



What's Buzzin': A Comparison of Bee Populations in Central Park

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Introduction

Urbanization and the number of people living in cities are increasing immensely on a global scale. By 2050, 70% of the world population is projected to live in urban areas (Seto et al. 31). For urban life to thrive, biodiversity and strong ecosystems are essential. Pollination is a crucial service that contributes to crop production and plant variety to fuel these ecosystems.

Globally, about three-fourths of the world's flowering plants and 35% of the world's food crops depend on animal pollinators, with bees providing most of this service (USDA). In dense cities like New York City, bees are essential because they play a vital role in local pollination by supporting community gardens, parks, and street plantings. According to the Cornell College of Agriculture and Life Sciences, scientists estimate that in New York State alone, there are 450 bee species, which comprise 45 of the 425 genera of bees worldwide (Cornell CALS). Bees make up about 68% of all flower visitors in parks and residential neighborhoods, making them the dominant urban pollinators (NYC Parks).

At the same time, bee populations worldwide are declining. The total bee population in the U.S. has fallen 61% from 1947 (5.1 million colonies) to 2008 (2.39 million colonies) (Lekakis 6). Urban environments can either harm or improve this number, as on one hand, pollution and intensive landscaping can reduce nesting sites and green spaces. On the other hand, urban gardens and parks host high bee diversity, with honeybees and bumblebees being the most dominant species in these environments (Rahimi et al. 8). Given the role bees play as critical pollinators, we need to understand how bee populations change in such an environment.

Our project reviews the question: How have bee populations in Central Park changed over time, and what factors have led to these fluctuations? Central Park is one of the largest and most intensively visited green spaces in New York City, combining diverse habitats and human activity. Additionally, citizen-science platforms like iNaturalist are used for species identification and documenting plants, animals, fungi, and insects, holding more than 200 million biodiversity observations worldwide. We will use iNaturalist to observe bee populations in Central Park because it has one of the largest and diverse datasets of bee records within New York City. Using these observations, we will examine changes over time and explore if environmental and human-related factors might have influenced those changes.

Methodology

For our analysis, we used bee observations from iNaturalist, a citizen-science platform where users upload geotagged photos that are identified or confirmed by the community. We exported all verifiable bee records from Central Park between 2015 and 2025, filtered them to include only research-grade observations, and then removed entries with missing dates or unusable locations, ensuring that each remaining row represented a valid bee sighting in the park. From this cleaned dataset, we grouped observations by year to create Figure 1, which shows how the total number of bee observations in Central Park changed over time, showing an overall increase and peaking in 2022. We then grouped observations by common name and calculated total counts per species across all years to build Figure 2, a pie chart highlighting the top ten species plus an "Other species" category to summarize community composition. Here, we saw the most predominant species being the common eastern bumble bees and the western honey bees. Finally, we took those same top ten species, counted how many times each was observed in each year, and plotted them as separate lines in Figure 3 to visualize changes in reports of common species over time, where we see no significant outlier with a decreasing population. All data processing and graphing were done in Excel using simple descriptive summaries, and we interpret the results with the understanding that iNaturalist data reflect both real bee activity and patterns in human observation effort.

