

## WILDLIFE MANAGEMENT UNIT 6 - CHALK CREEK

### Boundary Description

**Summit** and **Duchesne** counties - Boundary begins at the junction of Interstates 84 and 80 near Echo; then northeast on I-80 to the Utah-Wyoming state line; south and east along this state line to Highway SR-150; south on SR-150 to Pass Lake and the Weber River Trail; west on this trail to Holiday Park and the Weber River road; west on this road to Highway SR-32; north and west on SR-32 to I-80 and Wanship; north on I-80 to I-84 near Echo.

### Management Unit Description

According to the most current Big Game Management Plan (2006), the Chalk Creek Management Unit has an estimated 74,461 acres of winter range and 306,147 acres of summer range for mule deer range. The majority of the range is private with 96% of the winter range, and 89% of the summer range occurring on private property. Widespread private ownership leads to numerous management complications. Unregulated development and loss of habitat are some of the biggest problems. The discovery, development, and removal of oil throughout the unit, especially the Chalk Creek area, has led to increased road and housing developments. Agricultural projects on crucial winter range also continue to increase depredation problems and further decrease the available big game range. Because of the preponderance of private land and the establishment of hunting clubs, access is severely restricted for trophy hunting on large areas. Private landowners are also less likely to undertake extensive rehabilitation projects to improve the value of the remaining range.

The topography of the unit is influenced mainly by the Uinta Mountains to the east, with their drainages flowing through long, gradual slopes down into the Weber River Valley. Other major drainages include Crandall Canyon, Chalk Creek, Echo Canyon, Hixon Canyon, Pecks Canyon, and Grass Creek. The southern exposures of these canyons are especially important winter ranges. The rest of the winter range is found in the low rolling foothills of the western and central areas of the unit. The upper limits of the winter range vary between approximately 6,800 and 7,200 feet (Giunta 1979).

Towns located in the valley along the Weber River include: Oakley, Peoa, Wanship, Hoytsville, and Coalville. Echo and Rockport Reservoirs, located on the west side of the unit on the Weber River, are both significant barriers to big game movement. Additionally, I-80 through Echo Canyon discourages big game movement and many deer deaths occur there during winter and spring.

In the 1977 range inventory, the winter range was classified into 12 distinct vegetation types (Giunta 1979). Of these, seven of the larger, more important types were sampled. The sagebrush-grass and oakbrush types were the most prevalent. The sagebrush-grass type is quite variable with basin big sagebrush, mountain big sagebrush, and Wyoming big sagebrush all occurring within the unit. The sagebrush-grass type is found on a variety of exposures, slopes, and elevations. In the 1977 inventory, it occupied 36% of the normal winter range and produced 33% of the total production. It was even more important on severe winter range, having occupied 43% of the available range. The oakbrush type, which covered 32% of the winter range, is the most productive type, but is largely unavailable in severe winters. This type intergrades with the sagebrush-grass and other types. Other important types are juniper, especially important for thermal cover, and mountain brush.

Fires in recent years have destroyed large tracts of important range. Because of this habitat loss, increasing numbers of mule deer, elk, and moose tend to concentrate in the lower areas on agricultural land and at mouths of canyons, especially during severe winters.

## **Range Trend Studies**

Nine interagency range trend studies were sampled in Unit 6 during the summer of 2011. A total of twelve studies have been established within Unit 6 since 1984. Six of the nineteen line-intercept transects established in 1977 were in areas considered important for continued monitoring. These transects were reread and replaced with new interagency trend studies in 1984. Ten studies (including the six studies which replaced the old line-intercept transects) were established in 1984, and of these studies one study [Anshutz Ranch (6-1)] samples a low sagebrush community; four studies [Echo Canyon Rest Area (6-2), Crandall Canyon (6-7), North Oakley Bench (6-9), and Mahogany Hills (6-10)] sample mountain brush communities; two studies [Spring Hollow Burn (6-3) and Upper Chalk Creek (6-11)] sample mountain big sagebrush communities; two studies [Echo Reservoir (6-4) and Spring Canyon (6-5)] sample juniper communities; and one study [Hixon Canyon (6-6)] samples a true mountain mahogany community. One study [South Fork Chalk Creek (6-8)] was established in 1990, and samples a mountain brush community. One study [Stag Canyon (6-12)] was established in 1996, and samples a mountain big sagebrush community.

In 1984, one study (Upper Chalk Creek) was suspended. In 1996, one study (South Fork Chalk Creek) was suspended. In 2006, one study (Hixon Canyon) was suspended. These sites were suspended for various reasons and if the need arises in the future these studies can be sampled again. To access maps, discussions, and data tables for suspended studies see: <http://www.wildlife.utah.gov/range>.

