

Mammalian habitat use along a development gradient in Northern Colorado

Final Report

Erica H. Goad

Graduate Degree Program in Ecology
Department of Fish, Wildlife, and Conservation Biology
Colorado State University

My project investigates the impact of rural residential development on wildlife habitat use and movement in Northern Colorado. Understanding the relationship between “exurban” development and wildlife habitat use is critical since this type of development is increasing dramatically in the Western United States and its effects on mammals are largely unknown (Miller and Hobbs 2002; Theobald et al. 2005). Development is largely occurring on private lands, which encompass over 60% of the land in the United States and are among the most biologically productive lands in the U.S. (Scott et al. 2001). Colorado is a prime example of growing populations in the West, and exploring how animals use their environment in the face of such change may inform development projects in the future that are effective at supporting wildlife.

This summer, I collected data using remotely-triggered wildlife cameras to address the following questions: Does development density have an impact on mammalian habitat use? Are there certain thresholds of development density at which certain species’ habitat use is altered? Does development density affect the relative activity of certain species and not others? Does housing density affect mammalian directional movement patterns? I set up 27 cameras across my study area in the North Fork of the Cache la Poudre watershed area northwest of Fort Collins inside and around various subdivisions of differing housing densities to see what mammals were using these habitats. My study area is a mixture of public and private land, including lands on the Arapaho-Roosevelt National Forest, Colorado Parks and Wildlife lands, and greenbelts in subdivisions. The cameras remained in their random locations for six weeks, after which I moved them to new locations for a total of 54 sites across the watershed. Using remotely-triggered cameras to collect data offers several benefits, including the non-invasive nature of the surveys, ensuring that no animals are captured, harmed, or disturbed in my study, and providing a tangible way to share my data with private landowners.

An important lesson I learned from my summer season is that working in natural resources inevitably means that things never work out exactly how you envision them. As I mentioned in my interim report this summer, I had to learn how to be flexible in my research and planning because the High Park Fire burned a portion of my study area. Thankfully, I did not lose any equipment, and my study is salvageable. The tragedy of these major fires is difficult for the community, and it has been an incredible experience watching the healing and rebuilding process throughout the rest of the summer. I am always impressed by the power of a community when it joins together to provide support for its members. The transition of the landscape post-fire is fascinating to observe as well. Native grasses were recolonizing some of the burn area just weeks after the fire and animals have been moving back in. Throughout the process I did as much as I could to remain sensitive to the

community, such as choosing new sites when my original points fell on burned areas, and timing phone calls to not interfere with evacuations. The good work of the firefighters undoubtedly saved other critical areas of my study.

Overall, the summer season was a great success. Table 1 describes the variety of species that I detected over the summer on my cameras.

Table 1. Species detected via wildlife cameras in Summer 2012

SPECIES	# of Photos Total
Mule Deer	1247
People	249
Cottontail	66
Domestic dog	50
Birds (all species)	62
Unknown	32
Horse	83
Red Fox	28
Abert's Squirrel	35
Black Bear	30
Coyote	10
Cow	61
Striped Skunk	9
Elk	10
Gray Squirrel	5
Moose	26
Mountain Lion	5
Domestic Cat	2
Bobcat	3
Yellow-bellied Marmot	3

Clearly, the wide variety of species detections is positive for my study and shows a vibrant mammal community in the area. Throughout the summer, I also gathered data on the levels of anthropogenic noise across my study area, which I am using as a rough proxy for human presence. The idea behind collecting this type of data is that mammals are likely respond not just to the visual stimulus of a house in their environment but also to sounds they may associate with it. The intention of including sound data is to incorporate another element in

my investigation of the impact of rural development on wildlife and to provide more robustness to my results.

I have not completed full analysis on my data, but Figures 1 and 2 below show some basic statistics on the impact of housing density on different species and their habitat use. I grouped the 54 sites and the species I detected at each one into four separate “bins” by housing density. Bin #1 includes the sites with the highest housing density on the landscape, whereas Bin #4 includes the sites with the lowest housing density. The graphs show the average detections of each species in each bin (which is the number of species detected altogether per bin divided by the number of cameras within that bin). There are some interesting trends that are apparent even with such basic information (such as the fact that mule deer detections seem to be dropping as housing density decreases). I look forward to analyzing the data more formally, and will provide the Lois Webster Fund with my final project findings.

