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: AKW-10 Wildlife Restoration FY2016

PROJECT NUMBER: 3.53 Caribou

PROJECT TITLE: Nutrition, mortality, range use, and demographics of the Forty-mile and Central Arctic caribou herds

PROJECT DURATION: 1 July 2014–30 June 2019

REPORT DUE DATE: 1 September 2016; Resubmitted December 1, 2017

PARTNER: None

PRINCIPAL INVESTIGATORS: Torsten Bentzen

COOPERATORS: Jeff Gross and Beth Lenart (ADF&G), Jim Herriges and Ruth Gronquist (U.S. Bureau of Land Management), and Mike Suitor and Martin Kienzler (Dept. of Environment Yukon).

WORK LOCATIONS: Forty-mile caribou range including most of Units 20E, 20B, and 25C east of the Steese Highway, Unit 20D north of the Tanana River, and portions of western Yukon Territory, Canada.

Central Arctic caribou range, central arctic slope and Brooks Range including portions of Units 24A, 24B, 25A, 26A, 26B and 26C.

I. SUMMARY OF WORK COMPLETED THIS SEGMENT ON JOBS IDENTIFIED IN ANNUAL WORK PLAN

OBJECTIVE 1: Map expansion and changes in seasonal use of the Fortymile caribou herd (FCH) range

ACTIVITY 1: Maintain a sample of at least 50 GPS collared cows.

ACCOMPLISHMENTS:

During October 5-6, 2015 we recaptured 9 known age female caribou and fitted them with new GPS collars. On March 14 and 31, 2016 we collaborated with Yukon Department of Environment staff in Dawson City to recapture 6 VHF collared cows of known age in Yukon, Canada, and fit them with new GPS collars. Then on April 13 we

deployed an additional 7 GPS collars on known age adult females on the Alaskan side of the border. Ages of collared caribou ranged from 4–13 years. An additional 36 short yearling female caribou were captured during this report period and were fitted with VHF collars to maintain an adequate sample (~20) of collared three-year-old cows to monitor parturition rate as an index of herd nutritional status. This maintains a current sample of 165 collared FCH cows (67 GPS, 98 VHF).

ACTIVITY 2: Conduct radiotracking flights to assess range size and use and evaluate appropriate sample of GPS collars to evaluate range use relative to VHF collars.

ACCOMPLISHMENTS:

1) Comprehensive radio tracking flights were conducted in October, November and December 2015, and January, March, April, May, and June 2016 to evaluate distribution of GPS to VHF collared cows.
2) Evaluation of seasonal distribution maps and caribou density is ongoing. Work was begun to produce routinely updatable seasonal range maps and core area estimates for the FCH starting during calving 2015. We used both VHF and GPS collar data to best compare current movement information to data collected during 1992-2008.

ACTIVITY 3: Collar adult bull caribou and evaluate distribution.

ACCOMPLISHMENTS:

1) 14 adult bull caribou were captured and fitted with GPS collars on April 13, 2016 bringing the total number of collared bulls in the Forty-mile herd to 24 (18 GPS, 6 VHF).
2) During this report period we began to evaluate distribution of bulls relative to collared cows in Forty-mile photocensus based population estimates and composition surveys. Preliminary analysis suggests that bulls were adequately included in groups of collared cows in both the 2015 photocensus and 2015 composition survey. However, further study and additional years of data are needed to fully address this issue.

OBJECTIVE 2: Determine change in the long-term nutritional status of the FCH.

ACTIVITY 1: Reassess newborn calf weights as index of changing nutritional condition in the FCH.

ACCOMPLISHMENTS:

In May 2016, we captured and weighed 70 newborn (≤3 days old) calves randomly selected throughout the calving area during May 18–24, which spanned the peak of calving (May 19). Females averaged 7.44 kg (SD=0.91, range=5.56–10.44, *n*=33) which was slightly higher than the average 7.18 kg observed last year. The males averaged 8.62 kg (SD=0.80, range=6.81–10.00, *n*=37) compared to 7.93 kg in 2015.