SUMMARY  
WILDLIFE MANAGEMENT UNIT 6 - CHALK CREEK

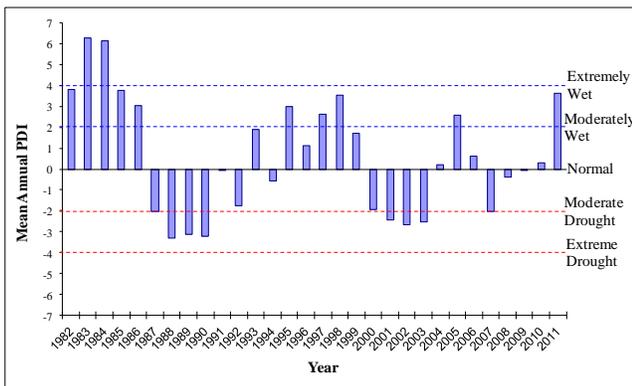
**Community Types**

Deer winter range within a unit is summarized into three categories based on ecological potentials which include **low potential**, **mid-level potential** and **high potential**. Low potential sites include desert shrub, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and cliffrose (*Cowania mexicana* ssp. *stansburiana*) communities. Mid-level potential sites include mountain big sagebrush (*A. tridentata* ssp. *vaseyana*) communities. High potential sites include mountain brush communities. Low sagebrush (*A. arbuscula*), black sagebrush (*A. nova*), and basin big sagebrush (*A. tridentata* ssp. *tridentata*) communities are placed within the low potential or mid-level potential scales based on precipitation and elevation. Deer **summer range** is summarized separately from winter range as a fourth category and typically includes aspen (*Populus tremuloides*) and high elevation mountain brush communities. Nine interagency range trend studies were sampled in Unit 6 during the summer of 2011.

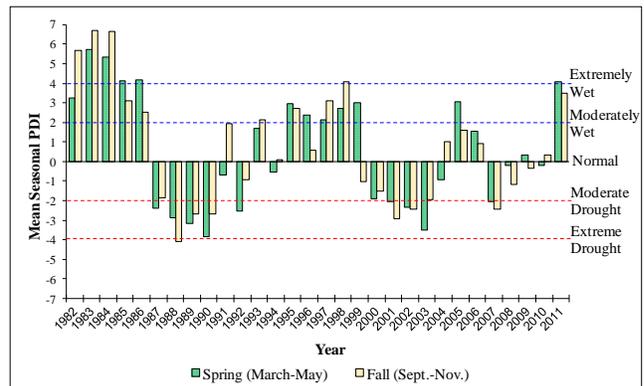
Two studies [Echo Canyon Reservoir (6-2) and Crandall Canyon (6-7)] are categorized as high potential deer winter range sites, and sample mountain big sagebrush and mountain brush communities. Both of the studies are also considered to be elk winter range. The seven other studies [Anshutz Ranch (6-1), Spring Hollow Burn (6-3), Echo Reservoir (6-4), Spring Canyon (6-5), North Oakley Bench (6-9), Mahogany Hills (6-10), and Stag Canyon (6-12)] are categorized as mid-level potential sites for deer winter range, and sample mountain big sagebrush or low sagebrush communities. Though categorized as winter range for the purpose of this report, the Anshutz Ranch, Spring Hollow Burn, and Stag Canyon studies are considered deer summer range and fawning habitat. These three studies are also considered to be elk summer range and calving habitat, with all of the other mid-level potential studies considered to be elk winter range.

**Precipitation**

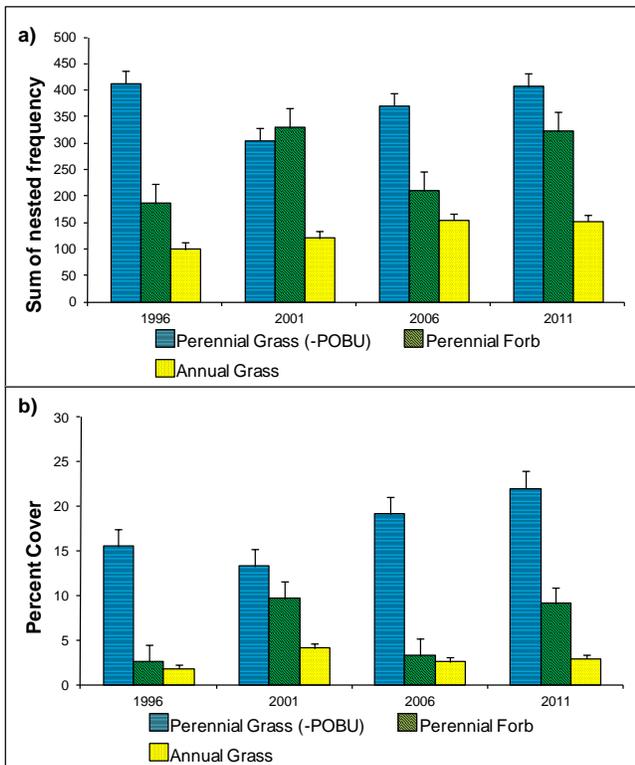
Vegetation trends are dependent upon annual and seasonal precipitation patterns. Precipitation and Palmer Drought Severity Index (PDSI) data for the unit were compiled from the National Oceanic and Atmospheric Administration (NOAA) Physical Sciences Division (PSD) as part of the Northern Mountains (Division 5). The Northern Mountains had a historic annual mean precipitation of 19.16 inches from 1895 to 2011. The



