

Alton and Long Valley Greater Sage-Grouse Report

Results of Vegetation Treatments



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Introduction: Due to the declining Greater Sage-Grouse (grouse) populations in southern Utah, the members of the Color Country Local Working Group combined efforts to study grouse in Long Valley, Utah. The study efforts were concentrated in Alton and Sink Valley to determine baseline data for this population. The Alton lek marks the southern-most lek of Greater Sage-Grouse in North America, but little else was known about them at the outset of this study.

Grouse Movements: To determine grouse habitat use and migration radio-transmitter collars were placed on grouse. Trapping began in March of 2005 using an ATV, spotlight, and nets, and was repeated each fall and spring to maintain a population of at least 12 birds during the rearing and dispersal seasons. Trapping was initiated in Alton and Sink Valley, but in 2006 the study expanded to include the northern Hoyt's Ranch lek. Captured grouse were sexed, assessed for injuries, and fitted with a necklace radio-transmitter. Beginning in 2007, blood samples were taken from trapped birds for genetic research. The bird was then released on site. After allowing two days recuperation, we used radio-telemetry to track the movements of the individual birds. During the summer grouse were found three to four times weekly. From September to April grouse were located twice a week. Although triangulation was possible, the grouse were visually located. At each site the GPS coordinate was recorded (UTM, Nad83) along with the habitat characteristics, flock size, proximity to any visual predators, and other applicable information.

To analyze grouse location, home range size, and habitat use we imported GPS locations into ArcGIS. We used RGap data, supplied by ARGC Utah, to determine vegetation type for each location. Categorizing locations into 4 biological seasons brood-rearing (May 1 – July 15), dispersal/fall (July 15 – November 1), winter (November 1 – February 28) and breeding (March 1 – April 31), we compared location and habitat type among years.

Vegetation Survey: Additionally, we conducted a vegetation survey to determine the impact/affects of pinyon and juniper tree removal on grouse movements in the Sink Valley area. In 2005, prior to tree removal, we created 5 survey lines, in areas where the treatment would occur. We collected information on the vegetative community and structure before the tree removal began, June-July 2005. We repeated the process in 2006 and 2007 to determine changes to the vegetative cover and composition immediately after the treatment. We will continue collecting data every other year to create a trend of vegetative changes in the treatment area. The survey lines were selected randomly within the proposed treatment area by pointing to a location on a map. Next, we drove to the general selected area and randomly selected a compass bearing. Then, we walked 100 ft at that bearing. This became the origin of the survey line. Next, we randomly selected another bearing. This became the direction of the 100-meter survey line. Along each survey line, we also created 5 perpendicular 'arms', 60m wide, bisected by the survey line. One arm was at each end of the survey line; the other 3 were randomly located along the 100-meter section, with at least 20 meters in between any 2 arms.

On each arm, we measured % vegetative cover, line-intercept, and average vegetative height. We measured vegetative composition using a modified Daubenmire frame (1m X 1m). For each arm, we placed the frame at 10, 20 and 30m from the survey line, for 6 measurements per arm. We calculated % cover for trees, shrubs, forbs, and grasses. When possible, we recorded both

the % vegetative type and % by species. For each side of the arm, we pulled a meter-tape along the 30m line. We calculated the amount of the tape covered by trees and/or shrubs (# cm covered), and the species of tree/shrub that covered the tape. For those tree/shrubs that covered the meter tape, we measured the height of the shrub.

Radio telemetry began in early 2005; vegetation treatments began in fall 2005. Therefore, we were unable to obtain a full year of data prior to treatment. In reporting the results of the study, we determined 'Year 0' to represent pre-treatment data for breeding and brood-rearing seasons. For Fall 2005, 'Year 0' occurred during the treatment and immediate after, when the land was virtually barren of growth, with fresh shredded mulch piles. During this time, the treatment was seeded. For Winter 2005, 'Year 0' represents immediately after the treatment, when the land was barren of growth with fresh shredded mulch piles. 'Year 1' then represents the first post-treatment data for the breeding and brood rearing seasons; it is also the first year of green-up after the treatment occurred.

Results and Discussion: We have trapped and tracked grouse through 2008. Data is now being summarized and analyzed to reflect the knowledge that we have of grouse using the additional data that we have collected since our last report (February 2008). We will submit a final report that includes this data within the year. This year, biologist working with Alton Coal Companies LLC, will continue the radio-telemetry research, with our assistance.

