

**MONTANA FISH, WILDLIFE & PARKS
ANNUAL PERFORMANCE PROGRESS REPORT**

Grant Title: Montana Elk Recreation Study
FBMS Number: F20AF00217
State Identifier: W-177-R
Period Covered: April 1, 2023 through March 31, 2024

Accomplishments:

The Montana Elk Recreation Study consists of three major components: field data collection, analysis of data from the Ruby Mountain study site, and collaboration with Colorado Parks and Wildlife on the joint analysis of elk-recreation data across the two state-led projects. Field data collection is complete, and we have entered the data analysis phase.

Field data collection:

We completed deployment and maintenance of cameras in the Ruby Mountains in June 2023. Field crews visited each camera site and removed the cameras. Field crews also refined measurements of camera viewshed prior to removing the cameras. Cameras were returned to MT FWP in October 2023.

In fall 2023, we began tagging all photos from the third field season, including using the Artificial Intelligence program MegaDetector to filter out blank photos. We presented a research-in-progress poster at The Wildlife Society’s 30th Annual Conference in Louisville, Kentucky, in November. We completed photo tagging in February 2024. Additional quality control evaluations are underway to maintain accuracy and consistency in the review of such a large number of photos.

Across the three years of data collection, 8,297,046 photos were collected. Of these photos, 115,412 photos contained elk.

<u>Species</u>	<u>Photos</u>
Mule Deer	82,699
Elk	115,412
Black Bear	945
White-tailed Deer	968
Moose	1132
Cougar	262

Data analysis:

Abundance estimates by species and year are in progress. We will estimate abundance of all species with sufficient data including elk, mule deer, white-tailed deer, moose, black bear and cougar. Abundance estimates will be focused on July-September each year due to the timing of camera maintenance and camera battery life. Abundance estimates will be finalized after all data are incorporated this coming summer.

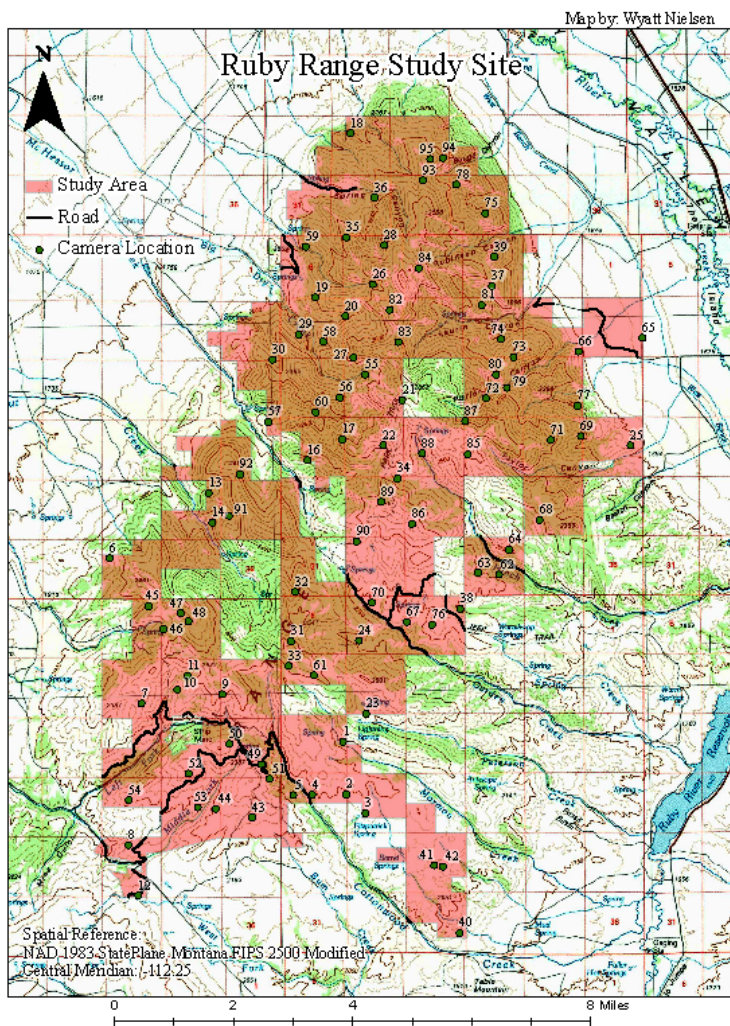
In spring 2024, we began summarizing elk movements and resource selection using the GPS collar data from 2020-2021. We acquired most of the desired covariates, though some covariate data are still pending. We began analyzing the GPS data in a population-level resource selection function (RSF) framework to assess temporal and spatial difference in elk resource selection during the summer recreation and fall hunting seasons. Results from the preliminary RSF analyses have been submitted to The Wildlife Society's 31st Annual Conference in Baltimore, Maryland. We continue with data analysis of the camera photos in a multi-species occupancy framework to assess multi-species interactions between elk, mule deer, and moose.

We are considering trail-based recreation in several ways. First, we are using data from GPS-collared elk to examine habitat selection in relation to human use of the Ruby Mountains. Human use data will be derived from trail-camera images creating a spatial and temporal occupancy map. These analyses are underway. We are also collaborating with Colorado Parks and Wildlife (CPW) researchers to compare elk responses to recreation. CPW will be collecting data for one more year. We are working together to develop measures of human recreation including use of camera data and potential use of commercially available, anonymous cell phone location data. We will jointly analyze the elk-recreation to obtain a more complete understanding of recreation impacts on elk behavior. The joint analyses will be completed without any additional costs to MT FWP.

Project timeline:

Analysis	Start	Expected Completion
Photo processing		Complete
Abundance estimation	Ongoing	August 2024
Recreationist occupancy model	Ongoing	September 2024
Recreationist frequency model	Ongoing	September 2024
Elk habitat telemetry use model	Ongoing	September 2024
Ruby Mountain Elk-recreation interaction	June 2024	October 2024
CO-MT joint elk-recreation analyses	July 2024	December 2025

Figure 1. Relative locations and camera identification (ID) numbers for 94 cameras deployed in the Ruby Mountain Range, Montana, in June 2020-June 2023. (Camera ID numbers are not sequential.)



Variations:

We have been unable to hire a post-doctoral researcher for the project which has slowed our progress on the analyses. The camera and GPS collar analyses for elk habitat selection related to human use will be completed before 12/31/2024. We will begin the joint analyses of elk-recreation data this year with CPW. The combined analyses will be further updated and finalized after CPW data collection is complete.