Alberta Conservation Association
2010/11 Project Summary Report

Project Name: *Sightability Correction for Elk Aerial Surveys in Southwest Alberta – A Component of the Southwest Alberta Montane Elk Study*

Wildlife Program Manager: Doug Manzer

Project Leader: Mike Jokinen

Primary ACA staff on project: Mike Jokinen

Partnerships

The Southwest Alberta Montane Elk Study Steering Committee was formed in 2005 and consists of the following collaborative partners and funding sources:

Alberta Conservation Association
Alberta Ingenuity Fund
Alberta Sport, Recreation, Parks and Wildlife Foundation
Alberta Sustainable Resource Development
Boone and Crockett Club
Canadian Wildlife Federation
Devon Energy Corporation
National Science and Engineering Research Council of Canada
Oregon State University
Parks Canada
Safari Club International
Shell Canada Limited
Southwest Alberta Sustainable Community Initiative
Spray Lakes Sawmills
University of Alberta
University of Calgary
World Wildlife Fund

Key Findings

- During one of the past three winters collared bull elk displayed different patterns of space use on winter range when compared with collared cow elk.

Introduction

Determining the number of ungulates missed during aerial surveys is a crucial component of interpreting survey results (Caughley 1974). Elk aerial surveys in southwestern Alberta are currently conducted as total trend counts during winter when elk are congregated and when snow cover provides good sightability. Slight changes in weather patterns have proven to influence

herding behaviour of elk, with potentially important implications for the proportion of elk observed during a survey (Boyce 1989, Allen 2005).

While trend count surveys provide a useful measure of elk relative abundance through time, they are a minimum count and do not allow estimates of the proportion of the population that are missed. From an elk harvest management perspective, mature bull elk typically travel in smaller groups and may exhibit differential habitat use from cow groups, including more extensive use of forested areas or use of separate winter ranges that are not currently surveyed. It is likely that estimates of bull:cow ratios derived using the current survey approach are biased due to differential sightability between the two sexes.

Methods

Using Global Positioning System (GPS) collar location data from both mature bull (three point+) and cow elk during 2008 – 2010, we examined patterns of spatial overlap between the two sexes during the period when aerial surveys would be conducted (January – March). Elk locations were recorded by their collars every two hours. We developed 95% Minimum Convex Polygon and kernel home ranges in ArcGIS 9.2 for each collared elk and calculated the amount of within- and between-sex overlap.

Results

In fiscal year 2008/09, we compared the percent overlap of five mature (three point+) bull elk and 13 cow elk using their winter GPS locations (January – March, 2008) (Figure 1). Our initial observations suggested mature bull elk winter home range size was half that of cow elk, on average. Individual bull and cow elk used consistent home range boundaries from January to March, allowing pooling of all collar data from each animal across all three months. When pooled, mature bull elk home ranges overlapped less with cow elk home ranges than cows overlapped with each other ($P = 0.017$), suggesting that bulls utilized different home ranges than cows during 2008. Finally, volume of intersection analyses indicated that bulls and cows showed different patterns of space use within their home range ($P = 0.040$).

We continued to test for yearly differences by examining 2009 and 2010 elk GPS collar data. We compared the percent overlap of four mature bull elk and three cow elk during winter 2009 (Figure 2), once again pooling all GPS data from each animal across all three months. During 2009, the overlap between bull and cow elk home ranges did not differ from that of cow home range overlap with each other ($P = 0.477$). Volume of intersection analysis also failed to show that bulls and cows were using space differently within home ranges during 2009 ($P = 0.681$). During 2010, we compared the percent overlap of two mature bull elk and eight cow elk (Figure 3), pooling all GPS data from each animal across all three months. Similar to 2009, we did not find overlap between bull and cow elk home ranges to differ from that of cow home range overlap with each other ($P = 0.328$) during 2010 and volume of intersection analysis did not show bulls and cows were using space differently within home ranges in 2010 ($P = 0.482$).

Figure 1. Minimum Convex Polygons (95%) of bull and cow elk winter range utilization in Wildlife Management Unit 302, January to March 2008.

Figure 2. Minimum Convex Polygons (95%) of bull and cow elk winter range utilization in Wildlife Management Unit 302, January to March 2009.

Figure 3. Minimum Convex Polygons (95%) of bull and cow elk winter range utilization in Wildlife Management Unit 302, January to March 2010.

Conclusions

Statistical analyses for both 2009 and 2010 data did not provide additional support for the pattern observed in 2008; however, we continue to struggle with maintaining an adequate sample size for overlap analyses due to timing of collar drop-offs, animal harvest and re-collaring of elk. These analyses are limited to one elk herd in the Castle-Carbondale area since few elk outside of this herd had full months of GPS collar data.

The potential to which mature bulls will separate from cow herds during the winter season could be a factor of individual herds (some herds may have fewer options to access preferred winter range) or individual years (intraspecific competition, predatory pressure, winter severity). The Southwest Alberta Montane Elk Study Steering Committee plans to maintain a sample of collared elk until 2013. This is the last year of this project as a stand-alone entity; however, as part of our continual improvement efforts within the Aerial Ungulate (big game) Survey program, we will continue overlap analyses to test for yearly differences to better understand winter range use of mature bulls during the winter aerial survey season, ultimately providing elk survey recommendations.

Communications

- ACA project objectives and staff biography highlighted on the Southwest Alberta Montane Elk Study website: www.montaneelk.com.
- Participated in Southwest Alberta Montane Elk Study Steering Committee meetings.
- Presentation to various user groups and/or at public information sessions held by the Southwest Alberta Montane Elk Study Steering Committee.
- Project highlighted in ACA *Conservation Magazine*, Fall 2010 issue.

Literature Cited

Allen, J.R. 2005. Use of sightability models and resource selection functions to enhance aerial population surveys of elk (*Cervus elaphus*) in Alberta. M. Sc. Thesis, University of Alberta, Alberta, Canada. 69 pp.

Boyce, M.S. 1989. The Jackson elk herd: Intensive wildlife management in North America. Cambridge University Press, Cambridge, U.K. 305 pp.

Caughley, G. 1974. Bias in aerial survey. Journal of Wildlife Management 38(4): 921-933.