**FEDERAL AID COORDINATION & SUPPORT**
**ANNUAL PERFORMANCE REPORT**

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-10 Wildlife Restoration FY2016

**Project Number:**     26.0

**Project Title:**     Biometric support for research and management programs

**Project Duration**:     July 1, 2015 – June 30, 2016

**Report Due Date:**     September 28, 2016

**PRINCIPAL INVESTIGATOR:** Grey W. Pendleton (HQ), Jason Waite (RI), Earl Becker (RII), Alyssa Crawford & John Merickel (RIII), Michael Guttery (RIV), and Adam Craig (RV)

**WORK LOCATION:** Statewide

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### Headquarters Report

### I.     PROGRESS ON PROJECT OBJECTIVES DURING LAST SEGMENT

OBJECTIVE 1:  Biometric consulting. Provide biometric assistance to research and management staff. In addition, the biometricians will review and evaluate biometric aspects of future research study proposals.

OBJECTIVE 2:  Attend conferences and training, and present findings.

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

**Job/Activity 1:** Provide biometric consulting.

**Accomplishments**

In this, my first year working with the ADFG Waterfowl Program, my activities were largely were 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. Emperor goose management.  Worked with ADFG staff and a former USFWS biologist reviewing modifying the Bayesian emperor goose model proposed for use in new emperor goose management plans. Also reviewed emperor goose harvest models produced by the U.S. Fish and Wildlife Service.  Participated in meetings (ADFG,

ADFG&USFWS) to develop harvest strategies for emperor geese to be implemented by the new management plans.

2.  Estimate the population size of nesting dusky Canada geese on Middleton Island, Alaska.  I worked with Waterfowl Program staff to modify the design of the project to estimate the number of dusky Canada goose nests on Middleton Island.  The revised design was intended to make sampling more feasible while still providing adequate estimates. I also participated in 1 week of field sampling (May 2016).  I produced preliminary estimates of the number of goose nests on the island and associated precision estimates.  .

3.  Abundance of mallards in urban Anchorage, Alaska.  I consulted with Waterfowl Program staff and examined existing data.  Developed preliminary mark-resight models for estimating population sizes, survival, and movement probabilities. Data collection continues.

**Job/Activity 2:**  Attend conferences and training, and present findings.

**Accomplishments**:

Meetings: I attended 2 meetings (Oct 2015, March 2016) of technical committees for the AMBCC.  The committee meetings I participated in were related to discussions of emperor goose management and developing new emperor goose management plans for both the AMBCC and the Pacific Flyway.  I also participated in related meetings with ADFG and Fish and Wildlife Service staff.

Training: A request to attend training (Bayesian Integrated Population Modeling) for application to the emperor goose population model was not approved.

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

No

**Prepared by: Grey Pendleton**

### Region I

### I.  PROGRESS ON PROJECT OBJECTIVES DURING LAST SEGMENT

OBJECTIVE 1:  Biometric consulting. Provide biometric assistance to research and management staff. In addition, the biometricians will review and evaluate biometric aspects of future research study proposals.

**Accomplishments**:

Marten RSF and Population project: I provided further statistical consulting on marten Resource Selection Function (RSF) models for Carl Koch, including model development, selection, and interpretation, programming assistance, software development, and final thesis manuscript review. Further progress was made implementing RSF data with capture-recapture data in newly-developed models to refine the population estimates.

Wolf Population Estimation project: I continued to provide statistical consultation on this project, including follow-up analyses on 2013 and 2014 data and drafting of manuscripts and presentations. Final population estimates were produced and included in an ADFG report. I provided consultation of the sampling design and data collection protocol for the 2015-2016 field season. I provided statistical consulting for an extension to the study area and sample collection to be carried out by the Hydaburg Wolf Project.

Deer Population Estimation Project: I produced preliminary estimates of deer population sizes for Gravina, Mitkoff, and Kupreanof Islands using data collected 2014-2015. I explored a variety of newly-developed models to compare the efficiency and precision of the population estimates. Information used during these analyses were used to help inform the refinement of the data collection protocol and sampling design used during the 2016 field season.

Goat sightability model: I continued statistical consultation and model development on Bayesian goat sightability model with Kevin White and Grey Pendleton. Final modeling procedure and model selection was completed and preliminary estimates of mountain goat populations for areas near Juneau for the past ~10 years were produced. Drafting of final report began.

Brown bear population estimation project: I continued analysis of Yakutat brown bear hair-snare data. Final population estimates were produced and drafting of final report has begun.

Research: I continued my work on developing extensions to mixed SCR-RSF models as described in a previous report. I began developing Bayesian spatially-explicit capture-recapture models for use in wolf and deer population estimates that allow for the inclusion of samples that failed to genotype, as well as data from trail cameras, incidental sample collections.

OBJECTIVE 2: Attend conferences and training, and present findings.

Meetings: I attended the ADFG Wildlife Conservation Regional meeting in Juneau, February 9-10, 2016, and presented results of the 2015 deer population estimates for portions of Southeast Alaska.

