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: 14.27

PROJECT TITLE: Development of an aerial wolf census survey operations manual for Interior Alaska

PROJECT DURATION: 1 July 2012–30 June 2014

REPORT DUE DATE: 1 September 2013

PARTNER: None

PRINCIPAL INVESTIGATOR: Craig L. Gardner, ADF&G; coauthor: Nathan J. Pamperin, ADF&G

COOPERATORS: None

WORK LOCATION: Region III

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

OBJECTIVES: Develop an aerial wolf census (AWC) operations manual that 1) describes existing wolf survey techniques and assumptions, 2) details the AWC and Minimum Wolf Count (MWC) methodologies, and 3) describes logistical and data collection protocols. The manual will include data sheets and data storage protocols.

DESCRIPTION: Reliable methods for measuring population abundance and distribution are fundamental to making informed management decisions and necessary to assess population response to management actions (National Research Council 1997, Pollock et al. 2002, Stetz et al. 2010). In Alaska, the need to develop and use the best population monitoring methods to obtain unbiased predator and ungulate population counts or estimates intensified after the passage of the 1994 Intensive Management (IM) Law (Alaska Fish and Game Laws and Regulations Annotated 2008:27–29). Since the inception of the IM law, our ability to quantify wolf (*Canis lupus*) populations has never been under more scientific, legal, public, and political scrutiny (Titus 2007). In response, ADF&G managers in Region III requested an operations manual describing methodologies to conduct credible aerial wolf censuses. Included would be a comprehensive treatise of survey assumptions and design and method requirement to

conduct either an AWC or MWC and citations to further evaluate other wolf survey techniques. Since 2000, Alaska wildlife managers have relied on 4 aerial wolf survey methods to monitor wolf population size and trends: 1) aerial wolf census (AWC; Stephenson 1978, Gasaway et al. 1983, Hayes et al. 2003); 2) minimum wolf count (MWC); 3) sample unit probability estimator (SUPE; Becker et al. 1998, 2004; Patterson et al. 2004); and 4) territory mapping using radiotelemetry (TMR; Ballard et al. 1987, 1997; Burch et al. 2005; Adams et al. 2008. The AWC, MWC, and SUPE methods are most commonly used by managers in Interior Alaska. All require following wolf tracks in the snow without the need for radio collars. The TMR method, used primarily in research projects, requires that most or all wolf packs in an area are radiocollared and regularly tracked to assess pack size and composition and to map territory boundaries. This technique is usually too expensive to be practical for management purposes, but may be the only option in areas with continual poor snow tracking conditions (wind scouring, track obliteration by wintering caribou [*Rangifer tarandus*] herds, etc.) or for early winter surveys when snow and light conditions are suboptimal. Contrary to other wolf survey methods, no operational manual exists for the AWC and MWC surveys.

JOB/ACTIVITY 1: Literature review.

I conducted an intensive literature review for information on wolf survey techniques and methods and on wolf movements and behavior during winter. I also reviewed ADF&G management and research wolf reports to find summaries of past wolf surveys conducted in Interior Alaska.

Federal funds were used to pay my salary while conducting this task. I acquired numerous publications and survey summaries that helped develop the wolf census manual.

JOB/ACTIVITY 2: Analyze past surveys.

We analyzed 7 different wolf censuses conducted in Interior Alaska since 1983. From these accounts, we developed recommendations on survey timing, duration, and intensity. Survey timing is dependent on adequate snow and weather conditions ensuring all assumptions of the census method are met. In brief, in the Interior, the common range of a snowfall event is 2–10″. Even though surveys can be initiated 1 day following the snow event (Stephenson 1978; Becker et al. 1998, 2004), we recommend beginning the survey 2–3 days after snowfall assuming favorable weather forecasts. The longer lag time allows wolves to move and make more tracks, including those that are on kills following the snow event. The greater distance wolves travel increases the probability of locating their tracks (Becker et al. 2004, Linnell et al. 2007). For multiple day surveys (≥3 days), we still recommend beginning 2 days after snowfall if an adequate weather window is forecasted. In areas prone to weather events or if the long range forecast does not indicate ≥5 day window, plan to initiate 1 day post-storm. For all areas, following snowstorms that deposit >10″, we recommend delaying the survey until 2–4 days after the storm because deep snow can impede wolf movements (Dale 1997). The allowable time interval to conduct an AWC is predicated by meeting survey assumptions and will vary between study areas and years due to terrain, ungulate densities, and weather conditions. Becker et al. (1998) recommended a survey interval of 1–4 days for the SUPE method.

With each passing day following the weather event the length of the wolf track segments will continue to increase making it easier to find tracks; however, longer track segments result in increased tracking time and expense. Eventually, the combination of both old and fresh wolf tracks and track deposition by moose (*Alces alces*), caribou, and sometimes lynx (*Lynx canadensis*) will reduce the efficiency of the survey and violation of survey assumptions could occur. There is no set time when this can happen. Based on discussions with experienced wolf survey pilots, the survey window should be limited to 4–5 days in areas with high densities of moose (>1 moose/mi^2) and up to 10 days in areas with low numbers of caribou and moose assuming suitable weather conditions. In areas with abundant caribou, an AWC survey may not be possible. If caribou are limited to a portion of the study area or herd size is small, it is possible to conduct AWC, but this area needs to be surveyed promptly after the weather event before caribou track accumulation is too great. We evaluated various search patterns and intensities used in surveys conducted in 3 different areas of Interior Alaska (McNay 1993; Gardner, ADF&G, unpublished data; Hollis, ADF&G, unpublished data). We found that a search pattern of flight lines separated by 1.0–1.5 mi is necessary to intersect all the track segments. Surveying at this flight line separation will require search intensities of 0.8–0.9 min/mi^2 when not tracking wolves. Search intensity will increase to ≤2 min/mi^2 when wolves are being tracked because flight speeds will be slower and more time will be spent circling compared to when flying a straight transect (Becker et al. 1998, 2004).

