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Investigating the effects of elevated Carbon dioxide on forest arthropods: One year of data from BIFoR FACE.

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Insects and CO₂

- Insects are key players in ecosystem functioning.
- Unclear how insects will respond to eCO₂.
- Insect responses could feedback and completely change forest performance – (*Pugh et al., 2017*).
- Likely to be first responders.

Are insects key drivers of change in woodland systems under climate change?













Sampling

- Characterisation of abundance, diversity and phenology
- Spatial and temporal replication
- Comprehensive, sensitive and robust
- Minimising impact
- Opportunity to compare and contrast method efficacy

I found

Name: _____

	___ ants		___ praying mantises
	___ flies		___ mosquitoes
	___ moths		___ wasps
	___ beetles		___ bees
	___ dragonflies		___ termites

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The sampling programme

	Pitfall trapping	Malaise trapping	Pan trapping	Understory beating	Canopy beating
Layer	Ground layer	Field layer	Field layer	Understory	Canopy
Sampling period	1 week	24 hours	24 hours	30 seconds	30 second
Sampling interval	1 month	1 month	1 month	1 month	1 month
Number per array	2	1	1 x 3	1	1



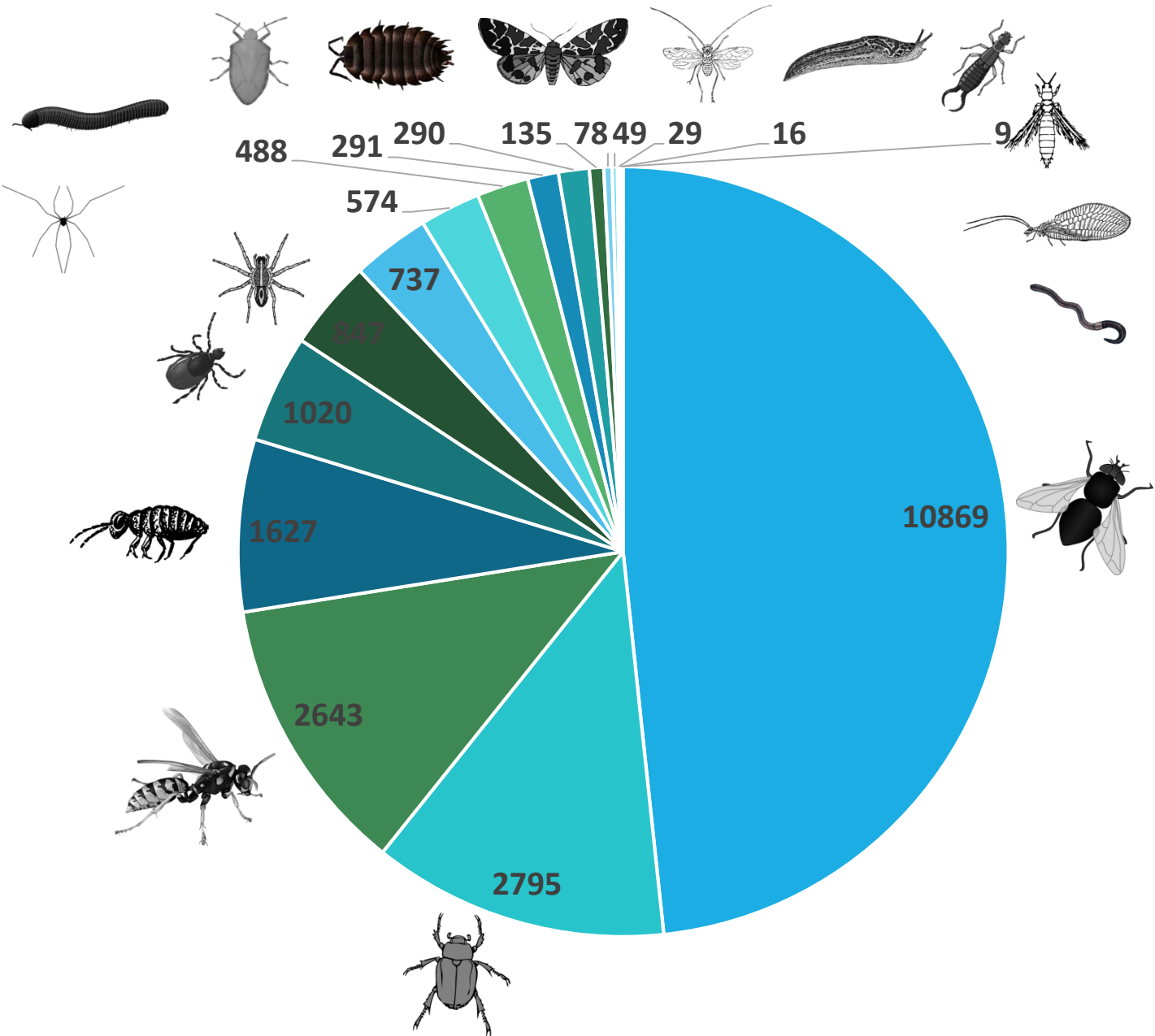
Meteorological data

Sampling method	Start time	End time	Window length
Pitfall	00:00 Day 1	23:59 Day 7	168 hours
Pan and malaise	00:00 Day 1	23:59 Day 2	48 hours
Beating	00:00 Day 1	23:59 Day 1	24 hours