Figure 1. Average species detections for people, mule deer, elk, black bear, and moose

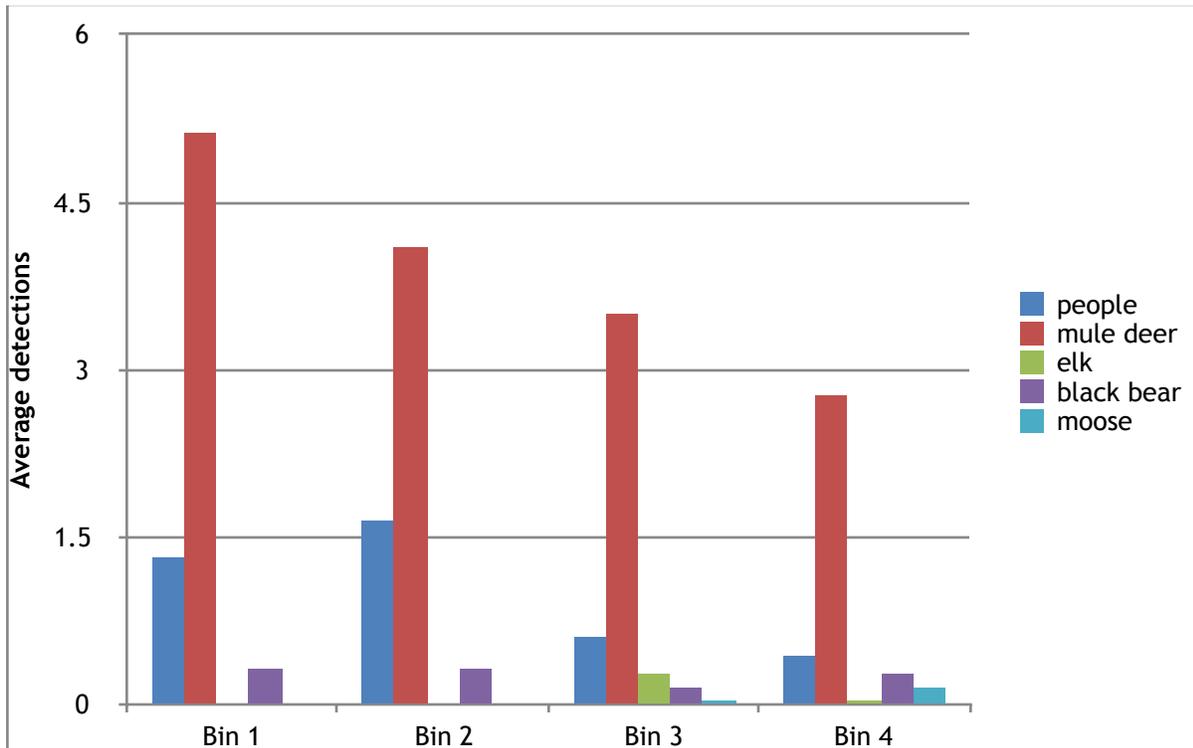
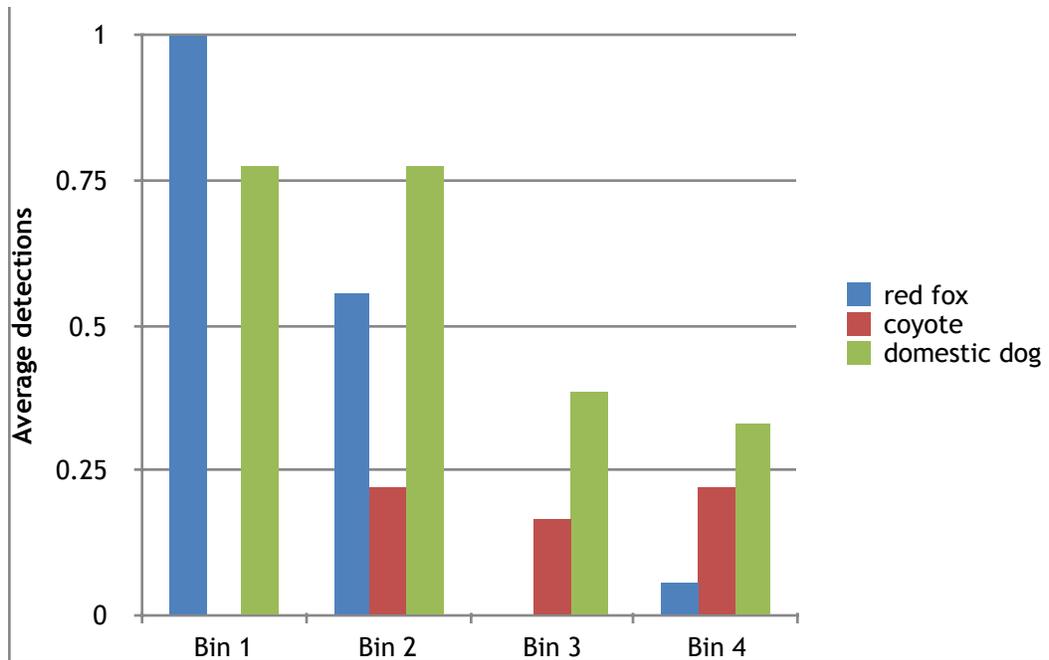


