

# Working with Nature for Biosecure Port Infrastructure



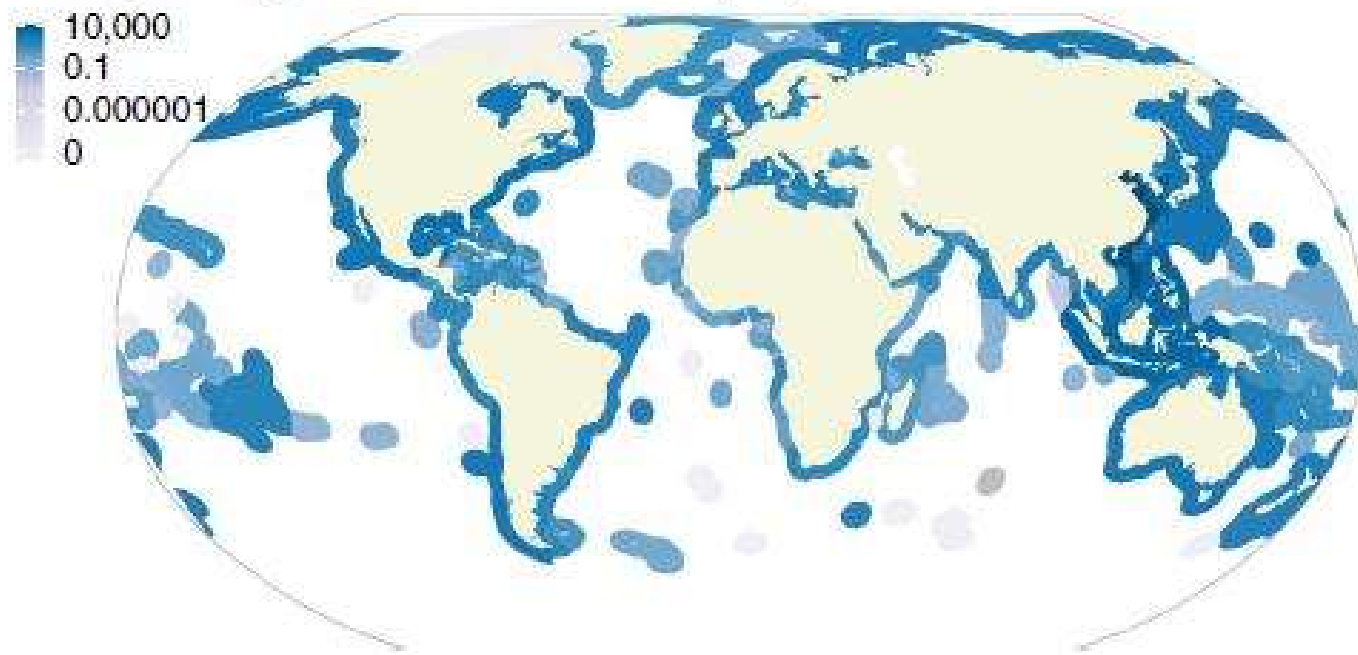
A/PROFESSOR KATIE DAFFORN



@DrKDafforn  
@livingseawalls

# Built structures have changed the global seascape

**a** Physical footprint of marine construction (km<sup>2</sup>)



Bugnot et al. 2021, *Nat. Sust.*

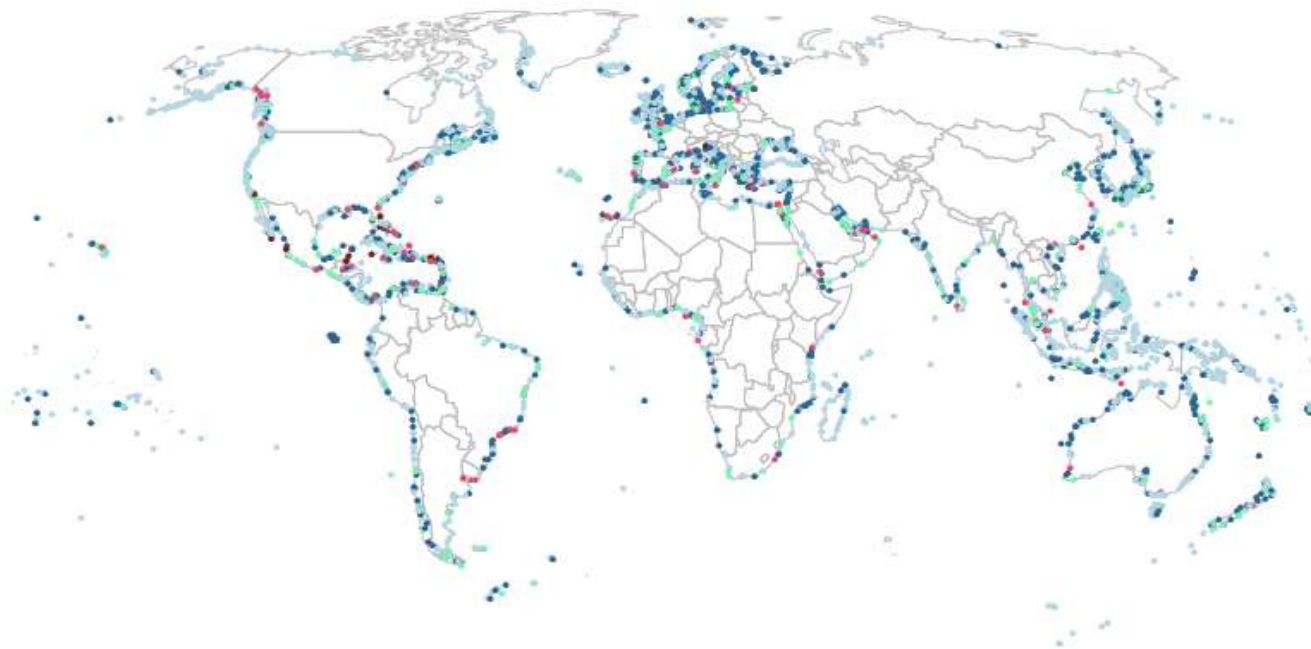
# Commercial ports



Bugnot et al. 2021, *Nat. Sust.*

