

# Floral resource competition between native bees and honeybees in Toronto

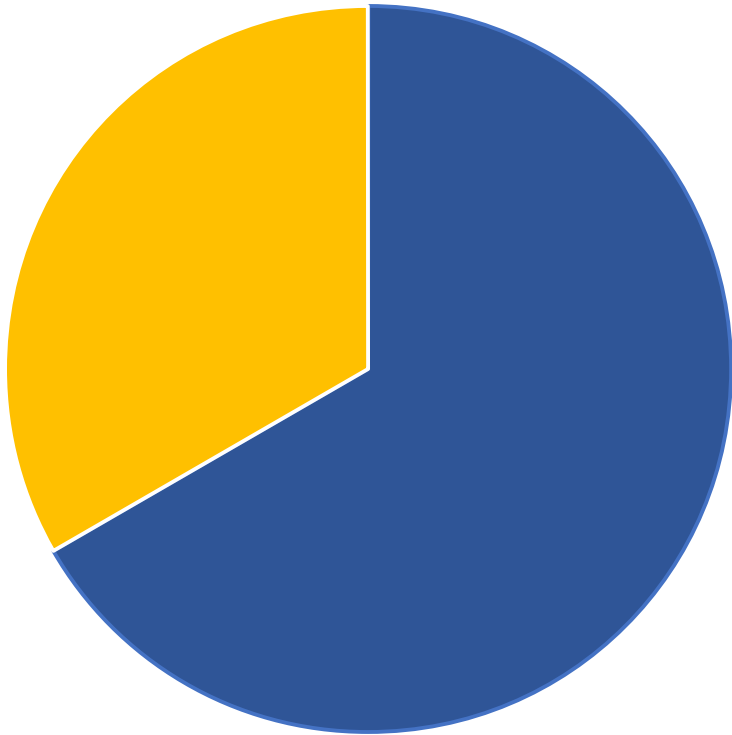


 @MacKellSarah

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Dr. Sheila Colla's Lab, York University

# Importance of Pollinators



Increase global crop  
production by \$235-577  
billion USD

(Lautenbach et al. 2012)



BumbleBeeWatch.org

Photo cred: Tiffani Harrison

# Diversity and importance of native bees



~ 2000 species  
**Toronto: 350 species**  
11 species



Antagain and Daniel Prudek/iStock/Getty Images

# Honeybees as potential competitors?

1 honeybee hive collects  
enough pollen for 33,000  
native bee progeny in 1 month

(Cane and Tepedino 2016)

(live by themselves)

# Honeybees as potential competitors?

## Floral Competition



<https://www.fllt.org/cl-the-honey-bee-our-friend-in-danger/>



### Decreased:

- Visitation rates
- Diversity
- Body size
- Fecundity
- Weight

Toronto Pollinator Protection Strategy 2018

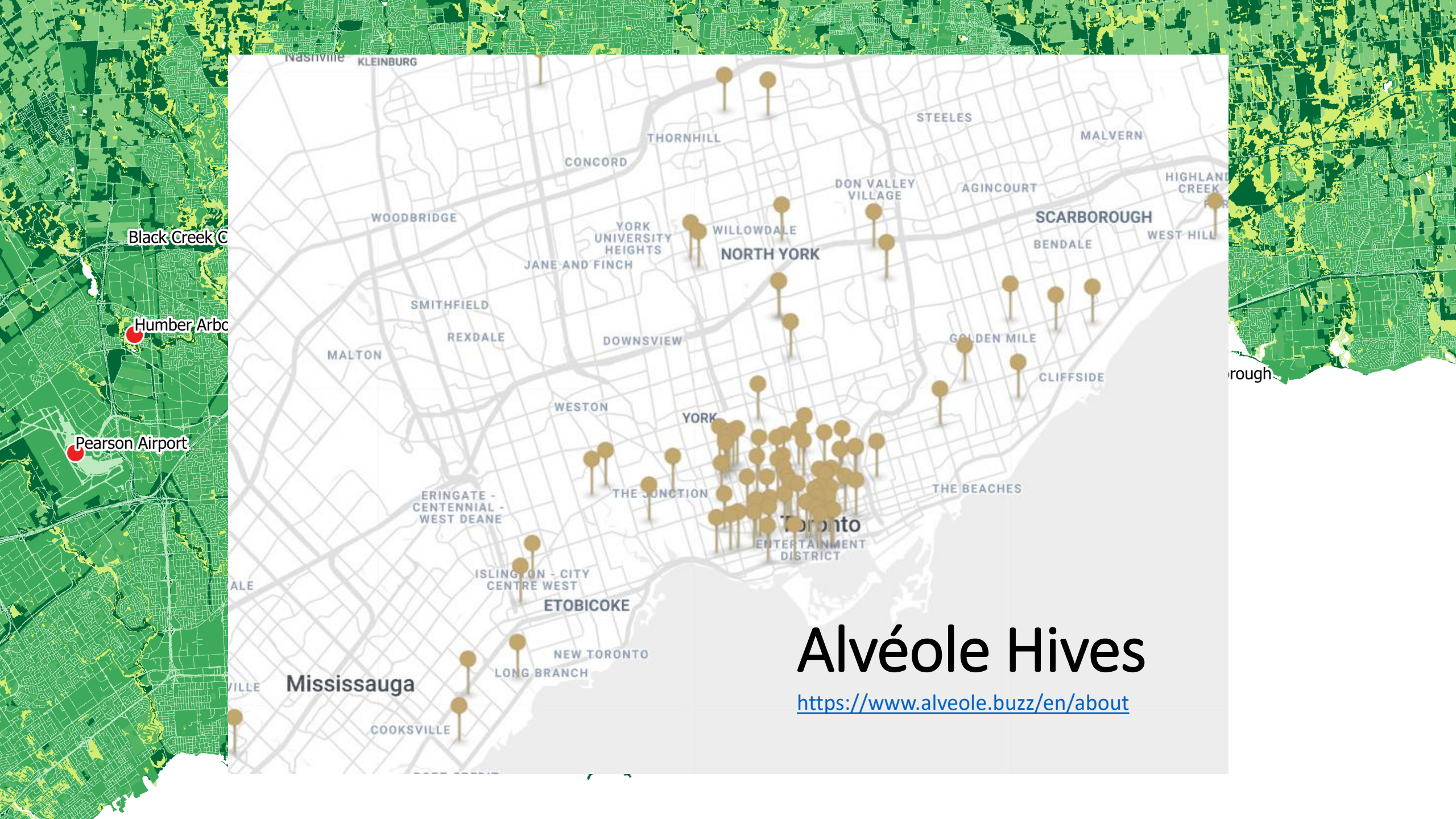
(Steffan-Dewenter and Tscharrntke 2000; Aizen and Feinsinger 1994; Badano and Vergara 2011; Goulson and Sparrow 2009; Paini and Roberts 2005; Elbgami et al. 2013)

# Research Questions:

- 1) Do higher honeybee abundances impact native bee community composition?
- 2) Do higher honeybee abundances impact native bee body sizes?
- 3) Is there pollen foraging overlap between honeybees and native bees?



