

**Alaska Department of Fish and Game
Wildlife Restoration Grant**

Grant Number: AKW-10 Wildlife Restoration FY2016
Project Number: 4.42
Project Title: Southeast brown bear data analysis and report preparation
Project Duration: 1 July 2009–30 June 2017
Report Due Date: 1 September 2016
PRINCIPAL INVESTIGATORS: Anthony Crupi, Dave Gregovich
WORK LOCATION: Southeast Alaska

I. PROGRESS ON PROJECT OBJECTIVES DURING LAST SEGMENT

OBJECTIVE 1: Analyze and prepare for publication historic data on brown bear population and habitat ecology in Southeast Alaska.

The Alaska Department of Fish and Game conducted brown bear research on Admiralty and Chichagof islands in Southeast Alaska from 1981–2003. These data were critical to the management of the brown bear population at the time and continue to be important to the needs of the resource. We will complete the current analysis in FY17.

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

JOB/ACTIVITY 1a: Gather and synthesize all historic data

We conducted several brown bear research projects on Admiralty and Chichagof islands between 1981 and 2003. Several reports and manuscripts were completed during this time yet a synthesis of these data as they relate to habitat selection has not yet been done. To accomplish this task we digitized historic VHF collar aerial survey data for use in ArcGIS and combined these with location data for 38 GPS collared animals. We generated a master geospatial database for use in ArcGIS with 4,326 aerial telemetry locations from Admiralty Island and 3,244 locations from Chichagof Island, in addition to 25,208 GPS collar locations from Admiralty Island, and 81,516 GPS locations from Chichagof Island for use in the analysis.

JOB/ACTIVITY 1b: Apply constant analytical procedures to the data

Our analysis of brown bear habitat ecology is dependent upon numerous habitat factors that serve as covariates in the habitat selection models. During the reporting period we compiled a newly acquired IfSAR Digital Elevation Model for the study areas and attributed the brown bear location data with this fine spatial resolution data. Analyses of these data have been pending our acquisition of this dataset which was fundamental to our habitat selection analysis. These data were delivered in 2016 and they allow us to

more accurately evaluate the role of elevation, slope, aspect, and vegetation in our analyses. We also obtained a new landcover classification (Vegetation Map and Classification Southern Alaska, Boggs 2014), as well as several current forest condition layers (Cover Type, Size Density Model, Timber Type) and attributed the locations with all of these important habitat covariates.

For the past 3 years our program has been developing sophisticated tools to assist in our analyses of animal movement patterns, home range size, and habitat selection. These methods take time to develop and implement in a rigorous manner and we are now prepared to implement these analytical procedures on this historic dataset. We are analyzing sex specific annual and seasonal home range use patterns using fixed kernel density estimation using least-squares cross validation and smooth cross validation bandwidth estimators which are biologically appropriate for the species. We will examine the effects of sex, age, and reproductive status on home range size using repeated-measures mixed effects models, treating each animal as a random effect to account for individual variation in home range size. To measure seasonal habitat selection of brown bears, we will construct resource selection function (RSF) models to statistically compare the environmental terrain factors and landscape variables at locations used by study animals to random available locations using logistic regression. Models will be validated using k-fold cross validation. The relative probability of selection will be mapped and contrasted between sexes to evaluate biological hypotheses.

JOB/ACTIVITY 1c: Prepare manuscripts suitable for publication

We have been actively working on preparing written manuscripts for publication. Given the retirement of several department employees and the allocation of only one month staff time per year to this project, this has been difficult to coordinate in a timely manner, yet we remain focused on completing this objective. We identified a need to collaborate with retired staff and acquire a technical editor for the project and that has been completed. No publications were published during the reporting period.

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

We have not deviated from the objectives and activities outlined in this project, yet there have been changes in principle investigators. While timelines identified have not been met this continues to be an important project for the management of the resource and is a high priority to the department.

IV. PUBLICATIONS

Pendelton, G., K. Titus, A. Crupi, J. Whitman, and L. Beier. *In Prep*. Brown bear population density on Northeast Chichagof Island, Alaska: potential methodological biases. Alaska Department of Fish and Game, Juneau, AK.

Crupi, A., K. Titus, R.Flynn and L. Beier. *In Prep.* Brown bear seasonal habitat selection of high density insular populations on Admiralty and Chichagof Islands. Alaska Department of Fish and Game, Juneau, AK.

V. RECOMMENDATIONS FOR THIS PROJECT

There was a considerable amount of data, spanning several decades from numerous principle investigators that needed to be synthesized for this project. This has been a monumental task to gather the historic data, interpret the data fields, and properly provide metadata so the datasets could be archived and usable into the future. The primary recommendation for this project is to continue data analysis and work towards finalizing publications. We recommend contracting with a recently retired employee, Dr. Kim Titus, to provide a historical perspective on the modern data analysis. We have made arrangements to collaborate with Dr. Titus in the Winter/Spring of 2017, with manuscripts prepared by the end of the next reporting period.

Prepared by: Anthony P. Crupi, Acting Research Coordinator

Date: 5 December 2016