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:** 12

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 2015

REPORT DUE DATE: 1 September 2014

PARTNER: None

PRINCIPAL INVESTIGATORS: Craig L. Gardner, ADF&G; Co-investigator: Nathan J. Pamperin, ADF&G

COOPERATOR: Knut Kielland, University of Alaska Fairbanks

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 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.

During FY14 we necropsied 1,353 marten carcasses collected from 26 different trappers in 14 areas. In comparison, during FY11, FY12, and FY13, we necropsied 308, 1,183, and 802 marten carcasses, respectively. Five trappers from 4 areas contributed the FY11 sample; 17 trappers from 9 areas, the FY12 sample; and 11 trappers from 8 areas, the FY13 sample. 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. We also extracted a lower fourth premolar from adult females for more exact age determination using cementum annuli. During FY14 we collected a premolar from 214 adult females for aging. Stable isotope analyses were conducted by our cooperator Knut Kielland and associates at the University of Alaska Fairbanks. We limited these analyses to adult females during FY10–FY14 to evaluate possible relationships between dietary choice and pregnancy. During FY12 (trapping year 2011–2012) we identified a reproductive failure that occurred across the Interior. We used this year as the benchmark for all comparisons.

Preliminary analyses of data collected in FY14 closely agreed with previous years' findings that the best forecast variable for predicting a given year's marten abundance and population composition is pregnancy rate in the previous year. 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. The best in-season check of the forecast appears to be percentage of adult males 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 ≥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. As the season progresses, once the percentage of adult males increases to ≥40% one can assume that few juveniles remain. This information is advantageous to managers monitoring marten population trends and useful to trappers in managing their lines (i.e., knowing when to stop trapping based on catch ratios of young-of-year (YOY) and possibly adult males to minimize capture of adult females). We are conducting 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).

Federal funds were used to pay salaries associated with collecting and necropsying marten carcasses. During FY14, 1,353 marten carcasses collected from 26 trappers in 14 areas in Interior Alaska were necropsied. Trapper interest in the project is increasing across the Interior resulting in the increased sample. Overall, the YOY/AdF ratio was 3.1, pregnancy rate for ≥1-year-old females was 72.1%, the average number of blastocysts/pregnant female was 2.3, percent adult male in the harvest was 35.2%. The YOY/AdF ratio was at the recommended minimum of 3.0 YOY/Ad (Strickland and Douglas 1987) and the < 40% harvest of adult males indicates that juvenile survival prior to the trapping season was good. The average pregnancy rate indicates that marten numbers across the Interior should increase next year assuming at least average juvenile survival.

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

JOB/ACTIVITY 3A: Skinned marten carcasses will be collected from 5–7 trappers in 3 study areas across the Interior during RY10–RY13. We will collect 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. Annual collections contain carcasses from all marten caught by these 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.

A premolar from the 214 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 will be sent to Matson's Laboratory, LLC (Milltown, Montana) for aging. We received ages from 510 harvested females ≥1-year-old from FY12 and FY13 from the laboratory. The average age was 3.1 years old and the oldest female caught was 12 years old (n = 2).

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 FY13. During this fiscal year, only the 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.

We compared diet between years, and found 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.

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**:** 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 monitor marten population status. We summarized our preliminary findings in an article published in the Alaska Trapper Association monthly magazine (included in the Publications section). We also prepared a report distributed to Interior area biologists and contributing trappers summarizing the FY14 necropsy results. Salary associated with these tasks was funded by federal aid (trapper effort will remain comparable throughout the study).

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

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.

Following is the article published in the Alaska Trapper Association magazine.

