

**Wildlife Restoration MULTI-YEAR GRANT
INTERIM 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-R-15-2020**PROJECT NUMBER:** P1.0**PROJECT TITLE:** Mulchatna Caribou Herd (MCH) Abundance, Survival, and Body Condition**PERIOD OF PERFORMANCE:** October 01, 2021- March 2023**PERFORMANCE YEAR:** October 01, 2021 - September 30, 2022**REPORT DUE DATE:** Submit to Coordinator Dec. 29, 2022**PRINCIPAL INVESTIGATOR:** Renae Sattler, Wildlife Biologist III, ADFG**COOPERATORS:** Nick Demma, Wildlife Biologist III, ADFG

Authorities: 2 CFR 200.328
2 CFR 200.301
50 CFR 80.90

I. PROGRESS ON PROJECT OBJECTIVES DURING PERFORMANCE YEAR

OBJECTIVE 1: Estimate age-specific survival rates and identify the proximate cause of death in adult female Mulchatna caribou (MC).

ACCOMPLISHMENTS: Estimating survival rates and proximate cause of death requires monitoring marked individuals. During this reporting period we captured 16 adult female caribou (>47 months) in the eastern portion of the Mulchatna range and affixed GPS collars in October of 2021 (Figure 1). Our goal was to capture up to 37 animals split between the Western and Eastern portion of the Mulchatna range. However, a series of low-pressure systems hit the SW coast of Alaska and created weather conditions (e.g., wind, freezing rain and fog) that prevented capture operations in the Western portion of the herd range.

This sampling effort raised the number of monitored individuals to 67. Of these individuals, 6 died during this reporting period resulting in an estimated survival rate of 90% (95% CI = 82-96%) in adult female caribou. The proximate causes of death were unknown (n=5) and starvation (n=1). One of the unknown mortalities was assumed to be a result of complications related to old age, as this female was 15 years old at her death. A field necropsy on the female who died of starvation revealed multiple fractures in her hind legs. The causes of these fractures are unknown, but we found no evidence of any predatory, nor even scavenging, interactions. The ability to identify proximate cause of death is reliant upon the speed in which the carcass can be reached and investigated. Unfortunately, weather and lack of available pilots/aircraft prevented carcass investigation in a timeframe necessary to make a confident estimate on the probable cause of mortality in four females, therefore cause of mortality was designated as unknown.

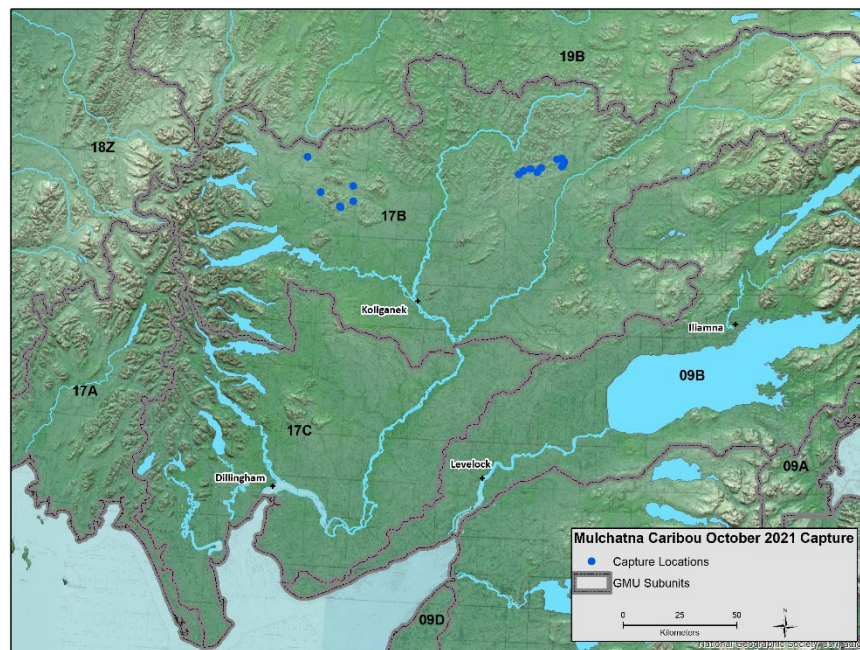


Figure 1. The capture locations of 16 adult female Mulchatna caribou in October 2021.

OBJECTIVE 2: Test the one herd hypothesis: evaluate the genetic structure within and between the east and west calving grounds and compare estimates of herd mixing identified through GPS data.

