Beetle Diversity in the Remaining Habitat Fragments on our Urban Campus

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Introduction

Habitat fragmentation is a common occurrence during urbanization as swaths of habitat are removed or modified to make way for more buildings and urban amenities. Tacoma is one such city that has some habitats in fragmented states still around. The UW Tacoma campus has numerous fragments of habitat amongst its buildings and two large fragments on Fawcett Ave. UWT has plans to eventually develop on these large fragments of empty property on Fawcett. It may be that these empty properties should be preserved, not only for the native species, but also for future student research & study. In this study, I explored e if there is enough biodiversity in arthropod species to warrant trying to preserve what is left of these large habitat fragments on Fawcett Ave.

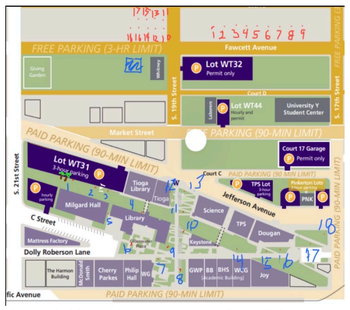
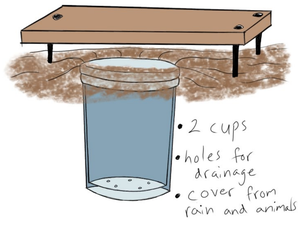


Image 1. Map of trap locations on Fawcett Ave and on UWT Campus

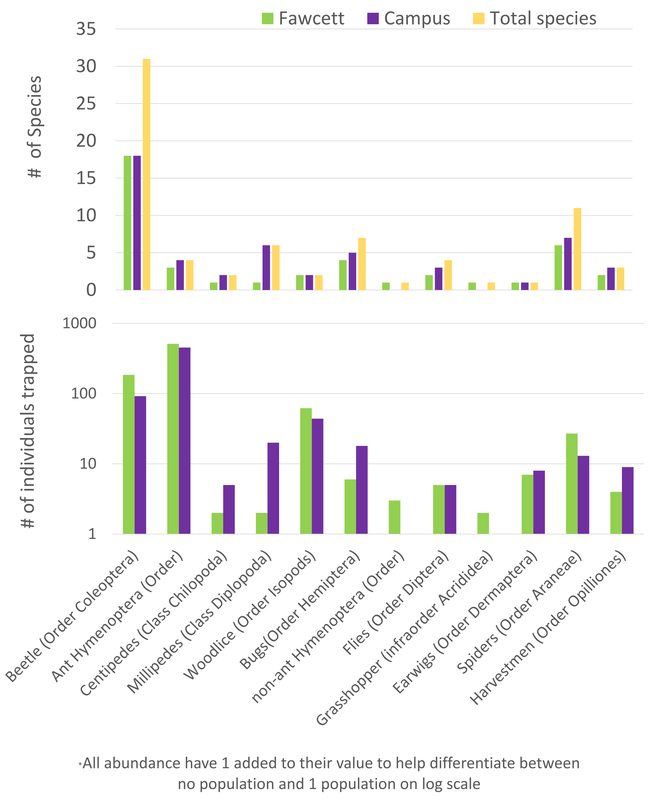
Methods

Trap Illustration



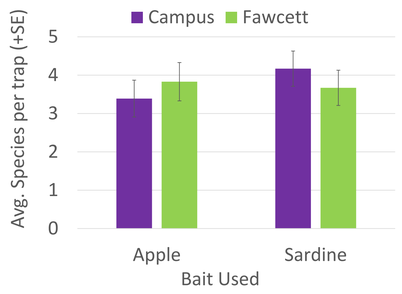
- Total of 36 pit traps. Half on campus and half on Fawcett Ave.
- Traps were baited on Tuesdays and insects collected on Thursdays.
- Traps were baited with sardines on May 16th and apples the next week on May 23rd.
- Arthropods were identified as close to species as possible within time constraint
- 75 fragments of habitat on campus have an average size of ~ 117 m^2 and totaling ~ 8751 m^2 This doesn't include the ~4487 m^2 park between SCI building and Market Street.
- Area of the empty plots on Fawcett were ~ 6433 m^2 and ~4355 m^2.

