



2023 International Temperate Reefs Symposium



# Giant kelp (*Macrocystis pyrifera*) in Wellington harbour: Status, responses to marine heatwaves, and restoration challenges

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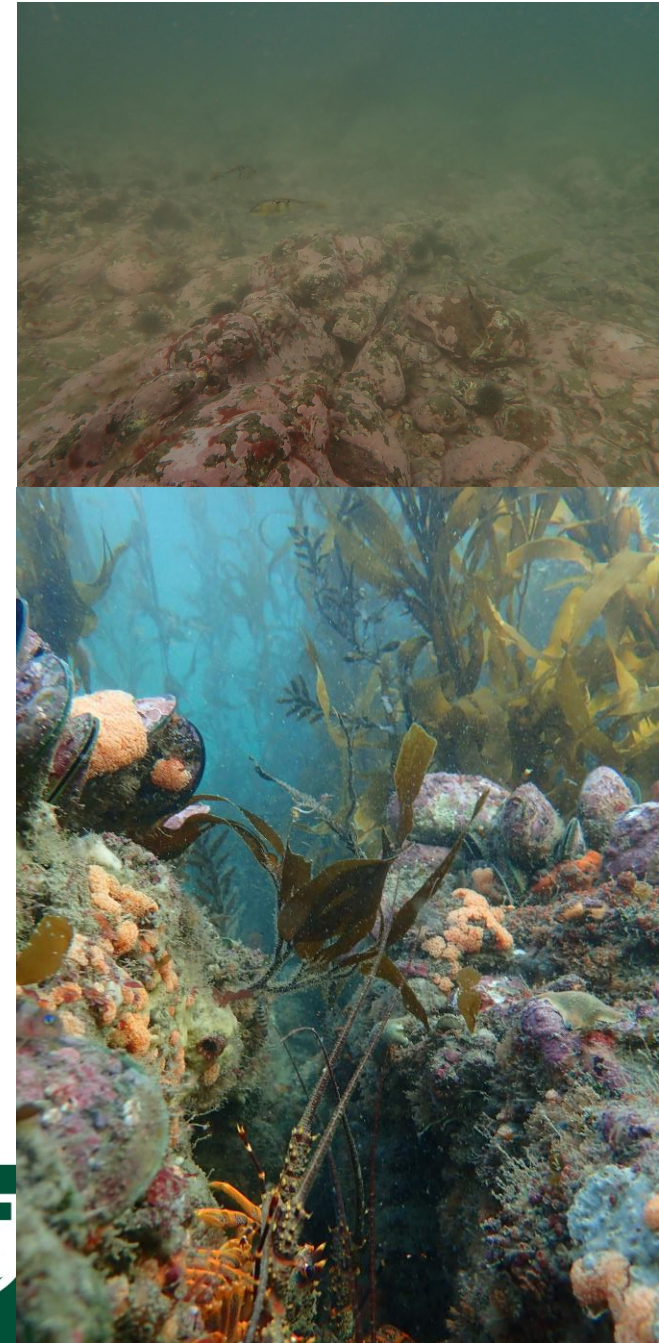
RUTHERFORD  
DISCOVERY FELLOWSHIPS



