

# **The Effects of Dogs on Wildlife Communities**

**Year-end Report, 2004**



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### Abstract

We have completed the first year of a two-year study on the effects of domestic dogs on wildlife communities along recreational trails in the foothills of Boulder County. We used four different methods to measure levels of activity of dogs and native mammals both on and off-trail in protected areas that 1) allow dogs on-leash only, 2) allow dogs off-leash, under “voice and sight control”, or 3) do not allow dogs. We performed 513 traps nights using scented track stations, searched and cleared 104 100m<sup>2</sup> permanent scat plots, took over 500 pictures using remote-triggered cameras, and performed over 300km of scat transects on trails, continuing year-round. The preliminary data indicate that dogs are found only where they are allowed, validating the policies as a means of controlling dog presence. Scat plot data indicates that Mule deer generally avoid trails, and their sensitivity to recreational traffic may increase in the presence of dogs, particularly at more than 150m off the trail. Scat transects on trails indicate that coyote activity is higher where dogs are prohibited than where dogs are allowed. These transects also indicate that off-leash sites have higher levels of activity for not only dogs, but also for mid-sized native carnivores including foxes and mustellids. Track stations detected low numbers of carnivores, and those detected were more often on the trails than off-trail. Track stations also indicate that small mammals may also be sensitive to the presence of dogs on trails. The camera data included pictures of 10 different species, but was insufficient to compare detection frequencies or to corroborate track station data. Results from the first season indicate a strong need to continue the project for another field season with intensified sampling and implementation of some minor modifications in the study design.

## Introduction

Domestic dogs are frequent visitors to recreational trails in Boulder County, and public debate exists over the impacts of dogs in ecologically sensitive areas. Dog ecology is a very broad topic that includes their roles as consumers, their direct interactions with wildlife, and their roles as vectors for disease and weeds. In this study we are focusing on the indirect effects of the presence of dogs restricted largely to recreational trails. The questions posed by this study are: 1) Is there any difference in the activity of mammalian predators and ungulates in areas of high dog density, comparing areas that allow dogs on-leash, off-leash, and areas that do not allow dogs? And 2) how do patterns of activity vary on the trail compared to the trail corridor (areas within 200 meters of trails), across these sites with three levels of dog activity?

## Study sites

The locations for this study consisted of protected lands managed by Boulder County Parks and Open Space (BCPOS) and City of Boulder Open Space and Mountain Parks (OSMP). Specific sites were chosen by dog policy, ecological attributes, and recreational visitation rates based on the opinions of BCPOS and OSMP staff. Sites that disallow dogs are Hall Ranch and Heil Valley Ranch (both BCPOS), sites that allow dogs on-leash only are Rabbit Mountain and Walker Ranch (both BCPOS), and sites that allow dogs off-leash under voice and site control are the Mesa Trail corridor from Skunk Canyon south to Eldorado canyon, plus the Shanahan Mesa, Homestead, and Doudy Draw trails (OSMP). All study sites are in the foothills with mixed ponderosa forest and grassland meadows.

All sites have multiple use trails with relatively high visitation rates. Following the opinions of BCPOS and OSMP staff, trails were selected with presumed roughly equivalent levels of human and canine visitation. However, recently we have found evidence that levels of dog visitation are highly disparate between the on-leash and off-leash sites. Rabbit Mountain and Walker Ranch receive an estimated 2% of visitors with one or more dogs (Michael Bauer, BCPOS), while the Mesa trail area receives as many as 31.4% of visitors with dogs (Matt Jones, OSMP). This disparity draws into question

the legitimacy of comparing the effects of dogs across these sites, and we have considered dropping the on-leash sites (Rabbit Mountain and Walker Ranch). However, the on-leash sites still represent an intermediate level of disturbance from dogs (presuming that off-leash dogs have a larger effect than leashed dogs), and the inference from keeping three levels of disturbance is much stronger than reducing the study to two levels of disturbance. As such we feel it is best to keep all three treatments for the second field season.

