

FEDERAL AID ANNUAL RESEARCH PERFORMANCE REPORT

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

PROJECT TITLE: Kenai Peninsula brown bear population demographics

PRINCIPAL INVESTIGATOR: Sean Farley

FEDERAL AID GRANT PROGRAM: Wildlife Restoration

GRANT AND SEGMENT NO. W-33-10

PROJECT NO. 4.38

STATE: Alaska

PROJECT DURATION: July 1, 2008 – June 30, 2013

PERIOD: July 1, 2011 – June 30, 2012



I. PROGRESS ON PROJECT OBJECTIVES SINCE PROJECT INCEPTION

OBJECTIVE 1: Determine the finite rate of change (λ) for the Kenai brown bear population.

Job/activity: collect demographic data

Data will be collected by collaring a subset of peninsula bears with vhf radio collars and following them for several years to collect data cub production, litter size, cub survival, adult survival, age of weaning, estimated age of first reproduction (where possible), inter birth interval, and annual natural mortality rate.

OBJECTIVE 2: Complete data analysis on differential reproductive fitness of Kenai brown bears.

Job/activity: data analysis

Collaborate with Dr. Sandy Talbot of the USGS Molecular Ecology laboratory in Anchorage, Alaska to look for individual maternal lineages of Kenai Peninsula brown bears. The data to be used will include recent genotypes determined for Jackson et al. (in press) as well as any additional bears handled. Where possible, perform a genealogical reconstruction of maternal lineages for the past 10 years. Relate that information with reproductive success from past radio-collared work.

OBJECTIVE 3: Develop a model predicting demographic vigor of Kenai Peninsula brown bears.

Job/activity: model development

Explore analysis of data from jobs 1 and 2 to construct predictive model(s) combining biological covariates (genetic relatedness, differential reproductive fitness, demographic data) of Kenai brown bears.

Objective 4: Attend conferences and training, write and present papers.

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

OBJECTIVE 1:

JOB/ACTIVITY __1: There are 45 collars being monitored, of which 11 are potential drops, leaving 34 bears known alive. Figure 1 indicates spring 2012 locations for all bear collars under review.

JOB/ACTIVITY _2_: Animal Captures... Fall 2011 captures were not conducted. During spring of 2012 ten bears were captured (9 adult females; 1 sub-adult males). The female bears were re-captures conducted to replace aging radio collars. Figure 1 shows most recent geographic distribution of bears.

JOB/ACTIVITY _3_: Data Analysis....Demographic data has been updated with deaths, re-captures, and productivity information through June 2012. A data audit was conducted to review old entries, resulting slight changes to survivorship tables and littersizes. The overall impact was minimal.

- 1) Annual Female survivorship has been calculated for the duration of the project (see Fig. 2)
- 2) Mean age of reproduction for the duration of the study (through 2010) has been calculated to be 11yr (sd 4) with a range of 3-23 years
- 3) Annual cub survival and litter size has been calculated for the duration of the project (see Tables 1 & 2).
- 4) Parameters from Tables 1 and 2 and Figure 2 were applied to a population model based upon Eberhardt and Siniff (1977). The age of first parturition was assigned 5 years with a range of 4 to 7. Mean annual birth rate was calculated from female cubs per female (assuming 50:50 ratio). An interbirth interval of 3.08 (3.05 to 3.17) was calculated from demographic data. Lambda was calculated to be 1.0451 with upper and lower bounds of 0.9693 and 1.1216, respectively.

OBJECTIVE 2:

JOB/ACTIVITY_1: Genotypes, spanning 1995-2011, have been determined for approximately 220 Kenai brown bears. The individual reproductive fitness for each bear will be determined from telemetry data and used in Objective 3.

OBJECTIVE 3:

JOB/ACTIVITY: No work was done on this job during the year.

Objective 4:

JOB/ACTIVITY: Three manuscripts were written during this period. Kenai brown bear samples and/or data were used in the analyses, and the references are listed below.

III. PUBLICATIONS

Webb Miller, Stephan C. Schuster, Andreanna J. Welch, Aakrosh Ratan, Oscar C. Bedoya-Reina, Fangqing Zhao, Hie Lim Kim, Richard C. Burhans, Daniela I. Drautz, Nicola E. Wittekindt, Lynn P. Tomsho, Enrique Ibarra-Laclette, Luis Herrera-Estrella, Elizabeth

Peacock, Sean Farley, George K. Sage, Karyn Rode, Martyn Obbard, Rafael Montiel, Lutz Bachmann, Ólafur Ingólfsson, Jon Aars, Thomas Mailund, Øystein Wiig, Sandra L. Talbot, and Charlotte Lindqvist. 2012. Polar and brown bear genomes reveal ancient admixture and demographic footprints of past climate change. www.pnas.org/cgi/doi/10.1073/pnas.1210506109 PNAS Early Edition.

