ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 115526
Juneau, AK 99811-5526

Alaska Department of Fish and Game
Wildlife Restoration Grant

GRANT NUMBER: AKW-23

PROJECT NUMBER : 26.0

PROJECT TITLE: Biometric support for research and management programs

PERIOD OF PERFORMANCE: July 1, 2017 – June 30, 2018
REPORT DUE DATE:

PRINCIPAL INVESTIGATOR: Chris Krenz

COOPERATORS:

Jason Waite (Region I), Earl Becker (Region II), John Merickel and Alyssa Crawford (Region III), Meg Inokuma (Region IV), and Grey Pendleton (Statewide – waterfowl) are the biometric staff for this project.

I. PROGRESS ON PROJECT OBJECTIVES DURING PERIOD OF PERFORMANCE

OBJECTIVE 1: Provide biometric consulting, assistance, analysis, and evaluation to research and management staff. This includes biometricians reviewing and evaluating biometric aspects of proposed studies and Research Operational Plans.

ACCOMPLISHMENTS:

Region I – Jason Waite

1. Deer density assessed from fecal DNA samples: Performed reanalysis for 2014-2016 deer population density estimates for Gravina and Mitkoff Islands with additional data from a genetics lab reanalysis. A series of *post-hoc* simulations were also performed on these data to assess the potential effects of reducing the number of sampling occasions and/or sampling transects on future sample collection efforts. Preliminary results of the simulations have been compiled, though additional analyses are required.
2. Mountain goat sightability model: Fine-tuned the Bayesian model while working towards developing a stand-alone application for use by managers. Progress has been made on improving the speed and precision of the model. The model was used to provide up-to-date population size estimates for mountain goats in the Lynn Canal, Baranof Island, and Chichigof Island areas.

3. Mountain goat home ranges: Assisted with analysis of mountain goat home ranges by providing a variety of R programs. Code to estimate the home ranges (using the Reproducible Home Range package), inter-year home range overlap within animals, overlap between animals, and UDOI has been written. Methods to truncate home ranges based on barriers to movement (e.g., the ocean) have been assessed and implemented.
4. Prince of Wales wolf project: Continued to provide biometric support, including density and population size estimates for the 2016 population estimate. Simulations were also performed on these data to assess the potential effects of reduced sampling effort for future data collection efforts.
5. Fisher population assessment project: Assistance was provided to develop a sampling design for a fisher population assessment project in the Taku River study area, and again for a revised study area located along the Juneau road system. Conducted preliminary work to explore models that incorporate samples identified via DNA and unidentified/unmarked animals seen in camera traps, though this work is largely being undertaken by the grad student working on the project.

Region II – Earl Becker

1. Moose calf survival: Used a Kaplan-Meier survival model to estimate moose calf survival for GMUs 15A and 15C, which were compared to earlier estimates.
2. Effect of vaginal implant transmitters (VIT) in moose: Provided analysis of research data to determine if VITs effect pregnancy status and timing of calf parturition the following year.
3. Developed an unbiased distance sampling model to estimate bear population size: Updated the computer code used to compute the two-piece normal MRDS (Mark-Recapture Distance Sampling) model of Becker and Christ (2015) to include variability in the encounter rate into the variance calculation (Buckland et al. 2015) for the non-stratified sampling case. Work to expand the code for the stratified sampling is in progress.
4. Brown Bear population estimates: Provided estimates of brown bear population size and density for GMUs 9D and 9C from prior surveys, and worked with area biologists to estimate GMU sub-unit harvest rates and confidence intervals.

Region III – John Merickel and Alyssa Crawford

1. Moose survey and inventory: Provided survey design, determined optimal sampling allocation, collected aerial survey data, analyzed data for population abundance estimates, and applied appropriate sightability corrections to abundance estimates for GMU subunits 12, 20E, 19D, Experimental Moose Management Area (subset of 19D McGrath area), 20A, 20B, and 24B with area biologists Tony Hollis, Josh Pierce, Jeff Wells, Jeff Gross, Glenn Stout, and research biologist Danny Caudill.
2. Estimation of effects of predator control on moose in GMU subunit 24B: Analyzed trends in GSPE population abundance data in relation to wolf removal. Estimated survival of calf and yearling moose in relation to wolf removal in cooperation with area biologist Glenn Stout.