# Love Rimurimu seaweed restoration

Group brought together to restore *Macrocystis pyrifera* in Wellington Harbour

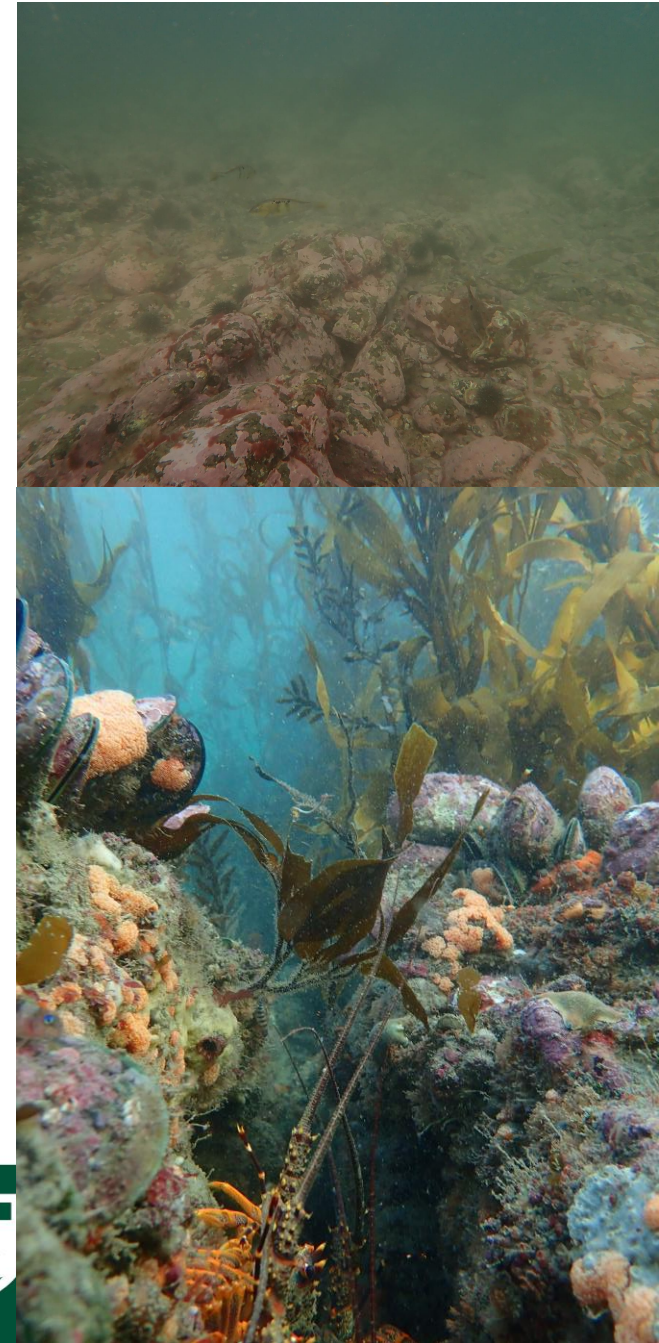
- Community outreach (Mountains to the Sea Wellington)
- Juvenile sporophyte restoration (NIWA)
- Seaweed community status, stress testing and future-proofed restoration (VUW)



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- **Seaweed community status, stress testing and future-proofed restoration (VUW)**





# Matiu Island

Once a focal site of  
kai gathering for  
local iwi

# Community member memories

- Loss of pāua
- Degradation of kina quality
- Loss of agar producing seaweeds
- Loss of fin fish species