Trails were selected so as to buffer adjacent trails by at least 400m, and trail segments within 300m of houses or other development or within 200m of roads were also excluded. Transect locations for scented tracking stations and remote triggered cameras were chosen using a systematic random method. First, the total length of useable trail was calculated (excluding buffers), and this distance was divided by 12, giving the spacing between transects along the trail, with room to spare. Minimum distance between transects is 500m, enough to be considered independent. The first transect location from the trailhead (or edge of buffered area) was chosen randomly within the interval calculated above. Subsequent transects were then placed at the calculated intervals. Transects began at the trail and ran one direction off the trail, alternating sides unless chosen to avoid trails, cliffs, or other obstructions. Circular scat plots were performed 200m up the trail from the other transects, on the same side of the trail.

### Methods

The methods for examining mammalian activity included scented track stations, circular scat plots, on-trail scat surveys, and infrared-triggered remote cameras. Except for the trail surveys, all other methods were sampled within three distance categories from trails (0-5m, 50-100m, and 150-200m). Cameras and track stations were set up for three nights, checked daily, with an extension if it rained heavily. All sampling locations were recorded with GPS.

Scented track stations consist of a liquid predator lure (Carmen's Pro's Choice and Canine Call, Sterling Fur Company, Sterling, OH) and a smooth substrate to collect

prints. Initially, we cleared 1m<sup>2</sup> patches of vegetation and sifted the dirt to a fine silt within which to collect prints, but this method proved too labor intensive and did not provide adequate print resolution. After a round of sampling, we switched to aluminum track plates coated with talc to collect prints. This method provides excellent print resolution and persistence, though any rain beyond a sprinkle will clean the talc from the plate. Tracks were identified to the species.

Circular scat plots measured 100m<sup>2</sup>, and during the first season were cleared of all scat to establish a baseline standard. We also identified and counted all scats, and found primarily ungulate pellets, particularly mule deer. Scat plots will be revisited after one year, as ungulate pellets may be expected to persist that long. Scats were identified to the species when possible; otherwise scats were identified to the family.

The second type of scat survey is along trails themselves, begun late in the summer. Again, initially trails were cleared of scats to create a baseline. Subsequently scats were identified and cleared in three-week intervals. These surveys will continue throughout the year and will provide an additional metric of carnivore use of trails across treatments.

The final method was the use of eight sets of Trailmaster 1500 remote triggered cameras, which record the time any picture is taken, and thus are valuable in capturing the temporal element of wildlife activity. This is important because an alternative behavioral response of wildlife to dogs is that they alter their patterns of activity through time rather than space to avoid disturbance such as dogs and recreationists. Due to limited numbers, cameras were set up on a subset of track stations, balanced across distances from the trail. The infrared beam was set 10 to 18 inches above the ground, and grasses that could interfere with the beam were removed. When trees were not available, posts were placed in the ground to support the infrared transmitter. Sensitivity was set at 5 so as to detect animals moving quickly across the beam. The time delay was set at 5 minutes so as to avoid repeated pictures of the same animal. For cameras set across the trail, the cameras were set to not operate during peak usage, approximately 8:00am to 6:00pm, to avoid

using up film on people. Off trail, cameras were allowed to run 24 hours. Camouflage duct tape was used to secure and hide the cameras.

### Results

Track stations were used a total of 513 trap nights, with 219 detections, for a 0.42 overall detection probability. On 120 of these trap nights the plates were cleared by rain, and 17 times the plates were interfered with (turned over, moved, or stolen). 35 prints were unidentifiable, but 19 of these were thrown out when we switched methodology from sifted dirt to aluminum tracking plates.

