

**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-16-2020

**PROJECT NUMBER:**

**PROJECT TITLE:** Evaluating Stress Hormones of Caribou in Areas with Planned Development

**PERIOD OF PERFORMANCE:** April 01, 2020 through June 30, 2022

**PERFORMANCE YEAR:** October 1, 2021 through March 31, 2021

**REPORT DUE DATE:** June 29, 2021

**PRINCIPAL INVESTIGATOR:** Shawna Karpovich

**COOPERATORS:** Lincoln Parrett, Lara Horstmann

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Authorities: 2 CFR 200.328  
2 CFR 200.301  
50 CFR 80.90

**I. PROGRESS ON PROJECT OBJECTIVES DURING PERFORMANCE YEAR**

**OBJECTIVE 1:** Fecal collections within 20-mile buffer around proposed development (Figure 1).

**ACCOMPLISHMENTS:** This reporting period does not include April when fecal sample collections are conducted.

**OBJECTIVE 2:** Process samples, run validations, extract hormones, and run EIAs.

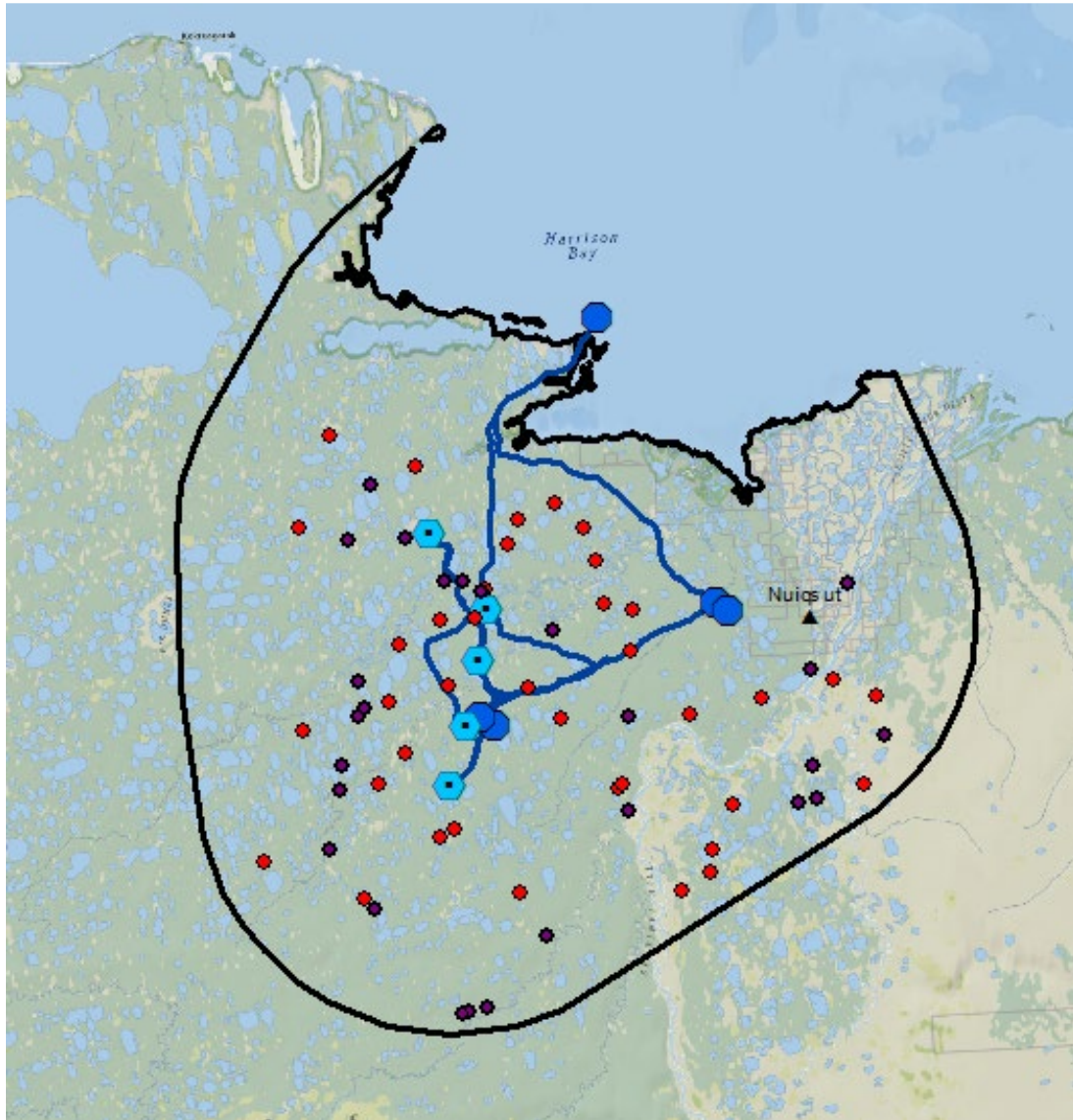
**ACCOMPLISHMENTS:** During this reporting period the 123 fecal pellet groups collected and processed during the last reporting period were analyzed for corticosterone concentrations (Figure 3), cortisol concentrations are also presented (Figure 2).

