2008 ANNUAL REPORT
SAGE-GROUSE RESTORATION PROJECT

Cooperators

U.S. Department of Agriculture
Natural Resources Conservation Service
Utah State University
Utah State University, College of Natural Resources
Utah State University Extension Services
Jack H. Berryman Institute
Western Governors' Association
Western States Sage and Columbian Sharp-tailed Grouse Technical Committee
North American Grouse Partnership
Utah Division of Wildlife Resources

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Executive Summary

The purpose of Sage-Grouse Restoration Project (SGRP) is the identification, integration, evaluation, and documentation of effects of 2002 Farm Bill conservation technologies and strategies on sage-grouse and other sagebrush-steppe obligates. To address this need, the SGRP facilitated a grants-in-aid program in 2006 to provide funds for the design and implementation of research and demonstration projects that will evaluate and communicate the effectiveness of 2002 Farm Bill conservation practices and technology in restoring or enhancing sage-grouse habitat on private lands.

Information gained will be used to assist private landowners, Natural Resources Conservation Service (NRCS), Soil Conservation Districts, and state wildlife agency field staff in the planning and implementation of habitat projects and practices on private lands to benefit sage-grouse and other sagebrush-steppe obligate species. The projects implemented also will contribute to range-wide sage-grouse conservation efforts. SGRP will provide current information on the role of existing conservation practices and technologies relative to conserving sage-grouse and other sagebrush obligate species. The information gained from the multi-state experiments also will assist local sage-grouse working groups in complying with the conservation plan reporting requirements set forth in the U.S. Fish and Wildlife Service (USFWS) Policy for Evaluation of Conservation Efforts (PECE) When Making Listing Decisions.

Other anticipated benefits of the SGRP are a web-based project library that will provide NRCS staff, wildlife biologists and managers, and farmers and ranchers with visual information and data regarding the role of conservation practices in increasing their productivity and natural resource conservation. In addition SGRP will disseminate private lands conservation planning needs to a much wider research audience bringing in the best researchers in the field to address field-level technology needs.

Table of Contents

Summary of 2008 Activities

SGRP Web Site

A web page that was developed specifically for SGRP is still being maintained. The web site address is http://sgrp.usu.edu/. The web site contains the SGRP Mission Statement, History, Grants-in-Aid, Proposal Submission, Research Priorities, Technical Review Panel, Guidance Committee, Funded Projects, Project Library, Learning Tools, News and Updates, Annual Reports, Publications, Personnel, and Web Links. Using these links, visitors may learn more about the SGRP personnel and research funded through SGRP. This web site is currently being updated.

Project Library

The Project Library contains information on the Parker Mountain Adaptive Resource Management local working groups and text of the project proposals that were funded. These are listed below:

> "Development of a Sagebrush Habitat Improvement Guide for the Gunnison Sage-grouse by Evaluating Recently and Historically Treated Areas within the Gunnison Basin" by Dr. Joe Brummer
>
> "Greater Sage-grouse Brood-rearing Habitat Manipulation in Mountain Big Sagebrush, Use of Treatments, and Reproductive Ecology on Parker Mountain, Utah" by David Dahlgren.
>
> "Grazing Sagebrush with Sheep to Enhance Greater Sage-grouse Brood-rearing Habitat" by Dr. Roger Banner
>
> "Greater Sage-grouse Use of Restored Sagebrush Areas in Rich County Utah" by Dr. Frank Howe

Learning Tools

Three presentations are available in the Learning Tools section of the website. They are:

> "Sagebrush (*Artemisia* spp.) Seed and Plant Transfer Guidelines" is a pdf file of a 2004 NRCS publication by Mary F. Mahalovich and E. Durrant McArthur.
>
> "Sagebrush treatments and their impacts on sage-grouse" is a PowerPoint presentation by Leslie Elmore.

"Relating Post-Treatment Vegetation Responses to Habitat Requirements of Gunnison Sage-grouse" is a 2008 PowerPoint presentation by Joe Brummer and John Scott given at Gunnison Sage-grouse Range Wide Workshop, Montrose, CO. May 2008.

Publications

Below are a list and summary of publications that are currently available on the SGRP website. As publications become available and are approved for distribution by the SGRP Board they will be added to the site.

Chi, R., D.K. Dahlgren, and T.A. Messmer. 2007. "Technical Note: Greater Sage-Grouse Response to Sagebrush Management in South-Central Utah."

