	-	-
2008	20	6	34	-	12	-	1	-	92	11	14	4	32	1	2	40	-
2013	2	29	3	-	1	-	-	-	3	2	-	-	3	-	1	3	-
2018	-	19	-	-	-	-	-	-	-	-	-	-	-	-	6	-	1
2023	-	34	-	-	10	7	-	-	-	-	-	1	3	-	4	-	0
year	Average Cover (%)																
1998	-	0.0	-	0.0	0.6	-	-	0.0	-	-	-	-	0.1	-	-	-	0.3
2003	-	0.0	-	-	0.0	-	-	-	0.4	-	-	-	0.1	-	-	-	-
2008	1.0	0.7	0.1	-	0.4	-	0.0	-	0.5	0.0	0.0	0.2	0.1	0.0	0.7	0.3	-
2013	0.0	0.6	0.0	-	0.1	-	-	-	0.0	0.0	-	-	0.0	-	0.1	0.0	-
2018	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	0.0
2023	-	0.8	-	-	0.1	0.0	-	-	-	-	-	0.0	0.0	-	0.2	-	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea grossulariifolia (gooseberryleaf globemallow)	Streptanthus cordatus (heartleaf twistflower)	Trifolium (clover)	unknown annual forb <sup>a</sup> (unknown forb)	unknown perennial forb (unknown forb)
year	Nested Frequency							
1998	-	-	-	-	-	-	-	4
2003	-	-	-	3	-	-	11	5
2008	21	1	6	27	-	2	-	-
2013	1	18	-	73	-	-	-	-
2018	-	-	-	7	-	-	-	-
2023	-	-	-	42	3	-	-	-
year	Average Cover (%)							
1998	-	-	-	-	-	-	-	0.0
2003	-	-	-	0.2	-	-	0.0	0.1
2008	0.1	0.0	0.5	5.6	-	0.0	-	-
2013	0.0	0.3	-	1.4	-	-	-	-
2018	-	-	-	0.0	-	-	-	-
2023	-	-	-	0.1	0.0	-	-	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-42.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Ceanothus greggii (desert ceanothus)	Ephedra viridis <sup>p</sup> (mormon tea)	Eriodictyon angustifolium <sup>p</sup> (narrowleaf yerba santa)	Garrya flavescens (ashy silktassel)	Gutierrezia microcephala (threadleaf snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Pinus monophylla <sup>i</sup> (singleleaf pinyon)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	Quercus turbinella <sup>p</sup> (Sonoran scrub oak)	Ribes <sup>p</sup> (currant)
year	Line Intercept Cover (%)											
1998	-	-	-	-	-	-	-	-	-	-	-	-
2003	8.5	-	0.8	-	0.6	-	0.1	2.8	2.3	3.3	8.8	-
2008	-	-	-	-	1.6	-	7.6	-	-	-	1.1	-
2013	-	-	1.9	-	3.8	-	16.4	-	-	-	6.9	-
2018	-	-	1.7	-	3.6	-	19.7	-	-	-	8.2	-
2023	0.2	-	3.6	-	4.3	-	29.3	-	-	-	8.5	-
year	Quadrat Cover (%)											
1998	20.2	-	-	0.1	-	1.0	2.5	1.8	0.5	3.6	4.0	-
2003	10.2	-	1.3	-	0.8	1.2	0.2	2.7	1.8	2.1	7.5	-
2008	-	0.0	0.0	-	0.4	-	3.3	-	0.0	-	0.6	0.0
2013	0.0	-	1.6	-	2.5	-	11.5	-	-	-	6.0	-
2018	0.1	-	1.9	-	2.2	-	18.4	-	-	-	3.5	-
2023	0.9	-	3.6	0.0	2.5	-	25.0	-	-	-	8.3	-

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-42.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	4380	1740	17	80	2	27	0	2	58/88
2003	2160	-	3	64	33	2	0	16	57/73
2008	20	-	100	0	0	0	0	0	37/41
2013	60	-	100	0	0	0	0	0	46/55
2018	40	-	0	100	0	0	0	0	53/78
2023	60	120	0	100	0	0	0	0	- / -
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	80	-	75	25	0	0	25	0	6/15
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ceanothus greggii -- (desert ceanothus)</b>									
1998	240	20	8	75	17	17	0	8	72/111
2003	120	-	0	50	50	17	0	33	74/110
2008	180	320	100	0	0	0	0	0	13/24
2013	280	-	14	86	0	0	7	14	45/68
2018	320	-	0	94	6	0	0	6	59/74
2023	280	-	0	93	7	21	0	14	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ephedra nevadensis<sup>P</sup> -- (Nevada jointfir)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	53/106
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
1998	-	-	-	-	-	-	-	-	74/108
2003	-	-	-	-	-	-	-	-	71/84
2008	-	-	-	-	-	-	-	-	73/98
2013	-	-	-	-	-	-	-	-	131/194
2018	-	-	-	-	-	-	-	-	97/144
2023	-	40	0	0	0	0	0	0	- / -
<b>Eriodictyon angustifolium<sup>P</sup> -- (narrowleaf yerba santa)</b>									
1998	640	-	3	81	16	0	0	3	58/38
2003	320	-	6	44	50	44	13	25	43/38
2008	220	20	0	100	0	0	0	73	36/56
2013	1080	-	11	76	13	4	0	33	49/76
2018	1000	-	2	60	38	2	0	40	51/67
2023	1320	20	9	85	6	3	0	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 (%)				
<b>Garrya flavescens -- (ashy silktassel)</b>									
1998	40	-	0	100	0	0	50	50	56/89
2003	60	-	33	0	67	0	0	67	- / -
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	61/100
2023	-	-	-	-	-	-	-	-	-/-
<b>Grayia spinosa -- (spiny hopsage)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	20	-	100	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia microcephala -- (threadleaf snakeweed)</b>									
1998	3080	880	19	71	10	0	1	7	21/25
2003	760	360	53	47	0	0	0	0	22/23
2008	5860	980	0	100	0	0	0	0	31/40
2013	7740	120	36	56	8	0	0	11	32/53
2018	12180	60	6	84	10	0	0	9	26/45
2023	37940	600	3	91	7	0	0	6	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	60	-	0	100	0	0	0	0	- / -
2003	100	-	40	60	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1998	-	-	-	-	-	-	-	-	16/33
2003	20	-	0	100	0	0	0	0	23/49
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus monophylla<sup>1</sup> -- (singleleaf pinyon)</b>									
1998	20	-	0	100	0	0	0	0	- / -
2003	60	-	0	100	0	0	0	0	- / -
2008	-	20	0	0	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia stansburiana<sup>9</sup> -- (Stansbury cliffrose)</b>									
1998	260	60	31	69	0	39	0	0	140/165
2003	120	-	17	83	0	50	0	0	168/186
2008	-	-	-	-	-	-	-	-	38/95
2013	20	-	100	0	0	0	0	0	- / -
2018	-	-	-	-	-	-	-	-	140/213
2023	-	-	-	-	-	-	-	-	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	87/122
2018	-	-	-	-	-	-	-	-	31/50
2023	-	-	-	-	-	-	-	-	-/-
<b>Quercus turbinella<sup>p</sup> -- (Sonoran scrub oak)</b>									
1998	460	60	4	96	0	0	0	0	145/172
2003	100	20	0	80	20	0	0	0	159/245
2008	780	-	10	90	0	0	0	100	82/81
2013	100	20	20	80	0	0	0	0	140/242
2018	180	40	11	89	0	0	0	0	140/246
2023	180	-	22	78	0	33	0	0	- / -
<b>Ribes<sup>p</sup> -- (currant)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	20	0	0	0	0	0	0	- / -
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Yucca baccata -- (banana yucca)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	64/73

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-42.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

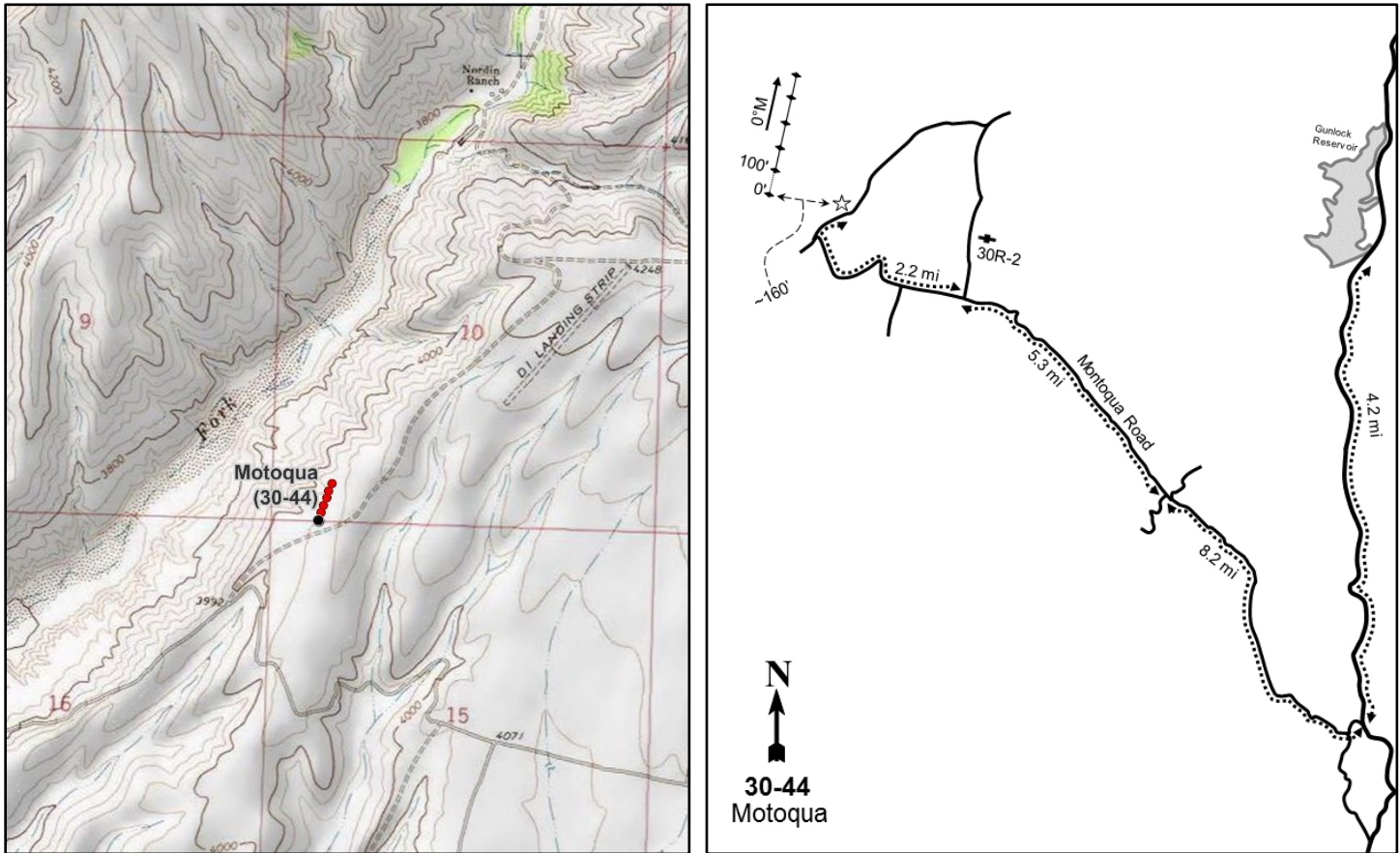
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
1998	60	-	-	-	-	-	7.8
2003	72	-	24	29	47	-	11.1
<b>Pinus monophylla (singleleaf pinyon)</b>							
1998	57	-	-	-	-	-	6.6
2003	51	-	13	53	27	7	9.2

**Table 30-42.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	30.0	14.4	8.6	2.4	-1.1	10.0	0.0	<b>64.3</b>	Fair-Good
2003	25.1	8.1	2.0	0.1	-0.8	1.6	0.0	<b>36.0</b>	Very Poor-Poor
2008	3.1	0.0	0.0	0.3	-1.4	10.0	0.0	<b>12.0</b>	Very Poor
2013	11.7	13.6	8.4	0.1	-0.2	6.4	0.0	<b>39.9</b>	Poor
2018	12.7	11.5	4.2	0.0	0.0	0.7	0.0	<b>29.1</b>	Very Poor
2023	14.1	14.4	8.8	0.2	-1.6	6.8	0.0	<b>42.7</b>	Poor



## MOTOQUA - STUDY NO. 30-44

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Motoqua NW; Township 40S, Range 19W, Section 10  
NAD 83 UTM ZONE 12, 236973 East 4134014 North

**Transect Information**

Browse Tag # (0' Stake)	520
Transect Bearing	10° 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 Gunlock Reservoir, travel south on North Gunlock Road for 4.2 miles, then turn right (west) onto Montoqua Road. Proceed for 8.2 miles to roads on the right (north) and left (south), then continue straight. Travel for 5.3 miles to a road on the right that leads to study 30R-02. Continue straight again for 2.2 miles, passing a road on the left and then turning right at a T-junction, then park. The 0-foot baseline stake is approximately 160 feet from the road on the left (northwest) side and is marked with browse tag #520.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	DESERT INN
Elevation	4,040ft (1,231m)
Aspect	West
Slope	13%
Sample Dates	05/16/2018, 05/17/2023

**Wildlife Habitat and Vegetation History****Table 30-44.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30-44.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1982	Blackbrush	Phase I
1992	Blackbrush	Phase I
2018	Blackbrush	Phase I
2023	Blackbrush	Phase I

**Site Notes**

Other "T" posts are located in the general vicinity of the transect, but are not part of this study site.

**Soils****Table 30-44.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Sandy Clay Loam	7.8	56.2	21.4	22.4	1.3	13.0	160.0	0.3	05/16/2018

**Site Potential**

1981 - 2010 Average Annual Precipitation	11 inches
NRCS Ecological Site	Semidesert Shallow Hardpan (Blackbrush)
NRCS Ecological Site #	R030XY230UT
States and Transitions	1982-2023 - State Undefined: Community Phase Undefined

Blackbrush (*Coleogyne ramosissima*) has been the dominant browse species on this site since study establishment in 1982. A variety of other shrub species including desert almond (*Prunus fasciculata*), desert bitterbrush (*Purshia glandulosa*), and banana yucca (*Yucca baccata*), among others, have also been present in lesser amounts (Photos, Pre-1992 Data, Table 30-44.12, Table 30-44.13). The understory has remained depauperate in diversity and quantity, and the introduced annual grass species cheatgrass (*Bromus tectorum*) and red brome (*B. rubens*) contributed a majority of the herbaceous cover during the two most recent samplings. In 2023, both annual grasses species had notable increases in cover, with cheatgrass having the largest increase in nested frequency (Table 30-44.7, Table 30-44.10, Table 30-44.11). Increased amounts of annual grass can pose a threat to the ecological resilience of the community and may alter fire regimes. Without a major disturbance, it is feasible to expect this site to remain in this or a similar state in future sample years.

Deer winter range condition was considered to be fair in 2018 and very poor in 2023; deterioration of winter range between the two sample years is mainly due to increases in annual grasses. Improvements to deer winter range could be accomplished through efforts that encourage recruitment of young preferred browse plants; diversifying and increasing perennial grass and forb cover while reducing annual grasses would also greatly improve winter range (Table 30-44.15). Pellet transect data indicates that deer presence was high in 2018 and moderate in 2023 (Table 30-44.9).

**Trend Summary Tables****Table 30-44.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	20.2	5.2	0.4	26.6	8.2	-
2023	19.1	5.1	0.0	23.7	6.0	-

**Table 30-44.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	370	-	149	13	4.1	-	0.7	0.0
2023	443	2	278	71	35.7	0.0	4.6	0.5

**Table 30-44.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	17.5	0.1	41.1	24.5	15.8	28.1
2023	9.4	-	31.4	13.8	14.8	54.5

**Table 30-44.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Mule Deer	Rabbit
	Quadrat Frequency	
2018	28	56
2023	20	20
Year	Days Use Per Acre (ha)	
2018	46.2 (114.2)	-
2023	28.1 (69.5)	-

**Table 30-44.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Bromus rubens <sup>ai</sup> (red brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency			
2018	348	130	-	3
2023	397	344	2	1
year	Average Cover (%)			
2018	3.7	0.4	-	0.0
2023	25.1	10.6	0.0	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-44.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus (milkvetch)	Astragalus nuttallianus <sup>ai</sup> (smallflowered milkvetch)	Calochortus flexuosus (winding mariposa lily)	Chamaesyce albomarginata (whitemargin sandmat)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Cryptantha gracilis <sup>ai</sup> (narrowstem cryptantha)	Descurainia incana <sup>a</sup> (mountain tansymustard)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriastrum sparsiflorum <sup>a</sup> (Great Basin woollystar)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Lepidium ramosissimum <sup>a</sup> (manybranched pepperweed)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)	Microsteris gracilis <sup>a</sup> (slender phlox)	Plantago patagonica <sup>a</sup> (woolly plantain)	
year	Nested Frequency																	
2018	-	4	6	-	-	7	4	-	-	23	-	28	96	-	-	13	1	
2023	1	-	-	18	58	5	-	12	3	-	3	35	199	105	2	-	150	
year	Average Cover (%)																	
2018	-	0.0	0.0	-	-	0.0	0.0	-	-	0.1	-	0.1	0.5	-	-	0.1	0.0	
2023	0.0	-	-	0.1	0.2	0.2	-	0.0	0.0	-	0.0	0.1	2.7	1.1	0.0	-	0.5	

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES		
Silene antirrhina <sup>a</sup> (sleepy silene)		
Stephanomeria (wirelettuce)		
year	Nested	
2018	-	-
2023	5	10
year	Average Cover (%)	
2018	-	-
2023	0.0	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-44.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES								
Coleogyne ramosissima <sup>p</sup> (blackbrush)								
Ephedra nevadensis <sup>p</sup> (Nevada jointfir)								
Ephedra viridis <sup>p</sup> (mormon tea)								
Prunus fasciculata <sup>p</sup> (desert almond)								
Purshia glandulosa <sup>p</sup> (desert bitterbrush)								
Thamnosma montana (turpentinebroom)								
Yucca baccata (banana yucca)								
Yucca brevifolia <sup>t</sup> (Joshua tree)								
year	Line Intercept Cover (%)							
2018	17.7	0.1	1.2	4.5	3.1	0.3	7.9	-
2023	16.9	-	0.9	3.7	2.2	-	6	-
year	Quadrat Cover (%)							
2018	15.1	0.6	0.8	2.1	1.7	0.3	4.9	0.4
2023	14.1	0.0	0.9	2.0	2.1	0.7	4.4	0.0

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-44.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Coleogyne ramosissima<sup>p</sup> -- (blackbrush)</b>									
2018	2640	-	1	92	8	4	0	5	79/101
2023	2580	-	0	59	41	0	1	32	- / -
<b>Cylindropuntia -- (cholla)</b>									
2018	-	-	-	-	-	-	-	-	77/47
2023	-	-	-	-	-	-	-	-	- / -
<b>Ephedra nevadensis<sup>p</sup> -- (Nevada jointfir)</b>									
2018	80	-	0	100	0	0	0	0	73/77
2023	40	-	0	100	0	0	0	0	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2018	300	-	7	67	27	13	27	27	63/69
2023	160	-	0	100	0	0	0	0	- / -
<b>Larrea tridentata -- (creosote bush)</b>									
2018	-	-	-	-	-	-	-	-	56/75
2023	-	-	-	-	-	-	-	-	- / -
<b>Opuntia -- (pricklypear)</b>									
2018	-	-	-	-	-	-	-	-	20/17
2023	-	-	-	-	-	-	-	-	- / -
<b>Prunus fasciculata<sup>p</sup> -- (desert almond)</b>									
2018	140	-	0	100	0	0	0	0	101/155
2023	120	-	0	33	67	0	0	17	- / -
<b>Purshia glandulosa<sup>p</sup> -- (desert bitterbrush)</b>									
2018	300	-	7	80	13	0	0	40	146/161
2023	200	-	0	0	100	30	20	70	- / -
<b>Thamnosma montana -- (turpentinebroom)</b>									
2018	140	-	14	86	0	0	0	0	44/75
2023	140	-	0	57	43	0	0	43	- / -
<b>Yucca baccata -- (banana yucca)</b>									
2018	2020	-	0	100	0	0	0	0	88/100
2023	820	-	0	100	0	0	0	0	- / -
<b>Yucca brevifolia<sup>t</sup> -- (Joshua tree)</b>									
2018	-	-	-	-	-	-	-	-	207/143

t - Tree Species; p - Preferred Browse; i - Introduced Species

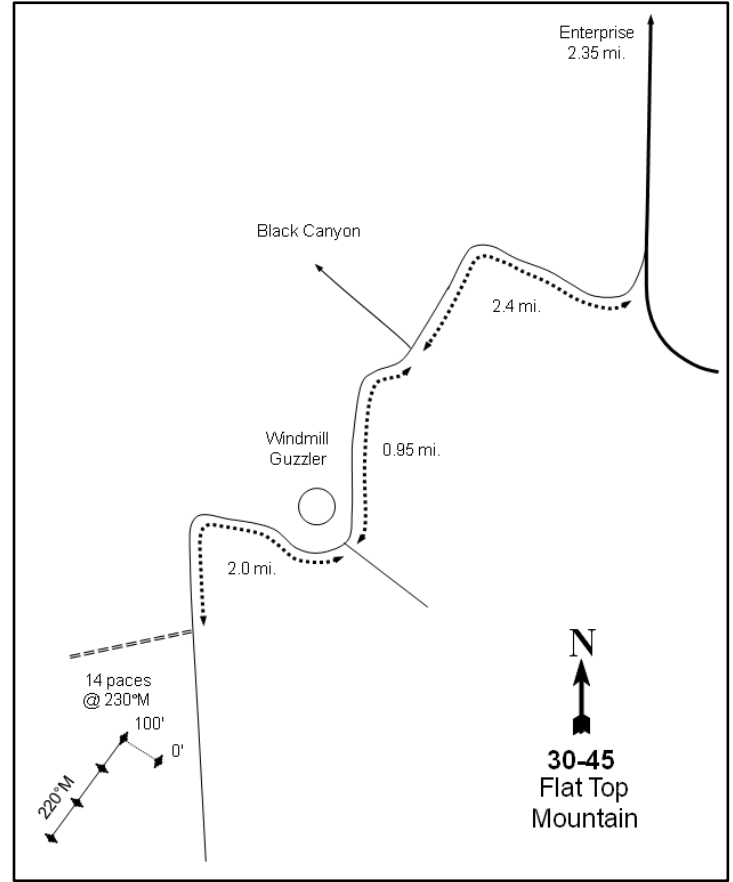
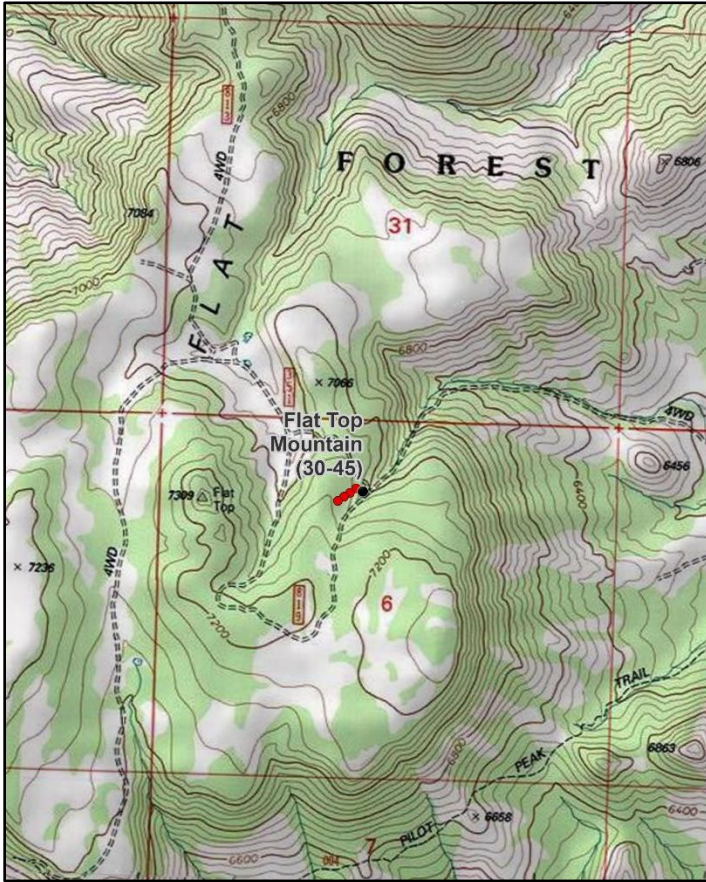
**Table 30-44.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Yucca brevifolia (Joshua tree)</b>							
2018	7	-	-	50	50	-	30.0
2023	2	-	-	50	50	-	30.0

**Table 30-44.15 - Deer Desirable Components Index: Semidesert Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	29.6	12.7	0.8	0.0	-3.0	0.0	0.0	<b>40.1</b>	Fair
2023	26.0	0.3	0.0	0.1	-20.0	1.0	0.0	<b>7.3</b>	Very Poor

## FLAT TOP MOUNTAIN - STUDY NO. 30-45



### Location Information

USGS 7.5 min Map Info Hebron SE; Township 38S, Range 17W, Section 06  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 252465 East 4155606 North

### Transect Information

Browse Tag # (0' Stake) 276  
 Transect Bearing 285° magnetic (Lines 2-4: 210° magnetic)  
 Length 400ft  
 Belt Placement Line 1 (11ft & 92ft), Line 2 (59ft), Line 3 (34ft), Line 4 (71ft)  
 Belt Marker Placement Belt 1: 8ft; Belt 2, 4: No Rebar

### Directions to Site

From the town of Enterprise, travel south on 200 East for 2.45 miles, at which point there will be a fork in the road. Proceed to the right and continue towards Calf Springs. Stay on the main road for 2.3 miles until another fork in the road is reached that is marked by the sign "Black Canyon;" do not proceed towards Black Canyon. Instead, proceed left at the fork for 0.95 miles, arriving at another fork in the road. Continue to the right (Forest Service Road #351) and travel for 2.0 miles until the road turns into a steep jeep trail. Approximately 0.15 miles up the road from where it first becomes steep and rough will be an intersection (the road is drivable all the way to the intersection). Walk 14 paces at 230 degrees from the intersection; the 0-foot baseline stake is located 11 paces north of the road and has a browse tag #276 attached. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height.