# Methods



Black Creek C

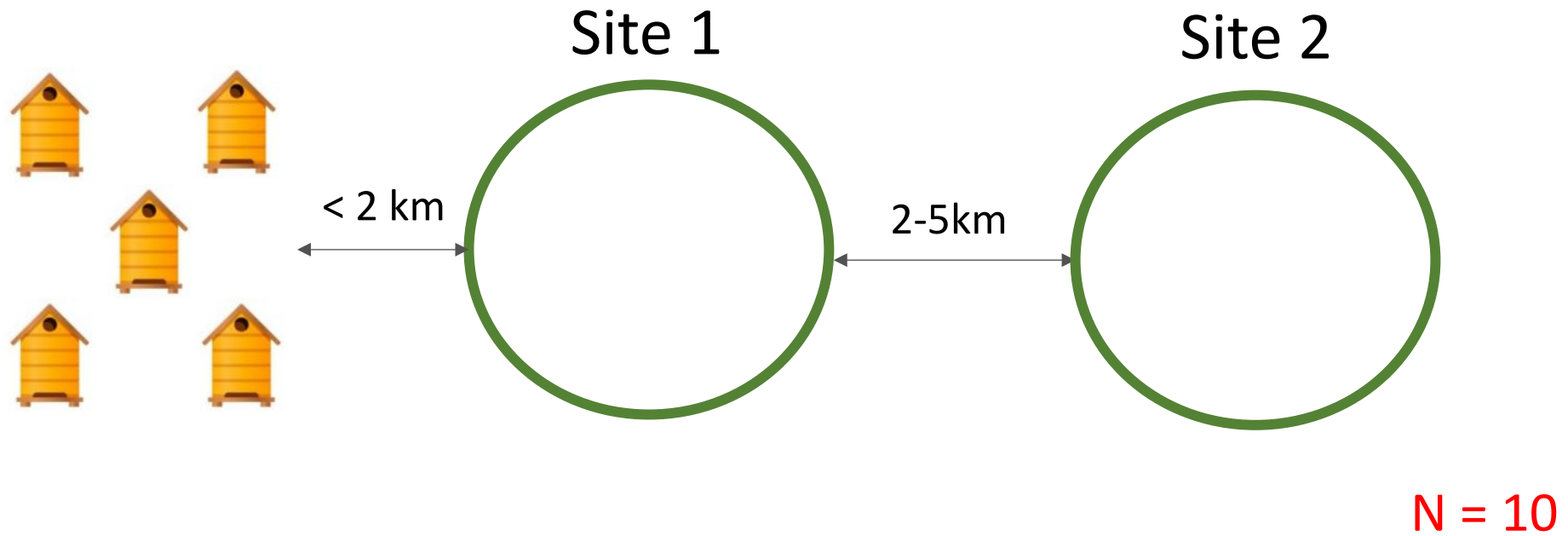
Humber Arb

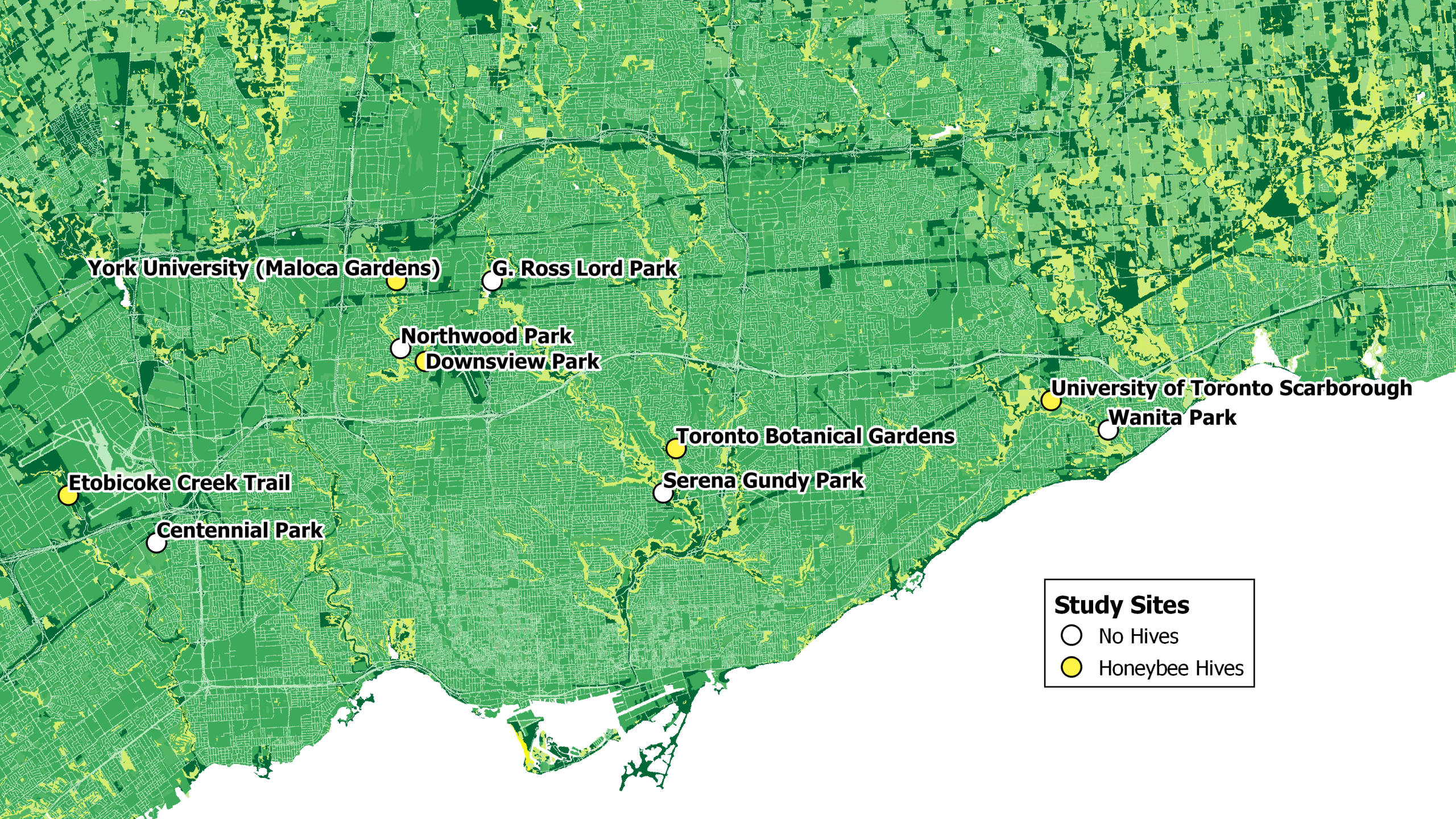
Pearson Airport

# Alvéole Hives

<https://www.alveole.buzz/en/about>

# Site Selection





**York University (Maloca Gardens)**

**G. Ross Lord Park**

**Northwood Park**

**Downsview