

Eco-engineering through enhancement of habitat complexity: it's not one-size-fits-all



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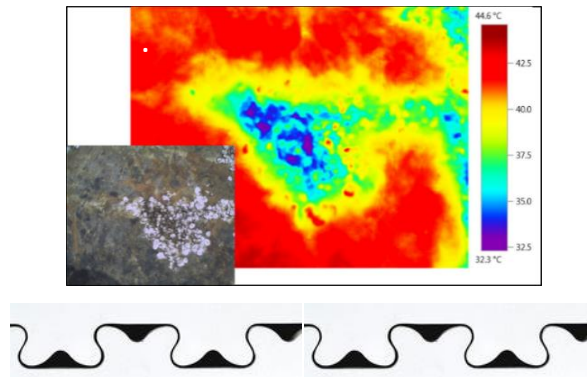


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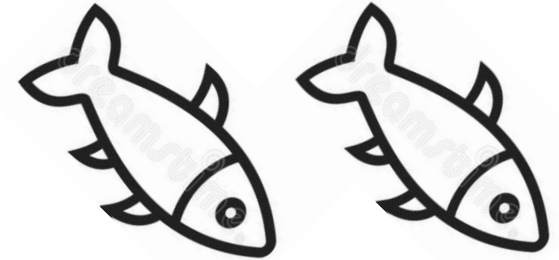
↑ Habitat complexity → ↑ Biodiversity



↑ Surface area



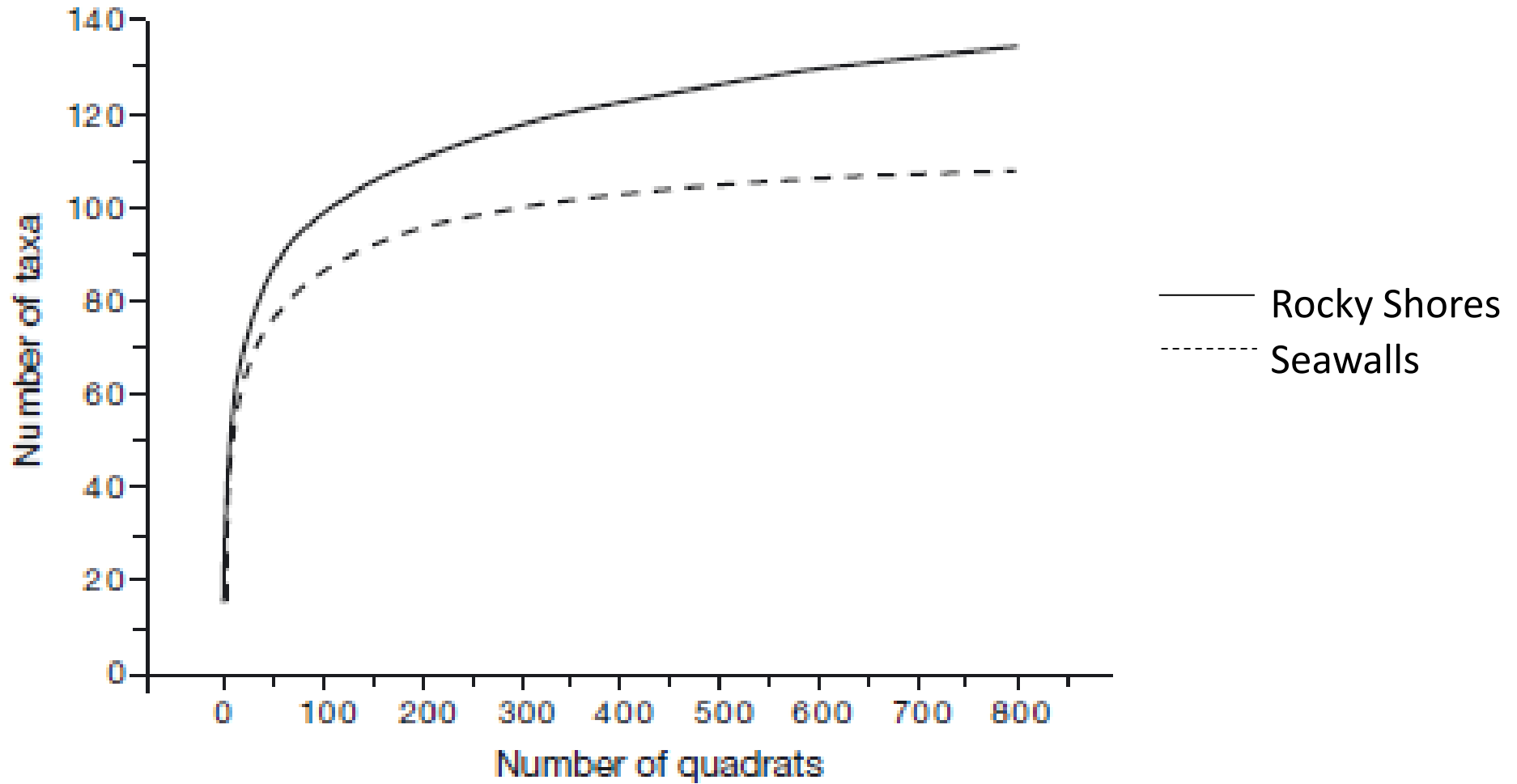
↑ Diversity of niches



↑ protection from predators



Reduced biodiversity of mobile species on seawalls



Chapman, M.G. 2003. "Paucity of mobile species on constructed seawalls: effects of urbanization on biodiversity". *Marine Ecology Progress Series* 264:21-29.