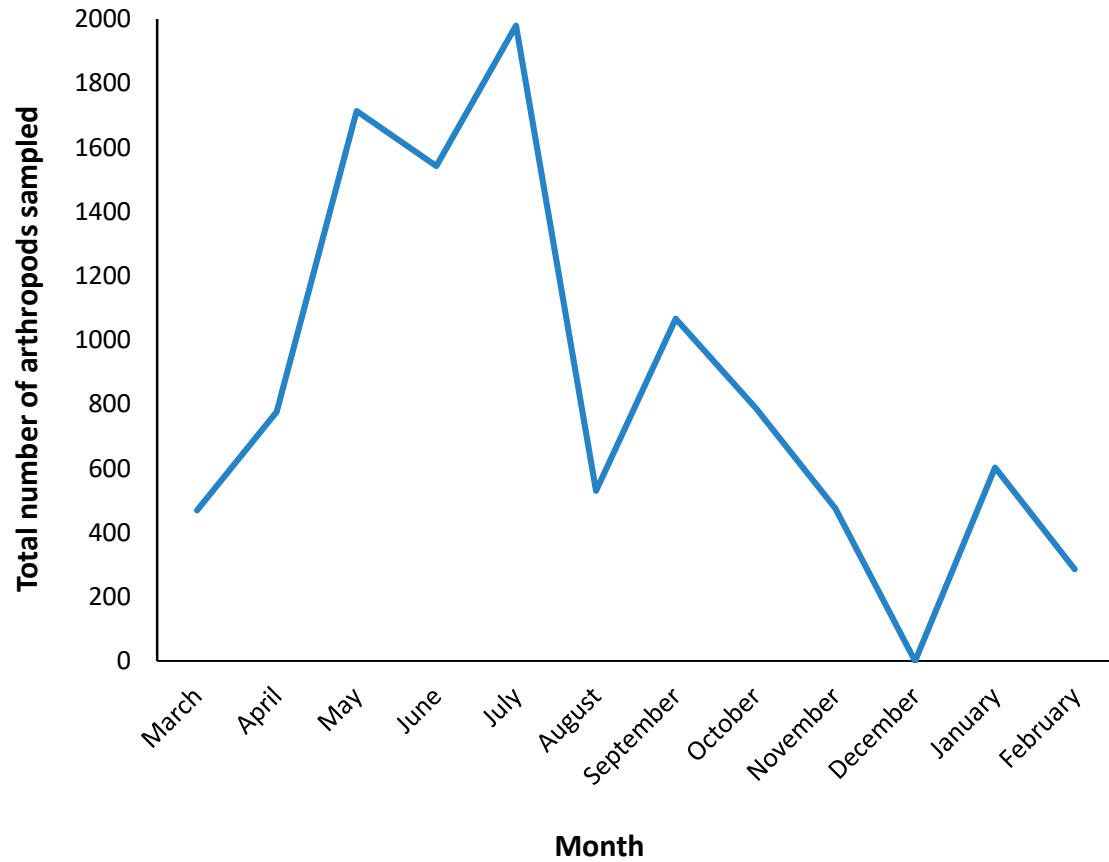
Results

Total arthropods sampled: 22,568.

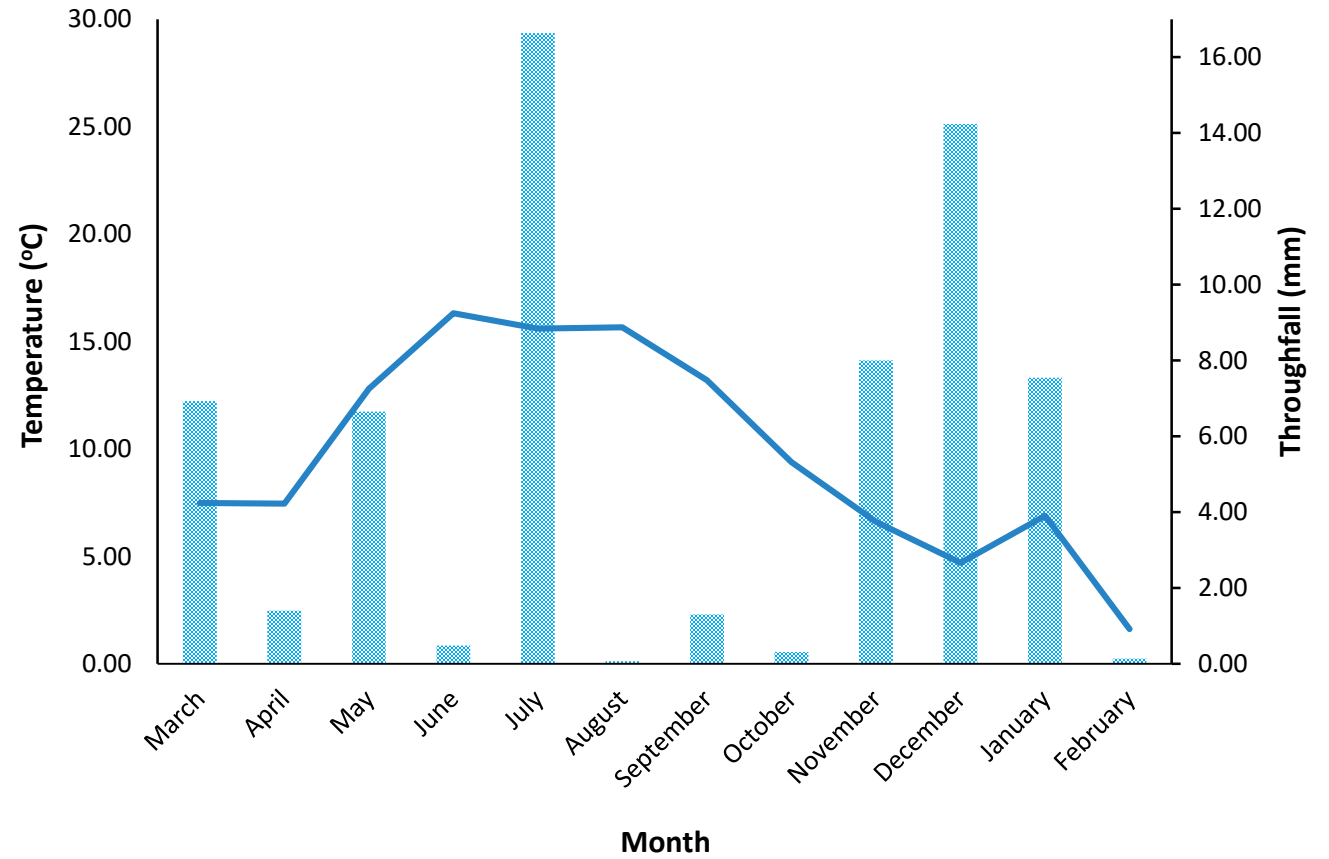
24 Orders in Phylum: Arthropoda.