**Figure 1.** The 30 year mean annual Palmer Drought Severity Index (PDSI) for the Northern Mountains (Division 5). The PDSI is based on climate data gathered from 1895 to 2011. The PDSI uses a scale where 0 indicates normal, positive deviations indicate wet and negative deviations indicate drought. Classification of the scale is  $\geq 4.0$  = Extremely Wet, 3.0 to 3.9 = Very Wet, 2.0 to 2.9 = Moderately Wet, 1.0 to 1.9 = Slightly Wet, 0.5 to 0.9 = Incipient Wet Spell, 0.4 to -0.4 = Normal, -0.5 to -0.9 = Incipient Dry Spell, -1.0 to -1.9 = Mild Drought, -2.0 to -2.9 = Moderate Drought, -3.0 to -3.9 = Severe Drought and  $\leq -4.0$  = Extreme Drought (Time Series Data 2012).



**Figure 2.** The 30 year mean spring (March-May) and fall (Sept.-Nov.) Palmer Drought Severity Index (PDSI) for the Northern Mountains (Division 5). The PDSI is based on climate data gathered from 1895 to 2011. The PDSI uses a scale where 0 indicates normal, positive deviations indicate wet and negative deviations indicate drought. Classification of the scale is  $\geq 4.0$  = Extremely Wet, 3.0 to 3.9 = Very Wet, 2.0 to 2.9 = Moderately Wet, 1.0 to 1.9 = Slightly Wet, 0.5 to 0.9 = Incipient Wet Spell, 0.4 to -0.4 = Normal, -0.5 to -0.9 = Incipient Dry Spell, -1.0 to -1.9 = Mild Drought, -2.0 to -2.9 = Moderate Drought, -3.0 to -3.9 = Severe Drought and  $\leq -4.0$  = Extreme Drought (Time Series Data 2012).



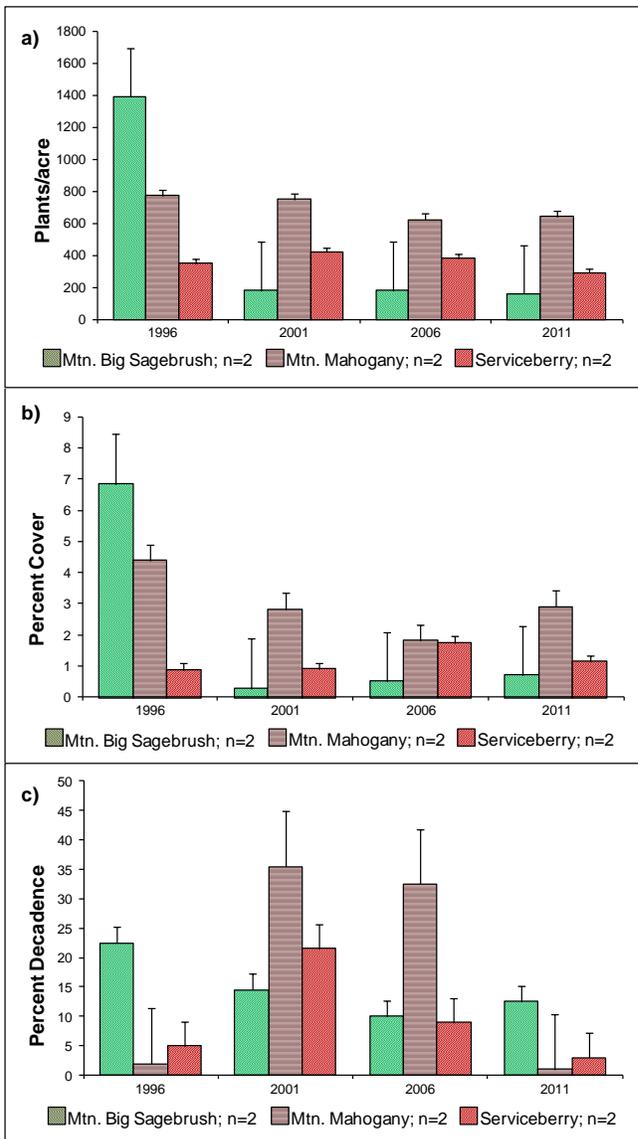
**Figure 3.** a) High potential sites mean perennial grass (-POBU), perennial forb, and annual grass sum of nested frequency by year for WMU 6, Chalk Creek. b) High potential sites mean perennial grass (-POBU), perennial forb, and annual grass cover by year for WMU 6.

mean annual PDSI of the Northern Mountains displays a cycle of several wet years followed by several drought years, over the course of study years in the unit. Over the course of the study wetter than normal years in the Northern Mountains included 1982-1986, 1993, 1995-1999, 2005, and 2011. Drought years included 1987-1992, 2000-2003 and 2007 (Figure 1 and Figure 2) (Time Series Data 2012).