Flat



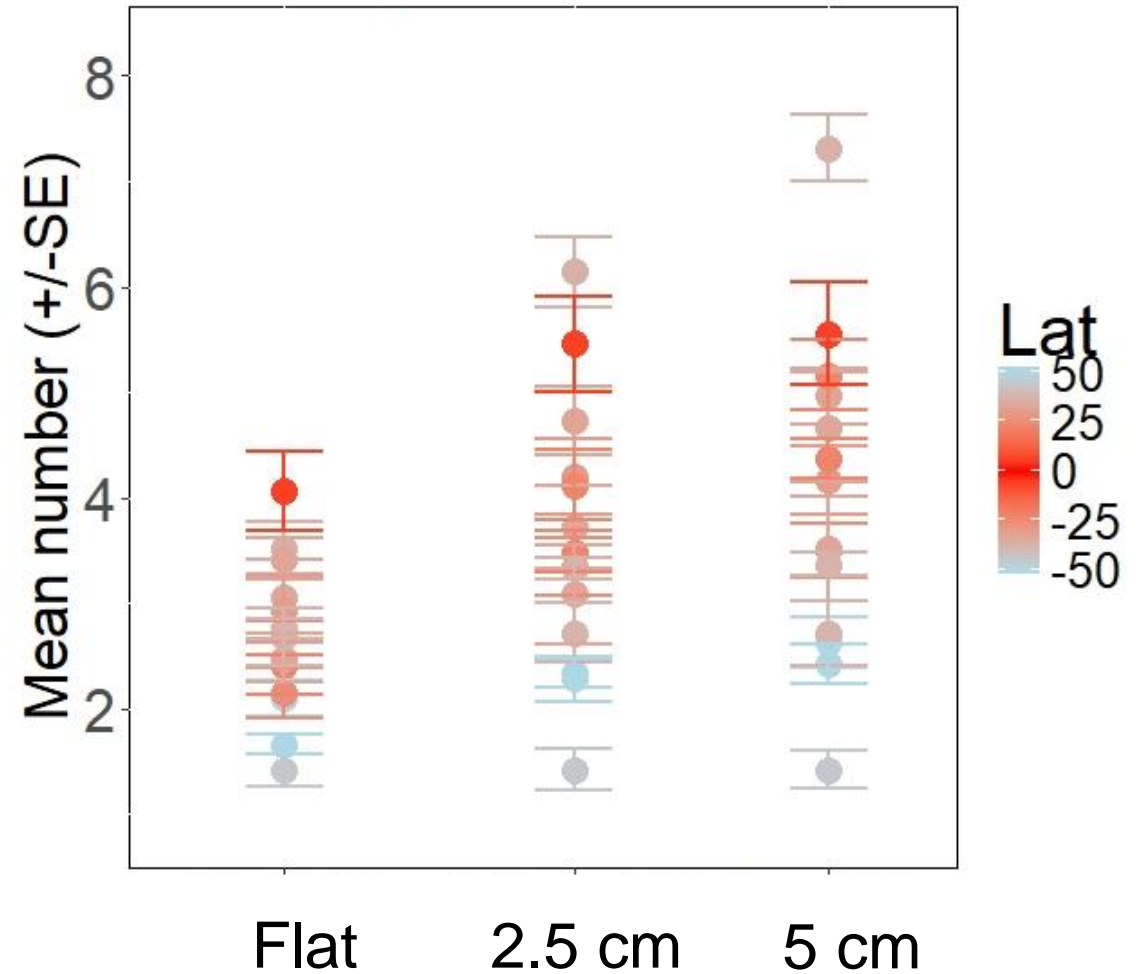
2.5 cm



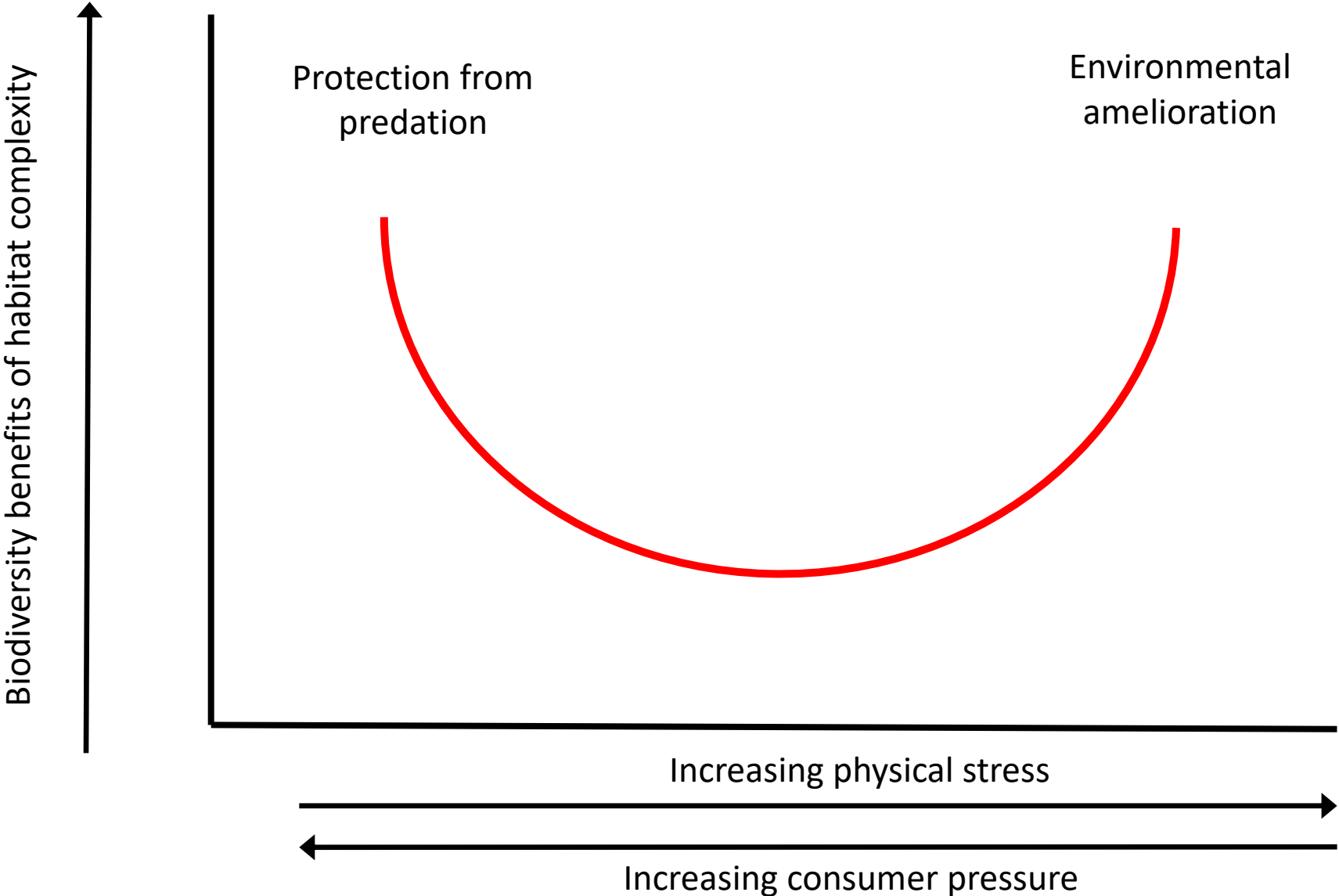
5 cm



Need predictive understanding of when and where enhancement of habitat complexity will have positive effects