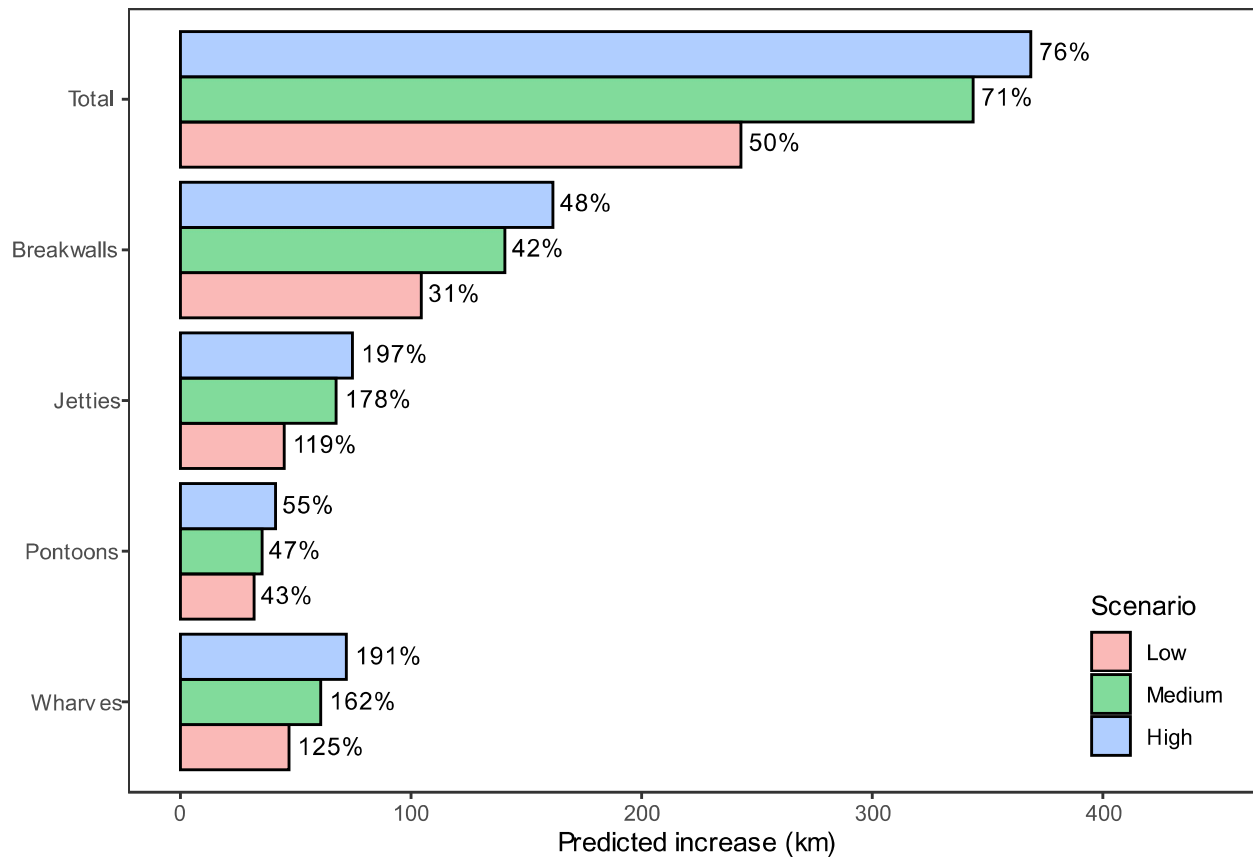
Port size

- Very large
- Large
- Medium
- Small
- Very small

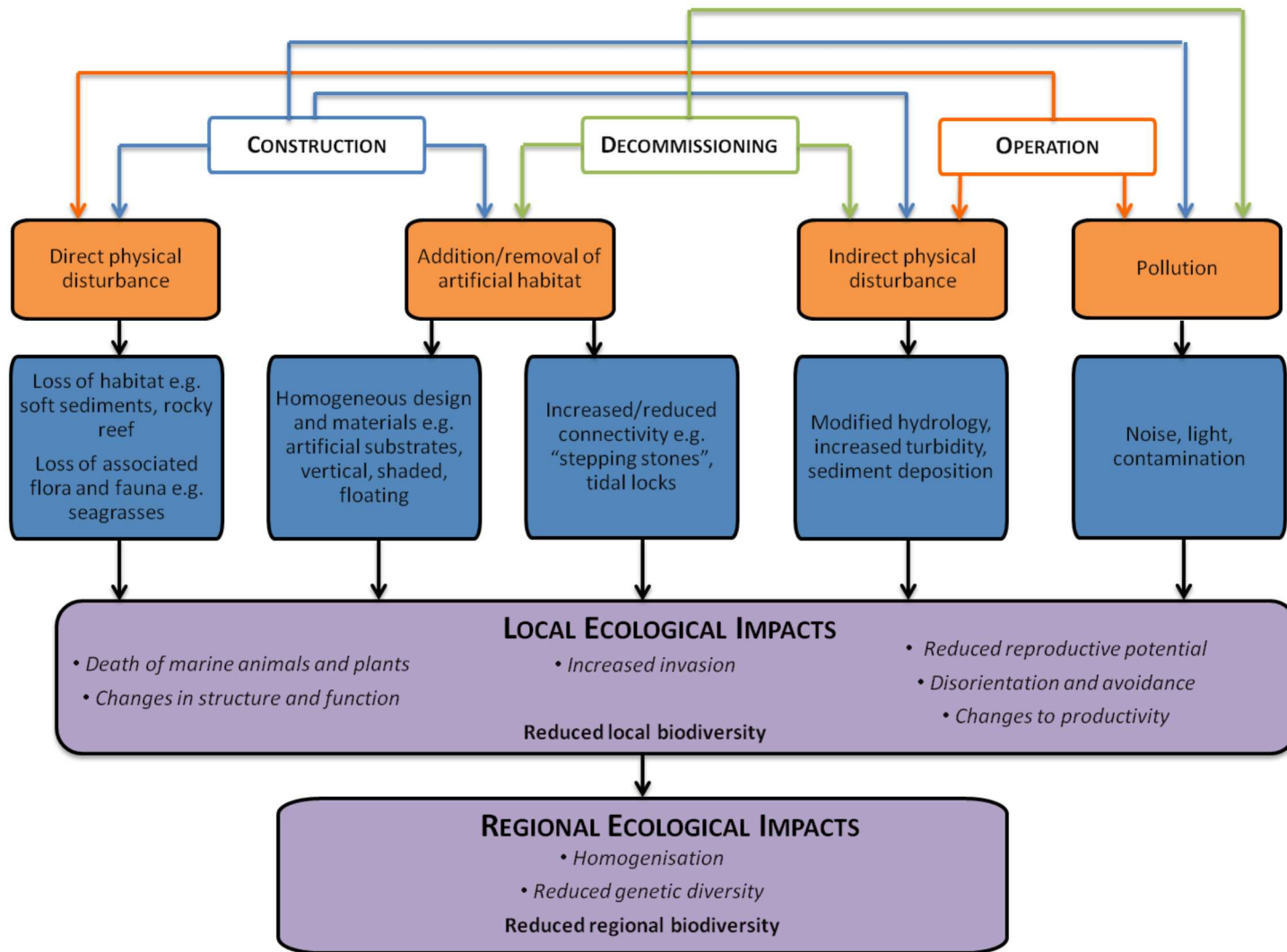


# And the future is looking concrete...

50-76% EXPANSION OF COASTAL INFRASTRUCTURE OVER 25 YEARS



Floerl et al. 2021, *Nat. Sust.*

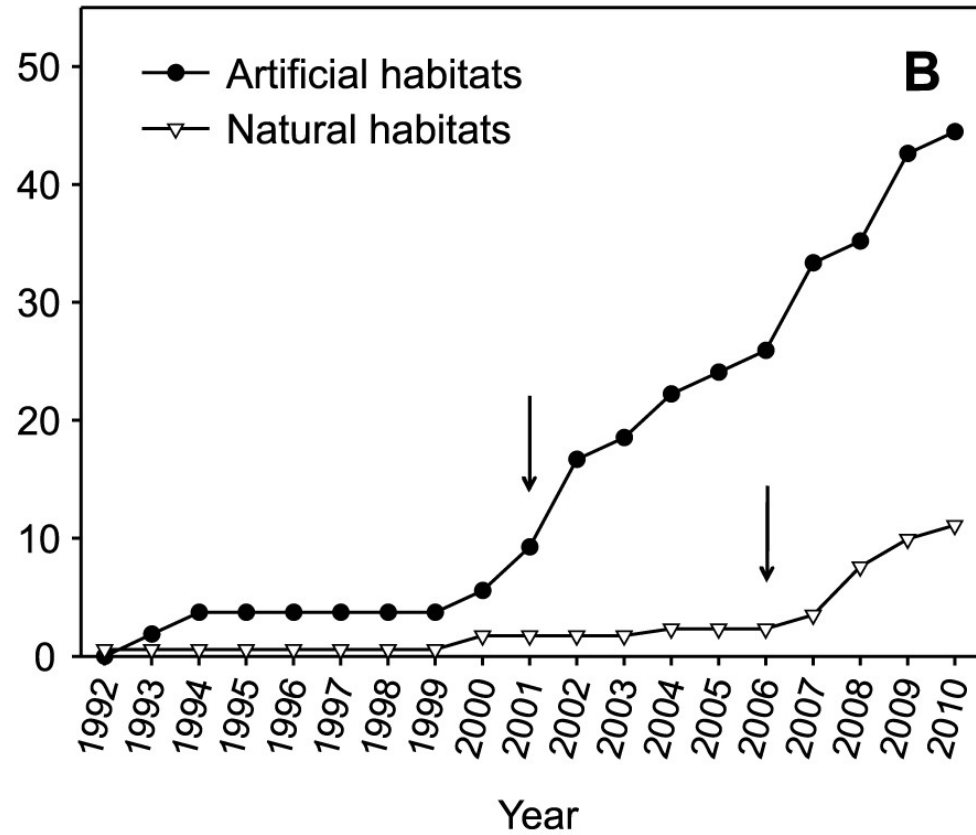


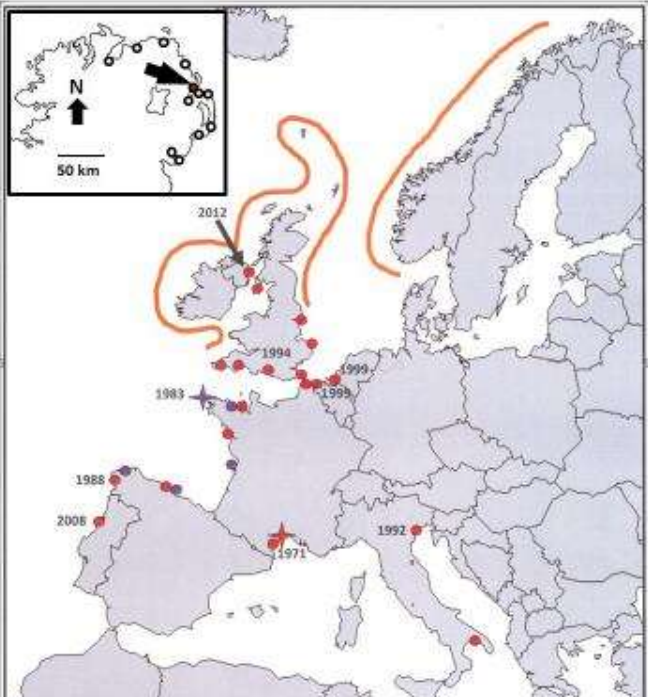