Summary: Appropriate levels of sagebrush are key to maintaining and improving sage-grouse populations. Today the quality of some of our rangelands is degraded. This is due to many factors such as improper livestock grazing, expansion of exotic grasses, considerable increases or decreases in sagebrush density, increased soil erosion, changes in fire regime, and conversion of sagebrush to seeded pastures, croplands, subdivisions, and roads. These changes have had adverse effects on our sage-grouse populations. Habitat management for sage-grouse should encourage a mosaic of habitat types with appropriate combinations of shrubs, grasses, and forbs.

Lupis, S.G., T.A. Messmer and T. Black. 2006. Gunnison Sage-Grouse Use of Conservation Reserve Program Fields in Utah and Response to Emergency Grazing: A Preliminary Evaluation. Wildlife Society Bulletin 34:957–962.

Abstract: Little information is available on the use of areas enrolled in the Conservation Reserve Program (CRP) by Gunnison sage-grouse (*Centrocercus minimus*) or the impacts of grazing on their habitat selection and movement patterns. Using radiotelemetry, we monitored 13 Gunnison sage-grouse in San Juan County, Utah, USA, during 2001–2002 to determine their use of CRP. Additionally, in 2002 some of the CRP land used by the birds in 2001 was grazed under a drought emergency declaration. This afforded us an opportunity to monitor their response to livestock grazing. Although Gunnison sage-grouse used CRP for nesting, brood-rearing, and summer habitat, it was not selected in greater proportion than its availability ($P > 0.10$) on the landscape. Bird-use sites in the CRP did not entirely meet habitat guidelines recommended by the Gunnison sage-grouse Rangewide Steering Committee (2005). Most of the sage-grouse we monitored avoided CRP fields when livestock were present. The one exception to this was a hen with a brood. We believe long-term maintenance of CRP in San Juan County will result in achieving habitat conditions that are more desirable for Gunnison sage-grouse. Future livestock management practices in areas used by Gunnison sage-grouse should incorporate short-term, high-intensity deferred-grazing rotations.

Dahlgren, D.K., R. Chi, and T.A. Messmer. 2006. Greater Sage-Grouse Response to Sagebrush Management in Utah. Wildlife Society Bulletin 34:975–985.

Abstract: Greater sage-grouse (*Centrocercus urophasianus*) populations throughout much of their range have been declining. These declines have largely been attributed to the loss or deterioration of sagebrush (*Artemisia* spp.) habitat. In response government agencies such as the United States Department of Agriculture, Natural Resources Conservation Service are cost-sharing on management practices designed to improve habitat conditions for sage-grouse. Little is known regarding sage-grouse response to various sagebrush management techniques. We studied the effects of reducing sagebrush canopy cover using 2 mechanical (Dixie harrow and Lawson aerator) treatments and 1 chemical (Tebuthiuron) treatment on greater sage-grouse use of brood-rearing habitats on Parker Mountain, Utah, USA. To conduct this experiment, we identified 19 40.5-ha plots that exhibited .40% mountain big sagebrush (*A. tridentata vaseyana*) canopy cover and randomly assigned 16 as treatment or controls (4 replicates each). Tebuthiuron and Dixie-harrow-treated plots had more forb cover than did control plots (P ¼ 0.01 and 0.02, respectively) in posttreatment periods. Greater sage-grouse brood use was higher in Tebuthiuron than control plots (P ¼ 0.01). We believe this was attributed to increased herbaceous cover, particularly forb cover. However, in all plots, sage-grouse use was greatest within 10 m of the edge of the treatments where adjacent sagebrush cover was still available. Although the treatments we studied resulted in the plots achieving sage-grouse brooding-rearing habitat guidelines, caution should be exercised in applying these observations at lower elevations, on sites with less annual precipitation, or on a different subspecies of big sagebrush. Prior to using these techniques to implement large-scale sagebrush treatments, the specific rationale for conducting them should be clearly identified. Large-scale projects using the techniques we studied would not be appropriate within sage-grouse wintering or nesting habitat.

Funded Projects

No new projects were funded because funding was unavailable. Reports from the on-going projects are contained within this 2008 Annual Report.