# *Macrocystis* past distribution

- Hay et al. 1990
  - Supported by herbarium records

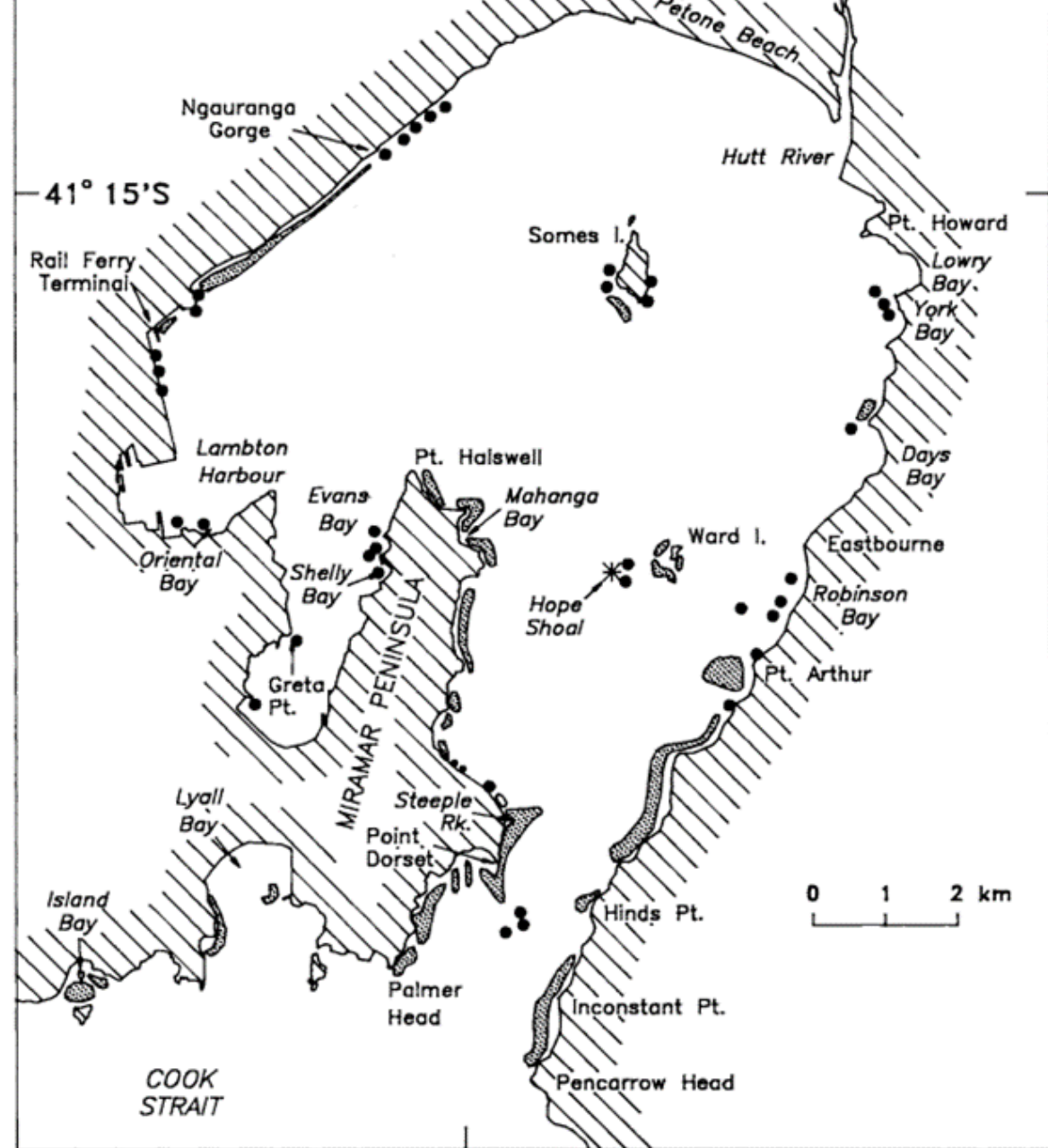


Fig. 4 – Map of Wellington Harbour showing localities mentioned in the text and the distribution of the main beds of *Macrocystis* (stippled). Sporadic distribution and isolated records are marked with solid dots. Data mainly from surveys in November 1988 and April 1990. Note: The size of the beds is exaggerated for clarity.