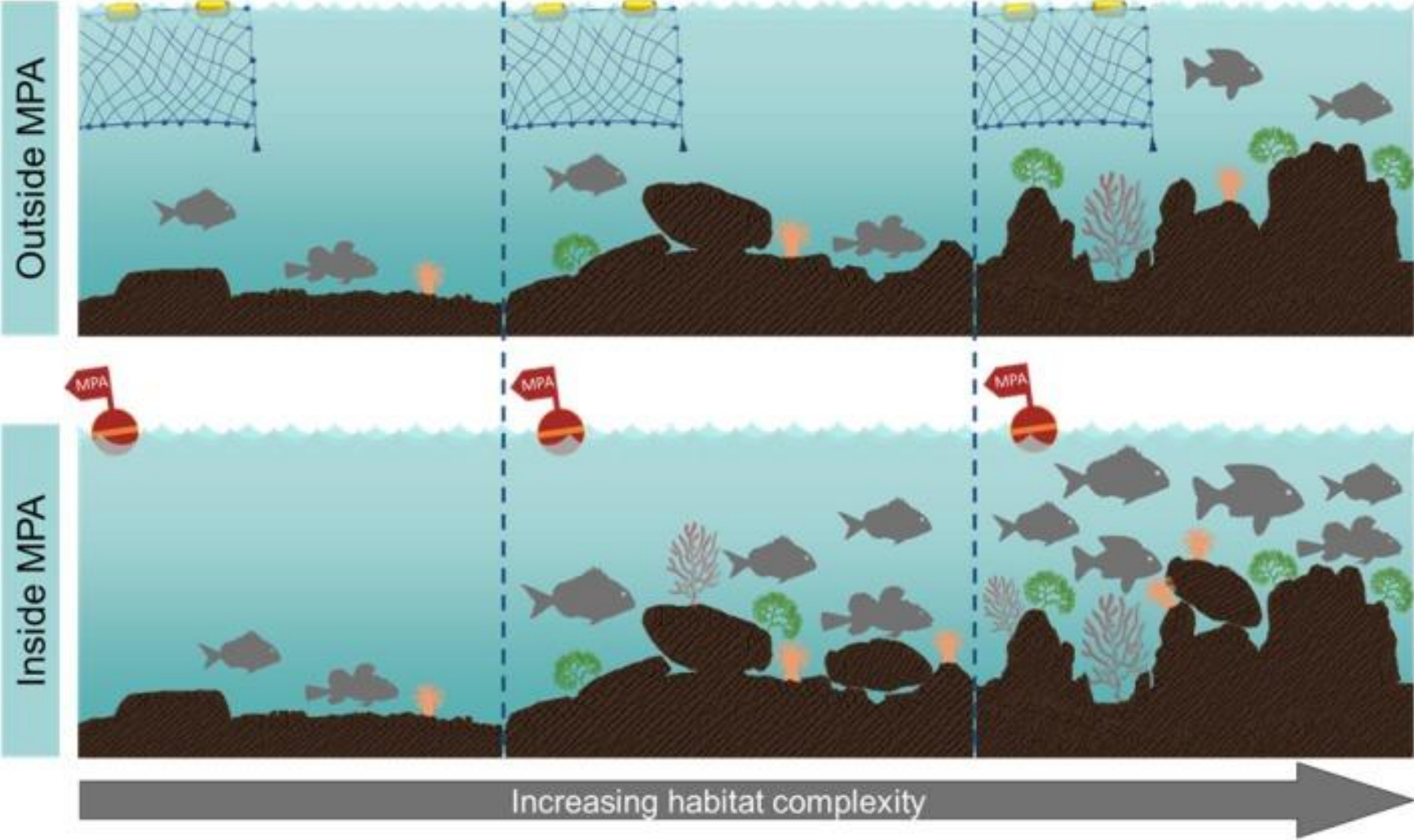


Effects of habitat complexity may depend on stressor mitigation



Adapted from: Bertness & Callaway, 1994

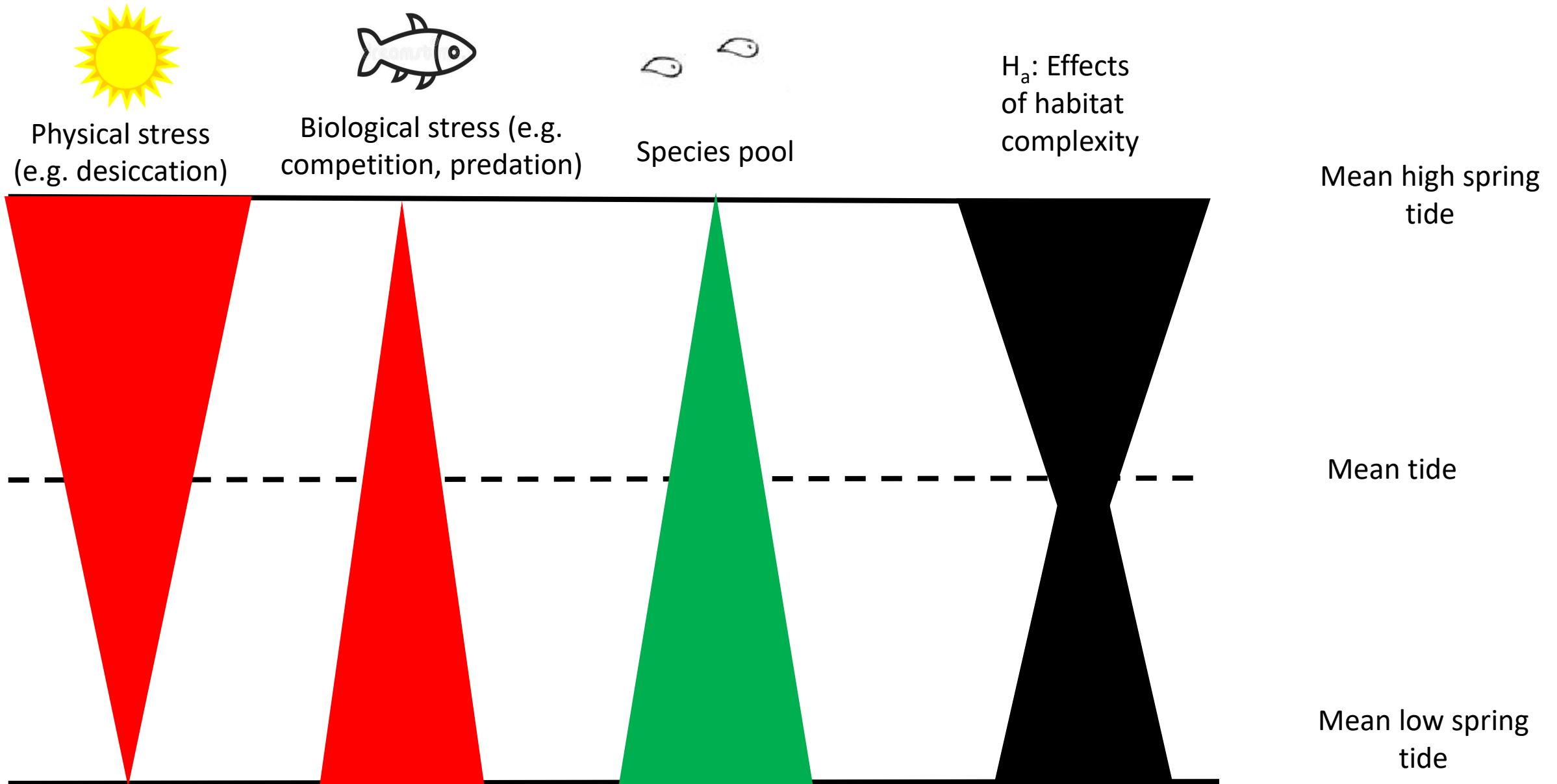
Effects of habitat complexity may depend on species pool



This talk

1. How do effects of habitat complexity vary with tidal elevation?
2. How do effects of habitat complexity vary across an estuarine gradient?

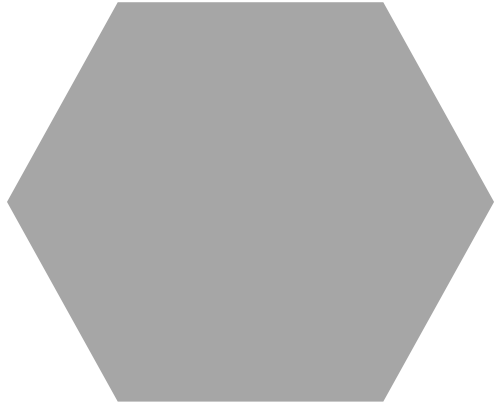
1. How do effects of habitat complexity vary across tidal elevation gradients?



