

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

GRANT NUMBER: AKW-B-R2-2020

PROJECT NUMBER: 4.38

PROJECT TITLE: Kenai Peninsula brown bear population demographics

PERIOD OF PERFORMANCE: July 1, 2019 - June 30, 2021

PERFORMANCE YEAR: July 1, 2019 - June 30, 2020; year 1 of a 2-year grant

REPORT DUE DATE: Submit to FAC August 28, 2020

PRINCIPAL INVESTIGATOR: Sean Farley

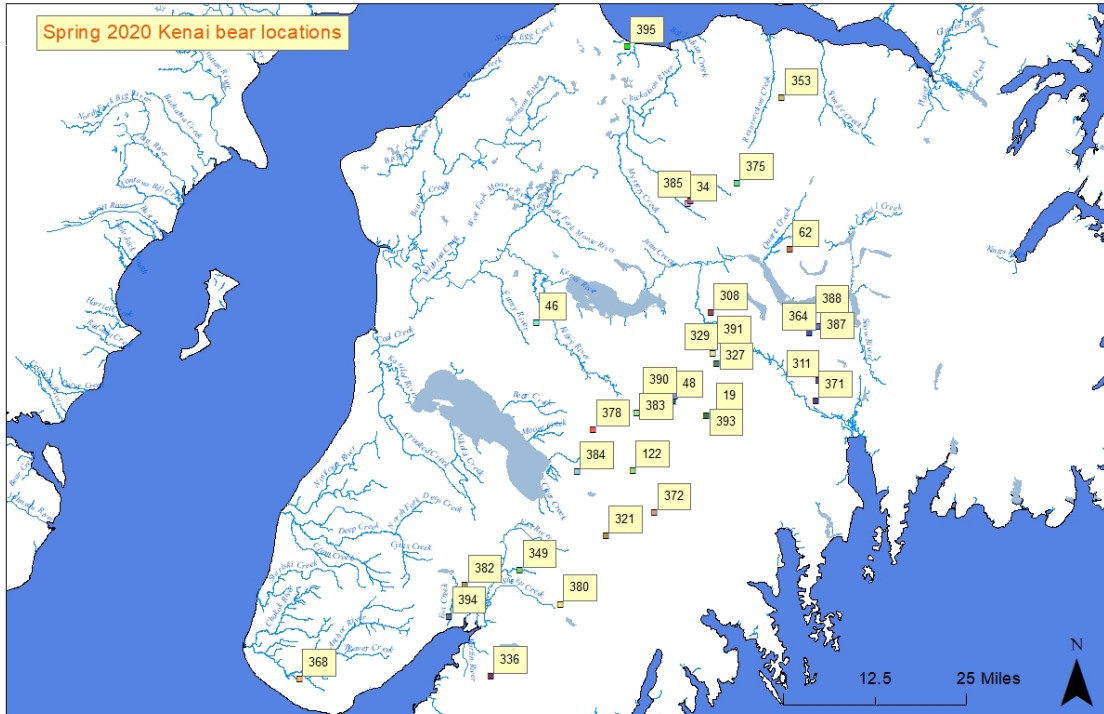
COOPERATORS: Jeff Selinger

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 (λ) for the Kenai brown bear population.
Accomplishments: There are 28 collars being monitored. Figure 1 shows vhf and capture locations for the reporting period. Note that only Fall 2019 captures were conducted. No capture work was undertaken in Spring 2020 due to the Covid-19 pandemic, which may result in up to 13 bears dropping their collars after July 1, 2020. During Fall 2019 2 bears were re-captured to replace old collars, one bear was not re-collared due to neck wear. No new bears were added to the dataset. Demographic data have been updated and calculations run for 1995-2005 and 2006-2020, however the 2020 data reflect productivity to spring 2020.

The map depicts current spring 2020 locations and the table contains fall 2019 capture locations.