SGRP Project Progress Reports

Project Title: Grazing Sagebrush with Sheep to Enhance Greater Sage-grouse Brood-rearing Habitat

Research Team:

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Project Summary

The purpose of this study is to evaluate the effects of strategic sheep grazing on vegetative communities believed important to sage-grouse broods. Intensive dormant season sheep grazing should increase the abundance of herbaceous understory plants (i.e. dandelion, cinquefoil, locoweed) by reducing competition by sagebrush as well as through pedoturbation and nutrient recycling (sheep urine and feces).

The experimental design consists of 8 sets of paired plots, 1 grazed plot and 1 control. Four sets of paired plots are located in areas having received a once-over Dixie harrow treatment in 2001. The other 4 sets of paired plots are located in unmanipulated sagebrush stands. Selection of which plots would be grazed and which would serve as a control was random. Each plot is approximately 3.2 ha.

Pre-treatment Data Collection

Pre-treatment vegetation data was collected during the first 2 weeks of July 2006. Four transects were randomly located within each plot as well as at 10 m, 20 m, and 30 m outside each plot. Vegetation metrics measured included shrub cover and height (line intercept), vertical obstruction (Robel pole), and understory vegetation composition and ground cover (20 x 50 centimeter Daubenmire frame and point intercept).

Immediately after vegetation data collection was completed, arthropods were sampled in and around all plots. Pitfall traps were established near each vegetation transect. Diluted antifreeze was poured into each pitfall trap to euthanize and preserve arthropods falling into the traps. Each pitfall trap was left open for approximately 48 hours.

During late July 2006, pellet counts and bird dog flush counts were conducted in all plots. Sage-grouse pellets were counted and removed from 1-meter radius circular plots located at each end of each vegetation transect in and around each plot. Bird dog flush counts were conducted using

dogs experienced at locating sage-grouse on Parker Mountain. Each plot was thoroughly covered by at least 1 dog and 1 handler. All grouse flushed from a plot were counted and their approximate location marked with a GPS.

Just prior to sheep grazing, shrub density was estimated using five 3-m radius circular plots in each control and grazed plot. At the same time, 5 sagebrush plants were randomly chosen and all above ground biomass was harvested. Harvested plants were dried and weighed as an estimate of sagebrush biomass within each plot. Biomass sampling was repeated immediately after grazing to determine the amount of biomass consumed by sheep.

Sheep Grazing

Beginning in mid-September 2006, 3-strand electric fences were constructed around plots randomly chosen to be grazed. Approximately 1,000 local ewes belonging to Andy Taft were used to graze plots. The sheep were split into 2 herds of approximately 500 head each so that plots could be grazed 2 at a time. The sheep were moved onto the first 2 plots on 17 October 2006. Grazing was conducted at this time to insure that herbaceous plants were dormant and therefore not negatively affected and to allow time for terpene levels in the sagebrush to decline. Grazing typically took between 7 and 10 days per plot, depending on the amount and size of the sagebrush in each plot. Grazing was completed on 27 November 2006. Assessments of sheep body condition were conducted prior to grazing and again at the end of the treatment by the local Extension Livestock Specialist, Kim Chapman. The average pre-grazing body condition was determined to be 2.5. After over a month of grazing sagebrush, the average body condition was determined to be between 2.5 and 2.75.

Post-treatment Data Collection

During the 2007 and 2008 field seasons, vegetation and grouse use data were collected as described for the pre-treatment data. In addition, 3 area constrained surveys were conducted in each plot. Area constrained surveys consisted of 4 people, spaced approximately 20 meters apart, walking the length of one side of the plot and then walking back along the opposite side.

Preliminary Findings

Sagebrush coverage in grazed plots was reduced from approximately 27.3% in July 2006 to approximately 8.6% in 2007. By 2008, sagebrush cover in grazed plots had rebounded to 12.9%. Sagebrush coverage in ungrazed plots increased from 26.5% in 2006 to 26.9% in 2007 and continued to increase to 28% in 2008 (Figure 1). Shrub density in grazed plots was reduced from approximately 25,818 plants per hectare in 2006 to 10,232 in 2007. Similar to sagebrush coverage, density did increase slightly in 2008. Density in ungrazed plots did decline from an average of 24,174 plants per hectare in 2006 to 21,638 plants per hectare in 2007. Ungrazed plots also saw a slight increase in shrub density in 2008 (Figure 1).