**II. SUMMARY OF WORK COMPLETED ON PROJECT TO DATE.**

Prior to receiving funding, a pilot season was conducted and during April 17 and 18, 2019, 71 fecal pellet groups were collected from 30 sites within the geofenced area, the pilot study data are included with the 2020 samples in Figures 1, 2, and 3 below. Preliminary results indicate significantly different concentrations in stress-related hormones between years, however it is unclear at this time what caused this increase. Measuring and controlling for environmental

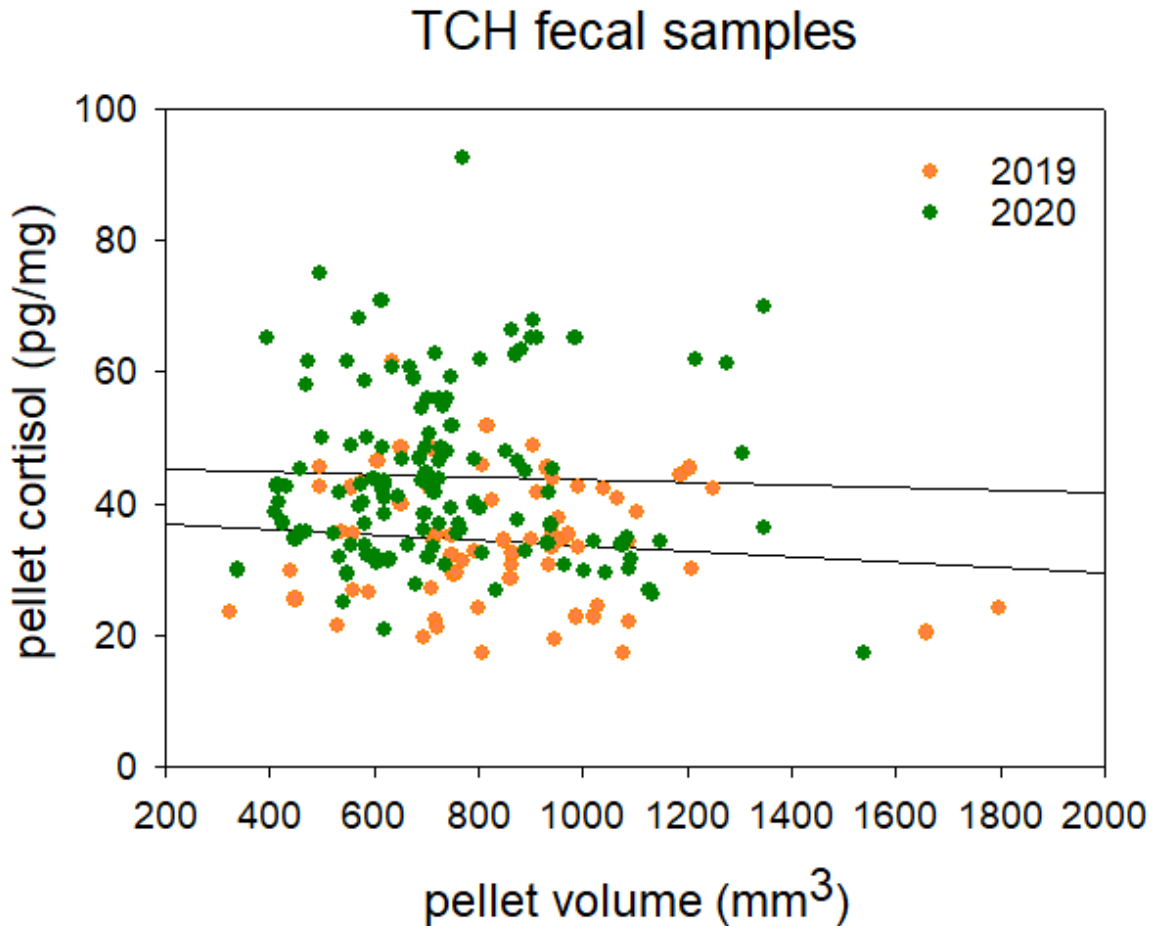
FY21 IPR AKW-R-16-2020 Evaluating Stress Hormones of Caribou in Areas with Planned Development