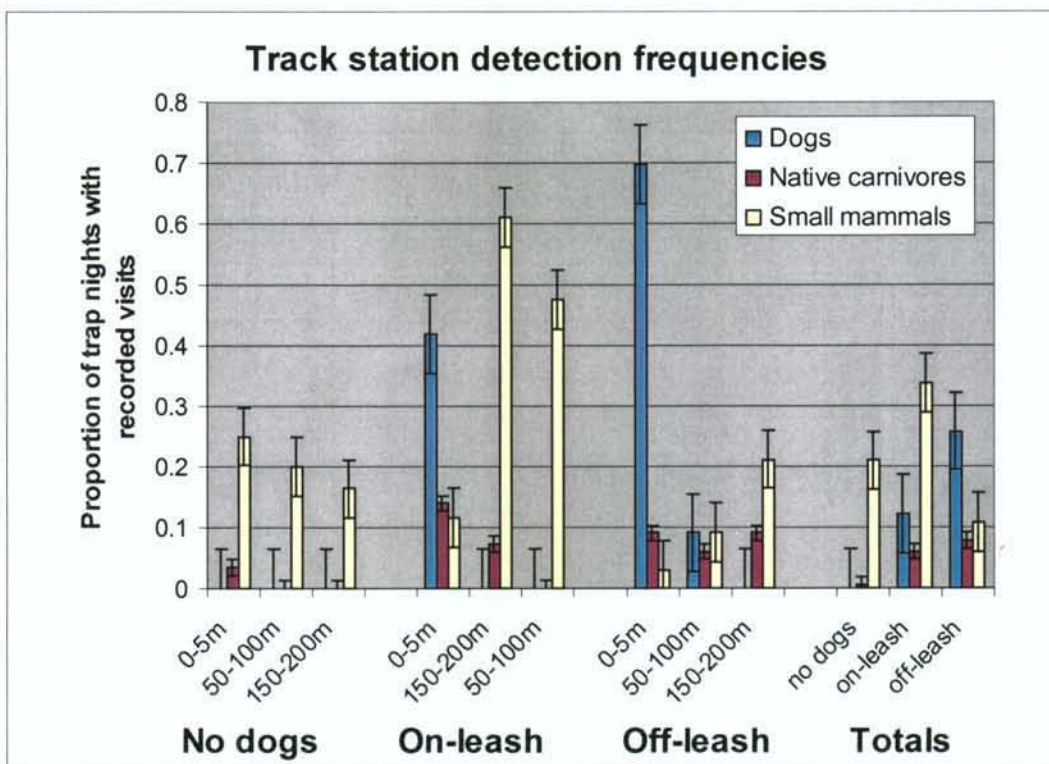


Fig. 1. Track station detection frequencies for dogs, native carnivores (coyote, fox, skunk, bobcat, black bear, mountain lion), and small mammals (pine squirrel, chipmunk, rabbit, rat), by dog treatment policy and distance from trail. Error bars represent +/- 1 standard error of the mean.

Overall detection probabilities for native carnivores were quite low (coyote=0.0075, fox=0.0175, skunk=0.01), so for comparisons we combined all native carnivores including coyotes, foxes, skunks, bobcats, bears, and mountain lions (Fig.1). Domestic dogs were detected the most at off-leash sites, both on the trail and at 50-100m off-trail.

At on-leash sites dogs were only detected on the trails, and at no-dog sites no dogs were recorded. In the presence of dogs small mammal detections decreased on-trail, and also decreased at 50-100m when dogs were allowed off-leash.

Circular scat plot data indicates that mule deer and elk avoid recreational trails, and that their sensitivity may increase when dogs are present (Fig. 2). Dog-free sites have the highest density of deer scat at the 50-100m off trail distance, decreasing when dogs were present. Lowest densities of deer scat were found when dogs were allowed off-leash.