We summarized and analyzed the vegetation data collected 2005-2008. We presented this data at The Wildlife Society's National Conference in November 2008. Additionally, we compared grouse habitat use among the years of the study to determine any trends of use. We analyzed grouse vegetation use with data collected from 39 grouse, consisting of more than 900 locations.

Vegetation

As expected, the % cover of forbs and grasses increased after vegetation treatment at Sink Valley ($n = 447$, $df = 2$, $F = 17.70$, $P < 0.000$; $n = 441$, $df = 2$, $F = 39.30$, $P < 0.000$, respectively). The amount of cover provided by shrubs was slightly less than before the treatment ($n = 448$, $df = 2$, $F = 2.44$, $P = 0.089$; Figure 1). The % cover provided by forbs increased within the first year of growth. By the second year, both forbs and grasses increased significantly. This quick response by forbs is highly beneficial to grouse. This suggests that there is little lag time between the disturbance of tree removal and benefit of increased forbs, which provided a benefit to grouse within 6 months of the treatment. Because grouse prefer areas with grasses and forbs during the brood-rearing season, for the insects that are often found in these areas, it does appear that brood-rearing habitat has been created via these treatments.

The decrease in shrub cover is most likely a result of the treatment process, with loss of branches from machinery and personnel trampling the environment in the effort to hand remove trees. In this process, the parts of the shrub are crushed but the shrub itself is alive, and we should see re-growth of sagebrush and other shrubs shortly after treatment. This type of woody growth may not be noticed within a 2-year timeframe. However, future surveys should be able to document sagebrush recovery.

Grouse require tall shrubs during winter to provide shelter from inclement weather. Hand removal of pinyon and juniper trees did not significantly reduce the shrubs available to grouse. Furthermore, the seed mixture included shrubs; therefore, future surveys may see an increase in the % cover of shrubs provided by new plants.

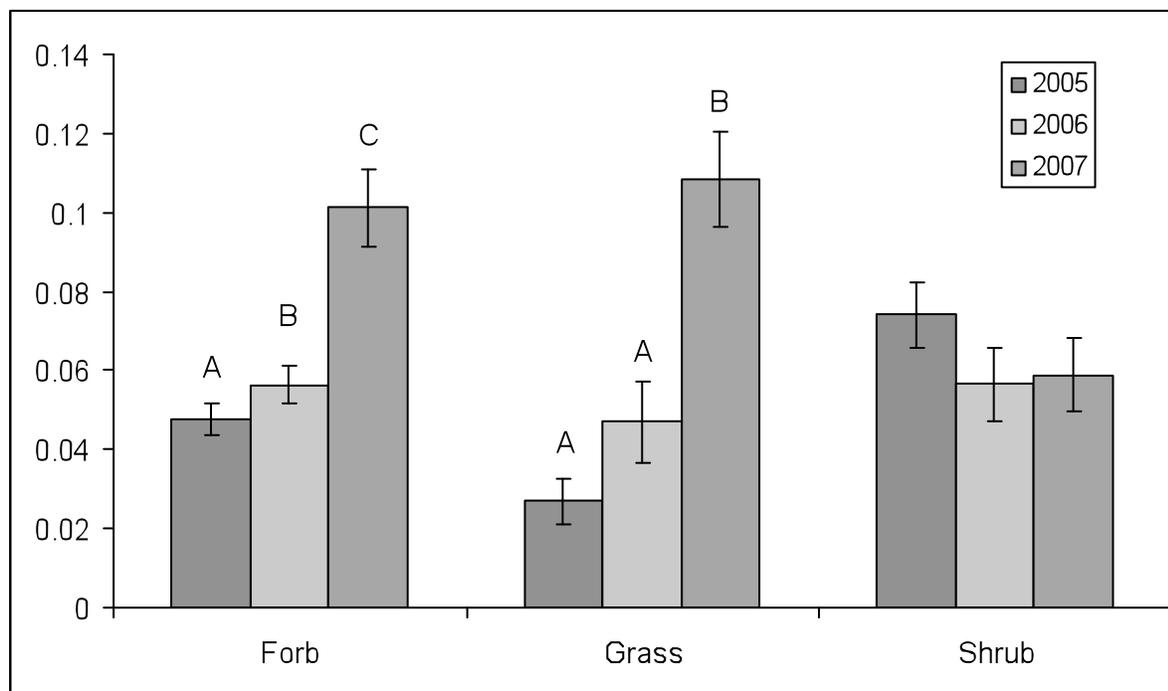


Figure 1: Percent composition of forbs, grasses, and shrubs per 1-m² frame, 2005-2007, Sink Valley Utah. For each type of vegetation, different letters indicate significant differences.

