

**FEDERAL AID ANNUAL
RESEARCH 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: W-33

Segment Number: 11

PROJECT NUMBER: 4.39

PROJECT TITLE: Grizzly and black bear distribution and abundance relative to the 2004 wildfires in eastern Interior Alaska: Possible intensive management consequences

PROJECT DURATION: 1 July 2008–30 June 2014

REPORT DUE DATE: 1 September 2013

PARTNER: None

PRINCIPAL INVESTIGATOR: Craig L. Gardner, ADF&G; ADF&G coauthors: Kalin A. Kellie Seaton, Brian D. Taras, and Nathan J. Pamperin

COOPERATOR: None

WORK LOCATION: Game Management Unit 20E, Fortymile River drainage

**I. SUMMARY OF WORK COMPLETED THIS SEGMENT ON JOBS IDENTIFIED
IN ANNUAL WORK PLAN**

OBJECTIVE 1: Determine the following trends relative to the 2004 wildfires in Unit 20E: 1) grizzly bear population size and distribution and possibly, predation on moose calves, 2) moose population size, composition, and trend, and if possible, 3) black bear population size and distribution and possibly, predation on moose calves. Develop an intensive management strategy that incorporates findings from this research.

During July 2008–June 2013, we have limited the study to evaluating grizzly bear population size and distribution relative to the 2004 wildfires. To meet this objective, we deployed 13 GPS radio collars on 9 female (3 recollars) and 1 male and 2 VHF collars on 2 males grizzly bears and monitored movements and distribution. We discontinued collaring males after FY09 because 0 of 3 collars deployed on adult males lasted >1 month before radio structural failure. The GPS radiotransmitter's projected operational life is 2 1/2 years, but only 3 of 13 have gone to term. Because the quality of the radios was not adequate to meet project objectives, we temporarily terminated that job and did not collar during FY12. During FY12 and FY13, we continued to model the mark-recapture data collected in 2006, incorporating additional heterogeneity and relationship data into more powerful, newly developed spatial models (Efford 2004,

Borchers and Efford 2008, Efford et al. 2009, Gardner et al. 2010, Obbard et al. 2010). We evaluated the effects of dependent bears in family groups and breeding pairs on population and variance estimates by expanding the genetic analysis of the 2006 data by extending the genotypes to 23 markers (including the gender marker). Our modeling efforts generated an estimated grizzly bear density in the study area of 10.9 grizzly bears/1,000 km² (SE = 3.3). We also used the results from spatial modeling to redesign our methodology for estimating grizzly bear numbers in the Unit 20E study area. Proposed study design changes included increased survey intensity by reducing the size of the sample units from 49 km² to 36 km², increasing the number of sample periods from 4 to 5, and to move the traps between all sessions instead of once between the second and third periods. We predict these changes will increase the capture rate and improve the precision of the population estimate. We have proposed a study to conduct a DNA-based mark-recapture population estimate of grizzly bears during FY14 in the 2006 study area using this more intensive design but the study was not approved due to fiscal restraints and will not be conducted in the foreseeable future.

JOB/ACTIVITY 1A: Literature review.

Federal funds were used to pay Craig Gardner's salary while working on this activity. On a monthly basis, a monthly literature search was conducted regarding 1) bear DNA-based mark-recapture population estimate techniques and analyses and 2) grizzly and black bear seasonal movements and habitat use. Several publications were obtained that will be useful in preparation of a manuscript on the results of this study.

JOB/ACTIVITY 1C: Remove GPS radio collars from female adult grizzly bears.

No federal funds were expended on this activity. We did not proceed because the 3 remaining GPS collars failed prior to the projected date of removal.

JOB/ACTIVITY 1F: Radiotrack collared bears and upload location data.

We flew 3 tracking flights to upload movement data and to verify family status of the 3 remaining GPS collared females during July–September 2012. For each individual bear, GPS data were uploaded and visual observations were made to monitor association with other bears (offspring or adult males). Both females that emerged with cubs during spring 2012 had lost their cubs by July 2012. The remaining female emerged with 3 yearlings in spring 2012 and 2 of these were observed with her in September 2012. The cub survival rate over the course of the study was 37%.

Federal funds were used to pay for tracking flights and to pay Craig Gardner's salary while working on this activity.

JOB/ACTIVITY 1G: Data analysis and reporting.

We continued with data analysis and manuscript preparation.

Federal funds were used to pay for a portion of Craig Gardner's salary while working on this activity.

II. SIGNIFICANT DEVIATIONS AND/OR ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

None.

III. PUBLICATIONS

None.

Literature Cited:

BORCHERS, D. L., AND M. G. EFFORD. 2008. Spatially explicit maximum likelihood methods for capture recapture studies. *Biometrics* 64:377–385.

EFFORD, M. G. 2004. Density estimation in live-trapping studies. *Oikos* 106:598–610.

EFFORD, M. G., D. L. BORCHERS, AND A. E. BYROM. 2009. Density estimation by spatially explicit capture recapture: Likelihood-based methods. Pages 255–269 *in* D. L. Thompson, E. G. Cooch, and M. J. Conroy, editors. *Modeling Demographic Processes in Marked Populations*. Springer, New York, New York.

GARDNER, B., J. A. ROYLE, M. T. WEGAN, R. E. RAINBOLT, AND P. D. CURTIS. 2010. Estimating black bear density using DNA data from hair snares. *Journal of Wildlife Management* 74:318–325.

ORBARD, M. E., E. J. HOWE, AND C. J. KYLE. 2010. Empirical comparison of density estimators for large carnivores. *Journal of Applied Ecology* 47:76–84.

IV. RECOMMENDATIONS FOR THIS PROJECT

Continue to request funding to repeat the mark-recapture grizzly bear population estimate in the 2006 study area.

PREPARED BY: Craig L. Gardner, ADF&G

DATE: 7 August 2013