

Adaptive Elk and Carnivore Management

September 2023 Project Update

Background:

FWP and the Montana Fish & Wildlife Commission are statutorily obligated to manage elk population sizes within ranges specified in the Montana elk management plan. The efficacy of FWP management prescriptions and Commission decisions to meet this obligation is hampered by uncertainty about the drivers of elk populations and distributions in different ecological systems. Additionally, FWP and the Commission only have partial control over elk populations and distributions because individual decisions by landowners and hunters also affect elk populations and distributions. Therefore, the outcomes of FWP management prescriptions and Commission decisions are not always completely predictable. This project will focus on developing the necessary components for an adaptive management program focused on management of elk populations and distributions in northwest Montana, which will be used to help FWP and the Commission manage elk populations and meet statutory obligations. Adaptive management plans aim to increase knowledge and decrease uncertainty through a data driven decision-making process that incorporates new information as it becomes available.

The purpose of this five-year project is to assess how habitat treatments, carnivores and other factors impact elk population vital rates and distributions and use this information to develop recommendations for meeting elk population objectives in NW Montana. We are also developing camera-based methods to estimate elk and carnivore abundance in hunting district (HD) 121, which is a difficult district to survey due to heavy tree cover that obstructs visibility. Our goals in this first year of the project are to collect baseline data on elk vital rates, distributions, and habitat conditions, and deploy a grid of cameras. HD 121 was selected as the study area in part due to the abundance of elk and feasibility of capture, as well as the ongoing and potential forest management activities occurring in this area. Elk harvest has declined in HD 121, raising concerns from FWP and stakeholders regarding this elk population. FWP is partnering with the University of Montana to complete this project.

Results to date:

Elk collaring and monitoring

We captured and fitted 71 6-month calves and adult elk with GPS collars in the HD 121 study area during winter 2022-2023 (60 females, 11 males). Captures included a combination of ground clover trapping and chemical immobilization delivered from helicopter. Clover trapping was the primary method of capturing elk on lower elevation private lands and helicopter capture was the primary method of capturing elk on higher elevation public lands. The collars are satellite-linked to allow location and mortality data to be collected remotely and are programmed to collect locations every 2 hours until dropping off the animal during winter 2026.

We have collected a total of 143889 elk locations to date (Fig 1, Fig 2). There have been 2 elk collar malfunctions and 4 elk mortalities (Table 1). We are currently monitoring the locations and survival of 65 adult elk (57 females, 8 males).

During spring 2023, we captured and collared a total of 25 neonate calves. To date, we have recorded 2 neonate collar malfunctions, 10 dropped collars, and 3 neonate mortalities (Table 1). We are currently monitoring the survival of 10 calves.

Carnivore collaring and monitoring

During winter 2022-2023, we worked with hound handlers to capture and collar 3 mountain lions (3 females and 0 males). Mountain lion collars are satellite-linked to allow location and mortality data to be collected remotely and are programmed to collect locations every 4 hours until dropping during winter 2026. We have collected a total of 3142 mountain lion locations to date.

During spring and summer 2023, we captured and collared 4 black bears (1 female and 3 males). We are currently monitoring 4 black bears. We have recorded 0 collar malfunctions and 0 black bear mortalities. We have collected a total of 880 black bear locations to date.

Camera Deployment

We deployed remote trail cameras at random locations across the study area for the purpose of estimating elk, mountain lion, wolf, and black bear abundance. We used generalized random tessellation stratified (GRTS) sampling to create

a spatially balanced distribution of camera location sites. We paired a trail camera at the random location with an additional predator camera at half of these locations. Predator cameras were set near the ground along trails within 250 meters of the random camera to increase the likelihood of detecting predators. A total of 119 cameras (80 random GRTS and 39 predator) were deployed during May and June 2023 (Fig 3). Each camera is set with both time lapse and motion capture trigger settings to capture images every 10 minutes and when motion triggers the camera. Cameras will have fresh batteries and SD cards serviced twice per year and remain in the field for 2 years. Images will be classified using an Artificial Intelligence classifier to identify empty images. The photos classified as potentially having an animal present will be reviewed and classified to species.

Vegetation Surveys

We developed a land cover layer that included vegetation type, timber harvest strategy, and time-since-harvest information to define 25 unique land cover classes. We then identified 375 random vegetation sampling sites that were spatially-distributed within land cover classes and across the study area, with the intention of sampling vegetation at each location once during summer 2023. We measured forage quantity and quality along a 40m transect at each site. A total of 224 sites were sampled (Fig 4).