Complex



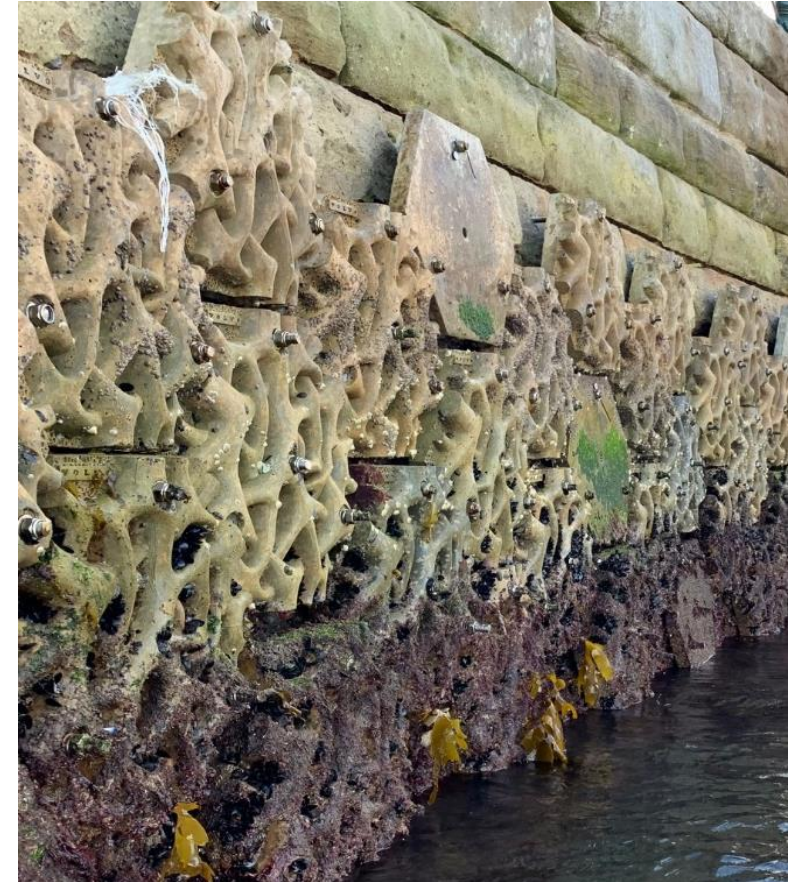
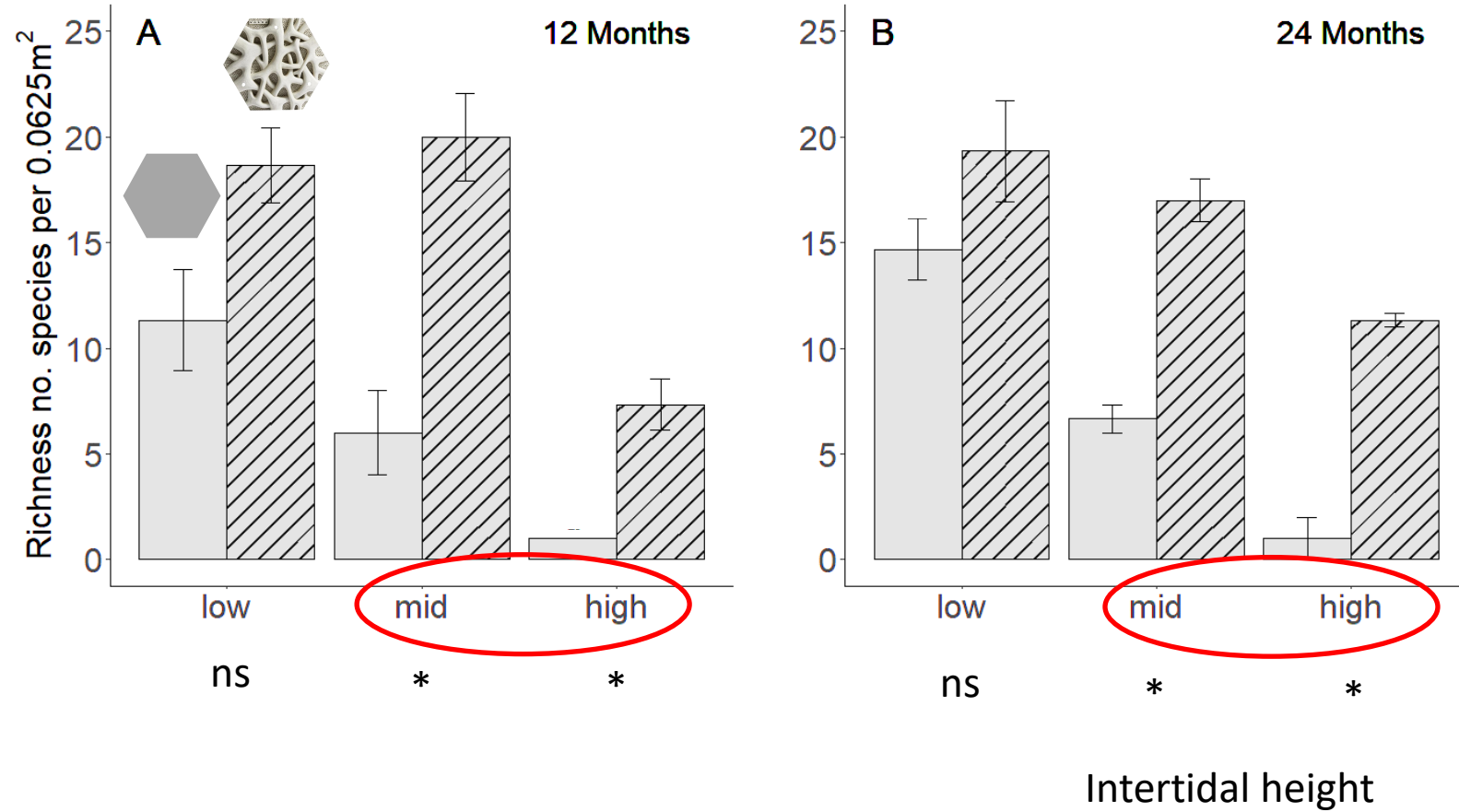
Flat

