Introduction

A major problem affecting surface waters in urban environments is contamination, primarily from an influx of fecal matter from surface runoff. Fecal pollution in surface waters is a significant quality issue because at high levels of contamination, those who interact with and ingest the water source (humans and animals) may contract various gastrointestinal diseases. Fecal coliforms are bacterial indicators of fecal pollution in water and are commonly found in the feces of wild and domestic warm-blooded animals. While not all coliforms are infectious, the determination of certain fecal coliform levels can serve as proxies for particular disease-causing pathogens that can be harmful for the health of humans and other animals. Prospect Park and Green-Wood Cemetery are both urban environments that harbor an abundance of wildlife, especially small mammal populations. Given that fecal contamination in surface waters may be caused by ground runoff, the goal of this study was to understand if there is a relationship between surrounding small mammal activity within each respective location and fecal coliform levels in urban ponds.

Research Question & Hypotheses

Question: Is small mammal activity related to fecal coliform levels in urban ponds? Hypothesis: There is a relationship between small mammal activity and fecal coliform levels; in areas with higher small mammal activity, there will be higher fecal coliform levels within the pond.

Methods

- Chose 5 sites in Prospect Park and Green-Wood Cemetery
- Established a 20 m perimeter from the edge of each pond
- Surveyed scat using the guide Scats and Tracks of North America
- Placed 4 camera traps strategically around the perimeter of the pond for 24 hours. Reviewed images from camera traps
- Sampled pond water from each site
- To determine the total fecal coliform levels in each water sample, dipped agar-plated paddles (LaMotte Biopaddle Medium) into each water sample and stored them in an incubator for 24 hours at 35°C (±2°C)
- Estimated Total fecal coliform counts using a magnifying glass and compared colonies to preexisting coliform data provided by an LaMotte guide.
- Based on camera trap data, human activity at each pond was categorized as the following:
  - Category 1: 0-2 people
  - Category 2: 3-5 people
  - Category 3: 6-8 people
  - Category 4: 9-10 people
  - Category 5: 11+ people

Results

- Our results indicate that as the small mammal count within the surrounding environment of a pond increases, fecal coliform levels increase within the pond.
- The data suggests that there is a positive correlation between scat count and fecal coliform enumeration. In areas that had a higher scat count, fecal coliform levels were also higher.
- While Dell Pond, in Green-Wood Cemetery, consistently proved to be an exception to our fecal coliform research findings, it is important to note that this pond had undergone water quality treatment during the time of water sampling.
- Additionally, Green-Wood Cemetery generally had higher scat counts than Prospect Park. This may be due to the fact that dogs are the highest small mammal population in Prospect Park, and most dog-owners appear to be picking up after their dogs.
- Our data also suggests that in areas that have high amounts of human activity (Boathouse; Category 5), there was a larger variety of animal species compared to areas of low amounts of human activity (Dell; Category 1). However, in areas that have low amounts of human activity, there was a greater animal count of raccoons, squirrels, and birds.
- The data comparing animal activity between areas of lower elevation and higher elevation shows that at higher elevation, bird activity increases. Meanwhile, small mammal activity remains the same.
- Overall, our data provides information about the enumeration of fecal coliform in certain urban ponds and depicts how increased small mammal activity appears to have an impact on these levels. Our data can aid in identifying a general amount of how much coliform is present in urban environments, which can pose health risks to the human population.
- However, our data does not tell us the extent to which these levels are a potential danger to the health of humans and animals. Therefore, understanding exactly how dangerous these levels are can be a potential future study.
- Additionally, based on comparative data provided by the LaMotte guide, the fecal coliform from each biopaddle test has been identified as being part of the genus Proteus. Reasons on why this fecal coliform is present in each pond and its implication on human and animal health may also be examined in future studies.

Discussion

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Acknowledgements

We would like to sincerely thank Project TRUE and the Wildlife Conservation Society for giving us the opportunity to conduct our research. We would also like to thank the program director Jason Aloisio, Dr. Alan Clark, and our project leaders, Sarah Davis and Brian O’Toole, for their endless support and guidance. Lastly, we would like to thank our undergraduate mentor for introducing us to the world of urban ecology.

References