



“Keep Calm and Carrion”: Assessing Species Richness of Carrion Beetles and Small Mammals Across Urban Parks



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Introduction

With hundreds of cities, thousands of cars, and billions of people, what is our effect on the environment around us? Urbanization impacts the environment through habitat loss, fragmentation, and pollution, especially in cities.²



Fig. 1: *Peromyscus leucopus* (White Footed mouse)¹

To better understand these effects, we studied the dynamics between carrion beetles, small mammals, and urbanization.

Carrion beetles play a constituent role in an ecosystem by recycling the nutrients from small mammal carcasses back into the soil. The populations of small mammals have an influence over the success of beetle populations by providing means for reproduction.² To study the population of carrion beetles in New York City, we conducted research in five parks which differed in their level of urbanization. We used track tubes to record presence of small mammal species and hanging traps to collect carrion beetles.

Understanding the relationships between urbanization, small mammal diversity, and carrion beetle diversity can provide insight into the effects of urbanization.²

Methods

Track tubes

- ❖ 2 ft gutters connected to form a tunnel with a piece of contact paper inside and inked felt at each opening. Three tubes were placed at each site.
- ❖ Tubes were baited for one day with oats and peanut butter.



Fig. 2: Identifying animal tracks

Hanging traps

- ❖ A small perforated container holding raw chicken placed inside of a larger container filled with soapy water and hung from tree with string.
- ❖ Traps were checked after one week.



Fig. 3: Hanging trap for collecting beetles

Data Collection

- ❖ 14 sites: 4 in Central Park, 1 in Riverside Park, 2 in Highbridge Park, 3 in Inwood Hill Park, and 4 in Pelham Bay Park
- ❖ Legible tracks were identified from track tubes.
- ❖ Beetles were cleaned in ethanol and pinned.
- ❖ Urbanization was measured as distance from Times Square.

Research Question & Hypotheses

What is the impact of small mammal species richness on carrion beetle species richness across an urban gradient?

- ❖ The species richness of carrion beetles increases as urbanization decreases.
- ❖ The species richness of small mammals increases as urbanization decreases
- ❖ The species richness of carrion beetles increases as species richness of small mammals increases.

Results

Carrion Beetle Species Richness

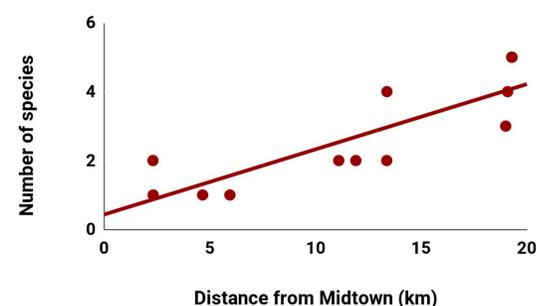


Fig. 4: Beetle species richness at each site as distance from Midtown Manhattan increases. Pearson's $r = 0.841$

Small Mammal Species Richness

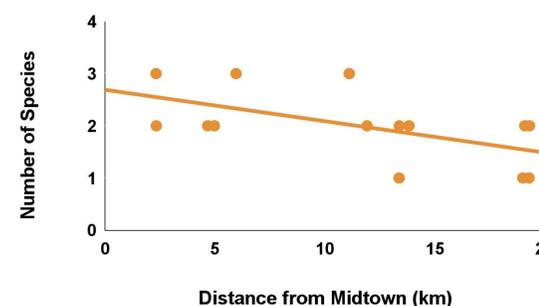


Fig. 5: The population of mammals at each site as distance from Midtown Manhattan increases. Pearson's $r = 0.569$

Number of Species Present in NYC Parks

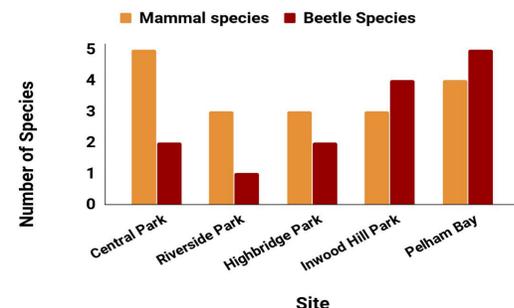


Fig. 6: Mammal and beetle species richness for each site

Small Mammal and Beetle Species Richness

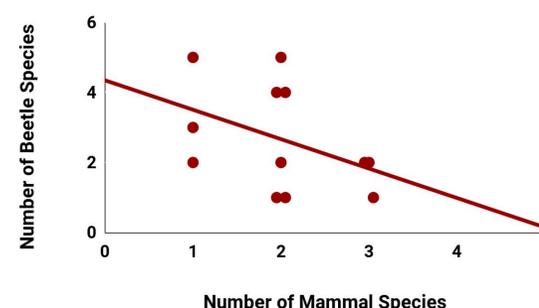


Fig. 7: shows the relationship between small mammal species richness and beetle species richness. Pearson's $r = 0.415$



Fig. 8: Five species of Carrion Beetles found during the study.

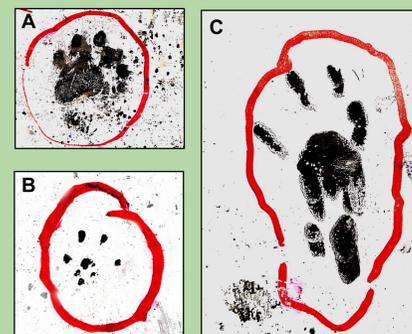


Fig. 9: The images show tracks taken from the contact paper of track tubes a) Skunk track b) White footed mouse c) Grey squirrel.

Discussion

Effects of Urbanization on Beetles

Our predictions were supported by a strong positive correlation between species richness and increasing distance from Midtown (Fig. 4).

This could be because urban parks had larger mammals which compete with beetles and are harder for them to utilize.³



Fig. 10: Students collecting carrion beetles

Effects of Urbanization on Small Mammals

Our hypothesis was rejected by a negative correlation between mammal species richness and urbanization (Fig. 5). More species were found at more urban sites.

Urban parks could be confining mammals smaller areas, making them more likely to find track tubes. Potential factors affecting this data are territorial behavior of species and environmental factors such as rain washing away prints.

Effects of Small Mammal Species on Beetle Species

Our hypothesis that an increase in the species richness of small mammals would lead to an increase in the species richness of carrion beetles was not supported. Data in Fig. 7 shows a negative correlation. However, this may be due to confounding effects of urbanization.

Future Studies

Future studies using hanging traps should use tamper-proof traps. Small mammal data could be improved by using more sites and more tubes at each site to yield more accurate results. In the future, a study may look at a comparison between mammals and beetles at sites that are at the same level of urbanization to account for the possible confounding variable seen in this study.

Overall, more sites and a longer period of time for the study would be useful for any future study using these methods.

References

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