

**Population Origin and Identification of Unknown Lek Sites for  
Columbian Sharp-tailed Grouse in Grand Teton National Park  
2020 Annual Progress Report**



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## Introduction

Sharp-tailed grouse (*Tympanuchus phasianellus*) are a wide-ranging prairie-grouse species that can be found throughout the northern Great Plains, much of Canada and Alaska, and throughout portions of the Intermountain West (Connelly et al. 1998). Across its range there are six extant subspecies, including the Columbian (*T. p. columbianus*; CSTG) found in the Intermountain West (Connelly et al. 1998). Columbian sharp-tailed grouse have been petitioned for listing under the Endangered Species Act of 1973 and are currently listed as a species of conservation concern by the Wyoming Game and Fish Department (Keinath et al. 2010). Within Wyoming, Columbian sharp-tailed grouse are only positively known from Grand Teton National Park (hereafter GTNP), where there is a small population, and potentially in Carbon County where there is a robust population of sharptails, but whether these are Columbian sharp-tailed grouse is in question (Spaulding et al. 2006).

Within GTNP there was a small population of CSTG until the 1940s, when that population was extirpated (John Stephenson, GTNP biologist, personal communication). During 2010, CSTG reappeared at a single lek, a communal display ground where males gather and compete in an attempt to attract females, located in the southeastern portion of the park near Kelly, Wyoming. Currently, sharp-tailed grouse can only be found at this single lek within the park and it has had approximately 1–10 males attending each spring since discovery in 2010 (John Stephenson, GTNP biologist, personal communication). Prairie-grouse populations typically require multiple leks in an area to maintain a sustainable population, thus identifying new leks is important for the understanding of population dynamics in GTNP and for identifying management priorities in the areas where they occur.

## Research Questions

To better understand sharp-tailed grouse distribution in Grand Teton National Park, our project has two main objectives:

1. Model potential lek locations using a resource selection function (RSF) to better understand where grouse might be found in the park.
2. Search potential areas highlighted by the RSF to ground truth the results and potentially locate previously unknown leks in the park.

## Methods and Results

To better understand potential CSTG lek site distribution within Grand Teton National Park, we developed a resource selection function (RSF) from used and available lek locations from an area with similar vegetation conditions at a site in southern Carbon County, Wyoming (Fig. 1; Manly et al. 2002). We followed a similar process to that of Smith et al. (2016) to establish baseline lek site selection based on vegetation and topographic conditions within the southern Carbon County site. We identified the scale that each vegetation and topographic covariate was most influential by comparing logistic regression models at for each covariate by buffering each lek by 100, 500, 1,000, and 2,000-m and averaged the covariate within that buffer; models were ranked using Akaike's Information Criterion adjusted for small sample size ( $AIC_c$ ) and we selected the buffer with the lowest  $AIC_c$ . Once we identified the scales of each covariate, we generated a logistic regression using the identified vegetation and topographic covariates to predict sharp-tailed grouse probability of lek site selection. We used this model to generate and validate a predictive surface within Carbon County, Wyoming (Fig. 1). After the RSF model was generated and validated in

Carbon County, Wyoming, we projected that model onto the surface of Grand Teton National Park to establish potential lek sites in the area (Fig. 2). Our top model included the average slope within 100 m, distance to the nearest grassland patch, average distance to the nearest sagebrush patch within 500-m, proportion of conifer cover within 100-m, proportion of mixed forest within 500-m, proportion of aspen within 500-m, and proportion of mixed shrub within 2,000-m of a lek. We used the single known lek location within the park to identify if the model has potential to predict new lekking sites in the area; the model predicted that the current known lek location is located in a high probability of lek occurrence area.

### **Future Work**

During spring 2021, we will use the RSF predictive surface of potential lek sites in GTNP to attempt to locate new leks sites in areas with the greatest potential to be lek sites based on the model. We will walk transects in areas with the greatest probability of lekking site occurrence as predicted by the RSF (Fig. 2). Transects will be conducted in spring 2021 during a 2–3-week time period during peak lekking season from mid-April–mid-May. Transects will be 1-km and will be 1-km apart to maximize the search area and minimize overlap between transects. While walking the transects, we will listen for lekking males and search for any sign of a potential lek along or near the transects. Transects will be searched during morning hours (5:30–9:30) to maximize the probability of detection since peak lekking occurs during these times. We will report the locations of any new leks to John Stephenson so that he can continue to monitor these leks into the future to help understand population trends in the park. We had originally planned to complete this work during spring 2020, but unfortunately were unable to get out into the field during spring 2020 due to COVID-19 restrictions.