The 1961-1990 mean annual precipitation was 12-14 in. on the Anshutz Ranch and Stag Canyon studies; 14-16 in. on the Echo Reservoir study; 16-18 in. on the Spring Hollow Burn and Spring Canyon studies; 18-20 in. on the Echo Canyon Rest Area, Crandall Canyon, and North Oakley Bench study; and 20-24 in. on the Mahogany Hills study (PRISM Climate Group 2011).

### Mountain Brush Communities (High Potential)

**Browse:** The high potential site cumulative median browse trend for the unit has decreased slightly from the outset of the study. Trend had a slight decrease in 1990, a slight increase in 1996, then slight decreases in 2001 and 2006 (Figure 7a). The two high potential studies are within communities of mixed mountain brush species. A wildfire removed most of the browse from the Echo Canyon Rest Area study in 1999. The mean density and cover of mountain big sagebrush decreased substantially in 2001 due to the fire on the Echo



**Figure 4.** a) High potential sites mean density of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), true mountain mahogany (*Cercocarpus montanus*), and Saskatoon serviceberry (*Amelanchier alnifolia*) by year for WMU 6, Chalk Creek. b) High potential sites mean cover of mountain big sagebrush, true mountain mahogany, and Saskatoon serviceberry by year for WMU 6. c) High potential sites mean decadence of mountain big sagebrush, true mountain mahogany, and Saskatoon serviceberry by year for WMU 6.

Canyon Rest Area study, and remained low through 2011 (Figure 4a and Figure 4b). The mean decadence of mountain big sagebrush also decreased in 2001, and has remained low to moderate since that time (Figure 4c). True mountain mahogany (*Cercocarpus montanus*) is common on both of the high potential studies, and is the dominant browse species on the Crandall Canyon study. Despite the fire on the Echo Canyon Rest Area study mean density of mahogany remained similar in 2001, but decreased significantly in 2006 and remained lower in 2011 (Figure 4a). The mean cover of mahogany decreased significantly in 2001, and has remained at lower levels through 2011 (Figure 4b). Mean decadence of mahogany was significantly higher in 2001 and 2006 due to increased decadence on the Echo Canyon Rest Area study (Figure 4c). Saskatoon serviceberry (*Amelanchier alnifolia*) is also common on the studies. Though mean density is moderate (Figure 4a), mean cover has been fairly low (Figure 4b). Mean decadence of serviceberry has been fairly low, but was high in 2001 due to high decadence on the Echo Canyon Rest Area study in that year (Figure 4c).

Herbaceous Understory: The high potential median cumulative grass trend for the unit has remained relatively stable since the outset of the study. There was a large decrease in trend in 2001, but slight increases in 2006 and 2011 returned trend to past levels (Figure 7a). Desirable perennial grass species are generally diverse and abundant on these studies. The annual grass species cheatgrass (*Bromus tectorum*) and Japanese chess (*B. japonicus*) are common, but are a minor component of the herbaceous understory. The weedy perennial species bulbous bluegrass (*Poa bulbosa*) was only sampled on the Echo Canyon Rest Area study at low frequency and cover. For more information on this species, refer to the Echo Canyon Rest Area discussion section. The mean sum of nested frequency of perennial grasses, excluding bulbous bluegrass, decreased significantly in 2001, but steadily increased in 2006 and 2011 returning to 1996 levels (Figure 3a). Much of the decrease in 2001 was likely due to the fire on the Echo Canyon Rest Area study in 1999. Despite the decrease in the mean sum of nested frequency the mean cover of perennial grasses remained similar in 2001, and has steadily since that time (Figure 3b). The mean sum of nested frequency of annual grasses increased significantly in 2006, and remained at higher levels in 2011 (Figure 3a). However, mean cover of annual grasses was similar in 1996, 2006, and 2011, with significantly higher mean cover in 2001 (Figure 3b).

The high potential median cumulative forb trend for the unit has improved throughout the course of the study years. There were slight increases in trend in 1996 and 2001, a large decrease in 2006, but a large increase again in 2011 (Figure 7a). Perennial forbs have been diverse and abundant within the sampled communities. The mean sum of nested frequency and cover of perennial forbs has fluctuated since 1996, with significantly higher measurements in 2001 and 2011 than in 1996 and 2006 (Figure 3a and Figure 3b).

Browse Utilization & Animal Presence: Many of the preferred browse species have displayed moderate to heavy use over the course of the study years. While prolonged heavy utilization of browse can have detrimental effects on the health of the browse community, it does not appear that animal utilization of browse is a primary concern for the high potential studies on this unit.

