

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

Grant Number: AKW-10 Wildlife Restoration FY2016

Project Number: 4.43

Project Title: Spatial relationships, harvest vulnerability, and harvest rates of brown bears on the northern mainland coast of Southeast Alaska

Project Duration: 1 July 2009–30 June 2017

Report Due Date: 1 September 2016

PRINCIPAL INVESTIGATOR: Anthony Crupi

COOPERATORS: Wrangell-Saint Elias National Park & Preserve

WORK LOCATION: Mainland coast of Southeast Alaska from Glacier Bay National Park to Icy Bay, including the Yakutat and Malaspina Forelands

I. PROGRESS ON PROJECT OBJECTIVES DURING LAST SEGMENT

OBJECTIVE 1: Describe seasonal spatial relationships of brown bears in a portion of GMU 5 including seasonal home ranges and habitat selection.

Since the inception of the study, we have captured and GPS radiocollared 92 brown bears (49 males, 43 females) in game management unit (GMU) 5A. Of these, 22 brown bears (15 males, 7 females) were captured at the landfill in Yakutat. In GMU 5B, we captured and deployed GIS collars on 18 brown bears (10 males, 8 females).

By the end of the reporting period, we had retrieved 97 GPS radio collars from 82 individual bears in GMU 5A. We have performed preliminary analyses of location data investigating seasonal movement patterns, animal home range size, and den site selection.

OBJECTIVE 2: Estimate harvest rate of brown bears.

We sent 12 samples collected during the reporting period to Wildlife Genetics International (WGI) for DNA analysis. These samples will be combined with the previous 201 tissue samples collected between 2009 and 2015 to estimate the harvest rate of brown bears in GMU 5A.

OBJECTIVE 3: Estimate the density of brown bear on the Yakutat Forelands

We modeled the population density and abundance of brown bears in Yakutat using a spatially explicit capture-recapture framework. We examined models that accounted for trap type, sex, time, behavior, site-specific capture probability, and the inclusion of telemetry data. The top model was improved by the inclusion of sex and telemetry data. We estimated the density of brown bears at 98.8 ± 8.2 bears / 1,000 km² within the 2,447

km² of bear habitat in the study area. We estimated the expected abundance of brown bears in the study area in 2013 at 260.1 ± 21.5 bears.

OBJECTIVE 4: Characterize bear den selection

We continued to evaluate brown bear dens within the Yakutat Forelands study area during the reporting period. We located 130 brown bear dens from the GPS radiocollared bears as well as from spring aerial surveys. We visited 40 brown bear dens and collected den site factor data. The terrain and landcover factors of the den sites will be compared with random (available) locations in a resource selection model.

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

JOB/ACTIVITY 1a: Capture bears, deploy GPS radio collars

Accomplishments: We concluded the capture and collaring portion of the project during FY2015.

JOB/ACTIVITY 1b: Retrieve collars

Accomplishments: By the end of the reporting period, we retrieved 97 GPS radio collars from 82 individual bears.

JOB/ACTIVITY 1c: Download and analyze location data.

Accomplishments: Brown bear GPS radiocollar data have been downloaded and entered into a geographic information system database. The location data have been analyzed according to seasonal movement patterns, animal home range size, and den site selection.

JOB/ACTIVITY 1d: Prepare reports and publications

Accomplishments: During the reporting period we prepared the final report, “Brown Bear Population Estimation in Yakutat, Southeast Alaska”. It is currently under review and will be published as a Final Wildlife Research Report in Fall 2016.

JOB/ACTIVITY 2a: Collect DNA samples

Accomplishments: We collected DNA from 9 harvested bears, and 3 other human-caused mortalities. The DNA samples have been processed and archived. The bears harvested in the fall season were sent to WGI for DNA analysis.

Job/Activity 2b: Estimating harvest rate

Accomplishments: Once the final data are received from WGI, we will estimate harvest rate using a closed population model in Program MARK. The live-captured and hair-snare samples will constitute “marked” samples and hunter-harvested bears will constitute recaptures.

Job/Activity 3a: Estimating the density of brown bears in the Yakutat Forelands

Accomplishments: We estimated population density of brown bear using genetic mark recapture with maximum likelihood methods implemented in the SECR package in R.

We considered a range of models with biologically plausible covariates on both the baseline detection probability, g_0 , and spatial dispersal parameter, σ . We identified 152 unique individuals from 389 brown bear samples.

We estimated the density of brown bears at 98.8 ± 8.2 bears / 1,000 km² within the 2,447 km² of bear habitat in the study area. We estimated the expected abundance of brown bears in the study area in 2013 at 260.1 ± 21.5 bears.

Job/Activity 4a: Locate brown bear dens from tracking the radiocollared bears and from surveys in the spring.

Accomplishments: We have identified 130 brown bear dens from GPS radio collars in the Yakutat Forelands and during spring aerial surveys above treeline in GMU5A.

Job/Activity 4b: Describe the attributes of the dens sites and then compare those attributes with random (available) locations.

Accomplishments: We developed a prioritized list of brown bear den sites to assess den site selection and we will visit those den sites in the upcoming year. We also have developed a suite of habitat and terrain factors to be used in a resource selection function model. To date, we have located 9 den sites on the ground and described their attributes in relation to den site selection.

III. PUBLICATIONS

Crupi, A. P., J. N. Waite, R. W. Flynn, and L. R. Beier. *In Prep.* Brown bear population estimation in Yakutat, Southeast Alaska. Alaska Department of Fish and Game, Final Wildlife Research Report. ADF&G/DWC/WRR-2016-X, Juneau, AK, USA.

IV. RECOMMENDATIONS FOR THIS PROJECT

In the final year we will conclude field work in Yakutat and prepare final project reports following objectives and job activities outlined in the project statement.

Prepared by: Anthony Crupi, Acting Research Coordinator

Date: 1 September 2016