Camera-Trap Survey of Mammals in a Riparian Zone on Gunpowder Creek in Boone County, Kentucky

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Introduction

The Earl and Hazel Jones Center for Conservation is a 92-acre property in Burlington, KY, purchased by the Boone County Conservation District (BCCDKY) in 2023. BCCDKY is developing a land management plan for the property to protect and conserve the forest, field, wetland, and riparian habitat along this one mile stretch of Gunpowder Creek. BCCDKY uses a variety of tools including mapping software, forest surveys, and wildlife surveys to form their land management plan, and is seeking to increase knowledge of the biodiversity, abundance, and behavior of local wildlife. In this study, we used camera traps to record the presence and behavior of mammals in the riparian zone at the property throughout the summer of 2024.

Figure 1. GIS map with points marking where camera traps were set up.

Background

Gunpowder Creek has a 58 square mile watershed and is a tributary of the Ohio River. A watershed plan published in 2014 reported that sediment and storm water are among the leading threats to water quality. Since 2015, extensive storm water best management practices (BMPs) have been implemented throughout the watershed, which recently led to the EPA's delisting of Gunpowder Creek for sediment impairment. Although this is seen as a success, continuous monitoring remains necessary.

Riparian zones, the area between aquatic and terrestrial environments, can be used to determine a forest or stream ecosystem's health (Swanson et. al. 1982). Monitoring for indicator and keystone species in the riparian zone can give land managers information about the overall health of the watershed and ecosystem structure and function, such as river otters and groundhogs, respectively. Camera trap surveys are a type of study that uses automated cameras that are triggered by some form of movement to collect video or photographic images of the presence or absence of an animal (McCallum, 2012). This type of passive monitoring is a cost-effective and useful method of data collection as equipment can be deployed for weeks at a time and the researchers do not need to be present during the surveys.

Methods

- Data was collected using Browning Dark Ops Extreme trail cameras. Each camera had a different recording length setting. Camera #1 was set to 10 seconds, Camera #2 was set to 60 seconds, and Camera #3 was set to 20 seconds.
- Locations selected for monitoring were determined based on evidence of mammal presence such as scat, tracks, well used deer trails, otter slide activity, and areas of potential dens.
- Cameras were left out for a span of 7.5 weeks from late May to mid July and were checked every three to four days.
- Mammal species, date, time, and observational notes of what the organisms were doing was recorded into a Google Sheets file.
- Adjustments were made to camera placements periodically to avoid interference from vegetation, improve camera angle, or if there were no mammals recorded for several days in a row.

