

# The Effectiveness of Sage-Grouse Core Areas as an Umbrella for Non-Game Species

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## **EXECUTIVE SUMMARY**

Our purpose is to determine how effective Wyoming's Greater Sage-Grouse Core Population Areas are in conserving sagebrush-associated non-game wildlife species, with emphasis of those designated in the State Wildlife Action Plan (2010) as being species of greatest conservation need (SGCN) (see Table 1). Aspects of this research can be distilled into the following three questions:

- Which non-game wildlife species occur (and at what abundances) within Greater Sage-Grouse Core Population Areas?
- How viable are selected non-game wildlife populations within Greater Sage-Grouse Core Population Areas?
- How will Greater Sage-Grouse Core Population Area management (i.e., grouse-centered management) affect non-game wildlife?

In order to answer these questions, we have identified the following four objectives and begun implementing fieldwork and analytical methods applied from statewide to local scales:

- 1) Quantify statewide overlap between Greater Sage-Grouse Core Population Areas and focal non-game wildlife species' predicted spatial distributions using GIS data.
- 2) Examine the occurrence and relative abundance of non-game wildlife species across gradients of sagebrush habitat and Greater Sage-Grouse Core Population Areas in the field.
- 3) Evaluate the reproductive success of three sagebrush-obligate passerine SGCN (Brewer's Sparrow, Sage Sparrow, and Sage Thrasher) across gradients of sagebrush habitat and Greater Sage-Grouse Core Population Areas in the field.
- 4) Examine the responses of non-game wildlife to sagebrush-reducing experimental habitat treatments designed and implemented to benefit Greater Sage-Grouse.

### **Note regarding ongoing status of research**

Please note that although this document is the final report required under the specified funding agreement, research is still ongoing and anticipated to conclude in 2016. Therefore, much of the information presented in this document is preliminary in nature. We successfully completed our first field season this past summer (2012), collecting data in the central portion of the state (near Jeffrey City, WY) to address objectives 2-3. In the following three summer field seasons (2013-2015), we will continue to address objectives 2-3 and begin addressing objective 4. Spatial (or GIS) analysis addressing objective 1 is ongoing and preliminary findings are presented in this report.

## INTRODUCTION

The creation of Wyoming’s Greater Sage-Grouse Core Areas and the increased protection afforded these areas has created a natural laboratory for the study of the umbrella species concept—a potentially useful shortcut to effective wildlife management. In short, by protecting the area required by the umbrella species (Greater Sage-Grouse in this case), managers expect to be able to conserve other wildlife species of interest which occur in the same area without having to direct management actions for them specifically. According to Wyoming’s State Wildlife Action Plan (2010), the sagebrush steppe is home to nearly 450 species of mammals, birds, amphibians, reptiles, and fish, most of which are classified as non-game species. Approximately 6% of these species (25) are considered Species of Greatest Conservation Need (SGCN). The focal non-game wildlife for this project at this time includes 11 species, 7 birds, 2 mammals, and 2 lizards (Table 1)

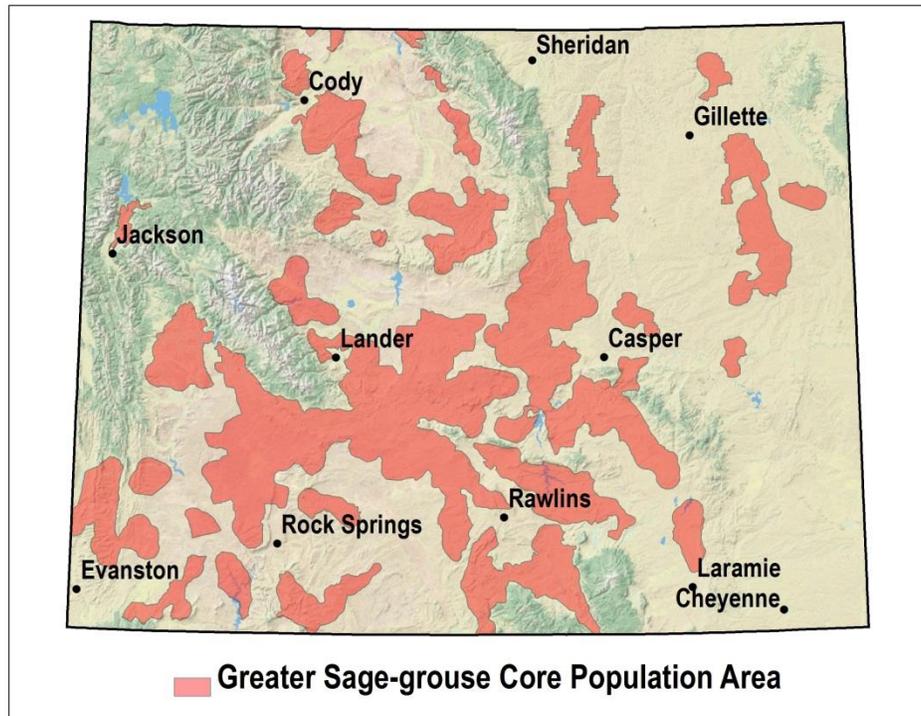
**Table 1.** Focal non-game wildlife species and Species of Greatest Conservation Need (SGCN) status.