### Site Information

Land Ownership Federal  
 Land Administrator USFS  
 Allotment Black Hills  
 Elevation 7,020ft (2,140m)  
 Aspect North-Northeast  
 Slope 5-25%  
 Sample Dates 05/27/1998, 06/05/2003, 05/29/2008, 05/21/2013, 06/04/2018, 06/06/2023

**Table 30-45.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Hawkins	-	2004	35427

**Wildlife Habitat and Vegetation History**

**Table 30-45.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	summer

**Table 30-45.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1982	Gambel Oak	NA
1998	Gambel Oak	NA
2003	Gambel Oak	NA
2008	Gambel Oak	NA
2013	Gambel Oak	NA
2018	Gambel Oak	NA
2023	Gambel Oak	NA

**Site Notes**

Rebar was not found on belt 1 or 4 in 2023, but may still be present and obscured by Gambel oak (*Quercus gambelii*). Deer presence was likely high in 1982 due the high abundance of pellet groups and bedding areas (Jense et al., 1982). In 2013, deer pellet groups were fresh and many of the game trails were active. Mormon crickets were observed on the site in 2003 and again in 2018, and chukars were seen in 2023.

**Soils**

**Table 30-45.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	5.6	38.0	37.4	24.6	5.2	52.1	435.2	0.6	05/27/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation                      28 inches  
 NRCS Ecological Site    Mountain Gravelly Loam (Oak)  
 NRCS Ecological Site #    R047XB410UT  
 States and Transitions    No state and transition model is available for this ecological site.

From study establishment in 1982 to 2004, this study site was dominated by stands of mature Gambel oak (*Quercus gambelii*) with a diverse understory primarily comprised of the perennial forb arrowleaf balsamroot (*Balsamorhiza sagittata*). Recruitment of Gambel oak was abundant in 2008 following a 2004 wildfire (Table 30-45.1), but much of the canopy cover was lost. However, oak retained dominance, and cover has increased since that time period. Arrowleaf balsamroot has continued to maintain dominance within the herbaceous community (Photos, Pre-1992 Data, Table 30-45.11, Table 30-45.12, Table 30-45.13). The introduced annual grass cheatgrass (*Bromus tectorum*) was observed for the first time in 2008 having likely found opportunity for range expansion following the wildfire. Cheatgrass has not exhibited significant increases in frequency or cover in subsequent sample years (Table 30-45.7, Table 30-45.10), and will likely remain that way if disturbances remain infrequent. If the area experiences increased fire intervals, however, cheatgrass may increase and become a dominant vegetation component.

Due to the abundance and diversity of the shrub and herbaceous communities, this site may serve as adequate habitat for summering mule deer (Table 30-44.3), but may serve as better foraging range during very mild winters due to high oak cover. Deer presence on this site was moderate in 2023 according to pellet transect data (Table 30-44.9).

**Trend Summary Tables**

**Table 30-45.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	18.2	0.0	-	0.7	-	-
2003	27.2	-	-	53.1	0.3	-
2008	13.6	-	-	20.4	-	-
2013	18.7	0.0	-	43.4	-	-
2018	43.1	-	-	52.0	-	-
2023	31.1	-	-	49.1	-	-

**Table 30-45.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	-	123	38	333	-	5.8	0.2	27.4
2003	-	131	50	250	-	6.4	0.6	17.3
2008	39	127	149	232	0.7	7.1	2.9	19.2
2013	102	155	78	237	2.5	6.1	0.3	16.2
2018	57	197	6	142	0.3	6.8	0.0	15.3
2023	109	156	115	275	1.6	7.2	1.1	30.4

**Table 30-45.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	5.2	-	58.7	2.9	21.4	45.9
2003	8.3	-	43.3	1.3	22.6	48.7
2008	20.7	-	29.6	3.9	22.6	40.1
2013	8.4	-	43.1	3.7	21.7	48.4
2018	10.8	-	53.8	4.2	20.0	59.9
2023	8.8	-	35.5	7.0	21.8	59.3

**Table 30-45.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
1998	-	15	-	-
2003	-	9	-	1
2008	-	36	-	4
2013	-	15	-	2
2018	1	18	-	1
2023	1	8	-	-
Year	Days Use Per Acre (ha)			
1998	-	40.9 (101.0)	-	-
2003	-	67.7 (167.2)	-	-
2008	-	49.6 (122.5)	0.7 (1.7)	-
2013	-	28.8 (71.2)	-	-
2018	-	38.9 (96.0)	-	-
2023	-	34.2 (84.4)	-	-



**Table 30-45.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum lettermanii (Letterman's needlegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus marginatus (mountain brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Pascopyrum smithii (western wheatgrass)	Poa fendleriana (muttongrass)
year	Nested Frequency						
1998	-	-	-	-	-	-	123
2003	6	-	9	-	-	-	116
2008	3	-	21	39	6	-	106
2013	3	-	21	102	1	32	105
2018	10	-	22	57	9	47	141
2023	-	7	3	109	5	55	116
year	Average Cover (%)						
1998	-	-	-	-	-	-	5.8
2003	0.1	-	0.2	-	-	-	6.0
2008	0.0	-	0.8	0.7	0.1	-	6.2
2013	0.0	-	0.8	2.5	0.1	1.7	3.5
2018	0.6	-	0.5	0.3	0.2	1.0	4.4
2023	-	0.0	0.1	1.6	0.1	2.0	4.9

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-45.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium acuminatum (tapertip onion)	Arabis holboellii <sup>a</sup> (Holboell's rockcross)	Astragalus argophyllus (silverleaf milkvetch)	Balsamorhiza sagittata (arrowleaf balsamroot)	Calochortus nuttallii (sego lily)	Chenopodium atrovirens <sup>a</sup> (pinyon goosefoot)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Collomia linearis <sup>a</sup> (tiny trumpet)	Comandra umbellata (bastard toadflax)	Conium maculatum <sup>ami</sup> (poison hemlock)	Crepis acuminata (tapertip hawksbeard)	Cymopterus (springparsley)	Delphinium nuttallianum (two-lobed larkspur)	Erigeron divergens <sup>a</sup> (spreading fleabane)	Erigeron eatonii (Eaton's fleabane)	Galium multiflorum (shrubby bedstraw)
year	Nested Frequency																
1998	1	49	1	-	117	1	-	1	-	-	-	1	9	-	-	-	-
2003	-	7	7	-	89	-	7	9	-	-	5	4	-	-	-	-	2
2008	-	24	88	2	63	2	47	9	-	5	3	3	-	-	-	16	1
2013	9	8	13	1	78	2	6	4	-	-	-	-	-	3	-	7	-
2018	-	-	2	3	60	-	3	-	-	-	-	-	-	-	-	-	-
2023	24	27	21	1	92	-	6	3	2	-	-	-	-	-	3	2	-
year	Average Cover (%)																
1998	0.0	0.5	0.0	-	11.0	0.0	-	0.0	-	-	-	0.0	0.2	-	-	-	-
2003	-	0.0	0.0	-	12.5	-	0.0	0.0	-	-	0.4	0.0	-	-	-	-	0.0
2008	-	0.1	1.9	0.0	11.4	0.0	0.6	0.0	-	0.0	0.1	0.0	-	-	-	0.4	0.0
2013	0.0	0.0	0.1	0.0	10.8	0.0	0.0	0.0	-	-	-	-	-	0.0	-	0.0	-
2018	-	-	0.0	0.4	12.5	-	0.0	-	-	-	-	-	-	-	-	-	-
2023	0.3	0.2	0.1	0.1	18.4	-	0.0	0.0	0.0	-	-	-	-	-	0.0	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Heliomeris multiflora (showy goldeneye)	Hydrophyllum occidentale (western waterleaf)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Ligusticum porteri (Porter's licorice-root)	Lithophragma tenellum (slender woodland-star)	Lupinus argenteus (silvery lupine)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navarretia breweri <sup>a</sup> (Brewer's navarretia)	Nicotiana attenuata <sup>a</sup> (coyote tobacco)	Packera multilobata (lobeleaf groundsel)	Penstemon (beardtongue)	Penstemon confusus (Owens Valley beardtongue)	Petradoria pumila (rock goldenrod)	Phlox austromontana (mountain phlox)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Pseudostellaria jamesiana (tuber starwort)
year	Nested Frequency																
1998	-	107	-	-	-	4	37	-	-	10	-	-	8	10	-	-	214
2003	-	46	-	-	-	2	22	-	-	13	-	-	7	4	3	3	137
2008	-	50	2	-	5	0	1	-	3	2	1	-	-	2	-	21	75
2013	-	64	-	2	-	0	57	2	-	2	-	-	3	2	15	13	69
2018	-	-	-	-	-	0	1	-	-	10	0	-	1	4	-	-	5
2023	2	58	-	0	-	0	68	3	-	17	-	0	5	5	-	31	81
year	Average Cover (%)																
1998	-	6.3	-	-	-	0.2	0.2	-	-	0.2	-	-	0.2	0.5	-	-	6.2
2003	-	0.9	-	-	-	0.0	0.1	-	-	0.1	-	-	0.2	0.0	0.0	0.0	1.9
2008	-	2.6	0.0	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	0.0	-	0.2	0.4
2013	-	2.1	-	0.4	-	0.0	0.2	0.0	-	0.0	-	-	0.0	0.0	0.1	0.0	0.3
2018	-	-	-	-	-	0.0	0.0	-	-	0.2	0.0	-	0.1	0.2	-	-	0.0
2023	0.1	4.2	-	0.0	-	0.0	0.4	0.1	-	0.4	-	0.0	0.6	0.3	-	0.6	1.5

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Solidago missouriensis (Missouri goldenrod)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Symphoricarum (aster)	Taraxacum officinale (common dandelion)	Tragopogon dubius <sup>ai</sup> (yellow salsify)	Vicia americana (American vetch)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency						
1998	-	-	57	3	-	80	6
2003	35	-	-	-	-	29	5
2008	34	27	-	1	-	66	-
2013	47	27	-	-	1	41	7
2018	37	25	1	-	-	22	-
2023	1	43	40	-	-	49	3
year	Average Cover (%)						
1998	-	-	1.1	0.0	-	1.1	0.0
2003	1.4	-	-	-	-	0.1	0.0
2008	1.6	1.4	-	0.0	-	1.3	-
2013	1.8	0.4	-	-	0.0	0.3	0.0
2018	1.3	0.3	0.0	-	-	0.3	-
2023	0.0	0.3	2.4	-	-	1.4	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-45.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Chrysothamnus depressus <sup>p</sup> (longflower rabbitbrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus (yellow rabbitbrush)	Opuntia (pricklypear)	Prunus virginiana <sup>p</sup> (chokecherry)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)	Symphoricarpos oreophilus <sup>p</sup> (mountain snowberry)
year	Line Intercept Cover (%)								
1998	-	-	-	-	-	-	-	-	-
2003	2.4	2.3	-	-	0.3	-	-	44.2	4.2
2008	0.3	-	-	-	-	-	-	13.2	6.9
2013	-	0.5	-	-	-	-	-	35.5	7.4
2018	-	0.7	-	-	-	-	-	49.4	1.9
2023	0.6	1.6	-	-	-	-	-	42.2	4.7
year	Quadrat Cover (%)								
1998	0.2	2.1	-	0.0	-	-	-	11.8	4.1
2003	0.8	1.4	0.1	-	0.0	-	-	22.9	1.9
2008	0.0	0.0	-	-	-	-	-	8.6	4.9
2013	0.0	0.2	0.0	0.0	-	-	-	15.3	3.1
2018	0.0	1.0	-	-	-	0.0	1.8	38.4	1.8
2023	1.1	1.6	-	-	-	-	-	26.8	1.8

t - Tree Species; p - Preferred Browse; i - Introduced Species

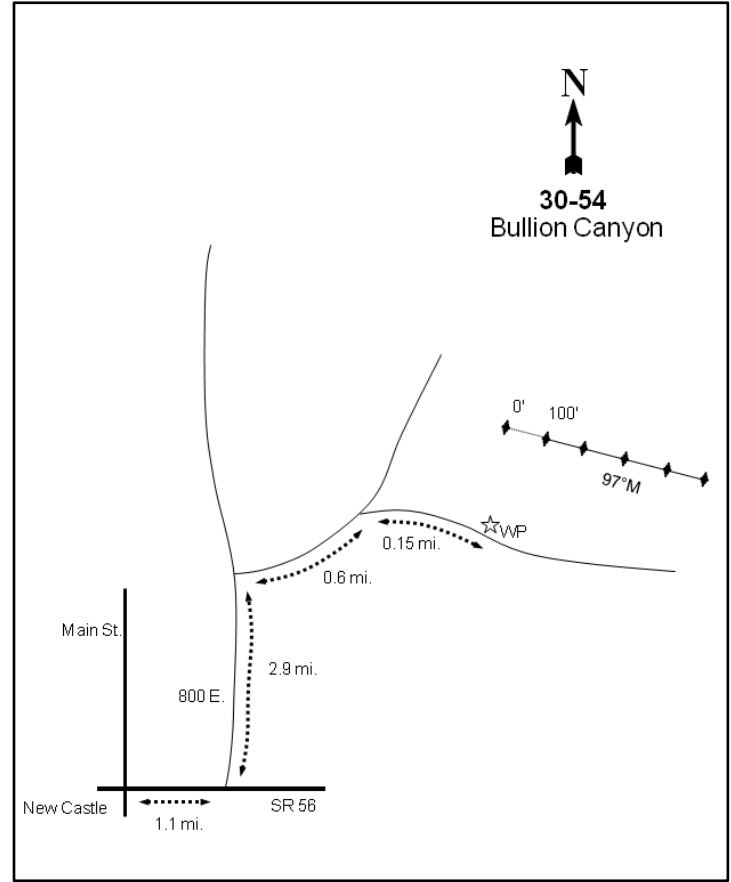
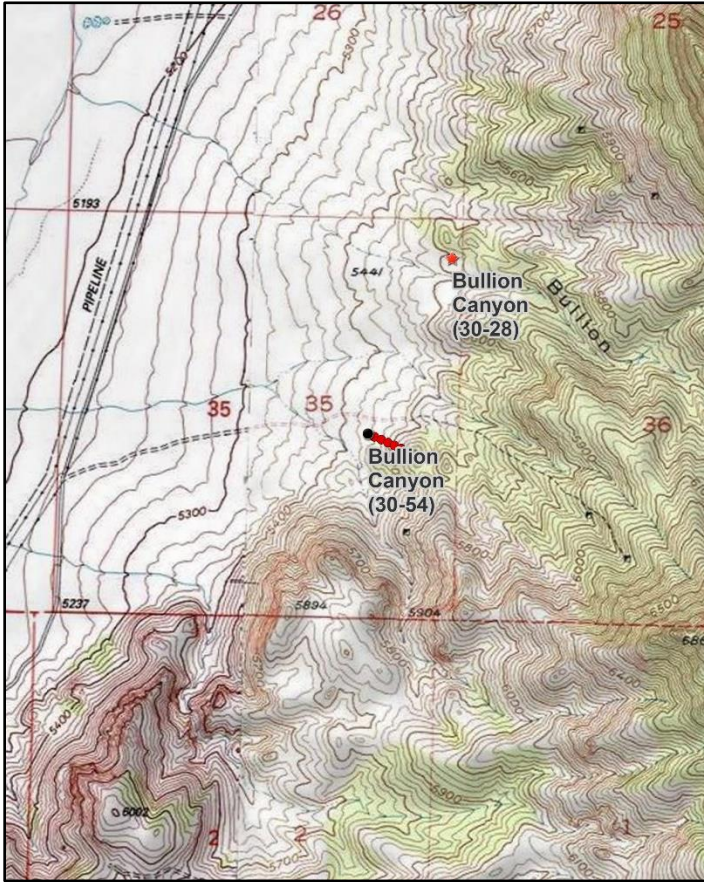
**Table 30-45.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Amelanchier utahensis<sup>p</sup> -- (Utah serviceberry)</b>									
1998	800	180	35	65	0	70	0	0	113/73
2003	40	-	0	100	0	0	50	0	211/207
2008	60	-	33	67	0	0	100	33	34/50
2013	40	-	0	100	0	0	100	50	29/44
2018	40	-	50	50	0	0	50	0	33/51
2023	480	-	0	100	0	8	4	0	- / -
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
1998	780	-	3	95	3	36	56	3	35/67
2003	540	-	0	70	30	30	7	4	35/71
2008	80	-	75	25	0	0	25	75	9/22
2013	100	200	20	80	0	40	20	0	21/45
2018	100	-	0	100	0	40	20	0	19/51
2023	6200	11440	97	3	0	1	0	0	- / -
<b>Chrysothamnus depressus<sup>p</sup> -- (longflower rabbitbrush)</b>									
1998	440	-	96	5	0	0	0	0	20/39
2003	20	-	0	100	0	100	0	0	19/48
2008	-	-	-	-	-	-	-	-	- / -
2013	60	-	67	33	0	0	0	0	7/16
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus -- (yellow rabbitbrush)</b>									
1998	20	-	100	0	0	0	0	0	- / -
2003	-	-	-	-	-	-	-	-	77/156
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	22/21
2018	-	-	-	-	-	-	-	-	36/41
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	40	-	0	100	0	0	0	0	13/46
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
1998	80	-	0	100	0	0	0	75	20/46
2003	100	-	0	100	0	0	0	0	14/37
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	29/89
2023	-	-	-	-	-	-	-	-	-/-
<b>Prunus virginiana<sup>p</sup> -- (chokecherry)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	20	-	100	0	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	40	-	100	0	0	0	0	0	- / -
2023	20	-	0	100	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	80	-	50	50	0	0	0	0	108/68
2023	-	-	-	-	-	-	-	-	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	6760	160	20	79	2	21	0	0	116/79
2003	10420	40	27	62	11	12	7	5	111/72
2008	25240	500	14	37	49	7	1	84	64/38
2013	10440	460	31	68	1	33	0	1	76/59
2018	11660	60	25	74	0	28	1	0	88/76
2023	8920	-	11	88	2	22	17	1	- / -
<b>Symphoricarpos oreophilus<sup>p</sup> -- (mountain snowberry)</b>									
1998	980	100	10	90	0	0	0	0	51/66
2003	1160	-	16	85	0	0	5	0	44/103
2008	740	20	3	97	0	0	0	0	49/126
2013	840	20	12	88	0	2	0	0	43/92
2018	160	-	13	88	0	13	0	0	31/72
2023	960	-	0	100	0	2	0	0	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species

## BULLION CANYON - STUDY NO. 30-54

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Silver Peak NW; Township 35S, Range 15W, Section 35  
NAD 83 UTM ZONE 12, 280059 East 4176994 North

**Transect Information**

Browse Tag # (0' Stake)	493
Transect Bearing	97° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

Starting at the intersection of SR-56 and Main Street in Newcastle, travel east on SR-56 for 1.1 miles to 800 East. Turn left (north) onto 800 East and drive 2.9 miles to a right turn (0.3 miles past a gate), then proceed for 0.6 miles to a fork. Take the faint two-track road to the right and go 0.15 miles to a witness post on the left (north) side of the road. The 0-foot stake is 91 paces from the witness post at 37 degrees magnetic and is marked by browse tag #493. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height.

**Site Information**

Land Ownership	Private
Land Administrator	Private
Allotment	SAND SPRING
Elevation	5,450ft (1,661m)
Aspect	West
Slope	15-30%
Sample Dates	05/19/1998, 05/21/2003, 05/15/2008, 05/28/2013, 05/23/2018, 05/24/2023

**Wildlife Habitat and Vegetation History****Table 30-54.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30-54.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1998	Black Sagebrush	Phase I
2003	Black Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Black Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Black Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2018	Black Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2023	Black Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II

**Site Notes**

Agricultural fields are located in the valley bottom about one and a half miles to the west. Hybridization of singleleaf pinyon (*Pinus monophylla*) and twoneedle pinyon (*P. edulis*) is likely and for the purposes of this study all pinyon species have been classified as twoneedle pinyon.

**Soils****Table 30-54.5 - Soil Analysis Data.** List of chemical and textural soil characteristics determined by laboratory analysis.

Texture	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m	Sample Date
Loam	7.0	46.0	29.4	24.6	1.7	6.4	160.0	0.6	05/19/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Stony Loam (Black Sagebrush)
NRCS Ecological Site #	R047XB332UT
States and Transitions	No state and transition model is available for this ecological site.

Since study establishment in 1998, the plant community on this site has been dominated by black sagebrush (*Artemisia nova*) (Table 30-54.12, Table 30-54.13). The herbaceous understory was dominated by the introduced annual grass species cheatgrass (*Bromus tectorum*) in 1998, but cheatgrass has been a minor component in subsequent sample years. Perennial grasses, particularly the native species James' galleta (*Pleuraphis jamesii*), provided most of the herbaceous cover in 2023 (Table 30-54.7, Table 30-54.10). Twoneedle pinyon (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) have increased over the study period (Photos, Table 30-54.14), and the study site was classified as being within Phase I transitioning to Phase II of woodland succession in 2023 (Table 30-54.4). Without a tree-removing disturbance, trees will likely continue to increase over time and become the dominant vegetation component.

Deer winter range condition has generally remained between very poor and poor since study establishment. As of 2023, deer winter range condition was considered to be poor. Improvement to deer wintering range can be accomplished through efforts that increase preferred browse cover and reproduction; diversifying and increasing cover of native perennial forbs while reducing cheatgrass would also improve winter range conditions (Table 30-54.15). According to pellet transect data, mule deer presence has been high in most sample years. In 2013 and 2023, however, deer presence was considered to be low (Table 30-54.9).

