The Impact of Elevated Aestivation Temperatures on the Behaviour of Bogong Moths (*Agrotis infusa*)

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Aestivation:

a suppression of an organism's metabolism and development in response to dry/hot weather (Withers and Cooper, 2010).

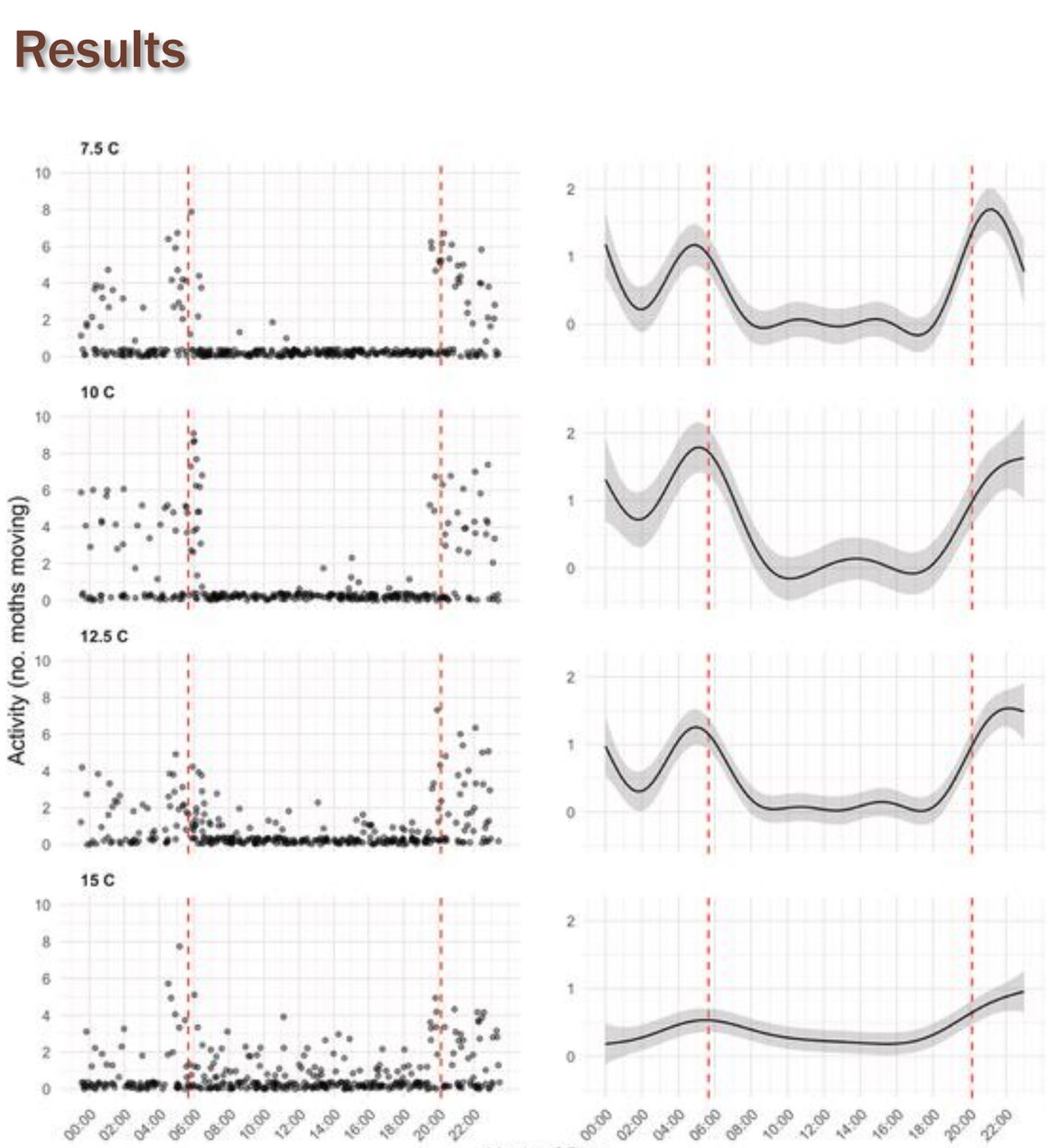
Background

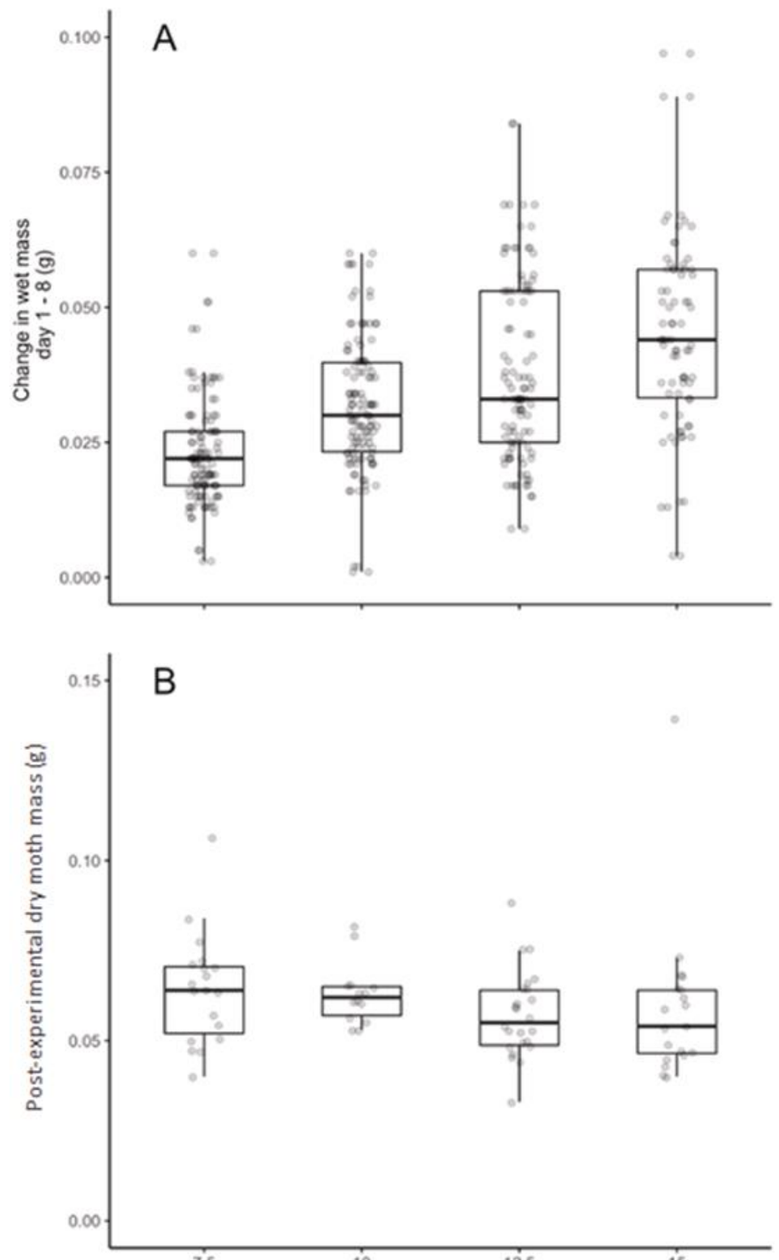
- **Bogong moths migrate annually** to the Australian Alps to **aestivate** over summer (Warrant et al. 2016).
- Average temperatures at the moth's aestivation sites **have been rising** due to climate change (Camac et al. 2020).
- Elevated temperatures may affect **bogong moth activity** and **mass loss** during aestivation.

Methods

- Moths were kept at **four temperatures** – 7.5˚C, 10˚C, 12.5˚C, and 15 ˚C.
- Their activity was captured by **Raspberry Pi motion-capture camera traps.**
- The moths were also **weighed three times** during the study.

Results





The pattern of peak activity at dawn and dusk with lower activity during the day was largely lost in the warmer temperatures - normal aestivation behaviour was disrupted at 12.5 °C and lost at 15 °C.

