

Is there a Relationship Between Urban Noise Pollution and Bird Song Duration?

Introduction

Being the city that never sleeps, New York is a great contributor of urban noise pollution. Urban noise pollution, or noise stemming from human activity, transit, traffic, and industry, uniquely affects not just residents but also avian habitats, behaviors, and soundscapes.

Birds tend to be louder in quieter parts of cities with more biodiversity (Merrall et al. 2020), and were found to sing longer in areas with diverse wildlife away from highways (Herrera-Montes & Aide. 2011). We also found research that claimed birds had difficulty in adjusting their pitch around building and car noises (Dowling et al. 2011), but this directly contradicts another study that found birds could adapt their pitch in noisy settings as a part of their adaptive behavior (Cardoso & Atwell. 2011). The latter related to another finding of a volume increase from birds in noisier environments (Ann et al. 2021).

These conflicting findings led to a research gap, prompting an investigation into the correlation between bird song duration and urban noise pollution, particularly in New York City.

To understand the impact of urban noise pollution on the duration of bird songs, an experiment was set up to track bird song durations in different parks throughout the five boroughs. **We hypothesized that urban noise pollution is negatively correlated with bird song duration and volume intensity.**

Materials and Methods

We recorded and identified different birds through ten parks in the Bronx, Manhattan, and Queens (Figure 1). J. Hood Wright Park was observed twice, but we have multiple data points, as there were multiple types of birds and bird calls. Eight out of ten parks had urban noise producers, like traffic intersections.

We mainly researched from the hours of 9 AM to 12 PM and used the Merlin Bird ID app to identify birds by song (Figure 2) and Decibel X to measure noise levels of the area. We also used iNaturalist to verify the species identified by Merlin Bird ID actually lived in their respective parks. Regular timers were also used to record the duration of bird noises. At each location, bird type, number of chirps per call, overall duration, estimated average time of each call (seconds), and the noise level of each park (in decibels) were recorded.

Overall decibel levels of the park and average duration of the call were plotted against each other.

Results

- We found that there was a weak correlation between decibel level and bird call duration. The correlation coefficient (r value) was 0.04.
- There was a relation between area of testing and decibel level. When we tested in Manhattan, there was an average of higher decibel values when compared to other boroughs (Figure 1).

Results (Continued)

