

**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: 3/23/2020 – 9/30/2021

PERFORMANCE YEAR: March 23, 2020 – September 30, 2021; year 4 of a 5-year grant

REPORT DUE DATE:

PRINCIPAL INVESTIGATOR: Brynn Parr, WBIII

COOPERATORS:

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 of selective harvest 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 across the study area for the 2020 cohort was 17%. The proportion and abundance of mature bulls has been stable across the study area over the last few years.

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

ACCOMPLISHMENTS: We captured and collared 16 neonatal muskoxen between 1 and 14 May 2020 and 60 neonatal muskoxen between 3 and 14 May 2021. Calves were collared, sexed (males = 40, females = 36), and released.

We increased our sample size of the 2020 cohort by capturing and collaring 6-month-old muskox calves in the fall of 2020. We used a Pneudart model 171 projector with an Armson O.E.G. 1" scope and Type C 1.0cc 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. Atipamezole (0.1 mg/kg) and naltrexone (20 mg/1 mg thiafentanil) were administered to reverse the xylazine and thiafentanil, respectively.

We captured 29 muskox calves between 13 and 22 October 2020. Average weight of all calves was 94 kg (range: 59 – 132 kg; $n=27$). Females averaged 88 kg (range: 59 – 111 kg; $n=12$) and males averaged 99 kg (range: 77 – 132 kg; $n=14$). There was no significant difference in weight between males and females ($P=0.009$). Expandable permanent collars were placed on females; fully expanded neonatal collars were placed on males. No complications from these collars 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: Survival of the 2020 cohort was 37% between birth and 6 months of age, 100% between 6 and 12 months, and 96% between 13 and 17 months (the end of this reporting period).

Survival of the 2021 cohort was 45% between birth and 5 months of age (the end of this reporting period).

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-specific fecundity rates were experimentally obtained in the spring of 2020 through focal group observations; group-specific fecundity rates ranged from 75-92%. Using historical blood samples, we have documented 95% of mature cows (≥ 4 years) tested ($n=20$) were pregnant, 100% of three-year old cows tested ($n=6$) were pregnant, and one two-year old cow tested was pregnant.

Group- and age-specific fecundity rates were not obtained in the spring of 2021 due to decreased focal group observations and limited pilot availability for repeated low-level aerial photography.

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

ACCOMPLISHMENTS: We monitored neonate collars deployed in the spring of 2020 and 2021 near daily for one-month post-capture and monthly thereafter. We documented 10 muskox calf mortalities between 6 May and 11 July 2020, and we documented 35 muskox calf mortalities between 7 May and 1 October 2021. Whole carcasses were sent to our laboratory for complete necropsies. Bear predation ($n=32$) accounted for 71% of mortalities documented; unknown predators ($n=3$), other/unknown ($n=4$) and capture-related causes ($n=2$) made up the remaining mortalities. Four collars appear to have slipped off the neonate in 2021 and were right censored on the last date they transmitted a

live signal. An additional two collars in 2021 were censored prior to any survival analysis due to collar failure and/or capture abandonment.

Following 6-month-old calf captures in the fall of 2020, calves were radiotracked as often as weather permitted through winter and monthly starting in April 2021. Six collars emitted mortality signals. Upon collar retrieval, it was determined 5 of the collars slipped off. The remaining mortality was assigned to bear predation.

II. SUMMARY OF WORK COMPLETED ON PROJECT TO DATE.

Year 4 of a 5-year project.

We have captured and collared a total of 199 muskox over the course of this project to date: 149 were initially collared as neonates, and 50 were initially collared as a 6-month-old calf. Thirteen neonates were collared from the 2018 cohort, 84 calves were collared from the 2019 cohort, 42 calves were collared from the 2020 cohort, and 60 neonates were collared from the 2021 cohort. Survival from birth through 6 months of age has averaged 37.3%, while survival from 6 – 12 months of age has averaged 97%. Capture protocols have continued to adapt yearly to ensure capture related mortalities are minimized. Most mortalities documented to date occur in the first month of life for muskox. We will continue to use adaptive capture protocols and investigate mortalities as quickly as possible to increase our understanding of muskox population dynamics.

III. SIGNIFICANT DEVELOPMENT REPORTS AND/OR AMENDMENTS.

We requested and received approval to extend this project through October 31, 2022.

IV. PUBLICATIONS

No publications have resulted from this project to date.

V. RECOMMENDATIONS FOR THIS PROJECT

This project will continue 1 more year.

Prepared by: Brynn Parr

Date: 11/30/2021