Alberta Conservation Association
2008/09 Project Summary Report

Project name: *Sharp-tailed Grouse Lek and Habitat Inventory Program*

Project leader: Stephen Hamilton

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Partnerships
Alberta Sustainable Resource Development
TD Friends of the Environment Foundation

Key findings

- Our habitat model enabled us to find leks roughly in proportion to the habitat we predicted to be low, medium and high quality.
- In 2008 we located 53 new leks from 212 surveys stratified over a 26,000 km^2 area.
- We developed a habitat based approach to estimate lek density across the region. Lek density was estimated at 0.026 leks/km^2 (676 leks).
- Low/Medium/High habitat strata surveyed to 4%, 16%, and 22% of available area respectively

Abstract
Understanding the interaction between sharp-tailed grouse and their human-modified prairie habitat is essential in building towards the goal of preventing population declines similar to what has been seen with other prairie grouse in Alberta (i.e., sage grouse). We continued evaluating a rigourous method to survey for sharp-tailed grouse leks over broad spatial extents in east-central Alberta. We developed a model to predict where leks would occur on the landscape, and used the locations of detected leks to estimate their density across the region (26,000 km^2). We surveyed roughly 6% of the region, successfully locating 53 leks with a greater than expected rate of detection in the proportion of habitat we deemed as high quality relative to portions of lesser quality. We used a modified point-count distance function design to estimate lek density for the study area at 0.026 leks/km^2 (95% CI 0.016 – 0.043 leks/km^2), with higher densities estimated in strata with higher expected lek occurrences.

Introduction
Sharp-tailed grouse are in decline across much of North America (Storch 2000). Developing rigourous tools for monitoring sharp-tailed grouse in Alberta has been highlighted as a need by the Alberta Grouse Technical Council (AGTC) and an important goal for the Alberta Conservation Association (ACA). In 2005, the ACA began developing a predictive lek occurrence model in east-central Alberta, the goal being to understand the interaction between

sharp-tailed grouse and their human-modified prairie habitat, and the effects of agricultural and industrial development on populations of a celebrated game species. In 2008, we began work on a new approach to estimate lek densities over a broad spatial area. We predicted the region would have a maximum density of 0.13 leks/km^2 based on the distance that hens typically nest from a lek (Manzer and Hannon 2005).

Methods

We derived a vegetation classification from Landsat imagery and used historical lek locations to develop a model that predicts where leks occur based on habitat features (resource selection function). Using this approach, we stratified the 26,000 km^2 study area into three classes representing high, medium, and low scores for predicting where leks would occur. Over the past three years, we used this predictive model to stratify the region to search for new leks, and used our survey efforts to evaluate and then refine the model's predictive quality. In 2008, we developed an approach to estimate the density of leks across the region, by modifying a distance sampling procedure (Buckland et al. 2001). We assumed all leks were detected relative to the survey centre, and that any area inside a radius of 300 m from the centre was surveyed with certainty. We estimated lek density based on a function of detection distance to leks found from the survey centre for each year, as well as for high, medium and low habitat classes (strata).

Results

We surveyed 212 transects in 2008, detecting 77 leks, 53 of which were physically located. We surveyed 6% of the 26 000 km^2 study area using a 1:2:1 ratio of random points within high, medium, and low quality habitat classes. Because there was a much higher proportion of total area in the low class than the medium and high classes, the relative area of each class differed from our survey ratio, with 22% of the high quality habitat, 16% medium, and 4% low quality habitat classes surveyed. Our validation revealed that leks in 2008 were detected more often than expected in high quality habitat ($p = 0.04$), reflecting similar findings in 2006.

Using 129 locations surveyed from 2006-2008, we estimated lek density for the study area at 0.026 leks/km^2 (Figure 2), or approximately 676 leks over 26 000km^2 (95% CI: 416-1118 leks). When stratifying our estimates by class, we found that lek density increased with habitat quality, from 0.017 leks/km^2 (95% CI: 0.0090 – 0.032 leks/km^2) in low quality areas to 0.048 leks/km^2 (0.023 – 0.10 leks/km^2) in high quality areas.

When stratifying density estimates by year, we found that estimates for 2006 and 2007 were similar, with estimates of 0.034 and 0.038 leks/km^2 respectively, in line with the regional estimate for all years. The 2008 result was lower, however, estimating only 0.018 leks/km^2, but remaining within the lower confidence limits for the other years.

Conclusions

Our approach provides a straightforward, rigourous method to estimate occurrence and density for sharp-tailed grouse leks over vast areas with lower cost and time than customary methods

would demand. Our predictions of where leks would occur were validated for two of our three survey years, and density estimates for the region fell within predicted values.

Our lek occurrence models indicate that the availability of healthy grassland was strongly preferred by sharp-tailed grouse, and regions with abundant cropland were avoided. Density estimates corroborated these findings, with lower than expected densities in low quality areas and the highest lek densities in high quality areas.