factors, while potentially infeasible over a 2-3 year study, could be very important. Annual differences in factors such as weather (winter and summer temperatures, snow depth, snow persistence, etc.), parasite loads, insect harassment, diseases, and several other factors could influence stress-related hormone levels and would be important to consider as part of the present study and follow-up studies. Considering the brevity of this study, and the fact that development has halted, we consider the data we collect to be pre-development and will be compared to future studies (pending funding) from post-development conditions.



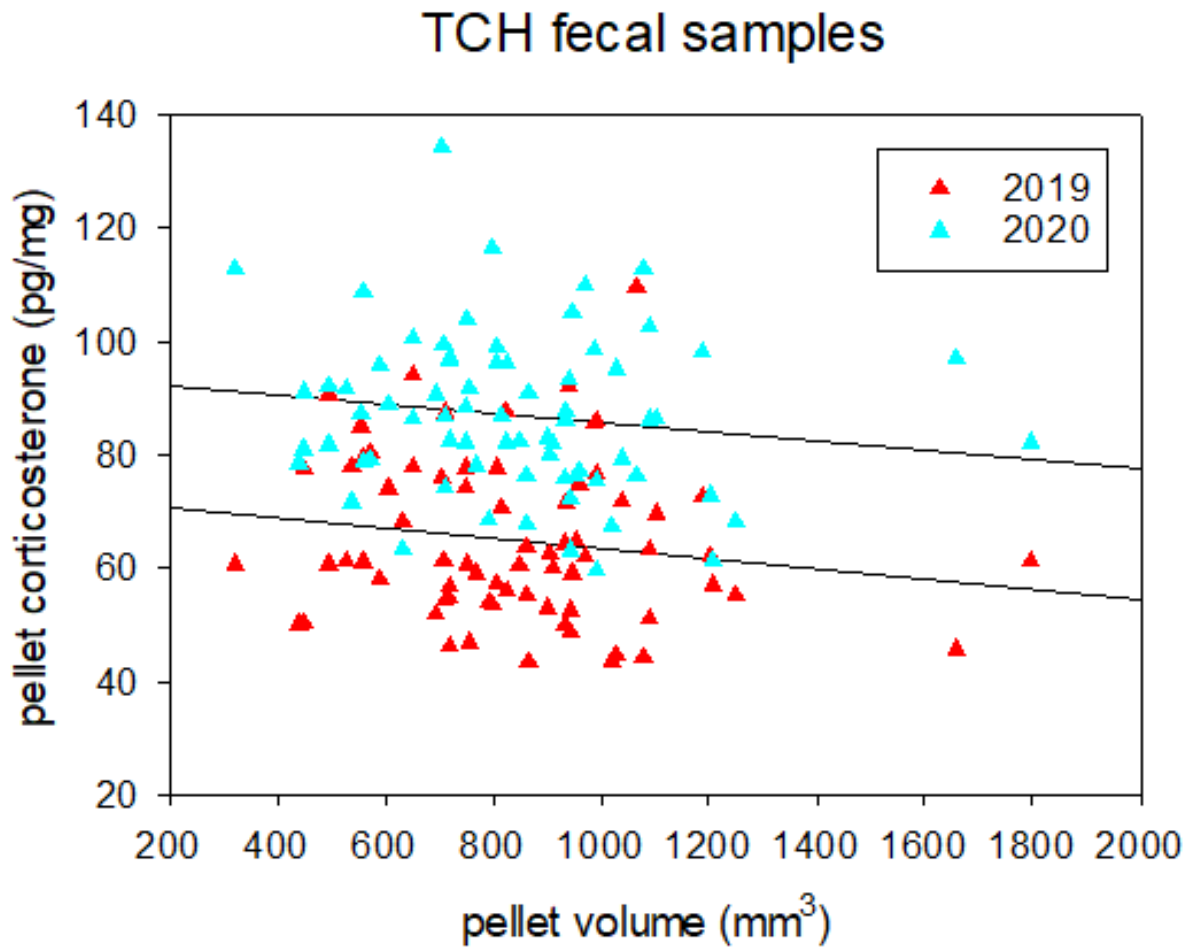
**Figure 1.** Proposed sites for Willow Development oil wells (blue hexagons), gravel pits, airport, and dock (blue octagons), and ice or gravel roads (blue lines). Black outline is the geofence, placed ~20 miles around the proposed development. When GPS collared caribou are within this border the collars switch from collecting locations every 12 hrs to every 2 hrs or from every 2 hrs