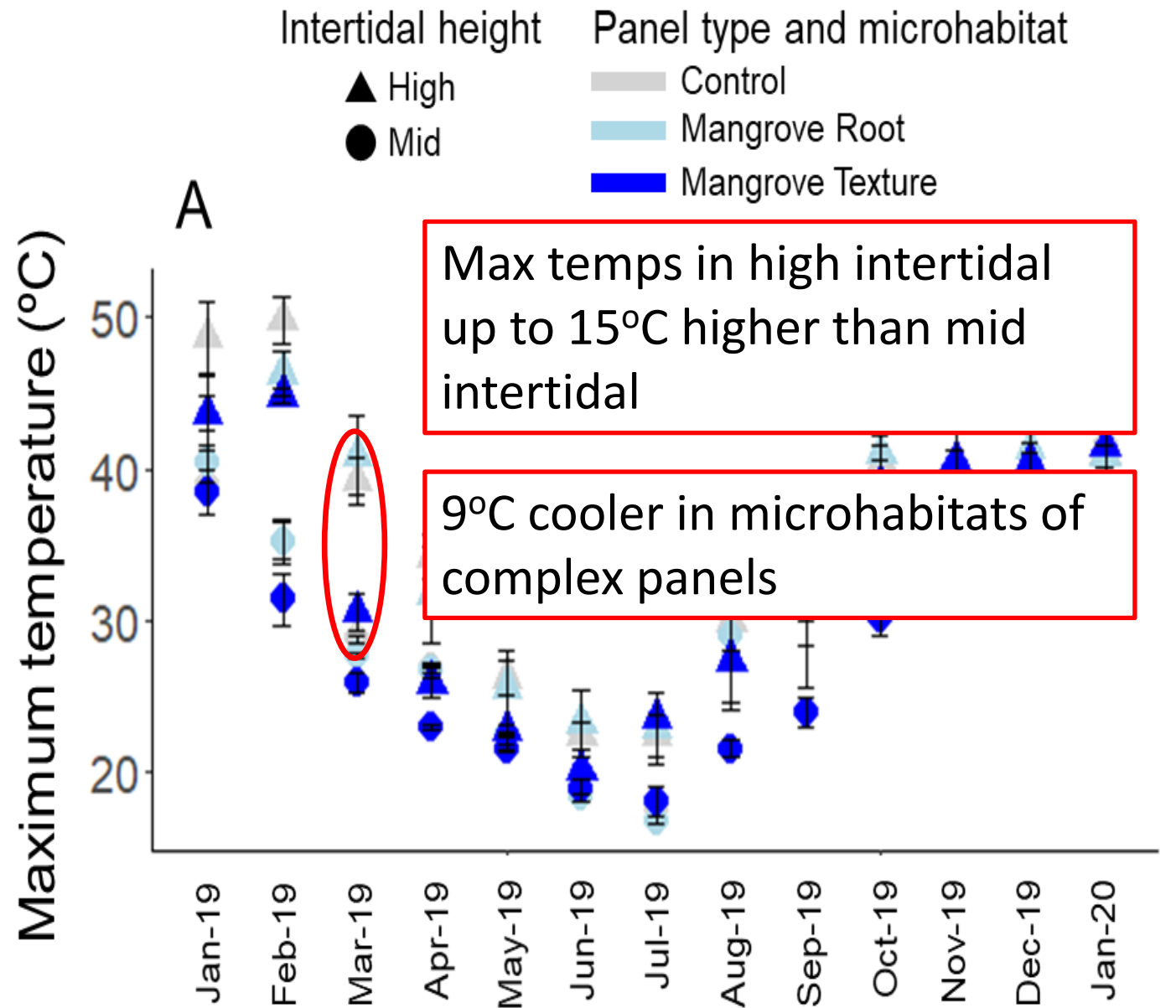
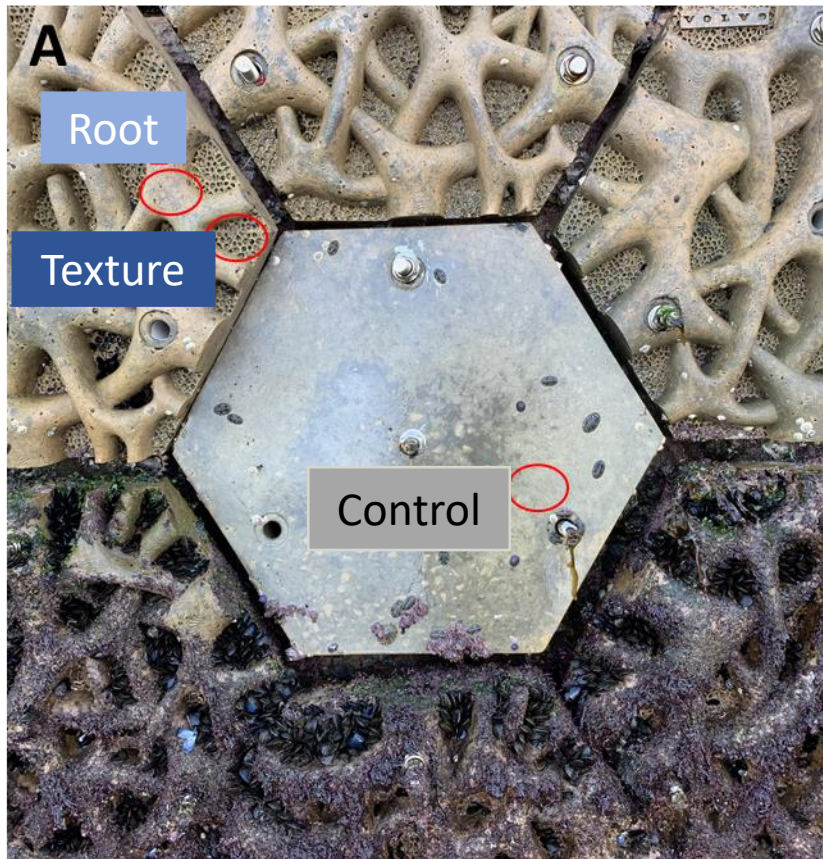


Installed Milson's Point, Sydney Harbour, October 2018

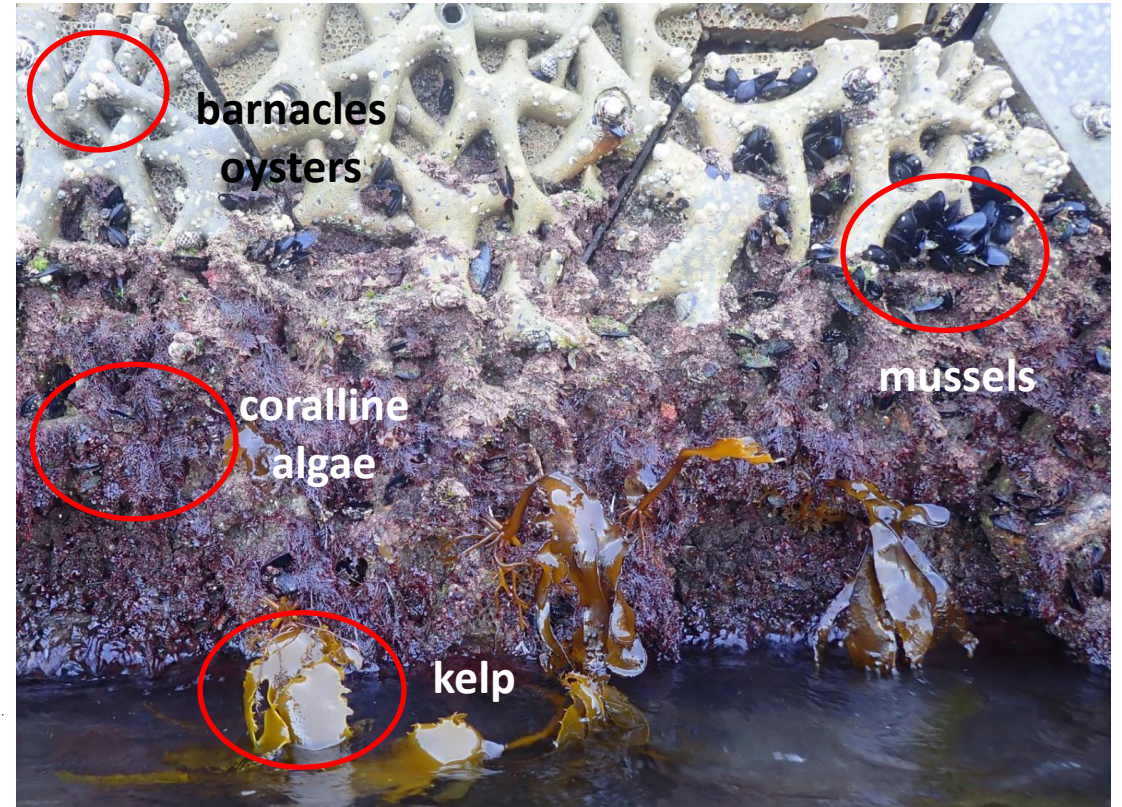
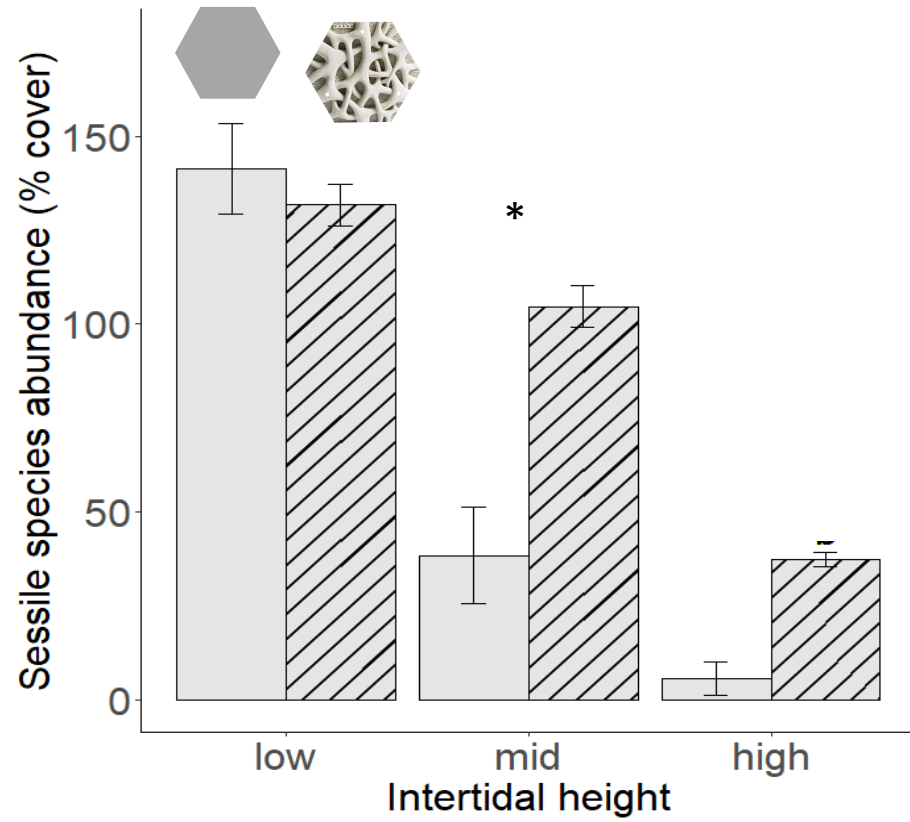


