

# Effect of Temperature and Wind on the Probability of Observing Wild Bees in a Multiyear Monitoring Study

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## Introduction

- ❖ Concerns over wild bee decline have prompted monitoring efforts of their abundance over time (Turley et al., 2022).
- ❖ Despite this, weather remains an understudied confounding variable that may affect bee abundance studies (Overturf et al., 2022).
- ❖ Temperature and wind speed may alter wild bee activity and may affect bee sampling results (Karbassioon et al. 2023, Kerr et. al. 2015).
- ❖ The present study investigates how temperature and wind speed influence wild bee sampling efficiency in the context of long-term monitoring studies using a logistic regression model.

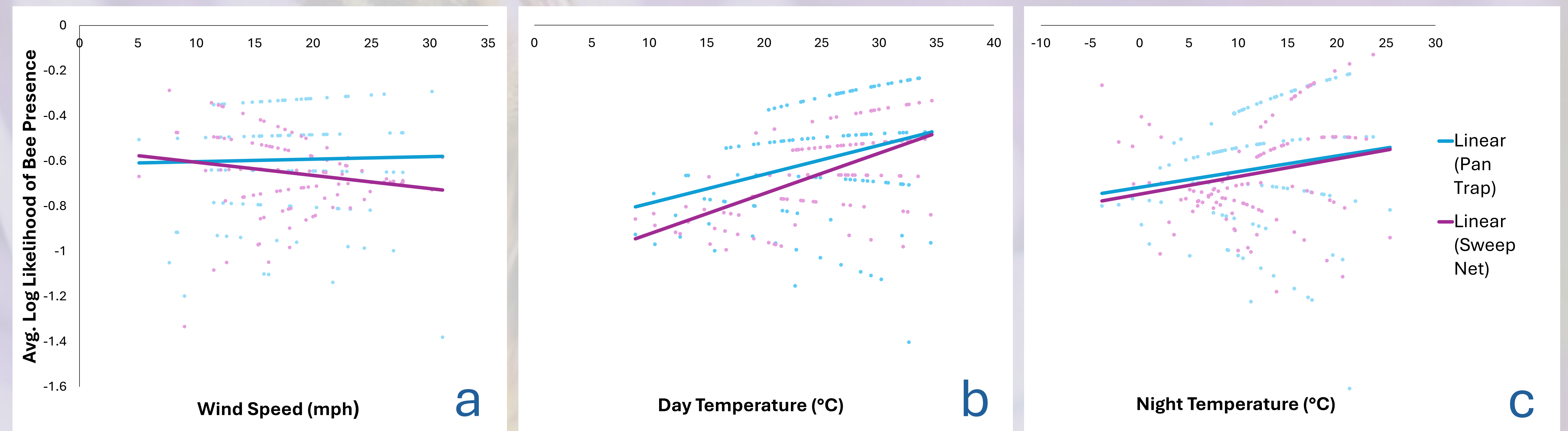
## Methods

- ❖ Bees were sampled biweekly from 2016 to 2023 at six sites across an urban-rural gradient in Plymouth Co., MA using pan traps and sweep netting (adapted from Popic et al., 2013).
- ❖ Wind speed, day and night temperature data were retrieved using the online weather database, Visual Crossing (Visual Crossing Corporation, 2025).
- ❖ Logistic regression was performed to model presence or absence of bees caught by pan trap or by sweep netting (Long, 1997, pp. 63-96).

Weather Variables	Pan Trap Bees Collected	Sweep Net Bees Collected
Wind Speed (mph) ↑	Bees ↑, p=0.59	Bees ↓, p< .01*
Day temperature (°C) ↑	Bees ↑, p< .01*	Bees ↑, p< .01*
Night temperature (°C) ↑	Bees ↑, p< .01*	Bees ↑, p< .01*

**Table 1:** The relationship between weather variables and likelihood of observing bees across pan trap and sweep net samples. Asterisks denote statistically significant relationships.

## Relationship between Weather Variables and the Probability of Bee Presence



**Figure 1:** The relationship between a) wind speed (mph), b) day temperature (°C) or c) night temperature (°C) and the probability of observing bees in pan trap (blue trendline) and sweep net (purple trendline) samples. Statistical significance for each relationship is indicated in Table 1.

## Discussion and Conclusion

- ❖ Wind speed's negative effect on pan trap results (fig. 1, panel a) suggests a method-specific effect even under moderate wind speed conditions (no sampling conducted on extremely windy days)
- ❖ Day and night temperature both positively increased pan trap and sweep net sample abundance, with day temperature showing the largest effect (fig.1, panels b & c); this may be due to warmer temperatures increasing bee activity.
- ❖ Weather variables influence pollinator monitoring estimates, so they should be included in statistical models of bee abundance trends.
- ❖ More precise modeling of the effects of weather conditions on bee activity may also be useful in the agricultural setting to maximize pollination services or to minimize insecticide harm.

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