Pitfall



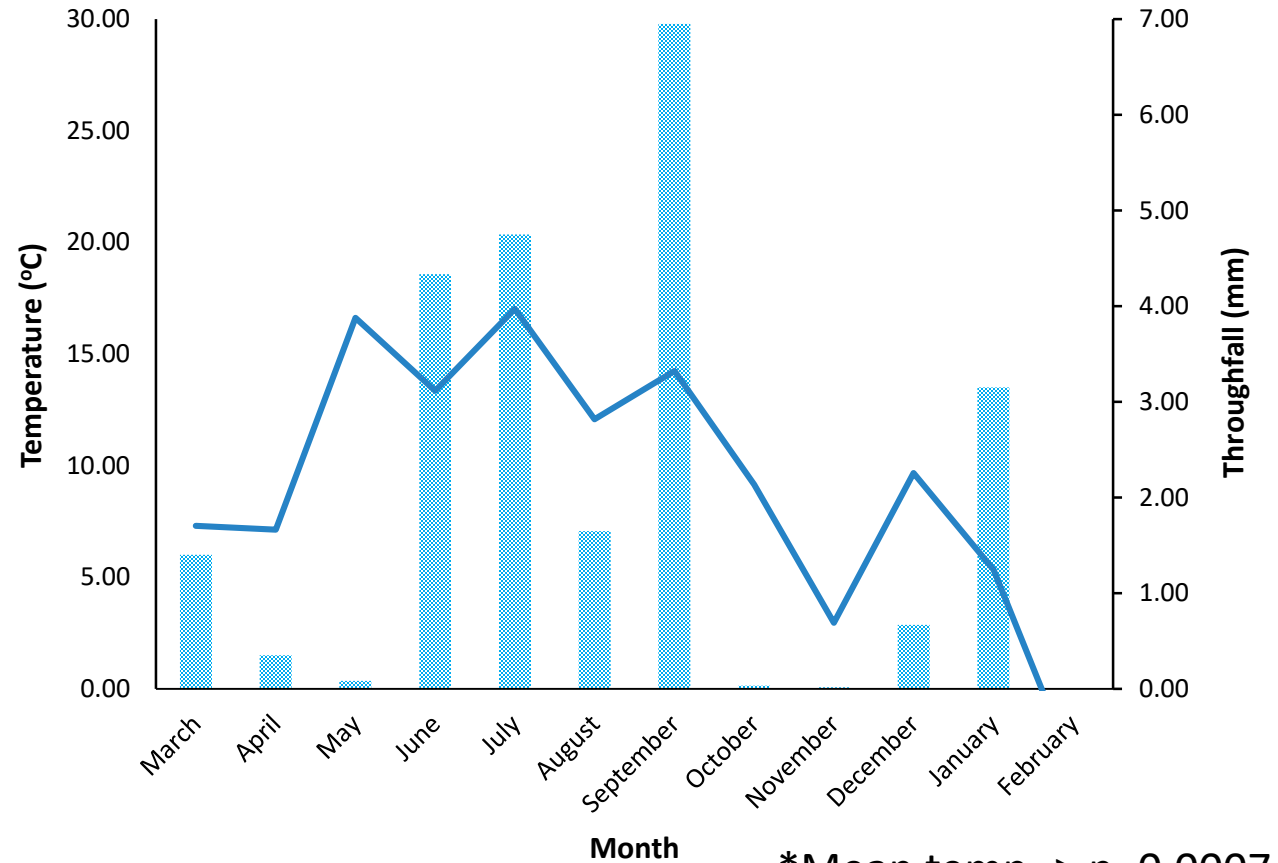
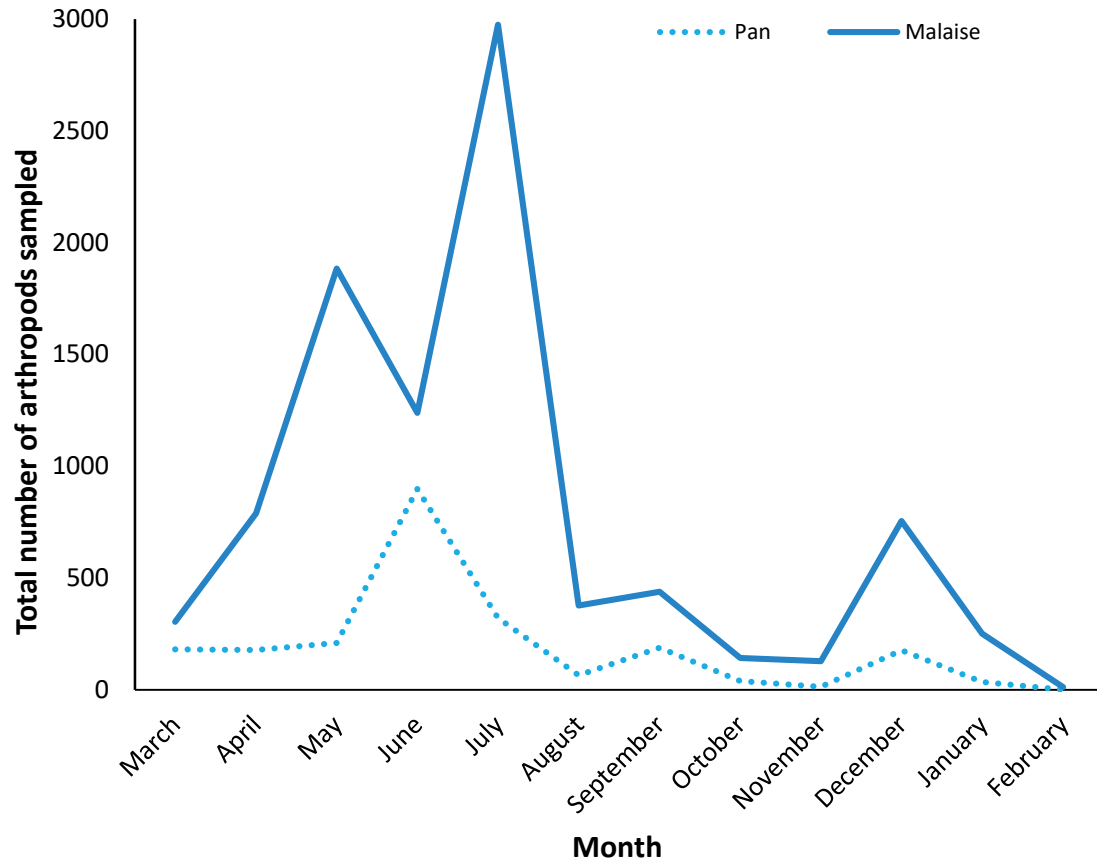
7 day