Species richness (12-36 mo)

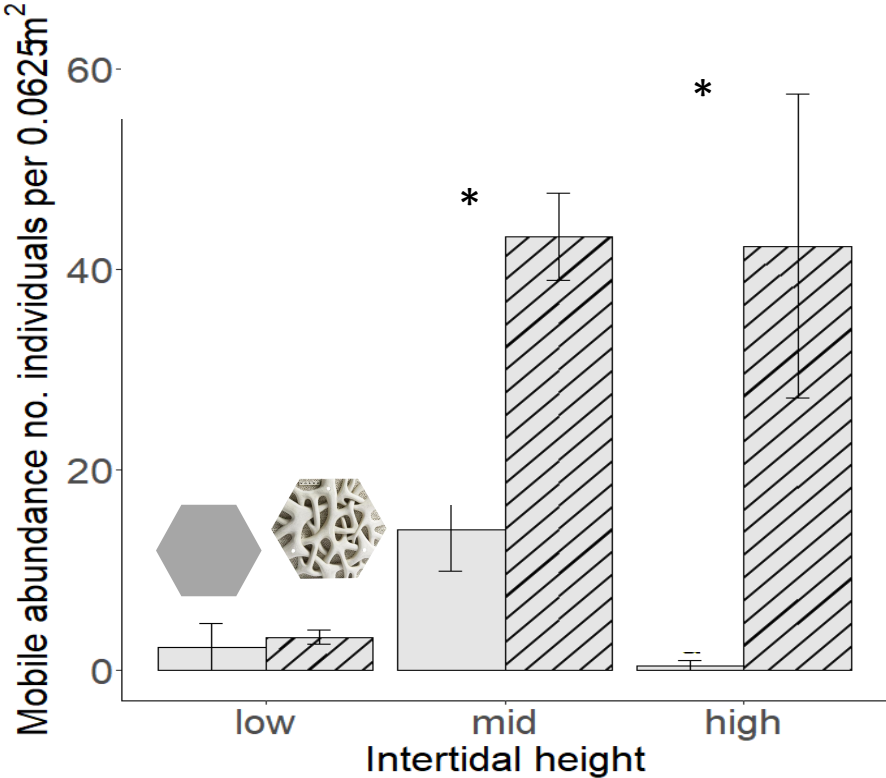




Sessile species cover (36 mo)



Mobile species abundance (36 mo)

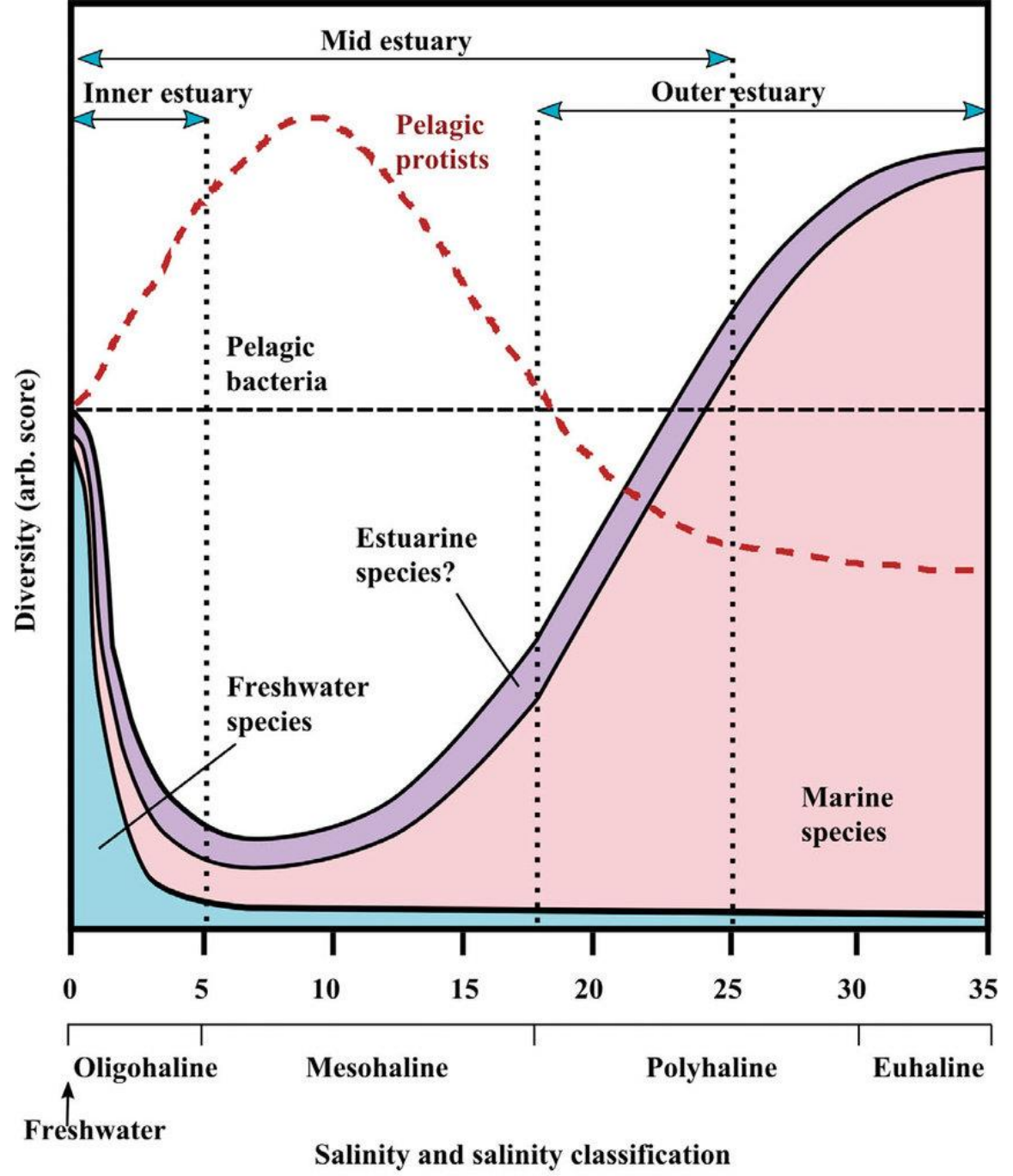


Summary: tidal elevation gradient

- Over 36 months, effects of complexity **strongest** in the **mid intertidal**
- **Low intertidal:** Reduced role for habitat complexity in mitigating abiotic stress? Inability of habitat complexity to fully mitigate competitive interactions?
- **High intertidal:** reduced pool of colonists on which complexity can act?

