

**ALASKA DEPARTMENT OF FISH AND GAME
WILDLIFE RESTORATION GRANT**

Grant Number: AKW-4 Wildlife Restoration FY2015

Project Number: 26.0

Project Title: Biometric Research and Support

Project Duration: 1 July 2014–30 June 2015

Report Due Date: 1 September 2015

Principal Investigator: Grey W. Pendleton (HQ), Jason Waite (RI), Earl Becker (RII), Alyssa Crawford & Brian Taras (RIII), Michael Guttery (RIV), Adam Craig (RV)

Work Location: Statewide

Wildlife Division Headquarters

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

OBJECTIVE 1: Biometric consulting

In this, my first year working with the ADFG Waterfowl Program, my activities were largely consulting, with only preliminary data analyses and no manuscript preparation; data analyses and report and manuscript preparation will be a larger part of the job in the future.

1. Participate in activities related to the Alaska Migratory Bird Co-management Council (AMBCC) technical committees.
 - A) Estimating subsistence harvest of migratory birds. Researchers from Colorado State University have contracted with AMBCC to review current methods for estimating migratory bird harvest and suggest alternative methods that might be more efficient; I reviewed and commented on their draft reports regarding objectives of the current survey and evaluating the utility of the current survey.
 - B) Emperor goose management. I met with ADFG staff and a former USFWS biologist who are developing an emperor goose model that incorporates multiple existing data sources to become familiar with the basics of the program opening the possibility of more extensive future involvement.
2. Estimate the population size of nesting dusky Canada geese on Middleton Island, Alaska. I worked with Waterfowl Program staff to design a project to estimate the number of dusky Canada goose nests on Middleton Island. I also participated in 1 week of field sampling and helped make decisions on modifying the original plan

- because of field logistics. I produced preliminary estimates of the number of goose nests on the island and associated precision estimates. Final estimates are waiting on GIS calculations to account for habitat differences in nest density.
3. Estimate the winter populations of waterfowl in Kachemak Bay, Alaska. I reviewed prior analyses, reports, and reviews by other statisticians. I then consulted with Waterfowl program staff on acceptable assumptions for analyses and proposed an alternative stratification and analyses; analyses of the existing data are pending.
 4. Abundance of mallards in urban Anchorage, Alaska. I consulted with Waterfowl Program staff and examined existing data. Data collection continues.

OBJECTIVE 2: Attend conferences, training, write and present papers.

Meetings: I attended a meeting (March 2015) of technical committees for the AMBCC. The committee meetings I participated in were related to estimation of subsistence harvest of migratory birds and emperor goose management.

Training: None

II. SIGNIFICANT DEVIATIONS AND/OR ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

No.

III. PUBLICATIONS

None.

IV. RECOMMENDATIONS FOR THIS PROJECT

None.

Prepared by: Grey W. Pendleton

Date: 1 September 2015

Region I

PROGRESS ON PROJECT OBJECTIVES DURING LAST SEGMENT

OBJECTIVE 1: Habitat selection studies of brown bears, mountain goats, moose, deer, wolf, martens, and wolverines.

I provided statistical consulting for Region 1 projects that involved habitat selection objectives including Yakutat brown bears and Kuiu martens.

OBJECTIVE 2: Population and survival estimation methods for brown bears, black bears, mountain goats, moose, deer, wolves, and martens.

I provided statistical consulting for Region 1 projects that involved population objectives including mountain goat sightability modeling, DNA-based deer population estimation, martens on Kuiu Island, wolves in Unit 2, and brown bears in Yakutat. I worked on

developing new methods for mountain goat sightability models and DNA-based mark-recapture methods for brown bears, deer and wolves.

OBJECTIVE 3: Biometric consulting.

I provided statistical consulting for wide range of Region 1 projects including wolverine and marten diet analysis using stable isotopes, mountain goat sightability modeling, habitat modeling (brown bears, moose, and mountain goats), DNA-based population estimation for deer, martens, wolves, and brown bears, aerial surveys for deer, and deer habitat assessment.

OBJECTIVE 4: Attend conferences and training write and present papers.

I attended the Alaska Board of Game meeting in January 2014. I presented the forb/browse data at annual staff meeting in February 2015, the marten model results at The Wildlife Society AK-Chapter meeting in April 2015, and SECR modeling results at the monthly Spatial Discussion Group meeting in September 2014. I attended a workshop on generalized linear mixed models with Ben Bolker at annual ASA meeting in Fairbanks, October 2014. I attended class on Program MARK with Gary White at CSU in June 2015. Also, I attended CPR/AED and Wilderness First Aid training in April 2015.