Park**

**Etobicoke Creek Trail**

**Centennial Park**

**Toronto Botanical Gardens**

**Serena Gundy Park**

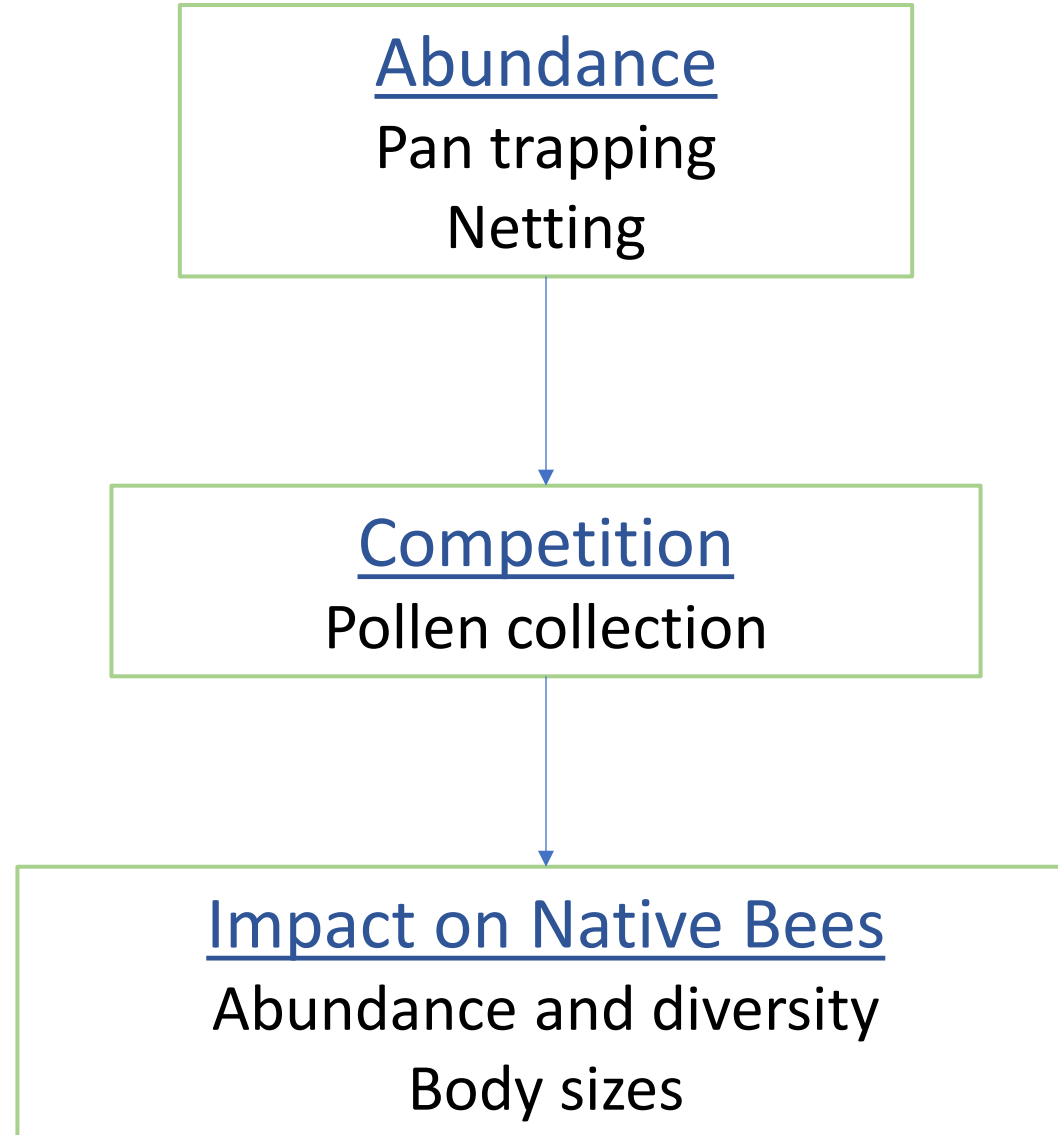
**University of Toronto Scarborough**

**Wanita Park**

**Study Sites**

- No Hives
- Honeybee Hives

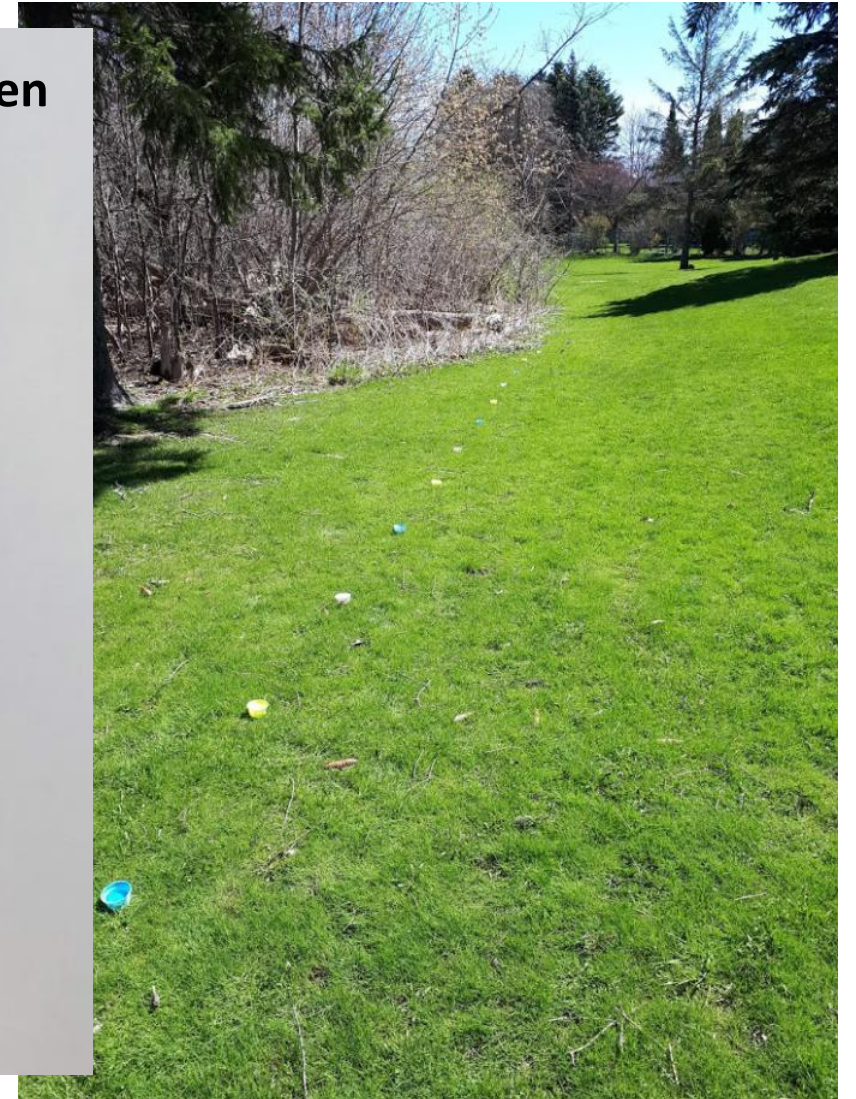
