WHERE THE WILD WINGS ARE
A SURVEY OF BIRD DIVERSITY

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ABSTRACT

Birds make good candidate organisms to study in urban environments because of their ability to survive in smaller spaces than most animals, but bird diversity is negatively affected by the rise of urbanization. We utilized point counts to collect visual and auditory data on bird diversity and abundance between two forested sections of the Bronx Zoo. We detected a greater abundance of birds at Mitsubishi Riverwalk (n = 574 birds) than at Old Riverwalk (n = 221 birds). Similarly, we detected a greater number of species at Mitsubishi Riverwalk (n = 35 species) and concluded that the two sites supported significantly different levels of bird diversity. Lastly, we found Mitsubishi Riverwalk had a significantly greater abundance of invasive birds species than Old Riverwalk (p = 0.0105).

INTRODUCTION

Urban ecology is the study of the interaction of organisms within urban environments (Wu 2014). Birds provide a number of important ecosystem services, including controlling insect populations, seed dispersal, pollination, and nutrient cycling (Driscoll 2013). Additionally, birds make useful study organisms because they are often found throughout urban environments and can survive in small green spaces (< 2 ha) (Carbó-Ramírez and Zuria 2011). Increased urbanization has previously been shown to coincide with a decrease in bird species diversity and an increase in invasive species abundance (Batten et al 1972, Clergeau et al 1998). More research about the effects of urbanization on bird diversity can be helpful for those working to preserve areas for wildlife (Bibby 1998). We are interested in analyzing bird size along with observing the prevalence of invasive bird species at developed and undeveloped sites.

METHODS

Point counts were conducted to record bird abundance and diversity data. Data collection began five minutes after arriving to point count stations and birds were recorded based on visual and/or auditory confirmation. Eight stations were established at least 50m away from each other: four stations at Mitsubishi Riverwalk and four stations and Old Riverwalk. Data was recorded four days a week for a period of three weeks. Each day we alternated which site was done in the morning and which was done in the afternoon. Date, time of arrival, start time of survey, weather, last rainfall, wind speed, and temperature variables were also recorded. Microsoft Excel was used to run a two-sample t-test to compare bird height, diversity, and proportion of invasive to native species between sites.

Image 1: American Robin perched on a log at Mitsubishi Riverwalk.

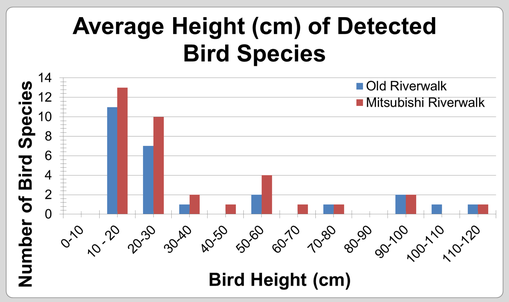
Image 2: Common Grackle perched on a log at Mitsubishi Riverwalk.

Image 3: Great Blue Heron walking across mud at Mitsubishi Riverwalk.

RESULTS

Point count data revealed more observations of birds at Mitsubishi Riverwalk than at Old Riverwalk by total number of detections and number of species identified. During our combined point counts, we had a total of 795 bird detections and 39 different bird species. We had 221 bird detections at Old Riverwalk and 574 at Mitsubishi Riverwalk. We identified 35 bird species at Mitsubishi Riverwalk and 26 species at Old Riverwalk. There were a few species we could not identify exactly, but we could narrow it down to a type of warbler and a type of swallow. We additionally identified a Snowy Egret on site but not during our point counts.

Mallards were the most commonly observed bird species, accounting for 103 observations, followed by House Sparrows (80), and Canada Geese (73). Most observations of birds fell in two height classes ranging between 10-20 cm and 20-30 cm. Invasive birds species made up 16.2% of the total observations at Mitsubishi Riverwalk as compared to 2.3% of observations at Old Riverwalk.



Left, Figure 2: Bar graph comparing the average heights of bird species detected at Old Riverwalk and Mitsubishi Riverwalk.