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

JOB/ACTIVITY 1: Habitat selection studies of brown bears, mountain goats, moose, deer, and wolverines.

Accomplishments:

Marten RSF project: I provided further statistical consulting on marten Resource Selection Function (RSF) models for Carl Koch and Dave Gregovich, including model development, selection, and interpretation, programming assistance, and software development.

JOB/ACTIVITY 2: Population and survival estimation methods for brown bears, black bears, mountain goats, moose, deer, and martens.

Accomplishments:

Wolf project: Wolf population estimation became a major issue in 2014–2015. I finalized data analysis of 2013 hair board data and provided assistance with summaries and reports. I provided statistical consulting for 2014 project design. I analyzed 2014 hair board data to estimate population abundance and provided assistance with summaries, presentations, and reports. Also, I participated in hair board field work in December 2014 and live capture field work in May 2015.

Marten capture-recapture project: I re-examined marten data to estimate population abundance using new and improved methodology (SCR-RSF models).

Goat sightability model: I continued statistical consultation and model development on Bayesian goat sightability model with Kevin White and Grey Pendleton.

Brown bear project: I provided consultation and comments for Malaspina brown bear report (Anthony Crupi). I began analysis of Yakutat brown bear hair-snare data and provided preliminary estimates of population abundance.

JOB/ACTIVITY 3: Biometric consulting.

Accomplishments:

Marten stable isotope project: I provided further assistance with stable isotope data, including analyses, interpretation, and software programming for Carl Koch. I improved performance and programmed additional functionality into the MixSIAR-GUI program.

Browse/Forb assessment: I assisted in the development and testing of survey techniques and field protocols for assessment of forbs in deer overwintering habitat. In addition, I participated in forb field surveys in fall 2014 on Mitkof and Kupreanof. I analyzed resulting data and performed additional expanded analyses on Spring 2015 browse survey data. I assisted with development of a presentation for the Board of Game (presented by Kelly Nesvacil) in January 2015.

Research: I developed extensions to mixed SCR-RSF models first presented by Royle et al. These models should prove useful for providing more accurate and precise estimates of population abundance on a spatially-explicit level by incorporating advanced SCR models with RSF-like habitat use data.

Other consultation projects: I provided biometric support for wolverine stable isotope analysis (Rod Flynn), aerial surveys for deer (Rich Lowell). I provided comments on updated Sheep Sealing Manual.

JOB/ACTIVITY 4: Attend conferences, training, write and present papers.

Accomplishments:

Meetings: I attended the Alaska Board of Game meeting in January 2014. I presented the forb/browse data at annual staff meeting in February 2015, the marten model results at The Wildlife Society AK-Chapter meeting in April 2015, and SECR modeling results at the monthly Spatial Discussion Group meeting in September 2014.

Training: I attended a workshop on generalized linear mixed models with Ben Bolker at annual ASA meeting in Fairbanks, October 2014. I attended class on Program MARK with Gary White at Colorado State University in June 2015. Also, I attended CPR/AED and Wilderness First Aid training in April 2015.

Outreach: I participated as a science fair judge for Thunder Mountain High School in association with the American Statistical Association AK Chapter.

IV. SIGNIFICANT DEVIATIONS AND/OR ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

No.

V. PUBLICATIONS

None.

VI. RECOMMENDATIONS FOR THIS PROJECT

This project should be continued as described in the study plan.

Prepared by: Jason N. Waite, Biometrician II

Submitted by: Rodney W. Flynn, Research Coordinator

Date: 1 September 2015

Region II

IV. PROGRESS ON PROJECT OBJECTIVES DURING LAST SEGMENT

OBJECTIVE 1: Provide biometric consulting to ensure the highest possible quantitative standards are applied to the Division's wildlife management and research activities.

Provided statistical consulting for Region 2 projects that included: developing a new analytical method for bear count data collected at McNeil State game sanctuary; performing moose survival analysis; consulting on passive monitoring systems for deer in rainforest habitats of Prince William Sound, and consulting on a black and brown bear survey for GMU 20A. The latter also included redesigning the sampling program to conduct distance sampling surveys of bears in Alaska.

OBJECTIVE 2: Develop an unbiased distance sampling model to estimate bear population size.

I submitted a paper entitled "A Unimodal Model for Double Observer Distance Sampling Surveys" to the journal PLoS ONE. The referee reviews were generally positive and encouraging. The manuscript was revised and is under final review. This journal also requires the computer code needed to duplicate the results. Due to the cutting edge nature of this work, over 2,000 lines of r-code (with documentation) were required to do this. This code has also been submitted as supplemental information to the journal.

OBJECTIVE 3: Stay current with new biometric techniques and developments by attending conferences and training.