Pellet group transect data indicates that deer predominately occupy these high potential studies. The mean abundance of sampled deer pellet groups on the unit decreased from high abundance in 2001, to moderate abundance in 2006, and decreased further to low abundance in 2011. The mean abundance of elk pellet groups was low in 2001, increasing to moderate in 2006, and decreasing to lower abundance in 2011. Use by both species may have been lower in 2011 due to the severe winter of 2010-2011, which likely limited access to the sites. Livestock sign was only sampled on the Crandall Canyon study, and has been low on the study since 2001 (Figure 9a).

Deer Desirable Components Index (DCI): The mean high potential deer DCI decreased slightly in 2001 due to a large decrease in preferred browse cover. Most of the decrease was due to the wildfire on the Echo Canyon Rest Area study in 1999. Preferred browse cover, perennial grass cover, and perennial forb cover have increased since 2001. Rankings have ranged from fair to fair-good since 1996 (Table 1 and Figure 7).

Discussion: The decreases in mountain big sagebrush are almost entirely due to the fire on the Echo Canyon Rest Area study. Despite the decreases in sagebrush these sites appear to be healthy, and other preferred

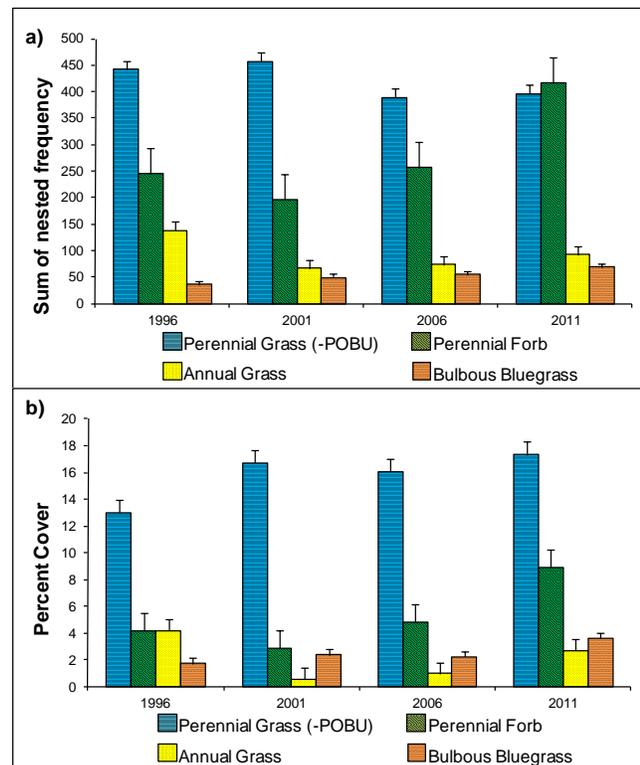
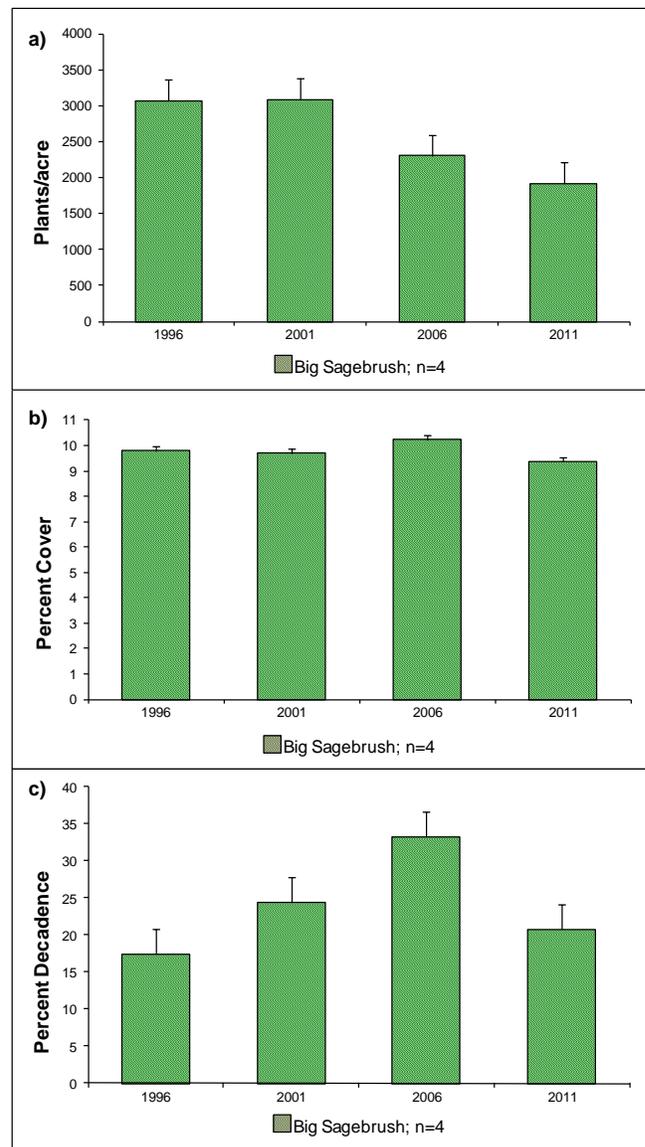
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover (-POBU)	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
96	20.4	10.2	8.0	25.5	-1.3	5.3	0.0	<b>68.0</b>	Fair-Good
01	9.1	9.0	10.2	26.0	-3.1	7.7	0.0	<b>58.9</b>	Fair
06	9.8	12.1	6.4	30.0	-1.9	6.6	0.0	<b>62.8</b>	Fair
11	12.1	13.9	7.9	30.0	-2.2	9.2	0.0	<b>70.9</b>	Fair-Good