Sage-grouse Use of Treated Sites

Grouse require different types of habitat over the course of their lifecycle; forbs and grasses during brood-rearing, large sagebrush in fall and winter, and a combination of sagebrush and open areas in the breeding season. Removing pinyon and juniper trees should provide new habitat to meet each of these requirements, although the establishment of sagebrush will take longer than that of forbs and grasses. However, this treatment may actually remove suitable habitat in the short term by removing cover and shelter. We documented the locations of grouse to determine how they used the treated areas immediately after treatment, when new seeds are just establishing and shrubs are responding to a reduced competition for sun and water. We considered grouse preference of a habitat as use > 30% of the total habitat use.

Grouse habitat use of treated areas different among years during the biological (rather than seasonal) fall, winter, and breeding seasons (Table 1). The chi-square analysis determined no difference among years during the brood-rearing season (Table 1). This is misleading, however, because there was no use of the treated areas during the brood-rearing season prior to treatment. Thus, by there being use after treatment, there was a difference. The greatest % of use of treated

areas occurred during winter (Table 2). Because these are day locations, presumably grouse are using the treated areas to forage during this time of year. However, it is slightly enigmatic because these areas afforded no cover or shelter from the elements after treatment. Therefore, the birds were using these areas out in the open and fully exposed. Observational data confirmed this type of use by grouse; the birds camouflaged with the mulch piles and would be found resting among them when not foraging.

Table 1: The results of the X^2 analysis of frequency of treated habitat use by grouse for each season of use, Sink Valley, Utah, 2005-2007.

Season	X^2	df	P
Breeding	9.56	2	0.008
Brood	0.00	1	1.00
Fall	78.25	2	0.00
Winter	50.48	2	0.00

Table 2: Number of locations of grouse and percentage of the total number of locations in treated habitats for each biological season.

Season	# of Locations	% Use
Breeding	27	21.0
Brood	28	13.5
Fall	72	19.8
Winter	100	45.7

Brood-rearing season (May 1 – July 15)

During the brood-rearing season we did not detect a change in the habitat use of treated areas by grouse. We did detect a decline in the use of Pinyon/Juniper and agricultural habitats. Part of the decline can be explained by the decline in availability of Pinyon/Juniper after Year 0; however grouse did not prefer this habitat type previous to the treatment. We determined a preference for agricultural and sagebrush habitat during the brood-rearing season. We had a low sample size of grouse in Year 0 of this season, therefore it is difficult to determine if this pattern of use was representative of the entire grouse population. However, based on observational data, we feel that most of the population would fit this pattern of use for Year 0.

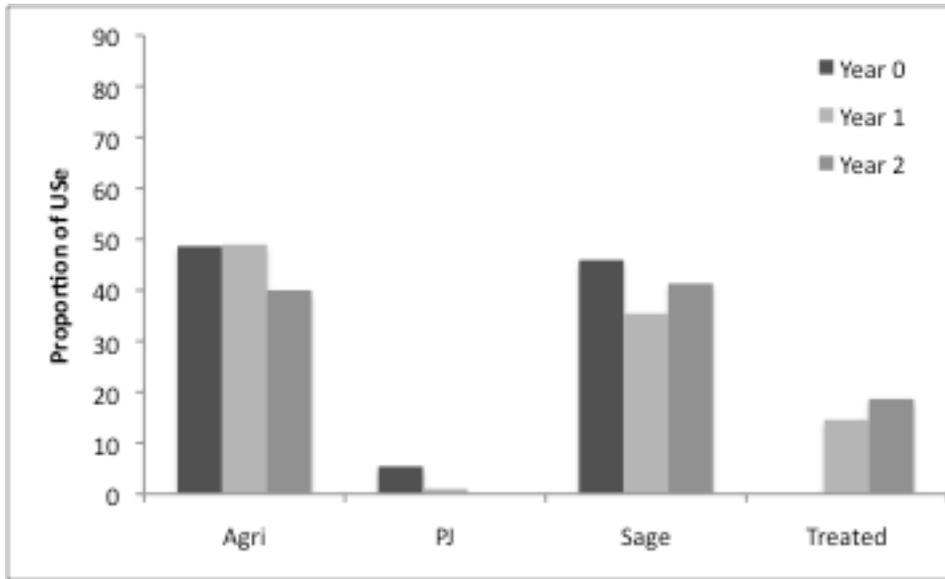


Figure 2: Proportion of total grouse locations found in each treatment type during the brood-rearing season, Sink Valley, Utah, 2005-2007.