Common name	Scientific name	SGCN (2010)	SGCN Priority Tier	NSS Cell (2010)
<b>Birds</b>				
Brewer’s sparrow	<i>Spizella breweri</i>	Yes	II	NSS4 (Bc)
Burrowing owl	<i>Athene cunicularia</i>	Yes	I	NSSU (U)
Ferruginous hawk	<i>Buteo regalis</i>	Yes	I	NSSU (U)
Loggerhead shrike	<i>Lanius ludovicianus</i>	No	N/A	N/A
Sage sparrow	<i>Amphispiza belli</i>	Yes	II	NSS4 (Bc)
Sage thrasher	<i>Oreoscoptes montanus</i>	Yes	II	NSS4 (Bc)
Short-eared owl	<i>Asio flammeus</i>	Yes	II	NSS4 (Bc)
<b>Mammals</b>				
Pygmy rabbit	<i>Brachylagus idahoensis</i>	Yes	II	NSS3 (Bb)
Sagebrush vole	<i>Lemmiscus curtatus</i>	No (removed in 2010)	N/A	N/A
<b>Reptiles</b>				
Greater short-horned lizard	<i>Phrynosoma hernandesi</i>	Yes	III	NSS4 (Bc)
Northern sagebrush lizard	<i>Sceloporus graciosus</i>	No (removed in 2010)	N/A	N/A

## METHODS

### Study Area

The study area for spatial analysis of wildlife distribution overlap with Core Areas is the entire state of Wyoming (Figure 1). We conducted field work in and near the eastern half of the Greater South Pass Core Area in the area surrounding Jeffrey City, WY in the summer of 2012. Future field work will continue to be conducted in this area with the possibility of expansion to other areas of the state in and around Core Areas.



**Figure 1.** Map of Greater Sage-Crouse Core Population Areas in Wyoming. The eastern half of the Greater South Pass Core Area, where 2012 field work took place, is between Lander and Rawlins in the central portion of the state.

### Spatial Analysis of Core Area Overlap

We obtained predictive species distribution models (SDMs) for 12 species (Greater Sage-Grouse and the 11 non-game species listed in Table 1) for the entire state from the Wyoming Natural Diversity Database (Keinath et al. 2010). We then performed overlap analysis to calculate two overlap measures:

1. The proportion of Core Area each species is predicted to occur in.
2. The proportion of each species' statewide distribution that overlaps Core Area.

## **Transect Surveys**

### *Study design*

We conducted line transect surveys on 72 transects in order to detect the abundance (and ultimately density) of non-game wildlife. Transects were 500 m long, and siting using a random stratified cluster sampling approach, with strata being levels of grouse breeding density (Doherty et al. 2010) and clusters of 4 transects. We also ensured that survey locations were sited both inside and outside of Core Area. Using GIS, we then snapped these locations to the nearest dirt road, precluding extremely remote and hard-to-access sites.

In order to be considered, the entire length of the transect line had to meet the following criteria:

- Located on and accessed via public land (i.e., BLM or state-owned).
- At least 1 km from known oil/gas well locations.
- At least 100 m from medium or high-traffic roads (paved and unpaved).
- At least 500 m from the nearest neighboring transect line.

Most 500 m transects were placed such that one end was within ~10 m of a two-track dirt road used to access the transect cluster. We chose to cluster transects and site them near seldom-travelled two-track dirt roads for logistical reasons (i.e., to maximize the amount of transects surveyors could visit per day). All transects were sited within 60 km (straight line distance, not travel distance) of the field crew's base camp in the town of Jeffrey City, WY.

### *Survey method*

Line transects were surveyed for birds once during 2012 using standard distance-sampling protocol, recording all bird species observed while walking the line, and recorded the distance from the observer and angle from the line for each observation. Line transects were then resurveyed later in the season to document reptile, rabbit, and grouse (as indexed by fecal pellets) presence and abundance.

## **Nest Monitoring**

### *Study design*

We conducted nest searching and monitoring activities on eight nest plots in order to assess the reproductive success of SGCN songbirds. Plots were 500 x 500 m square (25 ha) and placed in a non-random fashion. We selected plot locations that covered all levels of grouse breeding density and maximized the within-plot shrub variability (being sure to select plots that included both very shrubby and vegetatively sparse areas).