ACTIVITY 2: Model FCH demographics

ACCOMPLISHMENTS:

All collared cows >3-years old were observed daily from the air during 12–26 May to determine parturition. Out of 105 total cows included in this year's parturition survey, 78 (74%) were parturient. Of 12 three-year-old cows only three (25%) were parturient. Among cows ≥ 4 years old 75 of 93 (81%) were parturient. Three-year-old parturition rates remain below rates observed in the 1990s (1994-2015, Slope = -0.10, $P < 0.001$, $R^2 = 0.32$, n=3–20). The decline in adult parturition rate is less pronounced but significant (1994-2015, Slope = -0.03, $P = 0.033$, $R^2 = 0.076$, sample size 30–83).

OBJECTIVE 3: Examine calf survival in the FCH 2016-2019.

ACTIVITY 1: Determine timing and source of mortality relative to changes in herd status and predator abundance.

ACCOMPLISHMENTS:

1) We collared 69 newborn calves (33 females 36 males) 24-48 hrs. after birth with VHF collars with mortality sensors during May 18-28.
2) All calves were radio-tracked daily during May 19-31. Eleven calves died during this period. All kill sites were visited within 4 hours of observation and cause of death determined. During May 19-31, 2016 four calves were killed by wolves, three by black bears, three by grizzly bears, and one perinatal death unrelated to predation was observed. No capture related abandonment was observed.
3) We redeployed 8 collars from calves that died during the calving period. This boosted our sample of collared calves from 61 to 69.
4) We radio-tracked all collared calves 13 times (roughly every other day) in June. Nine collared calves died during June. We visited all kill sites on the same day they were observed and determined cause of death.

ACTIVITY 2: Determine perinatal mortality rate.

ACCOMPLISHMENTS:

Daily radio-tracking of all parturient cows until calves were collared allowed us to determine perinatal mortality rates among a sample of 78 cows. We observed one instance of non-predator related perinatal mortality.

OBJECTIVE 4: Reassess newborn calf weights and survival as index of changing nutritional condition in the Central Arctic herd (CAH).

ACTIVITY 1: Weigh newborn calves.

ACCOMPLISHMENTS:

We captured and weighed 57 newborn (≤3 days old) calves during June 3–4 at the peak of the calving period. Calves (21 female, 36 male) were randomly selected from areas both east and west of the Dalton Highway. Weights averaged 6.63 kg (SD=1.11, range=3.75–8.70, n=57). Based on preliminary analysis, we detected little difference in weight between sexes or relative to 2015 neonate weights or relative to pooled neonate weight data collected during 2001–2006.

ACTIVITY 2: Assess early calf survival.

Lightweight expandable VHF collars were deployed on all 57 newborn calves when they were captured for weighing. Based on preliminary analysis, perinatal survival among the 2016 cohort (birth to June 15) was 79%. Four calves died of exposure during severe weather on June 5th. Perinatal survival among the remaining 53 calves was 86% compared to the 93% perinatal survival rate observed in 2015. Summer (June 15- Sept 6), overwinter, and annual survival rates have yet to be determined.

Survival among newborn calves collared in 2015 was high. By the end of summer (Sept 6, 2015) survival was 79%. Calves were not radio-tracked over winter. However, 31 calves returned to the calving grounds in summer 2016. If the 13 calves missing in summer 2016 are assumed to have died during winter off their calving grounds, estimated annual survival was 53%. All CAH captures and collaring were supported by collaboration with a USGS project led by Dr. Layne Adams.

II. SIGNIFICANT DEVIATIONS AND/OR ADDITIONAL FEDERAL AID-FUNDED WORK NOT DESCRIBED ABOVE THAT WAS ACCOMPLISHED ON THIS PROJECT DURING THIS SEGMENT PERIOD

Due to an unallowable expense on the FY2016, AKW-7 grant report, $64,126 will be debited to this grant in FY2018, AKW-23.

As parts of Objective 2: Determine change in the long-term nutritional status of the FCH.