# Macrocystis 2022 distribution

- Range retraction
- Present range

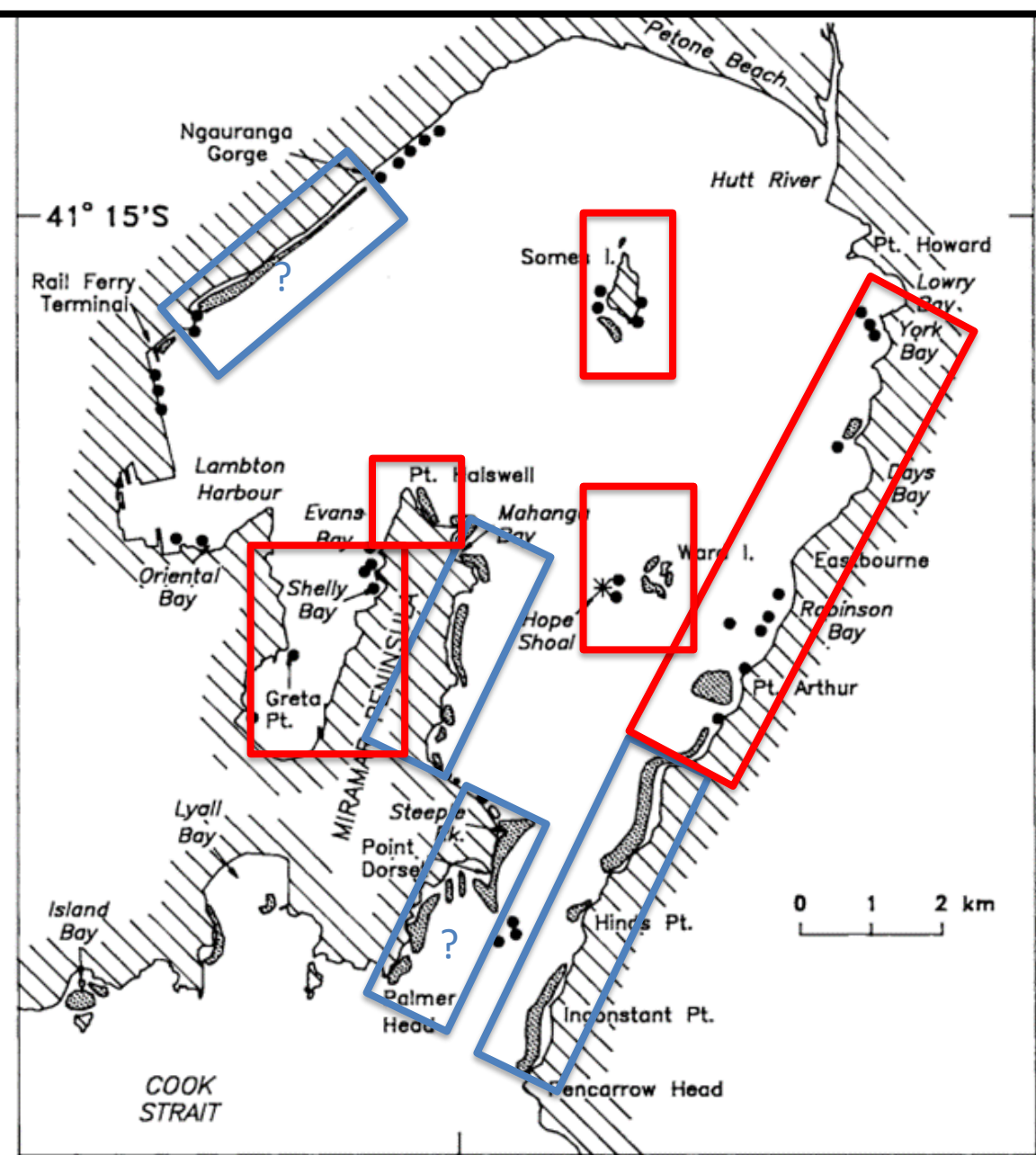


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# Challenges

- Cannot restore without knowing causal agent(s) of change
- No adequate baseline
- No adequate time series of biotic and abiotic data in kelp forests
- A lot of “act first, think later” attitudes

# Why did it disappear?

- Increased sediments and pollutants
- Decreasing irradiance
- Marine heatwave events
- Increases in kina (sea urchins, *Evechinus chloroticus*)?