*Mean temp -> p=0.0031

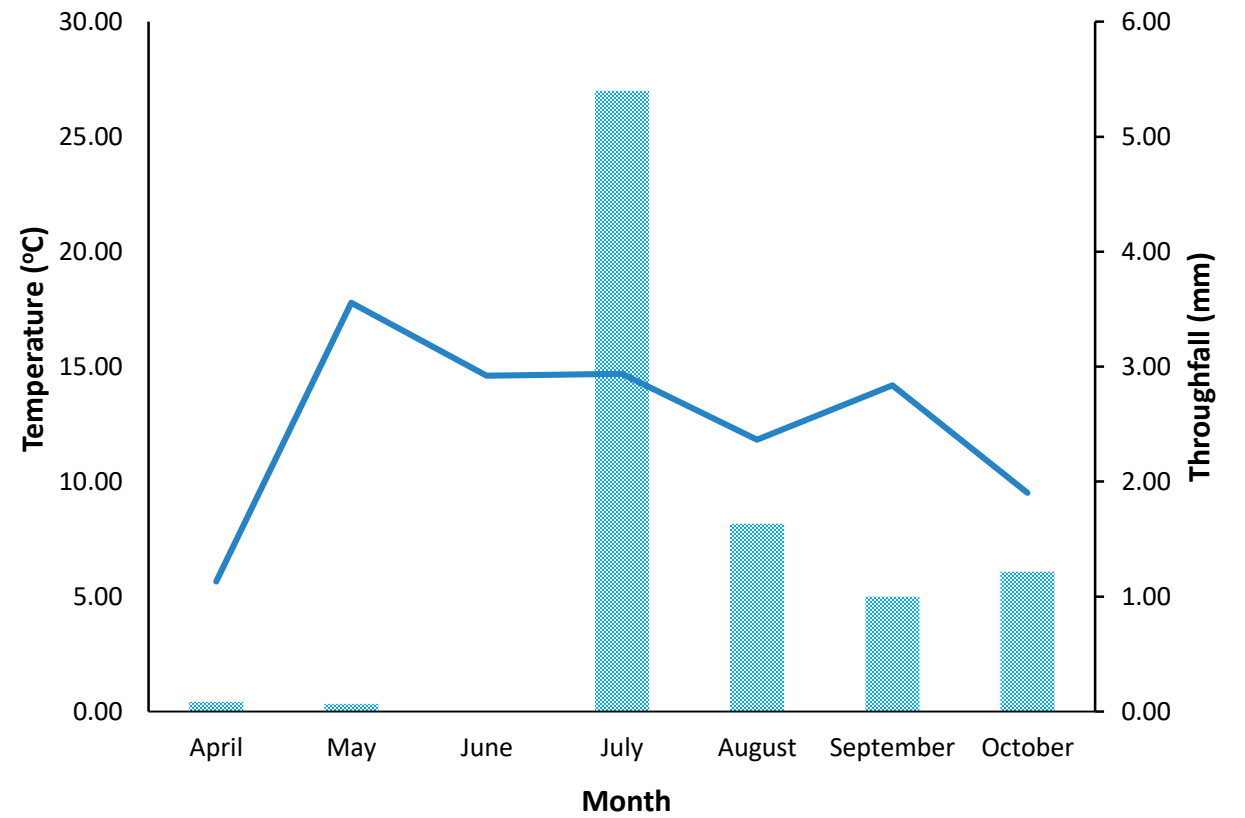
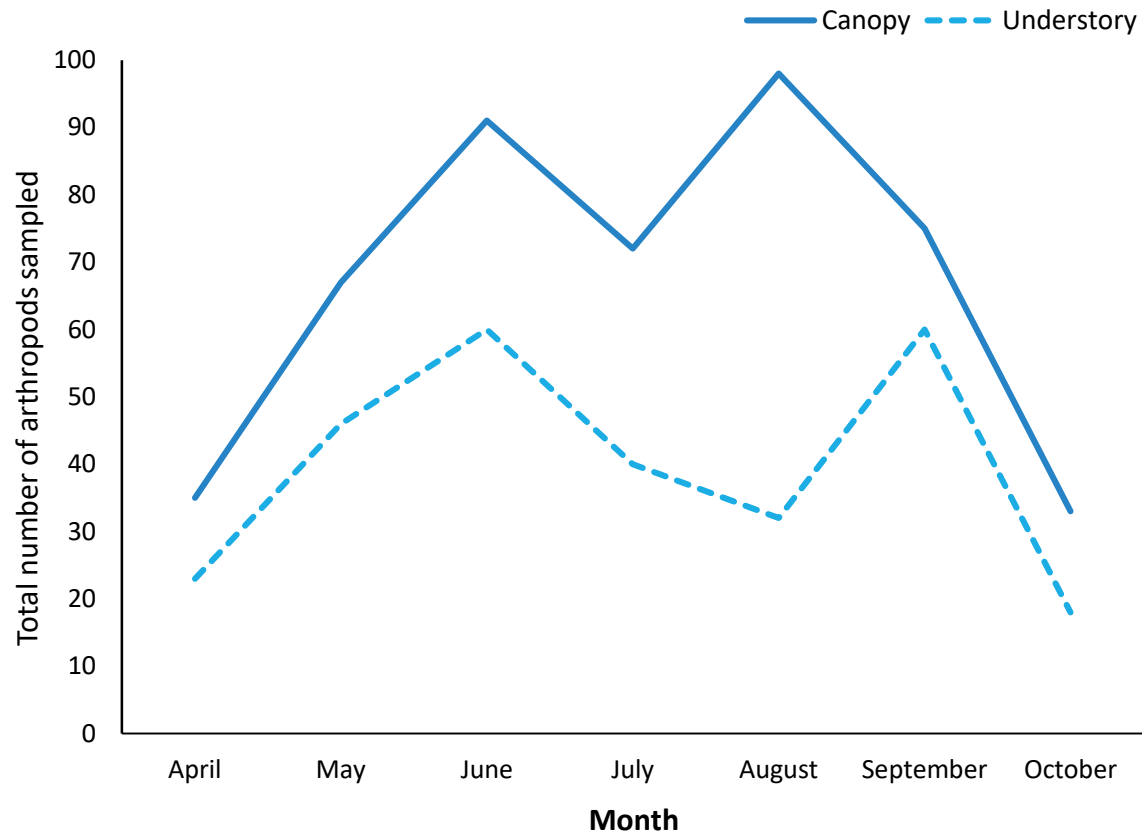
Malaise and pan trap