**Table 1.** High potential scale mean deer DCI scores and rankings (n=2) by year for WMU 6, Chalk Creek. The deer DCI rankings are divided into three categories based on ecological potentials which include low, mid-level and high.

browse species are increasing slowly on the Echo Canyon Rest Area study. Annual grass species are common on the studies, but do not appear to pose a major threat to these high potential sites.

### Mountain Big Sagebrush Communities (Mid-Level Potential)

**Browse:** The mid-level potential site cumulative median browse trend for the unit decreased substantially in 1990, but has remained fairly stable since that time (Figure 7b). Preferred browse is limited on the Spring Hollow Burn, Echo Reservoir, and Spring Canyon studies. Mountain big sagebrush is the dominant browse species on the majority of the other mid-level potential studies. Basin big sagebrush occurs on the Anshutz Ranch study, and



**Figure 5.** a) Mid-level potential sites mean perennial grass (-POBU), perennial forb, annual grass, and bulbous bluegrass (*Poa bulbosa*) sum of nested frequency by year for WMU 6, Chalk Creek. b) Mid-level potential sites mean perennial grass (-POBU), perennial forb, annual grass, and bulbous bluegrass cover by year for WMU 6.

**Figure 6.** a) Mid-level potential sites mean density of big sagebrush (*Artemisia tridentata*) by year for WMU 6, Chalk Creek. b) Mid-level potential sites mean cover of big sagebrush by year for WMU 6. c) Mid-level potential sites mean decadence of big sagebrush by year for WMU 6.

was summarized with mountain big sagebrush in this report as big sagebrush. Low sagebrush is the dominant browse species on the Anshutz Ranch study, but does not occur on any other studies in the unit. For more information on low sagebrush, refer to the Anshutz Ranch discussion section. The mean density of big sagebrush was similar from 1996 to 2001, but decreased significantly in 2006 and remained at lower levels in 2011 (Figure 6a). Despite the decrease in density, mean cover of big sagebrush has remained similar since 1996 (Figure 6b). Mean decadence of big sagebrush has ranged from moderate to high levels of decadence; with the highest decadence occurring in 2006 (Figure 6c).

Herbaceous Understory: The mid-level potential median cumulative grass trend for the unit increased substantially in 1990, remained stable through 2001, then decreased slightly in 2006 (Figure 7b). Perennial grasses comprise the majority of the herbaceous understory on most of these studies. Grasses within these communities are generally diverse and abundant. The annual grass species cheatgrass is common on the Echo Reservoir, Spring Canyon, and Stag Canyon studies, but is much less common on the other mid-level potential communities. The weedy species bulbous bluegrass was common only on the North Oakley Bench study, but has increased slightly on other studies in the unit as well. Mean sum of nested frequency of perennial grasses decreased significantly in 2006, and remained at decreased levels in 2011 (Figure 5a). Despite the decrease in the mean sum of nested frequency, the mean cover of perennial grasses increased significantly in 2001, and has remained higher since that time (Figure 5b). Mean sum of nested frequency of annual grasses decreased significantly in 2001, and has remained similar since that time (Figure 5a). Mean cover of annual grasses also decreased significantly in 2001, but increased significantly again in 2011 (Figure 5b). Most of the increase in cover of annual grasses in 2011 was due to an increase on the Stag Canyon study in that year. Bulbous bluegrass has steadily increased on the unit since 1996 (Figure 5a and Figure 5b), but remains rare on most sites except the North Oakley Bench study.

The mid-level potential median cumulative forb trend for the unit increased slightly in 1990 then increased more markedly in 2006 and 2011 (Figure 7b). Perennial forbs are also diverse and abundant, though they do not provide as much cover as perennial grasses within the sampled communities. The mean sum of nested frequency and cover of perennial forbs remained similar from 1996 to 2006, then increased significantly in 2011 (Figure 5a and Figure 5b). The increase of perennial forbs in 2011 is likely due to the wet, cool spring of that year (Figure 1 and Figure 2).

Browse Utilization & Animal Presence: Preferred browse is limited on the Spring Hollow Burn, Echo Reservoir, and Spring Canyon studies. Big sagebrush plants on the Anshutz Ranch and Stag Canyon studies have displayed light to moderate use over the course of the study years. Utilization of big sagebrush plants has been moderate to heavy on the North Oakley Bench and the Mahogany Hills studies throughout the study years. While prolonged heavy utilization of browse can have detrimental effects on the health of the browse community, it does not appear that animal utilization of big sagebrush is a primary concern for the mid-level potential studies on this unit.