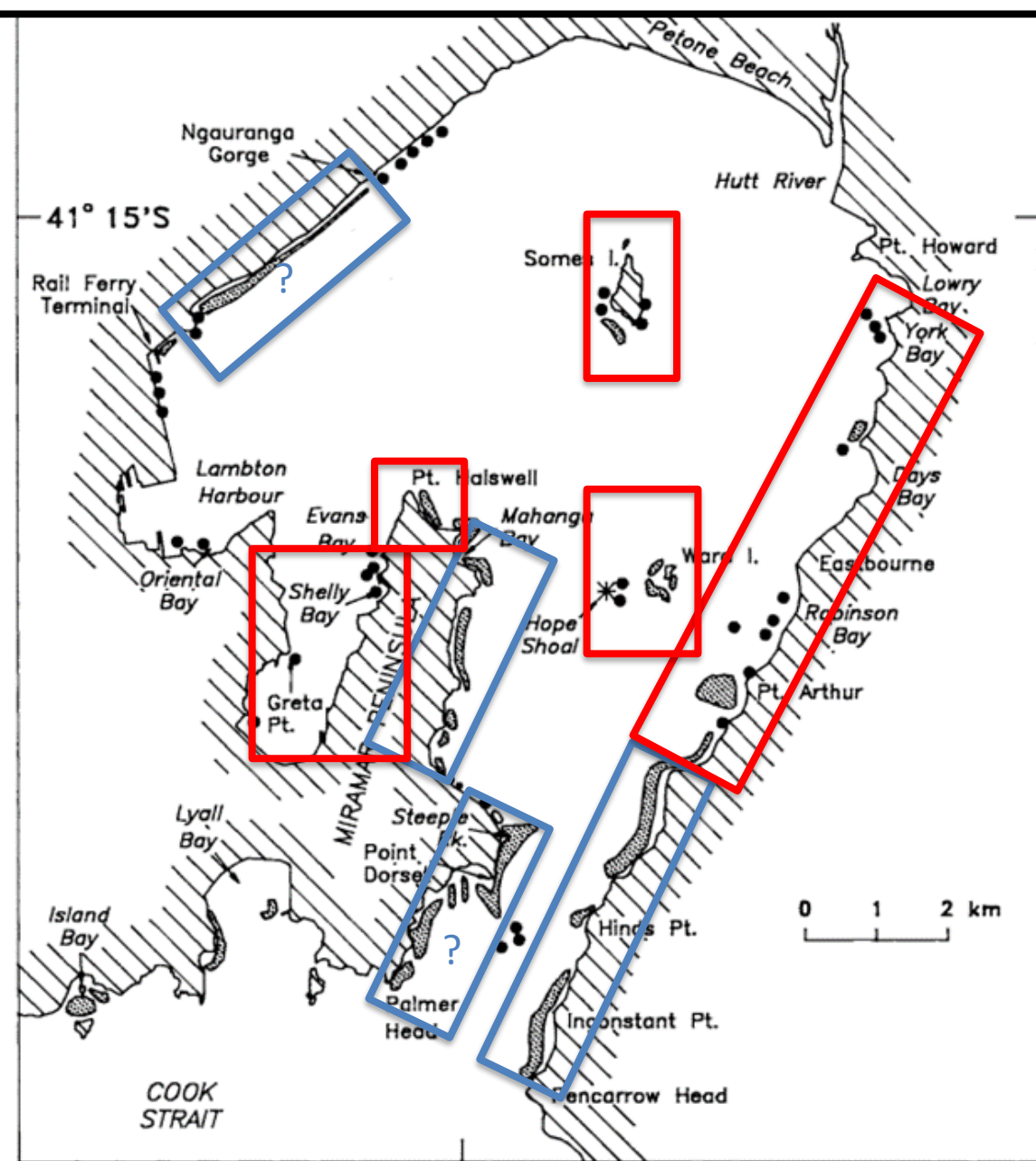


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# Loss of other important species

- *Carpophyllum maschalocarpum*
- *Cystophora* spp.