I attended a short course on Generalized Additive Models (GAMs) that was sponsored by the Alaska Chapter of the American Statistical Association.

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

JOB/ACTIVITY 1: Biometric consulting.

I consulted on the bear view monitoring, deer monitoring, and moose survival analysis within the region. I consulted on bear estimation in GMU 20.

JOB/ACTIVITY 2: Bear population estimation.

I submitted and revised a manuscript on the use of aerial distance sampling to obtain estimates of bear population size. I also revised and documented the r-code needed to perform this analysis. I am currently revising the sampling design used to perform distance sampling of black and brown bears in Alaska.

JOB/ACTIVITY 3: Attend conferences, training, write and present papers.

I attended a short course on Generalized Additive Models (GAMs).

IV. SIGNIFICANT DEVIATIONS AND/OR ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

No.

V. PUBLICATIONS

None.

VI. RECOMMENDATIONS FOR THIS PROJECT

This project should be continued as described in the study plan.

Prepared by: Earl Becker, Biometrician III

Date: 23 September 2015

Region III

IV. SUMMARY OF WORK COMPLETED THIS SEGMENT ON JOBS IDENTIFIED IN ANNUAL WORK PLAN

OBJECTIVE 1: Biometric consulting.

JOB/ACTIVITY 1A: Provide biometric assistance to research and management staff. In addition, the biometricians will review and evaluate biometric aspects of future research study proposals.

The Region III biometrician positions were vacant during portions of this reporting period. PCN 11-2113 was vacant 1 July 2014–5 April 2015. PCN 11-2206 was vacant 16 September 2014–30 June 2015.

Both the Region III biometricians reviewed and performed statistical analyses, assisted in study design, and provided statistical editing in support of numerous federal aid projects.

Federal aid research project 1.69 – “Movements and sightability of moose in Game Management Unit 21E”

- During July–August 2014, assisted Tom Paragi in finalizing a memorandum entitled “Unit 21E moose population estimate with sightability correction, March 2012.”

Federal aid research project 1.73 – “Long-term effects of predator reductions on moose abundance, survival, nutrition, and hunting harvest in the Unit 19D East moose management area”

- Analyzed data collected during a mark-resight survey to estimate the abundance of black bears in the McGrath area. During August 2014, completed final memorandum entitled “McGrath Area Black Bear Abundance 2014 – Analysis Summary.”

Federal aid research project 3.53 – “Nutrition, mortality, range use, and demographics of the Fortymile and Central Arctic caribou herds”

- Performed extensive data analysis of neonate mass for both the Fortymile and Central Arctic caribou herds.
- Updated select analyses and figures in “BOERTJE, R. D., C. L. GARDNER, K. A. KELLIE, AND B. D. TARAS. 2012. Fortymile caribou herd: Increasing numbers, declining nutrition, and expanding range. Alaska Department of Fish and Game, Wildlife Technical Bulletin 14 ADF&G/DWC/WTB-2012-14, Juneau.”

Federal aid research project 4.39 – “Grizzly and black bear distribution and abundance relative to the 2004 wildfires in eastern Interior Alaska: Possible intensive management consequences”

- Continued analysis of DNA capture-recapture data for grizzly bears in Unit 20E using spatially-explicit capture-recapture models. Continued work on a manuscript to document the study results. Draft nearly ready for external review.

GARDNER, C. L., B. D. TARAS, K. A. KELLIE, AND N. J. PAMPERIN. *In prep.* Sampling design and modeling challenges for estimating density of an intensively managed grizzly bear population in Interior Alaska. *Journal of Wildlife Management.*

Federal aid research project 5.10 – “Identifying and evaluating techniques for wildlife habitat management in Interior Alaska”

- Although the final reporting requirements have been met and this project is officially closed, Brian Taras assisted the project leader in revising and finalizing an ADF&G wildlife research report.

PARAGI, T. F., AND D. A. HAGGSTROM. 2015. Identifying and evaluating techniques for wildlife habitat enhancement in Interior Alaska: Prescribed burn assessment. Alaska Department of Fish and Game, Final Wildlife Research Report 1 July 2005–30 June 2009, ADF&G/DWC/WRR-2015-1, Juneau.

Federal Aid Survey and Inventory Projects:

- Assisted ADF&G Area Manager Beth Lenart (Region III-Fairbanks) in analyzing and interpreting the results of caribou census surveys for the Central Arctic herd in 1997, 2000, 2002, 2008, 2010 and 2013.
- Assisted ADF&G Area Manager Don Young (Region III-Fairbanks) with the analysis of moose short-yearling mass in GMU 20A.
- Assisted ADF&G Area Manager Don Young (Region III-Fairbanks) and ADF&G Area Manager Glenn Stout (Region III-Fairbanks) with draft documents and process concepts for implementing wildlife survey and inventory projects.