Dafforn et al. (2015) *Frontiers in Ecology and the Environment*





## Northward range shift of non-native coral facilitated by artificial habitats





Northward range shift of the non-native alga  
*Undaria pinnatifida*

Spread linked to recreational craft and provision of  
habitat by marinas

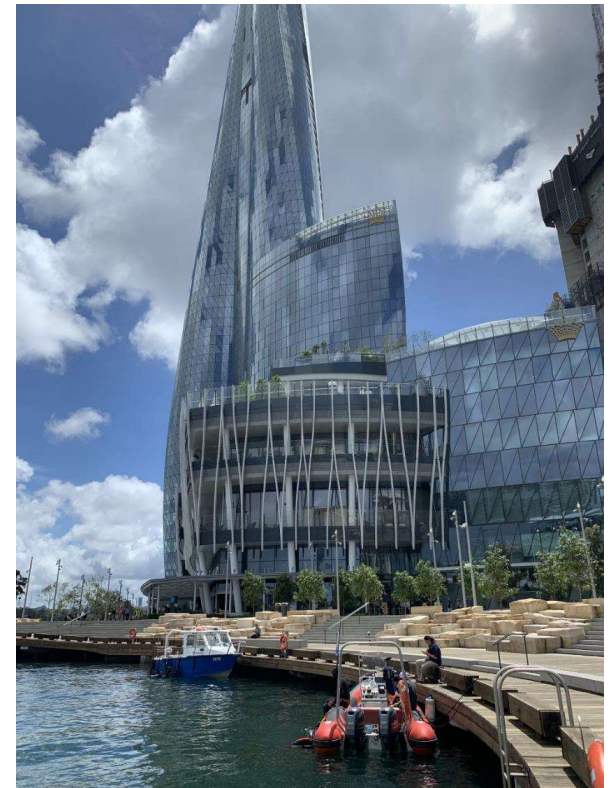
Minchin & Nunn (2014) *Bioinvasions Records*

