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: AKW-10 Wildlife Restoration FY2016

PROJECT NUMBER: 7.01

PROJECT TITLE: Develop and evaluate indices for assessing marten population status and trend in Interior Alaska

PROJECT DURATION: 1 July 2010–30 June 2017

REPORT DUE DATE: 1 September 2016

PRINCIPAL INVESTIGATORS: Kerry L. Nicholson, Craig L. Gardner (retired), ADF&G, Alyssa Crawford (Biometrician), Co-investigator: Nathan J. Pamperin, ADF&G

COOPERATORS: Knut Kielland (University of Alaska Fairbanks); Molly Murphy (University of Alaska Fairbanks); Joe Cook (Museum of Southwestern Biology)

WORK LOCATION: Game Management Units 12, 19D, 20, 25B, and 25C

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

OBJECTIVE 1: Evaluate if fecundity based on pregnancy rates and blastocyst counts can be used as indicators of marten population status and composition for subsequent trapping season(s).

JOB/ACTIVITY 1A: Collect carcasses from the same trappers from the same areas and evaluate the young of the year: to adult female (YOY:AdF) ratios relative to the previous year's blastocyst counts and pregnancy rate. If there are no relationships, these data will indicate that either our methods of assessing pregnancy (presence of blastocysts) or counting blastocysts are not adequate or that YOY survival was lower than expected during the period between birth and the onset of trapping season.

Federal funds were used to pay salaries associated with collecting and necropsying marten carcasses. Trapper interest in the project has increased across the Interior. During all years, for each carcass, we determined gender:age class (adult or young of year [YOY] based on skull characteristics); pregnancy by the presence of blastocysts in the uterine horns; and collected muscle, hair, and claw samples to determine seasonal diets using stable isotope analyses.

During FY16 we necropsied 2,006 marten carcasses collected from 37 trappers across the Interior (Figure 1).

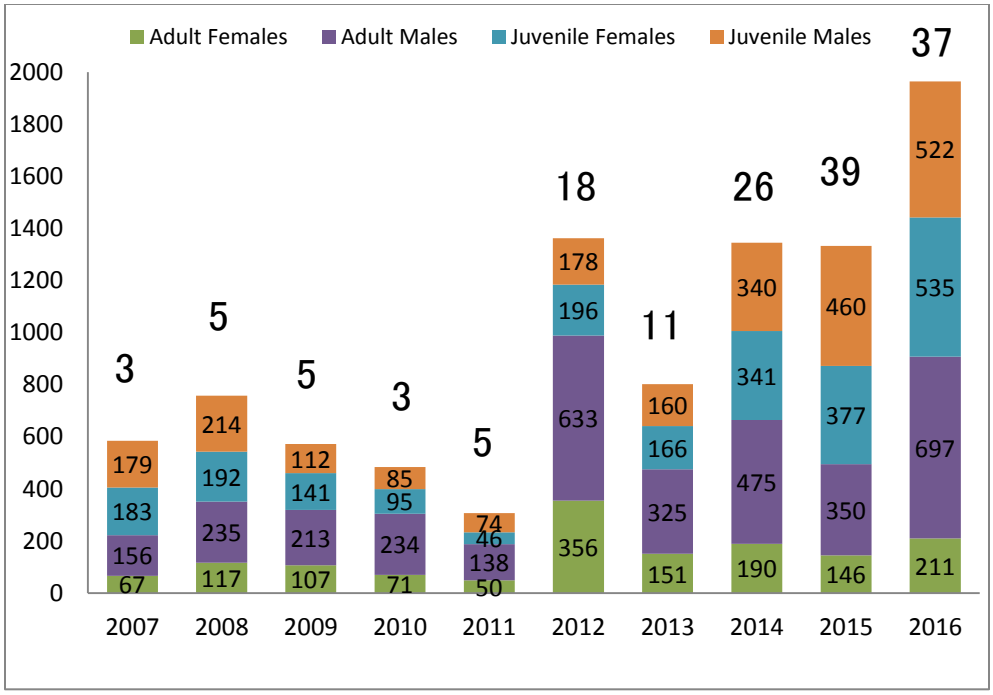

Figure 1. Number of marten harvested per trapping season from across Interior Alaska 2007-2016. Number of trappers participating indicated above column.