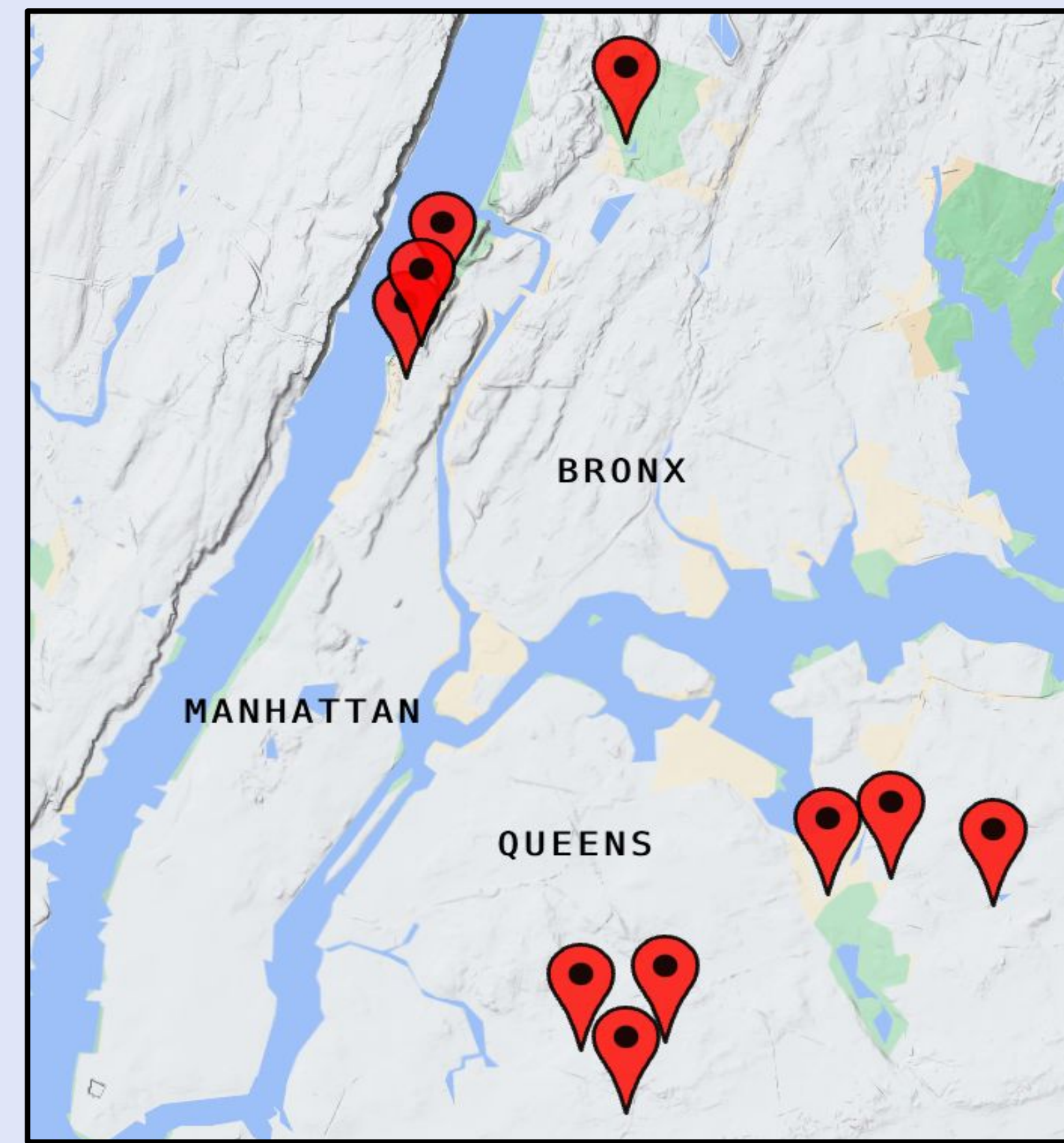


Figure 1: Map of the ten parks observed

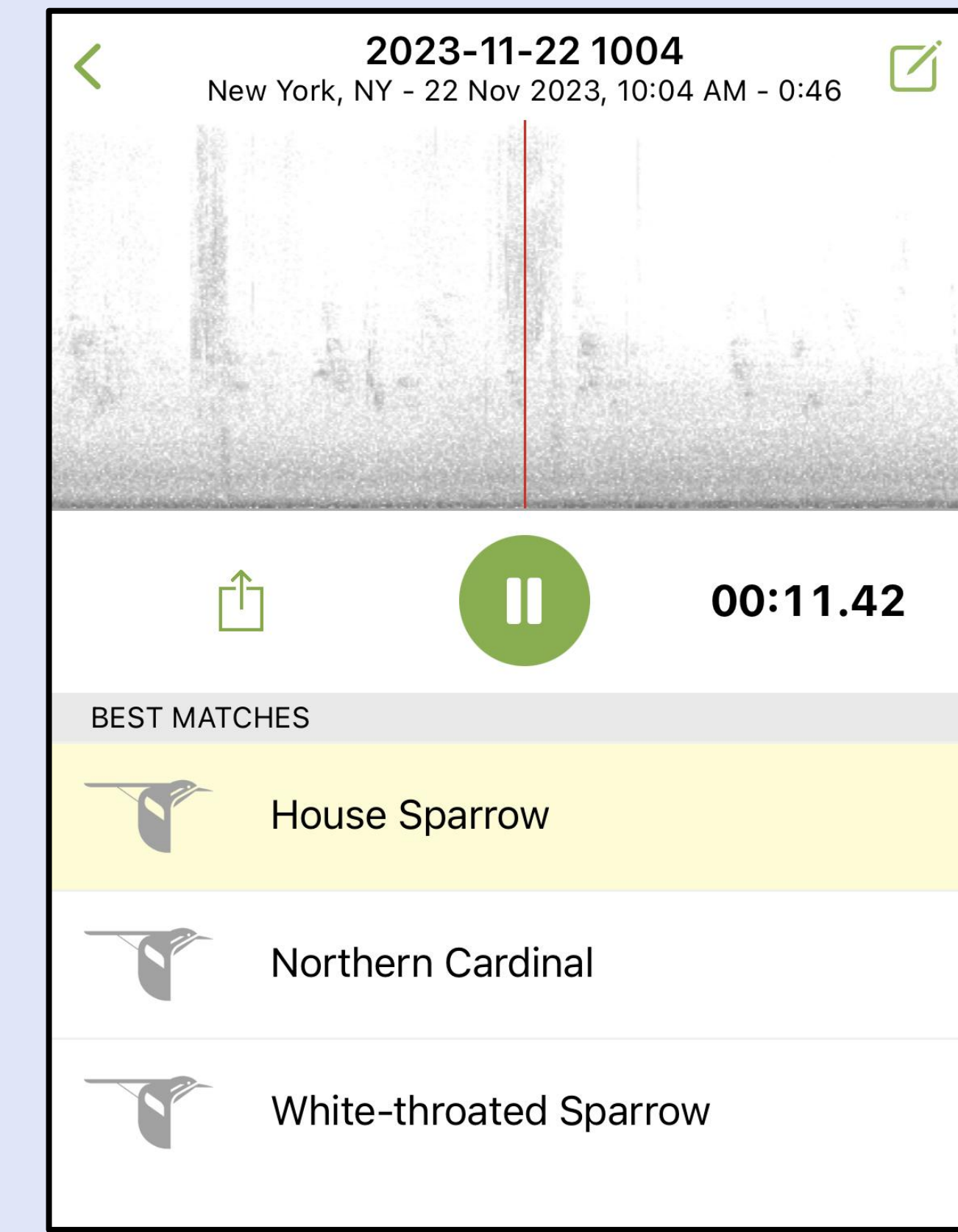


Figure 2: An example of Merlin Bird ID identifying bird species from a recording

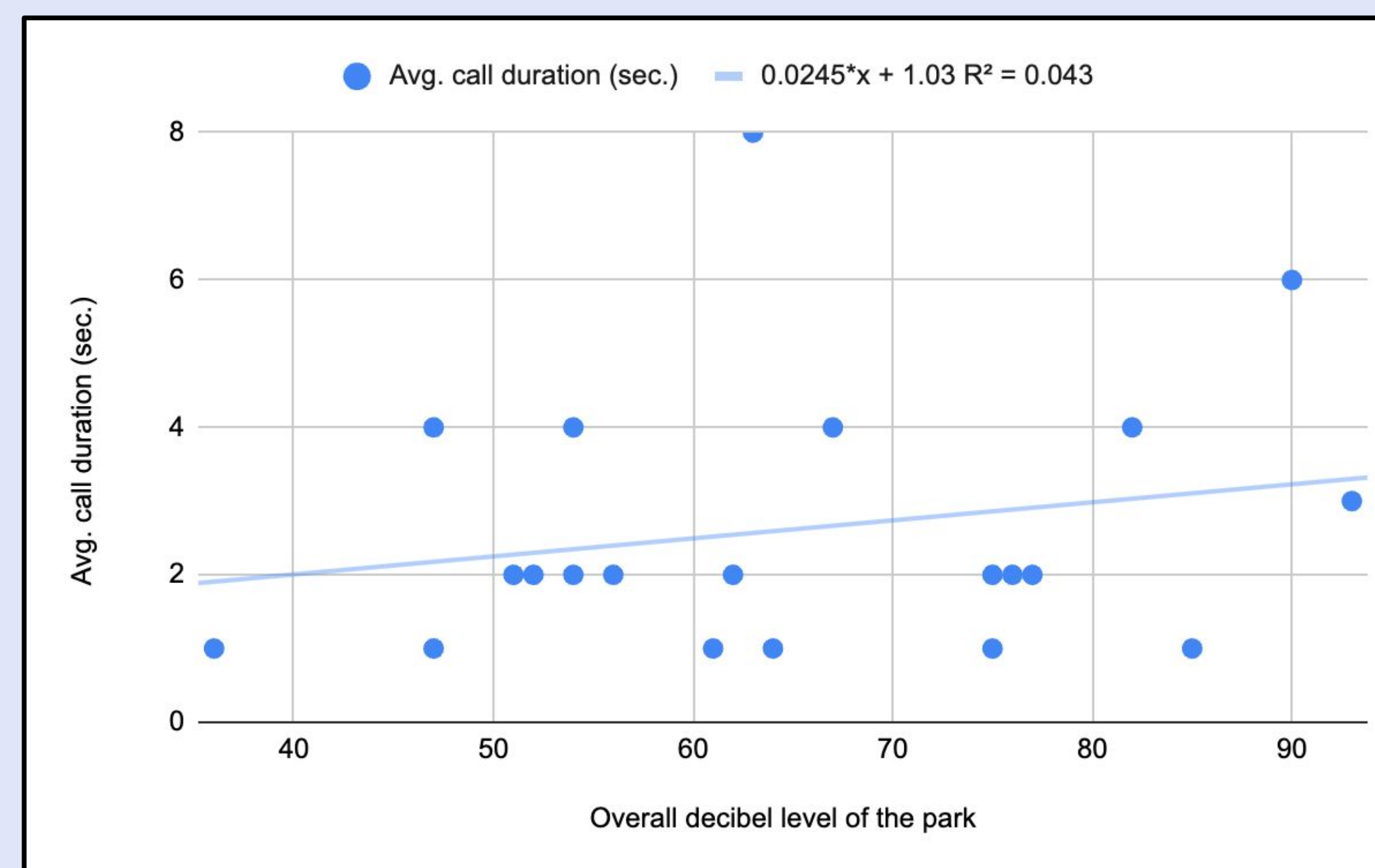


Figure 3: Average Bird Call Duration (in Seconds) Vs. Ambient Decibel Levels. > 69 dB designates calm noise (no talking, ambience). 70 dB to 85 dB signifies normal levels to noise (kids running, street noise). 90 dB < refers to loud noise.

Table 1: Bird species found in their respective park, as identified by Merlin Bird ID.

Park Location	Birds Found (Common Name)
Bennett Park (Manhattan)	American Crow, House Sparrow
Fort Tryon Park (Manhattan)	Red-bellied woodpecker, Northern Cardinal, White-throated sparrow
Fresh Meadows Corona Park (Queens)	Golden-crowned Kinglet, Common Raven, Ring-billed Gull, Canada Goose, Dark-eyed Junco
J. Hood Wright Park (Manhattan)	Tufted titmouse, Dark-eyed Junco, Northern Cardinal, House Sparrow, White-throated sparrow, House Finch
Joseph F. Mafera Park (Queens)	American Robin
