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: 17.80

PROJECT TITLE: Black bear abundance and distribution in the Tanana Flats in Interior Alaska

PROJECT DURATION: 1 July 2009–30 June 2014

REPORT DUE DATE: 1 September 2013

PARTNER: U.S. Army

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

COOPERATORS: John Haddock and Amal Ajmi, U.S. Army

WORK LOCATION: Tanana Flats, Game Management Unit 20A

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

OBJECTIVE 1: Estimate population size and distribution of black bears in the U.S. Army's Tanana Flats Training Area located in northcentral Unit 20A.

During June–July 2010, we conducted a DNA-based mark-recapture black bear population estimate study in a portion of GMU 20A that included the U.S. Army's Tanana Flats Training Area as well as one of the most important moose calving areas in Unit 20A (Boertje et al. 2009). We subdivided the 981 km^2 study area into 157 2.5×2.5 km (6.25 km^2) systematically distributed sample units. We deployed 1 hair trap in black bear habitat as close to the center of each sample unit as possible and baited with liquid lure. We conducted 5 8-day sampling periods during 10 June–27 July 2010. Hair traps consisted of a single strand of 4-pronged barbed wire set 48–50 cm above ground around 3–6 trees to form an enclosure with a perimeter of 22–30 m. Three liters of liquid lure consisting of rotted salmon (2 liters) and rotted cow blood were poured on moss in a mound of forest debris that was elevated ~0.3–1 m above ground. We also hung a cloth soaked with lure 3–5 m high in a tree to aid scent dispersion. Hair traps were rebaited at the end of sample period but were not relocated. We also added a secondary lure at each

trap site during sample periods 2 (skunk), 3 (fermented egg), 4 (blueberry oil), and 5 (butterscotch and anise oils) to maintain trap novelty. We checked and rebaited each trap once every 8 days. We followed hair collection protocol outlined in Kendall et al. (2008). We discarded any hair samples that were obviously ungulate hair. Hair samples were sent to an independent lab (Wildlife Genetics, International, Nelson, British Columbia, Canada) specializing in bear genetic samples. Hair sample storage, laboratory analysis and genotyping error checking techniques have been thoroughly described in Poole et al. (2001), Paetkau (2003), and Kendall et al. (2008, 2009). We analyzed all bear samples with ≥1 guard hair follicle or ≥3 underfur hairs because of a high proportion of samples with low number of hairs. Black bear density was estimated with maximum likelihood based spatially-explicit capture-recapture (SECR) models (Efford 2004, Borchers and Efford 2008, Efford et al. 2009, Borchers 2010). Our preliminary estimate is 59 bears ≥1-year-old/1,000 km^2 (SE = 7.3; 95% CI = 46–75 bears) with relative precision at the 95% confidence level of 24.2%. We determined relationships between captured bears by extending the genotypes to 23 markers (including the gender marker) and by installing motion detecting wildlife cameras at 7 different trap sites. We used the software PARENTE (Cercueil et al. 2002) to conduct the parentage analysis which uses allele frequencies, predicted error rates, mutation rates, and gender to assign a probability that for any pair of individuals they are parent and offspring. Of the 81 black bears, we identified 11 mother-father-offspring triads. These 11 litters were sired by 3 males.

JOB/ACTIVITY 1A: Literature review.

I conducted monthly literature reviews.

Federal funds were used to pay for a portion of Craig Gardner's salary while working on this activity. On a monthly basis, I conducted a literature search for information on bear DNA-based mark-recapture population estimate techniques and analyses, seasonal movements, and habitat use. I have acquired numerous publications that will be incorporated into the manuscript we are currently preparing.

JOB/ACTIVITY 5: 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:

BOERTJE, R. D., M. A. KEECH, D. D. YOUNG, K. A. KELLIE, AND C. T. SEATON. 2009. Managing for elevated yield of moose in Interior Alaska. Journal of Wildlife Management 73:314–327.

BORCHERS, D. L. 2010. A non-technical overview of spatially explicit capture-recapture models. Journal of Ornithology 152(2):435–444.

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

CERCUEIL, A., E. BELLEMAIN, AND S. MANEL. 2002. PARENTE: computer program for parentage analysis. Journal of Heredity 93(6):458–459.

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, USA.

KENDALL, K. C., J. B. STETZ, J. B. BOULANGER, A. C. MACLEOD, D. PAETKAU, AND G. C. WHITE. 2009. Demography and genetic structure of a recovering grizzly bear population. Journal of Wildlife Management 73:3–17.

KENDALL, K. C., J. B. STETZ, D. A. ROON, L. P. WAITS, J. B. BOULANGER, AND D. PAETKAU. 2008. Grizzly bear density in Glacier National Park, Montana. Journal of Wildlife Management 72:1693–1705.

PAETKAU, D. 2003. An empirical exploration of data quality in DNA-based population inventories. Molecular Ecology 12:1375–1387.

POOLE, K. G., G. MOWAT, AND D. A. FEAR. 2001. DNA-based population estimate for grizzly bears *Ursus arctos* in northeastern British Columbia, Canada. Wildlife Biology 7:105–115.

IV. RECOMMENDATIONS FOR THIS PROJECT

None.

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