Alberta Conservation Association
2008/09 Project Summary Report

Project name: *Pronghorn Antelope Aerial Survey Continual Improvement*

Project leader: Nathan Webb

Primary ACA staff on this project (including seasonals)
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Partnerships
Alberta Sustainable Resource Development

Key Findings

- Current pronghorn surveys in Alberta may underestimate population size and do not provide measures of precision.
- Helicopter-based distance sampling surveys correct for pronghorn missed during surveys and allow calculation of confidence intervals.
- Pronghorn population estimates can be improved with slight modifications to current surveys.

Abstract
In Alberta, accurate pronghorn antelope inventory methods are required to balance recreational hunting opportunities with losses due to severe winters. Traditionally, pronghorn populations have been monitored with aerial surveys across 1-mile strip transects. Recent work in the U.S. has indicated that these surveys may underestimate pronghorn density. In July 2008, ACA staff (in collaboration with Alberta Sustainable Resource Development) tested helicopter-based distance sampling to enumerate pronghorn densities. This work indicated that current methods may underestimate pronghorn densities by over 20%, and that distance sampling surveys can be implemented for little additional cost over the current survey approach.

Introduction
Pronghorn Antelope are a highly sought-after game species in Alberta, with over 25 times as many applicants as available licenses for trophy antelope in the rifle seasons. More so than any other ungulate species in the province, pronghorn regularly undergo large fluctuations in population size due to their susceptibility to harsh winter conditions. Accurate pronghorn inventory methods enable ASRD to adjust tag allocations in a manner that optimizes recreational hunting, while preventing declines and allowing herds to rebuild after severe winters.

In Alberta, aerial surveys for pronghorn are conducted as a series of non-random, 1-mile wide strip transects within each Antelope Management Area (AMA). Although the strip-

transect approach has seen wide-spread use throughout western North America as a pronghorn survey technique, extensive evidence suggests other approaches may allow more accurate estimates of pronghorn density.

Measuring the distance of pronghorn herds from strip transects is a simple modification that would allow an estimate of the percent of pronghorn missed during regular surveys, as well as add confidence intervals to density estimates. Confidence intervals are measures of precision for these estimates and allow statistically robust comparisons of densities among years or areas. In 2008, we conducted a survey trial to assess the feasibility of incorporating helicopter-based distance sampling into the current Alberta pronghorn survey protocol. Our specific objectives were to 1) determine if pronghorn flight response precludes distance sampling from helicopters; 2) determine the additional time required to collect distance data during pronghorn surveys, and 3) develop an initial estimate of the proportion of pronghorn that may be missed with the current Alberta survey approach in one AMA.

Methods

In order to evaluate the feasibility of collecting distance data as part of the current Alberta pronghorn survey protocol, ACA staff conducted a 2-day trial survey on 7-8 July 2008. Distance and herd-size data were imported into the program Distance 5.0 to develop density estimates and confidence intervals. We also calculated pronghorn density following the methods of Grue and Morton (2008) to allow comparisons to the traditional pronghorn survey approach.

Results

The survey crew observed a total of 172 pronghorn herds from the transect line during the survey trial, with an average herd size of 5.35 ± 0.50 (mean, S.E.).
A pronghorn density of 3.24 ± 0.86 individuals per square mile was predicted with a 90% confidence interval. The probability of detecting pronghorn herds dropped off rapidly beyond 200 m (Figure 1) reaffirming our prediction that densities may be underestimated if a detection probability is not used. Overall, the detection probability was 0.42 across the entire 1200m strip width used during the survey trial.

We calculated a pronghorn density estimate of 2.67 pronghorn/mi^2 for the traditional survey approach. This density is 17.6% less than the mean pronghorn density predicted by the distance sampling analyses, requiring a correction factor of 1.21 in order to equal the density predicted by distance sampling.

Conclusions

Our distance sampling survey trial indicated that collecting distance data during helicopter-based pronghorn surveys may be a practical approach for improving the confidence of pronghorn density estimates in Alberta. In addition, collecting distance data added little time to the traditional survey approach, suggesting that the improved data

quality resulting from distance sampling would require little additional effort over the current Alberta pronghorn surveys.

Communications

Report – Distance sampling for pronghorn antelope in Alberta - distributed this report to Alberta Sustainable Resource Development, July 2008.

Presentation – Distance sampling for pronghorn antelope in Alberta. Alberta Chapter of the Wildlife Society Annual Conference, March 2009.

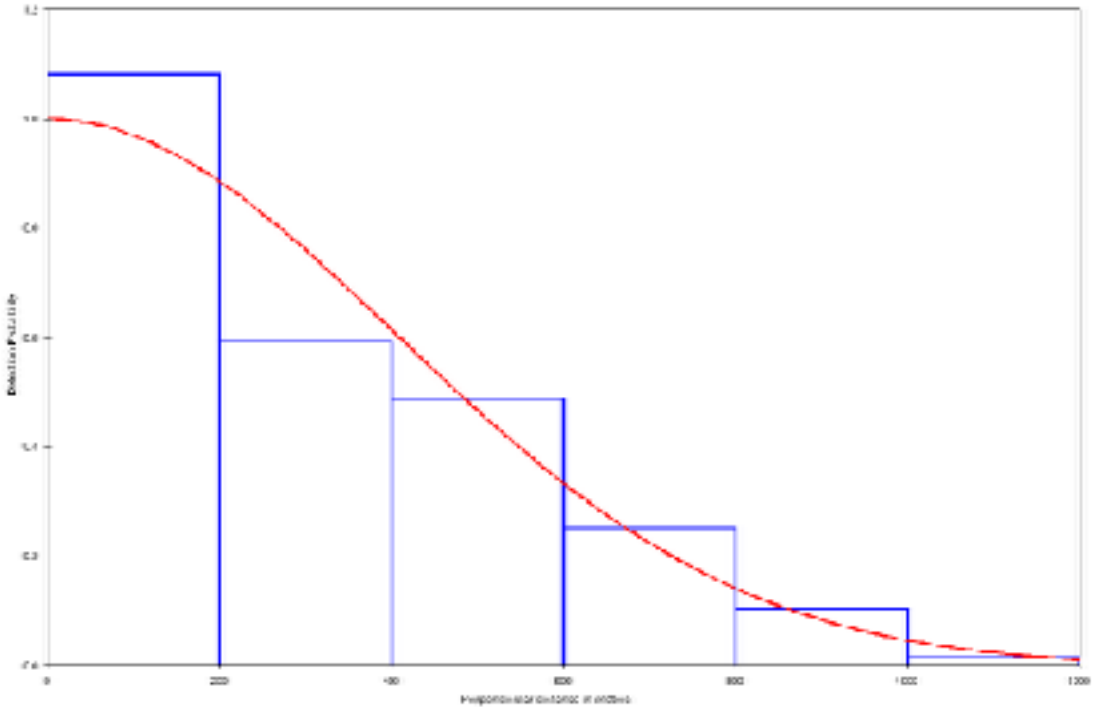

Figure 1. Histogram of pronghorn distance data with 200 m intervals. The slope of the curve indicates not all pronghorn are observed over the traditional 800 m wide strip transects, leading to underestimates of pronghorn density.

An observer counts pronghorn during aerial surveys in July 2008. (Photo: Maria Didkowsky)

During years with abundant rainfall, lush, green vegetation likely improves pronghorn sightability. (Photo: Maria Didkowsky)

Pronghorn surveys are designed not only to provide a population estimate, but to determine the ratio of bucks to does in the population. (Photo: Maria Didkowsky).