Alberta Conservation Association
2008/09 Project Summary Report

Project name: *Moose Aerial Survey Continual Improvement*

Project leader: Nathan Webb

Primary ACA staff on this project (including seasonals)
Nathan Webb, Robert Anderson

Partnerships
University of Montana
Alberta Sustainable Resource Development

Key Findings

- Distance sampling may provide an alternative to traditional stratified random block aerial surveys in areas with low moose density and dense forest.
- Approximately 50% of moose are not detected by observers in areas comprised of dense forest.
- Sightability trials with radiocollared moose in 2008/2009 provided an initial sample for the development of a model to correct moose population estimates in forested Wildlife Management Units.

Abstract
Current approaches used to survey moose in Alberta are not effective in areas where forest canopy cover is high or where moose densities are low. Helicopter-based distance sampling surveys may be a cost-effective approach to develop moose population estimates in these areas; however, sightability of moose on the transect line may be less than 100%, which violates a key assumption of distance sampling. In fiscal year 2008/2009, in collaboration with the University of Montana and Alberta Sustainable Resource development, ACA conducted sightability surveys with radiocollared moose to determine the proportion that are successfully observed during distance sampling surveys. Survey trials indicated that approximately 50% of moose are missed by observers in areas with dense forest cover.

Introduction
Currently, Alberta Conservation Association (ACA) and Alberta Sustainable Resource Development (ASRD) utilize Stratified Random Block (SRB) surveys to develop population estimates of moose (*Alces alces*), white-tailed deer (*Odocoileus virginianus*), and mule deer (*Odocoileus hemionus*) throughout the province, and of elk (*Cervus elaphus*) in west-central Alberta. During the 2008/2009 survey season, 74% of ACA's annual aircraft budget was allocated to SRB surveys for moose and deer. While SRB surveys are widely used for aerial surveys of ungulates throughout North America, they

are expensive, do not directly correct population estimates for animals missed during flights, and often result in imprecise population estimates when animal densities are low (Borchers et al. 2002).

An alternative to SRB surveys are line transect surveys, which estimate sightability bias directly using distance sampling methodology (Buckland et al. 2001). The most critical assumption of distance sampling is that animals on the center line are detected with 100% certainty. Unfortunately, during aerial surveys the detection probability of animals near the transect line is often much less than 1.0, resulting in population estimates that are biased low.

Recent advancements in Mark-Recapture Distance Sampling (MRDS) may allow moose population estimates derived with distance sampling to be corrected with a sightability model developed using radiocollared animals (Figure 1; Laake et al. 2008). If successful, this advancement promises to result in several improvements over current SRB techniques, including 1) the ability to develop accurate moose population estimates in low-density areas; 2) the ability to survey moose effectively in areas with dense vegetation cover; and 3) a substantial (~50%) reduction in current cost/unit area for aerial moose surveys.

Methods

Sightability trials were conducted once during winter 2008/2009, using a sample of 14 moose radiocollared by ASRD and the University of Montana. Collared moose were located in Wildlife Management Units (WMUs) 352, 353, 440, 441, and 442 near Grande Cache. These WMUs are comprised of rolling foothills and mountainous terrain, with extensive conifer forests interspersed with cutblocks and natural forest openings.

Each survey trial consisted of initially locating a radio-collared moose from a fixed-wing Cessna 337. A randomly chosen survey block of 1 mile by 1 mile was projected over each detected animal (Figure 1). A second crew, in a Bell 206 Jet Ranger Helicopter, searched the survey unit at an altitude of 75-125 m with an airspeed of 80 mph. The helicopter flew in regular, parallel paths across the sampling block, or in contours in areas with steeper terrain. Flight lines were spaced 400m apart to avoid spatial overlap between transects. Every moose detected along the flight path was recorded, along with several variables (% forest cover, moose activity, group size, etc.) known to affect the sightability of moose. If a target moose (collared) was missed by the observers, the helicopter pilot relocated the animal immediately, and the survey crew recorded the variables for that location.

Results

Trials conducted in fiscal year 2008/2009 resulted in a preliminary assessment of sightability of moose. Moose were successfully detected by observers in 50% of

sightability trials, indicating that the accuracy of moose surveys can be enhanced through the development of a sightability model. The 2008/2009 survey trials will provide an initial sample for model development and guidance for further sightability trials in 2009/2010 by ACA and the University of Montana.

Conclusions

Distance sampling surveys for moose will require a correction for animals that are not observed on the transect line. ACA plans to work in collaboration with the University of Montana and ASRD in fiscal year 2009/2010 to continue data collection for the development of a mark-recapture sightability model.

Communications

No communication efforts were conducted in 2008/2009 as the project is in the initial stages of data collection. When complete, project results will be distributed through professional presentations, posters, and an article in ACA's *Conservation* magazine.

Literature Cited

Borchers, D. L., S. T. Buckland, and W. Zucchini 2002. Estimating animal abundance, closed populations. Springer-Verlag, London, Berlin, Heidelberg.

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

Laake, J., M. J. Dawson, and J. Hone. 2008. Visibility bias in aerial survey: mark-recapture, line-transect or both? Wildlife Research 35:299-309.

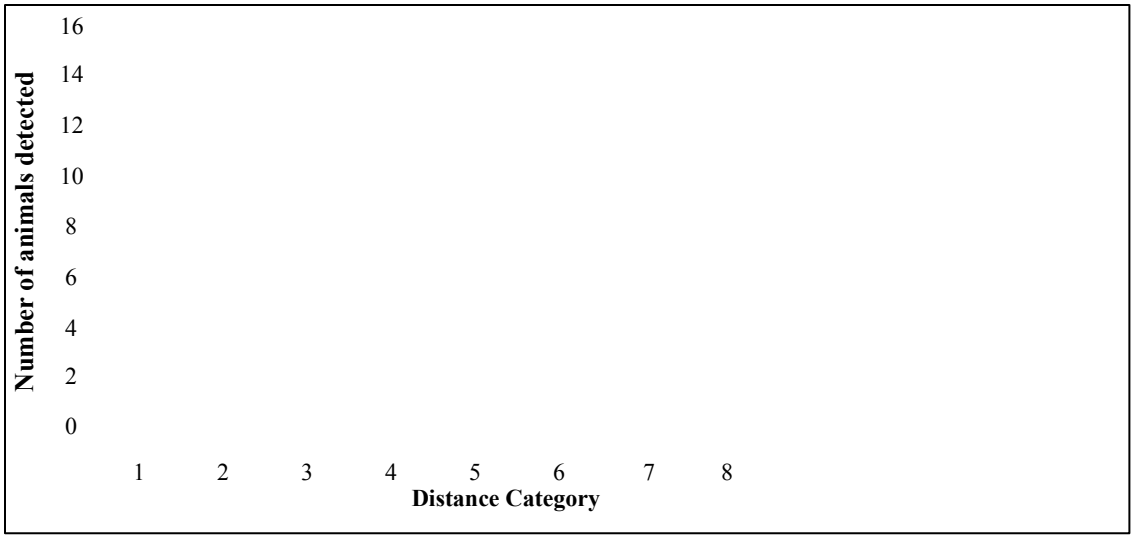

Figure 1. Graphical representation of the effects of sightability bias on a detection function for moose.

Sightability of moose is likely high when they are near the aircraft and in open habitats. (Photo: Dave Jackson)

Conifer trees often obscure moose, leading to underestimates of moose populations if surveys are not corrected for sightability. (Photo: Dave Jackson)