

**Alaska Department of Fish and Game  
Wildlife Restoration Grant**

**Grant Number:** W-33

**Segment Number:** 12

**Project Number:** 1.70

**Project Title:** Moose population dynamics in southeastern Alaska

**Project Duration:** 1 July 2010–30 June 2015

**Report Due Date:** 1 September 2014

**Principal Investigators:** Kevin S. White, Neil Barten, Ryan Scott

**Cooperators:** Glacier Bay National Park, DOT/PF

**Work Location:** Gustavus and Berners Bay, Alaska (GMU 1C)

---

**I. PROGRESS ON PROJECT OBJECTIVES DURING LAST SEGMENT**

**OBJECTIVE 1:** Acquire long-term demographic data from radio-collared moose in Gustavus and Berners Bay.

We monitored pregnancy rates by collecting fresh fecal pellets from radio-marked adult female moose during February–March 2013 (Gustavus, n = 24, Berners Bay, n = 0). Fecal pellets were analyzed for progesterone concentration to determine pregnancy status (Corrinne Kozlowski, St. Louis Zoo). We also analyzed archived fecal pellets collected from previously captured animals of known reproductive status to validate laboratory assays (n = 136). During May 2013, we conducted aerial (Gustavus, n = 2; Berners Bay, n = 2) and ground-based surveys to determine calf status of radio-marked adult female moose (Gustavus, n = 37, Berners Bay, n = 29). We monitored survival of radio-marked adult female moose (Gustavus, n = 42; Berners Bay, n = 33) each month via ground- or air-based radio-telemetry surveys. During 2012/2013, we investigated 12 mortality events involving radio-marked moose (Gustavus, n = 6; Berners Bay, n = 6). We monitored survival of calves associated with radio-marked adult female moose (Gustavus, n = 29; Berners Bay, n = 25) during May/June 2012, November 2012 and April 2013 via ground- or air-based radio-telemetry surveys. During 2012/2013, we investigated 3 mortality events involving calves associated with radio-marked moose (Gustavus, n = 2; Berners Bay, n = 1). We conducted 3 aerial surveys during winter in order to estimate moose population size and composition (Gustavus, n = 2; Berners Bay, n = 1). During these surveys moose sighting probabilities were estimated using mark-resight techniques based on data collected from radio-marked adult female moose. We did not conduct moose capture activities during this reporting period in Berners Bay. In Gustavus, we captured 15 moose (2 10-mo old calves and 13 adult females using ground-based capture methods in March 2013.

**OBJECTIVE 2: Develop deterministic population models for moose in Gustavus and Berners Bay**

We estimated annual and seasonal survival (adult female and calf) and reproductive (calving, twinning and fecundity) rates for radio-marked adult female moose and associated calves monitored in Gustavus (2003-2013, n = 84) and Berners Bay (2006-2013, n = 67). We also estimated age-specific survival and reproductive rates for each population. We developed and validated a 2-stage matrix population model parameterized using vital rate data summarized in Job 2a. The model was used to inform harvest management decisions for the Gustavus population and examine the potential for future harvest in the Berners Bay population.

**II. SUMMARY OF WORK COMPLETED ON JOBS IDENTIFIED IN ANNUAL PLAN THIS PERIOD**

**JOB/ACTIVITY 1a:** Estimate reproductive performance of radio-marked adult female moose

**Accomplishments:** We monitored pregnancy rates by collecting fresh fecal pellets and blood serum samples from radio-marked adult female moose during February-March 2014 (Gustavus, n = 16, Berners Bay, n = 8). Fecal pellets were analyzed for progesterone concentration (Corrinne Kozlowski, St. Louis Zoo) and blood serum analyzed for pregnancy-specific protein B (PSPB; Biotracking, Moscow, ID) to determine pregnancy status. During May-June 2014, we conducted aerial (Gustavus, n = 2; Berners Bay, n = 2) and ground-based surveys to determine calf status of radio-marked adult female moose (Gustavus, n = 35, Berners Bay, n = 29).

**JOB/ACTIVITY 1b:** Estimate survival of radio-marked adult female moose

**Accomplishments:** We monitored survival of radio-marked adult female moose (Gustavus, n = 44; Berners Bay, n = 35) each month via ground- or air-based radio-telemetry surveys. During 2013–2014, we investigated 11 mortality events involving radio-marked moose (Gustavus, n = 6; Berners Bay, n = 5).

**JOB/ACTIVITY 1c:** Estimate survival of calves associated with radio-marked adult female moose

**Accomplishments:** We monitored survival of calves associated with radio-marked adult female moose (Gustavus, n = 29; Berners Bay, n = 16) during May–June 2013, November 2013 and April 2014 via ground- or air-based radio-telemetry surveys. In March 2014, we deployed 11 time-lapse cameras on radio-marked adult females in Gustavus to validate calf status determinations.

**JOB/ACTIVITY 1d:** Estimate moose population size and composition.

**Accomplishments:** We conducted 2 aerial surveys during winter in order to estimate moose population size and composition (Gustavus, n = 1; Berners Bay, n = 1). During these surveys moose sighting probabilities were estimated using mark-resight techniques based on data collected from radio-marked adult female moose.

**JOB/ACTIVITY 1e:** Capture and radio-mark adult female moose.

**Accomplishments:** We conducted moose capture activities during this reporting period in both Gustavus and Berners Bay. In Gustavus, we captured 24 moose (Nov 2013, n = 8; March 2014, n = 15 adult females and 1 10-month old calf) using ground-based capture methods. In Berners Bay, we captured 8 animals (7 adult females and 1 10-month old calf) in March 2014.

**JOB/ACTIVITY 1f:** Prepare annual reports.

**Accomplishments:** We prepared a report detailing activities conducted in the Gustavus area, to satisfy ADFG Federal Aid reporting requirements. We also published a paper in a peer-reviewed journal about moose migration and implications for calf survival and adult nutrition in Gustavus, AK. We also published a paper about wolf diet in the Gustavus/Glacier Bay area.

**JOB/ACTIVITY 2a:** Synthesize population-specific demographic data.

**Accomplishments:** We estimated annual and seasonal survival (adult female and calf) and reproductive (calving, twinning and fecundity) rates for radio-marked adult female moose and associated calves monitored in Gustavus (2003–2014, n = 89, 351 moose years) and Berners Bay (2006–2014, n = 81, 223 moose years). We also estimated age-specific survival and reproductive rates for each population.

**JOB/ACTIVITY 2b:** Develop a moose population model for management applications.

**Accomplishments:** We developed and validated a 2-stage matrix population model parameterized using vital rate data summarized in Job 2a. In 2013, the model was extended to estimate the proportion of legal (spike/fork and 3-brow tine/50 inch) and non-legal bulls in the population. The model was used to inform harvest management decisions for the Gustavus and Berners Bay populations.

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

None

**V. PUBLICATIONS**

White, K. S., N. L. Barten, S. Crouse and J. A. Crouse. 2014. Benefits of migration in relation to nutritional condition and predation-risk in a partially migratory moose population. *Ecology*, 95: 225-237.

D. J. R. Lafferty, J. L. Belant, K. S. White, J. N. Womble and A. T. Morzillo. 2014. Linking wolf diet to changes in marine and terrestrial prey abundance. *Arctic*, 67: 143-148.

**VI. RECOMMENDATIONS FOR THIS PROJECT**

This project should be continued as described in the study plan.

01.70 Moose population dynamics in southeastern Alaska  
FY14 Annual Research Performance Report

**Prepared by:** Kevin White

**Date:** 9/01/14