# Methods



# Bee Sampling: weekly from May-August



## Monthly Sweep Netting for Pollen



# Floral Diversity and Density

biweekly from May to August

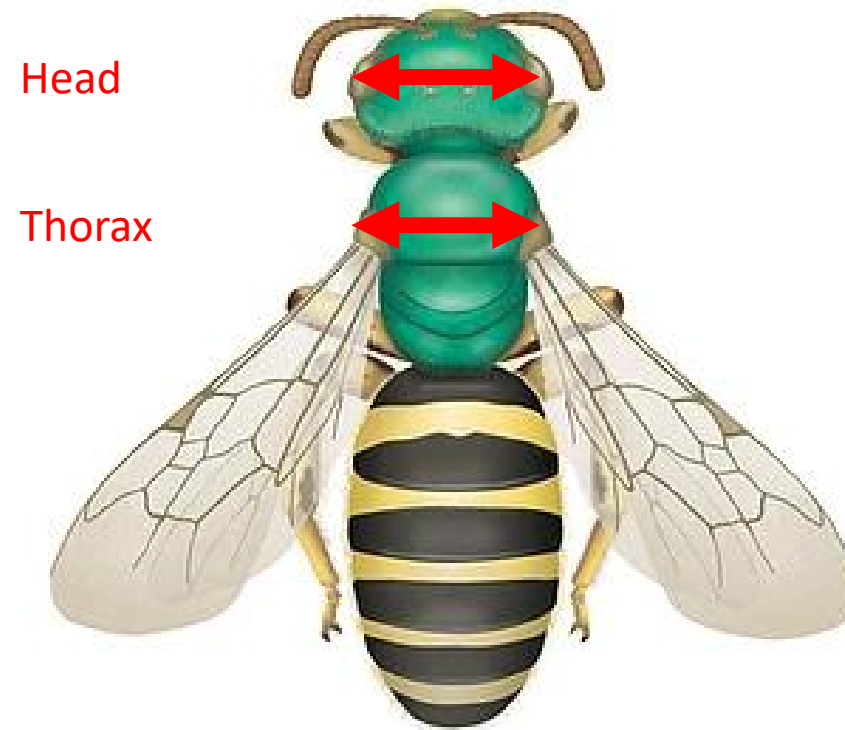


In progress lab work

# Bee Sample Processing

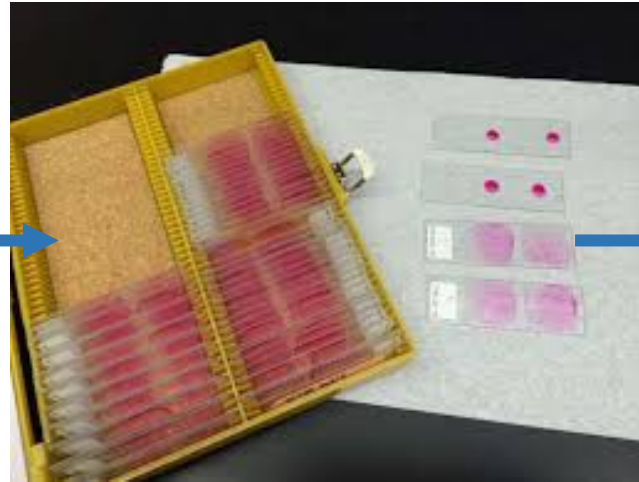