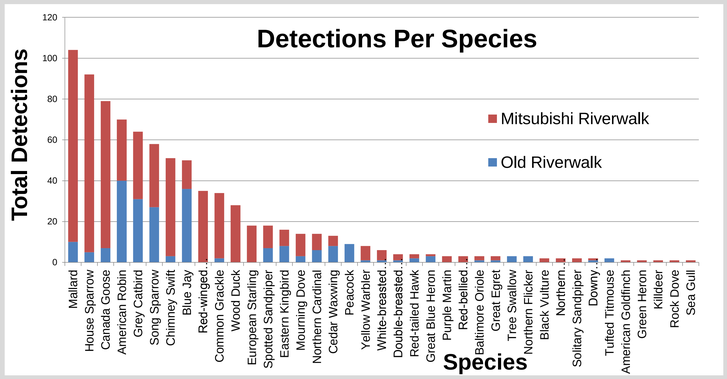


Figure 1: Bar graph showing all of the species detected at Old Riverwalk and Mitsubishi Riverwalk.

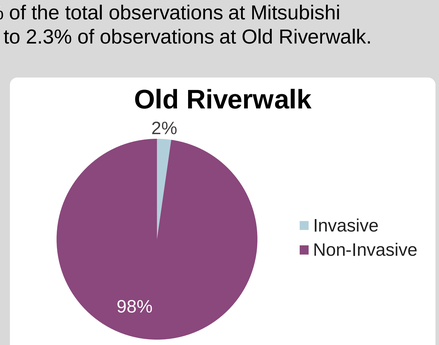


Figure 3: Pie graph of invasive and non-invasive bird detections at Old Riverwalk.

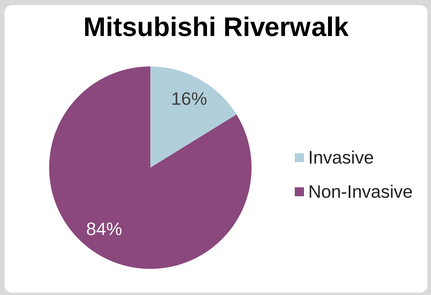


Figure 4: Pie graph of invasive and non-invasive bird detections at Mitsubishi Riverwalk.

CONCLUSION

One of our main objectives this summer was to compare bird species diversity between Old Riverwalk and Mitsubishi Riverwalk. We hypothesized Old Riverwalk would have a greater diversity of bird species than Mitsubishi Riverwalk. Our null hypothesis was that there was no difference in diversity between the two sites. The mean of species detected at each Mitsubishi Riverwalk point station (6.84 species) was higher than that of Old Riverwalk (3.67 species), therefore we were able to reject our null hypothesis. One possible explanation that may account for why greater diversity was observed at Mitsubishi Riverwalk could be attributed to landscape heterogeneity, which has been found to positively correlate with species diversity (Wright *et al.* 2002).

We also compared the number invasive bird species and their relative abundance at each site. Our findings showed more invasive bird species detected at Mitsubishi Riverwalk (n = 2) than at Old Riverwalk (n = 1). Abundance of invasive bird species observed at Mitsubishi Riverwalk (n = 93) was found to be significantly greater than Old Riverwalk (n = 5) (α = 0.05, p-value = 0.0105, t-calc = 2.488, df = 22).

Our third hypothesis examined whether we detected more large bird species at Mitsubishi Riverwalk than Old Riverwalk. We found nine large bird species at Mitsubishi Riverwalk and seven at Old Riverwalk. Statistical analyses failed to reject the null hypothesis, and we did not find significantly more large bird species at Mitsubishi Riverwalk (α = 0.05, p-value = 0.3489, t-calc = 0.3899).

There were a couple of limitations to this study. The point count method depends on the researchers' abilities to correctly spot and identify birds in the area. While we did become increasingly proficient with each survey, we were still relatively inexperienced bird watchers. Noise pollution caused by the surrounding urban environment (airplanes, maintenance work, visitors, etc…) and water spilling over from the dams made observation of birds by ear more challenging. We were also restricted to only conducting point counts between 10AM and 3PM. Weather was also a factor. We were inhibited on cloudy days because the glare of the clouds made it harder to differentiate colors, making it difficult to identify birds. Data was not collected for anthropogenic factors like proximity to dams, roadways, or pathways, these could also influence bird diversity and abundance. However, exploring possible correlations between bird diversity and anthropogenic factors could be a compelling research project for next year's Project TRUE team.

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