Pellet group transect data indicates that deer and elk both use these study areas. The mean abundance of both deer and elk pellet groups on the unit increased from moderate abundance in 2001 to moderately high abundance in 2006, but decreased again in 2011. Presence of both species may have been lower in 2011 due to the severe winter of 2010-2011. Deer pellet groups were sampled in the highest abundance on the Echo Reservoir, Spring Canyon, North Oakley Bench, and Mahogany Hills studies. Elk pellet groups were sampled in the highest abundance on the Anshutz Ranch, North Oakley Bench, Mahogany Hills, and Stag Canyon studies. The mean abundance of livestock sign has been mostly low on the studies (Figure 9b).

Deer Desirable Components Index (DCI): The mid-level potential deer DCI has increased slightly since 1996 with rankings ranging from poor to poor-fair. The DCI shows that preferred browse cover is limited on some of the studies in this unit, but that perennial grass and perennial forb cover is generally good (Table 2 and Figure 7).

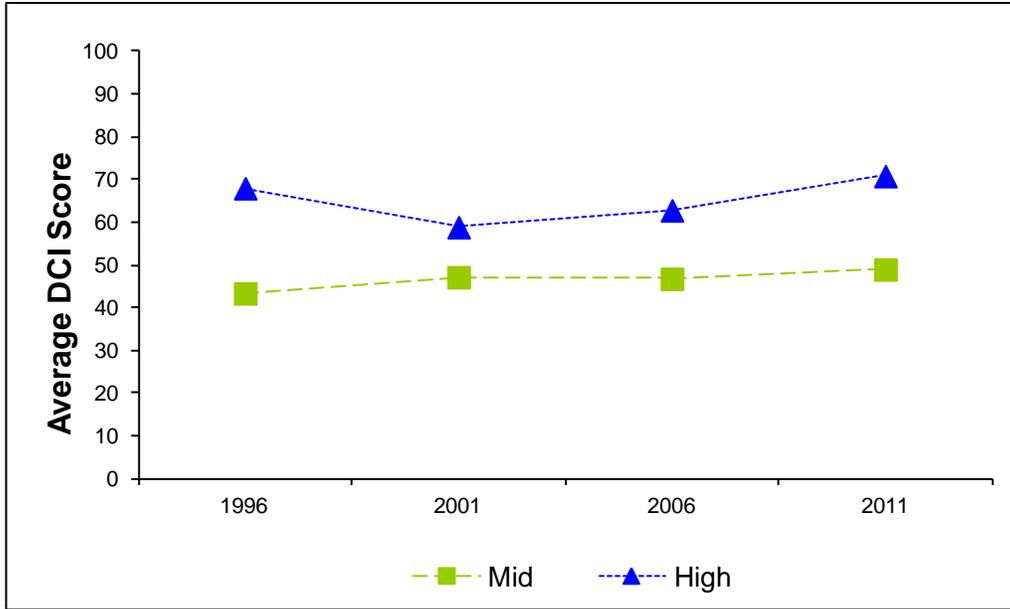
**Discussion:** Decreases in the density of big sagebrush populations appears to be due to different factors on different studies. While there have been several periods of drought over the course of the study years (Figure 1 and Figure 2), lack of precipitation does not appear to be the primary cause of the decline. A primary reason for decline appears to be an abundance of weedy annual species and the exotic weedy perennial grass bulbous bluegrass. These weedy species can form dense mats of cover that compete with seedling and young sagebrush plants, which limits establishment of new sagebrush plants into the population. As the sagebrush population matures, decadence increases and density decreases as old plants begin to die. Annual grass species can also increase fuel loads and increase the chance of a catastrophic fire event. Bulbous bluegrass is most prevalent on the North Oakley Bench study, increasing substantially since 1996. It is expected that further declines will occur in the sagebrush population on this study. Bulbous bluegrass is much less common on the other mid-level potential studies, but has shown increases in frequency and cover since 1996. Annual grass species are prevalent on the Stag Canyon study and may be in part responsible for the reduced recruitment of big sagebrush on that study. However, annual grasses were not the dominant grass component until 2011. Other weedy annual forb species have been common on this study, however.

Decreases in density of big sagebrush on the Anshutz Ranch appear to be due in part to competition with low sagebrush, which is the dominant browse species on that study. The decrease in density on the Mahogany Hills study appears to be due in part to competition from perennial herbaceous species, especially the seeded grass species smooth brome (*Bromus inermis*).