## Trend Summary Tables

**Table 30-54.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
1998	20.5	1.5	1.4	-	-	0.3
2003	12.8	0.2	3.5	8.1	0.4	2.9
2008	10.8	1.6	4.4	11.0	1.0	5.1
2013	10.1	1.5	5.4	11.1	2.2	5.3
2018	12.7	0.7	6.4	11.4	0.9	6.4
2023	9.7	0.2	4.2	5.9	0.4	6.5

**Table 30-54.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
1998	404	183	45	111	12.5	3.9	0.2	0.7
2003	12	126	4	112	0.0	3.2	0.0	0.6
2008	144	141	45	113	0.5	3.4	0.2	1.0
2013	110	176	-	63	0.8	3.5	-	0.4
2018	84	223	-	51	1.4	7.9	-	0.4
2023	209	222	125	82	4.9	14.5	0.6	1.8

**Table 30-54.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
1998	19.9	0.6	12.4	33.0	14.2	33.2
2003	15.1	0.3	20.0	35.6	16.0	21.8
2008	16.7	0.5	24.2	36.7	14.7	21.0
2013	19.4	0.8	24.6	26.7	11.5	24.4
2018	24.8	0.4	25.8	33.2	17.2	27.7
2023	16.3	0.1	25.7	25.8	17.0	33.2

**Table 30-54.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Horse	Rabbit
	Quadrat Frequency				
1998	-	-	24	-	9
2003	1	-	18	-	5
2008	2	-	32	-	62
2013	1	-	12	-	5
2018	-	-	18	-	27
2023	2	-	9	-	16
Year	Days Use Per Acre (ha)				
1998	2.9 (7.2)	-	48.9 (120.8)	-	-
2003	0.7 (1.8)	-	46.9 (115.9)	-	-
2008	3.6 (9.0)	-	62.3 (153.9)	-	-
2013	-	-	6.7 (16.6)	-	-
2018	8.0 (19.7)	-	44.9 (110.9)	1.7 (4.3)	-
2023	7.2 (17.9)	8.7 (21.5)*	14.7 (36.4)	0.6 (1.4)	-

\*Pellets per acre (ha)

**Table 30-54.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Aristida purpurea (purple threeawn)	Bouteloua gracilis (blue grama)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Carex (sedge)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency									
1998	46	1	-	404	1	40	-	112	22	2
2003	29	5	-	12	-	2	0	96	7	-
2008	25	4	19	144	-	6	4	98	12	6
2013	50	6	-	108	-	19	8	116	14	3
2018	77	-	-	84	-	39	8	143	7	-
2023	50	3	-	209	-	17	4	182	6	-
year	Average Cover (%)									
1998	0.9	0.0	-	12.5	0.0	0.4	-	2.1	0.5	0.0
2003	0.5	0.0	-	0.0	-	0.0	0.0	2.6	0.1	-
2008	0.4	0.1	0.3	0.5	-	0.0	0.1	2.5	0.1	0.0
2013	0.7	0.0	-	0.8	-	0.2	0.0	2.4	0.1	0.0
2018	1.5	-	-	1.4	-	0.4	0.1	5.9	0.1	-
2023	2.4	0.0	-	4.9	-	0.3	0.2	11.5	0.1	-

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-54.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis (rockcress)	Astragalus (milkvetch)	Brickellia oblongifolia var. limifolia (narrowleaf brickellbush)	Calochortus flexuosus (winding mariposa lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Cirsium (thistle)	Cryptantha (cryptantha)	Cymopterus purpurascens (widewing springsparsley)	Delphinium nuttallianum (two-lobe larkspur)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Draba <sup>a</sup> (draba)	Eriogonum (buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gilia inconspicua <sup>a</sup> (shy gilia)
year	Nested Frequency																
1998	2	-	4	5	-	5	8	8	15	-	-	13	24	8	-	-	10
2003	-	-	2	-	-	29	-	-	-	-	6	-	-	11	-	-	4
2008	1	-	-	4	5	22	12	2	11	-	1	2	2	-	15	-	39
2013	1	-	-	1	4	-	2	1	2	-	-	-	-	10	3	-	-
2018	-	-	-	5	5	-	4	-	-	-	-	-	-	-	9	-	-
2023	0	3	-	-	-	14	4	2	-	1	-	4	5	-	3	19	101
year	Average Cover (%)																
1998	0.0	-	0.0	0.0	-	0.0	0.1	0.0	0.0	-	-	0.1	0.1	0.1	-	-	0.1
2003	-	-	0.0	-	-	0.1	-	-	-	-	0.0	-	-	0.0	-	-	0.0
2008	0.0	-	-	0.0	0.1	0.1	0.3	0.1	0.1	-	0.0	0.0	0.0	-	0.1	-	0.1
2013	0.0	-	-	0.0	0.0	-	0.0	0.0	0.0	-	-	-	-	0.1	0.0	-	-
2018	-	-	-	0.0	0.2	-	0.0	-	-	-	-	-	-	-	0.1	-	-
2023	0.0	0.0	-	-	-	0.1	0.2	0.4	-	0.0	-	0.0	0.0	-	0.0	0.3	0.2

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species



FORB SPECIES	Heterotheca villosa (hairy false goldenaster)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lithospermum (stoneseed)	Lomatium foeniculaceum (desert biscuitroot)	Mirabilis multiflora (Colorado four o'clock)	Packera multiflobata (lobeleaf groundsel)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Sphaeralcea grossulariifolia (gooseberry/leaf globemallow)	Streptanthus cordatus (heartleaf twistflower)
year	Nested Frequency									
1998	-	-	-	17	-	1	2	48	-	11
2003	-	-	5	28	-	-	-	45	-	8
2008	-	7	-	25	-	0	3	38	1	3
2013	-	-	-	5	-	-	2	35	1	6
2018	-	-	-	-	-	-	3	22	1	13
2023	4	-	-	13	4	-	6	30	10	5
year	Average Cover (%)									
1998	-	-	-	0.1	-	0.0	0.0	0.2	-	0.1
2003	-	-	0.2	0.1	-	-	-	0.1	-	0.0
2008	-	0.0	-	0.1	-	0.0	0.0	0.1	0.0	0.0
2013	-	-	-	0.0	-	-	0.0	0.1	0.0	0.0
2018	-	-	-	-	-	-	0.0	0.1	0.0	0.0
2023	0.1	-	-	0.1	0.2	-	0.0	0.4	0.3	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-54.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Atriplex canescens <sup>p</sup> (fourwing saltbush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Cylindropuntia whipplei (Whipple cholla)	Ephedra nevadensis <sup>p</sup> (Nevada jointfir)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Sclerocactus (fishhook cactus)
year	Line Intercept Cover (%)									
1998	-	-	-	-	-	-	-	-	-	-
2003	7.8	0.2	0.2	-	0.1	-	2.9	0.2	-	0
2008	9.9	0.9	0.2	-	0.2	0.8	5.1	0	-	0
2013	10.4	0.4	0.7	-	0.3	1.4	5.3	-	-	0.1
2018	11.1	0.1	-	0	0.2	0.9	6.4	-	-	-
2023	5.8	-	0.2	-	0.1	0.2	6.5	-	-	-
year	Quadrat Cover (%)									
1998	19.1	1.0	1.0	-	0.5	0.5	1.4	-	-	-
2003	12.4	0.2	0.1	-	0.2	0.1	3.4	0.0	0.0	0.0
2008	10.1	0.6	0.2	-	0.1	1.3	4.3	0.1	0.0	0.0
2013	10.0	0.0	0.3	-	0.1	1.2	5.2	-	0.1	0.0
2018	12.5	0.0	0.1	0.0	0.1	0.6	6.0	-	0.4	-
2023	9.5	-	0.0	0.0	0.2	0.2	3.6	-	0.7	-

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-54.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1998	6420	120	13	70	17	60	9	10	35/61
2003	5260	-	6	40	54	31	16	35	24/48
2008	4880	120	1	57	42	30	12	31	28/55
2013	3420	-	2	69	29	22	63	20	28/58
2018	4240	20	1	70	30	26	10	15	27/53
2023	3100	20	3	48	50	34	7	48	- / -
<b>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
1998	140	-	0	57	43	86	0	29	55/64
2003	80	-	0	0	100	0	75	75	49/93
2008	60	20	0	100	0	33	0	0	56/98
2013	40	-	0	100	0	50	0	0	64/80
2018	40	-	0	0	100	0	100	50	64/83
2023	20	-	0	0	100	0	100	100	- / -
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
1998	960	60	6	85	8	2	0	6	22/31
2003	480	-	13	25	63	8	0	50	14/23
2008	660	60	9	52	39	12	12	24	17/26
2013	500	-	12	84	4	24	12	4	20/30
2018	480	-	4	88	8	0	4	0	16/23
2023	220	-	18	82	0	0	18	0	- / -
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	40	-	50	50	0	0	0	0	11/26
2018	80	-	0	75	25	0	0	25	12/29
2023	80	-	25	75	0	0	0	0	- / -
<b>Echinocereus coccineus -- (scarlet hedgehog cactus)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	60	-	67	33	0	0	0	0	- / -
<b>Echinocereus engelmannii -- (Engelmann's hedgehog cactus)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	60	-	0	100	0	0	0	0	12/11
2023	-	-	-	-	-	-	-	-	- / -
<b>Ephedra nevadensis<sup>P</sup> -- (Nevada jointfir)</b>									
1998	580	-	3	62	35	14	83	31	33/40
2003	840	-	57	24	19	12	24	26	24/32
2008	760	120	16	40	45	0	90	37	36/41
2013	640	-	53	44	3	6	41	28	28/40
2018	540	-	11	85	4	4	41	7	20/42
2023	260	-	62	23	15	23	62	15	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa -- (rubber rabbitbrush)</b>									
1998	-	-	-	-	-	-	-	-	21/46
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Grayia spinosa -- (spiny hopsage)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	80/104
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	20	-	0	100	0	0	0	0	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	1360	20	31	68	2	0	0	2	11/12
2003	560	-	0	93	7	0	0	7	13/17
2008	5320	100	13	83	5	0	0	2	13/15
2013	2020	-	7	92	1	0	0	3	17/22
2018	2420	-	7	93	1	0	0	3	15/17
2023	260	-	15	77	8	0	0	8	-/-
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	140	20	86	14	0	0	0	0	-/-
2003	120	-	33	67	0	0	0	0	-/-
2008	120	-	33	67	0	0	0	0	-/-
2013	160	-	50	50	0	0	0	0	-/-
2018	100	-	20	80	0	0	0	0	-/-
2023	120	40	0	100	0	17	0	17	-/-
<b>Opuntia -- (pricklypear)</b>									
1998	80	-	0	50	50	0	0	0	10/22
2003	180	-	0	67	33	0	0	33	13/37
2008	160	-	25	38	38	0	0	38	13/39
2013	-	-	-	-	-	-	-	-	13/36
2018	-	-	-	-	-	-	-	-	12/20
2023	20	-	0	100	0	0	0	0	-/-
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
1998	60	-	0	100	0	0	0	0	8/7
2003	80	-	0	75	25	0	0	25	5/5
2008	20	-	0	100	0	0	0	0	3/6
2013	20	-	0	100	0	0	0	0	10/15
2018	-	-	-	-	-	-	-	-	4/5
2023	-	-	-	-	-	-	-	-	-/-
<b>Pinus edulis<sup>1</sup> -- (twoneedle pinyon)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	20	20	100	0	0	0	0	0	-/-
2013	20	-	100	0	0	0	0	0	-/-
2018	20	20	100	0	0	0	0	0	-/-
2023	40	20	100	0	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Polygala subspinoso -- (spiny milkwort)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	12/24
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Salvia dorrii -- (purple sage)</b>									
1998	-	-	-	-	-	-	-	-	-/-
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	15/12
2023	-	-	-	-	-	-	-	-	-/-
<b>Sclerocactus -- (fishhook cactus)</b>									
1998	20	-	0	100	0	0	0	0	- / -
2003	80	-	0	100	0	0	0	0	8/5
2008	100	-	0	100	0	0	0	0	11/9
2013	100	-	0	100	0	0	0	0	11/12

t - Tree Species; p - Preferred Browse; i - Introduced Species

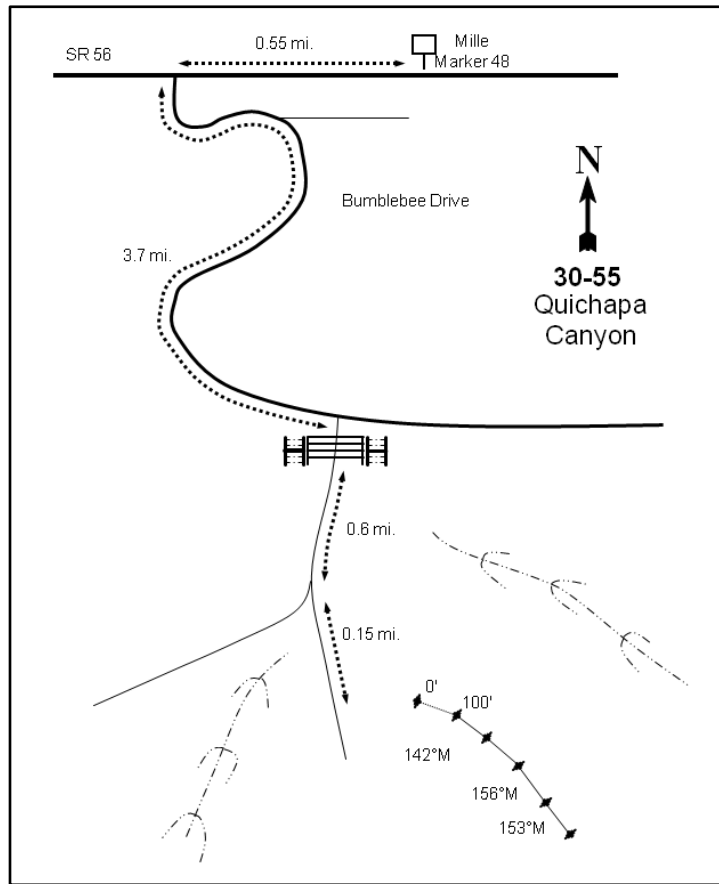
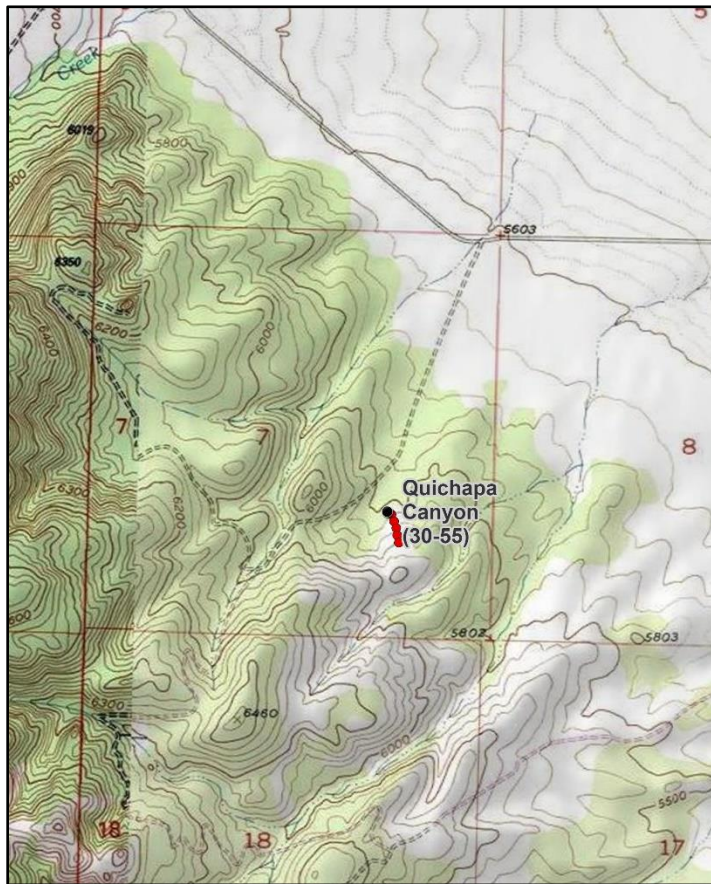
**Table 30-54.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2003	157	25	40	35	-	-	4.3
2008	164	-	40	60	-	-	7.8
2013	166	5	58	37	-	-	6.0
2018	173	-	50	25	25	-	9.7
2023	103	5	20	50	25	-	11.5
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	14	-	-	-	-	-	3.0
2003	18	22	56	11	11	-	4.2
2008	14	-	71	29	-	-	5.0
2013	17	-	88	13	-	-	4.4
2018	16	-	71	14	14	-	6.1
2023	15	-	57	29	14	-	8.3

**Table 30-54.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	25.6	9.4	6.3	7.8	-9.4	1.4	0.0	<b>41.1</b>	Poor
2003	10.1	-1.3	3.3	6.4	0.0	1.1	0.0	<b>19.6</b>	Very Poor
2008	13.8	3.4	0.5	6.9	-0.4	2.1	0.0	<b>26.2</b>	Very Poor
2013	13.9	6.9	1.8	7.0	-0.6	0.9	0.0	<b>29.8</b>	Very Poor
2018	14.3	6.0	0.3	15.8	-1.0	0.9	0.0	<b>36.3</b>	Very Poor-Poor
2023	7.4	0.3	1.8	29.1	-3.7	3.7	0.0	<b>38.5</b>	Poor

## QUICHAPA CANYON - STUDY NO. 30-55



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Kanarraville NW; Township 37S, Range 12W, Section 07  
NAD 83 UTM ZONE 12, 302302 East 4162875 North

### Transect Information

Browse Tag # (0' Stake)  
Transect Bearing  
Length  
Belt Placement  
Belt Marker Placement

498  
103° magnetic (Lines 1-3: 142° magnetic, Line 4: 156° magnetic, Line 5: 153° magnetic)  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Belt 4: 1ft; Line 1: 75ft Long

### Directions to Site

From SR-56, drive to mile marker 48 and continue east for 0.55 miles to Bumblebee Drive, which is a road on the right (south). Travel 3.7 miles south to a gate on the right. Proceed through the gate and drive for 0.6 miles to a fork. Proceed left and continue for 0.15 miles to the witness post on the left (east) side of the road. The 0-foot stake is 5 paces away from the witness post at 77 degrees magnetic and is marked by browse tag #498. The study is marked by half-high fenceposts.

### Site Information

Land Ownership	Federal
Land Administrator	BLM
Allotment	DRY CANYON
Elevation	5,860ft (1,786m)
Aspect	Northwest
Slope	20%
Sample Dates	06/03/1998, 05/30/2003, 05/20/2008, 05/16/2013, 06/06/2018, 06/07/2023

**Table 30-55.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Hand Crew - Lop and Scatter	-	-	Between 2018 and 2023	-

**Wildlife Habitat and Vegetation History****Table 30-55.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30-55.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
1998	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2003	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2008	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2013	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2018	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II

**Site Notes**

Water is available for wildlife in a stream one-quarter mile to the northeast of the site. Deer were seen nearby and fresh pellet groups were observed on site upon establishment in 1998. In 2013, insect galls were found on most of the mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) plants. Antelope bitterbrush (*Purshia tridentata*) was heavily hedged and was found growing closely associated with other shrubs. In addition, deer pellet groups were more frequently observed near preferred browse species.

The 100-foot stake was out of the ground in 2023 and was initially reset incorrectly due to inaccurate notes from the previous sampling: this led to line 2 being shortened to 75 feet long instead of line 1. The stake was then placed in the correct spot, but only after data from belt 2 had been gathered for that year. As a result, data taken in future sample years should not be affected, but discrepancies may be apparent when comparing 2023 data with that from other years.

**Soils****Table 30-55.5 - 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	6.4	54.7	16.7	28.6	2.1	9.5	89.6	0.6	06/03/1998

**Site Potential**

1981 - 2010 Average Annual Precipitation	14 inches
NRCS Ecological Site	Upland Gravelly Loam (Bonneville Big Sagebrush)
NRCS Ecological Site #	R028AY306UT
States and Transitions	1998-2023 - Utah Juniper/Invasive Annual State: Community Phase 3.1

This plant community on this study site has existed as a mixed stand of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and Utah juniper (*Juniperus osteosperma*) since study establishment in 1998; juniper cover and density increased between 2002 and 2018, but decrease in 2023 due to an unknown lop and scatter. Twoneedle pinyon (*Pinus edulis*) is also present, but with lower density and less cover than juniper (Table 30-55.12, Table 30-55.13, Table 30-55.14). The herbaceous understory was comprised mostly of the introduced annual grass species cheatgrass (*Bromus tectorum*) in 1998, but cover has decreased in subsequent years with some variability. Perennial grasses and forbs have provided limited cover over the duration of the study (Table 30-55.7, Table 30-55.10, Table 30-55.11). Without disturbance, juniper will likely increase in density and/or cover over time and become the dominant vegetation component.

Deer winter range condition has ranged between very poor and fair since study establishment. As of 2023, deer winter range condition was considered to be poor to fair. Improvement to deer wintering range can be accomplished through efforts that increase preferred browse reproduction; diversifying and increasing cover of native perennial forbs and grasses while reducing cheatgrass would also improve winter range conditions (Table 30-55.15). Pellet group data indicates that mule deer/domestic sheep presence was moderate in 2023 (Table 30-55.9).

**Trend Summary Tables**

**Table 30-55.6 - 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
1998	12.4	-	7.2	0.1	-	0.9
2003	9.8	-	6.8	11.8	-	14.0
2008	9.2	-	6.9	14.7	0.3	13.5
2013	13.1	0.0	10.8	17.4	0.2	14.0
2018	13.4	0.0	10.6	17.7	0.2	17.7
2023	14.8	0.1	5.9	18.1	0.1	13.7

**Table 30-55.7 - 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
1998	371	111	124	69	7.0	2.8	0.4	0.4
2003	150	111	267	60	0.9	1.2	2.1	0.3
2008	235	157	46	92	2.4	2.6	0.1	0.4
2013	237	199	150	103	0.9	3.1	0.3	0.9
2018	28	147	62	36	0.1	3.3	0.2	0.2
2023	137	178	159	102	1.5	4.7	0.6	0.9

**Table 30-55.8 - 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
1998	27.6	0.2	38.9	17.0	11.8	29.9
2003	20.2	0.1	32.4	22.3	13.5	25.2
2008	18.6	0.1	44.0	22.1	12.3	19.8
2013	31.5	0.2	39.4	11.3	10.3	28.8
2018	35.0	1.0	39.5	18.6	15.3	26.4
2023	26.4	-	32.9	16.1	13.7	24.5

**Table 30-55.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer/Domestic Sheep	Rocky Mountain Elk	Rabbit
	Quadrat Frequency				
1998	-	-	35	-	29
2003	-	-	23	-	19
2008	1	-	45	1	84
2013	-	-	26	-	24
2018	1	-	33	-	37
2023	-	-	24	4	19
Year	Days Use Per Acre (ha)				
1998	-	-	47.6 (117.5)	-	-
2003	0.7 (1.8)	-	33.5 (82.8)	-	-
2008	0.7 (1.8)	-	53.6 (132.4)	1.3 (3.3)	-
2013	-	-	20.8 (51.3)	-	-
2018	-	-	44.9 (110.9)	0.7 (1.7)	-
2023	-	8.7 (21.5)*	38.9 (96.0)	-	-

\*Pellets per acre (ha)

**Table 30-55.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Pleuraphis jamesii (James' galleta)	Poa bulbosa <sup>i</sup> (bulbous bluegrass)	Poa fendleriana (muttongrass)	Poa pratensis <sup>i</sup> (Kentucky bluegrass)	Poa secunda (Sandberg bluegrass)	Vulpia octiflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency									
1998	8	-	371	79	-	2	31	-	3	4
2003	11	-	150	51	14	-	44	-	2	-
2008	11	-	235	104	-	-	38	-	29	-
2013	6	2	237	107	8	-	78	1	23	-
2018	22	-	28	62	1	3	87	-	15	-
2023	-	-	137	99	-	9	97	-	6	-
year	Average Cover (%)									
1998	0.2	-	7.0	1.9	-	0.0	0.7	-	0.0	0.0
2003	0.1	-	0.9	0.7	0.2	-	0.2	-	0.0	-
2008	0.2	-	2.4	1.7	-	-	0.7	-	0.1	-
2013	0.0	0.0	0.9	0.8	0.0	-	2.0	0.0	0.2	-
2018	0.3	-	0.1	1.4	0.0	0.0	1.5	-	0.0	-
2023	-	-	1.5	2.3	-	0.0	2.4	-	0.1	-

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-55.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Allium (onion)	Alyssum desertorum <sup>ai</sup> (desert madwort)	Arabis (rockcress)	Astragalus (milkvetch)	Astragalus convallarius (lesser rushy milkvetch)	Astragalus newberryi (Newberry's milkvetch)	Calochortus nuttallii (sego lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Chaenactis douglasii (Douglas' dustymaiden)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Comandra umbellata (bastard toadflax)	Cryptantha <sup>a</sup> (annual cryptantha)	Cymopterus (springparsley)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Dichelostemma capitatum (bluedicks)
year	Nested Frequency																
1998	6	2	-	-	8	2	-	4	3	-	9	61	-	-	0	3	-
2003	5	-	-	8	2	-	-	2	-	-	-	208	10	-	2	30	-
2008	7	-	2	7	2	-	-	10	-	-	5	6	-	-	6	-	10
2013	19	1	-	5	2	8	-	6	-	21	5	114	-	-	4	3	-
2018	5	-	-	6	5	-	-	-	-	22	6	41	-	-	-	-	-
2023	24	-	1	9	1	1	5	13	-	44	4	60	-	1	5	5	-
year	Average Cover (%)																
1998	0.0	0.0	-	-	0.0	0.1	-	0.0	0.0	-	0.0	0.1	-	-	0.0	0.0	-
2003	0.0	-	-	0.1	0.0	-	-	0.0	-	-	-	1.3	0.1	-	0.0	0.2	-
2008	0.1	-	0.0	0.0	0.0	-	-	0.0	-	-	0.0	0.0	-	-	0.0	-	0.0
2013	0.1	0.0	-	0.0	0.0	0.3	-	0.0	-	0.0	0.0	0.2	-	-	0.0	0.0	-
2018	0.0	-	-	0.0	0.0	-	-	-	-	0.0	0.0	0.1	-	-	-	-	-
2023	0.1	-	0.0	0.0	0.2	0.0	0.0	0.1	-	0.1	0.0	0.1	-	0.0	0.0	0.1	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species



FORB SPECIES	Draba <sup>a</sup> (draba)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lomatium (desertparsley)	Microsteris gracilis <sup>a</sup> (slender phlox)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	Orobanche fasciculata (clustered broomrape)	Penstemon (beardtongue)	Phlox longifolia (longleaf phlox)	Polygonum douglasii <sup>a</sup> (Douglas' knotweed)	Pseudostellaria jamesiana (tuber starwort)	Sphaeralcea grossularifolia (gooseberryleaf globemallow)	Streptanthus cordatus (heartleaf twistflower)	Trifolium (clover)	Vicia americana (American vetch)	Zigadenus paniculatus (foothill deathcamas)
year	Nested Frequency															
1998	13	-	-	3	73	-	2	2	19	-	1	-	-	18	-	3
2003	1	55	-	1	100	-	-	-	24	5	-	2	1	8	-	-
2008	2	1	5	-	11	-	3	-	16	19	-	-	4	16	1	14
2013	-	-	2	-	31	1	4	-	38	-	-	-	-	23	7	11
2018	-	4	-	-	8	-	-	-	5	9	4	-	3	5	2	-
2023	-	-	3	18	54	-	-	-	24	47	-	-	3	9	-	3
year	Average Cover (%)															
1998	0.0	-	-	0.0	0.2	-	0.0	0.0	0.1	-	0.0	-	-	0.0	-	0.0
2003	0.0	0.3	-	0.0	0.3	-	-	-	0.1	0.0	-	0.0	0.0	0.0	-	-
2008	0.0	0.0	0.0	-	0.0	-	0.0	-	0.0	0.0	-	-	0.0	0.1	0.0	0.0
2013	-	-	0.0	-	0.1	0.0	0.0	-	0.1	-	-	-	-	0.1	0.1	0.1
2018	-	0.0	-	-	0.0	-	-	-	0.0	0.0	0.0	-	0.0	0.0	0.0	-
2023	-	-	0.0	0.1	0.1	-	-	-	0.3	0.1	-	-	0.0	0.1	-	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-55.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cercocarpus montanus <sup>p</sup> (alderleaf mountain mahogany)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>t</sup> (Utah juniper)	Opuntia (pricklypear)	Pinus edulis <sup>t</sup> (twoneedle pinyon)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)	Quercus gambelii <sup>p</sup> (Gambel oak)
year	Line Intercept Cover (%)									
1998	-	-	-	-	-	-	-	-	-	-
2003	4.3	-	6.5	-	-	13.5	-	0.5	0.5	0.5
2008	3.1	-	9.9	-	-	13.5	0.3	-	0.6	1.1
2013	2.9	-	12.8	-	-	14	0.2	-	0.4	1.3
2018	1.5	-	13.8	-	-	17.1	0.2	0.6	0.4	2
2023	1.6	-	13	-	-	12.9	0.1	0.8	0.2	3.3
year	Quadrat Cover (%)									
1998	5.1	2.0	3.8	-	-	7.0	-	0.1	1.4	0.0
2003	5.0	-	3.5	-	-	6.2	-	0.6	1.3	0.1
2008	2.5	-	6.2	-	-	6.9	0.0	-	0.4	0.2
2013	1.3	-	9.8	-	0.0	10.7	0.0	0.1	1.2	0.8
2018	1.4	0.0	10.2	-	-	10.6	0.0	0.0	0.8	1.0
2023	1.3	0.0	9.6	0.1	-	5.3	0.1	0.6	1.0	2.9