Results

- A total of 404 videos were recorded, including 134 videos of Raccoons (*Procyon lotor*), 126 videos of an unknown species of mouse, 63 videos of Groundhogs (*Marmotox monax*), 31 videos of Northern Fox Squirrels (*Sciurus niger*), 31 videos of American Minks (*Neogale vison*), 26 videos of White-tailed Deer (*Odocoileus virginianus*), 11 videos of North American River Otters (*Lontra canadensis*), and 1 video of a Beaver (*Castor canadensis*).
- Some of these videos include singular individuals, multiple individuals, individuals with juveniles, and individuals of different species.
- Additionally, some of these species, such as raccoons, were seen at all three camera sites, while others, such as mink, were only seen at one or two camera sites.
- There were a range of behaviors observed including feeding, exploration, defecation, running, playing, and scent marking.
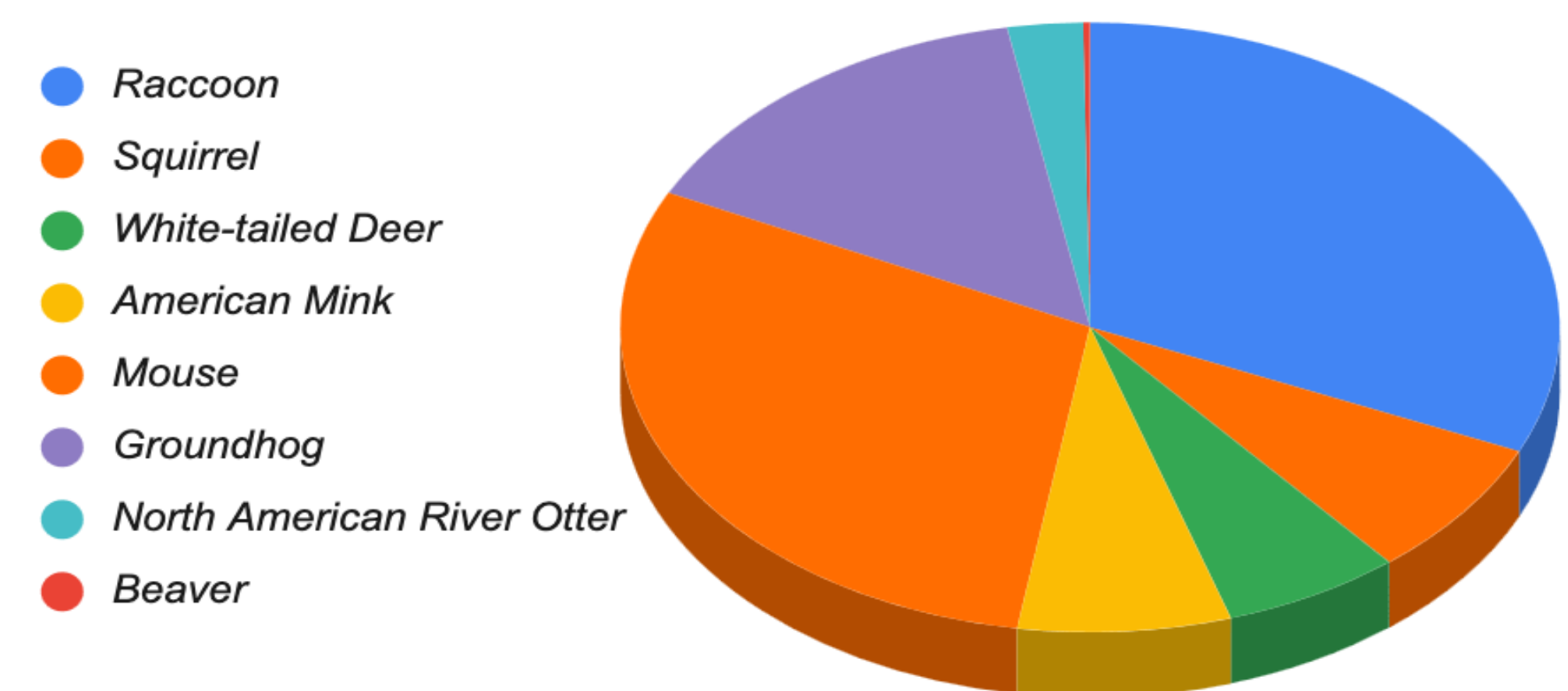

Figure 2. Cumulative total of mammal species observed on camera traps

Table 1. Example analysis of observed behaviors. Note that often two or more behaviors were seen in a single video.

	Walking	Running	Exploration	Playing	Scent Marking	Feeding	Defecation	Other
Raccoon	103	0	27	0	0	11	2	18
Northern Fox Squirrel	21	1	11	0	0	10	0	11
White-tailed Deer	24	1	2	1	0	12	0	8
American Mink	20	7	10	2	2	5	0	2
Groundhog	38	2	22	0	11	11	0	19
Mouse	4	69	30	0	0	8	0	23
North American River Otter	5	4	3	0	0	0	2	0
Beaver	1	0	1	0	0	0	0	0

Discussion

- While it was interesting to see a high diversity of species recorded, it was surprising to see a wide variety of behaviors recorded including social behaviors such as scent marking and playing.
- In total, there were 8 different mammalian species observed over 404 videos with Raccoons being seen the most and Beavers seen the least. Many of these videos included juvenile individuals or family groups, which indicates that this habitat is suitable for reproduction.
- The presence of more than one North American River Otter is notable since otters are considered an indicator species and require good-quality streams to support their diet, which consists primarily of fish and other aquatic species.
- While difficult to prove with cameras alone, several videos showing animals entering and exiting burrows along the creek bank and in root wads suggest the presence of den sites for otters, raccoons, and groundhogs. Assuming that these were, in fact, dens, it is notable that multiple species used the same den site.
- For future research, the use of more than 3 cameras to increase the possibility of seeing other mammals that are known to be in the surrounding area but were not captured during this study. It would also be possible in the future that a more in-depth study of mammalian behavior can be done, potentially with the use of radio tracking to track habitat range.
- These findings not only show us most of the species that use a riparian area, but they also help us develop potential land and wildlife management plans for the property. Because many of these mammals are considered indicator and keystone species for riparian areas, this research can also further boost public education of the importance of riparian zones and their organisms.

Figure 3. Images from camera traps. Top left: North American River Otter. Top right: White-tailed Deer and fawn. Bottom left: American Mink. Bottom right: Raccoon.

Literature Cited

- McCallum, Jamie. (2012) "Changing use of camera taps in mammalian field research: habitats, taxa and study types", *Mammal Review*, 43(3), pp. 196-206.
- Swanson, Frederick J., et al. "Land-water interactions: the riparian zone." (1982).

Acknowledgements