In 2007, both forbs and grasses had less coverage than in 2006 (Figure 2). However, forbs and grasses had greater coverage in grazed plots than in control plots, despite heavy season long grazing by cattle and antelope. The general reduction in forbs and grasses is likely due to the lack of winter snow pack and summer precipitation. Under the improved precipitation patterns of 2008, forb and grass coverage increased in all plots. It is interesting to note that while coverage of forbs and grass did increase in both grazed and ungrazed plots, forb coverage drastically increased in grazed plots.

Area constrained surveys indicated that in 2007, sage-grouse used grazed plots considerably more than ungrazed plots (Figure 3). However, in 2008 the results of the area constrained surveys were mixed and generally showed far less grouse use than in 2007. Bird-dog surveys conducted in 2006 indicated that sage-grouse were using control plots more than grazed plots (Figure 4). Bird-dog flush counts showed considerably higher use of grazed plot in 2007. In 2007, no grouse were flushed from control plots. In comparison, an average of 2.6 grouse were flushed per grazed plot. Unlike the area constrained surveys, the bird-dogs detected approximately twice as many grouse in grazed plots as ungrazed plots in 2008.

Project and Budget Status

All project activities detailed in the original funding proposal, excluding the formal statistical analyses, have been completed at this time. However, due to the inconclusive grouse use data we are planning to repeat all data collection in 2009. Consequently, we will be seeking additional funding to support these activities.

2009 Plan of Work

The following work will be accomplished in the 2009 field season. Vegetation sampling and sage-grouse use evaluations will be repeated on all control and treatment pastures. Vegetation sampling and bird use data collection were carried out during three previous field seasons, 2006-2008. In summer 2006, baseline vegetation measurements and sage-grouse use estimates were taken on randomly selected control pastures and pastures identified for implementation of grazing treatments during fall 2006. Vegetation measurements and sage-grouse use estimates were repeated in summer 2007 and 2008. Vegetation measurements, pellet counts, area constrained surveys, and bird dog flush count surveys will be conducted during July 2009 and will complete the project. This will provide data tracking vegetation response and bird use over a four year period. The final results will be compiled by December 2009 with subsequent publication following soon thereafter.

Because of the additional field season required to complete data collection, we are requesting 8 month project extension and additional support for the Ph.D. student. A proposed budget has been included for consideration.

Sage-grouse Restoration Project Extension
Budget 2009-2010

Salaries:

Michael Guttery, Ph.D student		**$16,000**
Benefits:		**1,320**
Travel Expense:		**3,000**
Materials & Supplies:		**2,000**
	Total:	**$22,320**

