

**FEDERAL AID ANNUAL RESEARCH
PERFORMANCE REPORT**

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

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

PROJECT TITLE: Kenai Peninsula Brown Bear Population Demographics

PRINCIPAL INVESTIGATOR: Sean Farley

FEDERAL AID GRANT PROGRAM: Wildlife Restoration

GRANT AND SEGMENT NO. AKW-20

PROJECT NO. 4.38

STATE: Alaska

PROJECT DURATION: July 1, 2013 – June 30, 2020

PERIOD: July 1, 2016 – June 30, 2017

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. (2008) 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 42 collars being monitored. One bear has been missing for 8 months and may have a malfunctioning collar. Figure 1 shows vhf and capture locations for the reporting period.

JOB/ACTIVITY _2_: Animal Captures... Fall 2016 one bear was captured (adult female). During spring 2017 7 bears were captured with 2 new to the dataset.

JOB/ACTIVITY _3_: Data Analysis....Demographic data have been updated and calculations run for 1995-2005 and 2006-2017. The 2017 data will not be complete until December 2017. Litter size and survival, female survival, and lambda calculation results are presented below. Note that the period of 2010-2012 lambda calculations cover a period of high harvest.

OBJECTIVE 2:

JOB/ACTIVITY: No additional work has been reported on this activity.

OBJECTIVE 3:

JOB/ACTIVITY: DEMOGRAPHIC DATA WILL BE RUN ON VORTEX TO DETERMINE EFFECT OF SUB-ADULT FEMALE COHORT LOST FROM HARVEST.

Objective 4:

JOB/ACTIVITY: Participated as organizer in the 2016 International Association of Bear Research and Management, held in Anchorage, Alaska. Professional actions included acting as associate editor for Canadian J. Zoology and reviewer for National Science Foundation Ecology-Physiology.

The following manuscripts were completed, submitted, accepted or provide supporting data under this grant for this period.

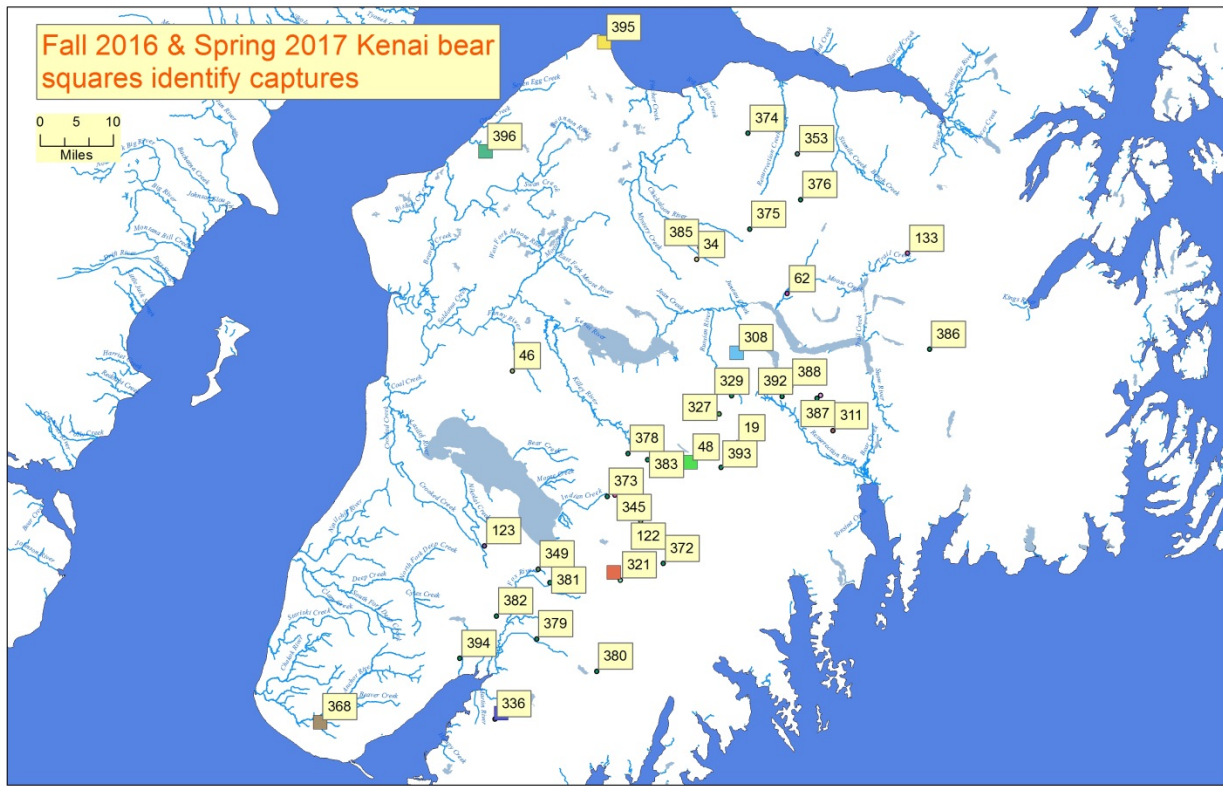
Fortin, J. K., K. D. Rode, G. V. Hilderbrand, J. Wilder, S. Farley, C. Jorgensen, and B. Marcot. (2016). Impacts of human recreation on brown bears (*Ursus arctos*): a review and new management tool. [PLoS One](https://doi.org/10.1371/journal.pone.0141983). 2016; 11(1): e0141983. Published online 2016 Jan doi: [10.1371/journal.pone.0141983](https://doi.org/10.1371/journal.pone.0141983)