Federal funds were used to pay for my salary while working on this task.

JOB/ACTIVITY 3: Write manual.

We completed a draft that will be reviewed by ADF&G supervisors, biologists, and biometricians and by other wolf experts in other agencies prior to release.

Federal funds were used to pay my salary while working on this task.

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:

ADAMS, L. G., R. O. STEPHENSON, B. W. DALE, R. T. AHGOOK, AND D. J. DEMMA. 2008. Population dynamics and harvest characteristics of wolves in the central Brooks Range, Alaska. Wildlife Monographs 170.

ALASKA FISH AND GAME LAWS AND REGULATIONS ANNOTATED, 2008–2009 edition. 2008. LexisNexis Matthew Bender, Charlottesville, Virginia.

BALLARD, W. B., L. A. AYRES, P. R. KRAUSMAN, D. J. REED, S. G. FANCY. 1997. Ecology of wolves in relation to a migratory caribou herd in northwest Alaska. Wildlife Monographs 135.

BALLARD, W. B., J. S. WHITMAN, AND C. L. GARDNER. 1987. Ecology of an exploited wolf population in south-central Alaska. Wildlife Monographs 98.

BECKER, E. F., H. N. GOLDEN, AND C. L. GARDNER. 2004. Using probability sampling of animal tracks in snow to estimate population size. Pages 248–270 *in* W. L. Thompson, editor. Sampling rare or elusive species: concepts, designs, and techniques for estimating population parameters. Island Press, Washington, D.C.

BECKER, E. F., M. A. SPINDLER, AND T. O. OSBORNE. 1998. A population estimator based on network sampling of tracks in the snow. Journal of Wildlife Management 62:968–977.

BURCH, J. W., L. G. ADAMS, E. H. FOLLMANN, AND E. A. REXSTAD. 2005. Evaluation of wolf density estimation from radiotelemetry data. Wildlife Society Bulletin 33:1225–1236.

DALE, B. W. 1997. Units 20A, 20B, 20C, 20F, and 25C wolf. Pages 108–121 *in* M. V. Hicks, editor. Wolf management report of survey-inventory activities 1 July 1993–30 June 1996. Alaska Department of Fish and Game, Study 14.0, Juneau, Alaska.

GASAWAY, W. C., R. O. STEPHENSON, J. L. DAVIS, P. E. K. SHEPHERD, AND O. E. BURRIS. 1983. Interrelationships of wolves, prey, and man in Interior Alaska. Wildlife Monographs 84.

HAYES, R. D., R. FARNELL, R. M. P. WARD, J. CAREY, M. DEHN, G. W. KUZYK, A. M. BAER, C. L. GARDNER, AND M. O'DONOGHUE. 2003 Experimental reduction of wolves in the Yukon: ungulate responses and management implications. Wildlife Monographs 152.

LINNELL, J. D. C., P. FISKE, J. ODDEN, H. BRØSETH, I. HERFINDAL, AND R. ANDERSEN. 2007. An evaluation of structured snow-track surveys to monitor Eurasian lynx *Lynx lynx* populations. Wildlife Biology 13(4):456–466.

MCNAY, M. E. 1993. Evaluation and standardization of techniques for estimating wolf numbers in Interior and Arctic Alaska. Alaska Department of Fish and Game, Federal Aid in Wildlife Restoration, Research Final Report, Study 14.15, Juneau, Alaska.

NATIONAL RESEARCH COUNCIL. 1997. Wolves, bears, and their prey in Alaska. National Academy Press, Washington, D.C., USA.

PATTERSON, B. D., N. W. S. QUINN, E. F. BECKER, AND D. B. MEIER. 2004. Estimating wolf densities in forested areas using network sampling of tracks in the snow. Wildlife Society Bulletin 32(3):938–947.

POLLOCK, K. H., J. D. NICHOLS, T. R. SIMONS, G. L. FARNSWORTH, L. L. BAILEY, AND J. R. SAUER. 2002. Large scale wildlife monitoring studies: Statistical methods for design and analysis. Environmetrics 13:105–119.

STEPHENSON, R. O. 1978. Characteristics of exploited wolf populations. Alaska Department of Fish and Game, Federal Aid in Wildlife Restoration, Research Final Report, Job 14.3R, Juneau, Alaska.

STETZ, J. B., K. C. KENDALL, AND C. SERVHEEN. 2010. Evaluation of bear rub surveys to monitor grizzly bear population trends. Journal of Wildlife Management 74:860–870.

TITUS, K. 2007. Intensive management of wolves and ungulates in Alaska. Transactions of the North American Wildlife and Natural Resources Conference 72:366–377.

IV. RECOMMENDATIONS FOR THIS PROJECT

None.

PREPARED BY: Craig L. Gardner, ADF&G

DATE: 8 August 2013