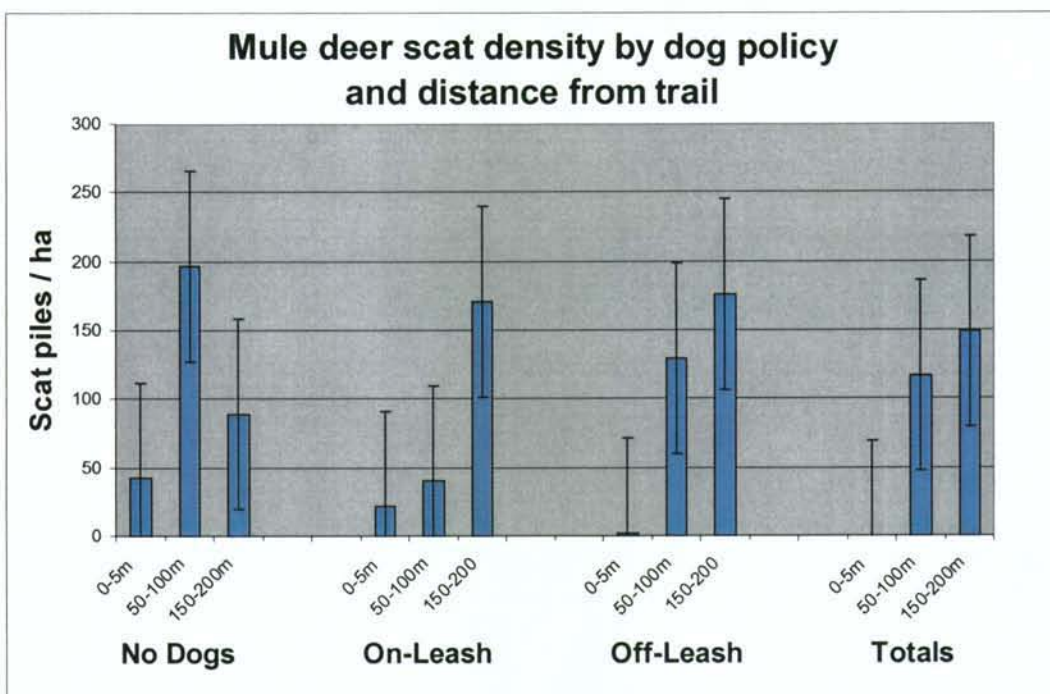


Fig. 2. Mule deer scat density by dog policy and distance from trail. Error bars indicate +/- 1 standard error of the mean.

On-trail scat surveys have covered over 300km to date, and are being continued year-round. Preliminary data suggests that that off-leash sites are receiving more wildlife usage than the other sites, though detections may be affected by trail conditions (including ice, snow and mud), and trampling (Fig. 3). Coyote scat reached its highest density on dog-free trails.

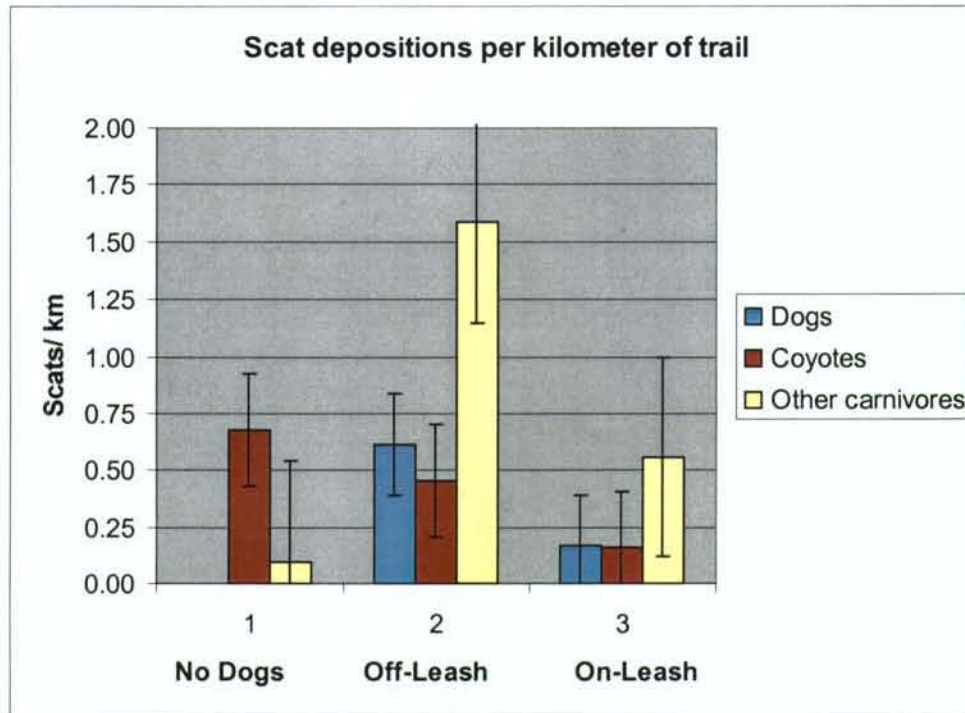


Fig. 3. Scat depositions per kilometer of trail. “Other carnivores” consists primarily of foxes, but also includes skunks and other mustellids. Error bars represent +/- 1 standard error of the mean.

