

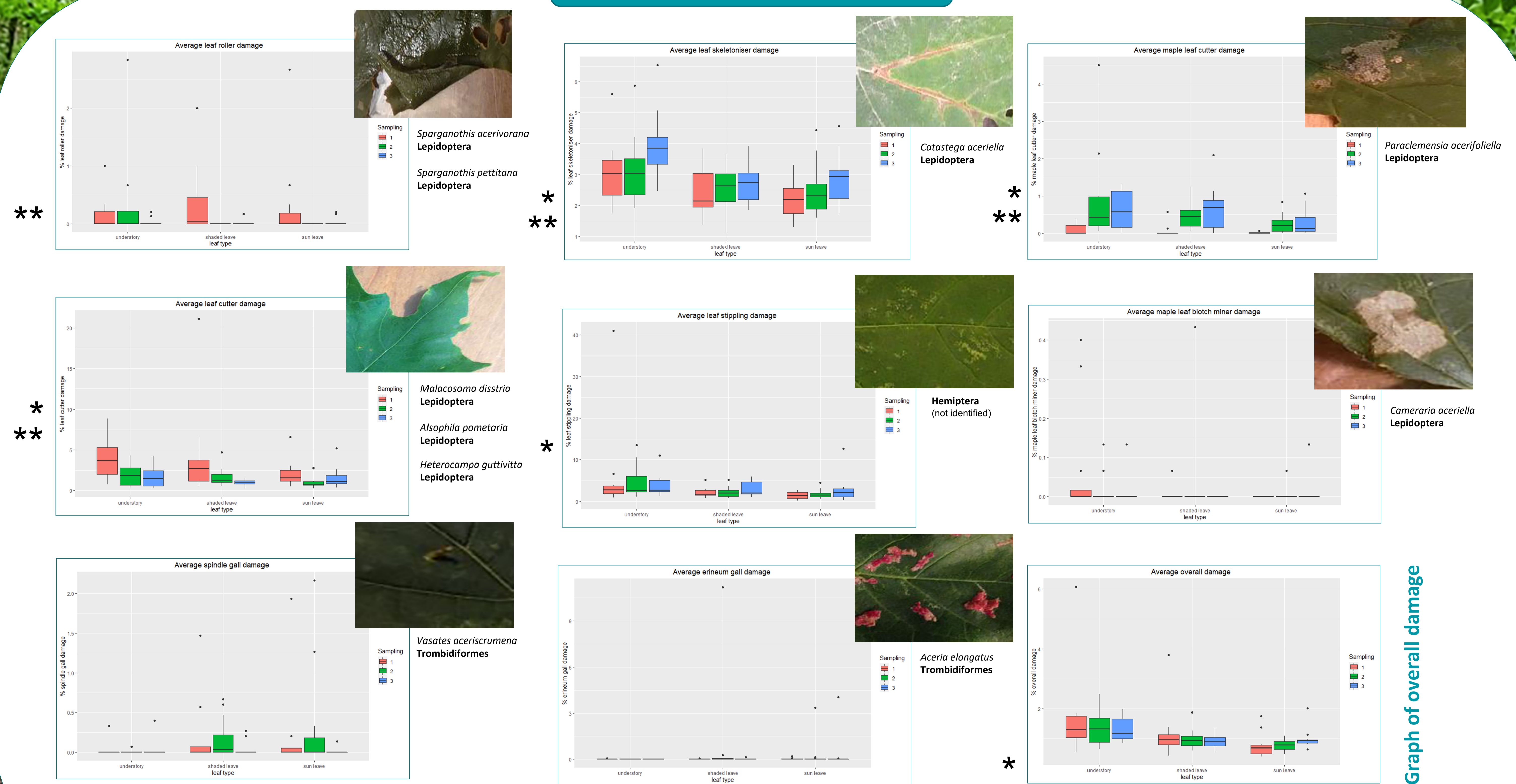
Introduction

The temperate forest decline, specifically sugar maple (*Acer saccharum*) dieback, is an ever increasing concern in southwestern Quebec. **Insect defoliators** seems an important contributing factor. Distribution of these herbivorous insects and the damages they cause within a tree can be affected by various factors including **vertical stratification** from the upper crown to the understory of a tree linked to heterogeneity in leaf quality.

This project focuses on understanding the **stratification of the herbivorous arthropod damages between sugar maple canopy sun-leaves, canopy shade-leaves and understory.**