We also extracted a lower fourth premolar from adults for more exact age determination using cementum annuli. For FY16 we collected 991 adult teeth for aging (207 females and 704 males).

Preliminary analyses of data collected in FY16 closely agreed with previous years' findings that the best forecast variable for predicting a given year's marten harvest is pregnancy rate in the previous year. It also revealed that forecasting models of marten harvest using previous year's harvest were not precise enough for management due to the multiple factors affecting marten abundance and harvest. We have hypothesized reasons why forecasting the next season does not always work and propose an in-season harvest check to determine the marten abundance and population composition status. However, there can be disconnects between pregnancy and juvenile presence in the harvest due to both poor (fewer than expected) and excellent juvenile survival during spring and summer. Lacking an inexpensive and easy method of collecting juvenile survival or prey abundance, we have attempted to develop an in-season check of harvest done by trappers using percentage of adult males or adults in the harvest. Since adult males are vulnerable to harvest throughout the season and juveniles are most vulnerable early on, early season harvest composition of around 35-40% adult males indicates poor productivity. Further, even during years of average to high juvenile numbers, the percentage of adult males can be used to monitor the composition of status of the harvested population. When the percentage of adult males harvested reaches ≥40% during the trapping season, one can

assume that few juveniles remain. This information is advantageous to trappers in managing their trap lines as they can cease trapping based on catch ratios of YOY and possibly adult males to minimize capture of adult females. It can also be useful for managers monitoring marten population trends on the basis of trapper catch reports. We will conduct additional analyses to determine if there are other factors that can be easily used by managers to develop a more accurate forecast of marten numbers in a given trapping season.

OBJECTIVE 2: Test the hypothesis that total YOY/AdF ratios of >3:1 are adequate for marten population maintenance.

JOB ACTIVITY 2A: Compare sex and age ratios and total catch between years by trapper (trapper effort will remain comparable throughout the study).

Similarly to last year, there is a reasonable YOY/AdF harvest ratio of 5.05 across the region, but a correspondingly low pregnancy rate. However, we still need confirmation of age through cementum annuli enumeration to ensure this ratio is correct. The pregnancy rate for FY16 was 47%, which is a small improvement from last year (FY15 = 43%), although it is still quite low in the context of the project dataset. These below average pregnancy rate indicate that marten numbers across the Interior may not increase next year and that summer survival may be critical. While YOY/AdF in FY15 indicated available of YOY, pregnancy was low and was predicted to lead to fewer YOY next season. For FY15 the overall preliminary YOY/AdF ratio was 4.28; this increased to 5.73 when ages were later confirmed through cementum analysis. The average number of blastocysts/pregnant female was 1.08 in FY15 and is only slightly higher at 1.22 for FY16. Percent adult male in the harvest was 26.24% and this year was 35.39%. The YOY/AdF ratio was higher than the recommended minimum of 3.0 YOY/Ad (Strickland and Douglas 1987).

OBJECTIVE 3: Assess how marten reproductive performance is related to diet and age by study area.

JOB/ACTIVITY 3A: Annual collections contain carcasses from all marten caught by trappers. We will necropsy all carcasses to identify gender and age classes, estimate fecundity, and collect muscle, hair, and claw samples to examine diets by sex and age using stable isotope techniques.

Skinned marten carcasses were collected from 5–7 trappers in 3 study areas across the Interior during RY10–RY13. We collected 300–800 carcasses per year including 100 from each study area. Furthermore, we have collected samples (≥1,500 marten) during RY07–RY09 from the 3 areas. A reproductive failure occurred across the Interior in FY12 (trapping year 2011–2012), and we used this as the benchmark for all comparisons.

In FY15, stable isotope analysis was conducted by our cooperator Knut Kielland and associates at the University of Alaska Fairbanks; however, we processed samples in FY16. We limited these analyses to adult females during FY10–FY14 to evaluate possible relationships between dietary choice and pregnancy. In FY15, we incorporated other sex and age classes for further possible exploration (73 juvenile females; 70 juvenile male; 164 adult females; 85 adult males). Thus far, we have processed 100 adult

female claws for the diet analysis, but have not had time to process the additional sex and age class.