# Bee Body Size Measurements

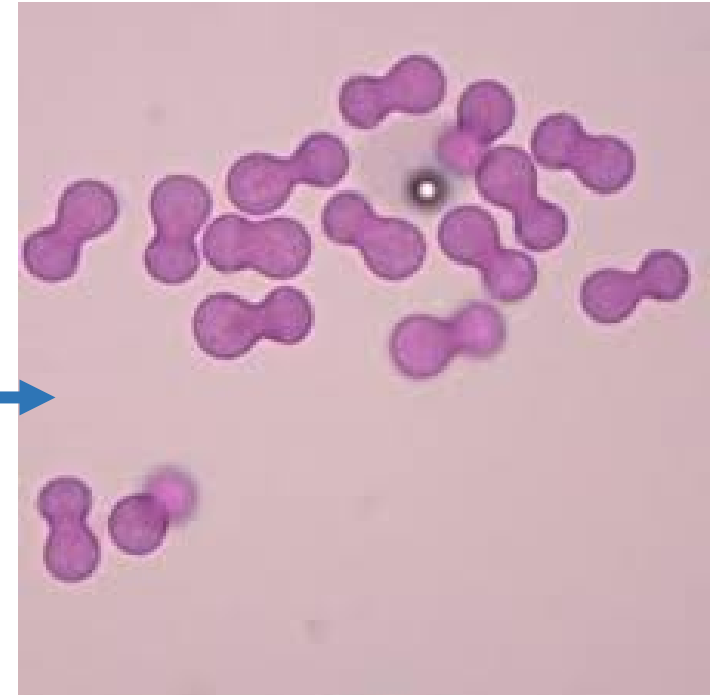


Picture credit: Ann Sanderson

# Pollen Identification



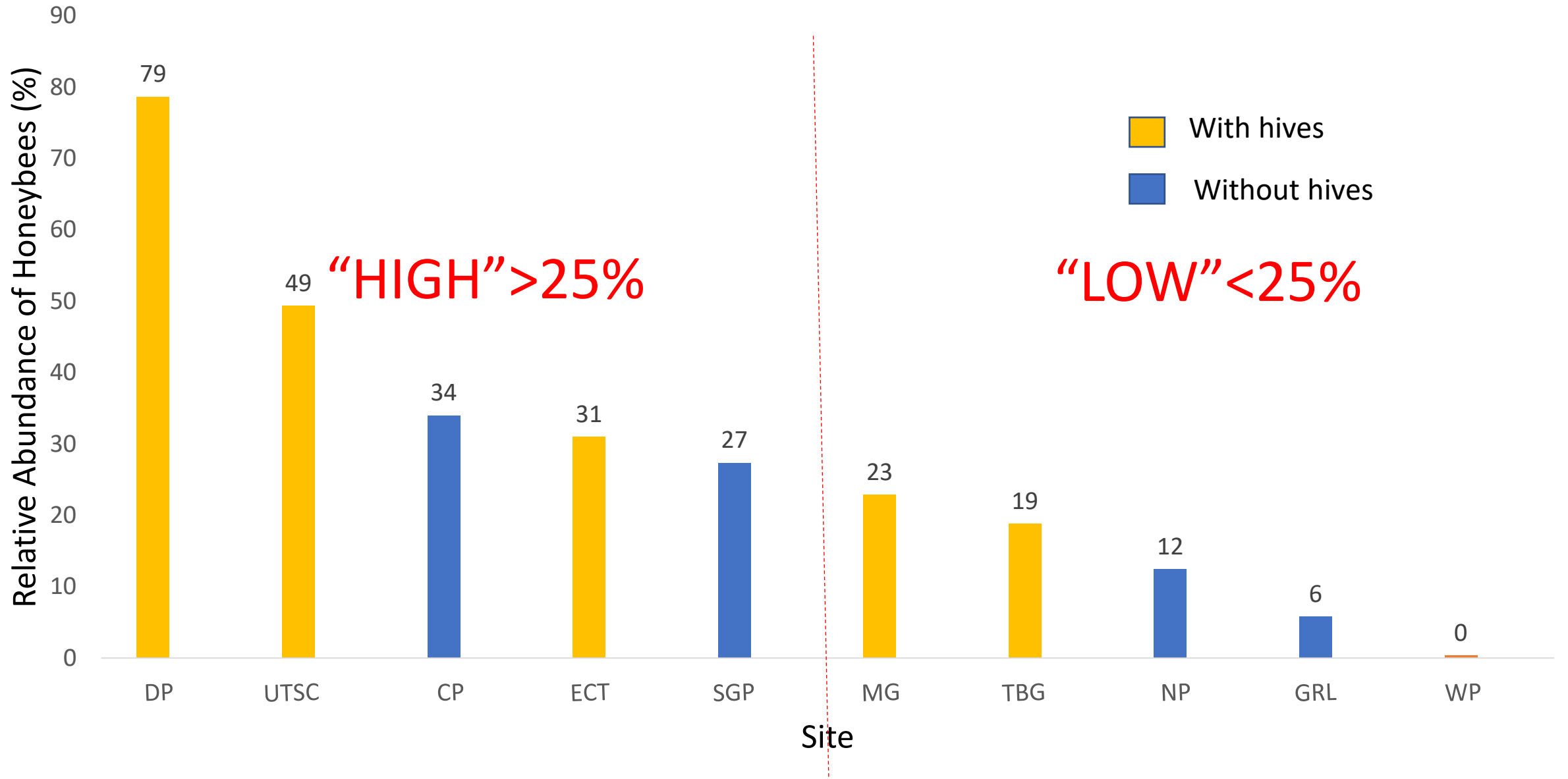
Lin and Johnson 2014



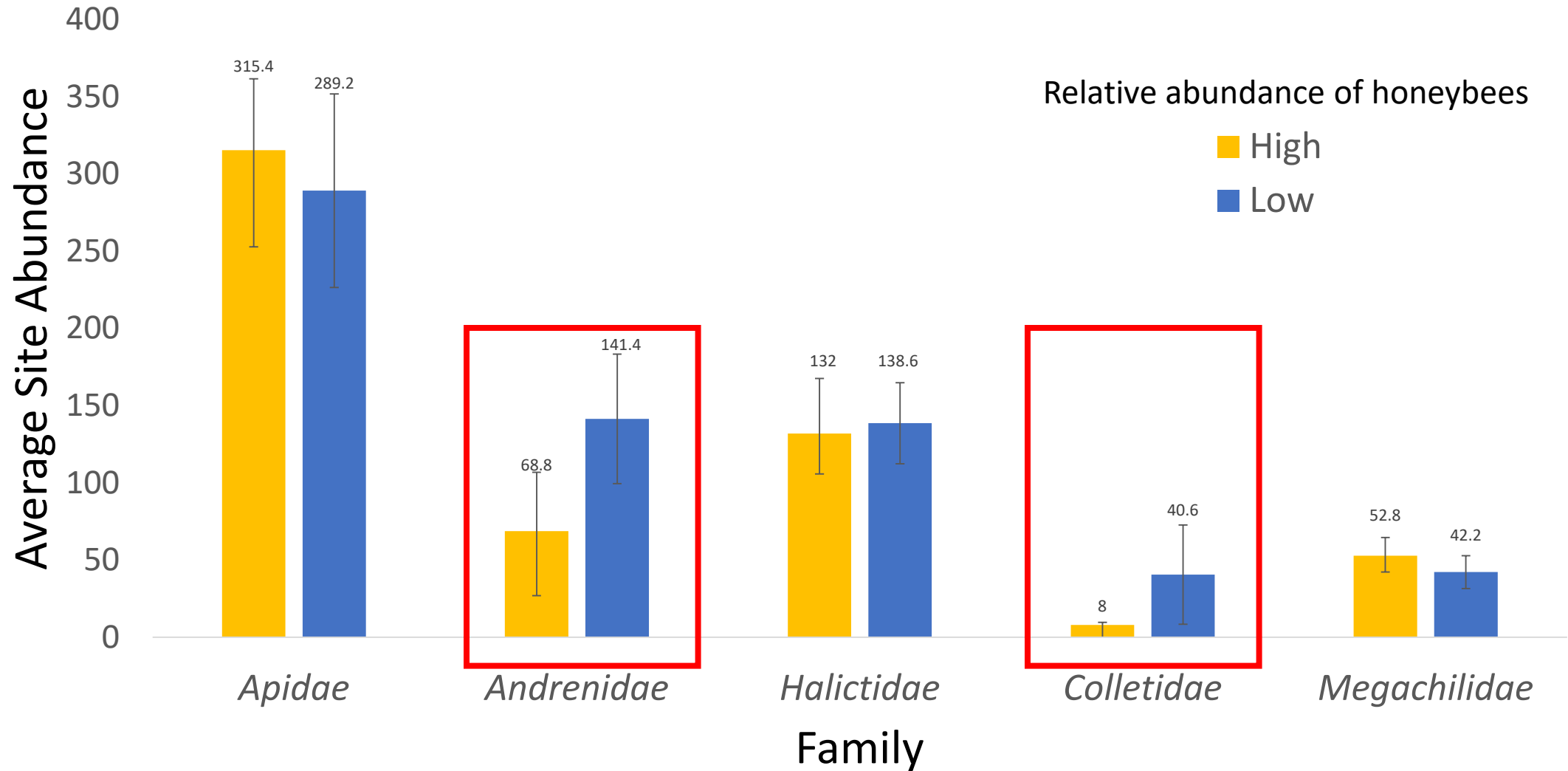
<http://www.uoguelph.ca/canpolin/New/Tips%20and%20Tricks%20Guide%20for%20Pollination%20Biologists.pdf>