Forecasting Marten Populations in Interior Alaska

by Craig Gardner and Nate Pamperin
Alaska Department of Fish and Game

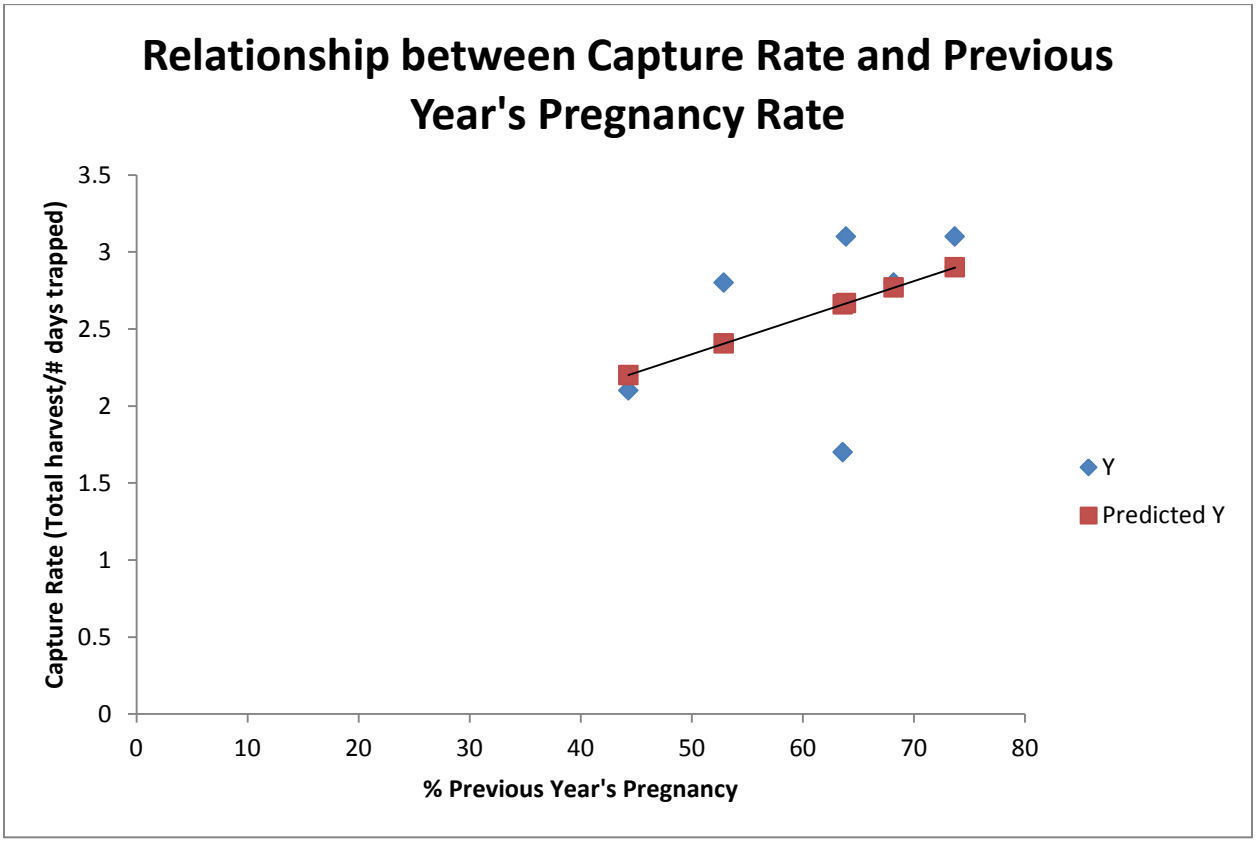
Three years ago, we initiated a marten study to evaluate if data collected from marten carcasses could be used to forecast marten population status. The ability to predict marten abundance would allow us to provide you (the trappers) relevant and timely information to plan your trapping efforts for the coming winter. During the past 3 trapping seasons, we collected and necropsied nearly 2,300 marten carcasses from trappers caught across

the Interior. From each carcass, we determined sex, age (based on skull characteristics) and pregnancy (by the presence of fertilized eggs in the uterus).

We are using these data to identify which variables are best to predict marten population trends across the Interior. Based on what we found so far, the variable which allows us to most accurately forecast the coming year's population is the previous year's pregnancy (figure below).

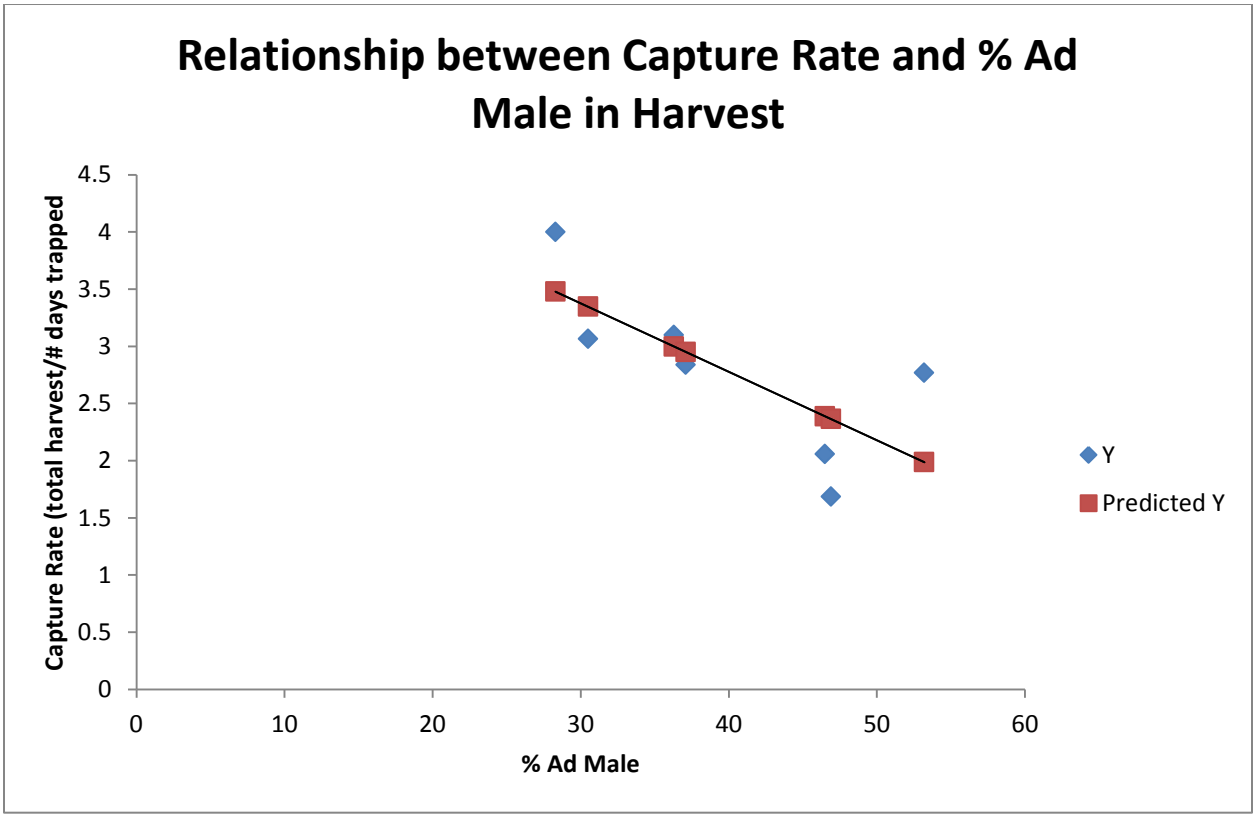
Marten reproductive biology is really interesting. Adult females utilize what is called "delayed implantation." This means that after they breed during July and August (before current trapping season), the fertilized eggs (1–7) float free in the uterus during the winter and do not implant until March or April. The kits are born during April and May, before the next trapping season. This means that pregnancy estimates from the current year's trapping season are really telling us what we can expect for the next year.

