

Does abundance of non-native *Apis* correlate with abundance within individual native bee nesting guilds?

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Introduction

- Pollination by bees is essential for healthy ecosystem function and crop production (Moisset and Buchmann, 2009).
- *Apis* (honeybee) Colony Collapse Disorder may lead to greater reliance on native bee pollinators in agricultural settings (Winfree et al., 2007).
- Potential resource overlap has led to speculation that domestic honeybees may negatively impact local native bee abundance, but no consensus has been reached (Steffan-Dewenter and Tscharrntke, 1999).
- Native bee nesting guilds (Packer et al., 2007) may interact differently with *Apis* based on each guild's unique resource requirements.
- This study investigated the relationship between *Apis* abundance and native bee abundance within each individual guild.

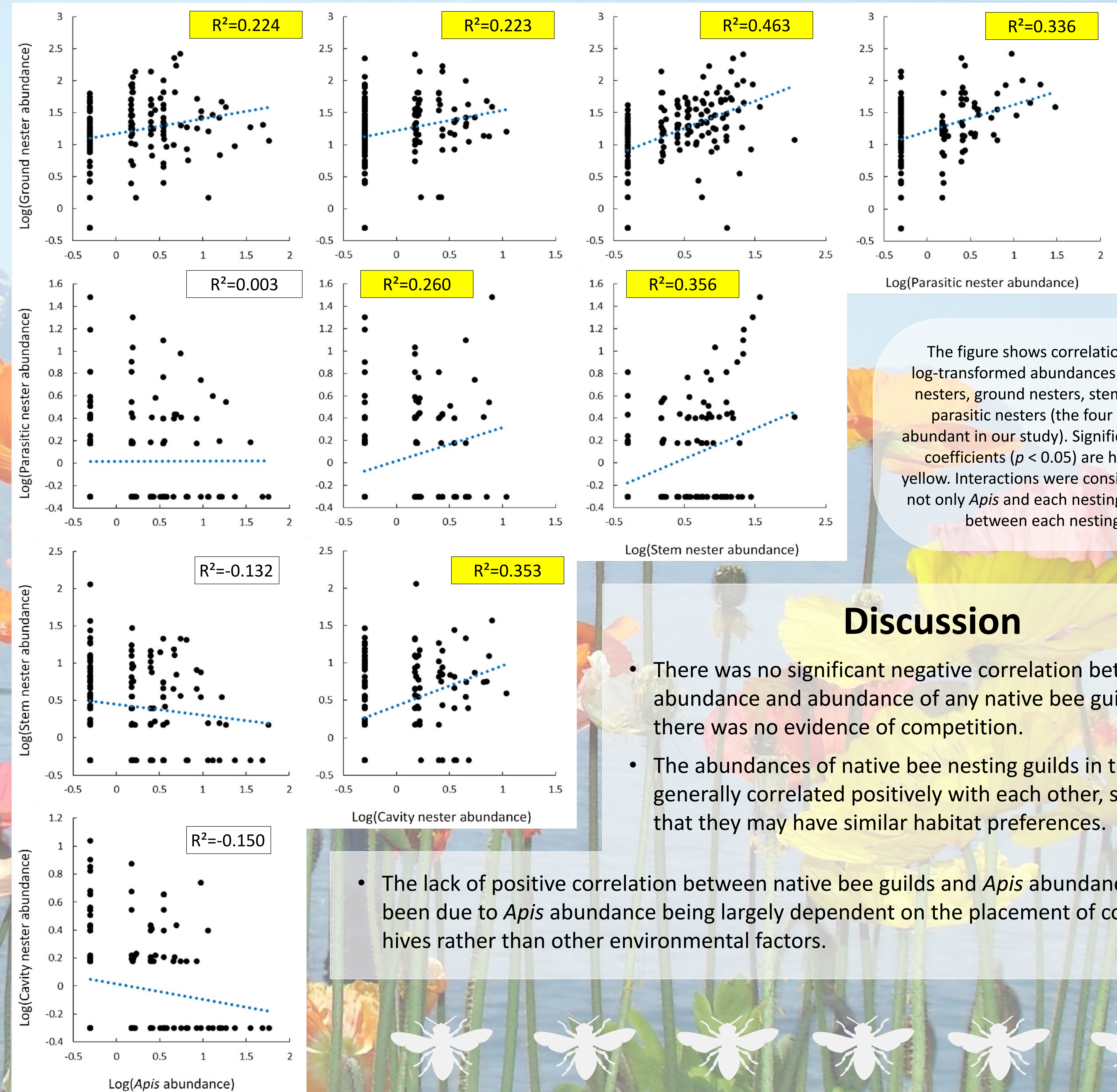
Study Sites

Table 1: Assessment of land use at six study sites in Southeastern Massachusetts. Native Meadow and Beaver Brook are located on the Brockton campus of Massasoit Community College.

STUDY SITES	TERRAIN	STUSTAINABLE LANDSCAPING	MOWED	% IMPERVIOUS (PAVED)
Christo's	Urban Parking Lot	No	Never	46.85
Beaver Brook	Urban College	Yes	Annually	46.03
Native Meadow	Urban College	Yes	Annually	32.03
Sachem Rock	Suburban Park	No	Occasionally	7.88
Dunrovin Farm	Rural Farm	No	Rarely	1.93
Leland Farm	Suburban Farm	No	Plowed	0.50

Methods

- Sampling took place from April-October during 2016 and 2017. Bees were collected by pan traps and sweep-netting.
- Pan traps were placed at every site in 10 replicates of 3 colors (blue, yellow, and white). The contents were collected after 24 hours, when two researchers also performed sweep-netting across a 100-m transect for 30 minutes (Droege, 2010).
- Bees were preserved in 70% ethanol before being washed, dried, pinned, and identified to genus. Each genus was classified into a guild.
- ArcGIS (Geographic Information Systems) software was used to find the permeability of a 300-m buffer zone around each collection site.
- Abundances were normalized per sampling effort. *Apis* and each guild's abundances were log-transformed and analyzed by Pearson correlation.



The figure shows correlations between log-transformed abundances of *Apis*, cavity nesters, ground nesters, stem nesters, and parasitic nesters (the four guilds most abundant in our study). Significant correlation coefficients ($p < 0.05$) are highlighted in yellow. Interactions were considered between not only *Apis* and each nesting guild but also between each nesting guild.

Discussion

- There was no significant negative correlation between *Apis* abundance and abundance of any native bee guild. Thus, there was no evidence of competition.
- The abundances of native bee nesting guilds in this study generally correlated positively with each other, suggesting that they may have similar habitat preferences.

• The lack of positive correlation between native bee guilds and *Apis* abundance may have been due to *Apis* abundance being largely dependent on the placement of commercial hives rather than other environmental factors.

References

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