3. Statewide assessment of intensive management programs: Provided biometric consultation on data management and structure in preparation for analyses on moose and caribou population and composition data to summarize and assess effects of intensive management statewide with Tom Paragi, Rob DeLong, and Jen Roach.
4. Provided biometric consultation for caribou composition estimation: Investigated alternative sampling and analysis methods for estimating caribou composition with Beth Lenart and Lincoln Parrett.
5. Provided biometric consultation for Grizzly bear abundance estimation: Conducted power analyses and feasibility assessment of the potential for conducting an aerial survey to estimate Grizzly bear abundance in Alaska Range with biologists Tony Hollis, and Kerry Nicholson.
6. Provided Biometric consultation for harvest data analysis: Consulted with research biologist Danny Caudill on implementation of statistical models for harvest data modeling.
7. Proposed research project to develop new abundance estimator: Developed and proposed project to develop an abundance estimator for moose with research biologist Graham Frye (co-PI) with a method called Close Kin Mark Recapture (CKMR).
8. Provided biometric consultation for marten harvest analysis: Consulted with research biologist Kerry Nicholson on analyses of donated marten carcasses and predictive models of marten harvest.
9. Provided biometric consultation for moose harvest analysis: Consulted with Galena area manager Glenn Stout on trends of moose harvest including moose antlers widths, and age structure.
10. Provided biometric consultation on caribou abundance: Consulted with herd managers on estimating caribou abundance and its variance using Rivest's method. Also consulted on developing data collection for counting effort of caribou on photos, and methods for automated counting of caribou on digital photos.
11. Provided biometric consultation on trends of the Fortymile caribou herd: Consulted with research biologist Torsten Bentzen and Tok area biologist Jeff Gross on trends in survival, and demographic rates of the Fortymile caribou herd.
12. Reviewed moose operational reports and plans: Reviewed and provided comments for moose operational reports and plans for GMU 12, 19, 20B, 20E, 21AE, 24, and 25ABD.

Region IV – Meg Inokuma

1. Provided biometric support in analysis of caribou: Assisted ADF&G research biologist Dominic Demma (Region IV – Palmer) in analyzing Mulchatna Caribou Herd survival and antler growth.
2. Provided biometric support on moose abundance estimates: Assisted ADF&G area biologist Neil Barten (Region IV – Dillingham) in estimating the abundance trend in the Weary River area, by completing analysis of moose data collected in the past and comparing different estimation techniques in GMU 17, and by also automating sightability correction factor (SCF) calculation based on either

intensive surveys or VHF surveys. Also assisted Mr. Barten by improving a moose abundance projection model to make it functional and user-friendly. Assisted both ADF&G area assistant biologist Chris Peterson (Region IV – King Salmon) and ADF&G area biologist Neil Barten (Region IV – Dillingham) in sample size allocation for an ongoing GSPE survey. And Assisted ADF&G area biologist Tim Peltier (Region IV – Palmer) in planning for a SCF survey.

3. Performed analysis in preparation for habitat enhancement effort: Assisted ADF&G research coordinator Michael Guttery (Region IV – Palmer) in planning Alphabet Hills burn area study.
4. Provided biometric support for management presentations. Assisted ADF&G area biologists Neil Barten (Region IV – Dillingham) and Tim Peltier (Region IV – Palmer) in Board of Game meeting preparation.
5. Provided biometric support for wolf survey. Assisted ADF&G research biologist Kassidy Colson (Region IV – Palmer) in analyzing flight timing for wolf surveys.
6. Provided biometric support for moose-vehicle research project: Assisted Utah State graduate student Luke McDonald who collaboratively works with ADF&G in analyzing moose-vehicle collisions in the Matanuska-Susitna Valley.

Region V – Adam Craig

1. Moose survey and inventory: Provided survey design, determined optimal sampling allocation, assisted with data analysis to estimate abundance and age/sex composition in Game Management Units 22D, 22E, 23, and 18.
2. Caribou survey and inventory: Provided survey design for composition estimates on Western Arctic and Teshekpuk caribou herds. Performed survival analyses on calf mortality data. Assisted with photocensus to estimate abundance of Western Arctic caribou herd. Provide timely estimates of harvest.
3. Muskox survey and inventory: Provided survey design for composition estimates of muskox populations in Game Management Units 22, 23, and 18. Assisted with mainland muskox survey documenting range expansion in Game Management Unit 18.
4. Provided biometric consultation for intensive management research: Assisted with design of moose research projects to assess potential limiting factors to abundance in Game Management Units 22 and 23.
5. Provided biometric consultation for browse removal surveys: Provided design for implementing browse removal surveys in Game Management Units 22 and 23.