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-55.13 - 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 (%)				
<b>Amelanchier utahensis<sup>P</sup> -- (Utah serviceberry)</b>									
1998	1240	400	21	36	44	27	42	26	115/109
2003	1780	220	42	25	34	23	25	21	95/91
2008	1020	60	37	26	37	12	14	18	111/107
2013	860	120	44	12	44	14	44	23	92/85
2018	880	20	41	39	21	18	30	16	82/83
2023	420	120	24	48	29	5	52	43	- / -
<b>Artemisia nova<sup>P</sup> -- (black sagebrush)</b>									
1998	80	-	0	0	100	0	0	75	21/44
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	20	-	0	100	0	100	0	0	45/98
2023	60	-	0	100	0	0	0	0	- / -
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
1998	2100	80	11	67	22	17	1	6	53/71
2003	1880	-	0	50	50	40	3	22	56/66
2008	4820	4640	41	43	16	9	1	8	51/65
2013	4360	1040	38	56	6	20	2	7	56/90
2018	3340	20	17	70	13	10	2	6	55/72
2023	3120	2220	14	73	13	10	3	13	- / -
<b>Cercocarpus ledifolius<sup>P</sup> -- (curl-leaf mountain mahogany)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	20	-	100	0	0	0	100	0	52/25
2023	-	-	-	-	-	-	-	-	- / -
<b>Cercocarpus montanus<sup>P</sup> -- (alderleaf mountain mahogany)</b>									
1998	-	-	-	-	-	-	-	-	113/132
2003	-	-	-	-	-	-	-	-	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	100	20	20	20	60	20	0	0	94/116
2018	20	-	100	0	0	0	0	0	- / -
2023	20	-	100	0	0	0	0	0	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
1998	-	-	-	-	-	-	-	-	- / -
2003	-	-	-	-	-	-	-	-	20/23
2008	-	-	-	-	-	-	-	-	- / -
2013	-	20	0	0	0	0	0	0	15/26
2018	20	-	100	0	0	0	0	0	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
1998	160	20	63	38	0	0	0	0	- / -
2003	160	-	38	63	0	0	0	0	- / -
2008	260	80	62	39	0	0	0	8	- / -
2013	180	40	44	56	0	0	0	0	- / -
2018	240	20	25	75	0	0	0	8	- / -
2023	160	20	13	63	25	13	0	50	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia -- (pricklypear)</b>									
1998	20	-	0	100	0	0	0	0	15/35
2003	60	-	0	100	0	0	0	0	10/33
2008	60	-	0	100	0	0	0	0	13/32
2013	80	-	25	75	0	0	0	25	15/50
2018	80	-	50	50	0	0	0	0	12/46
2023	60	-	33	67	0	0	0	0	- / -
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
1998	60	20	100	0	0	0	0	0	- / -
2003	40	-	100	0	0	0	0	0	- / -
2008	60	-	67	33	0	0	0	0	- / -
2013	40	100	100	0	0	0	0	50	- / -
2018	60	60	33	67	0	0	0	0	- / -
2023	60	-	67	33	0	0	0	33	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
1998	300	-	0	87	13	0	20	13	55/106
2003	260	-	0	62	39	23	69	0	32/71
2008	220	-	0	46	55	0	91	46	32/54
2013	80	-	0	75	25	0	75	0	36/86
2018	140	-	0	57	43	0	100	0	50/85
2023	80	-	0	50	50	0	100	50	- / -
<b>Quercus gambelii<sup>p</sup> -- (Gambel oak)</b>									
1998	160	20	75	25	0	0	13	13	102/81
2003	200	-	80	20	0	0	20	0	158/102
2008	760	-	74	26	0	5	0	3	80/71
2013	420	80	76	24	0	24	14	0	43/48
2018	460	-	56	44	0	0	56	0	78/61
2023	520	-	15	85	0	4	92	4	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species

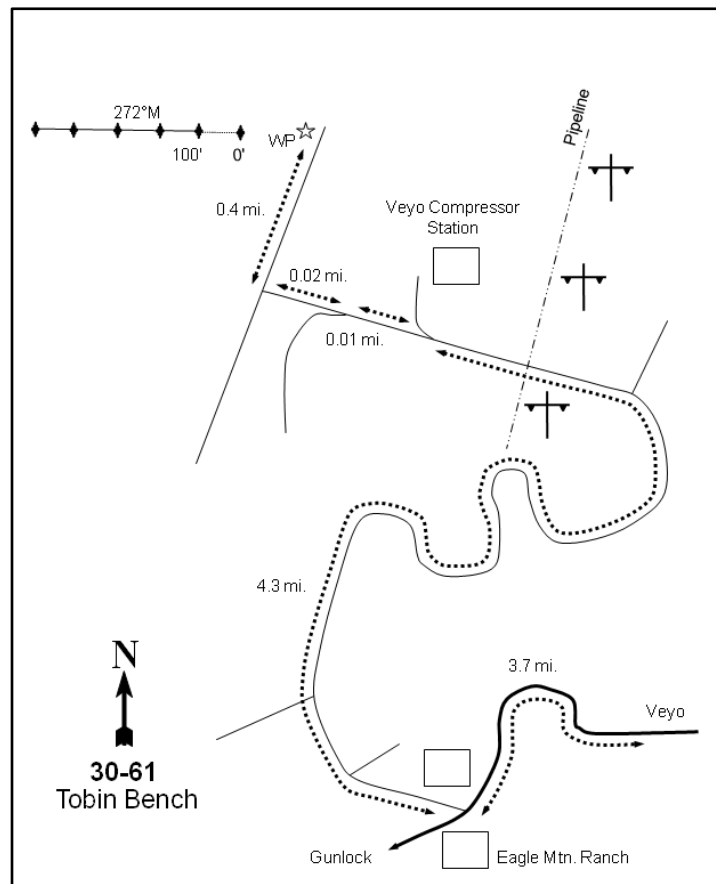
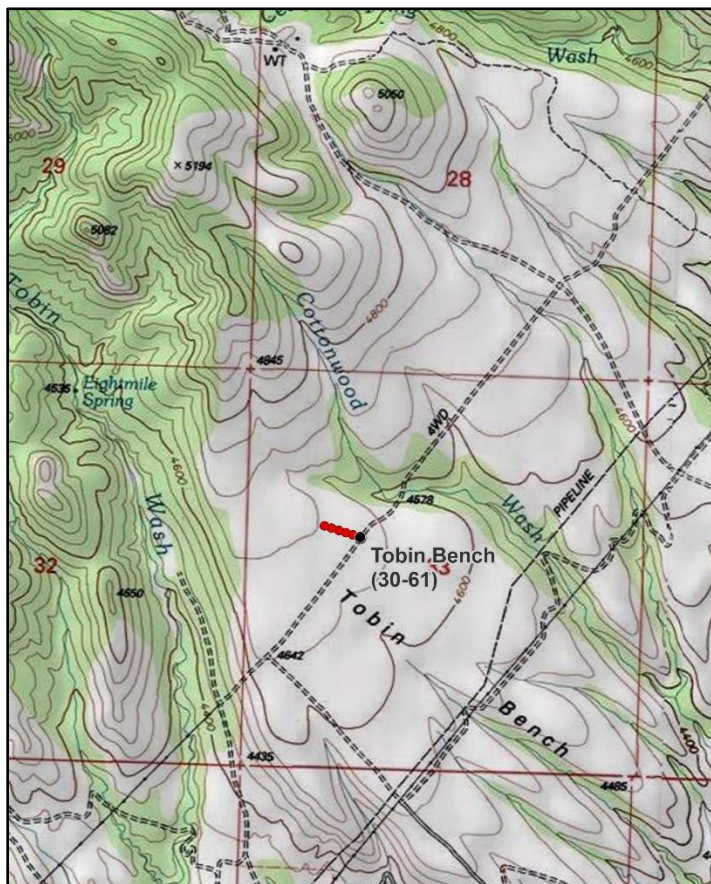
**Table 30-55.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2003	196	5	30	20	20	25	12.3
2008	87	22	61	6	11	-	10.1
2013	82	17	61	6	17	-	5.6
2018	88	-	50	33	11	6	8.2
2023	33	13	47	-	-	40	20.5
<b>Pinus edulis (twoneedle pinyon)</b>							
1998	10	-	-	-	-	-	20.0
2003	27	-	33	33	-	33	7.8
2008	33	64	29	7	-	-	2.4
2013	26	25	58	8	-	8	5.3
2018	29	25	42	25	8	-	4.0
2023	21	63	25	13	-	-	3.6

**Table 30-55.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
1998	17.1	2.3	6.2	5.6	-5.3	0.8	0.0	<b>26.6</b>	Very Poor
2003	15.8	2.6	9.3	2.4	-0.7	0.6	0.0	<b>30.1</b>	Very Poor
2008	19.0	8.7	15.0	5.3	-1.8	0.9	0.0	<b>47.1</b>	Poor
2013	22.3	11.2	15.0	6.1	-0.7	1.8	0.0	<b>55.7</b>	Fair
2018	22.1	11.1	11.7	6.6	0.0	0.4	0.0	<b>51.8</b>	Poor-Fair
2023	22.3	11.3	7.5	9.3	-1.1	1.8	0.0	<b>51.1</b>	Poor-Fair

## TOBIN BENCH - STUDY NO. 30-61

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Gunlock NE; Township 39S, Range 17W, Section 33  
NAD 83 UTM ZONE 12, 255113 East 4137729 North

**Transect Information**

Browse Tag # (0' Stake)  
Transect Bearing  
Length  
Belt Placement  
Belt Marker Placement

244  
272° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Belt 1: 3ft

**Directions to Site**

Drive west from Veyo on Center Street for 5.7 miles to a road on the right (north) side of the road; the Eagle Mountain Ranch will be on the left side of the road at this turn. Drive on this oiled road for 4.3 miles to the Veyo Compressor Station and a fork in the road. Proceed left at the fork and continue for 0.01 miles to another fork. Stay right and drive 0.02 miles to an intersection and a wire gate. Turn right and drive for 0.4 miles on an old powerline road to the witness post on the left (west) side of the road. The 0-foot stake is 7 paces from the witness post at 306 degrees magnetic and is marked by browse tag #244. The baseline runs approximately west and the study is marked by green steel "T" fence posts approximately 12 to 14 inches in height.

**Site Information**

Land Ownership: Federal  
Land Administrator: BLM  
Allotment: MINERA WASH  
Elevation: 4,650ft (1,417m)  
Aspect: East  
Slope: 3%  
Sample Dates: 05/27/2003, 05/14/2008, 05/21/2013, 05/24/2018, 05/25/2023

**Table 30-61.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Bull Complex	-	2006	41500
Seeding - Aerial	-	-	2007	1000

**Table 30-61.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Tobin Bench Fire Rehabilitation 1			Dribbler	Jan 2007	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	<i>Atriplex canescens</i>	Fourwing Saltbush	Lincoln NV	0.50	0.18
S	<i>Purshia stansburiana</i>	Stansbury Cliffrose		0.01	0.01
S	<i>Purshia stansburiana</i>	Stansbury Cliffrose		0.20	0.12
S	<i>Purshia stansburiana</i>	Stansbury Cliffrose	Millard UT	0.20	0.16

**Wildlife Habitat and Vegetation History****Table 30-61.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30-61.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2003	Stansbury Cliffrose	Phase I
2008	Annual Forb	No Encroachment
2013	Desert Bitterbrush/Threadleaf Snakeweed/Annual Forb	No Encroachment
2018	Desert Bitterbrush/Threadleaf Snakeweed/Annual Forb	No Encroachment
2023	Desert Bitterbrush/Threadleaf Snakeweed/Annual Grass	No Encroachment

**Site Notes**

The Tobin Bench Fire Rehabilitation was a seeding that took place in response to the Bull Wildfire Complex, which removed much of the vegetation on the site. In 2006, Stansbury cliffrose (*Purshia stansburiana*) and fourwing saltbush (*Atriplex confertifolia*) were seeded to increase forage value and augment preferred browse species lost to the burn. However, there is some discrepancy as to whether or not an additional seed mix of herbaceous species was applied in 2009. An old deer antler shed was found on site in 2013. In 2018, some of the bedstraw (*Galium sp.*) was likely misidentified as redstem stork's bill (*Erodium cicutarium*).

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Semidesert Gravelly Loam (Desert Bitterbrush)
NRCS Ecological Site #	Undefined
States and Transitions	No state and transition model is available for this ecological site.

In 2003, desert bitterbrush (*Purshia glandulosa*) dominated the shrub component of this study site. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) was also present, but experiencing a die-off that was likely drought-induced. The Bull Wildfire Complex in 2006 (Table 30-61.1) effectively removed much of the browse component from the area and bitterbrush cover had decreased as of the 2008 sample year. However, bitterbrush reestablished on the site and became a dominant shrub component in 2013 along with threadleaf snakeweed (*Gutierrezia microcephala*) (Photos, Table 30-61.12, Table 30-61.13). From 2008 through 2018, the herbaceous understory was mainly comprised of the introduced annual forb species redstem stork's bill (*Erodium cicutarium*); abundant redstem stork's bill is indicative of a degraded ecological state, but does provide some forage value to wildlife. In 2023, however, the introduced annual grass species cheatgrass (*Bromus tectorum*) contributed a majority of the understory cover (Table 30-61.7, Table 30-61.10, Table 30-61.11). Increased amounts of cheatgrass amplify fuel loads and threaten the resiliency of a plant community.

Deer winter range condition has ranged between poor and fair since study establishment. In 2023, deer winter range condition was considered to be poor to fair. Improvement to deer wintering range can be accomplished through efforts that increase preferred browse cover and reproduction; diversifying and increasing cover of native perennial forbs and grasses while reducing cheatgrass would also greatly improve winter range conditions (Table 30-61.15). Deer presence was moderate in 2023 according to pellet transect data (Table 30-61.9).

## Trend Summary Tables

**Table 30-61.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2003	13.8	-	-	10.2	-	-
2008	1.2	0.1	-	1.3	-	-
2013	7.6	3.1	-	8.3	5.3	-
2018	7.9	8.3	-	10.0	9.4	-
2023	10.1	16.2	-	8.6	16.3	-

**Table 30-61.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2003	-	9	2	74	-	0.0	0.0	3.3
2008	10	9	363	129	0.0	0.0	47.3	0.8
2013	15	22	356	3	0.0	0.3	8.0	0.0
2018	125	44	297	56	1.5	1.7	8.2	0.7
2023	386	36	256	205	19.3	2.4	3.7	3.3

**Table 30-61.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2003	23.2	0.1	50.1	9.6	7.9	17.0
2008	31.2	0.0	13.0	7.6	11.9	48.5
2013	45.1	1.5	26.1	2.2	13.9	18.6
2018	41.7	0.0	33.7	9.6	16.2	25.6
2023	32.0	-	29.7	3.6	14.6	44.2

**Table 30-61.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2003	-	50	-	7
2008	-	40	-	36
2013	-	20	-	22
2018	-	32	-	37
2023	2	28	-	6
Year	Days Use Per Acre (ha)			
2003	-	226.5 (559.5)	-	-
2008	-	41.5 (102.6)	1.3 (3.3)	-
2013	-	20.8 (51.3)	-	-
2018	1.5 (3.6)	46.2 (114.2)	-	-
2023	1.5 (3.6)	31.5 (77.8)	-	-

**Table 30-61.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus rubens <sup>si</sup> (red brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)	unknown perennial grass (unknown perennial grass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency							
2003	-	-	-	-	7	2	-	-
2008	2	-	-	6	7	-	-	4
2013	16	-	-	15	5	1	-	-
2018	25	3	21	113	12	-	7	2
2023	26	-	145	359	10	1	-	30
year	Average Cover (%)							
2003	-	-	-	-	0.0	0.0	-	-
2008	0.0	-	-	0.0	0.0	-	-	0.0
2013	0.2	-	-	0.0	0.0	0.0	-	-
2018	1.3	0.0	0.1	1.3	0.3	-	0.0	0.0
2023	2.1	-	2.7	16.4	0.3	0.0	-	0.3

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-61.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Calochortus flexuosus (winding mariposa lily)	Chamaesyce albomarginata (whitemargin sandmat)	Chenopodium fremontii <sup>a</sup> (Fremont's goosefoot)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Eriastrum sparsiflorum <sup>a</sup> (Great Basin woollystar)	Eriogonum cernuum <sup>a</sup> (nodding buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Galium <sup>a</sup> (bedstraw)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lepidium <sup>a</sup> (pepperweed)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea ambigua (desert globemallow)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested Frequency																
2003	-	37	46	-	-	-	-	-	-	-	-	-	2	-	-	-	-
2008	1	13	121	6	85	-	-	316	-	-	34	-	104	67	104	-	4
2013	-	-	1	-	1	-	4	352	-	-	1	-	-	-	-	-	2
2018	-	-	5	-	19	-	17	269	35	-	-	-	88	-	11	-	52
2023	-	35	51	-	7	125	-	214	-	4	-	1	-	-	3	108	93
year	Average Cover (%)																
2003	-	0.4	2.9	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-
2008	0.0	0.1	0.6	0.0	1.3	-	-	37.3	-	-	0.6	-	0.5	0.1	7.5	-	0.1
2013	-	-	0.0	-	0.0	-	0.4	7.6	-	-	0.0	-	-	-	-	-	0.0
2018	-	-	0.0	-	0.1	-	0.4	7.0	0.4	-	-	-	0.3	-	0.0	-	0.7
2023	-	0.2	0.4	-	0.0	0.4	-	3.2	-	0.0	-	0.0	-	-	0.0	1.9	0.8

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Symphiotrichum (aster)
year	Nested
2003	1
2008	-
2013	-
2018	-
2023	-
year	Average Cover (%)
2003	0.0
2008	-
2013	-
2018	-
2023	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-61.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Cylindropuntia whipplei (Whipple cholla)	Gutierrezia microcephala (threadleaf snakeweed)	Opuntia engelmannii (cactus apple)	Opuntia polyacantha (plains pricklypear)	Purshia glandulosa <sup>p</sup> (desert bitterbrush)	Quercus turbinella <sup>p</sup> (Sonoran scrub oak)
year	Line Intercept Cover (%)							
2003	0.9	-	-	-	-	-	7.9	1.4
2008	-	-	-	-	-	-	1.3	-
2013	-	-	-	5.3	-	-	7.1	1.2
2018	-	-	-	9.3	-	0.1	9.1	0.9
2023	-	-	-	16.2	-	0.1	7.4	1.2
year	Quadrat Cover (%)							
2003	6.1	-	-	-	-	-	7.2	0.5
2008	-	0.0	-	0.1	-	-	1.1	-
2013	-	-	-	3.1	-	-	7.0	0.6
2018	-	-	-	8.0	0.2	0.1	7.5	0.4
2023	-	-	0.1	15.8	0.2	0.1	9.6	0.5

t - Tree Species; p - Preferred Browse; i - Introduced Species



**Table 30-61.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2003	620	-	0	3	97	32	16	74	79/96
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	34/48
2023	-	-	-	-	-	-	-	-	-/-
<b>Atriplex canescens<sup>P</sup> -- (fourwing saltbush)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	97/166
2023	-	-	-	-	-	-	-	-	-/-
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	40	-	50	50	0	0	0	0	24/16
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	22/36
2023	40	-	0	50	50	0	0	50	-/-
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
2003	-	-	-	-	-	-	-	-	77/86
2008	-	-	-	-	-	-	-	-	26/19
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	45/50
2023	-	-	-	-	-	-	-	-	-/-
<b>Escobaria vivipara var. vivipara -- (spinystar)</b>									
2003	-	-	-	-	-	-	-	-	15/12
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia microcephala -- (threadleaf snakeweed)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	200	-	0	100	0	0	0	0	25/23
2013	7360	-	8	91	1	0	0	0	18/23
2018	4840	-	1	82	17	0	0	12	25/41
2023	15700	140	2	95	3	0	0	4	-/-
<b>Opuntia engelmannii -- (cactus apple)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	60	-	0	100	0	0	0	0	18/50
2023	60	-	0	100	0	0	0	0	-/-

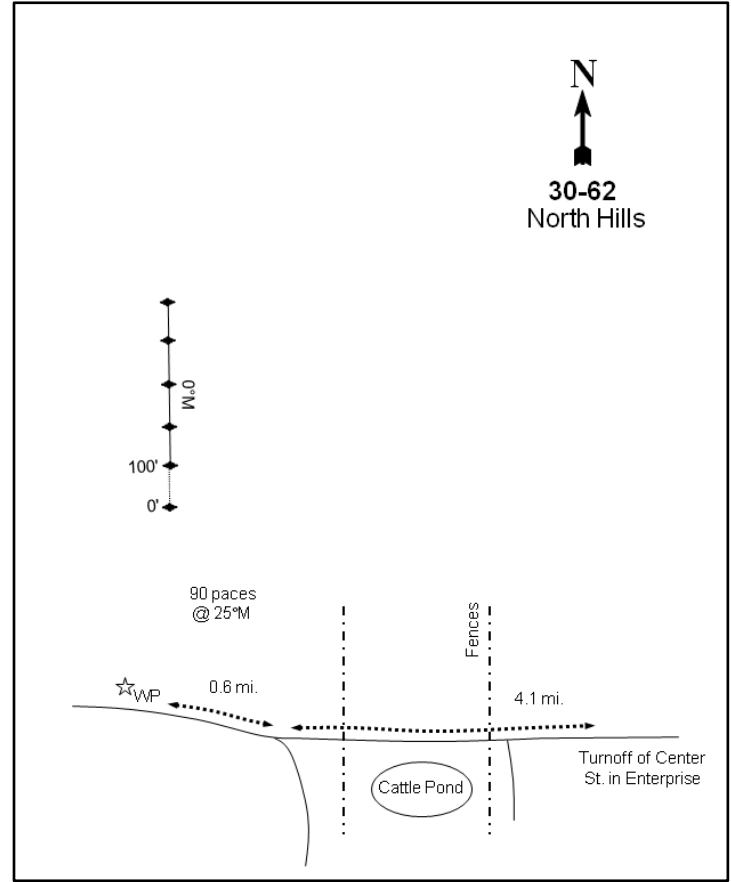
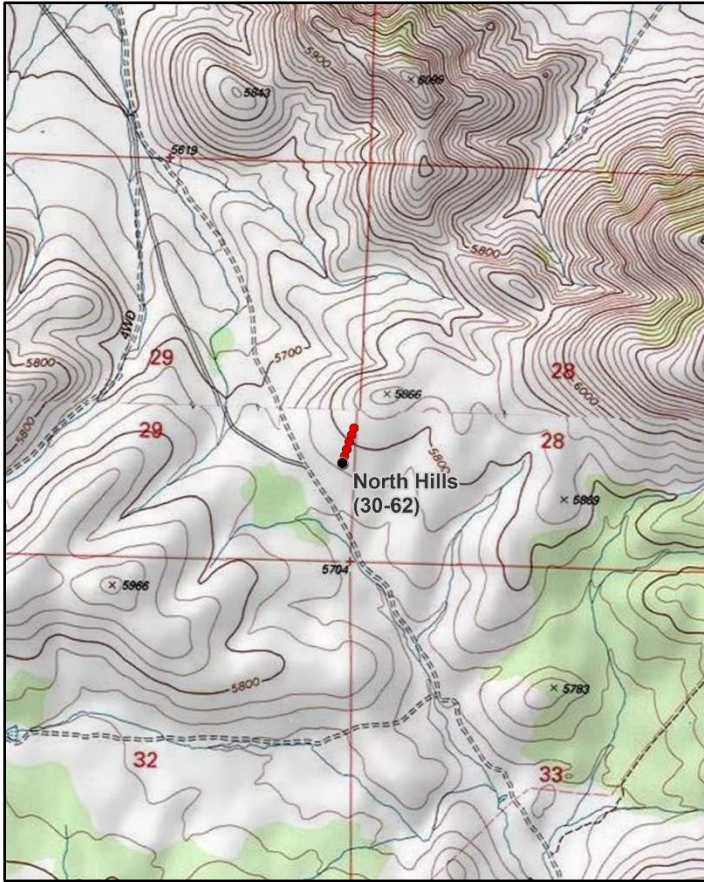
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2003	-	-	-	-	-	-	-	-	32/67
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	60	-	0	100	0	0	0	0	20/44
2023	60	-	0	100	0	0	0	0	-/-
<b>Purshia glandulosa<sup>p</sup> -- (desert bitterbrush)</b>									
2003	500	20	4	44	52	24	48	12	145/169
2008	300	20	13	87	0	0	7	80	40/53
2013	340	-	0	100	0	29	0	6	64/106
2018	420	-	0	100	0	5	14	0	82/130
2023	380	-	0	100	0	32	21	0	-/-
<b>Quercus turbinella<sup>p</sup> -- (Sonoran scrub oak)</b>									
2003	240	-	0	100	0	0	0	0	132/112
2008	220	-	0	100	0	0	0	100	48/40
2013	20	-	0	100	0	0	0	0	124/203
2018	40	-	0	100	0	0	0	0	131/114
2023	20	-	0	100	0	0	0	0	-/-
<b>Sclerocactus -- (fishhook cactus)</b>									
2003	-	-	-	-	-	-	-	-	27/29

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-61.15 - Deer Desirable Components Index: Semidesert Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2003	14.4	0.4	1.5	0.1	0.0	6.5	0.0	<b>22.9</b>	Poor
2008	2.0	0.0	0.0	0.1	0.0	1.6	0.0	<b>3.7</b>	Very Poor
2013	11.9	15.0	0.0	0.5	0.0	0.0	0.0	<b>27.4</b>	Fair
2018	14.6	15.0	0.0	3.5	-1.1	1.4	0.0	<b>33.3</b>	Fair
2023	12.3	15.0	0.0	4.9	-14.5	6.6	0.0	<b>24.3</b>	Poor-Fair

## NORTH HILLS - STUDY NO. 30-62

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Hebron NE; Township 36S, Range 17W, Section 29  
NAD 83 UTM ZONE 12, 255292 East 4167606 North

**Transect Information**

Browse Tag # (0' Stake)	434
Transect Bearing	0° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

Starting from the town of Enterprise, turn north on Second West and pass over a bridge. From the bridge, drive 0.6 miles to just past 375 West and turn right onto Old Modena Road right before a fire hydrant. On Old Modena Road, travel for 4.1 miles, passing study 30-52 and a small number of fences to a fork on the left. Continue straight for another 0.6 miles to the witness post on the right (north) side of the road. The 0-foot stake is 90 paces from the witness post at 25 degrees magnetic and is marked by browse tag #434. The study is marked by green steel "T" fence posts approximately 12 to 14 inches in height.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	COUNTY LINE
Elevation	5,770ft (1,759m)
Aspect	Southwest
Slope	11-14%
Sample Dates	05/29/2003, 05/22/2008, 05/23/2013, 05/30/2018, 05/22/2023

**Table 30-62.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Flatt	-	2021	14357
Chaining - One-Way Ely	Flatt Fire ESR (Proposed)	5844	2022	11211
Seeding - Aerial Before	Flatt Fire ESR (Proposed)	5844	December 2021 - January 2022	11211

**Table 30-62.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Flatt Fire BLM Unchained Remix			Aerial	Jan 2022	4583
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.28	0.23
G	Poa secunda	Sandberg Bluegrass	Mountain Home	0.22	0.17
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Columbia	1.00	0.91
G	Sporobolus cryptandrus	Sand Dropseed		0.25	0.24
F	Achillea millefolium	Western Yarrow	Eagle	0.10	0.08

**Wildlife Habitat and Vegetation History****Table 30-62.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30-62.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Perennial Forb-Grass	No Encroachment

**Site Notes**

Many mature cliffrose (*Purshia stansburiana*) present on the site before the burn were highlined and mostly unavailable to big game.

