FEDERAL AID INTERIM RESEARCH PERFORMANCE REPORT

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 115526
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PROJECT TITLE: Evaluating research options for developing a GSPE sightability correction factor

PRINCIPAL INVESTIGATOR: Kalin A. Kellie

COOPERATORS: Jay Ver Hoef (NOAA)

FEDERAL AID GRANT PROGRAM: Wildlife Restoration

GRANT AND SEGMENT NO. W-33-7

PROJECT NO. 1.66

WORK LOCATION: Interior Alaska (Region III)

STATE: Alaska

PERIOD: 1 July 2008 – 30 June 2009

I. PROGRESS ON PROJECT OBJECTIVES SINCE PROJECT INCEPTION

OBJECTIVE 1: Evaluate the effects of search intensity on sightability.

Student Intern (C. Pylant) and I digitized data from the 1970s sightability study, and organized information into a Microsoft® Access™ database and relational geographic information system (GIS) shapefiles. I combined this information with recent geospatial population estimation (GSPE) sightability data into a dataset useful for building a spatial sightability model. I combined sightability and search intensity data from the 1970s study and the current GSPE study into a single dataset in order to develop a logistic relationship between sightability and search intensity. This relationship expands on the one published in the moose survey technique manual developed by Gasaway et al. (1986:23) and encompasses a wider range of search intensities.

OBJECTIVE 2: Evaluate the sensitivity of the GSPE to variation in sightability and other sampling characteristics.

I generated 2 "known" populations from composites of >5 survey years at 2 different moose densities (>3 moose/mi^2 and <0.5 moose/mi^2). I averaged moose counts from units sampled in >1 year and interpolated unsampled units from those sampled. I developed a program in statistical software R (R Development Core Team 2008) to run simulated moose surveys and population estimates on the 2 "known" moose populations. Simulations included different levels of sampling, sampling ratios, and stratification error. In addition, each simulation recorded the performance of reported GSPE precision. I created plots used to evaluate the combined effect of all parameters (i.e., multivariate comparisons). B. Taras and J. Ver Hoef recommended including sensitivity analyses related to trend detection as this is a significant goal of GSPE population estimation.

OBJECTIVE 3: Develop a spatial sightability model using percent canopy cover generated from satellite imagery.

Poor survey conditions during winter 2007 prevented completion of scheduled sightability trials in Unit 20A. Because this 2-year pilot study is designed to provide the Alaska Department of Fish and Game (ADF&G) with timely recommendations for future sightability correction factor (SCF) and GSPE research, I modified the study design and used existing data for model development and analyses. I used fiscal year (FY) 2008 (FY08 = 1 Jul 2007–30 Jun 2008) operation funds slated for collecting Unit 20A sightability data to hire intern C. Pylant in February 2008 to assist with data entry and basic analyses. A statewide vegetation classification called the National Land Cover Data set (NLCD 2001)[1], available through the U.S. Environmental Protection Agency, provided 30 m-resolution vegetation information for all of Alaska. I summarized vegetation into 3 different classification systems for building the vegetation layer for the SCF model, summarizing for each GSPE sample unit by percent vegetation type. J. Ver Hoef and I evaluated the effectiveness of these 3 classification systems as a covariate for sightability. Percent forest was chosen as the best covariate. J. Ver Hoef then created a nonlinear logistic SCF model using all Unit 20A data and McGrath experimental micro-management area data through 2006. The model is based on average search intensity during the survey and the percent of forest pixels (30-m resolution) in the GSPE unit. The equation for calculating the variance for the SCF model still needs to be created and combined with the variance surrounding GSPE population estimates.

II. SUMMARY OF WORK COMPLETED ON JOBS IDENTIFIED IN ANNUAL PLAN THIS PERIOD

JOB/ACTIVITY 1: Moose survey data entry and summary.

We entered moose survey data relevant to sightability trials from Unit 19D (McGrath, Alaska) from winter 2008 surveys. To examine consistency in sightability between the 1970s trials and the current research, we summarized 1970s sightability trial data for search intensities commonly used for modern GSPE moose surveys. We are also working with WINFONET GSPE software programmer R. DeLong to make “search time” a required field when uploading and analyzing population estimates. This will improve monitoring of survey quality and prepare for automation of a spatial SCF in WINFONET.

JOB/ACTIVITY 2C: Create a model to evaluate GSPE sensitivity.

In anticipation of adding trend detection to GSPE sensitivity analyses, I developed R code (R Development Core Team 2008) to spatially simulate trends in population growth and decline. This project was extended 1 year because our staff biometrician was unavailable to assist in the GSPE sensitivity analyses.

JOB/ACTIVITY 3B: Develop a percent cover estimate for all GSPE units.

I created a layer of percent forest cover for all GSPE units in Interior Alaska using the technique developed during the previous reporting period. We will likely update this to the LANDFIRE vegetation classification system when it becomes available statewide

[1] http://www.epa.gov/mrlc/nlcd-2001.html

toward the end of 2009. The new LANDFIRE layer includes periodic updates that will aid in updating our percent cover layer to reflect recent fires and vegetation succession.

JOB/ACTIVITY 3C: Develop a spatial model for sightability.

J. Ver Hoef completed the variance calculations for the spatial SCF model on 30 June 2009.

JOB/ACTIVITY 3D: Validate the spatial model.

I compared the distribution of SCF estimates calculated using the spatial model for various moose survey areas around Interior Alaska. This was done by calculating an SCF from 100 random draws of 100 units in each of the survey areas. For these simulations I used 2 constant search intensities: 6 and 7 min/mi^2. In general, the model seemed to perform well but we were unable to examine the true effects on population estimation because the SCF variance was not available. The variance estimation for the model was not available in FY09, so we will evaluate model performance during FY10.

JOB/ACTIVITY 4: Data analysis and reporting.

We did not complete data analysis in FY09 due to the unavailability of our staff biometrician. The project has been extended for 1 year and we anticipate completing the analysis in early winter and writing the final report during summer 2010.

III. ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

None.

IV. PUBLICATIONS

None.

LITERATURE CITED:

GASAWAY W., S.D. DUBOIS, D.J. REED, AND S.J. HARBO. 1986. Estimating moose population parameters from aerial surveys. Biological Paper 22, University of Alaska Fairbanks, Alaska, USA.

R DEVELOPMENT CORE TEAM. 2008. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria.

V. RECOMMENDATIONS FOR THIS PROJECT

The results of this research will include recommendations regarding the application of a spatial SCF and detail effective sampling designs for GSPE surveys in various conditions. We also anticipate recommending further research in 2 areas: 1) Acquisition of sightability information at low density and during spring surveys and 2) Exploration of a hybrid approach to management decisions for moose populations that incorporate population estimates as well as other biological and harvest information.

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APPROVAL DATE: ____________________