Juniper Valley Park (Queens)	House Sparrow
Kissena Park (Queens)	European Starling, House Sparrow, Redwing
Reif Park (Queens)	Eastern Bluebird
Queens Botanical Garden	Song Sparrow
Van Cortlandt Park (The Bronx)	American Goldfinch, Tufted Titmouse, American Crow, Blue Jay, Common Grackle

Conclusion

Overall, our hypothesis turned out to be unsupported as our data concludes there is a weak correlation between urban noise pollution and bird song duration.

Lastly, while doing tests we noticed there is a large variety of birds found all across NYC even with an abundance of noise. This led to a greater demographic for our results.

Discussion

Anecdotally, we noticed certain avian reactions to urban pollution. In J. Hood Wright Park, a song from the Dark-eyed Junco was still able to be heard even with construction. Their song also lasted around eight seconds. This observation ties back into research on birds' capabilities to adjust their volume according to their environment (Cardoso & Atwell 2011). In Kissena Park, a Redwing promptly ended its call and flew away after it was scared from a car honk. This relays back to many studies we have found that describe urban noise pollution as a stressor for birds (Merrall et al, Walthers, et al.). We also noticed that more birds were concentrated in quieter, woodland areas of the parks compared to noisier areas (traffic from roads), highlighting their adaptability of environments (Herrera-Montes, M. I., & Aide, T. M.).

Future Directions

If no relationship exists between urban noise pollution and bird song duration exists, like our results suggest, the relationship would be better studied by doing the following:

- Expanding our research to parks in all five boroughs of the city as we would be able to get a greater number of results to compare to and see if there are correlations between areas.
- Observing on days with similar weather conditions, allowing our test to all have a constant present so there are no unnecessary variables harming the results.
- Observing throughout the entire day to get a precise average of bird call duration.

References

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