Fall Dispersal (July 15 – November 1)

Grouse use of available habitat altered greatly for the fall season over the course of our study. After the treatment, grouse preferred the treated areas; their use of agricultural areas declined greatly.

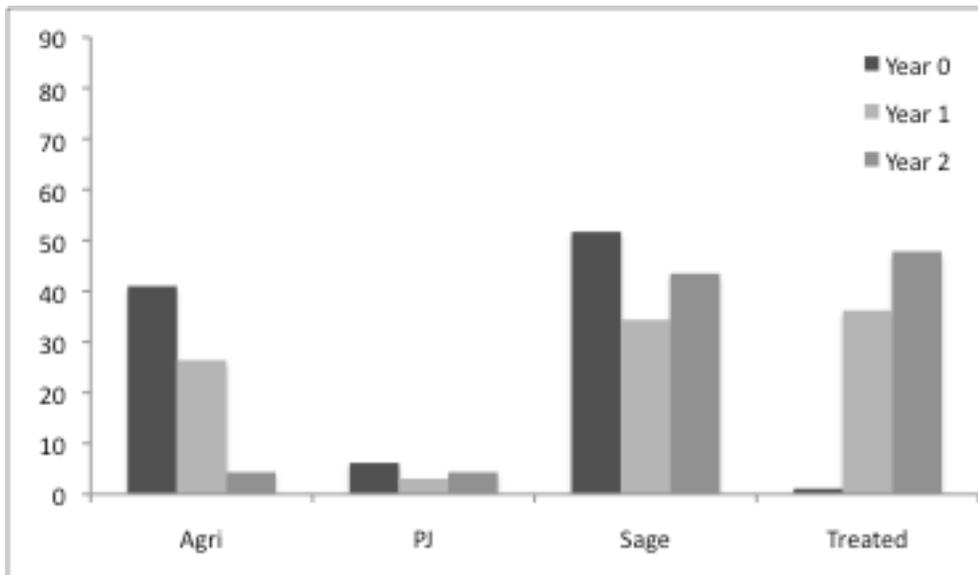


Figure 3: Proportion of total grouse locations found in each treatment type during the dispersal and fall season, Sink Valley, Utah, 2005 – 2007.

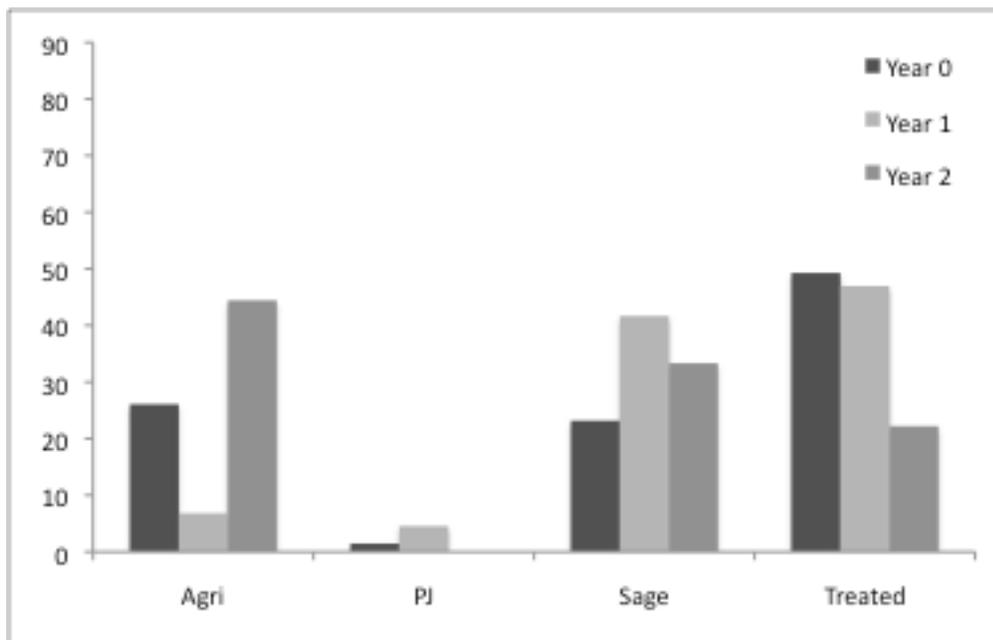
preference for these areas for feeding; perhaps on insects found in the mulch or around grasses

