Enhancing Operational Land Use Decisions for Sage-grouse Recovery in Alberta

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Abstract

The primary purpose of this study is to analyze the relationship between sage-grouse dynamics and the temporal and spatial changes of development footprints in southeastern Alberta.

Background and Relevance

The sagebrush steppe of southwestern Canada and northwestern US provides important habitat for over 100 avian species and 70 mammalian species (Knick and Rotenberry 1995, Paige and Ritter 2000, Knick et al. 2003, Holloran 2005). Following European settlement, substantial areas of sagebrush steppe habitat have been altered by human activities such as agriculture or natural resource extraction (Schneefas 1967, Braun et al. 2002, Knick et al. 2003, Holloran 2005). These landscape changes have been detrimental for a number of grassland and sagebrush dependent species (Knick et al 2003, Schroeder et al 2004, Aldridge 2005, Holloran 2005).

As a sagebrush-obligate species, sage-grouse (*Centrocerus urophasianus*) have been particularly affected by environmental changes over the past century. Throughout North America, their range has been reduced by 56%, and much of the remaining habitat is highly fragmented (Autenrieth 1986, Schroeder et al. 2004). Individual populations have declined by 15-90% since the early 1970's and many are at risk of extirpation (Connelly and Braun 1997, Aldridge and Brigham 2003, Connelly et al 2004). Sage-grouse habitat in Canada currently represents about 10% of the historic range (Aldridge and Brigham 2002). Since sage-grouse was listed as an endangered species in Canada in 1998, recovery teams have been active at the international, national, and provincial levels.

The Alberta recovery plan (Alberta Sage Grouse Recovery Action Group 2005) makes reference to specific limitations to land use activities within the remaining sage-grouse range, including the type of activity, its distance from the habitat of interest, noise levels and the temporal use of surrounding lands. What trends will emerge between sage-grouse activity in relation to human development of the sagebrush steppe environment in Alberta? Will these trends help outline the path to recovery for sage-grouse? The primary purpose of this study is to analyze the relationship between sage-grouse

dynamics and the temporal and spatial changes of development footprints in southeastern Alberta. We hypothesized that the decrease in sage-grouse lek persistence from 1968 to 2008 would correlate directly with increase in human footprint within sage-grouse habitat.

Methods and Data

The study area of this project is located in southeastern Alberta near the Milk River valley. The available data included the locations of active and inactive sage-grouse leks, male activity levels from 1968 to the present, air photos from 1968 to the present, and the distribution of current human footprints across the study area. All data was provided courtesy Alberta Sustainable Resource Development (ASRD) and Southern Alberta Landscapes.

We created a current Human Development Footprint (HDF) layer showing the distribution of current human development are around each lek in the study area. The HDF layer consists of a collection of human development in the study area including urban areas, agriculture, water wells, oil and gas facilities, wells, and pipelines, power lines, telecommunications infrastructure, roads, and gravel pits. We then used historical air photos to backdate the HDF layer to show changes in those features through time. We used regression analysis to analyze the influence of human disturbances (footprint and zones of influence) on trends in lek persistence and lek activity over time.

Results

Forthcoming results will show (I) definition of the areas where sage-grouse have been most affected by human development, (II) characterizations of trends between different kinds of human development and sage-grouse lek dynamics and activity levels, and (III) recommendations to improve the effectiveness of Alberta land use guidelines based on the trends identified.

Conclusions

This investigation will reveal correlations between specific human development types and sage-grouse lek activity levels. By highlighting correlations between development types and lek activity declines, recommendations can be made to limit harmful developments and allow the restoration and recovery of the sage-grouse in southeastern Alberta.

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