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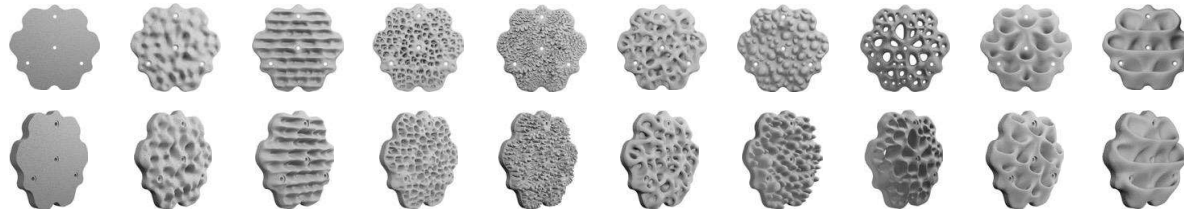
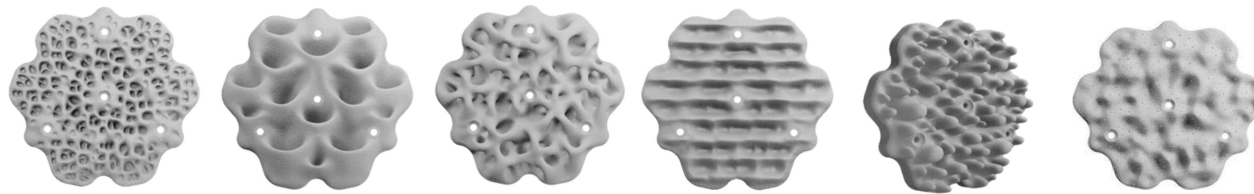
- 1) Increasing surface complexity
- 2) Including natural materials
- 3) Transplanting native species
- 4) Increasing daytime lighting

Airoldi et. al (2015) *Diversity and Distributions*,  
Dafforn et al. (2015) *Frontiers in Ecology and the Environment*  
Dafforn (2017) *Management of Biological Invasions*