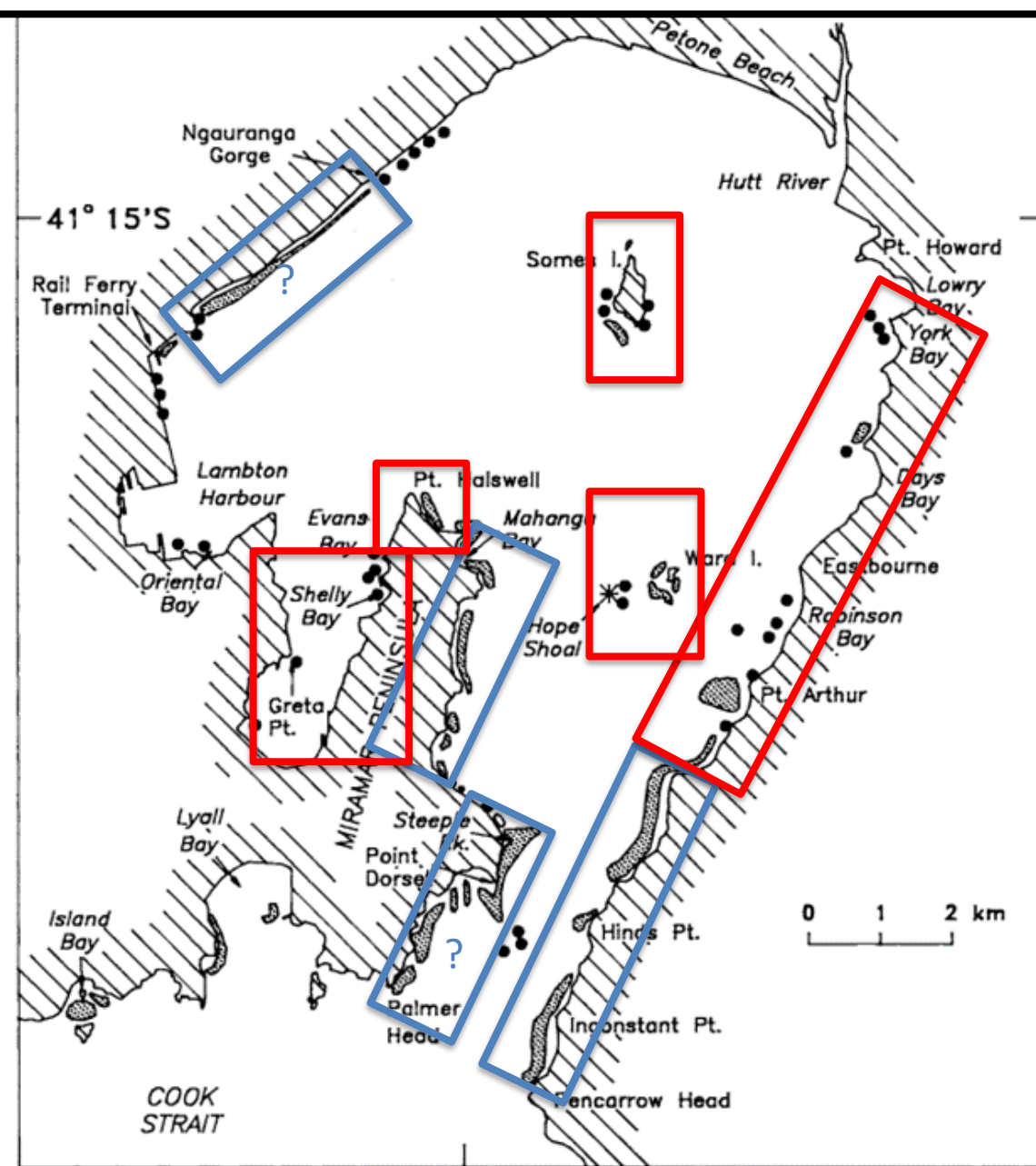


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# Macrocystis 2022 distribution