greatly. Interestingly, their use of sagebrush declined during the study period as well. While it may at first appear illogical for grouse to use an area with little cover during the fall, it makes more sense when we consider that this is representative of day use only. Therefore, we are seeing a

and forbs. More importantly, grouse were shifting their use from agricultural areas during a time when alfalfa would still be growing, providing insects and moisture, to the treated areas. Our analyses determined that by the second year, that of the highest use by grouse of treated areas, there was a significant increase in the amount of forbs and grasses present. The % cover (symbolic of the density of vegetation) of the treated areas was still lower than recommended levels for grouse by the end of the second year, yet grouse still preferred these areas over agricultural areas, signifying a return to their native habitat.

Winter (November 1 – February 28)

Trends in winter were difficult to determine. It is interesting to note that in winter, grouse used this area heavily prior to it being treated. We can infer that the trees provided shelter from wind and snow at this time. After this area was treated, the use of it stayed similar for one year, then declined sharply. In Year 1 grouse preferred sagebrush and treated habitats. In Year 2, the use of treated habitats declined with a similar increase in agricultural habitats.



One reason for this may be a difference in snow level between the two years, pushing the grouse into areas with more shelter and or food. Further investigation to explain this shift in habitat use is needed.

Figure 4: Proportion of total grouse locations found in each treatment type during winter season, Sink Valley, Utah, 2005 – 2007.

Breeding (March 1 – April 31)

Grouse rely heavily on sagebrush habitats during the breeding season. Thus, it was not surprising to see a preference of use for that habitat type during this season in our study. Similar to the winter habitat use pattern, grouse used treated areas less after their treatment, probably for the same reason. We documented a dramatic increase in the use of sagebrush habitat during the study. Some of this increase may be explained by the correlating decrease in treated and pinyon/juniper habitats. It is interesting to note that in Year 2, we did not document any use of

agricultural or pinyon/juniper areas during the breeding season. Further analysis with future data will be needed to determine if this is a trend or merely variability in the dataset.

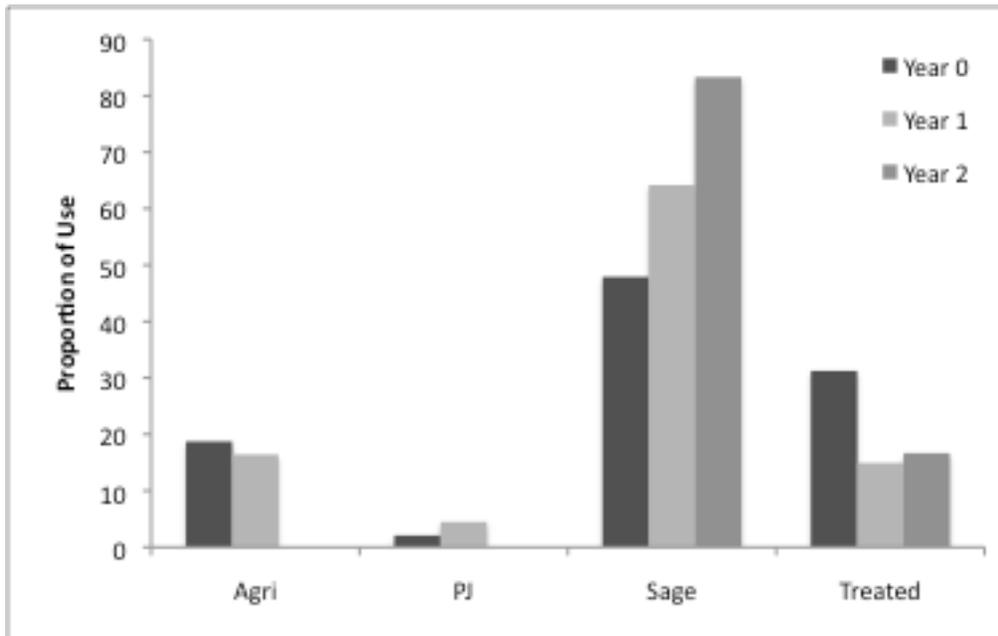


Figure 5: Proportion of total grouse locations found in each treatment type during the breeding season, Sink Valley, Utah, 2005 – 2007.