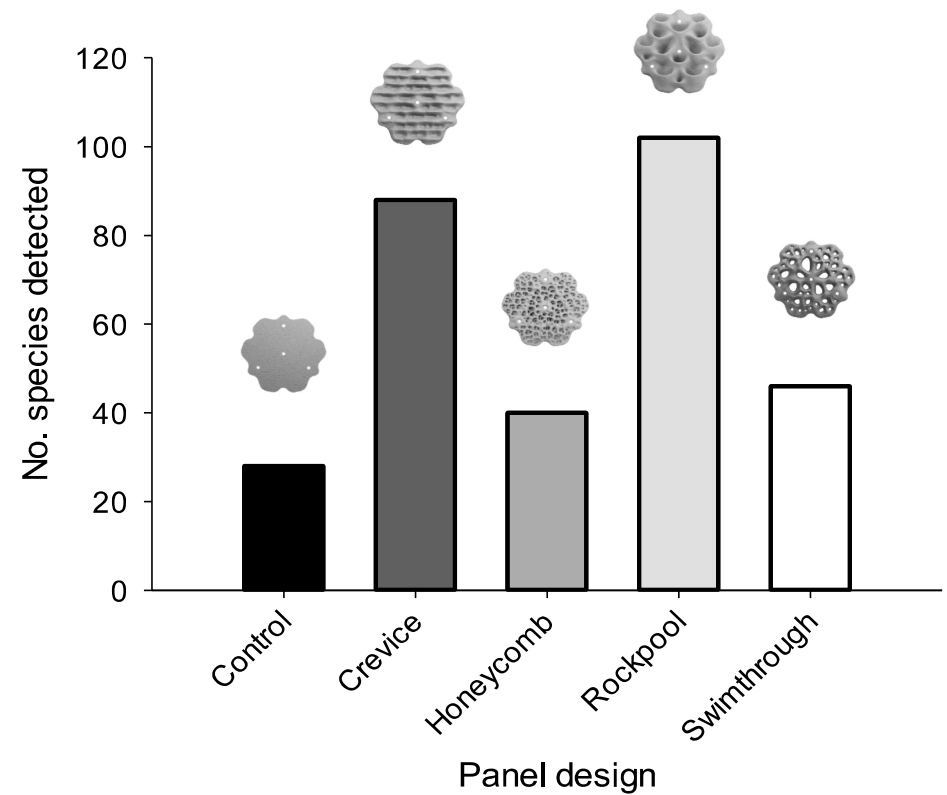
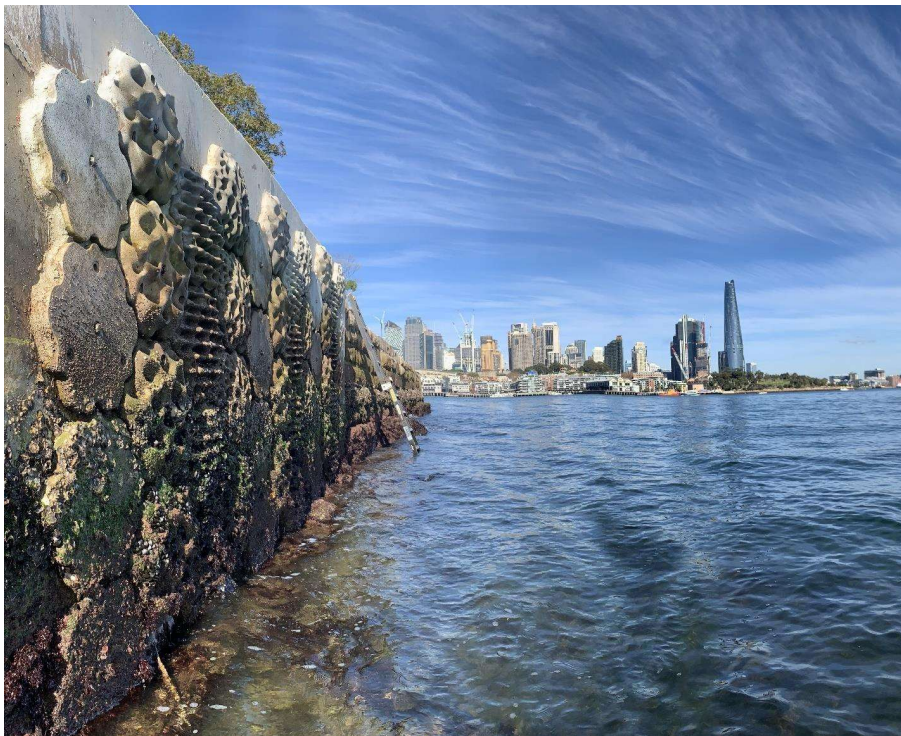