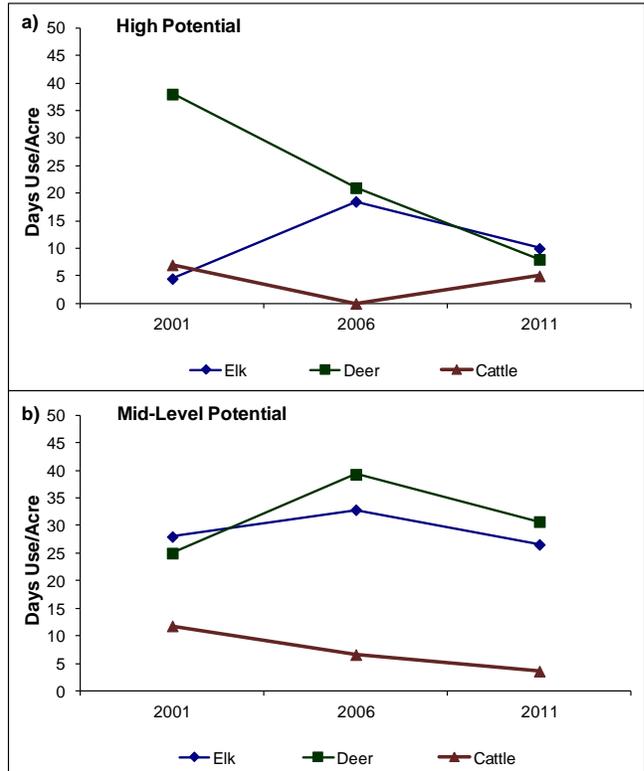
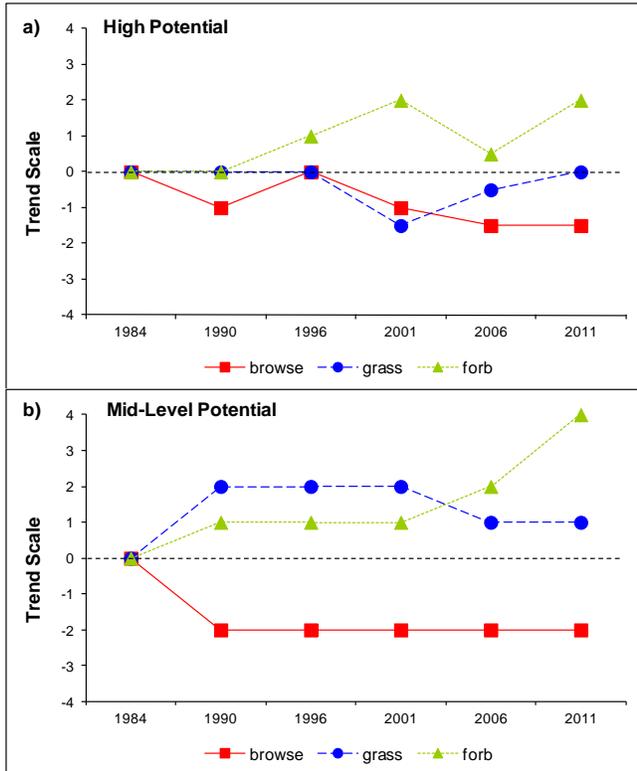
The cause of decline in the sagebrush populations in more recent years on the North Oakley Bench and Stag Canyon studies may also be due in part to a sagebrush defoliator moth (*Aroga websteri*) outbreak that occurred between the 2001 and 2006 sample years on several units in the region. The sagebrush defoliator moth is an obligate parasite of sagebrush (*Artemisia spp.*) that can have periodic outbreaks that cause substantial damage. This pest reduces the production and flowering of plants or, in high enough concentrations, can kill host plants. The defoliator moth was detected on the North Oakley Bench and Stag Canyon studies in 2006. Poor vigor and decadence also increased substantially in the North Oakley Bench study sagebrush population in 2006.

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover (-POBU)	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
96	12.3	6.2	3.8	18.2	-3.3	6.1	0.0	<b>43.4</b>	Poor
01	11.7	5.3	3.2	21.6	-0.4	5.8	0.0	<b>47.2</b>	Poor
06	11.4	4.2	2.9	22.4	-0.8	6.7	0.0	<b>46.8</b>	Poor
11	11.9	5.9	2.4	22.1	-2.0	8.8	0.0	<b>49.0</b>	Poor-Fair

**Table 2.** Mid-level potential scale mean deer DCI scores and rankings (n=7) by year for WMU 6, Chalk Creek. The deer DCI rankings are divided into three categories based on ecological potentials which include low, mid-level and high.



**Figure 7.** Mean mid-level (n=7) and high (n=2) potential scale deer DCI scores by year for WMU 6, Chalk Creek. The deer DCI rankings are divided into three categories based on ecological potentials which include low, mid-level and high.



**Figure 8.** a) High potential sites cumulative median browse, grass and forb trends by year for WMU 6, Chalk Creek. b) Mid-level potential sites cumulative median browse, grass and forb trends by year for WMU 6. **Figure 9.** a) High potential sites mean animals days use/acre (n=2) by year for WMU 6, Chalk Creek. b) Mid-level potential sites mean animal days use/acre (n=7) by year for WMU 6.