48 hour



*Mean temp -> p=0.000745

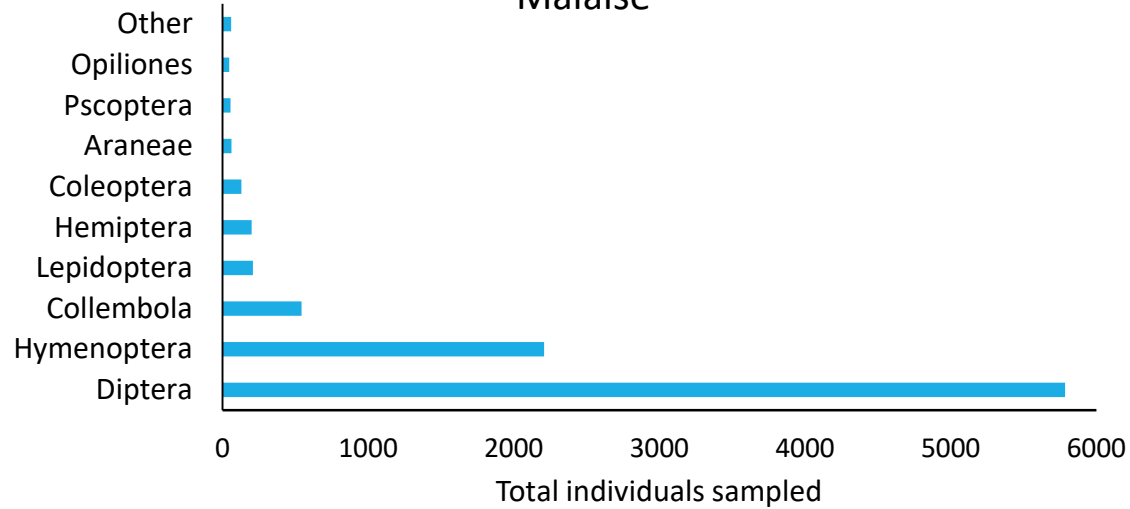
Beating



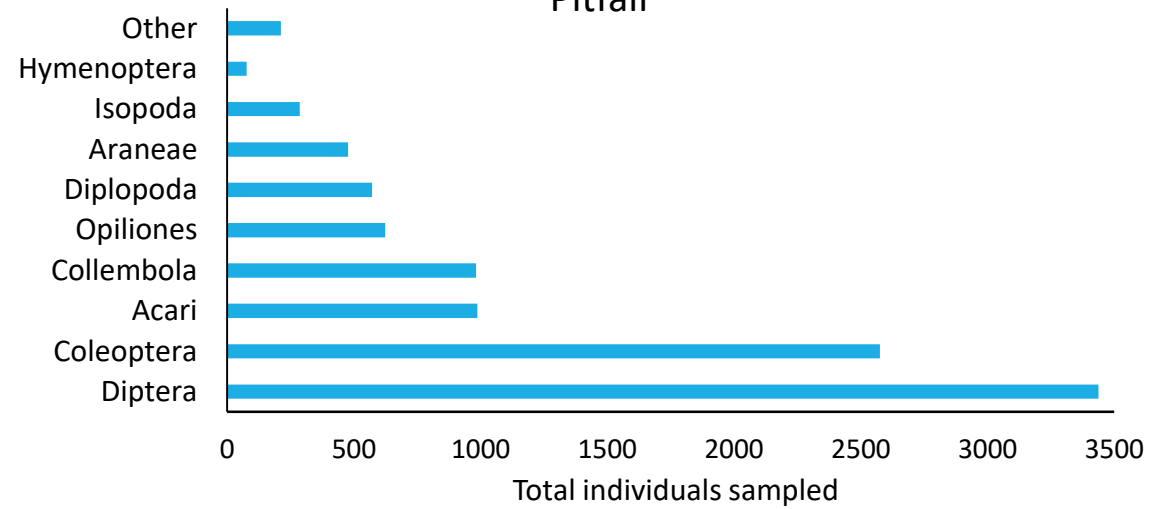
Sample composition



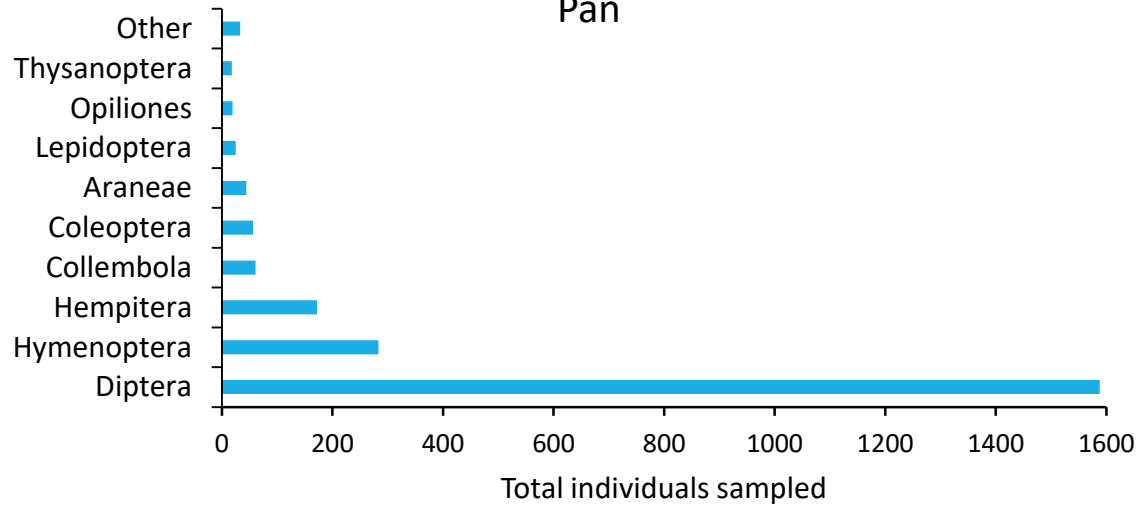
Malaise



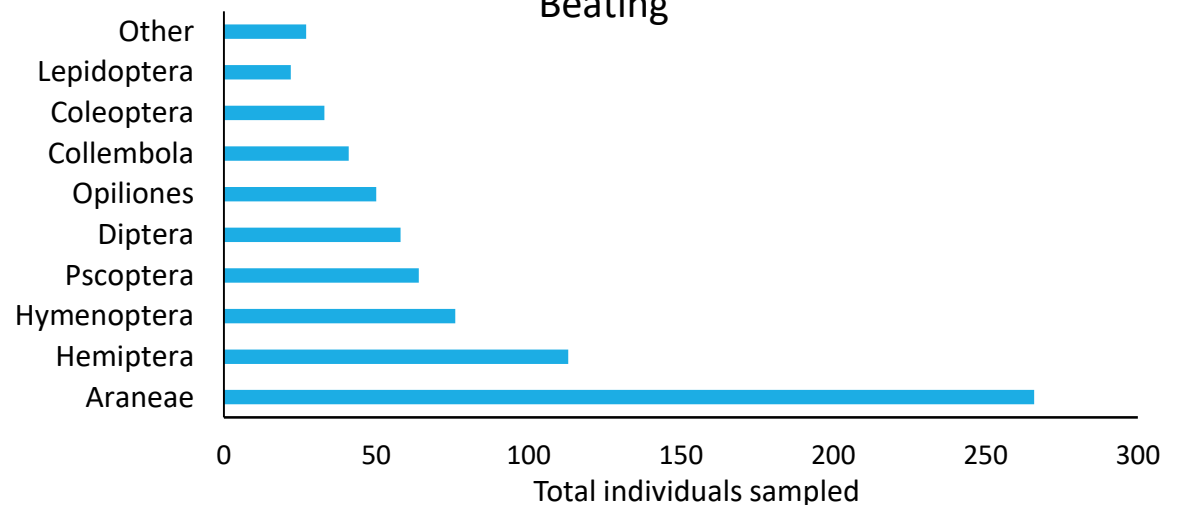