# Preliminary Results

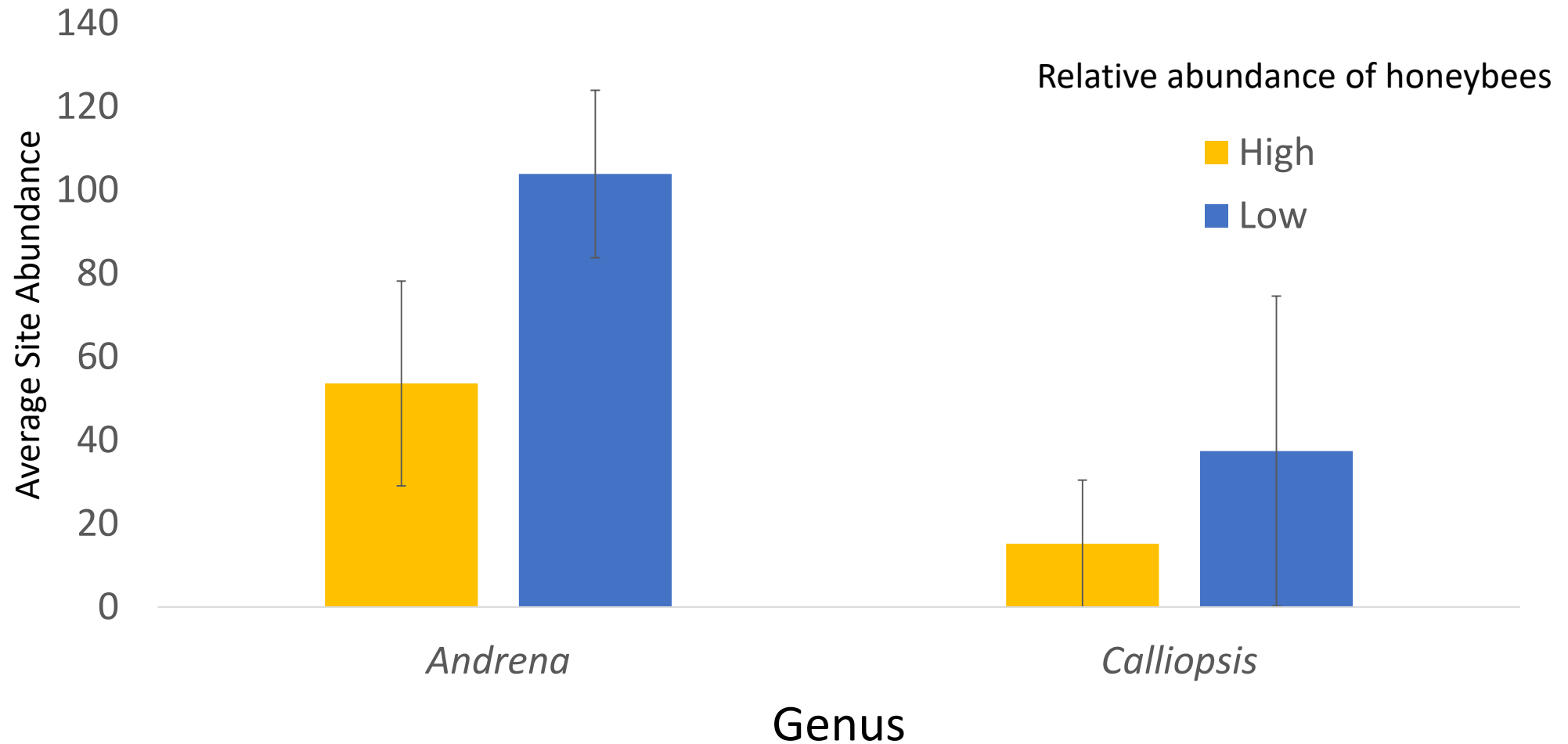
# Relative Abundance of Honeybees at Sites



