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-29

PROJECT NUMBER: 11.0

PROJECT TITLE: The role of sex and age composition in muskox population dynamics.

PERIOD OF PERFORMANCE: 3/23/2019 – 3/23/2020

PERFORMANCE YEAR: March 23, 2019 – March 23, 2020; year 2 of a 4-year grant

REPORT DUE DATE: May 29, 2020

PRINCIPAL INVESTIGATOR: Brynn Parr

Authorities: 2 CFR 200.328
2 CFR 200.301
50 CFR 80.90

I. PROGRESS ON PROJECT OBJECTIVES DURING PERFORMANCE YEAR

OBJECTIVE 1: Investigate techniques used to evaluate secondary effects of selective harvest on demographics and abundance.

ACCOMPLISHMENTS: A literature review on secondary effects and super additive harvest remains ongoing.

OBJECTIVE 2: Estimate recruitment rates across spatial and group-specific composition scales relative to the proportion and abundance of mature bulls.

ACCOMPLISHMENTS: Recruitment of the 2018 cohort through a year of age was 13% across subunits 22B, C, and D. Fall recruitment across the study area for the 2019 cohort in the fall of 2020 was 12%. The proportion and abundance of mature bulls has not changed.

OBJECTIVE 3: Establish methods for marking and following muskox ages 2 and less.

ACCOMPLISHMENTS: We conducted a pilot study in the first year of this project to mark neonatal muskoxen; we found helicopter-based captures were successful. Therefore, we continued capturing and collaring neonatal muskox using this method in year two.

We captured and collared 60 neonatal muskoxen between 30 April and 15 May 2019. We sexed and weighed 55 calves; overall, neonates weighed an average of 11kg. Males

(*n*=33) averaged 10.9kg and females (*n*=22) averaged 11.3kg; however, there was no significant difference in weight between the sexes.

Due to high mortality documented via collared neonates (see below), we increased our sample size of the first-year cohort by capturing and collaring 6-month-old muskox calves in the fall of 2019 in place of 18-month-old females. We used a Pneudart model 171 projector with an Armson O.E.G. 1" scope and Type C 1.5cc 14-gauge 1" barbed dart to deliver immobilization drugs to the calves. Calves were immobilized with 4.5 mg thiafentanil and 1.5 mg xylazine. We used 0.5 mL of sterile water to fill the remaining space in the darts. Atipamezole (0.1 mg/kg) and naltrexone (20 mg/1 mg thiafentanil) were administered subcutaneously to reverse the xylazine and thiafentanil, respectively.

We captured 25 muskox calves between 10 and 12 October 2019. Average weight of all calves was 97 kg (95% CI: 93-101 kg; *n*=21). Females averaged 86 kg (95% CI: 72-100 kg; *n*=4) and males averaged 100 kg (95% CI: 97-102 kg; *n*=17). Expandable permanent collars were placed on females; fully expanded neonatal collars and ear tag transmitters were placed on males. No complications from these collars or ear tag transmitters were recorded by the end of this reporting period.

OBJECTIVE 4: Estimate age-specific survival rates across spatial and group-specific composition scales relative to the proportion and abundance of mature bulls.

ACCOMPLISHMENTS: We have not yet estimated age-specific survival rates, pending an adequate sample size of collared individuals of known age. A preliminary attempt to estimate age-specific survival from historical composition data proved ineffective as inconsistencies were found tracking individual cohorts through time, particularly among females.

OBJECTIVE 5: Estimate group and age-specific fecundity across spatial and group-specific composition scales relative to the proportion and abundance of mature bulls.

ACCOMPLISHMENTS: Group and age-specific fecundity will be estimated using historical blood samples. We will also explore the utility of focal observations of groups starting in the spring of 2020 as an additional tool for estimating pregnancy rates.

OBJECTIVE 6: Identify causes of mortality during peak periods of mortality.

ACCOMPLISHMENTS: We monitored neonate collars deployed in the spring of 2019 near daily for one-month post-capture, and monthly thereafter. We documented 58 muskox calf mortalities between 29 April and 1 August 2019, resulting in 2% survival rate. Partial and complete carcasses were sent to our laboratory for complete necropsies. Predation (*n*=25) accounted for 43% of mortalities documented: bears accounted for 68% (*n*=17) of all predation events. Wolverines (*n*=2; 8%), eagles (*n*=1; 4%), and unknown predators (*n*=5; 20%) made up the remaining predation events. Starvation (*n*=9) or a combination of starvation and trauma (*n*=4) accounted for 22% of mortalities documented. Of these, 6 cases were clearly attributed to the capture event (i.e. calves were not seen back with the group between the collaring and mortality events). Birth defects (*n*=5; 9%), conspecific trauma (*n*=6; 10%), and unknown/open causes (*n*=9; 16%) make up the remaining mortalities. Two mortalities currently listed as unknowns are pending collar retrieval;

collars were radiotracked under deep water when they first emitted a mortality signal and were not revisited by the end of this reporting period. Calves lived an average of 14 days after being collared; calves dying of predation lived an average of 20 days after the collaring event while calves dying of all other causes lived an average of 8 days.

A total of 13 necropsies (45%) on collared muskox calves revealed some level of conspecific trauma. Not all trauma led to a mortality, but it is interesting to note that adult muskoxen were aggressive in varying levels towards nearly a quarter of the collared muskox calves. Adult muskoxen aggression towards calves is likely even higher, as some calves may survive these aggressive interactions.

Following 6-month-old calf captures in the fall of 2019, calves were radiotracked as often as weather permitted. Through the end of this reporting period, no mortalities had been documented.

II. SUMMARY OF WORK COMPLETED ON PROJECT TO DATE.

Year 2 of a 4-year project.

We captured and collared a total of 84 muskox from the 2019 birth cohort; 60 muskox were initially collared as neonates and 24 were initially captured in the fall as 6-month-old calves. We documented 2% survival of the neonates through 4 months of age, but 100% survival from 6 through 11 months of age (the end of this reporting period). Due to the uncertainty of the exact cause of death in a number of neonate mortalities and a lack of collars on animals from 2-4 months of age, we will need to continue to adapt our methods in the future in an attempt to understand these complexities and obtain data from the missing time period.

We worked with the collar manufacturer (Telonics) to develop an expandable collar (range of 24–34 inches in diameter) to use on 6-month-old female cows.

III. SIGNIFICANT DEVELOPMENT REPORTS AND/OR AMENDMENTS.

We requested and received an additional $155,874.79 in funding for this project during FY20. This additional money will be used to conduct a third full year of neonate captures and mortality investigations in FY21.

IV. PUBLICATIONS

No publications have resulted from this project to date.

V. RECOMMENDATIONS FOR THIS PROJECT

This project will continue 2 more years.

Prepared by: Brynn Parr