**Site Potential**

1981 - 2010 Average Annual Precipitation 16 inches  
 NRCS Ecological Site Upland Gravelly Loam (Bonneville Big Sagebrush)  
 NRCS Ecological Site # R028AY306UT  
 States and Transitions 2003-2018 - Bonneville Big Sagebrush/Snakeweed State: Community Phase 4.1  
 2023 - Seeded Range State: Community Phase 6.1

When the study was established in 2003, the plant community on this site was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) with a sparse population of Stansbury cliffrose (*Purshia stansburiana*) (Table 30-62.12, Table 30-62.13). The herbaceous understory was moderately diverse, but sparse and generally lacking in perennial grasses and forbs. The introduced annual grass cheatgrass (*Bromus tectorum*) provided most of the herbaceous cover through the 2018 year. In 2021, the area burned in the Flatt wildfire (Table 30-62.1), which removed the majority of the browse and tree component, causing the site to transition from a community state dominated by sagebrush to a state dominated by seeded perennial forbs and the native perennial grass James' galleta (*Pleuraphis jamesii*) (Table 30-62.7, Table 30-62.10, Table 30-62.11). Utah juniper (*Juniperus osteosperma*) remained scattered throughout the area in all sample years and the site was considered to be in Phase I of woodland succession until the burn; the study was considered to have no tree encroachment in 2023 (Photos, Table 30-62.4, Table 30-62.14). However, further tree encroachment is a possibility in future sample years due to nearby seed sources. In addition to the concern of conifer encroachment, cheatgrass has potential to threaten the ecological resiliency of the plant community and may alter the fire regime should it increase in the future.

Deer winter range condition has generally remained very poor to poor since study establishment. As of 2023, deer winter range condition was considered to be poor. Improvement to deer wintering range can be accomplished through efforts that increase preferred browse cover and reproduction; further diversifying and increasing cover of native perennial forbs and grasses while reducing cheatgrass would also improve winter range condition (Table 30-62.15). Pellet transect data shows that no animal pellet groups were observed in 2023 (Table 30-62.9).

## Trend Summary Tables

**Table 30-62.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2003	14.4	1.6	-	17.0	1.6	-
2008	19.0	1.3	-	18.8	0.7	-
2013	18.2	0.6	-	18.8	1.0	-
2018	17.9	2.5	-	23.3	2.5	-
2023	0.0	0.9	-	-	1.0	-

**Table 30-62.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2003	204	133	58	26	4.7	2.0	0.4	0.3
2008	403	185	152	49	12.4	6.0	0.5	0.1
2013	346	126	96	7	4.3	2.3	0.3	0.1
2018	229	154	13	3	3.7	3.1	0.0	0.0
2023	180	161	180	53	1.8	16.7	2.9	13.6

**Table 30-62.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2003	11.8	0.1	36.6	12.2	19.3	27.9
2008	7.7	0.4	38.9	12.5	21.1	38.4
2013	6.2	0.0	62.3	6.3	14.5	26.1
2018	18.0	0.1	48.0	19.0	22.3	23.5
2023	20.0	-	8.4	17.5	41.6	32.7

**Table 30-62.9 - Pellet Group 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				
2003	-	19	-	-	31
2008	2	36	1	2	70
2013	2	5	-	-	13
2018	-	6	-	-	35
Days Use Per Acre (ha)					
2003	-	25.5 (62.9)	-	1.2 (2.9)	-
2008	-	40.9 (101.0)	-	0.6 (1.4)	-
2013	-	9.4 (23.2)	-	-	-
2018	1.5 (3.6)	16.8 (41.4)	-	-	-

**Table 30-62.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus arvensis <sup>ai</sup> (field brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Pleuraphis jamesii (James' galleta)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Pseudoroegneria spicata (bluebunch wheatgrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
2003	11	1	174	49	81	5	14	-	86
2008	1	-	389	47	121	23	7	-	63
2013	-	-	346	20	83	15	16	-	-
2018	18	-	226	36	104	8	6	-	3
2023	1	-	174	9	154	1	3	0	21
year	Average Cover (%)								
2003	0.2	0.0	4.4	0.3	1.4	0.0	0.1	-	0.3
2008	0.0	-	12.3	1.1	4.4	0.4	0.1	-	0.1
2013	-	-	4.3	0.3	1.4	0.5	0.2	-	-
2018	0.2	-	3.7	0.5	2.3	0.0	0.0	-	0.0
2023	0.4	-	1.7	0.4	15.8	0.0	0.0	0.0	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-62.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Amaranthus <sup>ai</sup> (pigweed)	Asteraceae (null)	Astragalus (milkvetch)	Astragalus argophyllus (silverleaf milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curveseed butterwort)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Descurainia pinnata <sup>a</sup> (western tansymustard)	Dichelostemma capitatum (blue dicks)	Draba <sup>a</sup> (draba)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gilia inconspicua <sup>a</sup> (shy gilia)	Lactuca serriola <sup>ai</sup> (prickly lettuce)	Layia glandulosa <sup>a</sup> (whitedaisy tidytips)	Lomatium dissectum (fernleaf biscuitroot)	Lupinus argenteus (silvery lupine)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)
year	Nested Frequency																
2003	-	5	-	-	12	-	-	-	-	5	-	25	-	-	-	3	-
2008	-	12	3	-	6	-	43	2	26	27	-	14	-	-	-	-	19
2013	-	-	0	-	-	2	15	-	-	-	8	-	-	-	-	-	4
2018	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-
2023	1	-	-	2	4	1	-	-	11	-	-	-	1	1	0	-	17
year	Average Cover (%)																
2003	-	0.2	-	-	0.0	-	-	-	-	0.0	-	0.1	-	-	-	0.0	-
2008	-	0.0	0.0	-	0.0	-	0.1	0.0	0.1	0.1	-	0.0	-	-	-	-	0.1
2013	-	-	0.0	-	-	0.0	0.0	-	-	-	0.1	-	-	-	-	-	0.0
2018	-	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-
2023	0.0	-	-	0.0	0.0	0.0	-	-	0.1	-	-	-	0.0	0.0	0.0	-	0.2

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Mentzelia <sup>a</sup> (blazingstar)	Microseris lindleyi <sup>ia</sup> (Lindley's silverpuffs)	Microseris gracilis <sup>a</sup> (slender phlox)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)	Phlox longifolia (longleaf phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sphaeralcea ambigua (desert globemallow)
year	Nested Frequency						
2003	-	-	2	32	2	-	4
2008	16	1	27	40	-	-	5
2013	-	-	63	18	3	-	4
2018	-	-	3	4	-	-	3
2023	-	-	169	1	5	1	37
year	Average Cover (%)						
2003	-	-	0.0	0.2	0.0	-	0.0
2008	0.0	0.0	0.1	0.1	-	-	0.0
2013	-	-	0.2	0.0	0.0	-	0.0
2018	-	-	0.0	0.0	-	-	0.0
2023	-	-	2.7	0.0	0.2	0.0	13.3

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-62.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Gutierrezia sarothrae (broom snakeweed)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)				
2003	16.1	-	1.6	0.6	0.3
2008	17.9	-	0.7	0.9	-
2013	17.6	-	1	1.2	-
2018	21.7	-	2.5	1.6	-
2023	-	-	1	-	-
year	Quadrat Cover (%)				
2003	13.5	-	1.6	0.3	0.6
2008	17.3	-	1.3	1.7	-
2013	16.8	-	0.6	1.4	-
2018	17.3	-	2.5	0.6	-
2023	-	0.0	0.9	-	-

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-62.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>P</sup> -- (mountain big sagebrush)</b>									
2003	3380	20	1	53	46	23	8	20	57/79
2008	2740	80	0	60	40	21	4	16	61/97
2013	2480	-	1	67	32	52	7	18	55/81
2018	2640	-	0	80	20	4	0	29	65/93
2023	-	-	-	-	-	-	-	-	-/-
<b>Bassia prostrata<sup>PI</sup> -- (forage kochia)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	100	740	20	80	0	0	0	0	-/-
<b>Ephedra viridis<sup>P</sup> -- (mormon tea)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	69/101
2013	-	-	-	-	-	-	-	-	58/93
2018	-	-	-	-	-	-	-	-	73/92
2023	-	-	-	-	-	-	-	-	-/-
<b>Ericameria parryi var. parryi -- (Parry's rabbitbrush)</b>									
2003	-	-	-	-	-	-	-	-	16/37
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Escobaria vivipara var. vivipara -- (spinystar)</b>									
2003	20	-	0	100	0	0	0	0	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2003	2480	40	2	94	5	0	0	1	20/27
2008	4060	1980	3	93	5	1	0	2	14/17
2013	1460	20	6	92	3	0	0	6	15/21
2018	4300	-	3	94	3	0	0	3	15/20
2023	1600	12900	1	99	0	5	0	0	-/-
<b>Juniperus osteosperma<sup>I</sup> -- (Utah juniper)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	-/-
2023	-	-	-	-	-	-	-	-	-/-
<b>Opuntia -- (pricklypear)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	18/27
2018	-	-	-	-	-	-	-	-	15/40
2023	-	-	-	-	-	-	-	-	-/-



Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2003	-	-	-	-	-	-	-	-	-/-
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	-	-	-	-	-	-	-	-	4/8
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2003	80	20	25	75	0	25	75	0	139/124
2008	140	20	0	43	57	0	71	29	170/164
2013	80	-	0	75	25	50	25	0	99/95
2018	60	-	0	67	33	0	33	33	211/171
2023	-	-	-	-	-	-	-	-	-/-
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2003	20	-	0	0	100	0	100	100	25/54
2008	-	-	-	-	-	-	-	-	-/-
2013	-	-	-	-	-	-	-	-	-/-
2018	20	-	0	0	100	100	0	100	64/56
2023	-	-	-	-	-	-	-	-	-/-
<b>Yucca -- (yucca)</b>									
2003	-	-	-	-	-	-	-	-	70/90
2008	-	-	-	-	-	-	-	-	72/77
2013	-	-	-	-	-	-	-	-	59/68
2018	-	-	-	-	-	-	-	-	67/98

t - Tree Species; p - Preferred Browse; i - Introduced Species

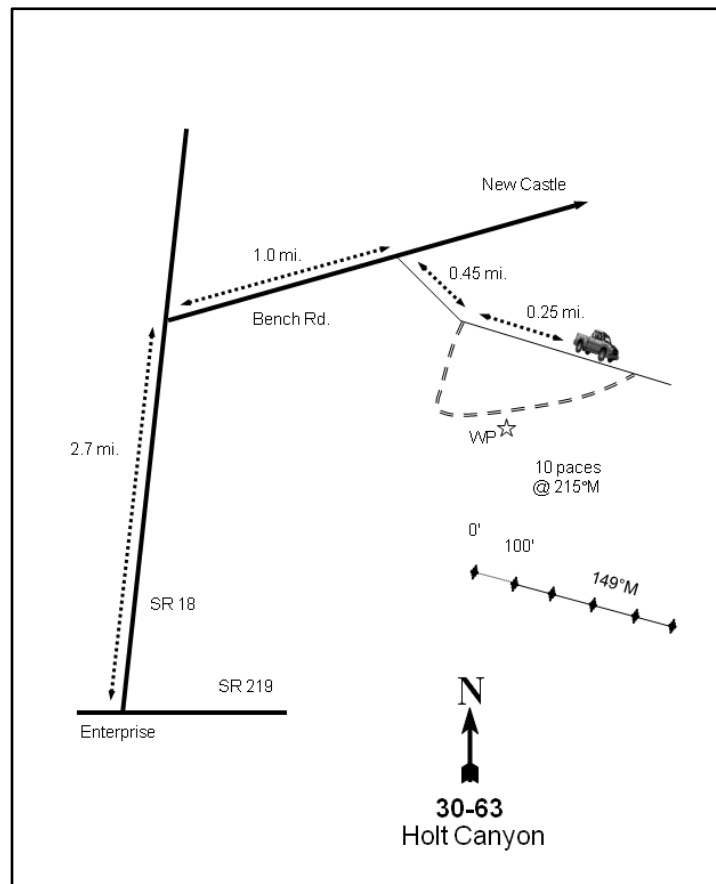
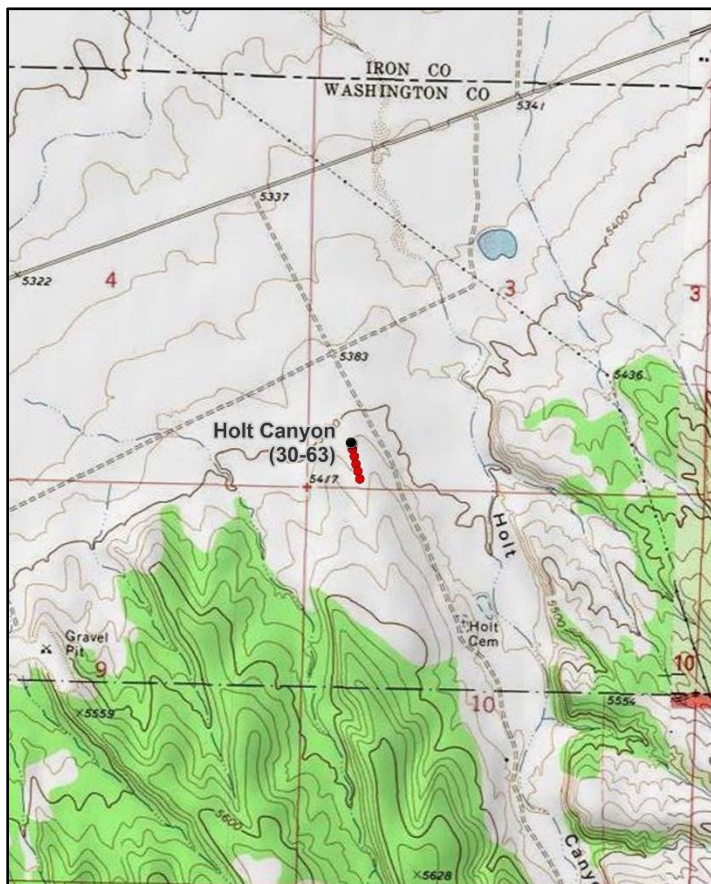
**Table 30-62.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2008	3	-	-	33	67	-	16.3
2013	4	20	20	20	40	-	10.2
2018	5	-	43	29	29	-	10.0

**Table 30-62.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2003	21.5	1.3	1.0	4.0	-3.5	0.6	0.0	<b>24.9</b>	Very Poor
2008	23.7	2.7	0.0	12.0	-9.3	0.3	0.0	<b>29.4</b>	Very Poor
2013	23.8	5.4	0.4	4.6	-3.2	0.2	0.0	<b>31.2</b>	Very Poor
2018	29.5	8.8	0.0	6.2	-2.8	0.0	0.0	<b>41.8</b>	Poor
2023	0.0	0.0	0.0	30.0	-1.3	10.0	0.0	<b>38.7</b>	Poor

## HOLT CANYON - STUDY NO. 30-63



### Location Information

USGS 7.5 min Map Info Enterprise NE; Township 37S, Range 16W, Section 03  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 266848 East 4163765 North

### Transect Information

Browse Tag # (0' Stake) 142  
 Transect Bearing 149° 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 Enterprise, drive east on Highway 18 for 2.7 miles to Bench Road. Turn RIGHT and drive approximately 1.0 mile to Holt Canyon Road (there is a sign). Drive on Holt Canyon Road for 0.45 miles to an intersection. Continue straight for 0.25 miles and park. Walk up the hill to the west and look for a full-high witness post next to a faint road. From the witness post, the 0-foot stake is 10 paces away at 215 degrees magnetic and is marked with browse tag #142. The study is marked by green steel "T" fenceposts approximately 12 to 14 inches in height.

### Site Information

Land Ownership Private  
 Land Administrator Private  
 Allotment No data  
 Elevation 5,430ft (1,655m)  
 Aspect Southwest  
 Slope 5-10%  
 Sample Dates 06/02/2003, 05/08/2008, 05/23/2013, 05/15/2018, 05/16/2023

**Wildlife Habitat and Vegetation History**

**Table 30-63.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	winter

**Table 30-63.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2003	Mountain Big Sagebrush	Phase I
2008	Mountain Big Sagebrush	Phase I
2013	Mountain Big Sagebrush	Phase I
2018	Mountain Big Sagebrush	Phase I
2023	Mountain Big Sagebrush	Phase I

**Site Notes**

In 2013, insect galls were observed on many of the sagebrush plants.

**Site Potential**

1981 - 2010 Average Annual Precipitation 14 inches  
 NRCS Ecological Site Upland Loam (Bonneville Big Sagebrush)  
 NRCS Ecological Site # R028AY310UT  
 States and Transitions 2003-2023 - Bonneville Big Sagebrush/Snakeweed State: Community Phase 4.1

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) has been the dominant shrub species on this site since study establishment in 2003 (Table 30-63.12, Table 30-63.13). The understory was moderately abundant in most sample years since 2003 with annual grasses, mainly cheatgrass (*Bromus tectorum*), as the dominant species. However, cheatgrass cover more than tripled between 2013 and 2018 and remained high in 2023; increased amounts of annual grasses have the potential to influence fire intervals. The perennial grass and forb community has remained very limited over the sample years and has been observed in close association with browse species (Table 30-63.7, 30-63.10, Table 30-63.11). Utah juniper (*Juniperus osteosperma*) trees are scattered across the transect and the site has been classified as being within Phase I of woodland succession throughout the study period (Table 30-63.4, Table 30-63.14). However, photos reveal that a dense stand of juniper is adjacent to the site, indicating that there may be potential for encroachment in future sample years.

Deer winter range condition has generally remained very poor to poor since study establishment. As of 2023, deer winter range condition was considered to be very poor to poor. Improvement to deer wintering range can be accomplished through efforts that support a reduction in preferred browse decadence and increase reproduction; diversifying and increasing cover of native perennial forbs while reducing cheatgrass would also improve winter range condition (Table 30-63.15). According to pellet transect data, deer presence has remained low since study establishment (Table 30-63.9).