### *Survey method*

Nest plots were visited by at least one observer at least every other day. We searched for songbird nests, then continued to monitor those nests over the course of the breeding season to assess reproductive success (e.g., young fledged or not).

### **Vegetation Sampling**

We also conducted intensive vegetation sampling both along line transects and within nest plots. The emphasis of this research being on non-game wildlife conservation, suffice it to say that we surveyed vegetation structure and composition associated with the wildlife observations collected during the surveys described above.

### **Statistical Analysis**

Statistical analyses will be forthcoming as data collection continues.

## RESULTS

### Spatial Analysis of Core Area Overlap

We first examined the proportion of Core Area each species is predicted to occur in. For the species examined, values ranged from 24-88% (Table 2). Next we examined the proportion of each species' predicted statewide distribution that overlaps Core Area. Values ranged from 23-48% for the species examined (Table 2).

**Table 2.** Spatial overlap between 12 sagebrush-associated wildlife of local management interest and Greater Sage-Grouse Core Population Areas in Wyoming based on predictive species distribution models created by Keinath et al. (2010).

Common name	Scientific name	Proportion of Core Area where predicted to occur	Proportion of predicted statewide distribution in Core Area
<b>Birds</b>			
Brewer's sparrow	<i>Spizella breweri</i>	88%	32%
Burrowing owl	<i>Athene cunicularia</i>	50%	27%
Ferruginous hawk	<i>Buteo regalis</i>	56%	34%
Greater sage-grouse	<i>Centrocercus urophasianus</i>	86%	34%
Loggerhead Shrike	<i>Lanius ludovicianus</i>	Not calculated	28%
Sage sparrow	<i>Amphispiza belli</i>	67%	44%
Sage thrasher	<i>Oreoscoptes montanus</i>	84%	38%
Short-eared owl	<i>Asio flammeus</i>	34%	23%
<b>Mammals</b>			
Pygmy rabbit	<i>Brachylagus idahoensis</i>	30%	48%
Sagebrush vole	<i>Lemmiscus curtatus</i>	61%	37%
<b>Reptiles</b>			
Greater short-horned lizard	<i>Phrynosoma hernandesi</i>	69%	48%
Northern sagebrush lizard	<i>Sceloporus graciosus</i>	24%	32%

### Transect Surveys

We observed over 1,400 individual birds of 18 different species. The six most abundant species accounted for nearly 95% of the observations and were (in order of abundance) Horned Lark, Brewer's Sparrow, Vesper Sparrow, Sage Thrasher, Western Meadowlark, and Sage Sparrow.

We observed only 15 individuals of one reptile species, Greater Short-horned Lizard, while surveying transects. Northern Sagebrush Lizards and Prairie Rattlesnakes were also observed in lower abundances while in the field, but not during formal transect surveys.

We observed over 16,000 fecal pellets of Greater Sage-Grouse in approximately 1,400 distinct pellet clusters while surveying transects.

### **Nest Monitoring**

We observed over 200 nests of 7 different species. The two most commonly discovered species accounted for nearly 95% of the observed nests and were (in order of abundance) Brewer's Sparrow and Sage Thrasher.

### **Vegetation Sampling**

Results will be forthcoming in this area.

## **DISCUSSION**

### **Spatial Analysis of Core Area Overlap**

Our preliminary results suggest that species which are highly associated with sagebrush habitats (often termed sagebrush-obligate species) and those which restricted distributional ranges (such as the pygmy rabbit) have higher amounts of overlap as calculated by our two methods.

### **Field Methods**

These methods are ongoing, precluding any discussion of findings at this time.

## **FUTURE DIRECTION**

### **Spatial Analysis of Core Area Overlap**

We plan to obtain species distribution models for more non-game and SGCN species and replicate our analyses. Also, we plan to apply spatial statistics to determine whether any given species' calculated overlap is sufficiently high or low to suggest meaningful conservation implications.

### **Field Methods**

Collection of data in the field on transects and nest plots will resume this summer (May – August) and is planned to continue for two subsequent years (total of four years of field data collection). This summer, we will begin addressing objective 4 of the study (see Executive Summary section), collecting pre-treatment data in areas where sagebrush-reducing vegetation treatments are planned to occur. These treatments are being implemented as part of the “Response of Greater Sage-Grouse to Habitat Treatments in Wyoming Big Sagebrush” project currently underway (see Smith, Beck, and Chalfoun 2012 Annual Report submitted to WGFD).

## **ACKNOWLEDGMENTS**

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## **LITERATURE CITED**

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