Communications

Presentation: Estimating sharp-tailed grouse lek density over broad spatial extents, 11th International Grouse Symposium in Whitehorse, Yukon (September 2008).

Paper: Estimating sharp-tailed grouse populations based on lek density over broad spatial scales. Studies in Avian Biology. *In review*.

Literature cited

Buckland, S.T., Anderson, D.R., Burnham, K.P., Laake, J.L., Borchers, D.L. and Thomas, L. 2001. Introduction to Distance Sampling: Estimating abundance of biological populations. Oxford University Press. Oxford, New York, USA.

Manzer, D.L. and Hannon, S.J. 2005. Relating grouse nest success and corvid density to habitat: a multi-scale approach. Journal of Wildlife Management 69(1):110-123.

Storch, I. 2000. Conservation status and threats to grouse worldwide: an overview. Wildlife Biology 6(4):195-204.

Pictures

Survey.jpg: Amanda Rezansoff performing a field survey near Dowling Lake, Alberta. (Photo: Stephen Hamilton)

Grassland.jpg: Grassland habitat for sharp-tailed grouse. (Photo: Stephen Hamilton)

Cropland.jpg: Agricultural cropland is not ideal habitat for sharp-tailed grouse. (Photo: Stephen Hamilton)

14) Figure and/or tables

Figure 1. The study area encompasses a sparsely populated region of central-east Alberta approximately 26 000km^2 in area. Primary land use includes agricultural cropland and grazing pasture.

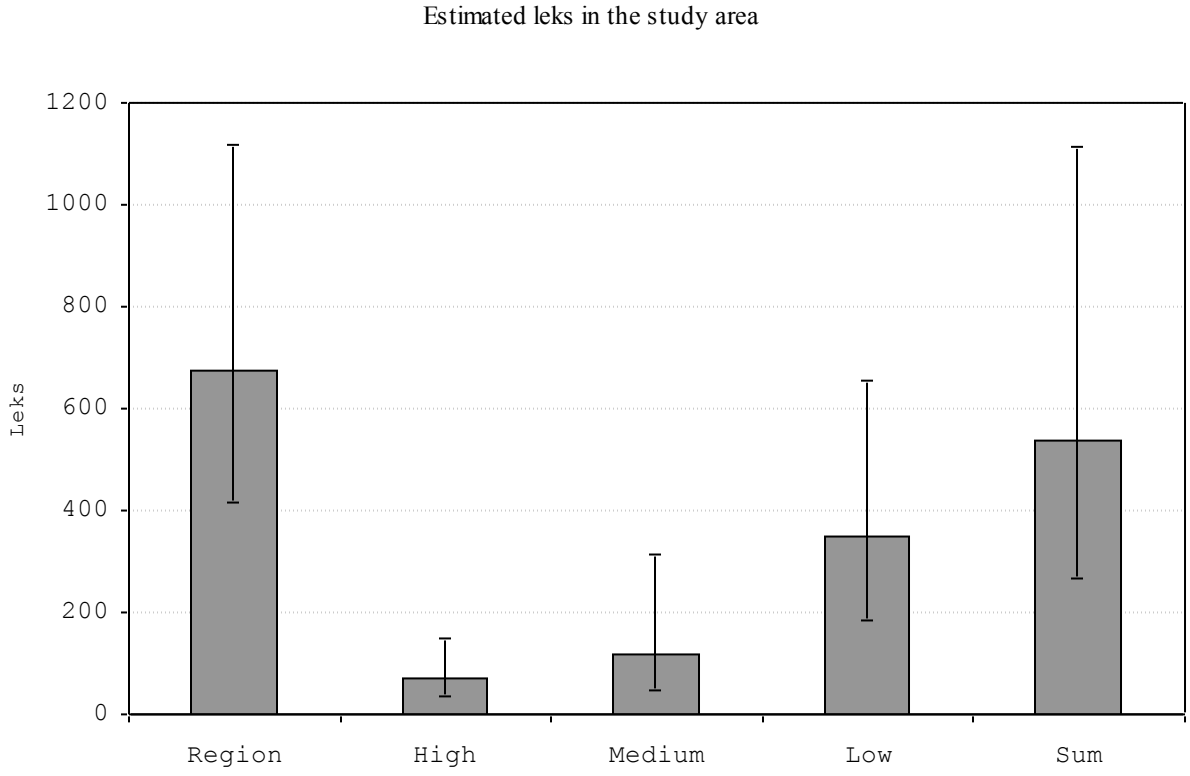

Figure 2. The number of leks in the study area based on the regional estimation as well as three habitat classes (+/- 95% CI). The 'Sum' column represents the total of leks estimated for high, medium, and low classes, while the error bars for this column are the sum of the upper and lower confidence limits of each.