Patterns and drivers of livestock depredation along the eastern frontier of the Greater Yellowstone Ecosystem

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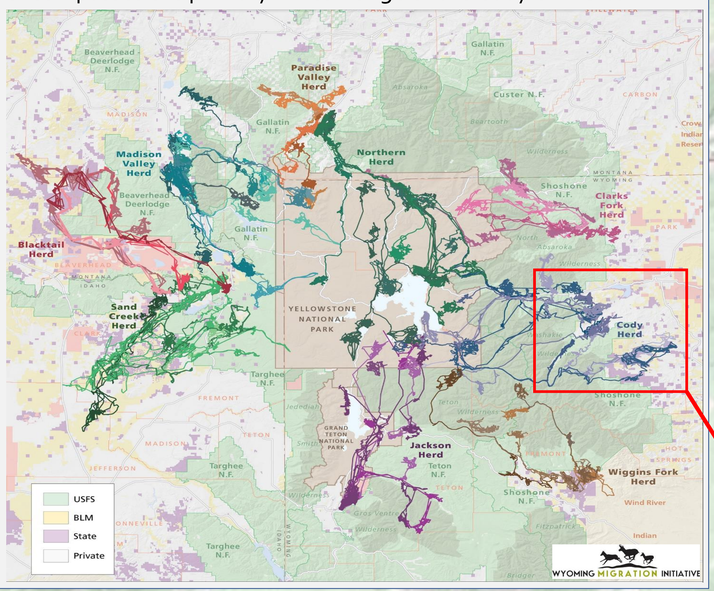
Background

- In the GYE, the expansion of wolves and grizzly bears from core wilderness areas to nearby rangelands has led to **increased predation on livestock**.
- Our research is focused on **understanding the environmental and behavioral drivers of wolf depredation** in the Shoshone and Greybull watersheds in the Absaroka Range between Yellowstone National Park and Cody, Wyoming.

Elk migrations in the GYE

Figure 1. Prey distribution and migration patterns may be one factor influencing patterns of depredation. The study area (red box) encompasses the primary winter range of the Cody elk herd.



Contrasting Hypotheses (Nelson et al. 2016)

Prey tracking hypothesis: wolves are attracted to native prey, but kill co-occurring livestock

Prey scarcity hypothesis: native prey become scarce through seasonal changes (i.e. migration) or long-term declines and wolves shift to hunting livestock

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Objectives

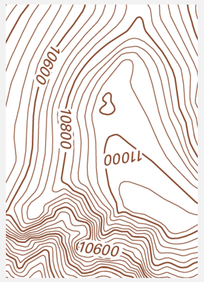
To evaluate seasonal patterns of wolf movement and predation and set up a longer term study analyzing the environmental drivers of livestock depredation risk and the ecology of wolf-cattle interactions.
Question 1: How do wolf movements change seasonally (i.e. spanning elk migration)?
Question 2: How do wolf kill rates and prey selection change seasonally?

Methodological Approach

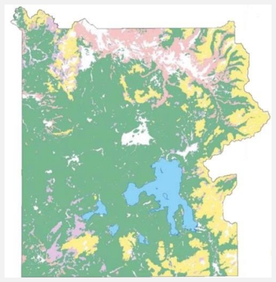
We will work with Wyoming Game and Fish Department (WGFD) to deploy GPS collars on at least two wolves in each of the 3-5 packs that use the upper Shoshone and Greybull drainages. We will quantify wolf habitat selection and predation patterns in summer and winter, delineating the seasons using elk migration dates and existing/new GPS collar data.

Question 1: Resource selection functions (RSFs)

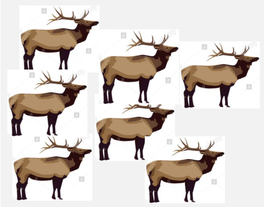
To assess wolf habitat selection, we will fit a RSF using environmental covariates:



Topography

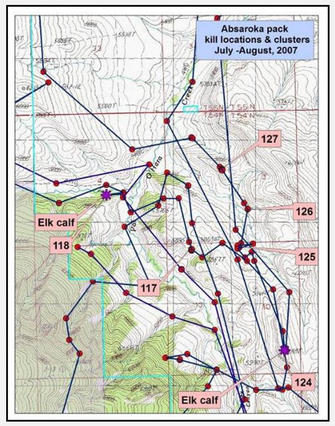


Habitat class



Prey density

Question 2: GPS cluster searching of kill sites



To assess wolf predation patterns, we will visit clusters of GPS locations and record prey species, age and class, and condition.

Figure 2: Wolf cluster searching map from Nelson et al. 2016. Field crews hiked out to each cluster site (where the focal wolf has spent more than 40 minutes within 100 meters) to search for kill remains.

Study Area

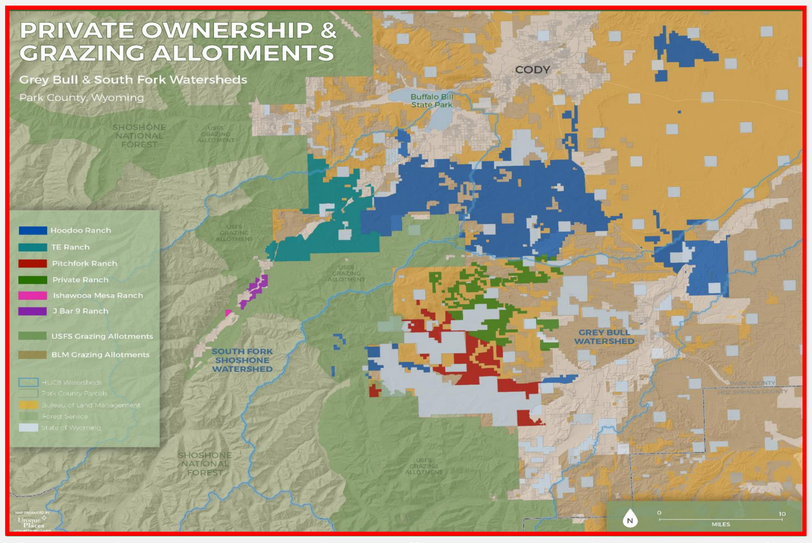


Figure 3. The approximate study area, illustrating many (but not necessarily all) ranches we anticipate engaging in this work.

Next Steps

- Collar wolves with WGFD in winter 2018/2019 and begin wolf habitat RSFs and cluster searching.
- Work with WGFD to obtain historical depredation location data and analyze patterns of cattle depredation (potentially across multiple carnivore species).
- Work with ranchers to set up a pilot study deploying GPS collars on cattle to understand wolf-cattle encounters and cattle responses by evaluating behavioral mechanisms that drive depredation processes on a finer scale