FURTHER STUDIES NEEDED TO DISENTANGLE MECHANISM

2. How do effects of habitat complexity vary across an estuarine gradient?

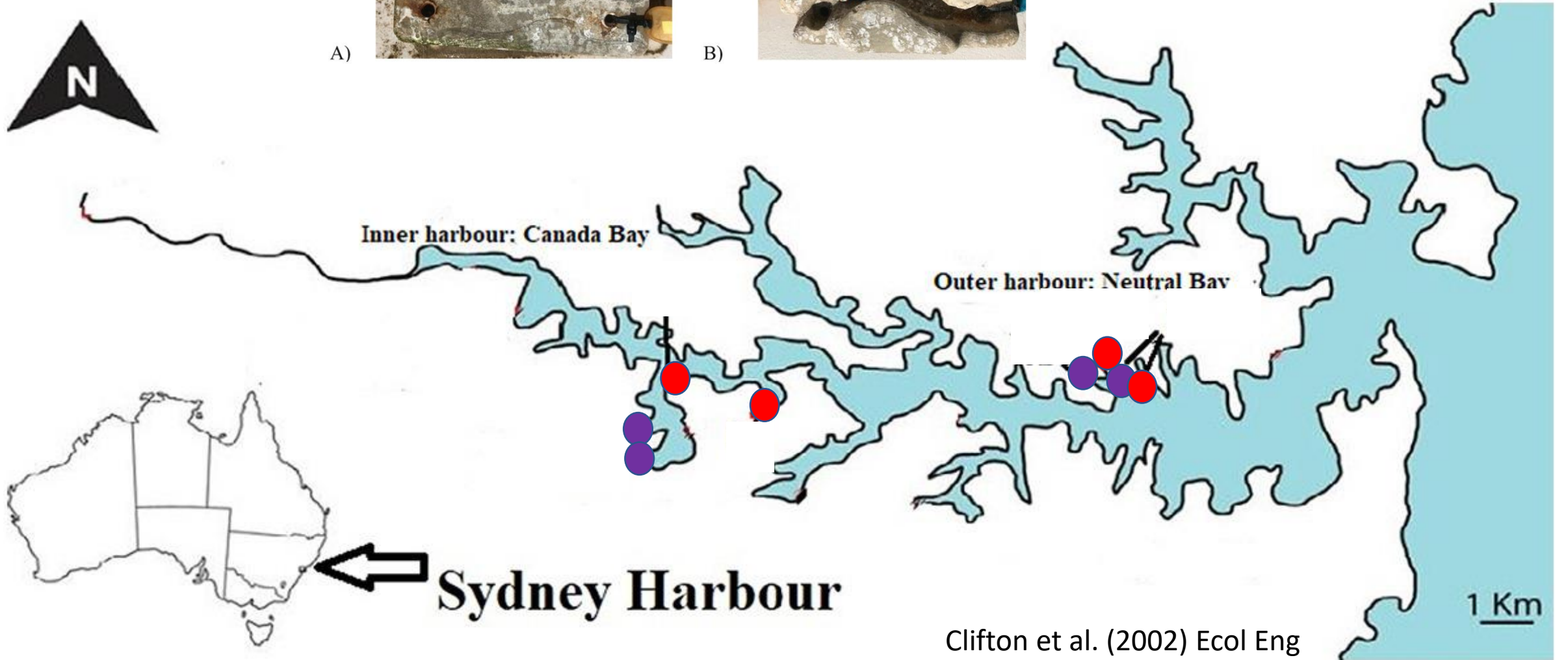




A)

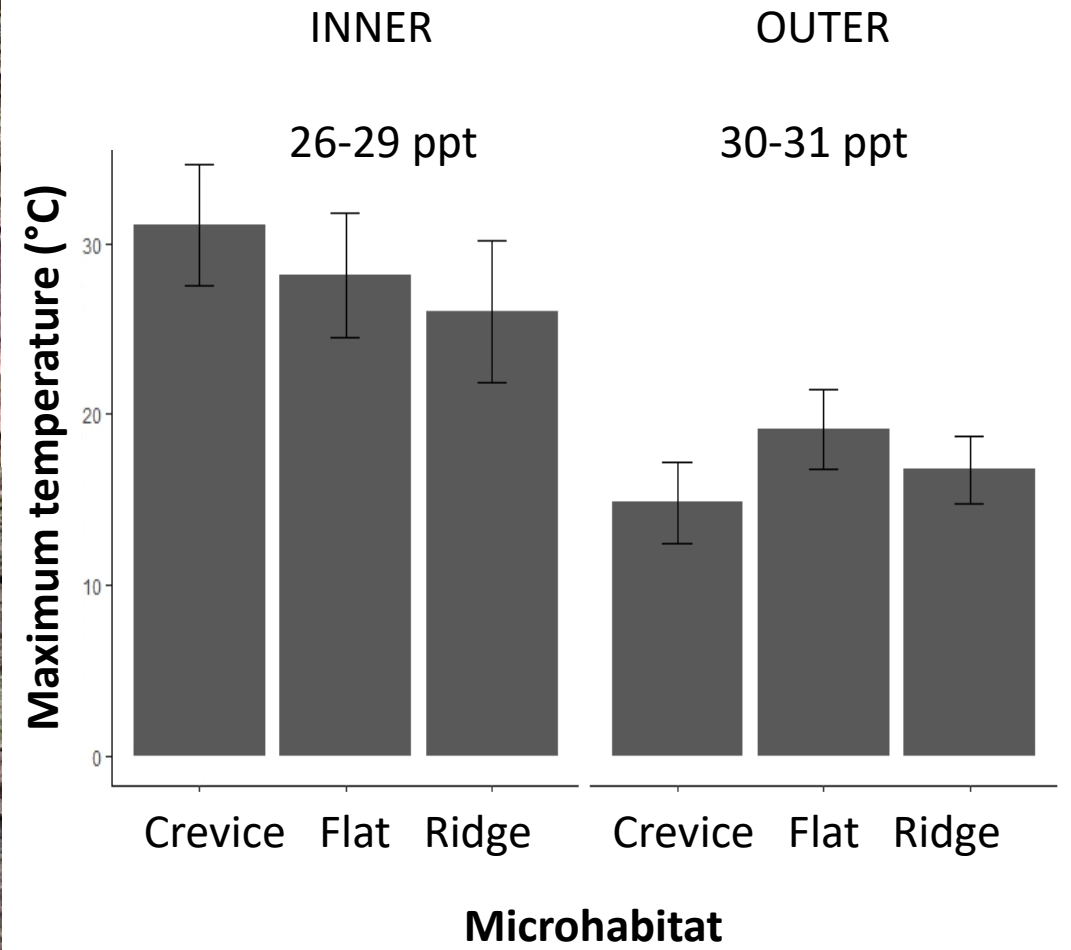


B)