Unfortunately, the previous year's pregnancy rates are not a *perfect* indicator because other factors can come into play, such as juvenile survival during spring and summer. For unknown reasons, a large proportion of the juveniles can die either before birth or during the summer. This situation occurred in 2011 (the lowest diamond on the figure below). Currently, we can't predict summer survival rates from previous year's carcass data. The best we can do is identify the situation by examining carcasses during the early part of the following trapping season.



We started this project with the idea to use the annual carcass collection to forecast marten population status. We now see it also offers an excellent snapshot of what is happening during the season. For example, by late January 2012 we identified the marten reproductive failure that occurred during 2011 across the Interior. This discovery enabled us to get the word out to trappers for their use during the last 6 weeks of the season. The best variables that can easily be monitored during the season are the percentages of juveniles and adult males in the harvest (next figure).

Adult males are vulnerable to harvest throughout the season and juveniles are most vulnerable early on and should dominate the harvest. Therefore, early season harvest composition of ≥40% adult males will clearly indicate poor productivity and low marten numbers that year. During years of average to above average productivity you should be catching 50–60% juveniles. The ideal harvest comprises of 60% or greater juvenile, about 30% adult male and just a few adult females. Luckily adult males and many juveniles are easy to identify from the skull. Many of you know how to do this but for those who don't, feel free to contact us and we can explain how.



We have been quietly forecasting marten numbers for the past 2 years but have not gone public because we were still learning which variables were the best indicators. Prior to last year's trapping season, we correctly forecasted low marten numbers across most of the Interior. Our prediction was based on the combination of the reproduction failure and average pregnancy rates from the prior year. Even though marten numbers were down, there was some good news. Survival of juvenile marten was excellent (at least in the

western portion of the Interior) so there was a pulse of juveniles allowing trappers to take some advantage of the high fur prices without hurting overall marten numbers.

For the coming 2013–2014 season, we have good and not so good news. The good news is that pregnancy rates for this year were above average throughout central and western Interior and about average in the east. As long as there was at least average juvenile survival over the summer, marten numbers should increase in most areas of the Interior, especially in the west (Game Management Unit 19). Marten numbers in the central portion (Units 20A–20D) will still be a bit depressed but a good catch of juveniles is expected. In the east and some areas in northern Interior, (Units 12 and 20E and most likely 21B) marten numbers will be low and unfortunately we don't expect a high number of juveniles. Our carcass collections for Units 20F and 25B, C and D were not adequate to make a forecast. Hopefully, we can get more marten from these areas this year.

We plan to continue this project. You can expect to receive these preseason forecasts of marten population status into the foreseeable future. Hopefully these forecasts will benefit your trapping efforts. Our only request is more carcasses from more trappers. Our predictions would benefit with more data from more areas of the Interior. Contact us if you would like to participate.

We also have some really interesting preliminary data regarding marten food habits. We are hoping these data will give us additional insight on population trends. We will report on that in a future article.

IV. RECOMMENDATIONS FOR THIS PROJECT

None.

PREPARED BY: Craig L. Gardner

DATE: 6 August 2014