Wildlife Restoration MULTI-YEAR GRANT INTERIM 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-23

PROJECT NUMBER: 4.38

PROJECT TITLE: Kenai Peninsula brown bear population demographics

PERIOD OF PERFORMANCE: July 1, 2017 – June 30, 2018

PERFORMANCE YEAR: Year 5 of 7, project runs July 1 2013-June 30, 2020

REPORT DUE DATE: Sept 1, 2018

PRINCIPAL INVESTIGATOR: Sean Farley

COOPERATORS:

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Authorities: 2 CFR 200.328
        2 CFR 200.301
        50 CFR 80.90

I.   PROGRESS ON PROJECT OBJECTIVES DURING PERFORMANCE YEAR

OBJECTIVE 1: Determine the finite rate of change (lambda) 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.

> **ACCOMPLISHMENTS:** JOB/ACTIVITY 1: There are 39 collars being monitored. Figure 1 shows vhf and capture locations for the reporting period.
>
> Fall 2017 captures were not conducted. In November 2017 there was a management capture and collaring of a subadult female that had been caught in a wolf snare. During spring 2018 9 bears were captured, all as re-captures in order to replace old collars with new. The November 2017 subadult was recaptured and given an expandable collar. No new bears were added to the dataset.

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.

> **ACCOMPLISHMENTS:** JOB/ACTIVITY 2: Data Analysis…. Demographic data have been updated and calculations run for 1995-2005 and 2006-2018, however the 2018 data will not be complete until December 2018 when all bears have denned for the winter. 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 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.

> **ACCOMPLISHMENTS:** JOB/ACTIVITY 3: Demographic data are being analyzed to estimate effect of sub-adult harvest.

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

> **ACCOMPLISHMENTS:** JOB/ACTIVITY 4 : Professional actions included functioning acting as associate editor for Canadian J. Zoology and reviewing multiple manuscripts for Journals.
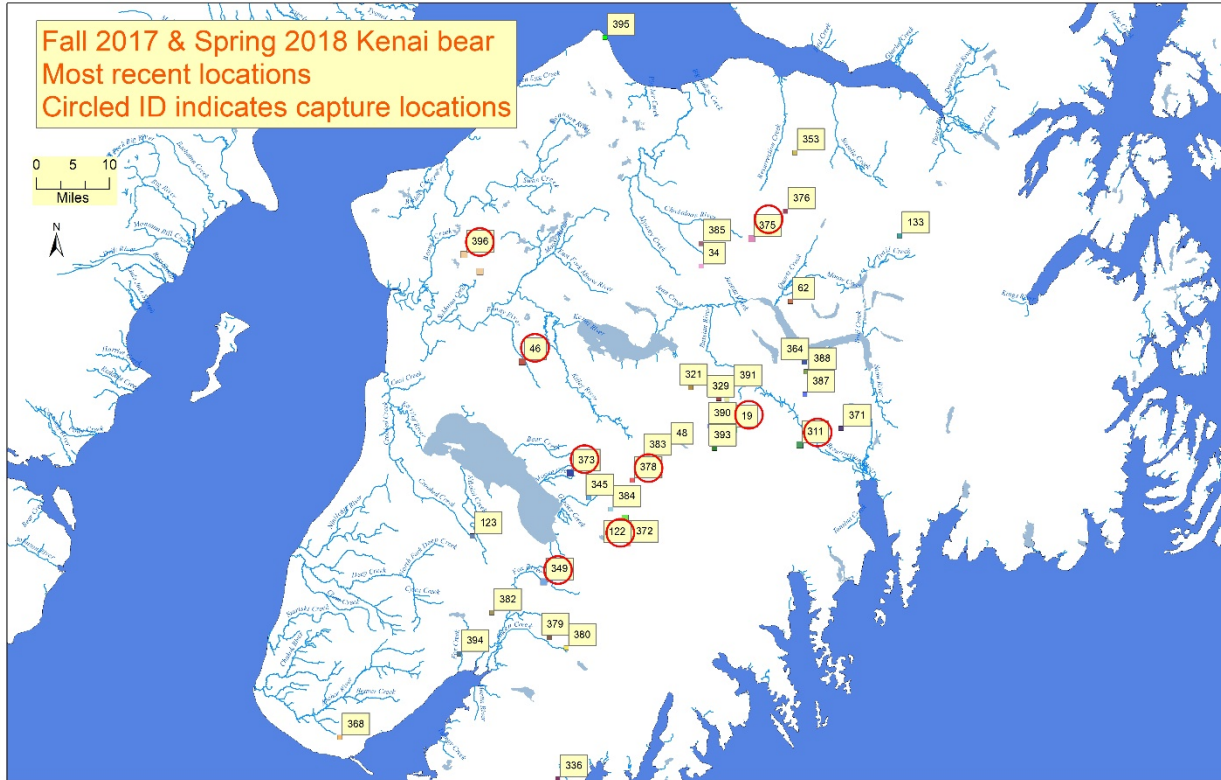
> The following manuscripts were completed, submitted, accepted or provide supporting data under this grant for this period.