**Trend Summary Tables**

**Table 30-63.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2003	23.2	0.4	-	18.5	0.6	-
2008	17.6	0.0	-	18.5	-	-
2013	16.1	0.0	0.0	22.8	-	2.1
2018	19.0	0.0	-	24.0	-	-
2023	27.0	0.0	-	23.0	-	-

**Table 30-63.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2003	129	134	133	27	1.1	3.4	1.5	0.3
2008	384	126	113	52	6.7	1.5	0.3	0.5
2013	416	131	39	9	5.9	2.9	0.1	0.2
2018	438	145	51	15	20.6	3.5	0.1	0.4
2023	442	133	158	47	15.8	5.6	0.6	0.4

**Table 30-63.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2003	11.5	0.2	41.1	23.9	4.8	31.6
2008	10.1	1.1	54.3	21.0	4.5	24.9
2013	12.1	0.5	59.9	10.8	2.7	29.2
2018	20.4	0.8	48.1	12.3	3.6	42.2
2023	15.2	0.1	51.9	7.2	4.3	42.4

**Table 30-63.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Coyote	Mule Deer	Rabbit
	Quadrat Frequency			
2003	-	-	8	26
2008	-	-	11	87
2013	-	-	1	17
2018	-	1	-	67
2023	-	-	3	67
Year	Days Use Per Acre (ha)			
2003	-	-	10.7 (26.5)	-
2008	1.5 (3.6)	-	12.8 (31.5)	-
2013	-	8.7 (21.5)*	2.7 (6.6)	-
2018	-	-	-	-
2023	-	8.7 (21.5)*	0.7 (1.7)	-

\*Pellets per acre (ha)

**Table 30-63.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Aristida purpurea (purple threeawn)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hesperostipa comata (needle and thread)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency								
2003	9	-	22	128	30	-	86	-	4
2008	19	-	18	382	68	-	44	3	27
2013	14	-	16	416	73	4	45	-	1
2018	18	-	9	438	81	5	45	1	2
2023	2	1	17	442	70	-	45	5	14
year	Average Cover (%)								
2003	0.0	-	0.5	1.1	0.3	-	2.5	-	0.0
2008	0.5	-	0.1	6.5	0.5	-	0.3	0.0	0.2
2013	0.3	-	0.6	5.8	1.2	0.1	0.8	-	0.0
2018	0.4	-	0.3	20.6	1.2	0.3	1.2	0.0	0.0
2023	0.2	0.0	0.5	15.7	2.9	-	1.7	0.3	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-63.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Alyssum desertorum <sup>ai</sup> (desert madwort)	Astragalus (milkvetch)	Calochortus flexuosus (winding mariposa lily)	Castilleja angustifolia (northwestern Indian paintbrush)	Chaetopappa ericoides (rose heath)	Chamaesyce albomarginata (whitemargin sandmat)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cryptantha gracilis <sup>a</sup> (narrowstem cryptantha)	Cymopterus (springparsley)	Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)	Eriastrum sparsiflorum <sup>a</sup> (Great Basin woollystar)	Eriogonum (buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (shy gilia)	Mentzelia albicaulis <sup>a</sup> (whitestem blazingstar)	Navarretia intertexta <sup>a</sup> (needleleaf navarretia)
year	Nested Frequency																
2003	-	-	8	-	5	5	-	-	10	-	-	-	-	-	66	-	88
2008	2	6	22	4	5	4	-	15	2	3	-	4	4	-	9	-	89
2013	18	-	-	-	4	-	3	-	5	-	12	-	-	-	6	-	1
2018	24	0	2	-	5	3	-	-	2	-	14	-	-	6	8	-	-
2023	55	0	20	-	2	13	-	17	3	1	-	-	-	12	109	7	-
year	Average Cover (%)																
2003	-	-	0.0	-	0.1	0.0	-	-	0.0	-	-	-	-	-	0.7	-	0.8
2008	0.0	0.0	0.1	0.0	0.4	0.0	-	0.0	0.0	0.0	-	0.0	0.0	-	0.0	-	0.2
2013	0.1	-	-	-	0.1	-	0.0	-	0.0	-	0.0	-	-	-	0.0	-	0.0
2018	0.1	0.0	0.0	-	0.4	0.0	-	-	0.0	-	0.0	-	-	0.0	0.0	-	-
2023	0.3	0.0	0.1	-	0.0	0.1	-	0.0	0.0	0.0	-	-	-	0.0	0.3	0.0	-

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Packera multilobata (lobeleaf groundsel)	Penstemon confusus (Owens Valley beardtongue)	Phlox longifolia (longleaf phlox)	Sedum lanceolatum (speartleaf stonecrop)	Sisymbrium altissimum <sup>ai</sup> (tall tumbled mustard)	Sphaeralcea ambigua (desert globemallow)
year	Nested Frequency					
2003	-	1	1	-	-	-
2008	-	-	4	3	5	-
2013	-	-	-	-	-	-
2018	1	-	2	-	-	-
2023	-	-	7	-	-	3
year	Average Cover (%)					
2003	-	0.0	0.0	-	-	-
2008	-	-	0.0	0.0	0.0	-
2013	-	-	-	-	-	-
2018	0.0	-	0.0	-	-	-
2023	-	-	0.0	-	-	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-63.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Line Intercept Cover (%)				
	Amelanchier utahensis <sup>p</sup> (Utah serviceberry)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Cylindropuntia echinocarpa (Wiggins' cholla)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Polygala subspinoso (spiny milkwort)
year	Line Intercept Cover (%)				
2003	-	18.5	0.6	-	-
2008	-	18.5	-	-	-
2013	-	22.8	-	2.1	-
2018	-	24	-	-	-
2023	-	23	-	-	0
year	Quadrat Cover (%)				
2003	0.4	22.8	0.4	-	0.1
2008	-	17.6	-	-	0.0
2013	-	16.1	-	0.0	0.0
2018	-	19.0	-	-	0.0
2023	-	27.0	-	-	0.0

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-63.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2003	3080	-	3	43	54	33	3	16	70/95
2008	2880	20	0	40	60	17	8	30	71/99
2013	2760	40	4	80	17	7	0	19	70/98
2018	2620	-	8	63	29	17	1	10	75/108
2023	2520	4640	2	70	28	0	0	29	- / -
<b>Cylindropuntia echinocarpa -- (Wiggins' cholla)</b>									
2003	20	-	0	100	0	0	0	0	- / -
2008	-	-	-	-	-	-	-	-	- / -
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	- / -
2023	-	-	-	-	-	-	-	-	- / -
<b>Polygala subspinoso -- (spiny milkwort)</b>									
2003	100	-	0	100	0	0	0	0	8/12
2008	-	-	-	-	-	-	-	-	13/10
2013	40	20	0	100	0	0	0	0	7/11
2018	120	-	17	83	0	17	0	0	8/8
2023	60	-	33	67	0	0	0	0	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2003	-	-	-	-	-	-	-	-	123/166
2008	-	-	-	-	-	-	-	-	91/115
2013	-	-	-	-	-	-	-	-	- / -
2018	-	-	-	-	-	-	-	-	146/226

t - Tree Species; p - Preferred Browse; i - Introduced Species

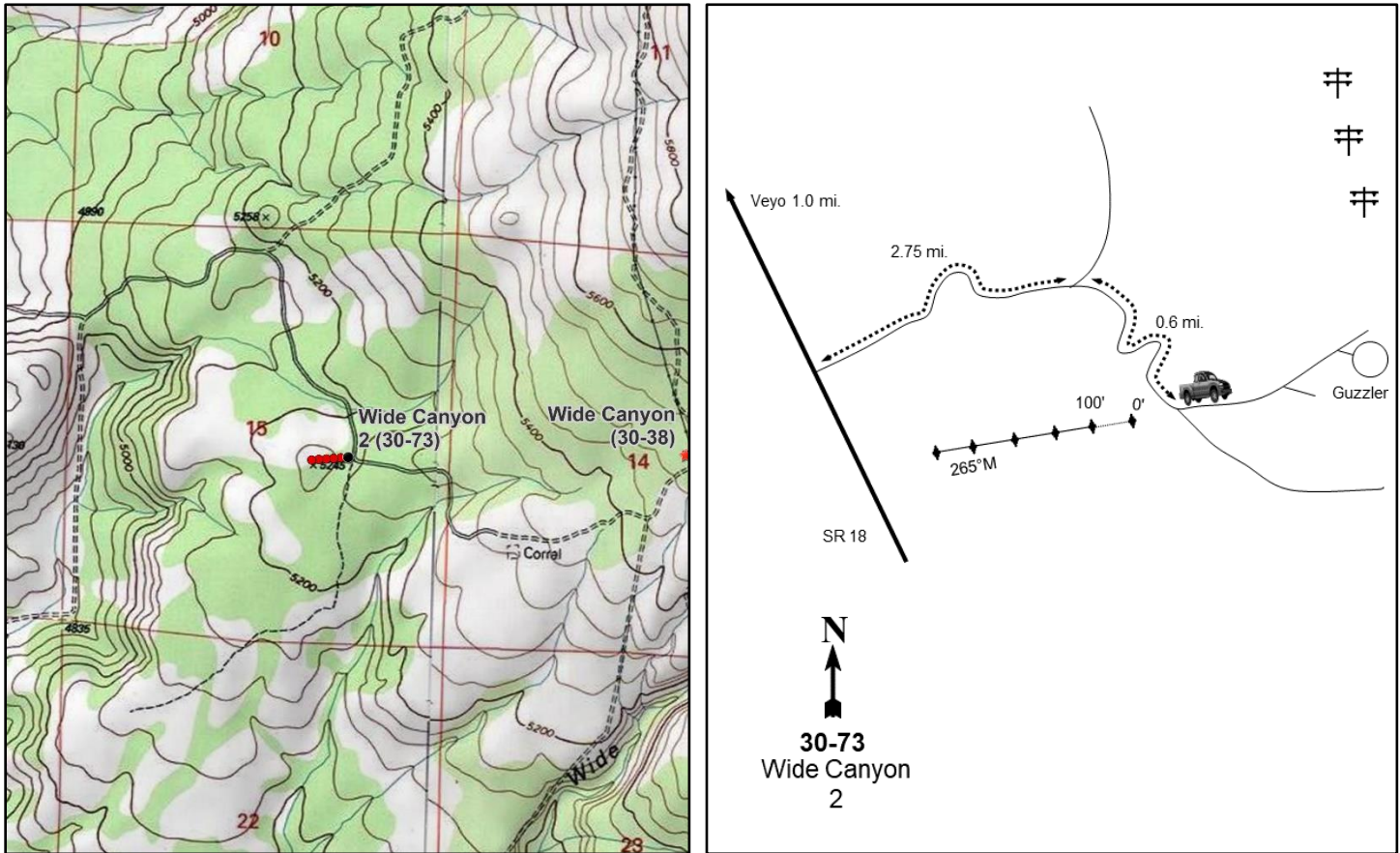
**Table 30-63.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
Juniperus osteosperma (Utah juniper)							
2018	5	-	-	100	-	-	9.5
2023	3	-	50	50	-	-	7.3

**Table 30-63.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2003	23.1	-1.2	1.6	6.9	-0.8	0.6	0.0	<b>30.2</b>	Very Poor
2008	23.1	-2.9	0.0	3.0	-5.0	1.1	0.0	<b>19.4</b>	Very Poor
2013	28.5	10.0	1.8	5.8	-4.4	0.3	0.0	<b>42.0</b>	Poor
2018	30.0	6.3	4.2	6.9	-15.4	0.9	0.0	<b>32.9</b>	Very Poor
2023	28.8	6.7	1.2	11.2	-11.8	0.8	0.0	<b>36.8</b>	Very Poor-Poor

## WIDE CANYON 2 - STUDY NO. 30-73

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Veyo SE; Township 40S, Range 16W, Section 15  
NAD 83 UTM ZONE 12, 266921 East 4132227 North

**Transect Information**

Browse Tag # (0' Stake)	158
Transect Bearing	150° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard; Line 3: 90ft Long

**Directions to Site**

From the town of Veyo at the intersection of Highway 18 and Center Street, proceed south for 3.8 miles, at which point a road begins, leading to the east. Proceed east on this road for approximately 2.75 miles to a fork in the road. Take the right fork and proceed for an additional 0.6 miles and park at the intersection: at this point there is a road going north. The 0-foot stake is identified by browse tag number #158. The study is marked by green steel "T" fence posts that are approximately 12 to 18 inches in height. Line 3 is only 90 feet long.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	VEYO
Elevation	5,249ft (1,600m)
Aspect	North-Northeast
Slope	2%
Sample Dates	05/21/2013, 05/23/2018, 05/25/2023



**Wildlife Habitat and Vegetation History****Table 30-73.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30-73.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2013	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2018	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II
2023	Mountain Big Sagebrush/Pinyon-Juniper	Phase I transitioning to Phase II

**Site Notes**

This site replaces the suspended site Wide Canyon (30-38), which was burned and lost much of its sagebrush during the Dammeron fires in 2005 and 2007. When this replacement site was sampled in 2013, perennial grasses were found sheltered within the browse component, while the introduced annual grass species cheatgrass (*Bromus tectorum*) was observed in the interspaces. As wildfire has removed much of the preferred browse in the surrounding area, the study area has become more valuable to wildlife as it retains much of the mature sagebrush stands that were once more widespread in the vicinity. Soil data has not been collected for analysis.

**Site Potential**

1981 - 2010 Average Annual Precipitation	15 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.

Since study establishment in 2013, the plant community on this site has been dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) (Table 30-73.12, Table 30-73.13). The herbaceous component has remained abundant, but a majority of the understory cover has been provided by the introduced annual grass species cheatgrass (*Bromus tectorum*) (Table 30-73.7, Table 30-73.10, Table 30-73.11). These increased amounts of cheatgrass could pose a threat to the ecological resilience of this study site and may have the potential to alter fire regimes. Utah juniper (*Juniperus osteosperma*) trees have been scattered throughout the study area since establishment and have been a codominant vegetation component in all sample years (Photos, Table 30-73.14). Although this study site was considered to be in Phase I transitioning to Phase II of woodland succession in 2023 (Table 30-73.4), further encroachment is possible if tree cover and density increase in future sample years.

Deer winter range condition has generally remained very poor since study establishment. As of 2023, deer winter range condition was considered to be very poor to poor. Improvement to deer wintering range can be accomplished through efforts that support a reduction in preferred browse decadence and increase reproduction while increasing cover; diversifying and increasing cover of native perennial forbs while reducing cheatgrass would also improve winter range condition (Table 30-73.15). However, pellet transect data shows that mule deer presence on this site was high in 2018 and 2023 (Table 30-73.9).

**Trend Summary Tables****Table 30-73.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2013	6.1	2.5	3.2	7.6	2.4	3.2
2018	7.9	2.8	2.6	7.4	3.1	3.5
2023	10.1	0.7	3.8	10.1	1.7	3.7

**Table 30-73.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional 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	363	51	251	58	10.0	0.7	1.5	0.4
2018	315	44	66	23	15.1	1.3	0.6	0.4
2023	209	66	251	115	2.4	3.4	3.1	3.8

**Table 30-73.8 - Basic 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	21.0	0.2	39.9	8.6	13.2	26.0
2018	24.8	0.5	48.3	16.1	15.2	27.7
2023	31.9	0.2	31.2	9.9	18.6	23.1

**Table 30-73.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rabbit
	Quadrat Frequency		
2013	1	26	25
2018	2	46	47
2023	1	35	10
Year	Days Use Per Acre (ha)		
2013	3.6 (9.0)	24.8 (61.2)	-
2018	2.2 (5.4)	75.7 (187.0)	-
2023	4.4 (10.8)	84.5 (208.6)	-

**Table 30-73.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Agropyron cristatum <sup>i</sup> (crested wheatgrass)	Bromus rubens <sup>ai</sup> (red brome)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Hordeum jubatum (foxtail barley)	Pleuraphis jamesii (James' galleta)	Poa secunda (Sandberg bluegrass)	Sporobolus cryptandrus (sand dropseed)	Vulpia octoflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency									
2013	2	4	6	361	35	-	7	4	-	81
2018	13	1	5	312	10	2	17	4	1	30
2023	-	-	0	208	30	-	27	4	6	14
year	Average Cover (%)									
2013	0.0	0.0	0.1	9.6	0.3	-	0.3	0.1	-	0.3
2018	0.1	0.0	0.0	15.0	0.2	0.0	1.0	0.0	0.0	0.1
2023	-	-	0.0	2.4	0.9	-	1.8	0.6	0.1	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-73.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Allium (onion)	Amaranthus retroflexus <sup>ai</sup> (redroot amaranth)	Astragalus minthorniae (Minthom's milkvetch)	Calochortus flexuosus (winding mariposa lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Cymopterus purpureus (purple springparsley)	Dichelostemma capitatum (bluedicks)	Draba cuneifolia <sup>a</sup> (wedgeleaf draba)	Eriogonum ovalifolium (cushion buckwheat)	Erodium cicutarium <sup>ai</sup> (redstem stork's bill)	Gilia inconspicua <sup>a</sup> (shy gilia)	Helionis multiflora (showy goldeneye)	Lithospermum incisum (narrowleaf stoneseed)	Lupinus brevicaulis <sup>a</sup> (shortstem lupine)	Microsteris gracilis <sup>a</sup> (slender phlox)	Phlox longifolia (longleaf phlox)
year	Nested Frequency																
2013	-	-	-	-	18	-	-	-	9	-	110	-	-	4	-	209	-
2018	-	-	1	-	8	3	-	-	1	1	25	-	5	-	-	25	-
2023	3	15	3	65	148	-	5	2	5	-	12	5	12	-	14	146	5
year	Average Cover (%)																
2013	-	-	-	-	0.0	-	-	-	0.0	-	0.9	-	-	0.0	-	0.5	-
2018	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	0.4	-	0.0	-	-	0.1	-
2023	0.0	0.1	0.1	0.4	2.2	-	0.1	0.0	0.0	-	0.2	0.0	0.7	-	0.1	0.6	0.1

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Sisymbrium altissimum <sup>ai</sup> (tall tumbled mustard)	Sphaeralcea ambigua (desert globemallow)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)
year	Nested Frequency		
2013	1	-	54
2018	18	-	16
2023	2	1	39
year	Average Cover (%)		
2013	0.0	-	0.4
2018	0.1	-	0.3
2023	0.0	0.0	2.5

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-73.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia nova <sup>p</sup> (black sagebrush)	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus (yellow rabbitbrush)	Ephedra viridis <sup>p</sup> (mormon tea)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)
year	Line Intercept Cover (%)						
2013	-	6.6	0.8	1	1.6	3.2	-
2018	-	7.3	1.2	0.1	1.9	3.5	-
2023	0.4	9.1	1.6	0.6	0.1	3.7	-
year	Quadrat Cover (%)						
2013	-	6.1	0.5	0.0	2.0	3.2	-
2018	-	7.9	0.5	0.0	2.4	2.6	-
2023	0.0	9.1	0.7	1.0	0.0	3.8	0.0

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-73.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia nova<sup>p</sup> -- (black sagebrush)</b>									
2013	20	-	0	100	0	0	0	0	21/46
2018	40	-	0	100	0	0	100	0	19/52
2023	-	-	-	-	-	-	-	-	-/-
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2013	1660	40	11	71	18	59	28	10	42/63
2018	2180	20	5	74	21	33	58	16	43/69
2023	1980	80	1	76	23	21	59	23	-/-
<b>Chrysothamnus viscidiflorus ssp. viscidiflorus var. stenophyllus -- (yellow rabbitbrush)</b>									
2013	160	-	0	63	38	0	0	38	43/76
2018	300	-	0	100	0	0	0	20	43/75
2023	300	-	0	80	20	7	0	20	-/-
<b>Cylindropuntia whipplei -- (Whipple cholla)</b>									
2013	-	-	-	-	-	-	-	-	48/92
2018	-	-	-	-	-	-	-	-	99/212
2023	-	-	-	-	-	-	-	-	-/-
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2013	120	-	50	33	17	0	0	17	87/122
2018	60	-	33	67	0	33	33	0	84/119
2023	60	-	0	67	33	67	0	33	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2013	3320	80	15	77	8	0	1	7	12/18
2018	2480	-	10	87	3	0	0	6	18/25
2023	40	40	0	100	0	0	0	0	-/-
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2013	40	20	50	50	0	0	0	0	-/-
2018	60	-	67	33	0	0	0	0	-/-
2023	80	-	50	50	0	0	0	0	-/-

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2013	-	20	0	0	0	0	0	0	89/90
2018	-	-	-	-	-	-	-	-	197/167
2023	-	20	0	0	0	0	0	0	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species

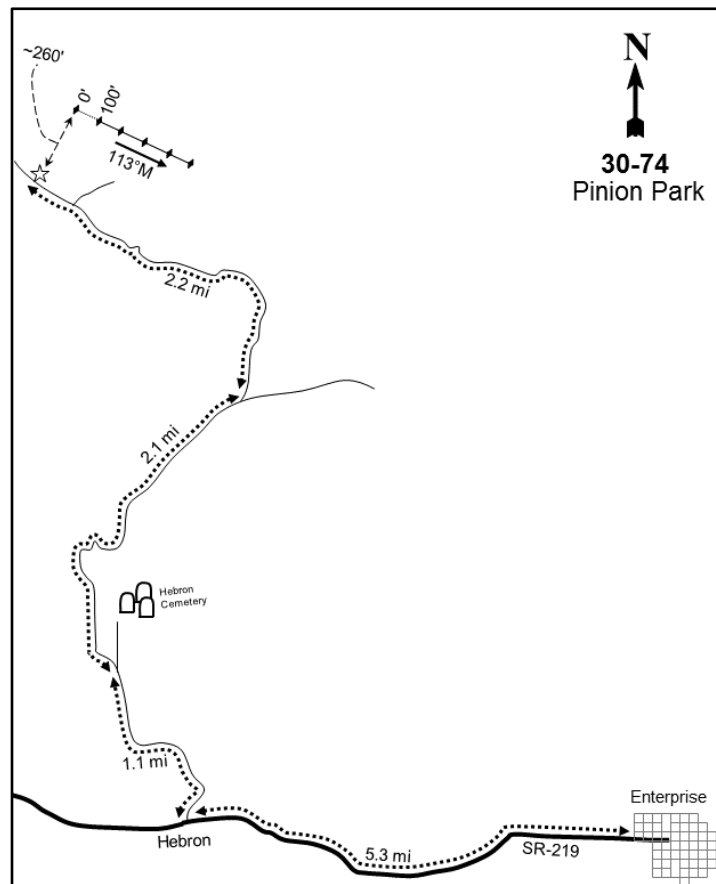
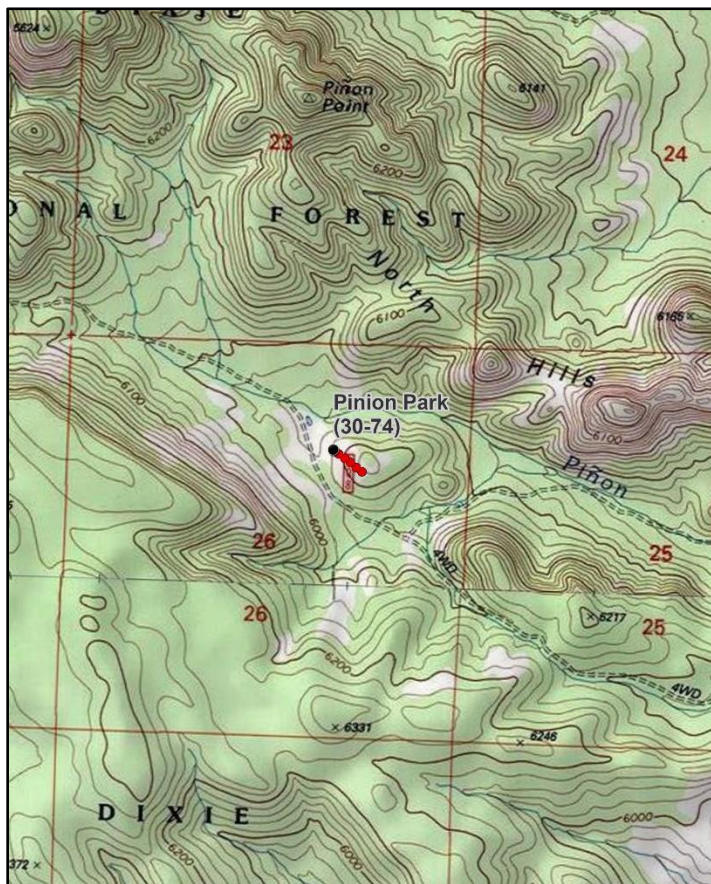
**Table 30-73.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2013	27	-	20	20	20	40	21.7
2018	25	-	36	7	21	36	18.1
2023	32	6	38	13	13	31	14.9
<b>Pinus monophylla (singleleaf pinyon)</b>							
2023	14	100	-	-	-	-	1.0

**Table 30-73.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2013	9.5	9.6	8.0	1.4	-7.5	0.8	0.0	<b>21.8</b>	Very Poor
2018	9.3	8.8	2.5	2.7	-11.3	0.7	0.0	<b>12.5</b>	Very Poor
2023	12.6	7.5	0.5	6.8	-1.8	7.7	0.0	<b>33.3</b>	Very Poor-Poor

## PINION PARK - STUDY NO. 30-74



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Pinon Point SW; Township 36S, Range 18W, Section 26  
NAD 83 UTM ZONE 12, 249884 East 4168534 North

### Transect Information

Browse Tag # (0' Stake)  
Transect Bearing  
Length  
Belt Placement  
Belt Marker Placement

108  
113° magnetic  
500ft  
Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Standard

### Directions to Site

From Enterprise, travel west on SR-219 for 5.3 miles to a road on the right (north) near the town of Hebron. Turn right and drive for 1.1 miles to Hebron Cemetery, then continue for another 2.1 miles to a fork. Proceed left and travel for 2.2 miles, then park; there is no witness post. The transect is approximately 260 feet uphill from and north of the road.

### Site Information

Land Ownership  
Land Administrator  
Allotment  
Elevation  
Aspect  
Slope  
Sample Dates

Federal  
USFS  
North Hills Territory  
6,050ft (1,844m)  
West  
12%  
05/30/2018, 05/23/2023

**Wildlife Habitat and Vegetation History**

**Table 30-74.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	winter

**Table 30-74.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Pinyon-Juniper/Wyoming Big Sagebrush	Phase II transitioning to Phase III
2023	Pinyon-Juniper/Wyoming Big Sagebrush	Phase II transitioning to Phase III

**Site Notes**

No Notes

**Soils**

**Table 30-74.5 - 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	6.7	40.2	39.4	20.4	2.5	12.0	166.0	0.2	05/30/2018

**Site Potential**

1981 - 2010 Average Annual Precipitation                      18 inches  
 NRCS Ecological Site    Upland Gravelly Loam (Bonneville Big Sagebrush)  
 NRCS Ecological Site #    R028AY306UT  
 States and Transitions    2018-2023 - Current Potential State: Community Phase 2.2

Since study establishment in 2018, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) has been the dominant browse species on this site with other species such as Stansbury cliffrose (*Purshia stansburiana*) and antelope bitterbrush (*P. tridentata*) also present in lesser amounts (Table 30-74.12, Table 30-74.13). The herbaceous understory has remained moderately diverse, but not very abundant, and the perennial forb matted buckwheat (*Eriogonum caespitosum*) has provided nearly all of the herbaceous cover (Table 30-74.7, Table 30-74.10, Table 30-74.11). Utah juniper (*Juniperus osteosperma*) has been present in significant amounts on this site, placing it in Phase II transitioning to Phase III of woodland succession; singleleaf pinyon (*Pinus monophylla*) has also been observed, but has not been as abundant as juniper (Table 30-74.4, Table 30-74.12, Table 30-74.14). Without a tree-removing disturbance, this site will likely continue to progress in the phases of woodland succession and exhibit the associated loss of the understory shrub and herbaceous components.

Deer winter range condition has remained very poor since study establishment. Improvement to deer wintering range can be accomplished through efforts that support a reduction in preferred browse decadence, and increase reproduction and cover; diversifying and increasing cover of native perennial forbs and grasses while reducing cheatgrass would also improve winter range condition (Table 30-74.15).