### **Literature Cited**

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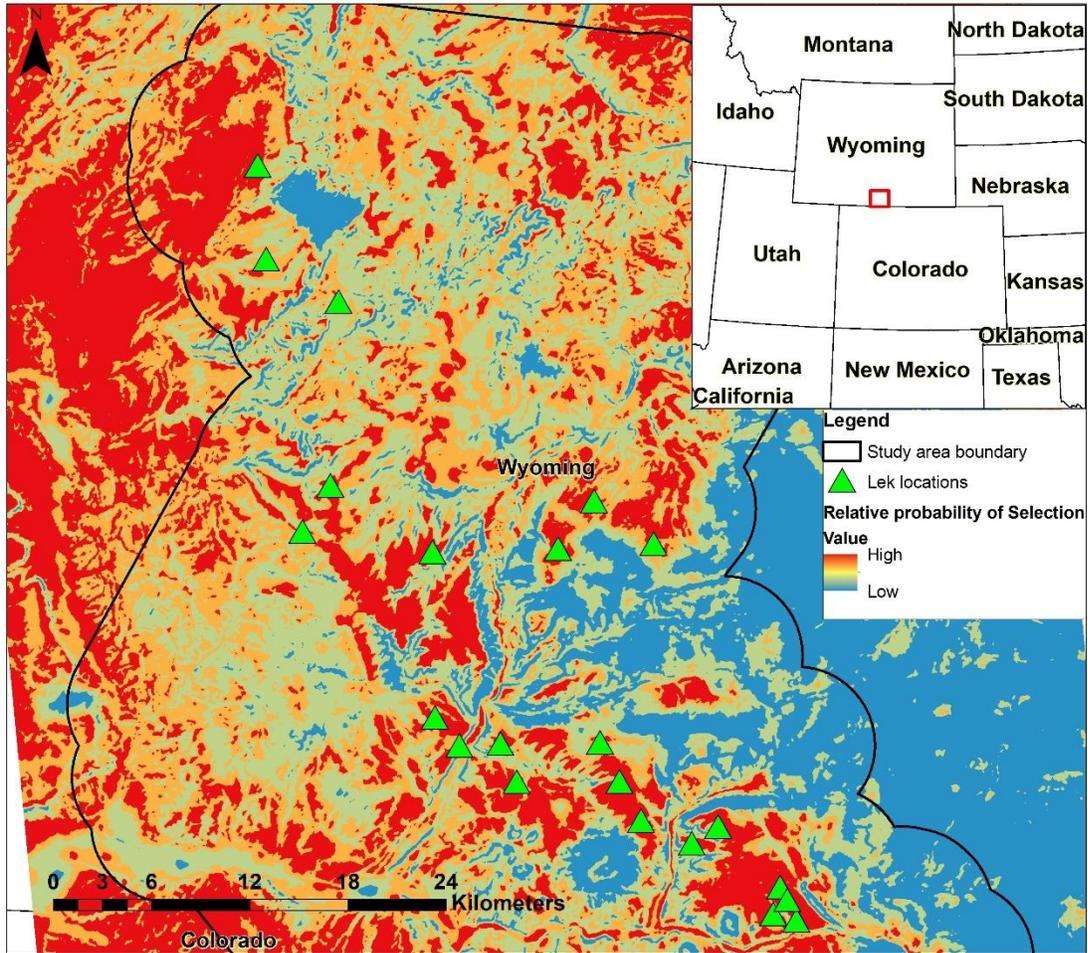


Figure 1. Sharp-tailed grouse relative probability of lek site selection from a resource selection function and known lek locations in southwestern Carbon County, Wyoming, USA, 2019.

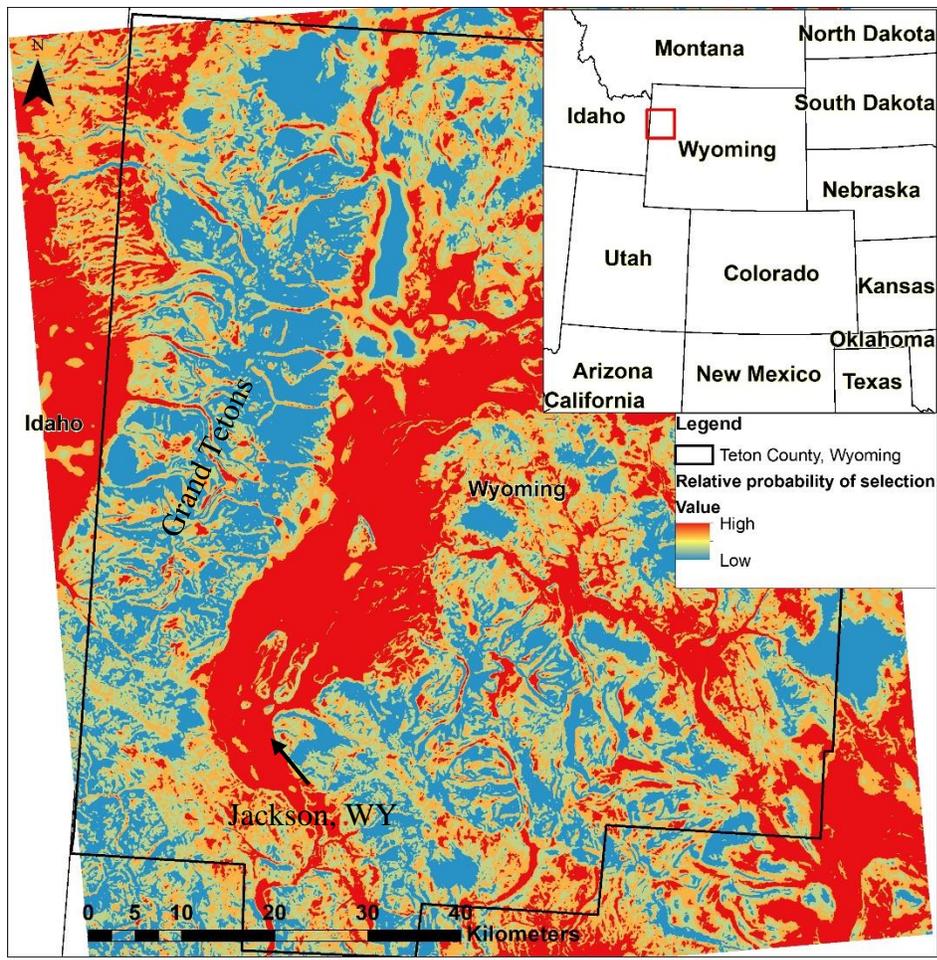


Figure 2. Sharp-tailed grouse relative probability of lek site selection within Teton County, Wyoming, USA. Predictive surface generated from a resource selection function based on known leks within Carbon County, Wyoming (see Fig. 1).