Keay, J.A., C. T. Robbins, S.D. Farley (In review JWM). Population Regulation of Denali Grizzly Bears

Mashintonio, A. G. Harris, S. Farley, G. Russell (in prep). Combining lasso with multi-model selection reveals habitat preferences of brown bears on the Kenai Peninsula, Alaska, USA

III. PUBLICATIONS
SEE OBJECTIVE 4

I. APPENDIX.



Number of Cubs by Fate and Age: 1995-2005

	Age of Cubs				Grand Total
	0	1	2	3	
Sum of Survived	151	88	85	2	326
Sum of Lost	59	63	0	0	122
Sum of Unknown	22	19	2	0	43
Total	232	170	87	2	491
Maximum Survival	0.72	0.58	1.00	1.00	To Weaning
Minimum Survival	0.65	0.52	0.98	1.00	

Number of Cubs by Fate and Age: 2006 -2017*

	Age of Cubs				Grand Total
	0	1	2	3	
Sum of Survived	146	125	109	31	430
Sum of Lost	83	38	0	0	121
Sum of unknown	9	3	3	31	15
Total	238	166	112	0	566
Maximum Survival	0.64	0.77	1.00	1.00	To Weaning
Minimum Survival	0.61	0.75	0.97	1.00	

Number of Litters by Litter Size and Age of Cubs: 1995 - 2005

Litter Size	Age of Cubs				Grand Total
	0	1	2	3	
1	14	11	8	0	33
2	54	49	23	1	127
3	33	20	11	0	64
4	3	0	0	0	3
Grand Total	104	80	42	1	227
Mean Litter Size	2.24	2.11	2.07	2.00	2.16

Number of Litters by Litter Size and Age of Cubs: 2006-2017*

Litter Size	Age of Cubs				Grand Total
	0	1	2	3	
1	32	36	23	4	95
2	51	30	25	6	112
3	34	22	13	1	70
4	1	0	0	0	1
Grand Total	118	88	61	11	278
Mean Litter Size	2.03	1.84	1.84	1.73	1.93

*2017 Data incomplete until December 2017

Mean adult female survivorship:

<u>Year span</u>	<u>mean</u>	<u>s.d.</u>	<u>Range</u>
1995-2005	0.936	0.057	(0.833 – 1.00)
2006-2017	0.94	.061	(0.793 – 1.00)

Lambda calculations

<u>Years</u>	<u>r</u>	<u>Upper limit</u>	<u>Lower limit</u>
1995-2005	1.03	1.12	0.95
2006-2017	1.05	1.15	0.96
2010-2012	0.98	1.92	0.87