**Trend Summary Tables**

**Table 30-74.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	12.3	-	14.1	12.1	0.1	24.5
2023	11.3	-	11.5	11.5	-	26.5

**Table 30-74.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	215	51	44	131	0.6	0.4	0.1	4.4
2023	348	98	300	112	4.1	2.4	3.0	3.8

**Table 30-74.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	8.7	0.3	40.8	29.6	18.9	26.7
2023	4.8	0.1	48.4	19.7	20.7	32.6

**Table 30-74.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Horse	Rabbit
	Quadrat Frequency			
2018	1	5	1	40
2023	-	7	1	21
Year	Days Use Per Acre (ha)			
	2018	-	22.1 (54.6)	6.4 (15.8)
2023	2.2 (5.4)	37.5 (92.7)	0.6 (1.4)	-

**Table 30-74.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES	Achnatherum hymenoides (Indian ricegrass)	Bromus tectorum <sup>ai</sup> (cheatgrass)	Elymus elymoides (squirreltail)	Poa fendleriana (muttongrass)	Poa secunda (Sandberg bluegrass)	Vulpia octiflora <sup>a</sup> (sixweeks fescue)
year	Nested Frequency					
2018	3	215	27	-	24	-
2023	3	348	27	8	69	4
year	Average Cover (%)					
2018	0.0	0.6	0.2	-	0.2	-
2023	0.0	4.1	1.0	0.1	1.3	0.0

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-74.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES	Agoseris glauca (pale agoseris)	Androstegium breviflorum (pink funnel lily)	Astragalus argophyllus (silverleaf milkvetch)	Calochortus nuttallii (sego lily)	Ceratocephala testiculata <sup>ai</sup> (curvseed butterwort)	Collinsia parviflora <sup>a</sup> (maiden blue eyed Mary)	Crepis acuminata (tapertip hawksbeard)	Cryptantha gracilis <sup>a</sup> (narrowstem cryptantha)	Delphinium scaposum (tall mountain larkspur)	Erigeron caespitosus (tufted fleabane)	Eriogonum caespitosum (matted buckwheat)	Eriogonum ovalifolium (cushion buckwheat)	Erysimum capitatum <sup>a</sup> (sanddune wallflower)	Gayophytum ramosissimum <sup>a</sup> (pinyon groundsmoke)	Gilia inconspicua <sup>a</sup> (sly gilia)	Lappula occidentalis <sup>a</sup> (flatspine stickseed)	Lewisia rediviva (bitter root)
year	Nested Frequency																
2018	-	-	-	-	18	11	0	-	-	-	119	-	-	10	-	3	-
2023	8	10	4	6	109	45	-	6	11	2	55	1	38	10	1	-	6
year	Average Cover (%)																
2018	-	-	-	-	0.0	0.0	0.0	-	-	-	4.4	-	-	0.0	-	0.0	-
2023	0.4	0.1	0.0	0.0	0.3	0.2	-	0.0	0.1	0.1	3.0	0.0	1.8	0.0	0.0	-	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species



FORB SPECIES	Nested Frequency					
<i>Lomatium dissectum</i> (fernleaf biscuitroot)	3	-	-	10	2	-
<i>Lupinus brevicaulis</i> <sup>a</sup> (shortstem lupine)	7	10	236	10	1	2
<i>Microsteris gracilis</i> <sup>a</sup> (slender phlox)	Average Cover (%)					
<i>Phlox longifolia</i> (longleaf phlox)	0.0	-	-	0.0	0.0	-
<i>Plantago patagonica</i> <sup>a</sup> (woolly plantain)	0.1	0.0	0.6	0.1	0.0	0.0
<i>Pleiactanthus spinosus</i> (thorn skeletonweed)	Average Cover (%)					
	0.0	-	-	0.0	0.0	-
	0.1	0.0	0.6	0.1	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-74.12 - 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>wyomingensis</i> <sup>p</sup> (Wyoming big sagebrush)	9.2	22.1	0.1	2.4	2.8	0.1
<i>Juniperus osteosperma</i> <sup>1</sup> (Utah juniper)	9.6	24.5	-	2	1.4	0.5
<i>Opuntia polyacantha</i> (plains pricklypear)	Quadrat Cover (%)					
<i>Pinus monophylla</i> <sup>1</sup> (singleleaf pinyon)	9.6	11.2	0.0	2.9	0.8	1.9
<i>Purshia stansburiana</i> <sup>p</sup> (Stansbury cliffrose)	9.9	10.3	-	1.2	1.1	0.4
<i>Purshia tridentata</i> <sup>p</sup> (antelope bitterbrush)	Line Intercept Cover (%)					
	9.2	22.1	0.1	2.4	2.8	0.1
	9.6	24.5	-	2	1.4	0.5

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-74.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2018	2340	-	3	62	35	1	0	26	47/71
2023	2400	2040	1	73	27	3	0	26	- / -
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2018	-	-	-	-	-	-	-	-	62/184
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	-	-	-	-	-	-	-	-	14/18
2023	-	-	-	-	-	-	-	-	- / -
<b>Juniperus osteosperma<sup>1</sup> -- (Utah juniper)</b>									
2018	180	60	22	78	0	0	0	0	- / -
2023	160	-	0	88	13	0	0	13	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	40	-	0	100	0	0	0	0	19/50
2023	20	-	0	0	100	0	0	100	- / -
<b>Pediocactus simpsonii -- (mountain ball cactus)</b>									
2018	-	-	-	-	-	-	-	-	8/16
2023	-	-	-	-	-	-	-	-	- / -
<b>Pinus monophylla<sup>i</sup> -- (singleleaf pinyon)</b>									
2018	180	-	78	22	0	0	0	0	- / -
2023	160	-	50	38	13	0	0	13	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2018	200	-	10	40	50	10	0	40	112/127
2023	260	40	0	15	85	23	31	85	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	240	-	0	67	33	25	25	0	51/80
2023	240	340	0	67	33	0	0	33	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species

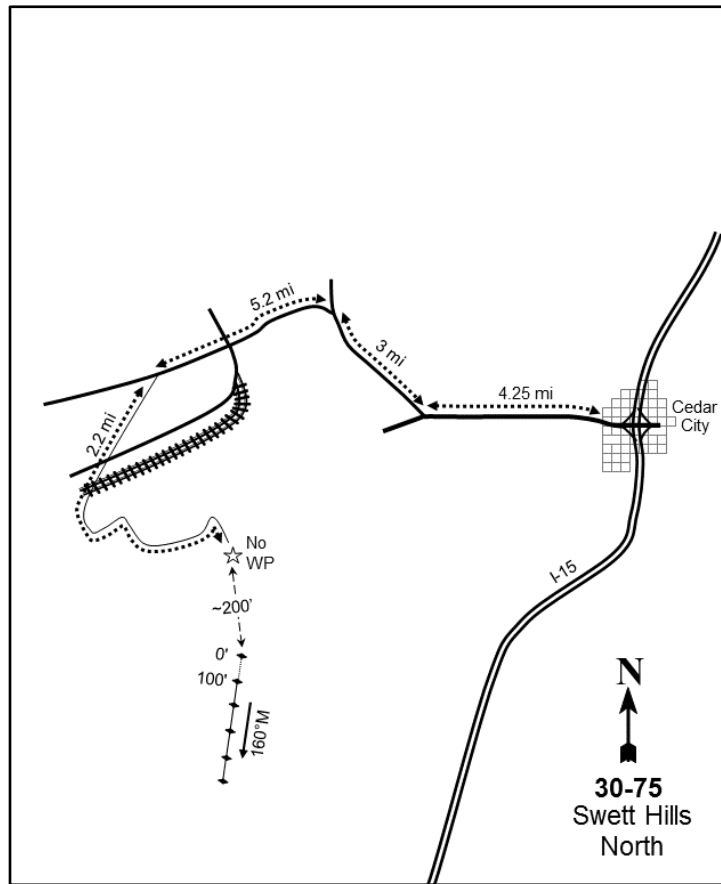
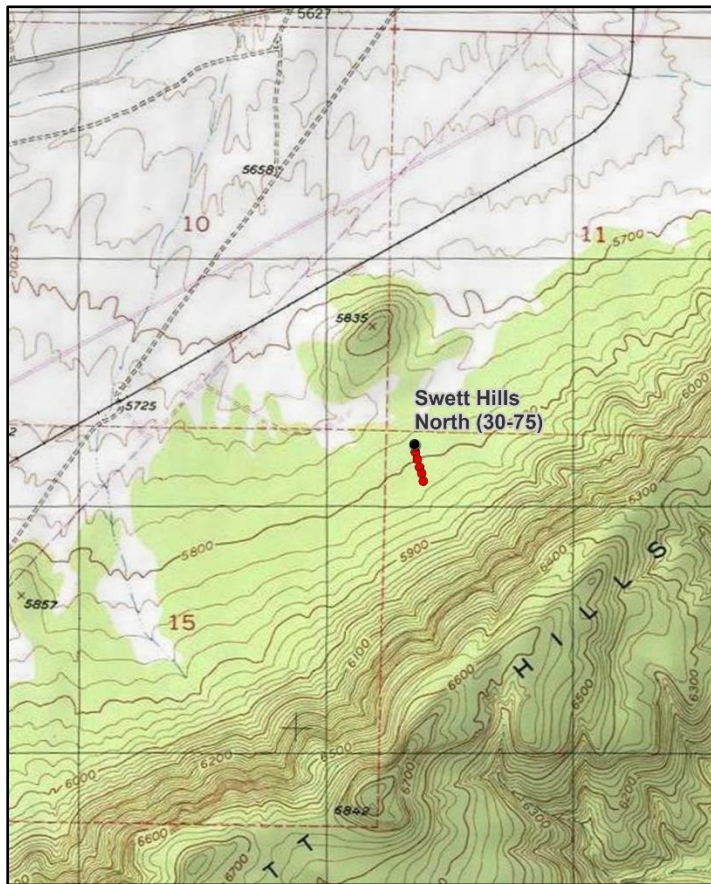
**Table 30-74.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	100	10	30	15	30	15	13.1
2023	96	10	20	20	15	35	19.9
<b>Pinus monophylla (singleleaf pinyon)</b>							
2018	73	17	33	22	17	11	7.7
2023	104	10	60	15	5	10	6.7

**Table 30-74.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	15.9	3.5	2.1	0.7	-0.4	8.8	0.0	<b>30.6</b>	Very Poor
2023	14.9	4.8	0.3	4.8	-3.1	7.6	0.0	<b>29.2</b>	Very Poor

## SWETT HILLS NORTH - STUDY NO. 30-75



### Location Information

USGS 7.5 min Map Info Desert Mound SE; Township 36S, Range 13W, Section 14  
 GPS (0' Stake) NAD 83 UTM ZONE 12, 298294 East 4172441 North

### Transect Information

Browse Tag # (0' Stake) Not Available  
 Transect Bearing 160° magnetic  
 Length 500ft  
 Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
 Belt Marker Placement Standard

### Directions to Site

From I-15 in Cedar City, travel west on Highway 56 for 4.25 miles to West 4800 North (West Iron Springs Road). Bear right and continue for 3 miles. At a "Y" intersection, turn left onto Desert Mount Road and proceed for 5.2 miles to a railroad track. Turn left onto a dirt road 0.25 miles after the track. Follow this road, crossing a gravel road and the railroad tracks. At a "T"-junction, turn left and follow this road through the trees. The site will be 800 feet past a treated clearing.

### Site Information

Land Ownership Federal  
 Land Administrator BLM  
 Allotment EIGHT MILE HILLS  
 Elevation No data  
 Aspect Northwest  
 Slope 5-10%  
 Sample Dates 05/23/2018, 05/24/2023

**Table 30-75.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Seeding - Aerial Before	Duncan Creek - Final Phase	3563	Fall 2016	998
Mechanical - Bullhog	Duncan Creek - Final Phase	3563	October 2016-May 2017	998

**Table 30-75.2 Seed Mix.** List of known seeded plant species and rates (if available).

Mix Name			Application Type	Application Date	Acres
Duncan Creek Final			Aerial	Nov 2016	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
G	Achnatherum hymenoides	Indian Ricegrass	Nezpar	2.00	1.75
G	Agropyron cristatum	Crested Wheatgrass	Nordan	1.00	0.91
G	Bouteloua curtipendula	Sideoats Grama	Niner	0.40	0.30
G	Elymus lanceolatus	Thickspike Wheatgrass	Bannock	1.00	0.96
G	Pascopyrum smithii	Western Wheatgrass	Arriba	1.00	0.93
G	Poa secunda	Big Bluegrass	Sherman	0.25	0.18
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.70	0.66
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Anatone	0.30	0.27
G	Pseudoroegneria spicata	Bluebunch Wheatgrass	Columbia	0.50	0.44
G	Sporobolus cryptandrus	Sand Dropseed	Washington	0.10	0.10
F	Linum perenne	Blue Flax	Appar	0.25	0.22
F	Medicago sativa	Alfalfa	Don	0.15	0.15
F	Medicago sativa	Alfalfa	Ladak +	1.35	1.30
F	Melilotus officinalis	Yellow Sweetclover		0.50	0.44
F	Penstemon palmeri	Palmer Penstemon	Rocky Mountain	0.10	0.09
F	Sanguisorba minor	Small Burnet		0.53	0.49
F	Sanguisorba minor	Small Burnet	Delar	0.50	0.40

Mix Name			Application Type	Application Date	Acres
Duncan Creek Final - Bitterbrush			Aerial	Nov 2016	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
S	Purshia tridentata	Bitterbrush	Washoe	0.25	0.19

Mix Name			Application Type	Application Date	Acres
Duncan Creek Shrub			Aerial	Jan 2022	1000
Type	Species	Common Name	Cultivar/Source ID	Bulk lbs/acre	PLS
F	Bassia prostrata	Forage Kochia	Snowstorm	0.25	0.14
F	Medicago sativa	Alfalfa	Ladak	0.10	0.10

**Wildlife Habitat and Vegetation History****Table 30-75.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	substantial	winter

**Table 30-75.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Perennial Grass/Stansbury Cliffrose	Phase I
2023	Perennial Grass/Annual Grass/Stansbury Cliffrose	Phase I

**Site Notes**

No Notes

**Soils****Table 30-75.5 - 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	7.8	64.2	19.4	16.4	2.2	10.0	167.0	0.4	05/23/2018

**Site Potential**

1981 - 2010 Average Annual Precipitation	13 inches
NRCS Ecological Site	Upland Gravelly Loam (Wyoming Big Sagebrush)
NRCS Ecological Site #	R028AY307UT
States and Transitions	2018-2023 - Seeded Range State: Community Phase 6.1

This site was established in 2018 to monitor deer habitat west of Cedar City in areas recently treated to remove pinyon (*Pinus spp.*) and Utah juniper trees (*Juniperus osteosperma*). The site has lacked in significant amounts of browse cover, but Stansbury cliffrose (*Purshia stansburiana*) has been the primary species sampled with two percent cover in 2023 (Table 30-75.12). The understory has remained dominated by a mix of both introduced and native grasses. Crested wheatgrass (*Agropyron cristatum*) has contributed the most perennial grass cover, while the introduced annual species cheatgrass (*Bromus tectorum*) was sampled with 11 percent cover during the most recent sample year. Annual grass cover may decrease over time as other perennial species grow and compete for resources (Table 30-75.7, Table 30-75.10). Cover of perennial and annual forbs has remained low to moderate, but composition has been fairly diverse. The introduced annual species tall tumbledustard (*Sisymbrium altissimum*) was the dominant forb species sampled each year. The noxious annual weed species Scotch cottonthistle (*Onopordum acanthium*) was observed for the first time in 2023, but with low abundance and cover (Table 30-75.7, Table 30-75.11). Utah juniper has also been observed, with all trees sampled being seedlings. Although density and age of trees were low as of 2023, maintenance projects such as lop and scatter may be advisable in the future to prevent further infilling (Table 30-75.14).

Deer winter range condition has generally remained very poor since study establishment. Improvement to deer wintering range can be accomplished through efforts that increase preferred browse cover; diversifying and increasing cover of native perennial forbs while reducing cheatgrass would also improve winter range condition. Attention may also need to be given to the removal of Scotch cottonthistle (Table 30-75.15). However, pellet transect data shows that deer presence was considered to be moderate in 2018 and high in 2023 (Table 30-75.9).

**Trend Summary Tables**

**Table 30-75.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	0.9	0.2	0.0	2.5	0.3	-
2023	2.2	0.3	0.0	3.7	0.2	-

**Table 30-75.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	169	115	51	48	5.4	8.4	3.2	1.2
2023	262	192	111	39	11.0	16.4	3.8	0.5

**Table 30-75.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	18.8	0.1	69.8	3.5	6.0	20.6
2023	10.1	0.2	66.1	1.9	4.5	31.2

**Table 30-75.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	-	22	1	40
2023	1	46	4	17
Year	Days Use Per Acre (ha)			
2018	-	23.4 (57.9)	-	-
2023	0.7 (1.8)	66.4 (163.9)	-	-

**Table 30-75.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES											
Achnatherum hymenoides (Indian ricegrass)											
Agropyron cristatum <sup>i</sup> (crested wheatgrass)											
Aristida purpurea (purple threeawn)											
Bromus tectorum <sup>ai</sup> (cheatgrass)											
Elymus elymoides (squirreltail)											
Elymus trachycaulus (slender wheatgrass)											
Pascopyrum smithii (western wheatgrass)											
Psathyrostachys juncea <sup>i</sup> (Russian wildrye)											
Pseudoroegneria spicata (bluebunch wheatgrass)											
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)											
Vulpia octoflora <sup>a</sup> (sixweeks fescue)											
year	Nested Frequency										
2018	2	61	3	169	30	13	4	4	15	12	5
2023	0	97	20	262	46	-	11	-	44	29	-
year	Average Cover (%)										
2018	0.2	4.8	0.0	5.4	0.8	0.4	0.2	0.3	1.3	0.4	0.0
2023	0.0	8.3	0.4	11.0	2.3	-	0.5	-	3.4	1.4	-

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-75.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES																	
Astragalus lentiginosus (freckled milkvetch)																	
Chenopodium album <sup>a</sup> (lambsquarters)																	
Cryptantha gracilis <sup>ai</sup> (narrowstem cryptantha)																	
Cryptantha humilis (roundspike cryptantha)																	
Descurainia pinnata <sup>a</sup> (western tansymustard)																	
Draba <sup>a</sup> (draba)																	
Erigeron caespitosus (tufted fleabane)																	
Eriogonum caespitosum (matted buckwheat)																	
Eriogonum cernuum <sup>a</sup> (nodding buckwheat)																	
Eriogonum ovalifolium (cushion buckwheat)																	
Erysimum capitatum <sup>a</sup> (sanddune wallflower)																	
Gilia inconspicua <sup>a</sup> (shy gilia)																	
Lactuca serritola <sup>ai</sup> (prickly lettuce)																	
Lappula occidentalis <sup>ai</sup> (flatspine stickseed)																	
Lomatium (desertparsley)																	
Lupinus brevicaulis <sup>a</sup> (shortstem lupine)																	
Medicago sativa <sup>i</sup> (alfalfa)																	
year	Nested Frequency																
2018	2	-	10	-	4	0	-	15	9	-	-	6	11	2	1	-	-
2023	4	1	-	1	1	7	9	1	-	0	5	12	-	5	-	9	1
year	Average Cover (%)																
2018	0.1	-	0.1	-	0.0	0.0	-	0.2	0.1	-	-	0.0	0.1	0.1	0.0	-	-
2023	0.0	0.0	-	0.0	0.0	0.0	0.1	0.1	-	0.0	0.0	0.1	-	0.0	-	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

FORB SPECIES	Microsteris gracilis <sup>a</sup> (slender phlox)	Nicotiana attenuata <sup>a</sup> (coyote tobacco)	Onobrychis vicifolia <sup>i</sup> (sainfoin)	Onopordum acanthium <sup>ani</sup> (Scotch cottonthistle)	Packera multiflora (lobeleaf groundsel)	Penstemon confusus (Owens Valley beardtongue)	Penstemon palmeri (Palmer's penstemon)	Phlox longifolia (longleaf phlox)	Salsola tragus <sup>ai</sup> (prickly Russian thistle)	Sanguisorba minor <sup>i</sup> (small burnet)	Sisymbrium altissimum <sup>ai</sup> (tall tumblemustard)	Sphaeralcea grossularifolia (gooseberry/leaf globemallow)	Streptanthus cordatus (heartleaf twistflower)	Tragopogon dubius <sup>ai</sup> (yellow salsify)
year	Nested Frequency													
2018	-	10	1	-	4	5	3	-	-	7	9	6	7	-
2023	9	-	-	3	-	3	-	11	16	2	61	6	4	10
year	Average Cover (%)													
2018	-	0.2	0.0	-	0.0	0.1	0.1	-	-	0.2	2.6	0.3	0.1	-
2023	0.0	-	-	0.1	-	0.0	-	0.0	0.0	0.1	3.4	0.0	0.0	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-75.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. wyomingensis <sup>p</sup> (Wyoming big sagebrush)	Gutierrezia sarothrae (broom snakeweed)	Juniperus osteosperma <sup>i</sup> (Utah juniper)	Opuntia polyacantha (plains pricklypear)	Pinus edulis <sup>i</sup> (twoneedle pinyon)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)
year	Line Intercept Cover (%)					
2018	0.6	0.2	-	0.1	-	1.9
2023	1.4	0.2	-	-	-	2.3
year	Quadrat Cover (%)					
2018	0.4	0.0	0.0	0.2	-	0.5
2023	0.8	0.3	0.0	0.0	0.0	1.3

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-75.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. wyomingensis<sup>p</sup> -- (Wyoming big sagebrush)</b>									
2018	120	-	33	67	0	17	0	0	32/40
2023	100	-	20	80	0	60	20	0	- / -
<b>Atriplex canescens<sup>p</sup> -- (fourwing saltbush)</b>									
2018	20	-	100	0	0	0	0	0	33/30
2023	20	-	0	100	0	100	0	0	- / -
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2018	-	-	-	-	-	-	-	-	13/21
2023	-	-	-	-	-	-	-	-	- / -
<b>Echinocereus coccineus -- (scarlet hedgehog cactus)</b>									
2018	-	-	-	-	-	-	-	-	11/23
2023	-	-	-	-	-	-	-	-	- / -

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
2018	-	-	-	-	-	-	-	-	20/37
2023	-	-	-	-	-	-	-	-	-/-
<b>Gutierrezia sarothrae -- (broom snakeweed)</b>									
2018	440	-	18	82	0	0	0	5	22/37
2023	1920	260	43	57	0	0	0	0	-/-
<b>Juniperus osteosperma<sup>i</sup> -- (Utah juniper)</b>									
2018	20	40	100	0	0	0	0	0	-/-
2023	20	20	100	0	0	0	0	0	-/-
<b>Opuntia polyacantha -- (plains pricklypear)</b>									
2018	340	-	0	100	0	0	0	6	11/27
2023	-	20	0	0	0	0	0	0	-/-
<b>Pinus edulis<sup>t</sup> -- (twoneedle pinyon)</b>									
2018	40	20	100	0	0	0	0	50	-/-
2023	20	-	100	0	0	0	0	0	-/-
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2018	360	20	61	39	0	17	33	11	129/129
2023	420	100	52	38	10	24	76	10	-/-

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-75.14 - Tree Characteristics.** Point-quarter tree density, size class distribution, and average diameter.

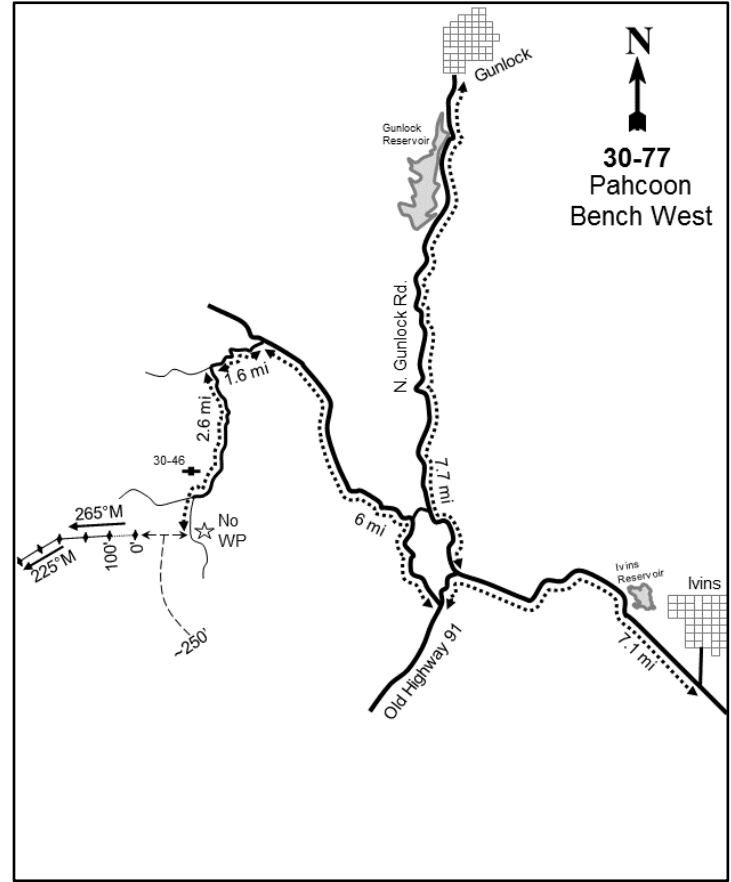
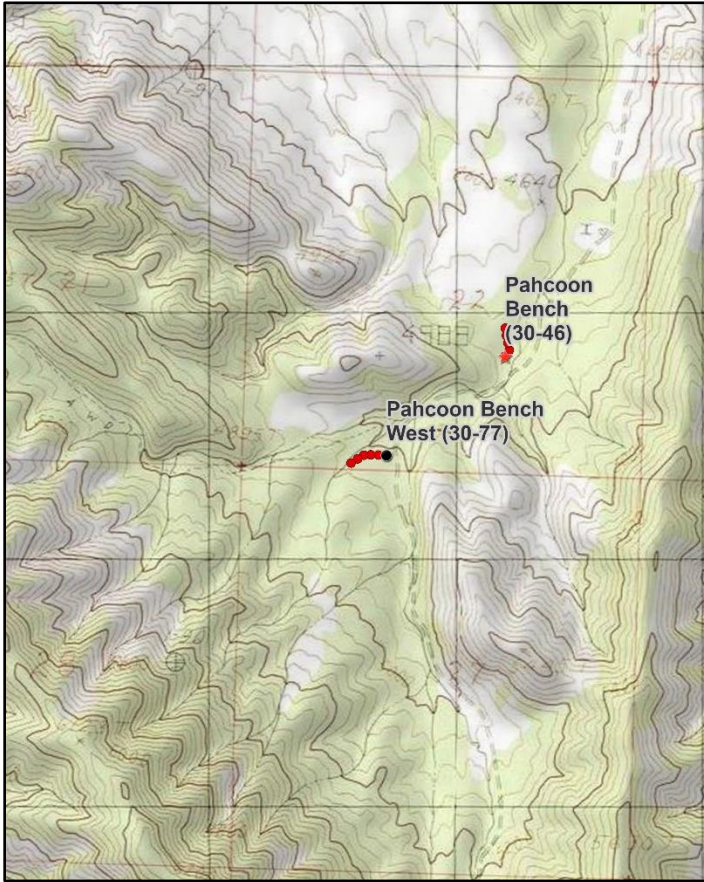
Year	Density	Size Class Distribution					Average Diameter (cm)
	Trees per Acre	Seedling (%)	1-4' (%)	4-8' (%)	8-12' (%)	>12' (%)	
<b>Juniperus osteosperma (Utah juniper)</b>							
2018	30	100	-	-	-	-	3.0
2023	30	30	50	20	-	-	4.0

**Table 30-75.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	3.6	0.0	0.0	16.7	-4.1	2.4	0.0	<b>18.7</b>	Very Poor
2023	5.2	0.0	0.0	30.0	-8.3	1.0	-2.0	<b>25.9</b>	Very Poor



## PAHCOON BENCH WEST - STUDY NO. 30-77



### Location Information

USGS 7.5 min Map Info  
GPS (0' Stake)

Shivwits NW; Township 41S, Range 18W, Section 22  
NAD 83 UTM ZONE 12, 246658 East 4120620 North

### Transect Information

Browse Tag # (0' Stake) 130  
Transect Bearing 265° magnetic (Lines 3-5: 225° magnetic)  
Length 500ft  
Belt Placement Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)  
Belt Marker Placement Standard

### Directions to Site

From the town of Gunlock, travel south on North Gunlock Road for 7.7 miles to a road on the right-hand (west) side. Turn right onto this road (Montoqua Road) and drive for six miles until you arrive at a road on the left (west). Turn left and continue for 1.6 miles, then turn left again. Drive south for 2.6 miles, passing the 30-46 study site (Pahcoon Bench) and a faint two-track to the west, then park; there is no witness post. The 0-foot stake is approximately 250 feet west of the road and is marked by browse tag #130.