Training: I participated in a workshop on Occupancy Modeling presented by Dr. Paul Doherty, Dept. of Fish and Wildlife Conservation Biology, Colorado State Univeristy, December 16-18, in Fairbanks, AK. I participated in an invitation-

only course on Bayesian Ecological Modeling taught by Tom Hobbs and Mevin Hooten at Colorado State University, Fort Collins CO, May 18-27, 2016.

Outreach: I presented a seminar on population estimation of wolves and marten for scientists, students, and faculty of UAF and NOAA in April 2016.

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

**Job/Activity 1:** Provide biometric consulting.

**Accomplishments**

Marten RSF and Population project: I provided further statistical consulting on marten Resource Selection Function (RSF) models for Carl Koch, including model development, selection, and interpretation, programming assistance, software development, and final thesis manuscript review. Further progress was made implementing RSF data with capture-recapture data in newly-developed models to refine the population estimates.

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Outreach: I presented a seminar on population estimation of wolves and marten for scientists, students, and faculty of UAF and NOAA in April 2016.

## III.    PUBLICATIONS

Crupi, A. P., R. W. Flynn, L. R. Beier, D. P. Gregovich, and J. N. Waite. 2014. Movement patterns, home range size, and resource selection of brown bears near the Malaspina Glacier, Southeast Alaska. Alaska Department of Fish and Game, Final Wildlife Research Report. ADF&G/DWC/WRR-2014-2, Juneau.

Roffler, G. H., J. N. Waite, R. W. Flynn, K. R. Larson, and B. D. Logan. 2016. Wolf population estimation on Prince of Wales Island, Southeast Alaska: a comparison of methods. Alaska Department of Fish and Game, Final Wildlife Research Report ADF&G/DWC/WRR-2016-1, Juneau.

## IV.  RECOMMENDATIONS FOR THIS PROJECT

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

**Prepared by:** Jason N. Waite, Biometrician II

## Region II

## I.    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: performing moose survival analysis; consulting on passive monitoring systems for deer in rainforest habitats of Prince William Sound, performed an analysis of the ability of a lunatec machine to detect bear saliva, and helped plan and conduct a black and brown bear survey of 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 published a paper entitled "A Unimodal Model for Double Observer Distance Sampling Surveys" in the journal PLoS ONE. I completed an analysis of a distance sampling grizzly bear survey in the Northern Brooks Range and am currently analyzing a southcentral brown and black bear survey that was conducted out of Talkeetna. I reviewed a paper on distance sampling of cetaceans for the journal: Fishery Bulletin.

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

I attended the International Bear Conference and presented a poster on using density surface models with distance sampling data. I was a co-author on a poster presenting the results of a distance sampling grizzly bear survey in the Northern Brooks Range. I did not attend the International Statistical Ecology Conference, held in Seattle Washington due to State travel restrictions.

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

JOB/ACTIVITY 1: Biometric consulting.

I consulted on deer monitoring, genetic bear detection with a lunatec machine, and moose survival analysis within the region. I consulted and help conduct a bear survey in GMU 20A.

JOB/ACTIVITY 2: Bear population estimation.

I completed an analysis of a distance sampling  grizzly bear survey in the Northern Brooks Range and am currently analyzing a southcentral brown and black bear survey that was conducted out of Talkeetna. I reviewed a paper on distance sampling of cetaceans for the journal: Fishery Bulletin.

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

I attended the International Bear Conference and presented a poster on using density surface models with distance sampling data. I was a co-author on a poster presenting the results of a distance sampling grizzly bear survey in the Northern Brooks Range.

## III. PUBLICATIONS

BECKER E. F. AND A. M. CHRIST. 2015. A unimodal model for double observer distance sampling surveys. PLoS ONE 10(8): e0136403. Doi:10.137/journal.pone.0136403

## IV. RECOMMENDATIONS FOR THIS PROJECT

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

**Prepared by:** Earl Becker, Biometrician III

**Region III**

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

**JOB/ACTIVITY:** Biometric consulting.

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 1.73 – "Long-term effects of predator reductions on moose abundance, survival, nutrition, and hunting harvest in the Unit 19D East Moose Management Area."**

- During May of 2016, assisted with assessment of sampling requirements during black bear mark recapture survey. During June of 2016, assisted with moose calf mortality data collection.

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

- Performed power analysis of calf survival and analyses of parturition rates, 4-month old mass, neonate mass, and summer mass growth rate for the Fortymile caribou herd.

- Performed analyses of parturition rates, yearling mass, neonate mass and survival for the Central Arctic caribou herd.

**Federal aid research project 5.20 – "Habitat evaluation techniques for moose management in Interior Alaska".**

- During May-June 2016, assisted Kalin Seaton in reanalysis and interpretation of interior snow depth data for chapter 3 of federal project 5.20 technical report entitled "Spatial characterization of snow depth for inference on moose habitat and population demography".

**Federal aid research project 7.01 – "Develop and evaluate indices for assessing marten population status and trend in Interior Alaska"**

- Performed analyses of marten harvest including predicting next season's harvest and estimating thresholds of overharvest in Region III.