Six initial focal sites chosen due to Mana Whenua interest and scientific merit

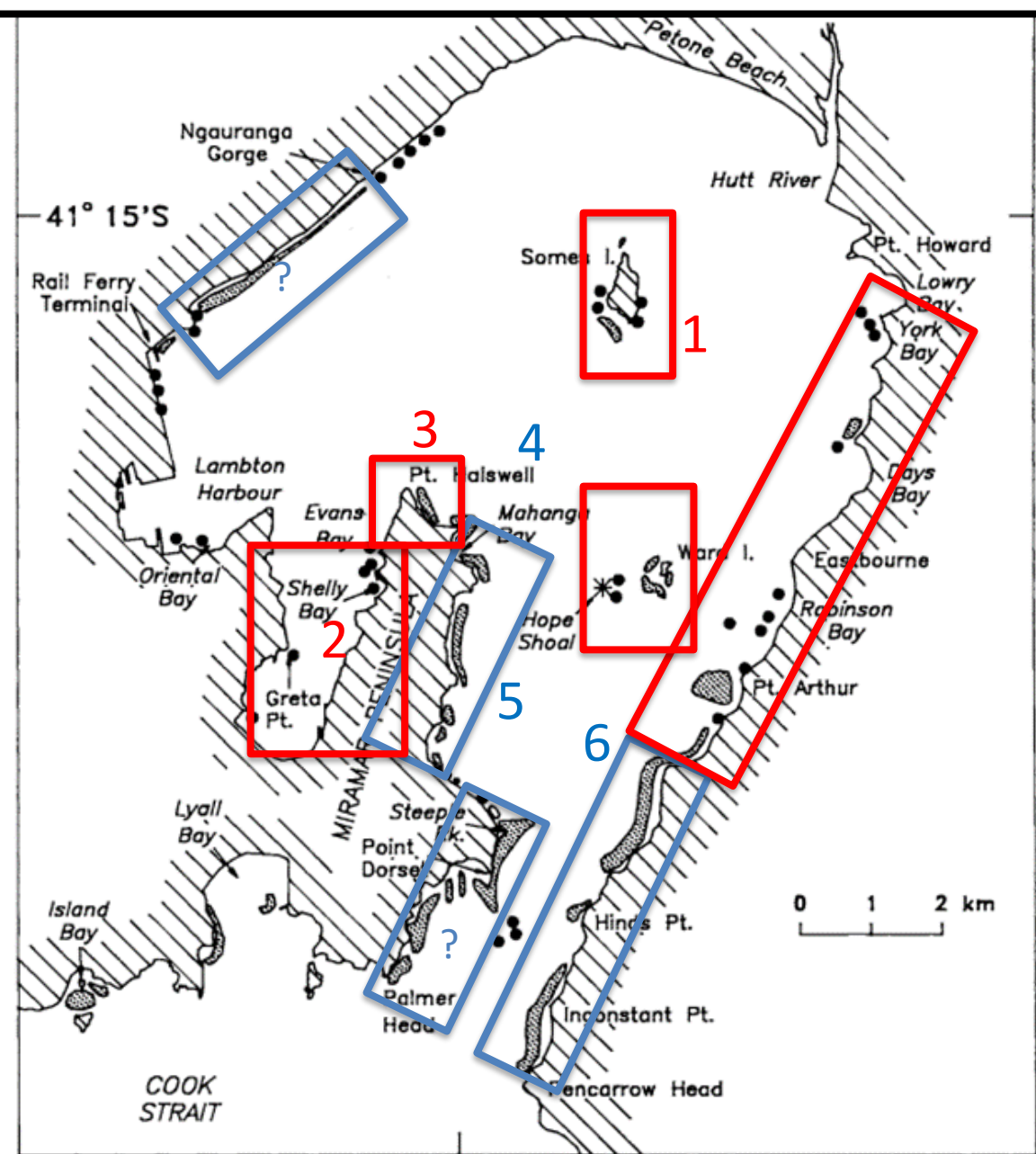


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# Macrocystis 2022 distribution