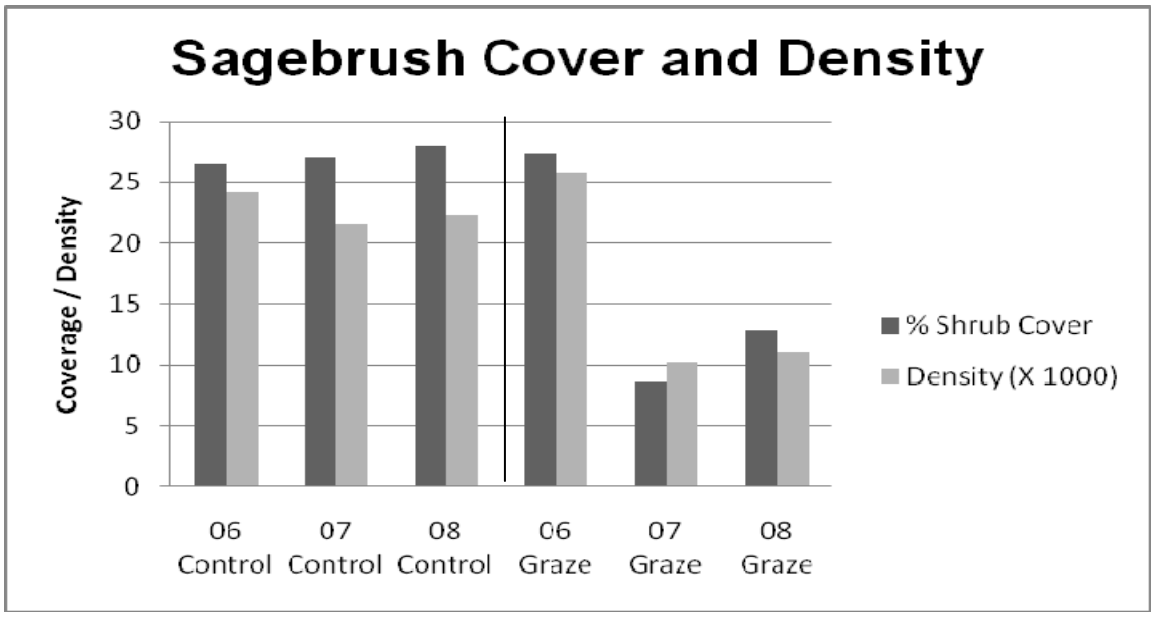

Figure 1. Sagebrush cover and density in experimental sheep plots, Parker Mountain 2006 – 2008.

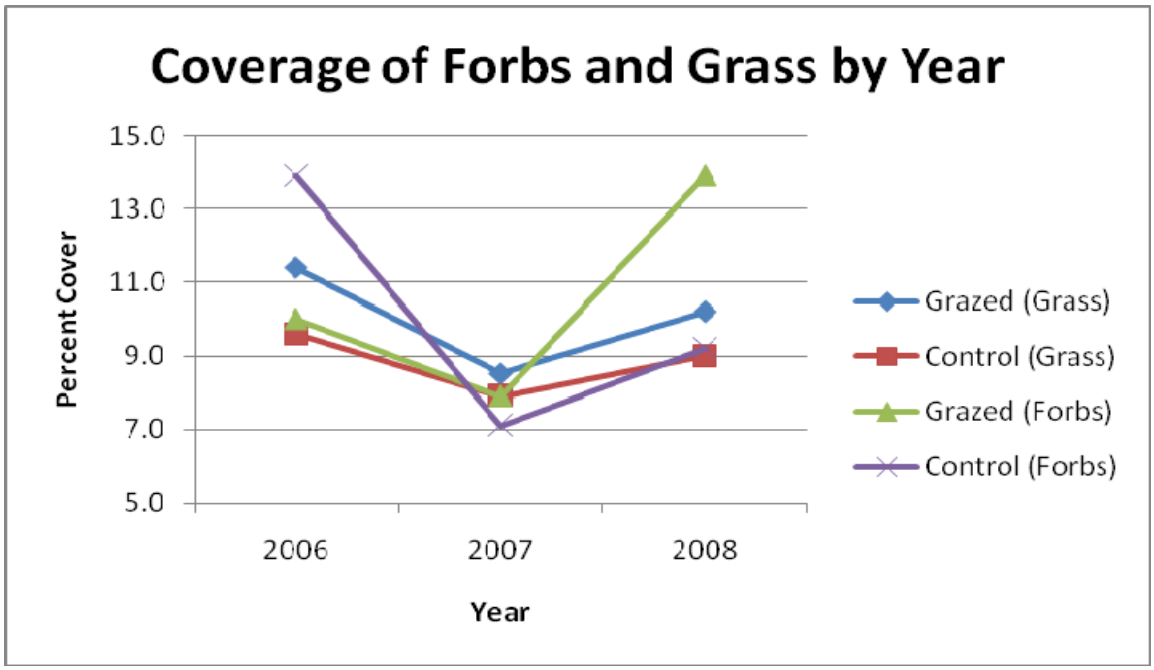

Figure 2. Forb and grass coverage in experimental sheep plots, Parker Mountain 2006 and 2008.