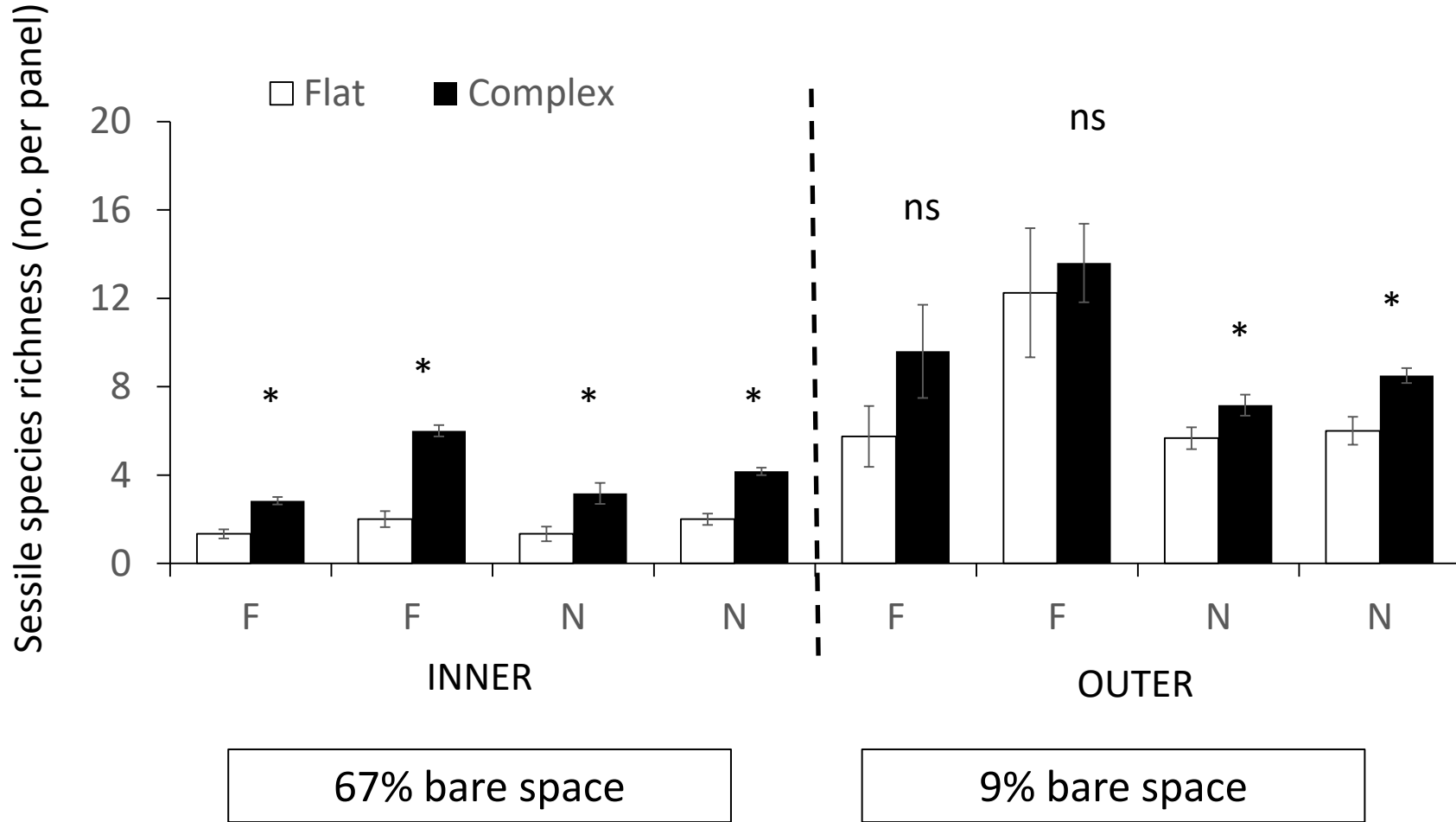


INNER

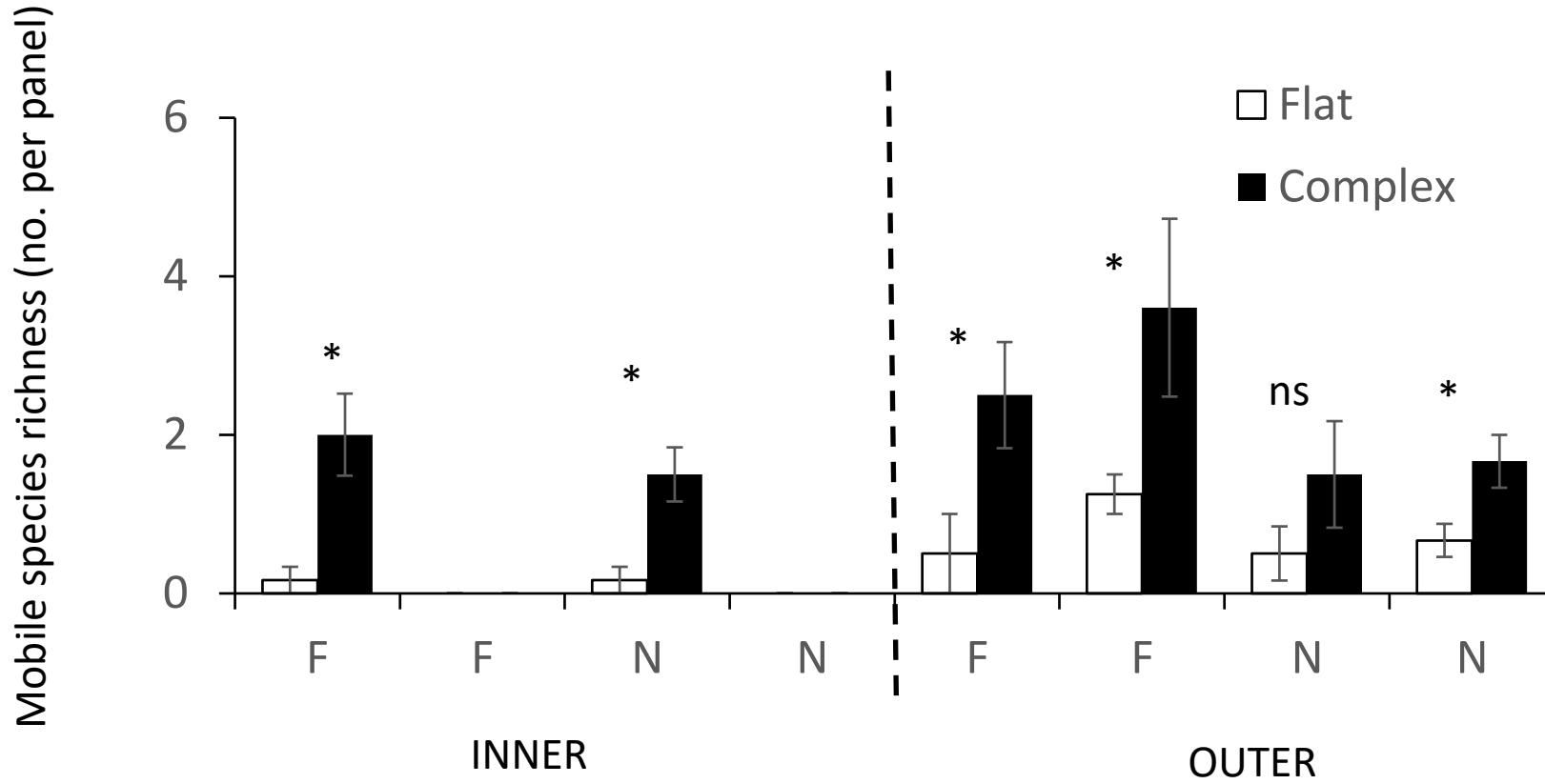
OUTER



Sessile species richness



Mobile species richness



Summary: estuarine gradient

- Effects of habitat complexity ranged from neutral to positive
- Greater colonisation of lower harbour panels
 - More species recorded
 - But complexity insufficient to mitigate competitive interactions at some sites?
- Effect sizes generally greater in inner harbour
 - Greater role in stress mitigation?

Conclusions

- Effects of habitat complexity not universally positive
- Effective application of eco-engineering interventions requires knowledge of local biodiversity and key stressors
- To avoid greenwashing and ineffectual interventions, bespoke approaches to ecoengineering are needed

Acknowledgements

Aria Lee, interns, field volunteers

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