Date	ID	LAT_DEG	LAT_MIN	LON_DEG	LON_MIN	SEX	Age
15-Oct-19	123	60	4.355	150	58.969	F	Adult
14-Oct-19	387	60	16.991	149	32.586	F	Adult
14-Oct-19	34	60	35.48	150	5.516	F	Adult

OBJECTIVE 2: Complete data analysis on differential reproductive fitness of Kenai brown bears.
Accomplishments: Testing of an X-chromosome SNP panel as well as a 150 autosomal SNP panel was due to begin early 2020. No work has been accomplished on this objective (relative to genetic analysis) due to laboratory closure from Covid-19 pandemic restrictions. The laboratory closures and restricted work hours has halted our anticipated winter progress on Objectives 2 and 3.

OBJECTIVE 3: Develop a model predicting demographic vigor of Kenai Peninsula brown bears.
Accomplishments: A manuscript under development has been in holding status due to Covid-19 pandemic closures of the laboratory and restricted work from collaborators.

OBJECTIVE 4: Attend conferences and training, write and present papers.
Accomplishments: The brown bear conference was held by ZOOM through Washington State University, Pullman, Washington early winter 2020. Participated in day long discussion of brown bear landscape use and nutritional/travel costs.

Provided input as associate editor for Canadian J. Zoology. Reviewed multiple manuscripts for Journals.

II. SUMMARY OF WORK COMPLETED ON PROJECT TO DATE.

Litter size and survival, female survival, and lambda calculation results are presented below

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	57	63	0	0	120
Sum of Unknown	22	16	0	0	38
Total	230	167	85	2	484
Maximum Survival	0.73	0.58	1.00	1.00	To Weaning
Minimum Survival	0.66	0.53	1.00	1.00	

Number of Cubs by Fate and Age: 2006 -2020*

	Age of Cubs				Grand Total
	0	1	2	3	
Sum of Survived	174	157	139	42	512
Sum of Lost	117	44	4	0	165
Sum of unknown	9	0	3	0	12
Total	300	201	146	42	689
Maximum Survival	0.65	0.84	1.00	1.00	To Weaning
Minimum Survival	0.54	0.72	0.95	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: 2006-2020*

Litter Size	Age of Cubs				Grand Total
	0	1	2	3	
1	35	42	26	6	104
2	68	40	37	9	135
3	43	26	16	6	84
4	1	0	0	0	1
Grand Total	147	108	79	21	324

Mean Litter Size	2.07	1.85	1.87	2.00	1.94
------------------	------	------	------	------	------

*2020 Data collected up to May 2020

Mean adult female survivorship:

Year span	mean	s.d.	Range
1995-2005	0.938	0.050	(0.857 – 1.00)
2006-2020	0.943	0.048	(0.821 – 1.00)

Population finite rate of increase (lambda): **

Year span	lambda
1995-2005	1.039
2006-2020	1.06

**lambda calculated using Vortex 10.5.0.0
8/25/2020

III. SIGNIFICANT DEVELOPMENT REPORTS AND/OR AMENDMENTS.

The Covid-19 pandemic has severely curtailed progress. As mentioned earlier in this report, all field work except telemetry was cancelled in 2020 due to COVID related restrictions. Laboratory work was also cancelled or rescheduled. Hence, a much greater amount of time than originally planned was spent analyzing animal location, movement, survival, and productivity data. This time spent is reflected in the \$135K spent on salary instead of the originally budgeted \$54.9K. Likewise, only \$11.6K was spent on supplies instead of the \$70K budgeted. If operations had taken place as planned, the remainder of the \$70K in line 4000 would have supported field equipment, laboratory supplies, reagents, and other consumables.

IV. PUBLICATIONS

None

V. RECOMMENDATIONS FOR THIS PROJECT.

Extend data collection on adult females and young until 2024 to cover one more litter generation and to recover from the year lost to Covid-19. During that time begin a transition to following 2 and 3 yr old bears with expandable collars to determine survival rate after weaning.

Continue efforts to identify maternal lineages of Kenai Peninsula brown bears and construct a genealogical lineage for at least 3 generations removed from present. Explore that dataset for indicators of reproductive success (e.g., home range location, heritability).

Use genetic relationship (first and second order relatives) to estimate population size. Augment data sample size by conducting one season of spring biopsy collection. Samples could be used for traditional mark-recapture calculations as well as possible application of close-kin mark-recapture.

Date: 8/25/2020