Pitfall



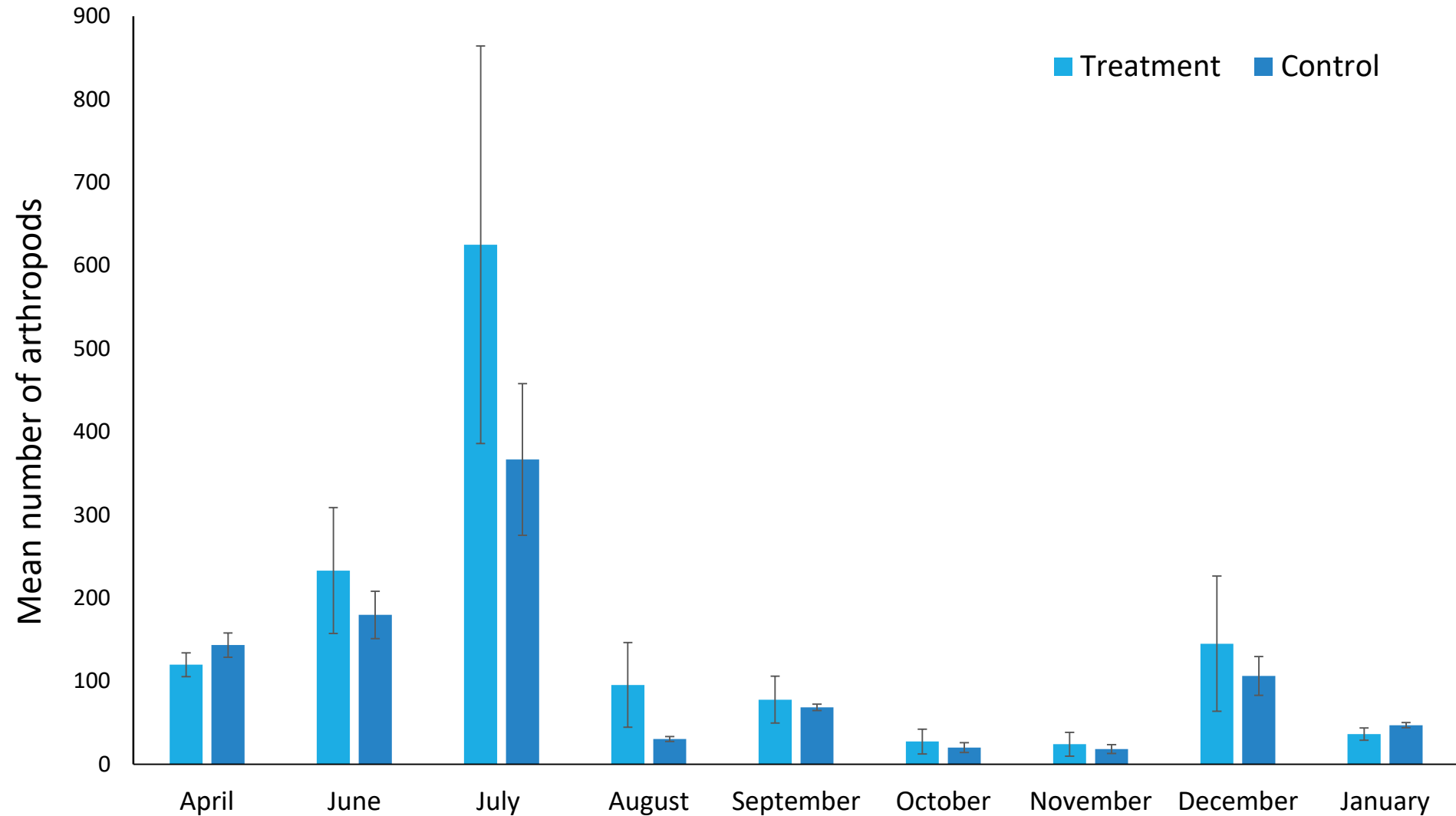
Pan



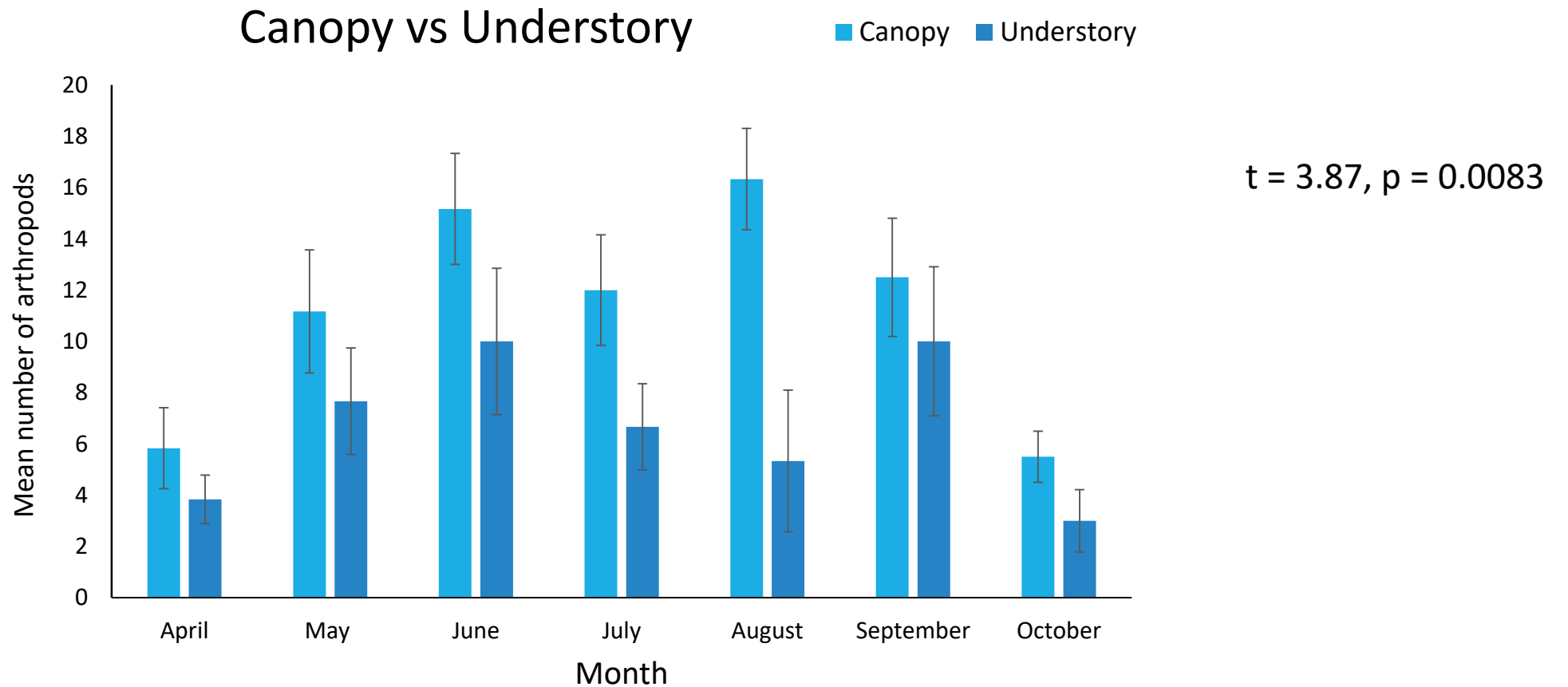
Beating



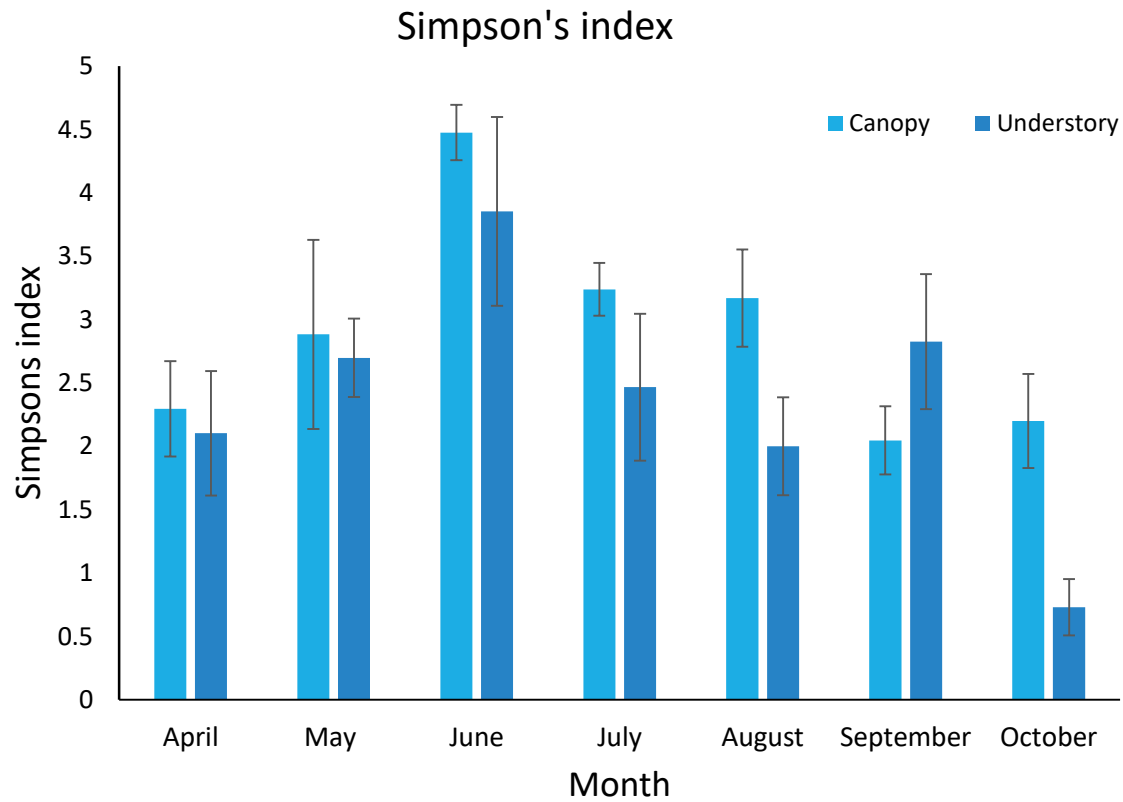
Treatment vs control (Malaise)



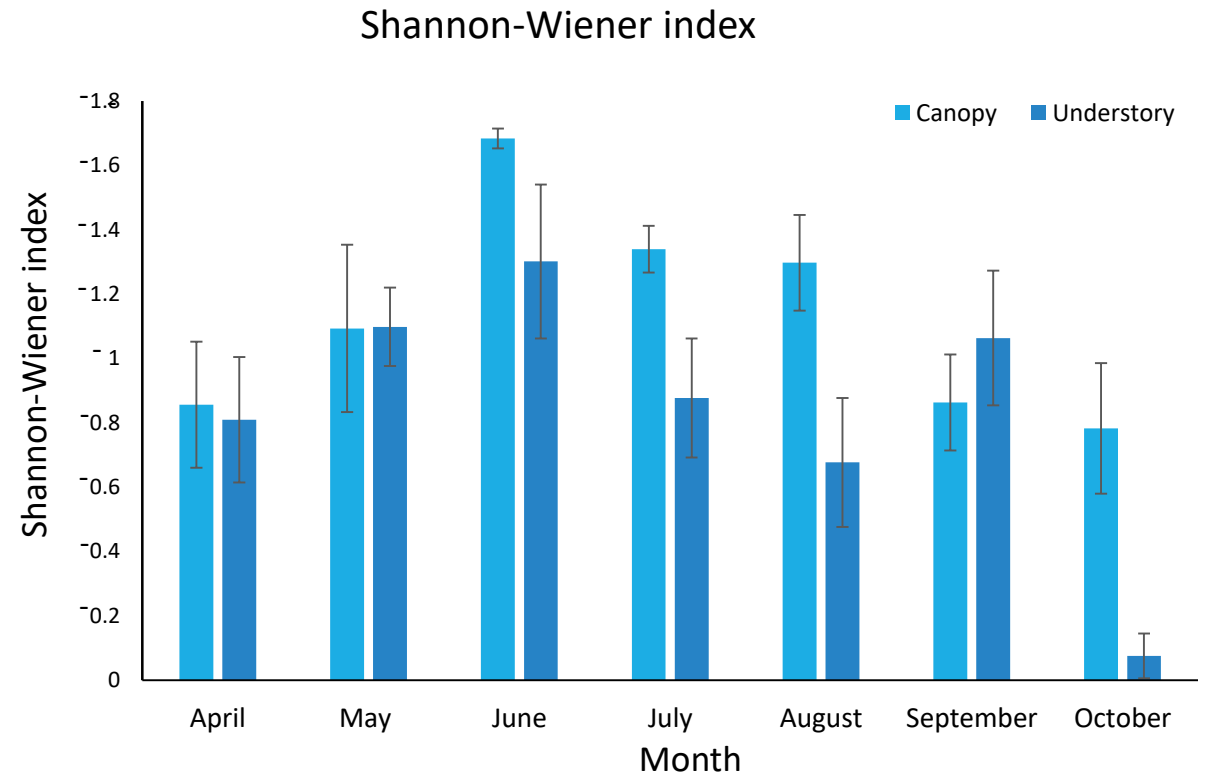
Layer comparison



Layer comparison



$t = 1.8494, p = 0.1139$



$t = -2.2157, p = 0.0686$

Conclusions

- Phenology is key
- Temp > rain
- Certain Orders dominate.
- Mature forest takes time to change.
- Canopy is important!



Embolemus ruddii



1 mm

Embolemus ruddii



Thanks for listening!

Any questions?

1 mm



Pan trap colour

Kruskal Wallis -> $\chi^2 = 6.3765$, $p = 0.04124$

Dunn post hoc test -> Blue-White - $p = 0.2970$