# 1) Increasing surface complexity

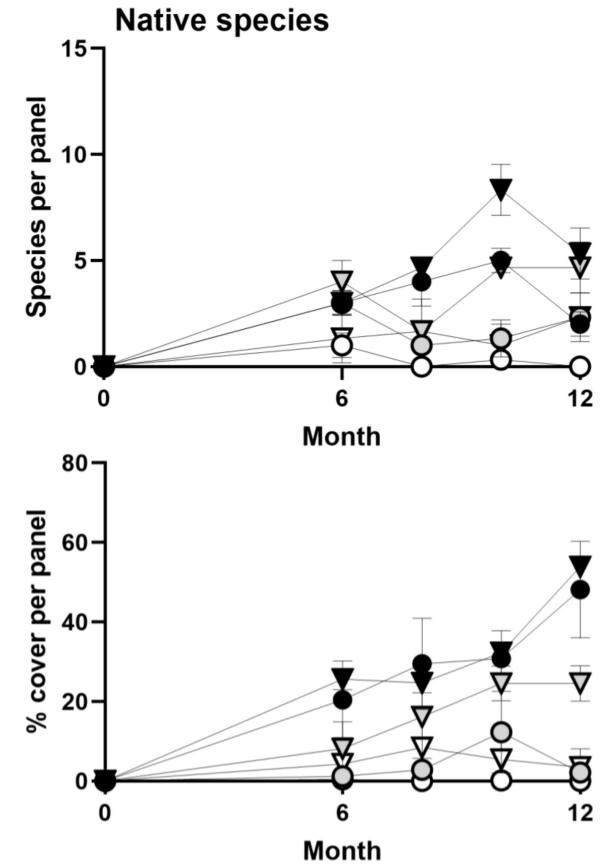
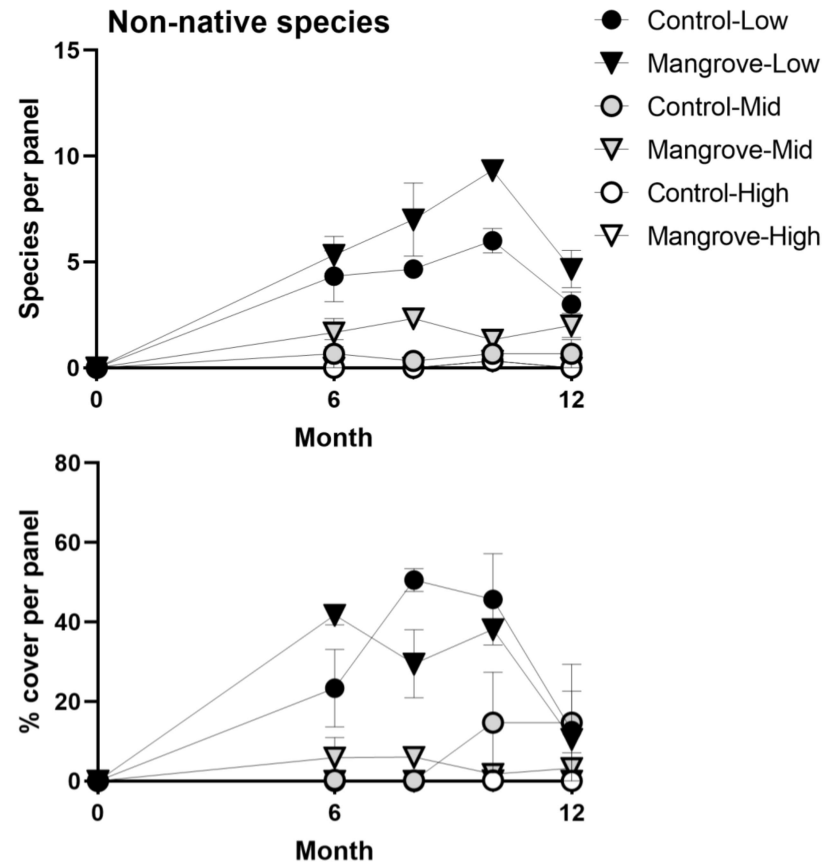
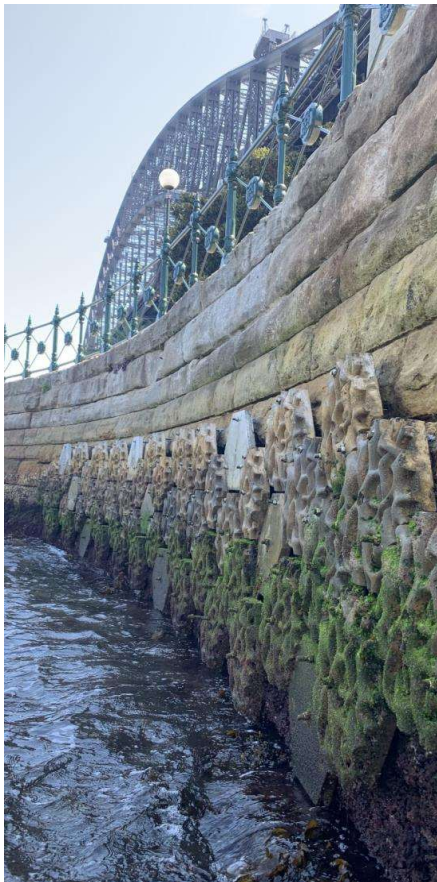


