How Urban Pollinator Garden Types and Locations Influence Community-Led Grant Success in Toronto*

Insights from Bayesian Analysis on Funding Outcomes for PollinateTO Projects.

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First sentence. Second sentence. Third sentence. Fourth sentence.

1 Introduction

1.1 Overview

Urban biodiversity plays a crucial role in sustaining ecosystem health, yet cities face challenges in designing equitable and effective strategies to protect pollinators. Toronto's PollinateTO initiative seeks to address this by funding community-led projects that create and enhance publicly visible pollinator gardens. Since its inception in 2019, the program has supported over 190 projects, resulting in approximately 500 gardens and 25,500 m^2 of pollinator habitat. While these efforts align with the city's Pollinator Protection and Biodiversity Strategies, the allocation patterns of these grants remain an open question. Specifically, understanding whether certain types of gardens (e.g., rain gardens, boulevard gardens) or locations (e.g., Neighbourhood Improvement Areas) are more likely to receive funding can provide valuable insights into optimizing resources and maximizing program impact.

1.2 Estimand

To address this question, this paper investigates the relationship between garden characteristics and PollinateTO funding decisions. Our analysis focuses on how variables such as garden type, location, and community engagement strategies influence both the frequency and magnitude of

*Code and data are available at: https://github.com/RohanAlexander/starter_folder.

funding allocations. The estimand centers on whether specific garden features are associated with higher funding likelihoods and amounts, filling a critical gap in understanding how urban biodiversity programs distribute resources.

1.3 Results

Our results reveal that certain garden types, such as__________, are more likely to secure funding, particularly in underserved areas identified as __________. We also find that projects emphasizing _________ receive higher allocations, highlighting the program's alignment with broader engagement and ecological priorities. These findings offer actionable insights into how urban biodiversity initiatives can balance ecological goals with social equity considerations.

1.4 Significance

The implications of this study extend beyond Toronto, providing a framework for other cities seeking to implement or refine pollinator protection strategies. By shedding light on funding allocation patterns, this research informs policymakers and urban planners on how to enhance the effectiveness and equity of biodiversity programs. These insights contribute to the growing body of literature on sustainable urban development and community-driven ecological stewardship.

1.5 Telegraphing

The remainder of this paper is structured as follows. Section 2 describes the data used in the analysis, including its sources, key features, and considerations regarding measurement and visualization. Section 3 outlines the methodology, detailing the data visualization techniques employed and the justification for using a Bayesian logistic regression model to analyze the relationship between garden characteristics and funding outcomes. Section 4 presents the results, including model validation and key findings. Section 5 offers a discussion of the results, focusing on their implications through key points, followed by an examination of the study's limitations and suggested future steps for further exploration. Section 6 concludes the paper. The Appendix provides supplementary materials, including raw data previews, data feature definitions, data visualizations, and technical model details such as posterior predictive checks, MCMC convergence diagnostics, and additional figures.

Section 2….

2 Data

2.1 Software Packages

We use the statistical programming language R (R Core Team 2023)…. Our data (Toronto Shelter & Support Services 2024)…. Following Alexander (2023), we consider… ## Data Source

2.2 Data Features

2.3 Data Measurement

Some paragraphs about how we go from a phenomena in the world to an entry in the dataset.

2.4 Data Consideration

2.5 Methodology

2.6 Data Visualization

Add graphs, tables and text. Use sub-sub-headings for each outcome variable or update the subheading to be singular.

Some of our data is of penguins (Figure 1), from Horst, Hill, and Gorman (2020).

Talk more about it.

And also planes (**?@fig-planes**). (You can change the height and width, but don't worry about doing that until you have finished every other aspect of the paper - Quarto will try to make it look nice and the defaults usually work well once you have enough text.)

Talk way more about it.

2.7 Predictor variables

Add graphs, tables and text.

Use sub-sub-headings for each outcome variable and feel free to combine a few into one if they go together naturally.

