Alberta Conservation Association
2007/08 Project Summary Report

Project name: Moose Resource Selection Function Modeling

Project leader: Stephen Hamilton

Primary ACA staff on this project: Stephen Hamilton and Doug Manzer

Partnerships:

Alberta Sustainable Resource Development

Key findings

- Sightability of moose confounded results making model interpretation unreliable.
- The best model to date for explaining resources used by moose in winter is based on percent of crown closure, stand age, stand species, distance to forest edge, and distance to water.
- New candidate models and better integration of sightability are required to successfully model moose resource selection from aerial ungulate survey data.

Introduction

In the past, information on moose has focused on population size, primarily determined by aerial surveys completed on a 5 - 6 year cycle. Management for moose was based on the animals' association with "key ungulate zones", primarily habitat along major river valleys, though this assumption has not been tested. Given the rate and intensity of industrial development in northeastern Alberta, we need to refine our understanding of moose habitat selection. Alberta Sustainable Resource Development (ASRD) has listed this work as a priority.

Methods

We used moose location data from aerial surveys to develop a resource selection function (RSF) based on a comparison of vegetation characteristics, availability of water, and density of anthropogenic features. We used a series of candidate models incorporating these variables based on expert input from a consultant hired by ASRD. We used wildlife management unit (WMU) 516 as an initial testing area because of the availability of both existing GIS data and two separate aerial survey datasets, allowing us to both build an initial model and validate it with independent data. Assuming the techniques developed for WMU 516 are successful, our intention has been to build models for the remaining WMUs in northeastern Alberta, and to provide a user-interface for model deployment to enable regional ASRD biologists to continue developing RSFs for their areas of interest in the future.

Results

The RSF for WMU 516 was completed in early 2006 and the results presented at the 42nd Annual North American Moose Conference. Using AIC to select the best candidate model we chose the model incorporating crown closure (corrected for sightability), stand age, stand species, distance to forest edge, and distance to nearest body of water. While the model was statistically sound based on k-fold cross validation (Boyce et al. 2002), the RSF predicted high use for moose in areas where moose were easily seen. In other words, sightability became the most influential variable in the model and thus did not allow for a reliable interpretation of results. We did not perform validation of the RSF using additional survey data as these data would suffer from the same problem as the original dataset. Instead we chose to investigate two new approaches to improve our model.

The first approach we took was to revisit the candidate models used for the RSF. The original models supplied by a consultant were based on GIS map layers that were readily available rather than on biological factors that may drive moose to select habitat. ASRD agreed to investigate developing new candidate models based on expert opinion of moose biologists, and then to find the most appropriate data to feed into the models.

The second approach we took was to better integrate sightability into the model. For this, we developed a theoretical design to inflate moose locations based on an existing sightability correction factor and the regional population estimate from the aerial surveys. This design has been approved by Alberta Conservation Association (ACA) and ASRD staff and is ready to be tested.

Conclusion

The moose RSF for northeastern Alberta developed in 2006, although statistically rigorous, was biologically untenable. Any future attempts to build a RSF for WMU 516, or any other WMU, will require both a new series of candidate models and a method of integrating sightability into the model. The sightability integration design extends beyond improving the moose RSF, and should be investigated as a possible standard method to build RSFs for any species when survey data only are available (rather than GPS/VHF radio collar data) as use locations.

Communications

- Presentation of results at the 42nd Annual North American Moose Conference, July 2006.

Literature cited

Boyce, M.S., P.R. Vernier, S.E. Nielsen, and F.K.A. Schmiegelow. 2002. Evaluating resource selection functions. Ecological Modeling 157: 281-300.

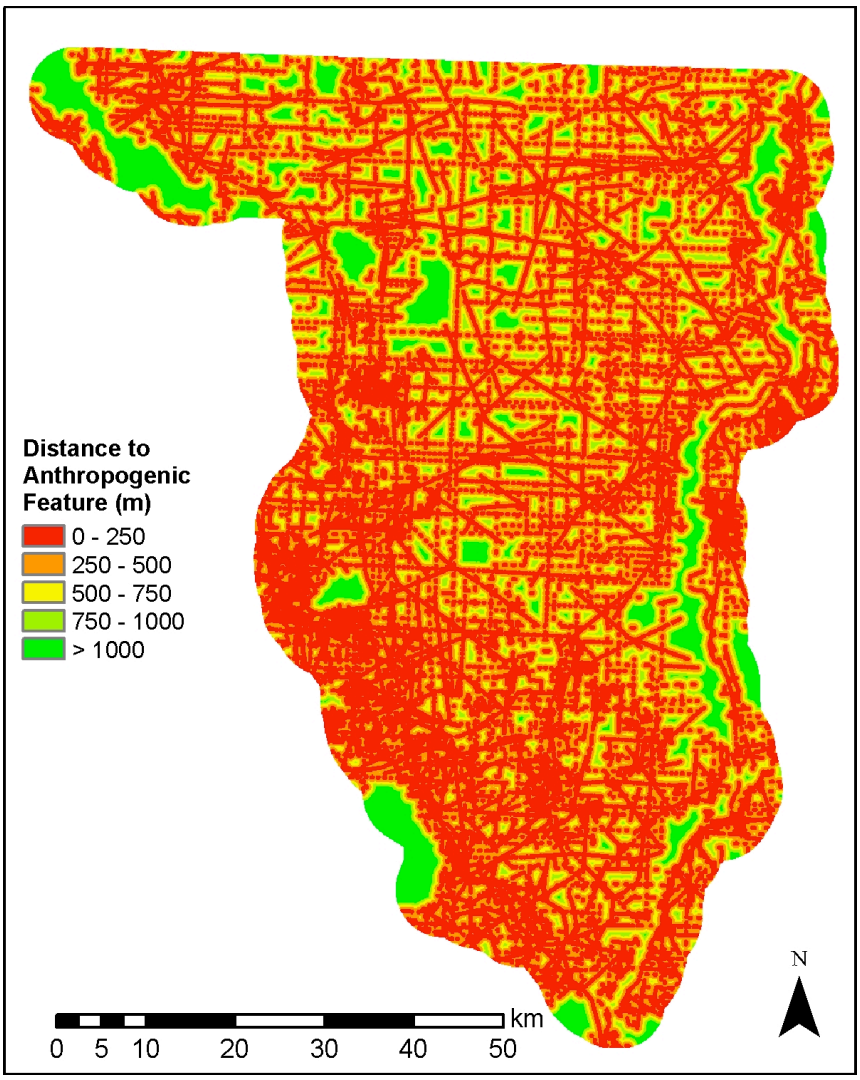

Figure 1. A map of potential moose habitat in WMU 516 overlain with anthropogenic features. Green areas represent regions that are greater than 1 km away from anthropogenic features (cutlines, access roads, wellsites, transmission lines, cutblocks, etc.).