# Complexity increases biodiversity

BISHOP, VOZZO.... AND DAFFORN (2022) PHIL. TRANS. OF THE ROYAL SOCIETY B



# Non-native up to 75% in the low intertidal on complex panels



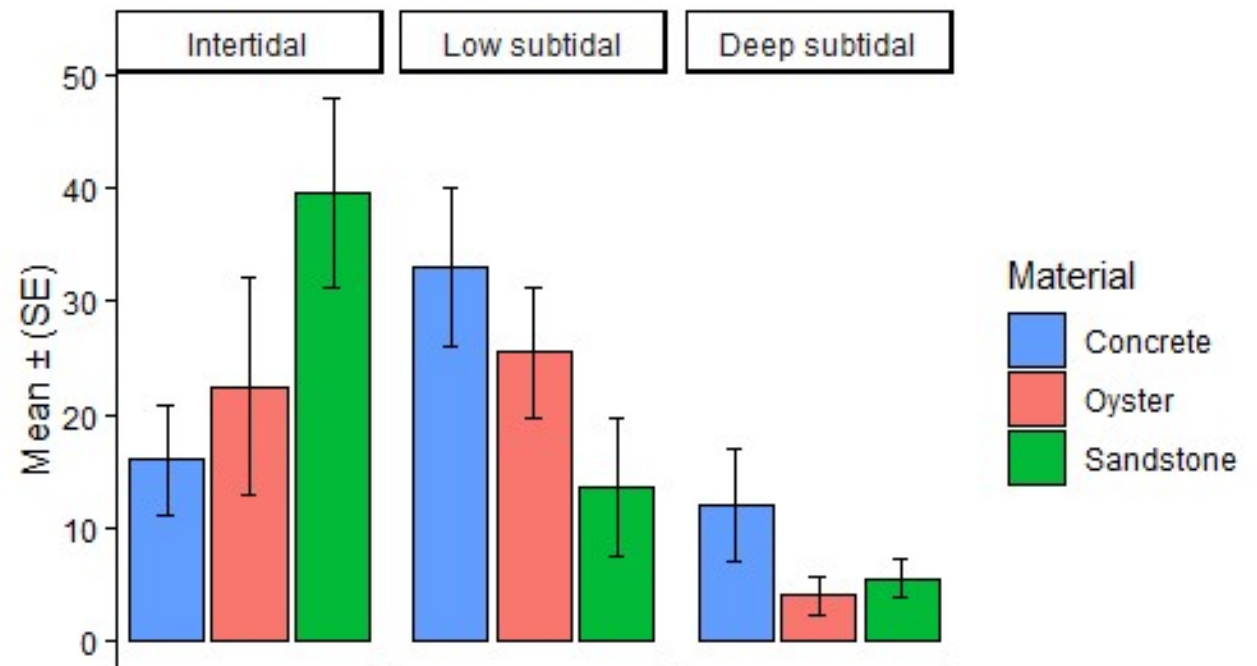


## 2) Including natural materials

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# Greatest non-native cover in the intertidal on sandstone materials



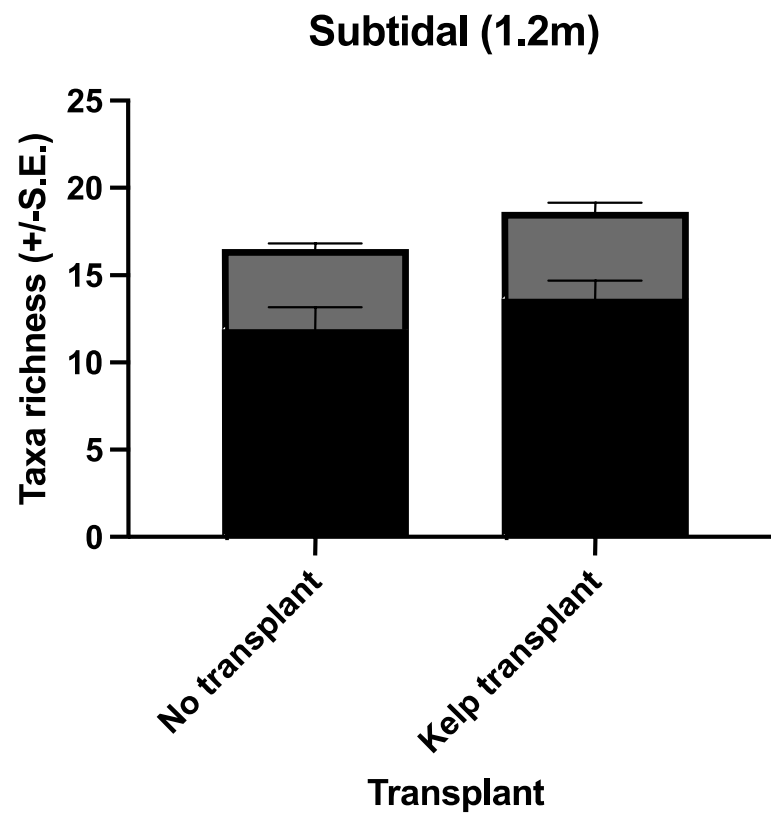


### 3) Transplanting native species

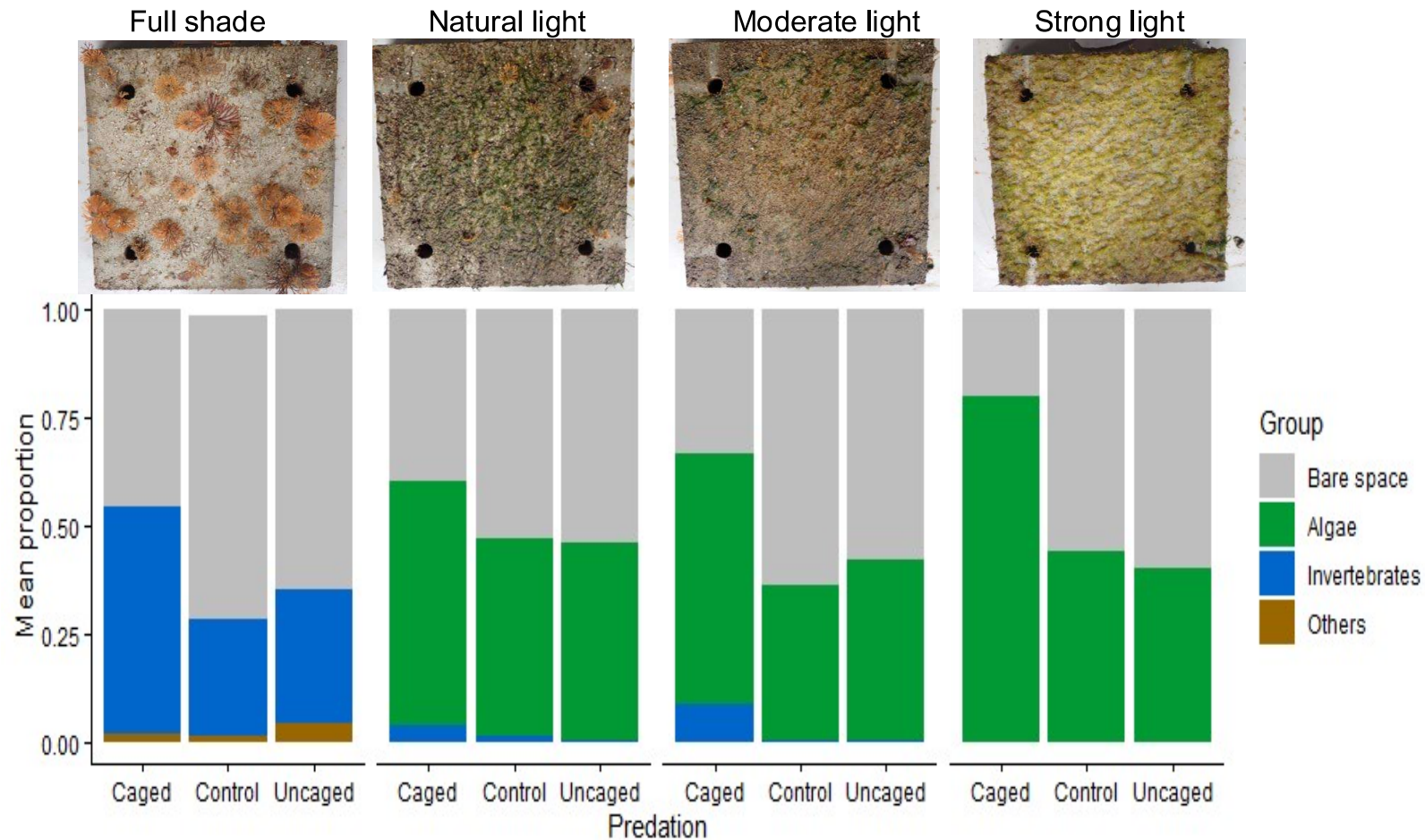
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# Kelp transplants increased richness overall in shallow subtidal