Statewide (waterfowl) – Grey Pendleton

1. Provided biometric support to dusky Canada geese project: Estimated the population size of nesting dusky Canada geese on Middleton Island, Alaska. Worked with Waterfowl Program staff to further refine the design for estimating the number of dusky Canada goose nests and produced estimates of the number of goose nests on the island (and associated precision estimates) for 2016 and 2017; analyses of 2018 data continue.
2. Estimated the abundance of sea ducks in Kachemak Bay, Alaska: Became familiar with field protocols and potential implications of sampling on estimation procedures. Discussed the possibility of using hierarchical Bayesian methods to produce estimates with program staff.

3. Biometric support for estimating abundance of mallards in urban Anchorage, Alaska. Conducted preliminary analyses and discussed possibility of using mark-resight models for estimating population sizes, survival, and movement probabilities.

OBJECTIVE 2: Biometric staff attend conferences and trainings as well as present findings.

ACCOMPLISHMENTS:

Region I – Jason Waite

1. Attended a workshop on Close-Kin Mark-Recapture (CKMR) in Fairbanks, Alaska, July 24-28.
2. Attended a workshop on Bayesian Integrated Population Models (IPM) in Fairbanks, October 23-27.

Region II – Earl Becker

1. Attended a workshop on Close-Kin Mark-Recapture (CKMR) in Fairbanks, Alaska, July 24-28.
2. Attended statewide moose workshop on estimating moose population size.

Region III – John Merickel and Alyssa Crawford

1. Attended Remington model 870 shotgun bear safety training.
2. Attended and hosted workshop and conference given by Dr. Mark Bravington on CKMR in Fairbanks.
3. Attended ADFG caribou workshop and presented work on composition estimation, estimating caribou abundance and its variance using Rivest's method, and a population model for the Fortymile caribou herd.
4. Attended moose workshop and presented on CKMR as an alternative approach to estimate moose abundance and vital rates.
5. Attended ADFG caribou workshop and presented on
6. Attended Joint Statistical Meeting in Baltimore, MD and presented on predictive models for marten harvest.
7. Attended Wildlife Safety course.
8. Attended Media interaction training.
9. Attended Integrated Population Modeling (IPM) workshop in Fairbanks, AK.

Region IV – Meg Inokuma

1. Attended the meeting of the Alaska Chapter of the American Statistical Association.
2. Attended Close-Kin Mark-Recapture Workshop.
3. Attended ADFG caribou workshop and presented an application of an Integrated Population Model for the Fortymile Caribou Herd.
4. Attended the workshop on "modern tools for spatial modeling and animal movement analysis."
5. Attended statewide moose workshop on estimating moose population size.

Region V – Adam Craig

1. Attended conference on close kin mark recapture techniques given by Dr. Mark Bravington in Fairbanks.
2. Attended statewide ADF&G caribou workshop and presented developments on abundance estimation and detecting thresholds in vital rates.
3. Attended statewide moose workshop on estimating moose population size and presented how adaptive cluster sampling designs may be used to estimate abundance.
4. Attended annual meeting of the Western Arctic Caribou Herd Working Group and presented how abundance is estimated using photocensus data.

Statewide (waterfowl) – Grey Pendleton.

- There was not a good opportunity to attend a conference or present results this year.

II. SUMMARY OF WORK COMPLETED ON PROJECT TO DATE.

Biometric consultation and analyses were provided for various research and management projects in regions I, II, III, IV, and V as well as the statewide waterfowl program. Consultation included survey and data collection recommendations, field data collection, and analysis of collected data. New biometric tools were worked on, built, and refined. Conferences and trainings were attended and various projects' findings were presented.

III. SIGNIFICANT DEVELOPMENT REPORTS AND/OR AMENDMENTS.

The Principal Investigator has been designated as Chris Krenz, DWC Wildlife Scientist 907-465-5157 Chris.krenz@alaska.gov. His role is only to compile submissions by the Biometricians.

IV. PUBLICATIONS

Roffler, G. H., J. N. Waite, K. L. Pilgrim, K. E. Zarn, and M. K. Schwartz. Estimating abundance of a cryptic social carnivore using spatially explicit capture-recapture. – Submitted June 2018.

V. RECOMMENDATIONS FOR THIS PROJECT

Provide biometric support through continuation of this project.

Prepared by: Jason Waite, Earl Becker, John Merickel, Alyssa Crawford, Meg Inokuma, Grey Pendleton, and Chris Krenz.

Date: August 31, 2018