Results

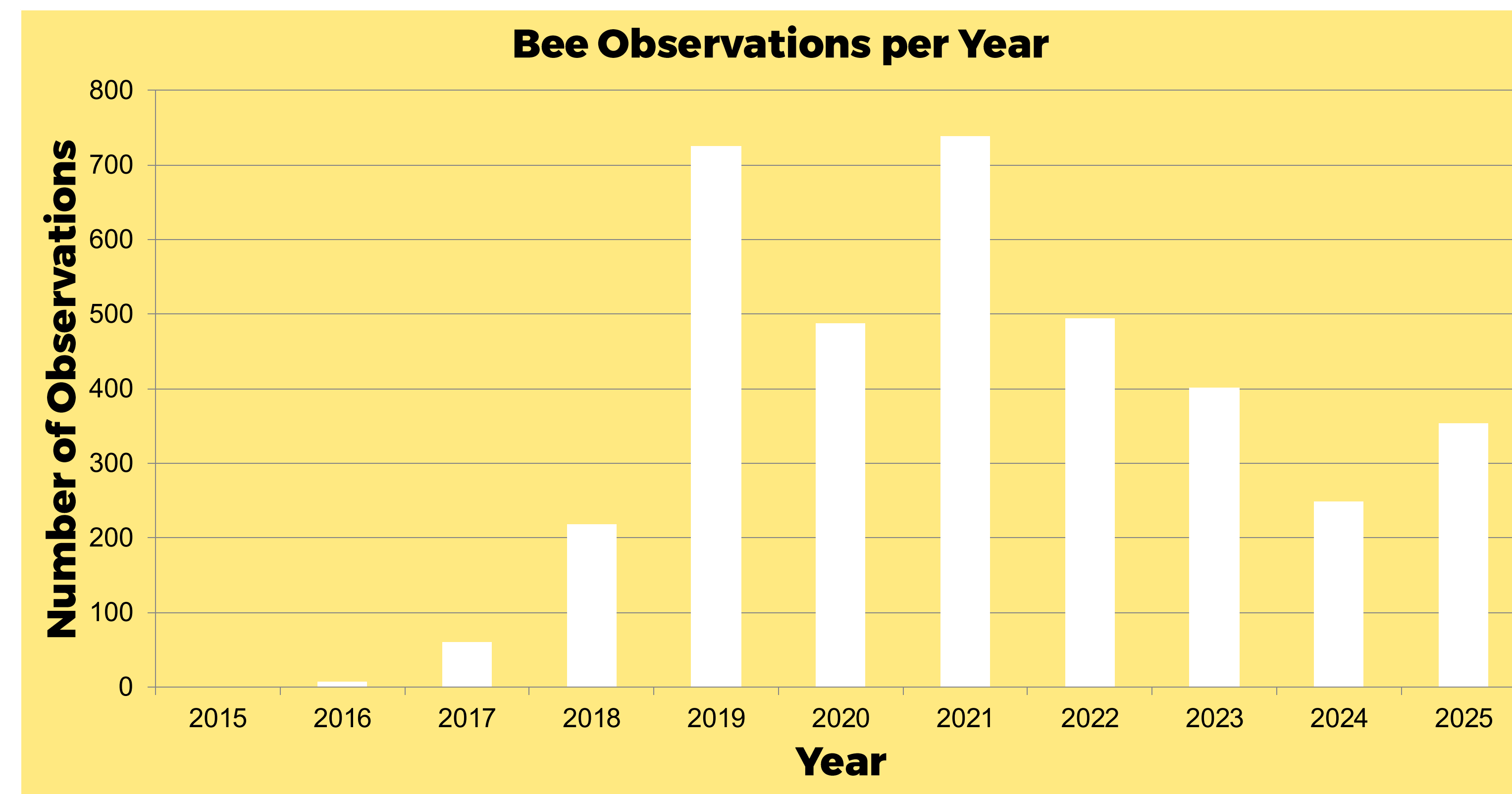


Figure 1: Yearly bee Observations in Central Park (2015-2025)