We also collected elk fecal pellets to identify the plant species that are important sources of forage for elk in this system. We used recent GPS locations obtained from collared elk to identify potential fecal sample collection sites. We collected pellets from 3-5 spatially distributed sites each week of the field season to create weekly composite samples. We have collected fecal samples from 45 sites. Samples will be sent to the Species From Feces – Bat Ecology and Genetics Lab at Northern Arizona University, where they will use DNA metabarcoding to determine the plant species composition within the pellets.

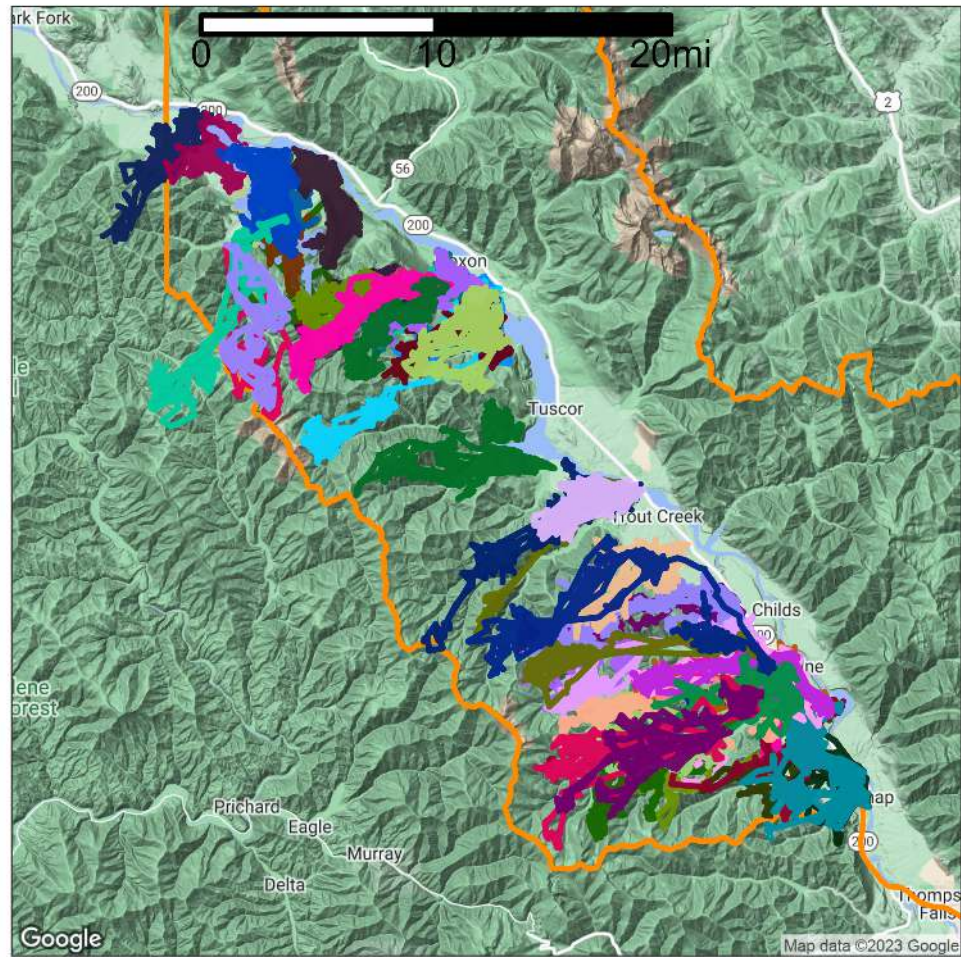
Acknowledgements

We thank the landowners that allowed access to their properties for this work and we thank the U. S. Forest Service for providing logistical support. We also thank the field crews, hound handlers and Quicksilver Air capture crew for their hard work. Funding for this project was provided by a Federal Aid in Wildlife Restoration grant to Montana Fish, Wildlife, and Parks and a grant from Rocky Mountain Elk Foundation.

Table 1: Summary of collared animal mortalities arranged by mortality date. Age class denotes the animals age at death and confidence refers to levels of evidence in classifying mortality cause.