The Trailmaster cameras took over 500 pictures, with 128 total detections, 51 of animals including dogs (Table 1). Wildlife only accounted for 18 pictures. One incidence of vandalism occurred (on the Mesa Trail), but no equipment was stolen. Four times the equipment was turned off.

Location	Distance from trail	species	number	Detection frequency
Hall Ranch	0-5m	merlin	1	0.167
Heil Valley	150-200m	bear	3	0.222
Mesa N/ Shanahan	150-200m	deer	2	0.148
Mesa N/ Shanahan	150-200m	bear	1	0.074
Mesa N/ Shanahan	150-200m	squirrel	1	0.074
Mesa N/ Shanahan	50-100m	turkey	1	0.074
Mesa N/ Shanahan	0-5m	dog	16	2.667
Mesa S/ Doudy Draw	0-5m	bear	2	0.333
Mesa S/ Doudy Draw	0-5m	dog	17	2.833
Mesa S/ Doudy Draw	0-5m	coyote	1	0.167
Mesa S/ Doudy Draw	50-100m	fox	1	0.074
Rabbit Mountain	150-200m	deer	2	0.148
Rabbit Mountain	150-200m	magpie	2	0.148
Walker Ranch	50-100m	deer	1	0.074

Table 1. Summary of data from Trailmaster cameras. Far right column represents pictures per day for each distance category and study site location.



### Discussion

Overall low detection rates were low for the amount of effort required, but promising trends regarding the influence of dogs still emerged from the preliminary data. The presence of dogs appears to influence the presence of mule deer, native carnivores, particularly coyotes, and small mammals.

Due to low detections of carnivores more sampling is needed. Very low detections were recorded at dog-free sites, which is contrary to casual observation of wildlife evidence in these areas (scats, visual IDs). In the circular scat plots we had low detection rates of carnivore scats, possibly because carnivores use trails disproportionately compared with random locations off-trail, and because carnivore scat decomposes more rapidly and is often eaten by other animals.

Preliminary data show that off-leash sites had more native carnivore detections than on-leash sites, which again had more carnivore detections than dog-free sites. This initial trend is contrary to expectations, that carnivores might avoid trails with high densities of dogs, particularly when allowed to run free. This trend might indicate that dogs attract carnivores to the trail, or that the study sites contain disparate enough population sizes of carnivores to override the influence of dogs.

### Changes for 2005

Sampling efforts must be increased in the second field season in order to reduce variance of parameter estimates and to identify trends resulting from the presence of dogs. The single greatest help toward this goal would be the ability to hire two full-time trained field assistants, but other changes must be considered as well. As discussed above, we have seriously considered dropping the on-leash only treatment from the study due to the very low dog visitation rates at these sites. At this time, it seems wise to keep this treatment and continue with three levels of dog-related disturbance. Another way to increase sampling effort may be to drop one of the off-trail distances for the second field season, focusing more on a single off-trail distance.

We are hoping to procure the same Trailmaster cameras for the summer, and are searching for more cameras to borrow. The more cameras we have at our disposal, the longer they may be left in place, and the more effective they will be for the effort. The majority of the effort with cameras was the set-up. With adequate supplies of cameras they could be left in place for up to two weeks. With a shortage of cameras their use may be focused on the trail itself, where most carnivore activity is, rather than using them also at random off-trail locations.

### Conclusion

We are encouraged by the trends we have identified, and are excited to continue. In order to ensure success in this project funding is essential. The primary needs are to hire and train two full-time assistants, procure a set of cameras, purchase film and other field equipment, and cover transportation costs.

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