### Site Information

Land Ownership Federal  
Land Administrator BLM  
Allotment JACKSON WASH  
Elevation 4,988ft (1,520m)  
Aspect Northeast  
Slope 2-5%  
Sample Dates 05/16/2018, 05/17/2023

**Table 30-77.1 Disturbance History.** Recorded history of major disturbances.

Treatment/Disturbance	Name	WRI DB#	Date	Size (acres)
Fire - Wildfire	Apex	-	June 2003	29933
Seeding - Aerial After	-	-	2003	-
Fire - Wildfire	West Mountain	-	August 2012	2456
Seeding - Aerial After	-	-	2012	-

**Wildlife Habitat and Vegetation History**

**Table 30-77.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30-77.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2018	Mountain Big Sagebrush	No Encroachment
2023	Mountain Big Sagebrush	No Encroachment

**Site Notes**

A deer leg was observed in the area in 2018. A guzzler is in the general vicinity.

**Soils**

**Table 30-77.5 - 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	7.2	56.2	28.4	15.4	1.4	22.0	186.0	0.4	05/16/2018

**Site Potential**

1981 - 2010 Average Annual Precipitation 14 inches  
 NRCS Ecological Site Upland Gravelly Loam (Bonneville Big Sagebrush)  
 NRCS Ecological Site # R028AY306UT  
 States and Transitions 2018-2023 - Bonneville Big Sagebrush/Broom Snakeweed State: Community Phase 4.1

Since study establishment in 2018, this study site has been dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*); lesser amounts of other shrubs such as narrowleaf yerba santa (*Eriodictyon angustifolium*), forage kochia (*Bassia prostrata*), and desert almond (*Prunus fasciculata*) have also been present (Table 30-77.12, Table 30-77.13). The herbaceous understory has been moderately diverse and abundant, with the perennial forb gooseberryleaf globemallow (*Sphaeralcea grossulariifolia*) and the introduced annual grass species cheatgrass (*Bromus tectorum*) providing a majority of the cover each year sampled (Table 30-77.7, Table 30-77.10, Table 30-77.11). Cheatgrass could negatively impact the plant community's ecological resilience should it increase in future sample years.

Deer winter range condition has generally remained fair since study establishment. As of 2023, deer winter range condition was considered to be fair to good. Improvement to deer wintering range can be accomplished through efforts that support an increase in native perennial grass cover while reducing cheatgrass (Table 30-77.15). Pellet transect data indicates that deer presence has been low in both sample years (Table 30-77.9).

**Trend Summary Tables**

**Table 30-77.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2018	13.8	4.7	-	17.6	3.9	-
2023	26.0	4.4	-	27.8	3.4	-

**Table 30-77.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2018	357	83	138	221	4.9	1.4	0.7	5.0
2023	386	115	172	231	10.3	2.0	2.9	5.1

**Table 30-77.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2018	42.1	0.1	41.8	6.1	3.2	31.1
2023	28.8	0.1	40.7	6.3	2.8	44.1

**Table 30-77.9 - Pellet Group Data.** Quadrat frequency and pellet group transect data for animal pellets. Rabbit pellet groups are not sampled in the pellet group transect.

Year	Cattle	Mule Deer	Rocky Mountain Elk	Rabbit
	Quadrat Frequency			
2018	6	11	1	53
2023	10	6	-	19
Year	Days Use Per Acre (ha)			
2018	29.8 (73.5)	15.4 (38.1)	-	-
2023	8.7 (21.5)	6.7 (16.6)	-	-

**Table 30-77.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
Aristida purpurea (purple threeawn)										
Bromus rubens <sup>si</sup> (red brome)										
Bromus tectorum <sup>ai</sup> (cheatgrass)										
Elymus elymoides (squirreltail)										
Erenopyrum triticeum <sup>ai</sup> (annual wheatgrass)										
Poa annua <sup>ai</sup> (annual bluegrass)										
Poa bulbosa <sup>i</sup> (bulbous bluegrass)										
Sporobolus cryptandrus (sand dropseed)										
Thinopyrum intermedium <sup>i</sup> (intermediate wheatgrass)										
Vulpia octoflora <sup>a</sup> (sixweeks fescue)										
year	Nested Frequency									
2018	4	-	344	-	3	33	-	76	3	127
2023	2	28	355	3	-	3	1	109	3	271
year	Average Cover (%)									
2018	0.0	-	4.4	-	0.0	0.1	-	1.3	0.0	0.3
2023	0.1	0.2	8.8	0.0	-	0.0	0.0	1.7	0.2	1.4

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-77.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES														
Astragalus (milkvetch)														
Calochortus nuttallii (sego lily)														
Chamaesyce albomarginata (whitemargin sandmat)														
Crepis acuminata (tapertip hawksbeard)														
Descurainia pinnata <sup>a</sup> (western tansymustard)														
Draba cuneifolia <sup>a</sup> (wedgeleaf draba)														
Eriastrum sparsiflorum <sup>a</sup> (Great Basin woollystar)														
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)														
Helianthus annuus <sup>a</sup> (common sunflower)														
Lupinus brevicaulis <sup>a</sup> (shortstem lupine)														
Microsteris gracilis <sup>a</sup> (slender phlox)														
Plantago patagonica <sup>a</sup> (woolly plantain)														
Sphaeralcea grossularifolia (gooseberry/leaf globemallow)														
Zigadenus paniculatus (foothill deathcamas)														
year	Nested Frequency													
2018	4	-	2	-	4	15	59	1	1	-	-	83	216	5
2023	-	8	23	0	-	3	16	70	-	3	7	106	213	10
year	Average Cover (%)													
2018	0.0	-	0.0	-	0.0	0.0	0.3	0.0	0.0	-	-	0.3	5.0	0.0
2023	-	0.4	0.3	0.0	-	0.0	0.0	1.8	-	0.0	0.0	1.1	4.4	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-77.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES	Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)	Bassia prostrata <sup>pi</sup> (forage kochia)	Eriodictyon angustifolium <sup>p</sup> (narrowleaf yerba santa)	Gutierrezia microcephala (threadleaf snakeweed)	Prunus fasciculata <sup>p</sup> (desert almond)	Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)	Purshia tridentata <sup>p</sup> (antelope bitterbrush)
year	Line Intercept Cover (%)						
2018	11.1	1.2	3.8	3.9	0.9	0.6	-
2023	14.3	0.7	10.8	3.4	0.7	-	1.3
year	Quadrat Cover (%)						
2018	8.4	1.7	2.8	4.7	0.2	0.8	-
2023	12.7	1.2	10.2	4.4	0.7	-	1.3

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-77.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
<b>Artemisia tridentata ssp. vaseyana<sup>p</sup> -- (mountain big sagebrush)</b>									
2018	1340	160	19	81	0	0	0	8	79/111
2023	1440	60	22	71	7	0	0	8	- / -
<b>Bassia prostrata<sup>pi</sup> -- (forage kochia)</b>									
2018	3180	-	0	100	0	13	2	0	12/22
2023	1600	20	20	80	0	24	59	0	- / -
<b>Ephedra viridis<sup>p</sup> -- (mormon tea)</b>									
2018	-	-	-	-	-	-	-	-	33/43
2023	-	-	-	-	-	-	-	-	- / -
<b>Eriodictyon angustifolium<sup>p</sup> -- (narrowleaf yerba santa)</b>									
2018	800	-	13	88	0	23	18	0	47/68
2023	2040	-	33	65	2	10	9	3	- / -
<b>Ericameria nauseosa ssp. nauseosa var. hololeuca<sup>p</sup> -- (rubber rabbitbrush)</b>									
2018	-	-	-	-	-	-	-	-	66/99
2023	-	-	-	-	-	-	-	-	- / -
<b>Gutierrezia microcephala -- (threadleaf snakeweed)</b>									
2018	2680	-	2	99	0	0	0	1	33/48
2023	3820	140	9	86	4	0	0	5	- / -
<b>Krascheninnikovia -- (winterfat)</b>									
2018	-	-	-	-	-	-	-	-	29/33
2023	-	-	-	-	-	-	-	-	- / -
<b>Prunus fasciculata<sup>p</sup> -- (desert almond)</b>									
2018	140	-	29	71	0	14	0	0	77/107
2023	200	20	40	60	0	0	0	0	- / -
<b>Purshia stansburiana<sup>p</sup> -- (Stansbury cliffrose)</b>									
2018	40	-	0	100	0	50	0	0	85/102
2023	-	-	-	-	-	-	-	-	- / -
<b>Purshia tridentata<sup>p</sup> -- (antelope bitterbrush)</b>									
2018	-	-	-	-	-	-	-	-	- / -
2023	60	-	33	67	0	33	33	0	- / -

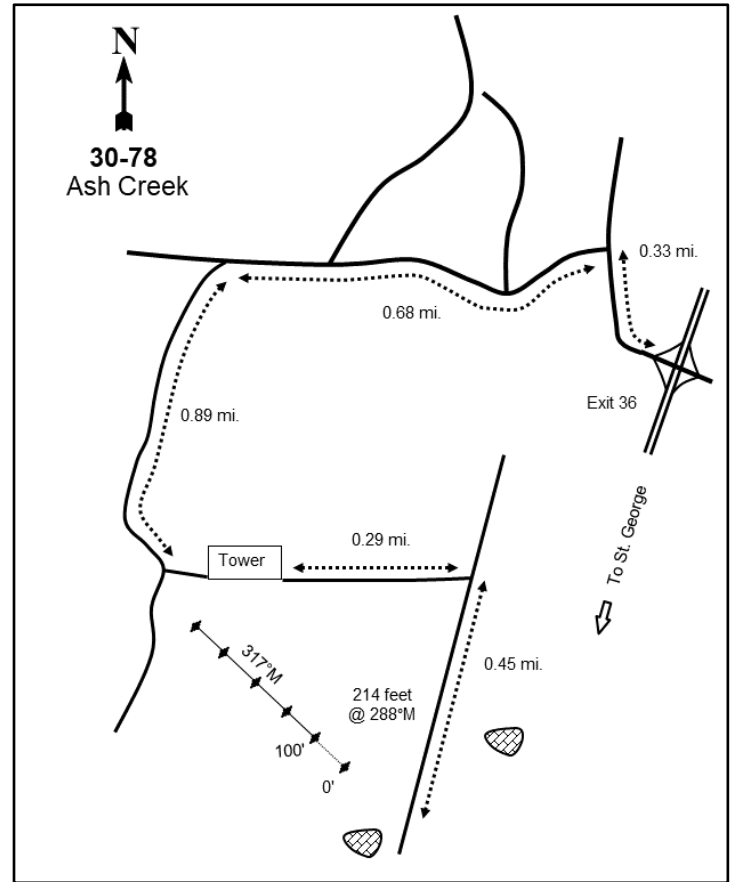
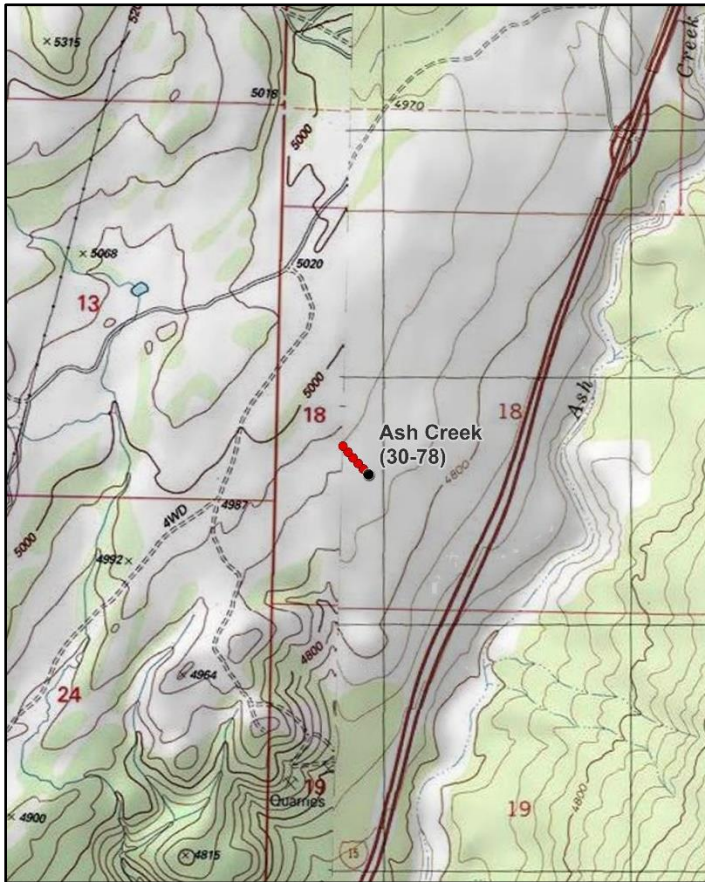
Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Quercus ×pauciloba -- (null)									
2018	20	-	0	100	0	0	100	100	30/46
2023	-	-	-	-	-	-	-	-	-/-
Quercus turbinella <sup>p</sup> -- (Sonoran scrub oak)									
2018	-	-	-	-	-	-	-	-	138/256

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-77.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2018	22.5	15.0	8.2	2.9	-3.6	10.0	0.0	<b>55.0</b>	Fair
2023	30.0	13.7	13.7	4.0	-7.7	10.0	0.0	<b>63.6</b>	Fair-Good

## ASH CREEK - STUDY NO. 30-78

**Location Information**

USGS 7.5 min Map Info  
GPS (0' Stake)

Kolob Arch SW; Township 39S, Range 12W, Section 18  
NAD 83 UTM ZONE 12, 300869 East 4140793 North

**Transect Information**

Browse Tag # (0' Stake)	44
Transect Bearing	304° magnetic
Length	500ft
Belt Placement	Line 1 (11ft), Line 2 (34ft), Line 3 (59ft), Line 4 (71ft), Line 5 (95ft)
Belt Marker Placement	Standard

**Directions to Site**

From exit 36 off of I-15 drive northwest for 0.33 miles to a left turn (west) that enters a small community. Proceed west on Escalante Path for 0.68 miles to a left turn. Turn left onto this road and travel 0.89 miles, at which point there will be a tower. Turn left while traveling through the tower complex, and travel 0.29 miles to an intersection and turn right. Travel for another 0.45 miles. On the southwestern side of the road is a large rock; park here. Walk 214 feet at 288 degrees magnetic from the rock to the 0-foot stake. The study is marked by green steel "T" fence posts approximately 18 to 24 inches in height and the 0-foot baseline stake is marked by browse tag #44.

**Site Information**

Land Ownership	Federal
Land Administrator	BLM
Allotment	BLACK RIDGE
Elevation	No data
Aspect	Southeast
Slope	8%
Sample Dates	05/31/2023

**Wildlife Habitat and Vegetation History****Table 30-78.3 - Wildlife Seasonal Habitat.** UDWR wildlife habitat and seasonality.

Species	Habitat	Season
Mule Deer	crucial	winter

**Table 30-78.4 - Vegetation History.** The dominant vegetation type(s) and phase of woodland succession (Tausch, Miller, Roundy, & Chambers, 2009).

Year	Vegetation Type	Woodland Succession
2023	Mountain Big Sagebrush/Annual Grass	No Encroachment

**Site Notes**

Black sagebrush (*Artemisia nova*) and mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) are likely hybridizing on and in the vicinity of this study site. For purposes of this study, all sagebrush has been classified as mountain big sagebrush.

**Soils****Table 30-78.5 - 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	6.8	32.9	39.2	27.9	3.9	14.9	227.0	0.4	05/31/2023

**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 the study was established in 2023, the plant community was dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*); lesser amounts of antelope bitterbrush (*Purshia tridentata*) were also present (Table 30-78.12, Table 30-78.13). The herbaceous understory was moderately diverse and abundant, although the introduced annual grass species cheatgrass (*Bromus tectorum*) provided the majority of the cover when the study was first sampled (Table 30-78.7, Table 30-78.10, Table 30-78.11). Cheatgrass could negatively impact the plant community's ecological resilience and resistance to disturbance should it increase in future sample years.

As of 2023, deer winter range condition was considered to be poor. Improvement to deer wintering range can be accomplished through efforts that support an increase in native perennial grass and forb cover while reducing cheatgrass (Table 30-78.15). However, deer presence was considered to be high in 2023 according to pellet transect data (Table 30-78.9).

**Trend Summary Tables****Table 30-78.6 - Shrub/Tree Summary.** Average modified Daubenmire quadrat and line intercept cover by year for shrubs/trees

Year	Quadrat Cover (%)			Line-intercept Cover (%)		
	Preferred Shrub	Other Shrub	Tree	Preferred Shrub	Other Shrub	Tree
2023	37.4	0.2	-	38.6	-	-

**Table 30-78.7 - Herbaceous Summary.** Nested frequency and average modified Daubenmire quadrat cover by year for herbaceous functional groups

Year	Nested Frequency				Quadrat Cover (%)			
	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb	Annual Grass	Perennial Grass	Annual/Biennial Forb	Perennial Forb
2023	348	244	79	58	16.0	8.8	0.8	0.6

**Table 30-78.8 - Basic Ground Cover.** Average modified Daubenmire quadrat cover by year for basic ground cover types.

Year	Cover Type (%)					
	Bare Ground	Cryptogams	Litter	Pavement	Rock	Vegetation
2023	3.4	-	45.0	3.2	20.6	58.5

**Table 30-78.9 - Pellet Group 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		
2023	-	15	7
Year	Days Use Per Acre (ha)		
2023	18.1 (44.8)	46.2 (114.2)	-

**Table 30-78.10 - Grass Species.** Nested frequency and modified Daubenmire average cover by year.

GRASS SPECIES										
Bromus arvensis <sup>ai</sup> (field brome)										
Bromus rubens <sup>ai</sup> (red brome)										
Bromus tectorum <sup>ai</sup> (cheatgrass)										
Elymus elymoides (squirreltail)										
Koeleria macrantha (prairie Junegrass)										
Pascopyrum smithii (western wheatgrass)										
Pleuraphis jamesii (James' galleta)										
Poa fendleriana (muttongrass)										
Poa secunda (Sandberg bluegrass)										
Vulpia octiflora <sup>a</sup> (sixweeks fescue)										
year	Nested Frequency									
2023	131	4	313	176	38	30	25	18	0	19
year	Average Cover (%)									
2023	1.6	0.0	14.4	5.7	0.5	0.8	1.6	0.1	0.0	0.1

a - Annual; n - Noxious Weed; i - Introduced Species

**Table 30-78.11 - Forb Species.** Nested frequency and modified Daubenmire average cover by year.

FORB SPECIES										
Agoseris glauca (pale agoseris)										
Calochortus nuttallii (sego lily)										
Epilobium brachycarpum <sup>a</sup> (tall annual willowherb)										
Erigeron divergens <sup>a</sup> (spreading fleabane)										
Erodium cicutarium <sup>ai</sup> (redstem stork's bill)										
Heliomeris multiflora (showy goldeneye)										
Lupinus brevicaulis <sup>a</sup> (shortstem lupine)										
Microsteris gracilis <sup>a</sup> (slender phlox)										
Plantago patagonica <sup>a</sup> (woolly plantain)										
Tragopogon dubius <sup>ai</sup> (yellow salsify)										
year	Nested Frequency									
2023	20	34	12	3	13	5	1	33	27	2
year	Average Cover (%)									
2023	0.4	0.2	0.5	0.0	0.1	0.0	0.0	0.1	0.1	0.0

a - Annual/Biennial; n - Noxious Weed; i - Introduced Species

**Table 30-78.12 - Shrub and Tree Species.** Average modified Daubenmire quadrat and line intercept cover by year.

SHRUB SPECIES				
Artemisia tridentata ssp. vaseyana <sup>p</sup> (mountain big sagebrush)				
Gutierrezia sarothrae (broom snakeweed)				
Purshia stansburiana <sup>p</sup> (Stansbury cliffrose)				
Purshia tridentata <sup>p</sup> (antelope bitterbrush)				
year	Line Intercept Cover (%)			
2023	29.7	-	0.6	8.3
year	Quadrat Cover (%)			
2023	28.7	0.2	0.0	8.6

t - Tree Species; p - Preferred Browse; i - Introduced Species



**Table 30-78.13 - Shrub/Tree Characteristics.** Population characteristics of shrub/tree species populations including density reproduction (seedlings), age distribution, utilization, vigor and average size (height/crown) of plants.

Year	Density		Age Class Distribution			Utilization		Poor Vigor (%)	Average Height Crown (cm)
	Plants Per Acre		Excluding Seedlings			Moderate (%)	Heavy (%)		
	Excluding Seedlings	Seedling	Young (%)	Mature (%)	Decadent (%)				
Artemisia tridentata ssp. vaseyana <sup>p</sup> -- (mountain big sagebrush)									
2023	4320	580	1	77	21	22	31	22	- / -
Gutierrezia sarothrae -- (broom snakeweed)									
2023	200	-	20	70	10	0	0	10	- / -
Purshia tridentata <sup>p</sup> -- (antelope bitterbrush)									
2023	560	-	4	89	7	4	93	7	- / -

t - Tree Species; p - Preferred Browse; i - Introduced Species

**Table 30-78.15 - Deer Desirable Components Index: Upland Potential Scale.**

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
2023	30.0	9.4	0.9	17.5	-12.0	1.1	0.0	<b>46.9</b>	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 <sup>1</sup> ). No pinyon present.
PINYON	Pinyon	Major component of the site (Phase III <sup>1</sup> ). No juniper present.
PJ	Pinyon-Juniper	Major components of the site (Phase III <sup>1</sup> ). Pinyon and Juniper present.
POTR	Quaking Aspen	POTR provides the dominant overstory (typically >5% cover).
POTR-CE	Quaking Aspen-Conifer Encroached	Mixture of QUGA and Conifers (conifers typically provide >5% cover).
PIPO	Ponderosa Pine	PIPO provides the dominant overstory (typically >5% cover).
PSMEM	Douglas Fir	Major component of the site (typically >5% cover).
ABCO	White Fir	Major component of the site (typically >5% cover).
PIFL	Limber Pine	Major component of the site (typically >5% cover).
PICO	Lodgepole Pine	Major component of the site (typically >5% cover).
PILO	Bristlecone Pine	Major component of the site (typically >5% cover).
PIEN	Engelmann Spruce	Major component of the site (typically >5% cover).
ABLA	Subalpine Fir	Major component of the site (typically >5% cover).
SUBALP	Subalpine Forest	Mixture of PIEN and ABLA provide the dominant vegetation cover
MIX CON	Mixed Conifer Forest	Mixture of conifer tree species provide the dominant vegetation cover
AG-PAST	Agricultural-Pasture	Active or abandoned agricultural pasture
AG-CL	Agricultural-Cropland	Active or abandoned agricultural cropland
*Vegetation types can be co-dominant on the study site and when more than one vegetation community types are co-dominant and are major components of the site a (/) is used to separate vegetation community types.		
<sup>1</sup> Phase of woodland succession		