Figure 2. Average species detections for canine species



My plan for the project is to repeat this entire process for a second “season” this winter, and I will incorporate snow tracking, another non-invasive detection method, to boost my detections. Including a winter season will be interesting to compare seasonal differences in the summer and winter in wildlife habitat use and their response to the presence of people and houses. Considering that many of 1400 homes in my study area are second homes, I imagine that there may be a seasonal difference in human presence as well mammalian habitat use, especially in the acoustic data I am collecting.

Thanks to the support of the Lois Webster Fund, my intern Erin had a great summer and gained valuable experience working with wildlife cameras and learning communication skills with private landowners.

One of the most fulfilling aspects of my project has been collaborating with private landowners. Working on private land is a necessity to answer the questions of my project, and generally there is a dearth of biological research on private land (Hilty and Merenlender 2003). Learning how to reach out to the community effectively was a good experience, and took many hours of phone calls, letter writing, presenting at community meetings, and generally making myself available for communication at any time. I also took care to ensure that my project was meaningful to the landowners as well. For example, I always took people’s input as to where I should place a camera on their property, since they certainly know more about where the wildlife is than I do from first glance. Because most people who live in these areas are intimately familiar with their land and value their wildlife, I did not have too much trouble getting permission from landowners across my study area. I appreciated their input and their willingness to allow me to do my study on their land. Once I had collected all of my data, I put the photographs up on a photo-sharing website and gave access to landowners so they could see what had walked by the camera that was on their property. I received positive feedback from everyone, and many landowners thanked me for my work and offered to allow future research projects on their land. I will copy text from

several letters and emails I received from landowners in response to the photos I shared:

“We enjoyed the pictures. You got lots of good deer pictures (and my husband!) and loved the skunk

ones. There was one of a rodent I couldn't identify-the head didn't show. It was fun looking at them. Sorry the mt lion didn't walk by. You are more than welcome to use our land any time.”

“Erica!! you left me speechless! the deer are precious and I am so glad they are plentiful and enjoy their

habitat!! Haven't seen that many hangin' around in front of the house lately, though, but that's cool - - the

hummingbirds seem to like it here so they keep me smiling! The bear is unbelievable!!! What an excellent

shot! Thank you so very much for sharing and please note, if you ever want to repeat the study here, you

are always welcome. Glad it made it interesting!!”

“Wow. These are super cool. Especially mtn. lion. Very good reason not to let unattended small children

roam around the place. Look forward to following your project.”

“I am absolutely stunned by the pictures, I had no idea that we had bears like that up there, as I have seen all of the other wildlife at one time or another. Until these pictures, I had only seen bear scat, so I had to assume they were there, I just never saw them.”

My intention is that this study will spark a greater interest in wildlife within the community and the importance of private lands as necessary habitat for a wide variety of species. To promote the dissemination of my research to the broader community, I have also received some grant money from the Center for Collaborative Conservation at Colorado State University to present the results of my study and engage the community through an art exhibit of a collection of photographs taken by the wildlife cameras and short narratives from landowners about living in rural areas and their encounters with wildlife. Working on private lands has provided a unique opportunity for community based conservation and the chance to meet conservation challenges through exchanging and sharing information with landowners. Scientists as a whole need to be effective communicators and collaborators, and this project certainly helped me to cultivate these skills. Many private landowners are proud of the wildlife that uses their properties, as reflected in the responses above, so this will create an opportunity for them to share their observations, values and land use practices with us and the wider community. I feel that the combination of photographs and narratives could very well inspire reflection on the interaction between the built and natural environment more effectively than traditional scientific products.

This project would not have been possible without the generous support of the Lois Webster Fund, and I look forward to presenting the results to the Audubon Society of Greater Denver. I am confident that this study will be an important contribution to our understanding of the interface of wildlife and people as our communities in Colorado and across the American West continue to grow.

References

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