Floral resource foraging habits of solitary bees in habitat mosaics

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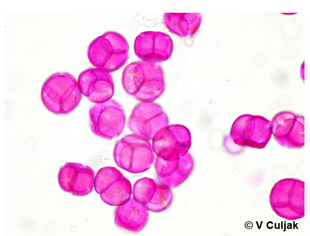
Introduction

Bees require a variety of resources such as suitable nesting sites and floral resources (nectar & pollen). However, a single habitat type may not contain all of these resources. Habitat mosaics, areas that contain different habitat types with different spatially-separated resources, allow us to study the effects of these limitations. The purpose of this study was to determine the foraging distances of *Osmia* and *Megachile* solitary bees. This was done by looking at the relative abundance of Ericaceae pollen in fecal pellets and pollen provisions in the bees' nests. In the Ottawa region, plants of the Ericaceae family are only found within the Mer Bleue and other bogs. Therefore, we were able to use the relative abundance of Ericaceae pollen as a metric of the maximum foraging distance of the bees. This project was exploratory as well since we wanted to determine if the bees entered the bog at all to forage and if the Ericaceae pollen is detectable and measurable.

Methodology



1. Artificial nesting structures for solitary bees (trap-nests) were set up at three sites near the edge of the Mer Bleue Bog in spring 2013.
2. Throughout the summer *Osmia* and *Megachile* bees colonized the nests and created pollen provisions for progeny.
3. In early winter, the nests were collected and dissected in order to obtain samples of fecal pellets and pollen provisions from individual cells.
4. The samples were then mounted and stained with a basic fuchsin stain (Kearns, CA & Inouye, DW; 1993) in order to visualize individual pollen grains.
5. The samples were then scored to determine the relative abundance of Ericaceae pollen.

Results

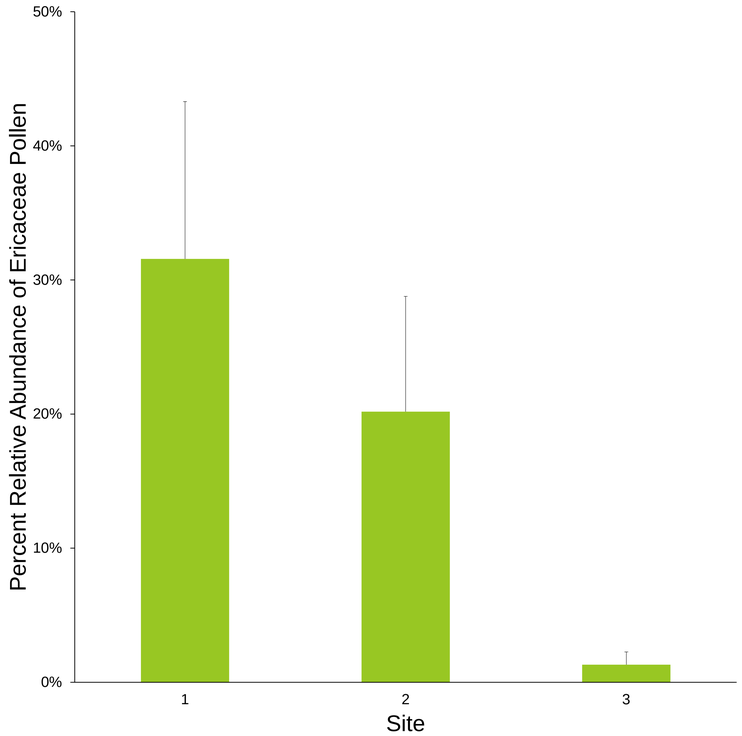
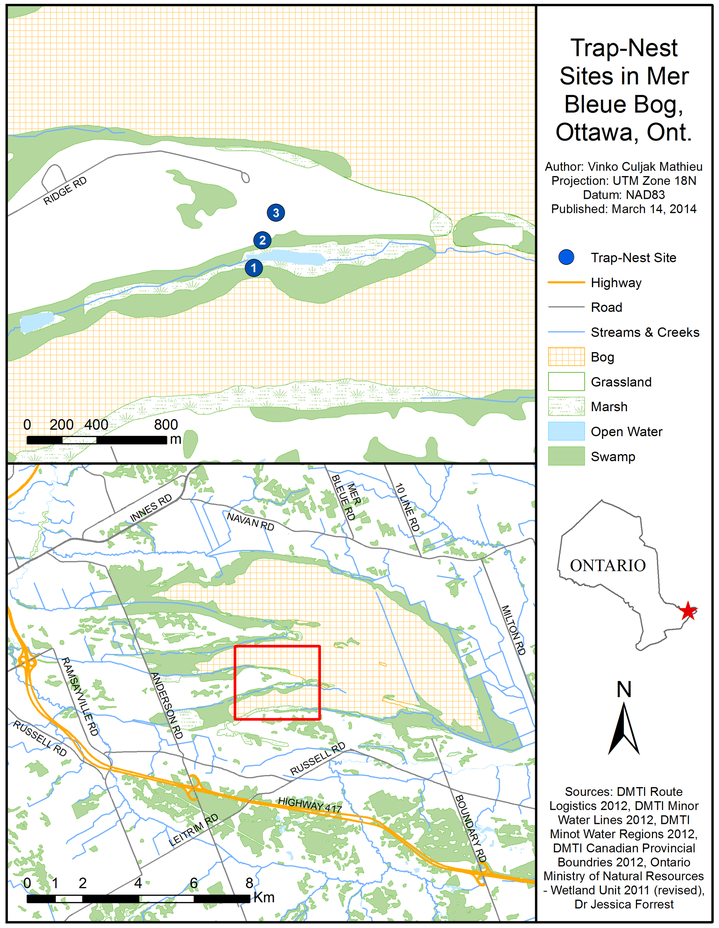


Figure 1: Percent relative abundance of Ericaceae pollen in fecal pellets and pollen provisions of trap-nesting bees at three sites of varying distance from the edge of the Mer Bleue Bog. Means plotted with standard error bars. Site 1 = closest to edge. Site 2 = intermediate distance to bog edge. Site 3 = farthest from bog edge. Sample size: site 1 = 16, site 2 = 21, site 3 = 6.

An analysis of the data distribution for each site showed that it is not normally distributed, making it difficult to confidently perform any analysis of differences between means or of variation. The results from an ANOVA test (f-stat: 1.28, nominator degrees of freedom: 2, denominator degrees of freedom: 40, p-value: 0.289) showed that there is no significant difference in the relative abundance of Ericaceae pollen between sites. However, a plot of the relative abundance of Ericaceae pollen versus the distance between the bog's edge and the nesting sites shows an apparent trend. This trend indicates that as the distance between the bog's edge and the nesting site increases, the use of Ericaceae pollen decreases.

Mer Bleue Bog



Conclusion

From the data obtained, we cannot determine the maximum foraging distance of solitary *Osmia* and *Megachile* bees. However, observations of Ericaceae pollen in site 3 nests indicate that the bees can travel up to 350m to obtain floral resources. It was also confirmed that the Ericaceae pollen is detectable and measurable in both the fecal pellets and pollen provisions. One issue with this study is the very small and uneven sample size. To overcome this, further research should involve a larger number of nesting sites at different distances from the bog's edge and each site should contain a larger number of nesting blocks.

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References

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