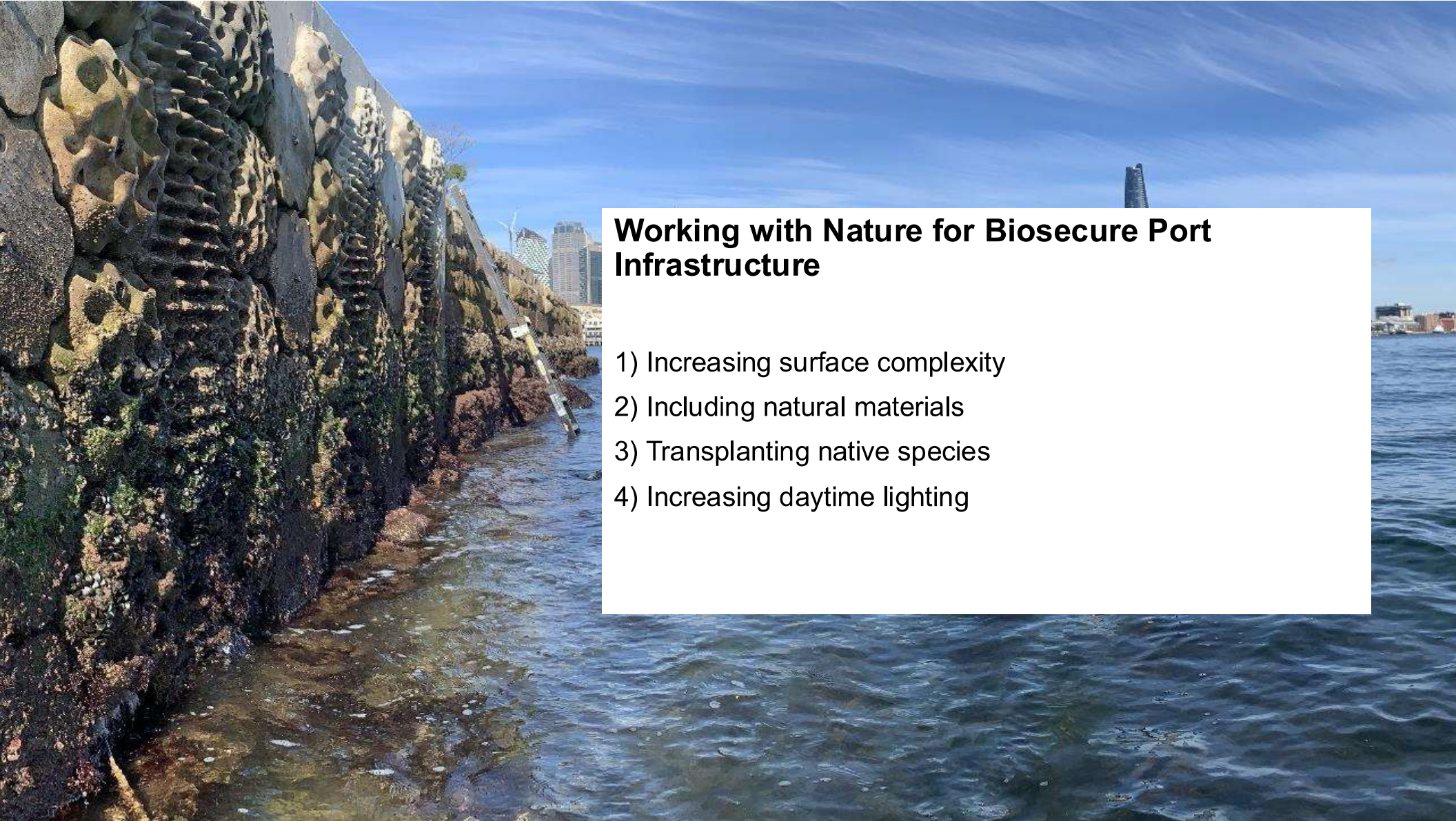


## 4) Increasing daytime lighting



Schaefer et al. (in prep)





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- 1) Increasing surface complexity
- 2) Including natural materials
- 3) Transplanting native species
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# Acknowledgements

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My amazing co-authors and collaborators:

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**Australian Government**  
**Department of Agriculture,  
Fisheries and Forestry**