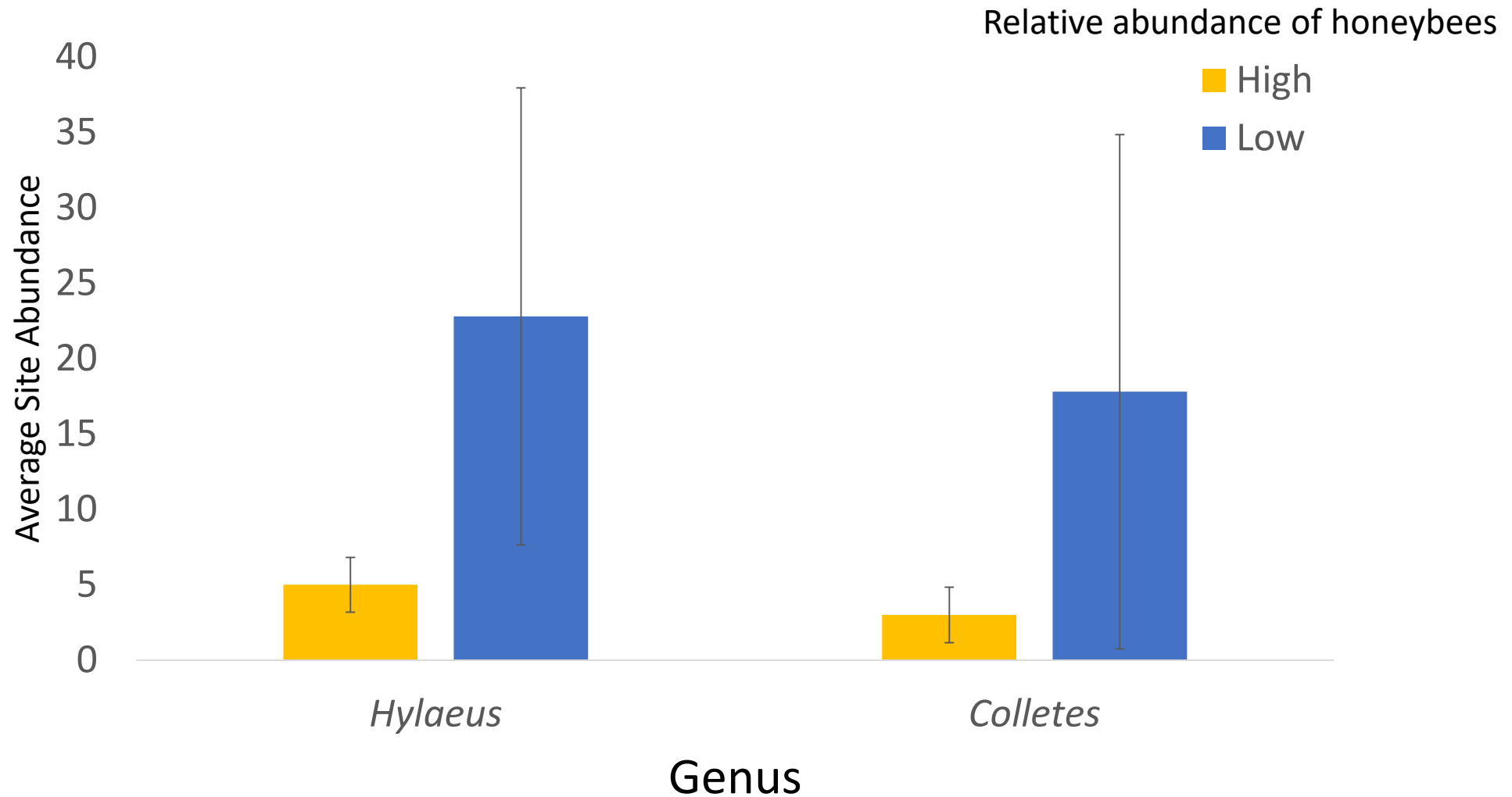
# Family Abundance



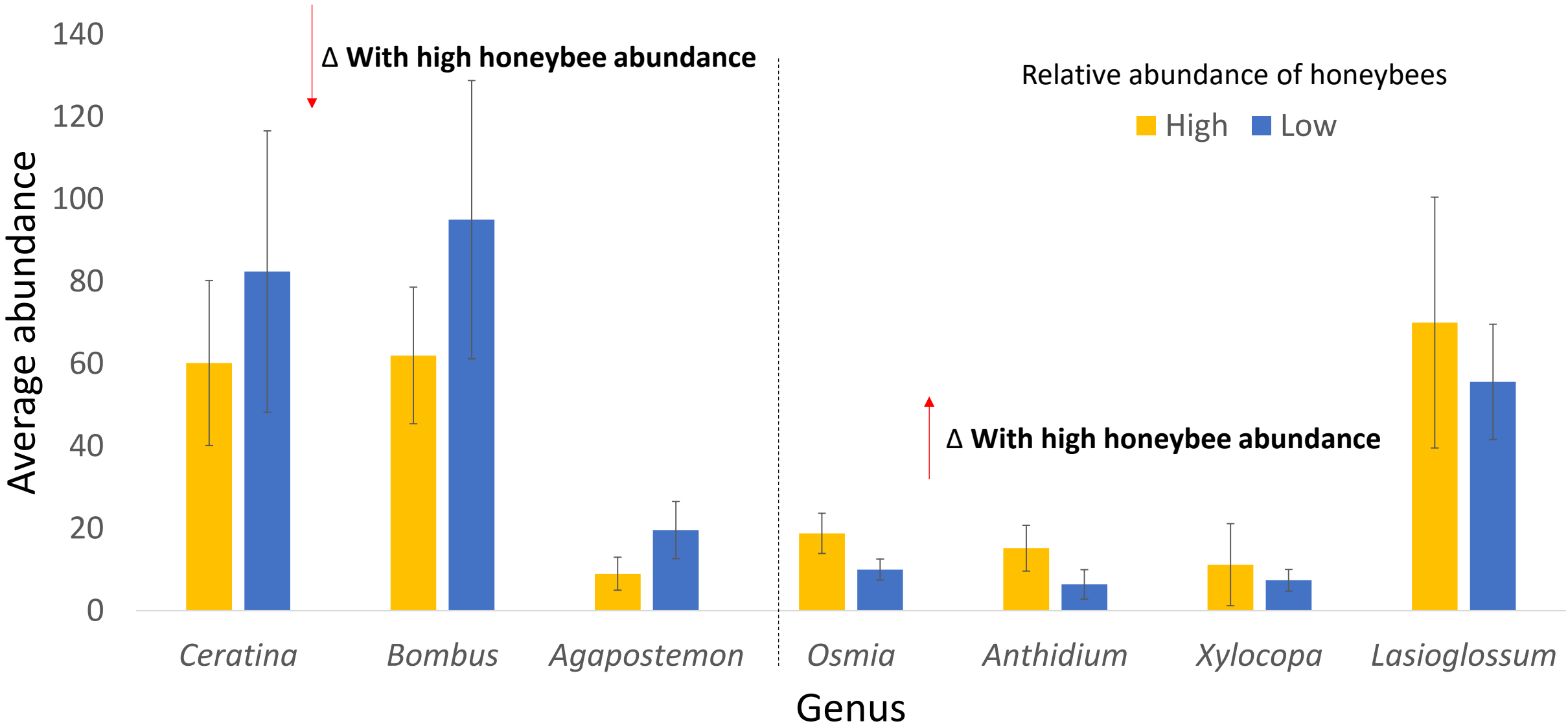
# Genus level abundance: *Andrenidae*

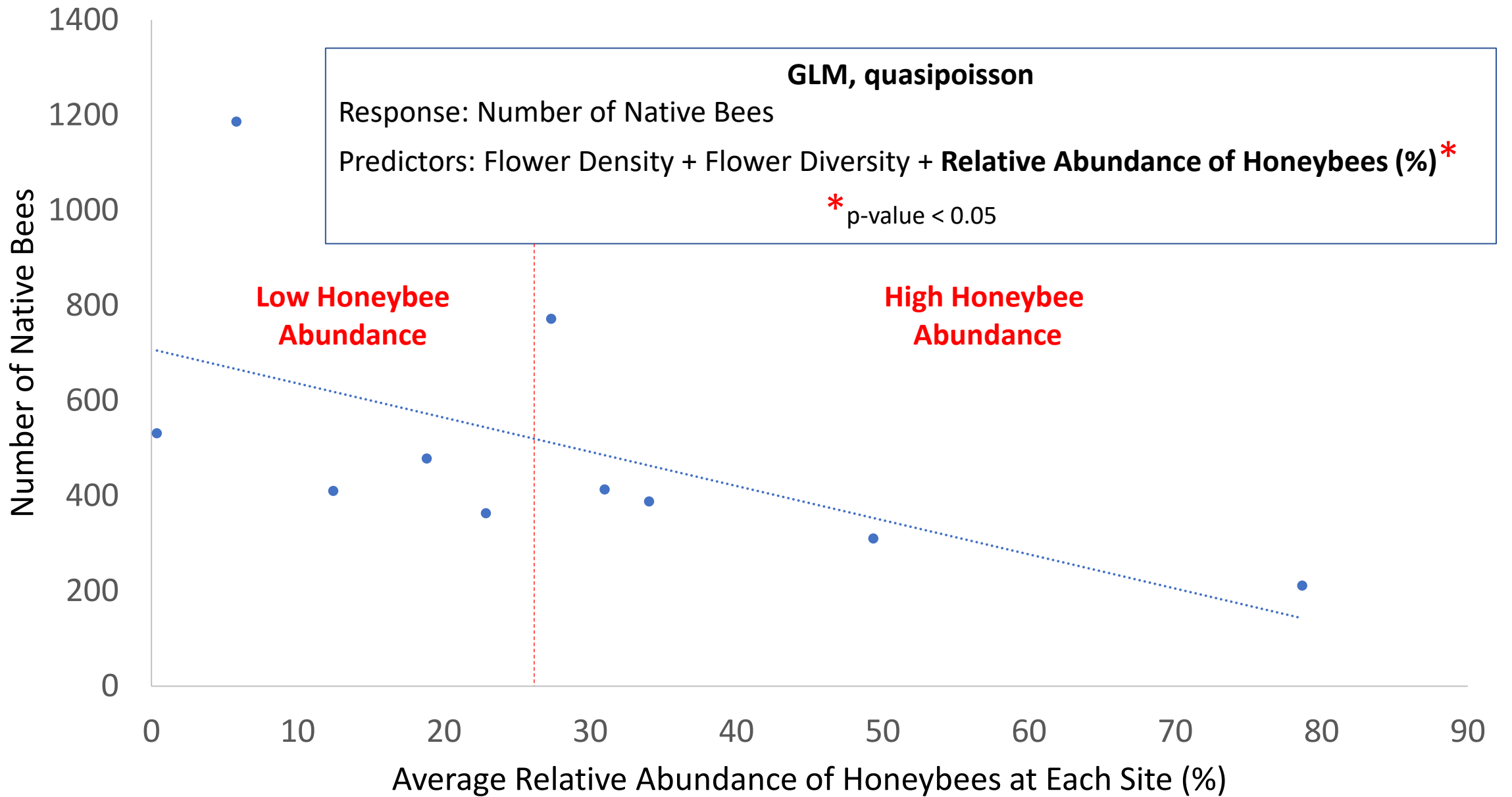


# Genus level abundance: *Colletidae*

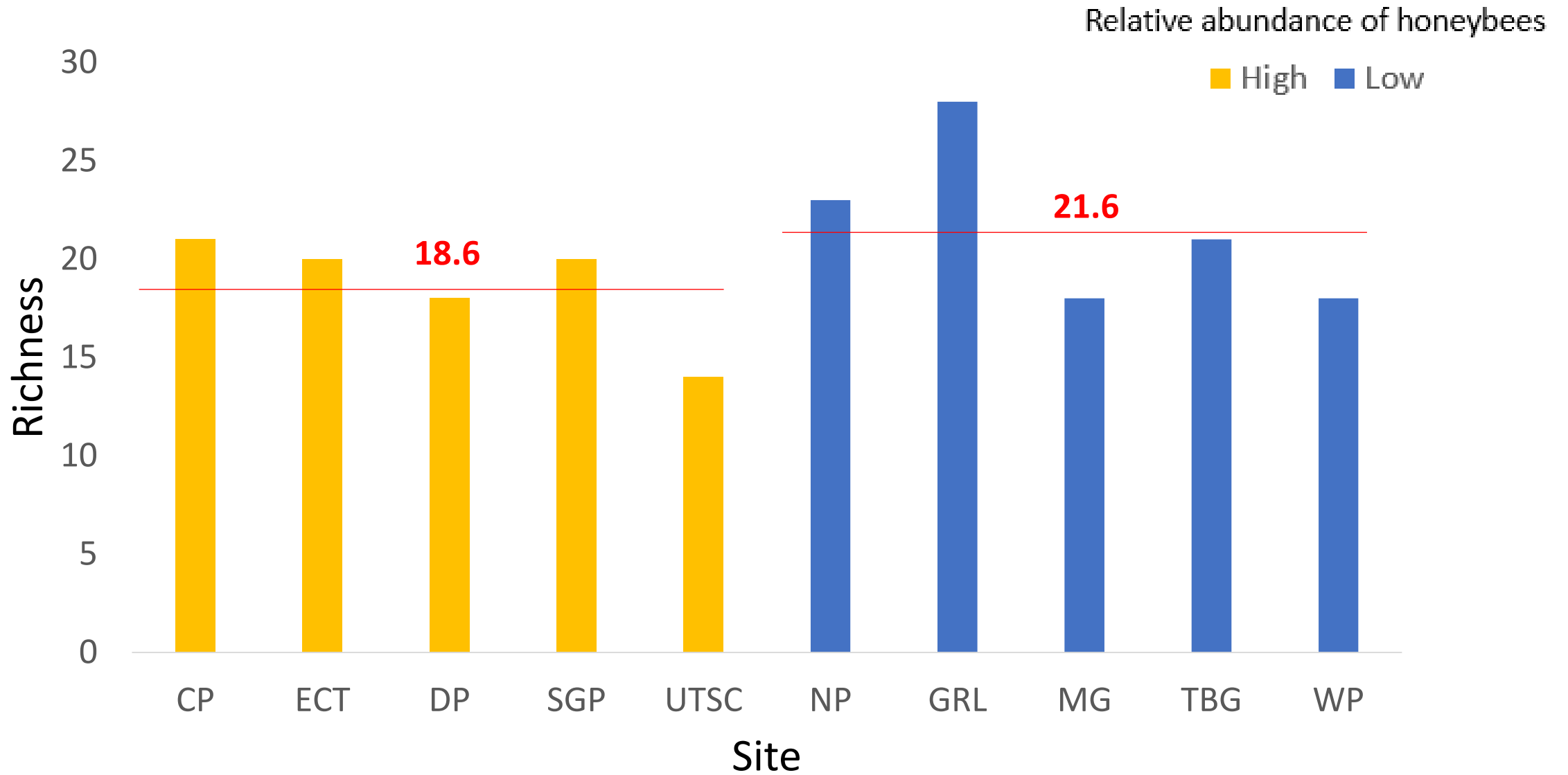


# Other genera abundances





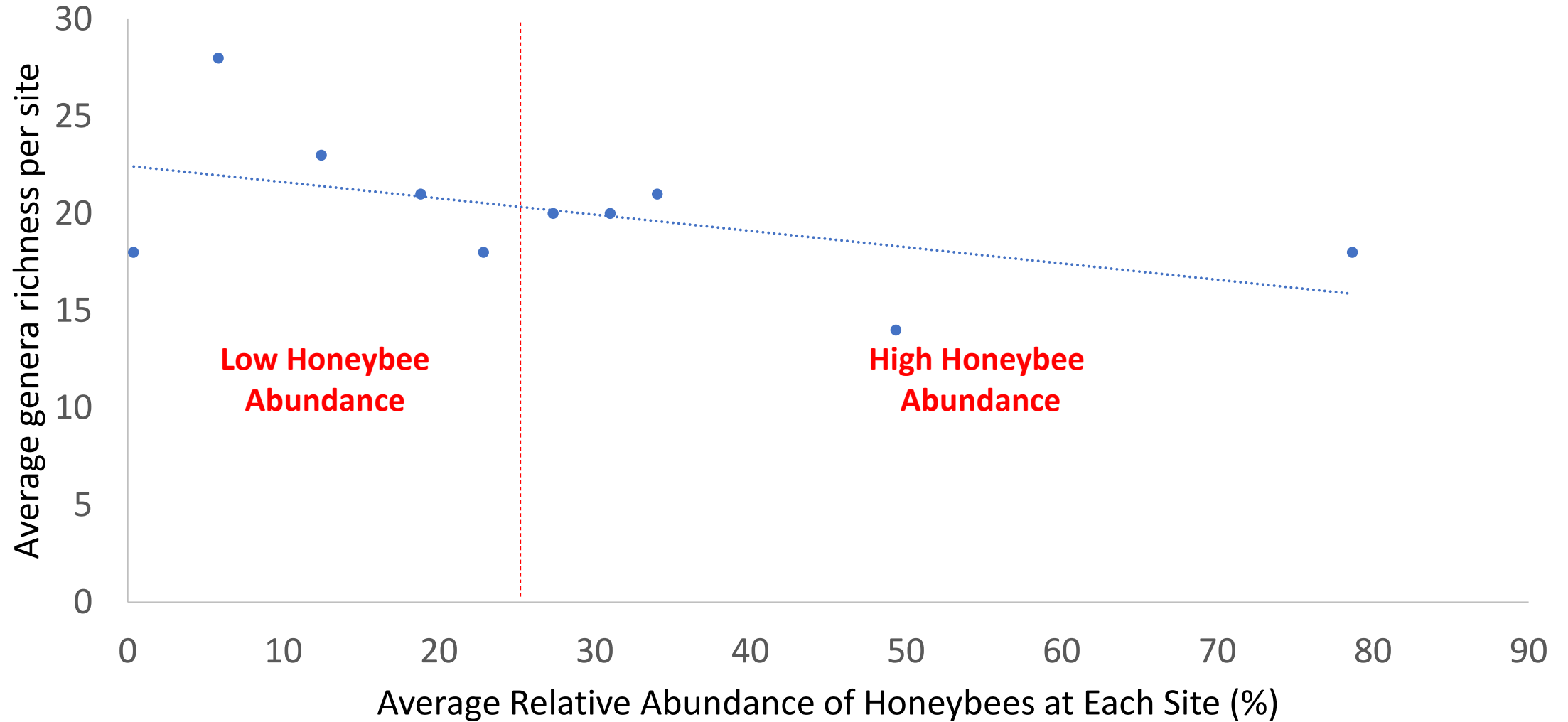
# Site genera richness



### GLM, poisson

Response: Genera Richness

Predictors: Flower Density + Flower Diversity + Relative Abundance of Honeybees (%)



# Preliminary conclusions

- Differences in family and genus level responses to honey bee abundances
- Honey bee relative abundance is negatively associated with number of native bees
- Honey bee relative abundance does not predict site genus richness

# Lots left to do

- Genus level identify rest of collected bees
- Species level identification
- Body size measurements
- Pollen identification



# Acknowledgments

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thank you



# References

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**Credit for pictures:** bees - Ann Sanderson, hives - Adobe Stock