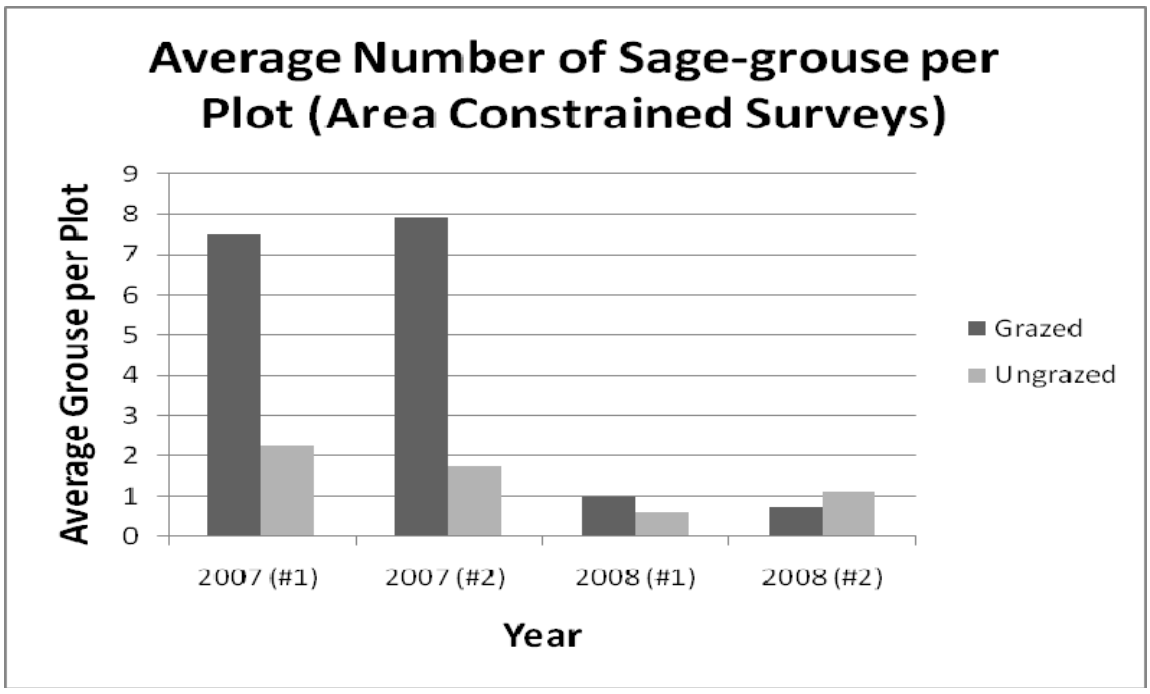

Figure 3. Average number of birds flushed per plot during area constrained surveys, 2007-2008.

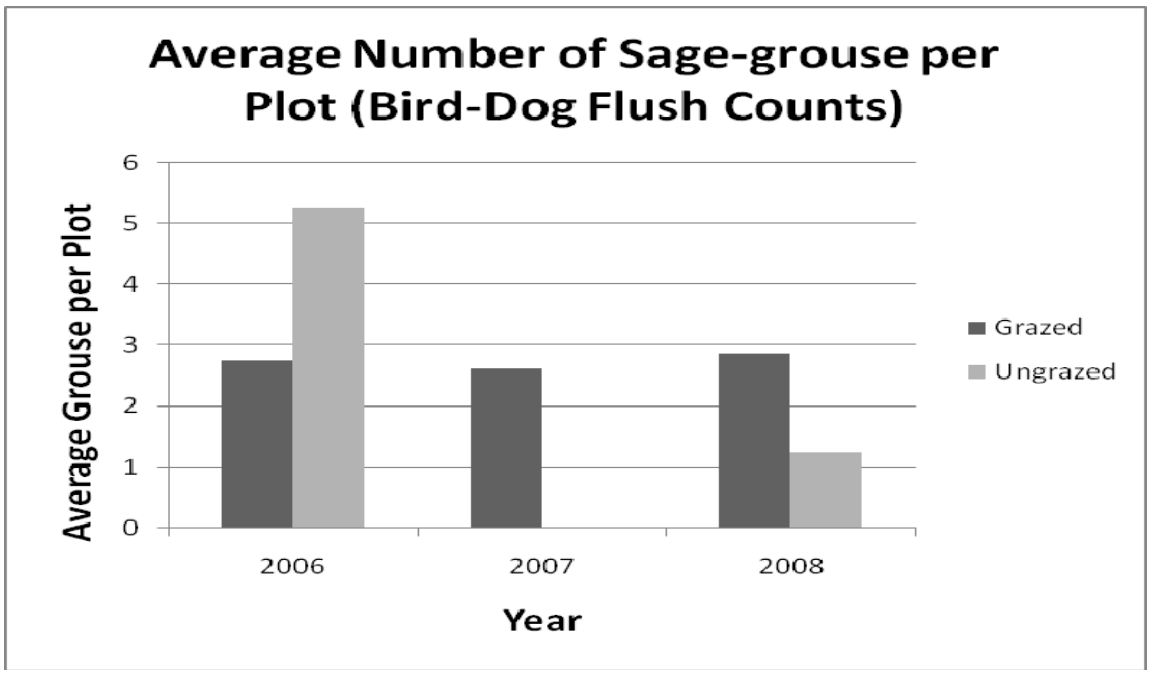

Figure 4. Average number of bird flushed per plot during bird-dog flush counts, 2006-2008.