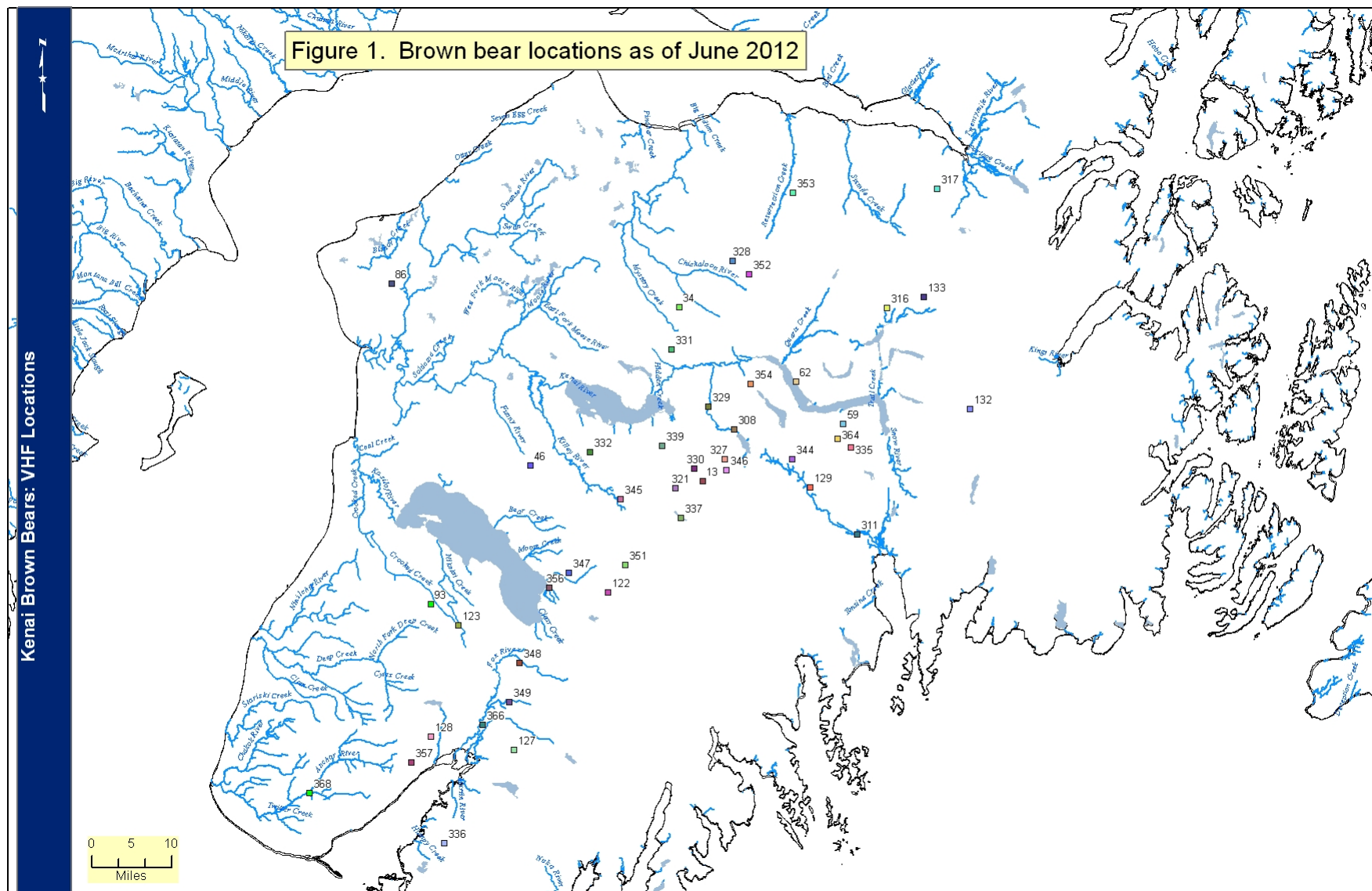
S. L. Talbot, S. A. Sonsthagen, G.K. Sage, S. D. Farley, N. G. Dawson, R. E. Wilson, and J. A. Cook (in review; 2012). Are Island Brown Bears Isolated? Insularity and Gene Flow among Coastal Populations in Southeast Alaska. *J. Mammalogy*.