Species	AnimalID	Sex	Capture Date	Mortality Date	Age Class	Mortality Cause	Confidence
Elk	NOX23020	Female	2023-02-07	2023-02-10	Calf	Natural	Probable
Elk	NOXN23019	Male	2023-06-05	2023-06-07	Neonate	Predation - lion	Certain
Elk	NOXN23015	Male	2023-06-03	2023-07-08	Neonate	Natural	Certain
Elk	NOXN23017	Male	2023-06-03	2023-07-15	Neonate	Predation - bear	Probable
Elk	NOX23057	Male	2023-02-14	2023-08-08	Yearling	Predation - wolf	Certain
Elk	NOX23039	Male	2023-02-16	2023-09-04	Adult	Harvest	Certain
Elk	NOX23047	Female	2023-01-25	2023-09-06	Adult	Harvest	Certain

Female elk movements



— NOX23000	— NOX23014	— NOX23029	— NOX23048	— NOX23101
— NOX23001	— NOX23015	— NOX23032	— NOX23049	— NOX23102
— NOX23002	— NOX23016	— NOX23033	— NOX23050	— NOX23105
— NOX23003	— NOX23017	— NOX23034	— NOX23054	— NOX23106
— NOX23004	— NOX23019	— NOX23035	— NOX23055	— NOX23107
— NOX23005	— NOX23020	— NOX23036	— NOX23058	— NOX23108
— NOX23006	— NOX23022	— NOX23037	— NOX23060	— NOX23109
— NOX23007	— NOX23023	— NOX23038	— NOX23062	— NOX23110
— NOX23008	— NOX23025	— NOX23042	— NOX23063	— NOX23111
— NOX23009	— NOX23026	— NOX23043	— NOX23064	— NOX23112
— NOX23011	— NOX23027	— NOX23046	— NOX23065	— NOX23113
— NOX23013	— NOX23028	— NOX23047	— NOX23100	— NOX23114

Figure 1: Map of female elk movements to date. The orange line denotes the HD 121 boundary.