**Federal aid survey and inventory projects.**

- Assisted ADF&G Area Managers (Region III-Fairbanks) with one or multiple of the following aspects of moose surveys; design, sightability estimation, data collection, data analysis in units 25D, 24B, 21D, 19A, 21E, 12, 20E.

- Assisted ADF&G Area Manager Beth Lenart (Region III-Fairbanks) in analyses of Muskox survival data and Central Arctic herd caribou composition and population data.

- Assisted ADF&G Area Manager Don Young (Region III-Fairbanks) in analyses of Delta herd caribou population and calf weight data.

- Assisted ADF&G Area Manager Don Young (Region III-Fairbanks) in analyses of moose twinning rate, and short-yearling mass in GMU 20A and twinning rates in GMU 20B.

**Other Federal Aid Projects.**

- Minor consulting was performed for a variety of federal aid projects on a drop-in basis.

- Assisted with field data collection on numerous projects involving a variety of species in Region III.

- Assisted ADF&G Research Biologist Tom Paragi with exploratory analyses of black bear stable isotope data.

- Alyssa Crawford assisted ADF&G Area Manager Glenn Stout at the Galena check station in September 2016.

**JOB/ACTIVITY: Conferences, training, papers.**

- Alyssa Crawford and John Merickel participated in the annual meeting of the AK Chapter of the American Statistical Association during August 25-27, 2015 in Anchorage including taking a short course on generalized additive models given by Dr. Simon Wood University of Bath, UK.

- John Merickel attended a workshop during October 1-2, 2015 on resource selection functions given by Dave Gregovich (Research Analyst, ADF&G).

- Alyssa Crawford and John Merickel attended a workshop during December 16-18, 2015 on occupancy modeling given by Dr. Paul Doherty (Colorado State University).

- John Merickel took online bear safety course and in-person bear safety/firearms training course in March 2016.

- Alyssa Crawford and John Merickel took a chemical immobilization/animal welfare course given by Dr. Kimberley Beckmen ADF&G wildlife veterinarian in March 2016.

- Alyssa Crawford completed course on spatial statistics at the University of Alaska Fairbanks during January-May 2016.

- Alyssa Crawford completed course on linear mixed models at Statistics.com in May 2016.

**PREPARED BY:** Alyssa L Crawford and John W Merickel

## Region IV

### I. PROGRESS ON PROJECT OBJECTIVES DURING LAST SEGMENT

OBJECTIVE 1: Biometric consulting. Provide biometric assistance to research and management staff. In addition, the biometricians will review and evaluate biometric aspects of future research study proposals.

Provided assistance with project design, data analysis, and interpretation for Region 4 projects that included: performed analysis of brown bear vital rates and population growth in GMU 13, assisted with wolverine population estimate in GMU 13, assisted with setting up moose abundance survey in GMU 13, assisted with analysis of caribou abundance in GMUs 13 and 17, performed sensitivity analyses to determine impact of survey intensity on Rivest caribou abundance estimator, led the development of a research plan to study moose movement and moose-vehicle collisions in the Matanuska-Susitna Valley.

OBJECTIVE 2: Attend conferences and training, and present findings.

Attended the meeting of the Alaska Chapter of the American Statistical Association

Attended workshop on Resource Selection Functions

Attended 24th International Conference on Bear Research and Management

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

**Job/Activity 1:** Provide biometric consulting.

**Accomplishments**

I completed an analysis of brown bear vital rates and population growth, and consulted on abundance estimates for wolverine, moose, and caribou.

**Job/Activity 2:** Attend conferences and training, and present findings.

**Accomplishments**:

Attended the meeting of the Alaska Chapter of the American Statistical Association, workshop on Resource Selection Functions, and 24th International Conference on Bear Research and Management

**Prepared by:** Michael R. Guttery, Biometrician II

## Region V

## I.    PROGRESS ON PROJECT OBJECTIVES DURING LAST SEGMENT

OBJECTIVE 1:  Biometric consulting. Provide biometric assistance to research and management staff. In addition, the biometricians will review and evaluate biometric aspects of future research study proposals.


OBJECTIVE 2:  Attend conferences and training, and present findings.


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

**Job/Activity 1:**  Provide biometric consulting.

### Accomplishments

- Assisted ADF&G Area Manager Tony Gorn (Region V-Nome) and biologist Bill Dunker (Region V-Nome) in designing geospatial population estimator (GSPE) moose surveys in Units 22B and 22C. Assisted with preparing a memorandum documenting the survey.

- Assisted ADF&G Area Manager Brandon Saito (Region V-Kotzebue) in designing composition surveys for muskox in Cape Krusenstern National Monument and Noatak National Preserve.  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 Selawik Wildlife Refuge 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.


**Job/Activity 2:**  Attend conferences and training, and present findings.

### Accomplishments:

Attended 3-day short course on use of Generalized Additive Models (GAM) hosted by Alaska Chapter of the American Statistical Association.

## III.   PUBLICATIONS

Spatiotemporal patterns in calf survival in the Teshekpuk Caribou Herd.  Final Grant Report (BLM-AK-NOI-L10AS00211; Grant#L10AC20353). In prep.

**Prepared by:** Adam Craig