Species Richness and Abundance by Taxon



·All abundance have 1 added to their value to help differentiate between no population and 1 population on log scale

Species richness per trap



Beetle sp. richness per trap

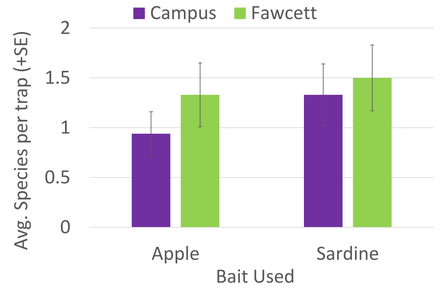


Table 1. Total number of beetles caught for each bait and area.

	Total Number of Beetles	
	apple	sardine
Campus	45	43
Fawcett	60	121

Table 3. Total number of other arthropods caught for each bait and area.

Total Number of Other Arthropods		
	apple	sardine
Campus	57	60
Fawcett	54	59

Carabus nemoralis Copyright © 2023 Sydney Ouhl

Table 2. Total number of ants caught for each bait and area

	Total Number of Ants	
	apple	sardine
Campus	93	359
Fawcett	267	244

Anisodactylus binotatus Copyright © 2014 Libby and Rick Avis

Nebria brevicollis Copyright © 2021 Gary Griswold

Clown beetle of the Subfamily Sapirininae Copyright © 2023 Sydney Ouhl

Common Sun beetle *Amara aenea* Copyright © 2008 John R. Maxwell

Notiophilus biguttatus Copyright © 2007 Stephen Luk

Bembidion lampros Copyright © 2015 Kirill V. Makarov

Philonthus cognatus Copyright © 2018 Dave Trochlell

Rugilus orbiculatus Copyright © 2015 Scott Gilmore

- 73 different species were trapped in total, with 51 species found on campus habitats and 42 species on the two Fawcett plots.
- Both sites had 13 beetle species that were not caught on the other site. Fawcett also had 9 other arthropod species that were not found on campus while campus had 17 different species not captured on Fawcett.
- Beetle species richness however was the same at both sites
- Interestingly, millipede species richness was greater on the campus habitat fragments than on Fawcett.
- Some species were only found in certain traps such as the Saprininae beetles found only in Fawcett trap 7 in both weeks, the *Notiophilus biguttatus* beetles only found on Campus trap 8 both weeks, and Genus Carpelimus on Campus trap 5 both weeks, suggesting the existence of distinct microhabitats at each site.
- The Staphylinidae family of beetles had the highest richness of all the arthropods found with a total of 11 different species of rove beetles.
- Total of 1462 arthropods were examined. 963 out of 1462 arthropods were the ant, *Tetramorium immagrans*.

Acknowledgments & Bibliography

I'd Like to Thank Gareth Kenee, Tessa Coleman, and Stanley Joshua for allowing us permission to conduct this project on campus grounds and UWT owned property and also the use of Gareth's gardening tools.

I'd also like to thank campus security guards I talked to for keeping an eye out for anyone messing with the project's traps around campus

Conclusions & Recommendations

With 73 total species trapped and a difference of 9 species found between Fawcett and Campus sites, the study conducted on ground dwelling arthropod diversity doesn't indicate a sizeable enough difference in species richness between the habitat fragments. When looking at the trends in species and trap locations, there was a non-significant trend of the larger patches of habitat to have a higher abundance of ground-dwelling arthropods. Although to note almost 2/3 of all arthropod abundance was the immigrant pavement ants, with them making up 56.7% of abundance on Fawcett and 67.0% on campus.

There is interesting pieces of evidence that shows that there is a large amount of beta diversity in these fragmented habitats. Once piece of evidence to note is that each area contained 72.2% of beetle species that were not found in the other area. Also, another piece of evidence of beta diversity is having found species that were only found in a particular trap. While there were many species where only 1 individual was caught all together, in both weeks there were multiple individuals of a species only caught in a particular trap location in both weeks. One of these species was a species of the Saprininae subfamily of clown beetles, in which 3 were caught both weeks in trap 7 on Fawcett. Another was *Notiophilius biguttatus* beetle caught once in week 1 and twice in week 2 in trap 8 on campus. A third species was from the Genus Carpelimus where 2 were caught on week one and 7 on week two in trap 5 on campus. This all suggests that there is small scale differences in the type and qualities of these habitats and great care should be taken with areas like these to prevent the destruction and elimination of a section of land so as not to also cause the extirpation of a species endemic to it.

Considering that this this study was only conducted for two weeks in May, more observation should be conducted on these patterns.