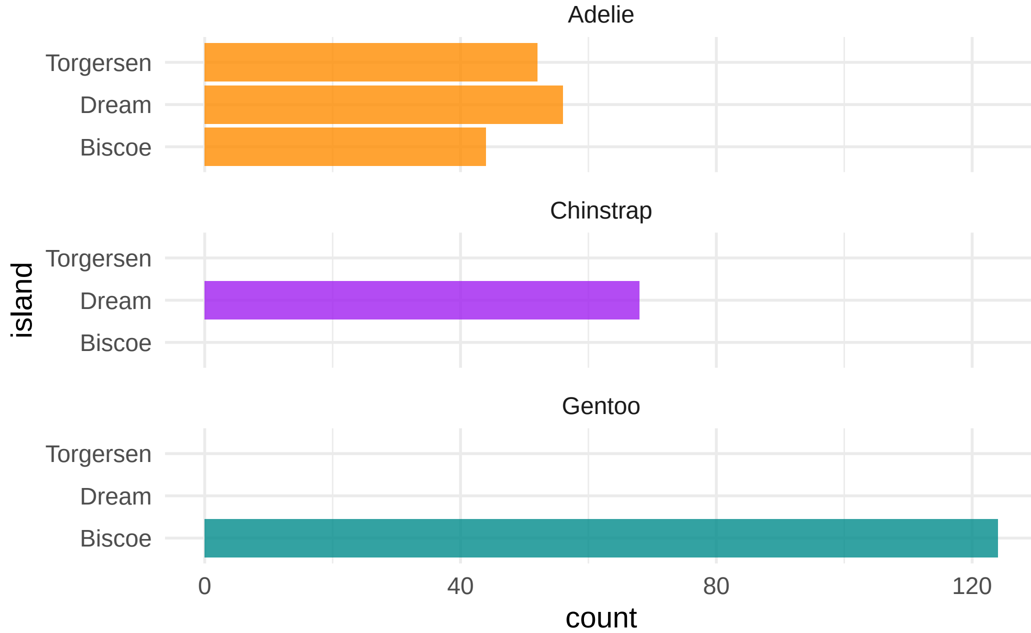

Figure 1: Bills of penguins

3 Model

In the analysis, I used a Bayesian Logistic Regression Model to examine the relationship between garden size and other factors like the type of garden, the year the project was funded, the neighborhood type (emerging neighborhood, EN vs neighborhood improvement area, NIA), and if it is an indigenous-led project.

The goal of our modelling strategy is twofold. Firstly,...

Here we briefly describe the Bayesian analysis model used to investigate... Background details and diagnostics are included in Appendix B.

3.1 Model set-up

Define y_i as the number of seconds that the plane remained aloft. Then β_i is the wing width and γ_i is the wing length, both measured in millimeters.

Table 1: Explanatory models of flight time based on wing width and wing length

$$
\begin{aligned}
y_i|\mu_i, \sigma &\sim \text{Normal}(\mu_i, \sigma) && (1)\\
\mu_i &= \alpha + \beta_i + \gamma_i && (2)\\
\alpha &\sim \text{Normal}(0, 2.5) && (3)\\
\beta &\sim \text{Normal}(0, 2.5) && (4)\\
\gamma &\sim \text{Normal}(0, 2.5) && (5)\\
\sigma &\sim \text{Exponential}(1) && (6)
\end{aligned}
$$

We run the model in R (R Core Team 2023) using the `rstanarm` package of Goodrich et al. (2022). We use the default priors from `rstanarm`.

3.1.1 Model justification

We expect a positive relationship between the size of the wings and time spent aloft. In particular…

We can use maths by including latex between dollar signs, for instance θ.

4 Results

Our results are summarized in Table 1.

5 Discussion

5.1 First discussion point

If my paper were 10 pages, then should be be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

5.2 Second discussion point

Please don't use these as sub-heading labels - change them to be what your point actually is.

5.3 Third discussion point

5.4 Weaknesses and next steps

Weaknesses and next steps should also be included.

Appendix

A Additional data details

B Model details

B.1 Posterior predictive check

In **?@fig-ppcheckandposteriorvsprior-1** we implement a posterior predictive check. This shows...

In **?@fig-ppcheckandposteriorvsprior-2** we compare the posterior with the prior. This shows...

Examining how the model fits, and is affected by, the data

B.2 Diagnostics

?@fig-stanareyouokay-1 is a trace plot. It shows... This suggests...

?@fig-stanareyouokay-2 is a Rhat plot. It shows... This suggests...

Checking the convergence of the MCMC algorithm

References

Alexander, Rohan. 2023. *Telling Stories with Data*. Chapman; Hall/CRC. https://tellingstorieswithdata.com/.

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