

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

Grant Number: AKW-20
Project Number: 14.28
Project Title: Deciphering wolf diets in Southeast Alaska using stable isotope analyses and prey remains in scats
Project Duration: 1 July 2015–30 September 2018
Report Due Date: 1 September 2017
PRINCIPAL INVESTIGATOR: Gretchen Roffler
COOPERATORS: Taal Levi and Aimee Massey (Oregon State University)
WORK LOCATION: Game Management Units 1-5, Region I, Southeast Alaska

I. PROGRESS ON PROJECT OBJECTIVES DURING LAST SEGMENT

OBJECTIVE 1: Collect scat samples.

During the reporting period we focused on collecting scats from geographical areas in Region I that were not well-represented during the first year of this study. The majority of the scat samples analyzed for prey content during FY 2016 were collected on Prince of Wales Island (GMU 2). Therefore, we conducted field collection trips in GMU 1A and GMU 3 during FY 2017. We also continued to collect scats opportunistically during field work activities for other projects in GMU 1C and GMU 4. Data from collected scats will be used to characterize variation in diet across geographic regions and seasons in Region I.

OBJECTIVE 2: Diet analysis of scats.

We continued to work with our collaborators at the Oregon State University to quantify diets of coastal wolves in southeast Alaska. During the reporting period, 2 metabarcoding runs of amplified target DNA sequences were completed in addition to the mechanical sorting of the same wolf scats for comparison of results from the 2 methods. The majority of the wolf scats analyzed (n = 237) were collected in GMU 2 (n = 135), and the remaining samples originated from GMUs 1A, 1C, 1D, 3, and 4. We compared results from the 2 methods in order to validate the metabarcoding approach, and found that both identified the major prey species, and most of the rare prey species, but metabarcoding detected comparatively more rare species. The primary prey species detected in wolf scats from GMU 2 were Sitka black-tailed deer (*Odocoileus hemionus Sitkensis*), beaver (*Castor canadensis*), and black bears (*Ursus americanus*), with river otters (*Lutra lutra*),

pink and silver salmon (*Oncorhynchus gorbuscha*, *O. kisutch*), steelhead (*O. mykiss*) and bald eagles (*Haliaeetus leucocephalus*) occurring at a lower frequency.

OBJECTIVE 3: Collect samples for stable isotope analysis.

During the reporting period we continued to collect muscle tissue and hair samples from harvested wolves in Region I.

OBJECTIVE 4: Stable isotope analysis.

The focus of our effort during the reporting period was on collecting samples and preparing them for shipment to the Alaska Stable Isotope Facility at the University of Alaska Fairbanks. Stable isotope analyses at this lab will be completed during FY 2018.

OBJECTIVE 5: Data synthesis and preparation of publications.

Preliminary analyses focusing on Prince of Wales Island wolf diets using mechanical sorting and metabarcoding were completed (see below). No other work was completed on this objective during the reporting period.

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

JOB/ACTIVITY 1A: We will collect georeferenced and date-specific wolf scats.

Accomplishments: During the reporting period we collected 291 wolf scats. The majority were collected in GMU 3 (n = 140) on Miktkof, Kupreanof, and Kuiu islands. We also collected samples from other GMUs (GMU 1A: n = 64, GMU 1B: n = 1, GMU 1C: n = 31, GMU 2: n = 34, GMU 4: n = 22).

JOB/ACTIVITY 1B: We will prepare collected scats for lab analysis, and record collection information in a database.

Accomplishments: Samples collected during FY 2017 were stored frozen, and prepared for future shipment to Oregon State University for analysis. Samples that were collected during FY 2016 were shipped to the lab (n = 232), and scat sample collection data and results were entered into a database.

JOB/ACTIVITY 2A: We will characterize food habits by quantifying the relative proportion of prey species consumed by individual wolves based on undigested remains contained in each scat.

Accomplishments: Laboratory analysis is ongoing. Preliminary results of the mechanical sorting and metabarcoding runs indicate that Sitka black-tailed deer are the primary prey of wolves in GMUs 1, 2, 3, and 4. However, we did find evidence of variation in the secondary prey species by geographical region. For example, in GMU 1C (Southeast mainland) sea otters (*Enhydra lutris*) were the second most frequently occurring prey species, followed by squirrels (*Sciuridae* spp.), mountain goats (*Oreamnos americanus*) and moose (*Alces alces*). In GMU 3, moose were the second most frequently occurring prey species, followed by beaver and black bear. In GMU 4 (Pleasant Island), only 2 prey species were detected: deer and sea otters.

JOB/ACTIVITY 3A: We will collect hair and muscle tissue samples from wolves to obtain sufficient representation of different biogeographical areas throughout southeast Alaska.

Accomplishments: We coordinated with area biologists, trappers, sealers, and other ADF&G staff to obtain wolf muscle tissue and hair samples from across Region I and the Yukon Territory, Canada, for stable isotope analyses. By the end of the reporting period, we had collected 335 samples, and prepared them for shipment to the Alaska Stable Isotope Facility. The samples included 251 hair samples (GMU 1A: n = 10, GMU 1B: n = 27, GMU 1C: n = 24, GMU 1D: n = 14, GMU 2: n = 38, GMU 3: n = 101, GMU 4: n = 2, Yukon: n = 35), 64 muscle tissue samples (GMU 1A: n = 1, GMU 1B: n = 10, GMU 1C: n = 11, GMU 1D: n = 5, GMU 2: n = 7, GMU 3: n = 28, GMU 4: n = 2), and 20 vibrissae samples (GMU 1A: n = 4, GMU 1B: n = 4, GMU 1C: n = 1, GMU 2: n = 6, GMU 3: n = 3, outside Region I: n = 2). We expect to receive results from these samples by 31 December 2017.

JOB/ACTIVITY 3B: We will collect muscle tissue samples from putative prey species to obtain sufficient resolution to distinguish different prey species from each other in the stable isotope analyses.

Accomplishments: We collected samples from 5 beaver and prepared them for analysis.

JOB/ACTIVITY 4: We will use a Bayesian stable isotope mixing model approach to analyze the data and to estimate prey species consumed by wolves seasonally.

Accomplishments: No work was completed on this objective during the reporting period. We intend to analyze all of the data collectively when the stable isotope analyses are completed during FY 2018.

JOB/ACTIVITY 5: We will complete data analysis and comparison of data sets from wolves throughout the region, and will prepare final reports and publications.

Accomplishments: Preliminary analyses focusing on Prince of Wales Island wolf diets using mechanical sorting and metabarcoding were completed (see below).

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

We originally proposed to send our stable isotope samples to the University of Wyoming for analysis; however, our agreement with this lab expired and we instead initiated work with the Alaska Stable Isotope Facility at the University of Alaska Fairbanks.

IV. PUBLICATIONS

Massey, A., Roffler, G.H., Allen, J., Levi, T. Quantifying wolf diet in southeast Alaska using molecular methods. Contributed poster. The Ecological Society of America Annual Meeting, August 9th, 2017. Portland, OR.

14.28 Deciphering wolf diets in Southeast Alaska using stable isotope analyses and prey remains in scats
Annual Interim Performance Report

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Submitted by: Susannah Woodruff, Research Coordinator

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