A premolar from the harvested females ≥1-year-old was collected to determine age structure of the harvest. Federal funds were used to pay for salary associated with extracting and preparing teeth for aging. Tooth samples were sent to Matson's Laboratory, LLC (Milltown, Montana) for aging. The average age was 3.1 years old and the oldest female caught was 12 years old (n = 2). In FY16 we added another 207 female samples, but are awaiting age confirmation from Matson's Lab.

Muscle, claw, and hair samples from each of the 214 harvested females ≥1-year-old were collected for stable isotope analyses to determine seasonal diets for FY12-14 and an additional 164 in FY15. During these fiscal years, only claw samples were analyzed but summary reports were not completed by the time of writing this report. Federal funds were used to pay for salary associated with this task and for the contracted work by the University of Alaska laboratory to conduct stable isotope analyses.

Preliminary comparison of diet between years indicate that during the year of low productivity (FY12) marten diets were dominated by squirrels when compared to more productive years (FY08 and FY10) when voles dominated the diet. Marten are dietary generalists but population declines have been documented following synchronous declines of rodents (Thompson and Colgan 1987, Flynn and Schumacher 2009). We will continue to evaluate diet for all sample areas over all of the sample years. We will be sampling small mammal and other diet items of marten develop the baseline catalogue of isotopic signatures to properly evaluate marten isotopic signatures.

OBJECTIVE 4: If funding becomes available or if outside ADF&G cooperators become interested, assess the value of small mammal abundance indices as predictors for marten population status.

JOB/ACTIVITY 4A: Assess the status of small mammal populations during August–October and possibly during the spring in areas where carcasses are being collected. Accumulate at least 600 trap nights (museum special snap traps) in a variety of available habitats in each study area to evaluate abundance of small mammals. Assess snowshoe hare abundance following techniques used by the University of Alaska Fairbanks (Knut Kielland, unpublished data). We will test if small mammal abundance can be used to predict marten population trend and productivity.

No work was accomplished on this objective during the report period.

OBJECTIVE 5: Literature review, data analysis, and publications.

JOB/ACTIVITY 5A: Analyze data and prepare reports and manuscripts.

Federal funds were used to cover salary when conducting literature reviews on a monthly basis. Literature searches were conducted for information on marten population dynamics, productivity, and food habits, and on the use of harvest data to monitor furbearer populations and on stable isotope analyses to monitor dietary choice of carnivores.

We began analyzing the capture data with the intent of preparing a manuscript evaluating the use of easily collected samples from harvested marten to forecast population status by trappers and managers. We will also be analyzing the data to identify any variables trappers and managers can monitor within season to track marten population status. In FY14, we summarized our preliminary findings in an article published in the Alaska Trappers Association monthly magazine. We also prepared a report distributed to Interior area biologists and contributing trappers summarizing the FY15 necropsy results (See attached). Salary associated with these tasks was funded by federal aid (trapper effort will remain comparable throughout the study).

II. PUBLICATIONS

LITERATURE CITED:

Flynn, R. W., and T. V. Schumacher. 2009. Temporal changes in population dynamics of American martens. Journal of Wildlife Management 73(8):1269–1281.

Strickland, M. A., and C. W. Douglas. 1987. Marten. Pages 531–546 [*In*] M. Novak, J A. Baker, M. E. Obbard, and B. Malloch, editors. Wild furbearer management and conservation in North America. Ontario Trappers Association, North Bay, Canada.

Thompson, I. D., and P. W. Colgan. 1987. Numerical responses of martens to a food shortage in northcentral Ontario. Journal of Wildlife Management 51:824–835.

PREPARED BY: Kerry L. Nicholson

DATE: -19 August 2016

Attached is a copy of an article published in the October 2015 ATA magazine. Note that some of the information will have changed from the above report due to the delayed confirmation of ages from the cementum analysis.