Hypothesis

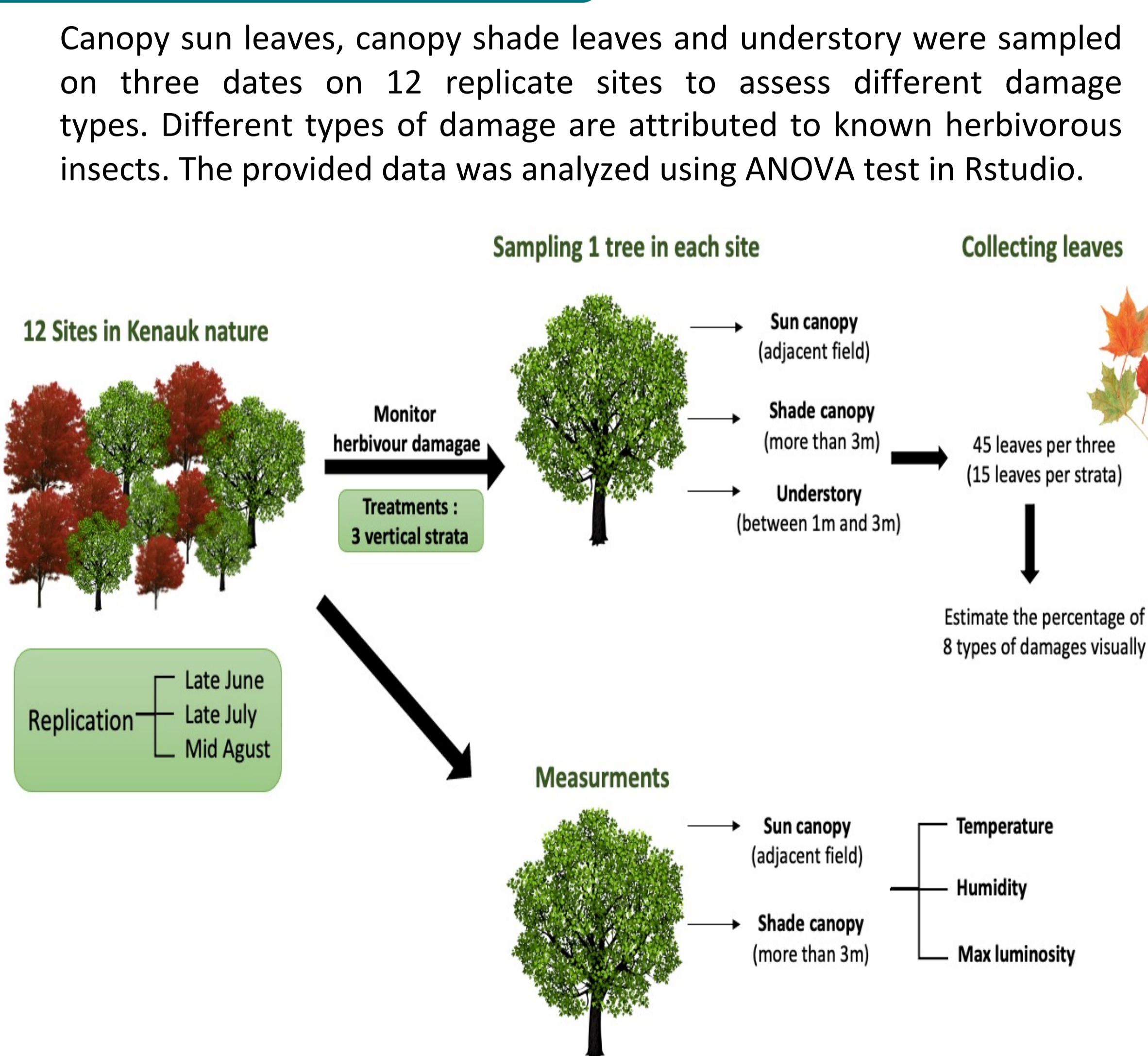
The tree canopy will exhibit higher herbivory damage than the understory due to higher nutritional quality and lower defenses of sun-leaves.



*Variation in herbivory damage between strata is significant ** Sampling period has a significant effect on herbivory damages
ANOVA Test
Overall leaf damage is higher in the understory than in the canopy (sun and shaded leaves)

Method

This project was done at Kenauk Nature (45°42'N; 74°53'W), Outaouais, Québec in June, July and August 2020.



Discussion

The results suggest that heterogeneity in leaf quality of sugar maple trees and light exposure play an important role in the amount of herbivory arthropod damages observed in different sections of the tree. Contrary to our expectation, **higher damages were observed in the understory**, than in the canopy, primarily by maple leaf-cutters and stippling sap-feeding hemipterans, followed by skeletonizers and cutters. In regards to the **seasonal changes**, while skeletoniser and maple leaf cutter damage shows an increase toward the end of summer, leaf cutter and roller damage decreased.

This trend could be explained by a **reduced palatability of leaves** from older trees and from light exposure, and by vertical **variation of herbivorous arthropod communities** between strata.

Little variation in leaf damages between the sun and shaded canopy was observed, indicating a need to conduct more studies of **leaf heterogeneity in the canopy** in order to better understand small-scale patterns of insect defoliators.

References

- Thomas, S.C., Sztaba, A.J. and Smith, S.M., 2010. Herbivory patterns in mature sugar maple: variation with vertical canopy strata and tree ontogeny. *Ecological Entomology*, 35(1), pp.1-8.
- Côté, B. and Ouimet, R., 1996. Decline of the maple-dominated forest in southern Quebec: impact of natural stresses and forest management. *Environmental Reviews*, 4(2), pp.133-148.
- Fortin, M. and Mauffette, Y., 2002. The suitability of leaves from different canopy layers for a generalist herbivore (Lepidoptera: Lasiocampidae) foraging on sugar maple. *Canadian Journal of Forest Research*, 32(3), pp.379-389.
- Maguire, D.Y., Robert, K., Brochu, K., Larrivée, M., Buddle, C.M. and Wheeler, T.A., 2014. Vertical stratification of beetles (Coleoptera) and flies (Diptera) in temperate forest canopies. *Environmental Entomology*, 43(1), pp.9-17.