1) I reassessed October –April weight change among FCH female calves as an index of nutritional condition. Twenty-five 4-month-old female calves were weighed for this project during October 5–10, 2015 by Tok office staff during routine collaring for the FCH management program. The average weight of 54.8 kg (SD=4.5, range=49.0– 63.5, n=25) was similar to the 2014 average. Calf weights in 2014 and 2015 were the heaviest observed since 2000. However, the long-term trend in fall calf weighs continues to decline by 0.16 kg per year (1990–2015, P=0.018). Short-yearling cows were weighed during April 2016 captures. Similar to 2015, the mean weight of 49.6 kg (SD=3.82, range=43.5–57.6, n=13) was significantly lower (P=0.0011) than the October average, which is relatively similar to weight loss reported in 1991 when it was last examined among Forty-mile calves.
2) FCH serum samples collected from 4-month old female calves spanning the years 2000-2015 were analyzed for blood urea nitrogen (BUN) and total protein. Long-term BUN and total protein values were examined as indicators of diet quality to determine if low values observed in 2013 indicate a declining trend among Forty-mile caribou. Protein content of diet and intake rates vary seasonally and are important determinants of BUN in caribou. The highest values are expected in summer and autumn and low BUN concentrations are well documented in semi-domestic reindeer under poor nutritional conditions (Sakkinen et al. 2001) and among both woodland caribou and Norwegian reindeer in winter (Johnson et al. 2010; Miller et al. 2013). However, preliminary analysis indicated no long-term trend in BUN (P=0.442, R^2=0.0052, n=116) or total protein (P=0.396, R^2=0.0063, n=116) during those years. The blood samples from fall 2013 were collected about 15 days later than in other years. Therefor the low BUN values observed in 2013 more likely reflected an early switch to the lichen dominated low protein winter diet rather than a long-term decline in diet quality.

3) FCH fecal samples were systematically collected while conducting field work throughout the year. This substantially improved the distribution of sampling sites in the core portions of the range. Approximately ten samples were collected at each site and analyzed for diet content by Jim Herriges (BLM) using the Wildlife Habitat Nutrition Laboratory at Washington State University. These data are expected to provide baseline FCH diet information during both summer and winter and will allow a comparison to winter diet information collected during 1992-1996. Preliminary results from 2014 contain higher than expected proportion of lichen in summer samples. We continue to collect samples and analysis of 2015-2016 samples is ongoing.

As part of Objective 4: Assess indices of nutritional condition in the CAH.

1) We examined long-term (1998-2015) CAH parturition rate data for indication of changing herd status. We detected a significant decline in parturition (slope on the logit scale = −0.06 [SE = 0.022], $P = 0.006$, $R^2 = 0.21$) among all female, radio-collared caribou ≥ 36-months especially due to low parturition rates in 2009 and 2014. Annual sample sizes ranged from 29 to 76 ($x = 47.7$). Among 36-month-old cows, however, no data were collected in 2003, 2008 and 2014 and sample sizes were too small 4 to 13 ($x = 7$) during the remaining years to detect a trend (slope on the logit scale = −0.07 [SE = 0.046], $P = 0.118$, $R^2 = 0.22$).
2) We assessed long term CAH yearling calf weight data as an indicator of nutritional status. Numerous sampling issues confounded our ability to untangle the effects of year, herd status or nutritional condition on yearling mass. Collection of weight data varied by 50 days during 2002-2015 with sampling skewed to later dates by 2010- 2015. Caribou calf weight change between March and April has not been investigated in the CAH and is likely herd specific and influenced by weather, movement, and range quality. A multi-year study of calf mass change over winter could provide us more confidence. For the short term, consistent sampling in early April will improve our ability to detect trends in yearling weight since 2010.

III. PUBLICATIONS

None. All specific results in this report are preliminary and will be discussed in a larger context in the final report.

IV. RECOMMENDATIONS FOR THIS PROJECT

The sample size of collared calves in the Forty-mile calf mortality study should be increased in 2017 to improve our power to detect changes in wolf caused mortality. An additional 15 to 20 collars would increase the sample to ≥90 and could likely be deployed and monitored without a major increase in staff time or aviation expenses.

A summary of existing bull movement data across Alaskan caribou herds is needed. Although 18 GPS collars are currently deployed on adult bull caribou in the FCH, bulls are a poorly understood component of herd dynamics and movements remain largely unexamined. Additional GPS collars would allow for detailed spatial analysis of seasonal bull movements and distribution relative to cows and improve techniques for estimating herd size and composition.

V. LITERATURE CITED

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Miller, A. L., A. L. Evans, Ø. Os, and J. M. Arnemo. 2013. Biochemical and hematological reference values for free-ranging, chemically immobilized wild Norwegian reindeer (*Rangifer tarandus tarandus*) during early winter. Journal of Wildlife Diseases 49:221-228.

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DATE: 17 August 2016

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Date: December 1, 2017