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Caleb Durbin

Pittsburg State University

Christine Brodsky

Pittsburg State University

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Camera Trap Study of the Mammal Communities Across an Urbanization Gradient

Caleb Durbin & Dr. Christine Brodsky
Department of Biology, Pittsburg State University, Pittsburg, KS 66762



Introduction

Urbanization Impacts

- The earth has become more urbanized over time, with more residents living in urban areas rather than rural (Seto et al., 2012).
- Consequently, urbanization has caused habitat fragmentation, habitat simplification, and food resource availability for wildlife.

The Effects on the Mammal Community

- Many wildlife species have become acclimated to human interactions. The behavior of wildlife has changed due to urbanization.
- Studies have shown that fear of humans is suppressed due to the feeding of wildlife (Saito & Koike, 2013).
- We can categorize wildlife by how they react to the urbanization which has an effect on how the species are distributed along the urban-to-rural gradient. Generally, more wildlife species are found in intermediate levels of urbanization due to anthropogenic, supplemental food sources and moderate patch sizes.
- One study found that mammal species richness varied between suburban and urban parks. The more urban sites had reduced species richness due to large areas of lawn habitat that provide limited habitat resources (Mahan & O'Connell, 2005).

Research Objectives

- Find patterns in mammal community composition across the urban to rural gradient in Pittsburg, Kansas.
- Observe whether there is a difference in the species richness along the urban to rural gradient.
- Promote more urban wildlife research in micropolitan areas, like Pittsburg.

Study Location



Methods

- We deployed camera traps for 98 trap nights (February 5 – March 18, 2019) at four locations across an urbanization gradient in Pittsburg (Fig. 1).
 - Monahan and O'Malley Prairie (rural), Robb Prairie (semi-rural), Highland Cemetery (semi-urban), and a residential house (urban).
- Each site had one trail camera (Bushnell Trophy Cam HD E3), set to take photographs of any passing wildlife with a 5-second delay. All cameras were placed < 1 m off the ground.
- We checked cameras every 7 trap nights. This included replacing the SD cards and downloading photographs.
- We recorded average temperature and precipitation for each trap night to observe if weather had any effects on the results.
- We observed and categorized the trap photos by identifying what mammal species were caught with the camera. We observed whether there was a difference across the urban to rural gradient.



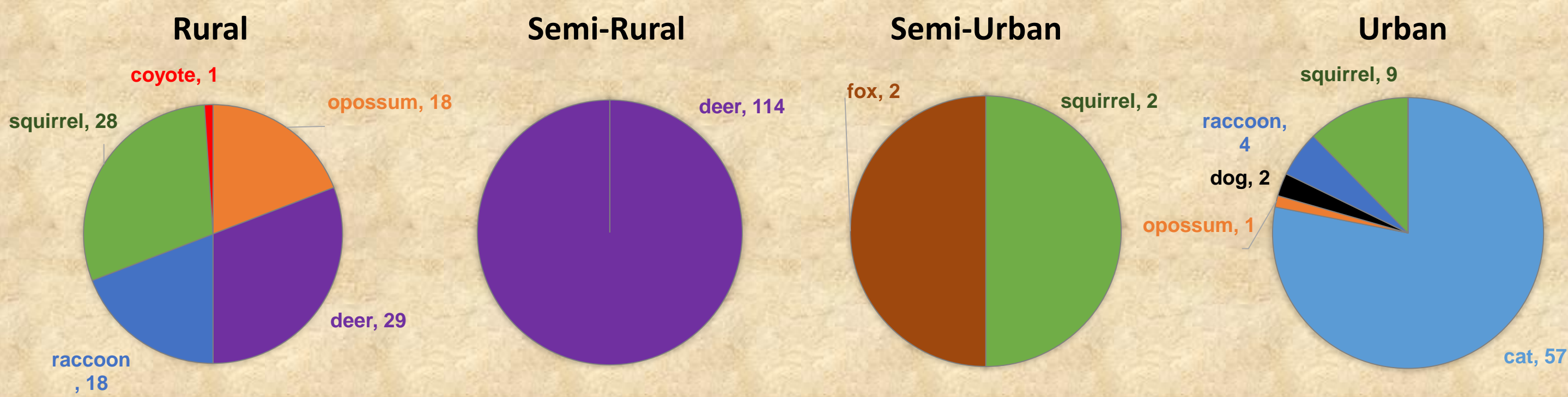
Figure 2. The camera traps were strapped onto the trunks of trees, signs, and telephone poles.

Results

- We observed 8 mammal species across all sites. The rural and urban sites had the greatest species richness, while the semi-rural and semi-urban sites had few species.
- Rural sites were dominated by urban adaptor species, such as white-tailed deer (*Odocoileus virginianus*), fox squirrels (*Sciurus niger*), opossum (*Didelphis virginiana*), and raccoon (*Procyon lotor*).
- Urban sites were dominated by urban exploiter and adaptor species, such as house cats (*Felis catus*), fox squirrels (*Sciurus niger*), and red fox (*Vulpes vulpes*).
- Weather ranged in temperature (-1.6°C to 9°C) and precipitation (total 2.31 cm; daily average 0.003 cm) across the study period. Inclement weather (i.e. cold, frozen rain) days resulted in fewer photographs.

Table 1. Species richness and number of photo captures across the four different habitats.

Habitat	Species Richness	Number of Photos
Rural	5	94
Semi-Rural	1	114
Semi-Urban	2	4
Urban	5	73



Results



Figure 4. Photos of the mammal species captured: a) Virginia opossum (*Didelphis virginiana*), b) White-tailed deer (*Odocoileus virginianus*), c) Fox squirrel (*Sciurus niger*), d) Red fox (*Vulpes vulpes*), e) Domestic cat (*Felis catus*), f) Raccoon (*Procyon lotor*), g) Coyote (*Canis latrans*), h) Domestic dog (*Canis lupus familiaris*).

Conclusions

Revisiting Research Objectives

- We found that there were many mammal species on both the urban and rural areas, but the semi-urban and semi-rural areas had a lower species richness.
- There were differences in which mammals preferred the urban areas and the rural areas. The white-tailed deer leaned more toward the urban avoider lifestyle, while raccoons were very adaptable to the urban and rural habitats, possibly due to human-provided food resources.

Future of Urban and Rural Mammals

- Urbanization rates are increasing, and this will have a major effect on wildlife. Habitat fragmentation will cause a decline in species that require larger habitats, which will have an effect on the other species. This could lead to extinction of many mammal species.
- The research done in this study must be done again to determine the future of Pittsburg's wildlife. This study helps us to understand species' habitat needs, and will help inform the public about what mammals are nearby. Knowing this, we can build more sustainable, greener cities to benefit our environment.

Acknowledgements & References

Thank you to Katie McMurphy for allowing me to set up a trail camera in her yard.

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