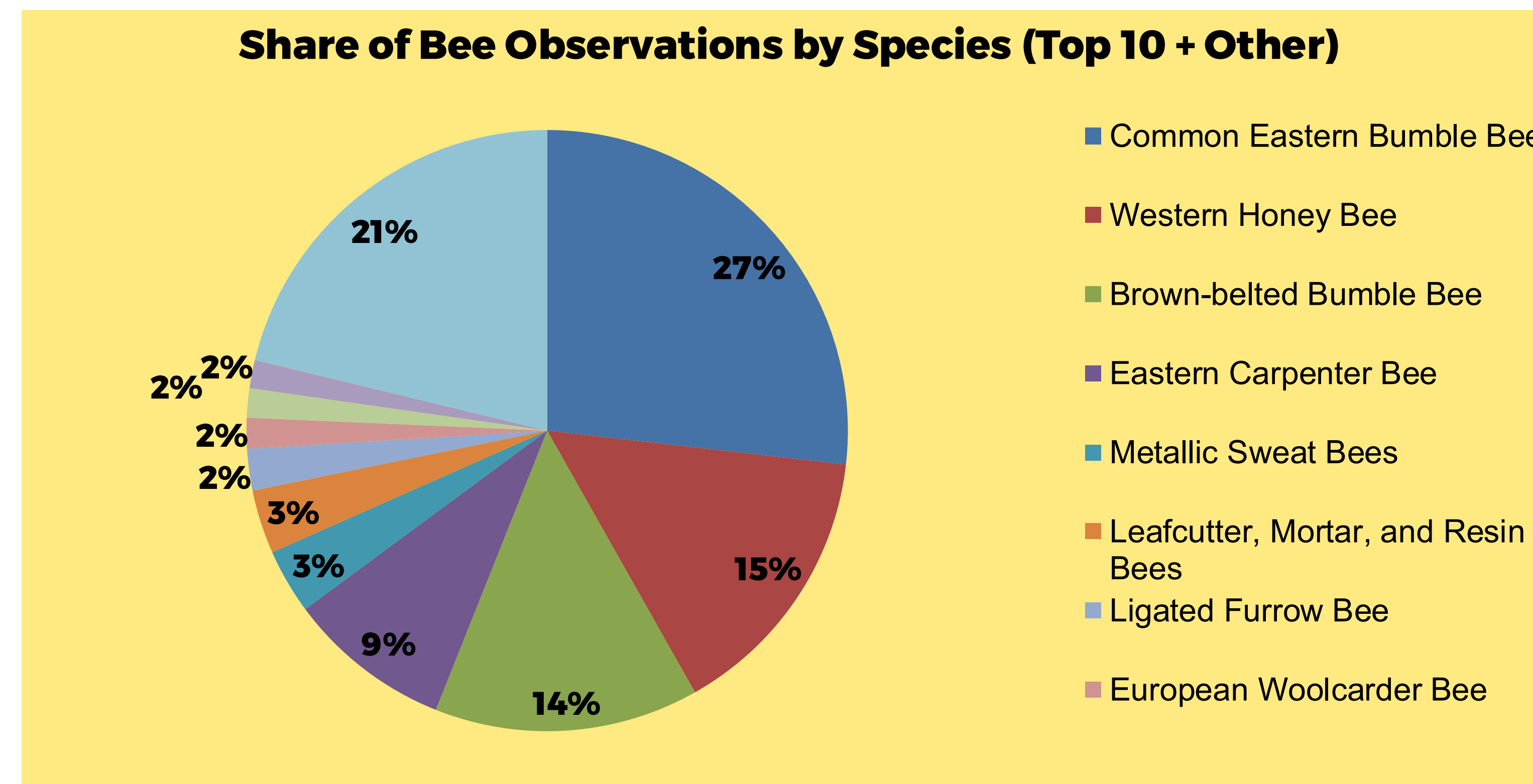


Figure 2: Unique Species observed Pie Chart

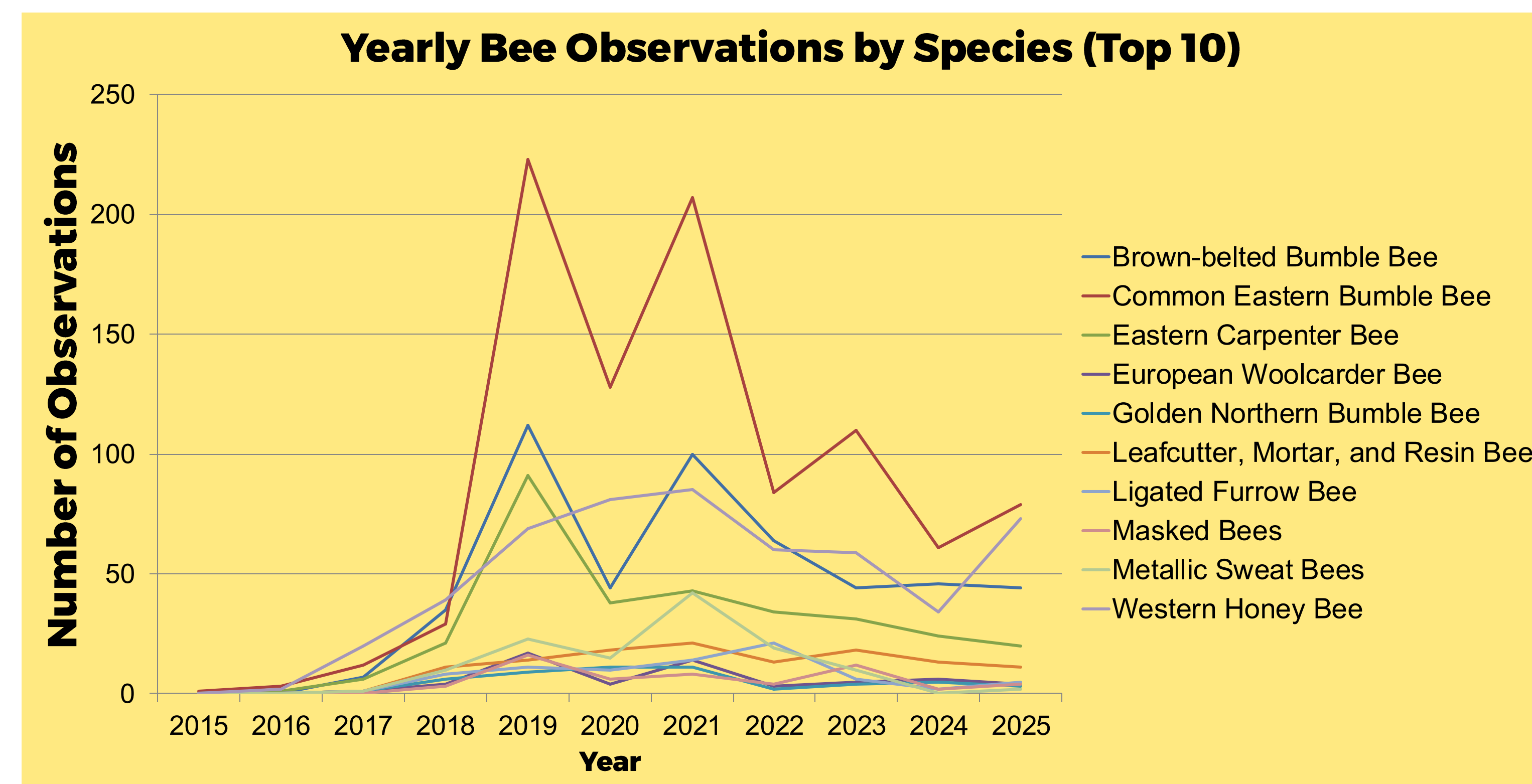


Figure 3: Trends over time (Top 10 Species)

Recommendations

The following recommendations are made, acknowledging the concept of urban ecology, whereby humans and bees interact in a physical environment. Central Park is the focus of our research, but our recommendations extend to the broader New York City.

- First, due to the lack of public-facing data on bee populations in New York City, platforms such as iNaturalist should be more widely used to maintain records of bee populations across the city and in specific areas, like Central Park.
- However, for an accurate picture of the bee population in New York City, the Department of Health and Mental Hygiene's Division of Environmental Health should publish its bee data openly, removing most, if not all, barriers to accessing the information.

Conclusion

Two questions are central to our research. First, how have bee populations in Central Park changed over time, and second, what factors have led to these fluctuations? From iNaturalist's inception to 2019, there was a substantial increase in bee observations in Central Park. In 2020, there was a decline in observations, most likely due to the COVID-19 pandemic. Then, observations grew in 2021 when New York State eased social gathering limits. However, observations have since experienced a year-by-year decline, with the exception of growth in 2025.

It must be understood that these questions are important to maximizing the mutual benefits humans and bees gain from interacting in Central Park. However, these observations do not accurately reflect the impact of human-bee coexistence in Central Park because the data is uncontrolled; however, research-grade and efficient.

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