Development of a Sagebrush Habitat Improvement Guide for the Gunnison Sage-grouse by Evaluating Recently and Historically Treated Areas within the Gunnison Basin

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A draft of the results from this project was written in 2007 and published in 2008 as part of last year's progress report. The objective of this project was to monitor historic as well as more recent treatments aimed at improving sagebrush habitat for the Gunnison sagegrouse. Because this was not a designed project, we had to measure treated areas that were already in place which meant that the age and location of treatments in the Gunnison Basin varied significantly both within and among treatment methods. We have a lot of data, but it is very messy because many factors such as environmental conditions during year of treatment, timing of treatment application, grazing management following treatment application, etc. varied significantly among treated areas. This makes interpretation of the data very difficult and we are still trying to figure out how to account for all of the potential confounding factors in our results. The plan is to work with a statistician during the spring of 2009 and try to figure out the best method to handle this messy data and make some final interpretations. Hopefully, we will be able to draw some solid conclusions that will allow us to develop the habitat improvement guide which was the ultimate end product of this project.

A Powerpoint presentation was developed for presentation at a Gunnison Sage-grouse workshop held in Montrose, Colorado in May of 2008 and is available on the website: www.sgrp.usu.edu in the learning tools section.

Project Title: Greater Sage-grouse Use of Restored Sagebrush Areas in Rich County Utah

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Project Summary

We are using several methods to assess Greater Sage-grouse habitat use in three types of areas: areas where sagebrush cover is being actively reduced (treated), areas of historic treatment (retrospective) and reference (untreated) areas. We will assess the efficacy of several methods which range from "quick and dirty" to state-of-the-art. This will allow us to develop portable and efficient means of evaluating sage-grouse use on a broader scale. Methodologies include distance sampling to estimate density of sage-grouse pellets (potential index to use), flushing counts using trained dogs and distance sampling techniques (snapshot measure of use), occupancy estimation (proportion of landscape used) and GPS radio-telemetry (roost site and seasonal use). Since habitat use may vary with population size, we are also conducting lek counts (as a covariate) in association with habitat use measures.

We have employed a 2-tiered study design: at the county-wide level, habitat and sage-grouse use data are collected at random locations across a tessellated grid at grid points separated by 5,000 m to 10,000 m; at the study site level, data are collected at grid points separated by 625 m to 2,500 m. At the study site level, we are focusing on two areas where large scale treatments have been recently conducted and where additional treatments are planned in the near future; these are Deseret Land and Livestock (DLL) and the Duck Creek Allotment (DC). In these areas, we collect data before and after treatments in treated and untreated areas. We also collect information from historically treated areas in the two primary study sites and across the county. This combination of approaches will allow us to assess the immediate impact of sage reduction treatments on sage-grouse as well as evaluate long-term recovery after such treatments.

Accomplishments

Our project addresses the following objectives: 1) Monitor sage-grouse response to sagebrush reduction by comparing use on treated, untreated and retrospective study areas; 2) Determine Ecological Site Descriptions and habitat characteristics of areas used by sage-grouse; 3) Model habitat characteristics of sage-grouse use areas; 4) Develop "portable" and efficient sage-grouse monitoring techniques through evaluation of various methodologies.

During 2008, we continued a full field schedule with a graduate student and 6 technicians. This project also benefits from several related projects with similar objectives on different focal species and their habitats.

Objective 1

Pellet transects: In Duck Creek (DC) (where sampling was most intense), we collected sage-grouse use data on 30 transects in treated areas and 15 transects in untreated areas. Preliminary data shows that densities of sage-grouse pellets were highest in treated areas. Our treatment sites occurred at two different elevations. The lower elevation sites had a much higher density of pellets (D = 1027.3) compared to higher elevation sites (D = 73.029). There were no significant differences between untreated elevation sites.

In the fall of 2008, the BLM treated approximately 2400 acres on the east side of DC. We collected pellet data on 30 transects within and adjacent to the proposed treatment site in June. We will monitor these sites next year to see if sage-grouse pellet densities changed post-treatment.

In 2007, we sampled 20 transects on Section 14 of Deseret Land and Livestock (DLL), prior to it being treated. We resampled these points in 2008 and found that pellet densities had decreased since being treated (2007: D =1141.4; 2008: D = 465.53). We will resample these points in 2009 to monitor sage-grouse response over time.