J. E. Teisberg, S. D. Farley, O. L. Nelson, G. V. Hilderbrand, M. J. Madel. P. A. Owen, C. T. Robbins (in manuscript). Immobilization of Grizzly Bears with Dexmedetomidine, Tiletamine, and Zolazepam

I. APPENDIX.

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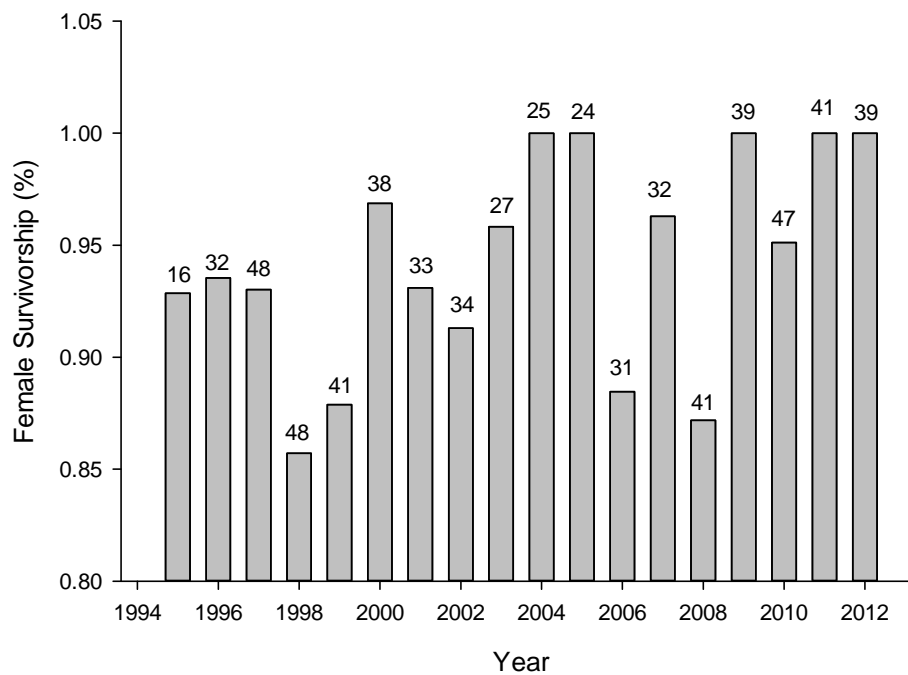
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Figure 2

Kenai Brown bear

(Total number of bears collared at beginning of each year is indicated.
This total can fluctuate annually if bears previously censored because
of lost collars are re-identified through recapture or DNA analyses of samples.)



Tables 1 & 2: Cub survivorship and litter size for Kenai Peninsula brown bears.

Number of Cubs by Fate and Age to 2012

| | Age of Cubs | | | | |
|------------------|-------------|------|------|------|-------------|
| | 0 | 1 | 2 | 3 | Grand Total |
| Sum of Survived | 211 | 145 | 132 | 16 | 504 |
| Sum of Lost | 106 | 71 | 6 | 0 | 183 |
| Sum of Censor | 4 | 1 | 3 | 0 | 8 |
| Sum of Unknown | 41 | 20 | 6 | 0 | 67 |
| Total | 362 | 237 | 147 | 16 | 762 |
| Maximum Survival | 0.67 | 0.67 | 0.96 | 1.00 | To Weaning |
| Minimum Survival | 0.59 | 0.61 | 0.92 | 1.00 | |

Assumes Lost Cubs Died
Assumes Lost and Unknown Cubs Died

Number of litters by Litter Size and Cub Age to 2012

| | Age of Cubs | | | | |
|------------------|-------------|------|------|------|-------------|
| Litter Size | 0 | 1 | 2 | 3 | Grand Total |
| 1 | 31 | 27 | 18 | 2 | 78 |
| 2 | 77 | 57 | 36 | 4 | 174 |
| 3 | 55 | 32 | 19 | 2 | 108 |
| 4 | 3 | 0 | 0 | 0 | 3 |
| Grand Total | 166 | 116 | 73 | 8 | 363 |
| Mean Litter Size | 2.18 | 2.04 | 2.01 | 2.00 | |