ACCOMPLISHMENTS: During the October 2021 caribou capture effort, we collected blood samples from 38 individuals that are currently undergoing DNA extraction and sequencing at the University of Minnesota Genomics Lab for the estimation of genetic sub-structuring within the Mulchatna herd. A PhD candidate at the University of Auburn is assisting in this effort. Additionally, caribou location data is being continually collected and archived for the next year to build a sample size sufficient to characterize seasonal space-use.

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OBJECTIVE 3: Quantify the effects of caribou health and body condition (e.g. rump fat, serology, and disease) on population growth rates and variation in individual reproductive success.

ACCOMPLISHMENTS: During the fall 2021 capture effort, we collected and analyzed caribou blood samples (n = 16) for the presences of *Brucellosis suis.*, a zoonotic bacterial infection associated with swollen joints, reproductive failures (i.e., abortions, weak calves), and reduction in survival. Blood was tested both internally at the Alaska Department of Fish and Game Veterinary Lab and externally at the National Veterinary Services Laboratory. We are awaiting test results.

To evaluate current caribou body condition entering winter, we followed newly developed methods by Cook et al. (2021) and collected a body condition index via palpation, and ultrasound measurements of rump fat, loin fat, and loin depth to calculate percent ingesta free body fat and protein in lactating and non-lactating females. We found notable differences in female caribou body condition and lactational status. Lactating females had less body fat ($6.53\% \pm 0.56$ SD, n = 7) than non-lactating females ($9.50\% \pm 3.20$ SD, n = 8). The continued estimates of differential percent body fat based on lactational status in Mulchatna caribou have raised concern about the current health of the Mulchatna herd and have highlighted the need for an investigation on the habitat quantity and quality of the Mulchatna caribou herd's summer range.

OBJECTIVE 4: Develop and test new techniques to detect and monitor changes in caribou herd abundance, survival, cause-specific mortality, and reproductive success.

ACCOMPLISHMENTS: We created a partnership with Dr. Jeff Welker of the University of Alaska Anchorage to elucidate the seasonal diets of caribou using stable isotope analysis of serum, blood, and hair samples from the 76 females captured thus far. Carbon and nitrogen ratios have been enumerated for local vegetation and all caribou samples. These values will be used to run diet mixing models and explore differences in diet considering important covariates (e.g., % body fat, sub-herd).

II. SUMMARY OF WORK COMPLETED ON PROJECT TO DATE.

We are in year 2 of this 3-year study to elucidate drivers of decline and sustained low population abundance in the MCH. Firstly, we conducted a rigorous investigation of archived MC data. We completed a 20+ yr retrospective analysis of age-specific survival and variability in reproductive success and explored the relationship between the ongoing predator control program (i.e., number of wolves harvested) and MCH demographics (i.e., calf and adult survival, and herd abundance). We found sustained periods of reduced survival in young and prime-aged females in the early 2000s and notable difference in pregnancy rates of 2-, 3-, and 4-year-olds before and after 2009. We found no evidence of wolf predation being a significant factor driving MCH demographics. Collectively, we interpreted these data to be evidence that the Mulchatna range likely experienced deleterious effects from density dependent nutritional factors as a result of significant population growth and high population density in the 1990s.

Simultaneously to our retrospective data analysis, we launched capture operations to understand the current health (e.g., survival, body condition, disease prevalence, and reproductive success) of adult female Mulchatna caribou. This effort revealed that, currently, the MCH are facing three notable challenges: illegal harvest, nutritional limitation, and brucellosis, a reproductive disease

that has deleterious effects on reproductive success. Despite these findings of bottom-up pressures and human predation impacting the MCH, in January of 2022 the Board of Game directed the Department of Fish and Game to expand predator control to destroy brown bears, black bears, and wolves on state lands associated with MCH calving grounds.

III. SIGNIFICANT DEVELOPMENT REPORTS AND/OR AMENDMENTS.

We have no significant development reports or amendments to report at this time.

IV. PUBLICATIONS

We presented these research findings to the State of Alaska Board of Game in January of 2022.

V. RECOMMENDATIONS FOR THIS PROJECT

We have no recommendations for changes to this project at this time and recommend that the project continue as planned. As results become available, we will reassess future needs and direction for this or related research.

VI. LITERATURE CITED

Cook RC, Oyster J., Mansfield K., Harris R.B. 2021. Evidence of summer nutritional limitations in a northeastern Washington moose population. *Alces* 57:23-46.

State of Alaska Board of Game January 2022 - The meeting material and audio are available on the meeting website at:

<http://www.adfg.alaska.gov/index.cfm?adfg=gameboard.meetinginfo&date=01-21-2022&meeting=wasilla>

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