Occupancy plots: We collected four seasons of occupancy sampling data at DC: Season 1: 5 May – 23 May; Season 2: 16 June – 4 July; Season 3: 28 July – 15 August; Season 4: 8 September – 26 September. Preliminary results indicate highest occupancy rates occurred in Season 1 treated plots (P = 0.706). Occupancy rates declined in treated plots during Season 2 (P = 0.45) and Season 3 (P = 0.403), then increased slightly during Season 4 (P = 0.538). Occupancy rates were consistently higher in treated plots than untreated plots.

Dog flushing transects: We performed 20 dog flushing transects between June and August in DC. We collected data on 10 transects in treated sites and 10 transects in untreated sites. We located very few sage-grouse with this technique during the sampling period. We have concluded that dog flushing transects with distance sampling techniques may not be a viable method for monitoring sage-grouse densities in Rich County.

Objectives 2 and 3

Vegetation data was collected at all line transects and occupancy plots from May through September. We also collected data at two feeding, two loafing and two roosting locations for each collared grouse per month.

Through cooperation with other researchers in Rich County, vegetation sampling was conducted at several thousand sampling points in treated, untreated and retrospective study sites across the county. Imagery (as described in the 2006 report) and on-the-ground vegetation samples are being used to develop a continuous field vegetation map of the area. This vegetation map will in turn be used in the development of habitat models and species abundance estimates for sage-grouse. The vegetation data will also contribute to the determination of habitat characteristics

and Ecological Site Descriptions (ESDs) at our study sites and across Rich County (our data will be shared with Drs. Douglas Ramsey and Neil West).

Objective 4

In 2008, we field tested all 4 methods proposed for comparison in this study (see Objective 1 for results). We collected information on effort and cost required to conduct each of the field methods and will weigh this against data quality to determine which methods or combinations are most efficient.

In 2008, we added GPS radio-telemetry. We used radios which include a "micro-GPS" receiver and a small VHF transmitter. The GPS receiver collects highly accurate triangulations 2 times per day for the 92 -day life of the battery. The small (<30 g) "micro-GPS" cannot be remotely downloaded, so grouse were recaptured to collect location data and recharge the telemetry units (which could be left on the birds). The VHF transmitters allowed relocation of marked birds for up to 9 months. While VHF location accuracy is inherently poor, we used the VHF transmitters as a check of the new GPS technology as well as locating nests, mortalities and birds for recapture. In addition to addressing Objective 4 the radio-telemetry data allowed us to determine the migratory status of these sage-grouse. We found that all sage-grouse moved less than 5 miles between lekking, summer and fall habitats.

Recommendations

We recommend continuing to address all 4 project objectives over the next two years by 1) continuing full field research with a graduate student and 4-6 technicians including increased radio-telemetry efforts, 2) continuing field efforts to depict current vegetation status, 3) determining, with other Utah State University (USU) researchers, habitats and ESDs used by sage-grouse and 4) developing descriptive and predictive sage-grouse/habitat models.

Project and Budget Status

SGRP and NRCS have provided the pivotal seed money for this multi-partner project. SGRP funding could only be obtained for one year of this three-year project and SGRP funding has been exhausted. Despite the lack of current SGRP funding, the project is on schedule to meet all primary objectives by the end of year 3 with the exception of evaluating radio-telemetry methods. The Utah Division of Wildlife Resources (DWR) and the Utah Department of Natural Resources (DNR) have provided sufficient funding for personnel through project completion, though funding for additional GPS radios is still being sought.

This project is being closely coordinated with several other shrub steppe wildlife research projects in Rich County; these include response of vegetation, passerines, pygmy rabbits, small mammals, and mule deer to sagebrush reductions. While DWR and NRCS/SGRP are the only funders identified for this specific project, the project actually also involves partner support from Utah DNR, Intermountain West Joint Venture, U.S. Fish and Wildlife Service, Bureau of Land Management, The Quinney Foundation, Rich County Coordinated Resource Management

(CRM), U.S. Forest Service, U.S. Geological Survey, North American Space Administration and the Rich County Landowners. We are also coordinating with USU researchers who are developing Ecological Site Descriptions and state-transition models for shrub steppe in Rich County and USU researchers studying sage-grouse in other areas of the state.