Male elk movements

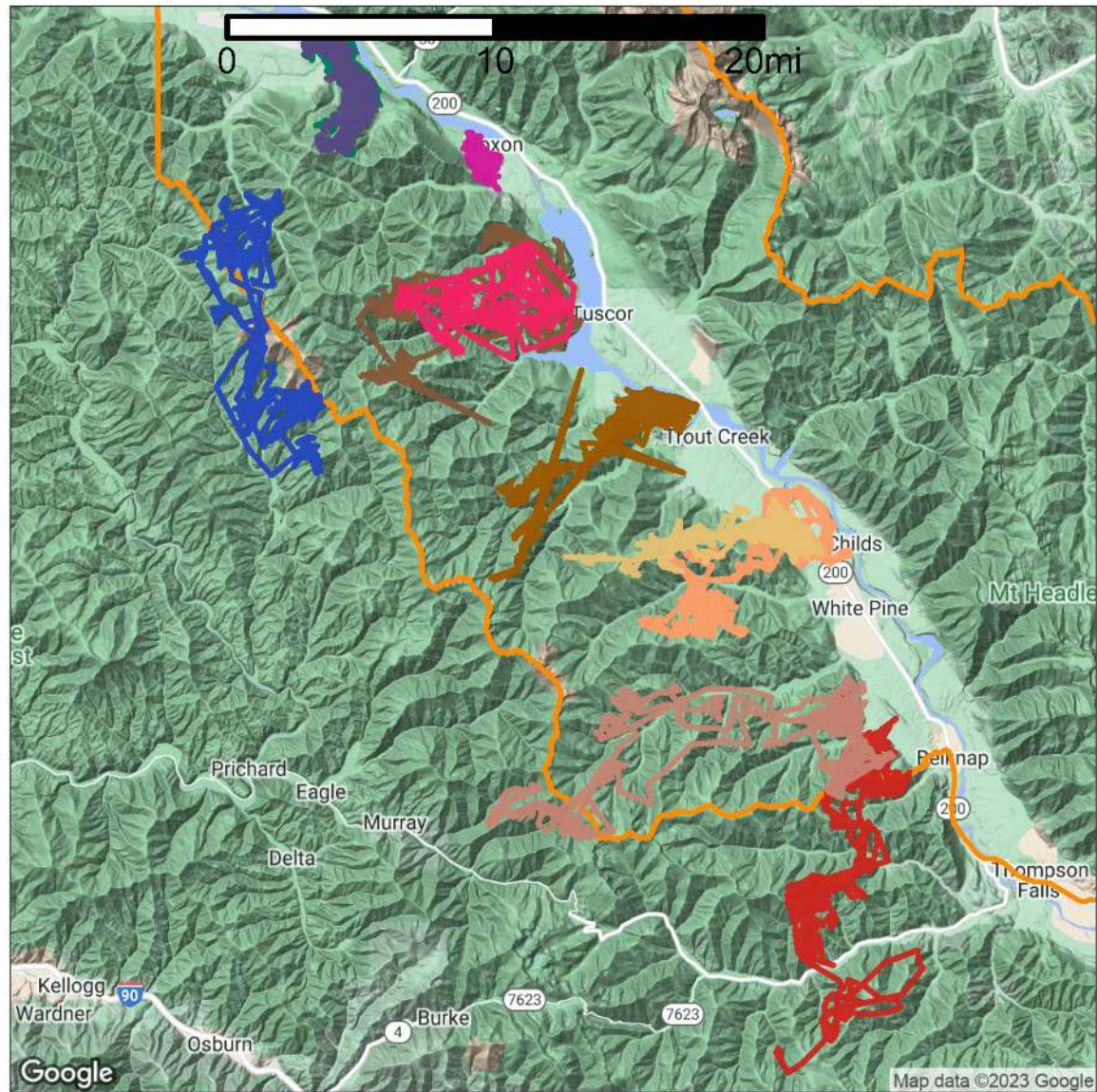


Figure 2: Map of male elk movements to date. The orange line denotes the HD 121 boundary.

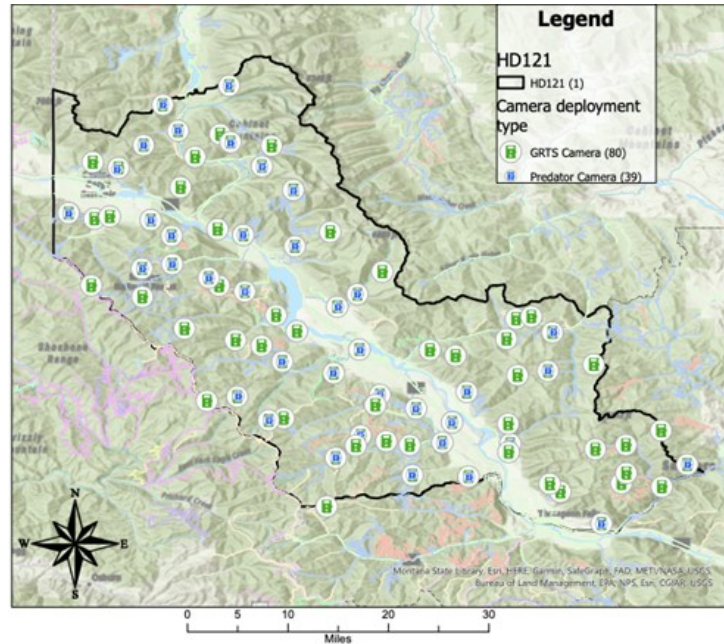


Figure 3: Location of remote cameras deployed in summer 2023. Solo GRTS cameras are represented by the green camera icons. Paired GRTS and predator cameras are represented by a blue camera icon.

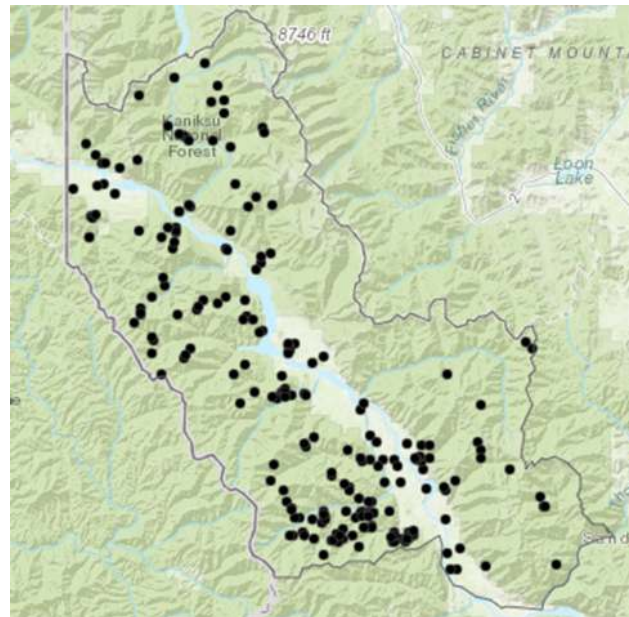


Figure 4: Location of vegetation transects sampled during summer 2023.