Other Federal Aid Projects:

- Minor consulting was performed for a variety of federal aid projects on a drop-in basis.
- Continued work on the manuscript “Consequences of violating the independence assumption in aerial mark-recapture distance-sampling studies” by A.-M. Benson, R. P. Barry, B. D. Taras, and J. H. Reynolds.

OBJECTIVE 2: Conferences, training, and presentations.

JOB/ACTIVITY 2A: Attend conferences and training and present findings.

- Brian Taras participated in the annual meeting of the Alaska Chapter of the *American Statistical Association* during 18–20 August 2014 in Fairbanks including taking a short course on generalized linear mixed models given by Dr. Ben Bolker from McMaster University.

II. SIGNIFICANT DEVIATIONS AND/OR ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

None.

III. PUBLICATIONS

Except for the following, citations for publications mentioned in Section II are reported in performance reports written by Region III principal investigators:

BENSON, A.-M., R. P. BARRY, B. D. TARAS, AND J. H. REYNOLDS. *In prep.* Bias in distance-sampling estimators due to dependent observations and imperfect detection: An example using simulated aerial-survey data. To be submitted to *Wildlife Society Bulletin*.

IV. RECOMMENDATIONS FOR THIS PROJECT

None.

PREPARED BY: Alyssa L. Crawford and Brian D. Taras

DATE: 15 August 2015

Region IV

IV. SUMMARY OF WORK COMPLETED THIS SEGMENT ON JOBS IDENTIFIED IN ANNUAL WORK PLAN

OBJECTIVE 1: Biometric consulting.

JOB/ACTIVITY 1A: Provide biometric assistance to research and management staff. In addition, the biometricians will review and evaluate biometric aspects of future research study proposals.

The Region IV biometrician position was vacant during portions of this reporting period. PCN 11-2293 was not filled until 1 June 2015.

The Region IV biometrician consulted on statistical analyses and assisted in study design, support of various projects.

OBJECTIVE 2: Conferences, training, and presentations.

JOB/ACTIVITY 2A: Attend conferences and training and present findings.

- Dr. Guttery completed a training plan and completed initial drug handling training.

II. SIGNIFICANT DEVIATIONS AND/OR ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

None.

III. PUBLICATIONS

None.

IV. RECOMMENDATIONS FOR THIS PROJECT

None.

PREPARED BY: Michael Guttery and Mark Burch

DATE: 29 September 2015

Region V

I. SUMMARY OF WORK COMPLETED THIS SEGMENT ON JOBS IDENTIFIED IN ANNUAL WORK PLAN

JOB/ACTIVITY: Biometric consulting.

The Region V biometrician reviewed and performed statistical analyses, assisted in study design, and provided statistical editing in support of federal aid projects.

Federal aid proposal review.

- None

Federal aid research project x.xx – “”

- None

Federal aid survey and inventory projects.

- Assisted ADF&G Area Manager Tony Gorn (Region V-Nome) in designing geospatial population estimator (GSPE) moose surveys in Units 22D and 22E. Assisted with preparing a memorandum documenting the survey.
- Assisted ADF&G Area Manager Tony Gorn and biologist Bill Dunker (Region V-Nome) in designing composition surveys for muskox in all of Game Management Unit (GMU) 22 and GMU 23SW. Assisted with preparing a memorandum documenting the survey.
- Assisted ADF&G Assistant Area Manager Brandon Saito (Region V-Kotzebue) in designing a GSPE moose survey for the upper Kobuk moose survey area.
- Assisted ADF&G caribou biologists Jim Dau (Region V-Kotzebue) and Lincoln Parrett (Region V-Fairbanks) in estimating and predicting caribou harvest for both the Western Arctic and Teshekpuk caribou herds.
- Assisted ADF&G caribou biologist Lincoln Parrett (Region V-Fairbanks) with the analysis of caribou calf survival with regards to winter range.
- Assisted Region V biological staff complete photographic survey to estimate abundance of Western Arctic caribou herd.

Other Federal Aid Projects.

- Minor consulting was performed for a variety of federal aid projects on a drop-in basis. These efforts included providing assistance to a newly hired Biometrician I stationed in Region III.

JOB/ACTIVITY: Conferences, training, papers.

- None during this time period

II. SIGNIFICANT DEVIATIONS AND/OR ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

None.

III. PUBLICATIONS

None.

IV. RECOMMENDATIONS FOR THIS PROJECT

None.

PREPARED BY: Adam J. Craig

DATE: 1 October 2015