to every 30 mins (depending on the collar model). Purple dots are the 2019 fecal collection sites and red dots are the 2020 fecal collection sites.



**Figure 2.** Fecal pellet cortisol concentrations in 2019 (orange) and 2020 (green). Results from a One-way ANCOVA, with fecal pellet volume as a covariate (index of age), show that fecal cortisol concentrations in 2019 were significantly lower than in 2020 ( $p < 0.001$ ). In 2020, an increase in oil development-related activity was seen in the study area, however it is difficult to

draw conclusions with a single year to year comparison as other factors such as weather, herd health, or food availability may have also differed between these two years.



**Figure 2.** Fecal pellet corticosterone concentrations (represents stress hormone metabolites) in 2019 (red) and 2020 (cyan). Results from a One-way ANCOVA, with fecal pellet volume as a covariate (index of age), show that fecal corticosterone concentrations in 2019 were significantly lower than in 2020 ( $p < 0.001$ ). In 2020, an increase in oil development-related activity was seen in the study area, however it is difficult to draw conclusions with a single year to year

comparison as other factors such as weather, herd health, or food availability may have also differed between these two years.

### **III. SIGNIFICANT DEVELOPMENT REPORTS AND/OR AMENDMENTS.**

Problems:

- 1) Due to the hardships associated with the Covid-19 pandemic, the cost for charters increased beyond what we predicted in the original budget. This will likely lead to a budget deficit in year 3. Consequentially, we intend to ask for additional funding to complete year 3.
- 2) The commencement of the development within the study area was delayed. Overall, this may be beneficial for this project as we now have data from a pre-development year (2019 pilot study before this project was funded) and a “minor development beginning” year in 2020. We suspect that the fecal pellets collected during 2021 and 2022 will also be from years with minor development. Therefore, this project will likely represent pre-development conditions. We plan to pursue funding for a follow-up project when development is established in the area.

### **IV. PUBLICATIONS**

None currently.

### **V. RECOMMENDATIONS FOR THIS PROJECT** None currently.

**Prepared by:** S. Karpovich

**Date:** 17-June-2021