Wet mass decreased more rapidly at higher temps, but dry mass did not differ, suggesting that loss of mass at higher temps was caused by **dehydration** rather than **loss of body fat.**

Conclusions

- Our results suggest that **warming of bogong moth aestivation sites will cause changes in activity levels** and lead to **dehydration** during aestivation.
- If activity levels and metabolic rate are correlated with higher mortality rates during aestivation, it could **reduce bogong moth abundance and alter the Australian alpine ecosystem**.

Camac, J.S., Umbers, K.D.L., Morgan, J.W., Geange, S.R., Hanea, A., Slatyer, R.A., McDougall, K.L., Venn, S.E., Vesk, P.A., Hoffmann, A.A., Nicotra, A.B. 2020. Predicting species and community responses to global change in Australian mountain ecosystems using structured expert judgement: An Australian mountain ecosystems case study. *Glob. Chang. Biol* 27(18): 4420-4434.
Withers, P.C., Cooper, C.E. (2010). Metabolic depression: a historical perspective. *Prog. Mol. Subcell. Biol* **49**:1-23.
Warrant, E., Frost, B., Green, K., Mouritsen, H., Dreyer, D., Adden, A., Brauburger, K., Heinze, S. (2016). The Australian bogong Moth *Agrotis infusa*: A Long-Distance Nocturnal Navigator. *Front. Behav. Neurosci* **10**:77.