Keay, J.A., C. T. Robbins, S.D. Farley (2018). Characteristics of a Naturally Regulated Grizzly Bear Population. JWM. 82(4):789–801; 2018; DOI: 10.1002/jwmg.21425

Mashintonio, A. G. Harris, S. Farley, G. Russell (submitted 2018). A Hybrid Approach to Modeling Habitat Selection of Brown Bears. Journal of Wildlife Management and Wildlife Monographs.

II.   SUMMARY OF WORK COMPLETED ON PROJECT TO DATE.

Fall 2017 & Spring 2018 Kenai bear
Most recent locations
Circled ID indicates capture locations

Date	ID	LAT_DEG	LAT_MIN	LON_DEG	LON_MIN	SEX	Age
09-Jun-18	396	60	36.637	150	57.6668	F	Subadult
08-Jun-18	349	59	57.6315	150	42.4022	F	Adult
07-Jun-18	375	60	36.664	149	47.997	F	Adult
07-Jun-18	46	60	23.673	150	44.886	F	Adult
06-Jun-18	311	60	12.027	149	39.596	F	Adult
06-Jun-18	19	60	14.364	149	55.125	F	Adult
06-Jun-18	373	60	10.269	150	34.684	F	Adult
05-Jun-18	378	60	9.061	140	20.038	F	Adult
05-Jun-18	122	60	4.619	150	22.29	F	Adult
04-Nov-17	396	60	34.54	150	54.04	F	Subadult

Number of Cubs by Fate and Age: 1995-2005

	Age of Cubs				
	0	1	2	3	Grand Total
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				
	0	1	2	3	Grand Total
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

	Age of Cubs				
Litter Size	0	1	2	3	Grand Total
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: 2006-2018**

	Age of Cubs				
Litter Size	0	1	2	3	Grand Total
1	33	37	25	6	101
2	56	34	29	8	127
3	38	24	14	6	70
4	1	0	0	0	1
Grand Total	128	95	68	20	311
Mean Litter Size	2.05	1.86	1.84	2.00	1.94

*2018 calculations to be conducted December 2018
**2018 Data incomplete until December 2018

Mean adult female survivorship:

Year span	mean	s.d.	Range
1995-2005	0.936	0.054	(0.833 – 1.00)
2006-2018	0.937	0.05	(0.793 – 1.00)

III.   SIGNIFICANT DEVELOPMENT REPORTS AND/OR AMENDMENTS.

1. N/A

IV.   PUBLICATIONS

See objective 4, above.

V.   RECOMMENDATIONS FOR THIS PROJECT

Due to low reproductive rates and the need to build long term data sets that accurately represent brown bear demographics, and the high degree of public interest in the Kenai Peninsula brown bear population, this project should be extended for another three years. We will formally request a new project end date with the project statement due in May of 2019.

Prepared by:

Date: 9/1/2018