1. Matiu Island
2. Shark Bay
3. Point Halswell
4. Kau Bay
5. Worser Bay
6. Camp Bay/Point Arthur

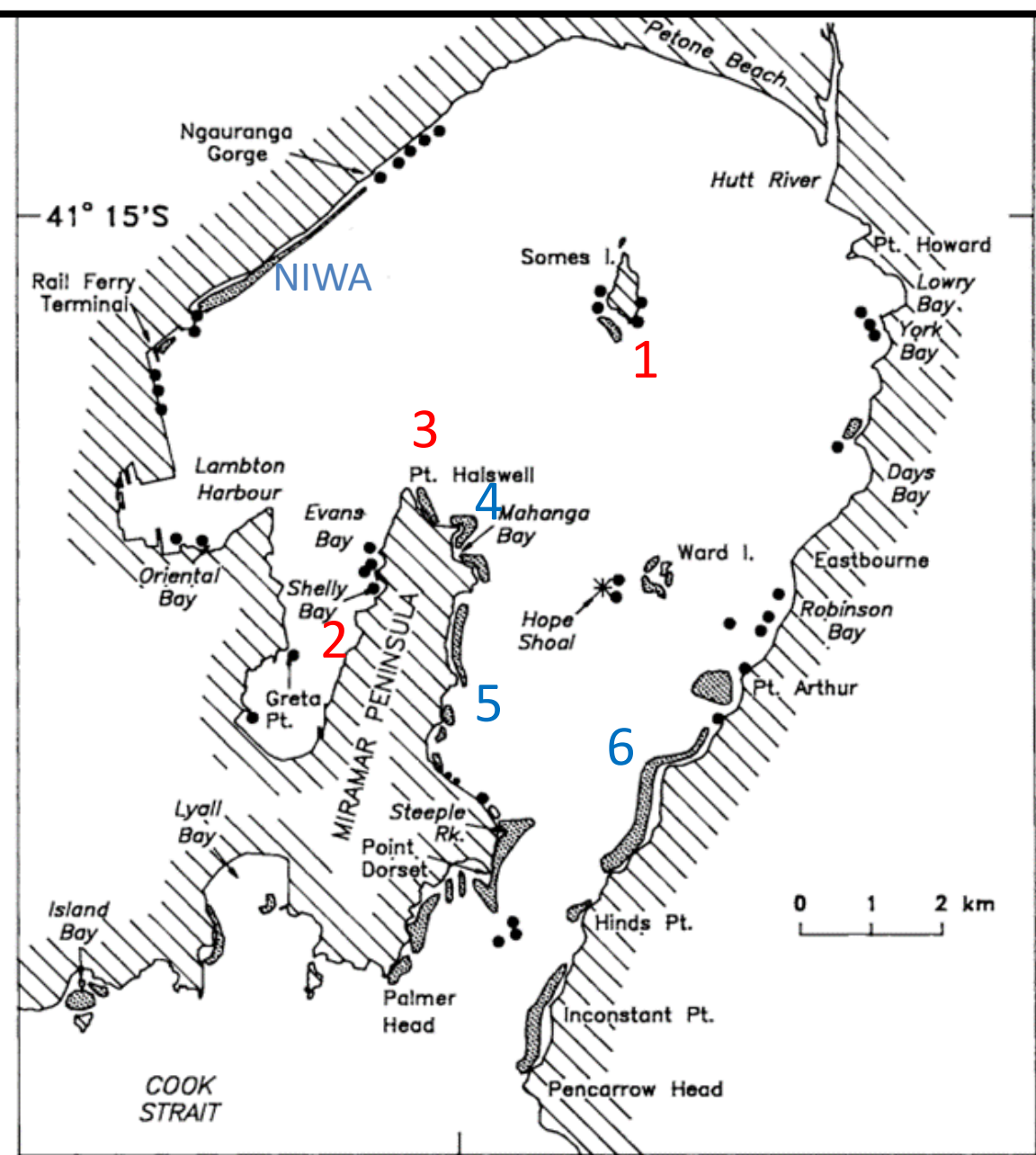
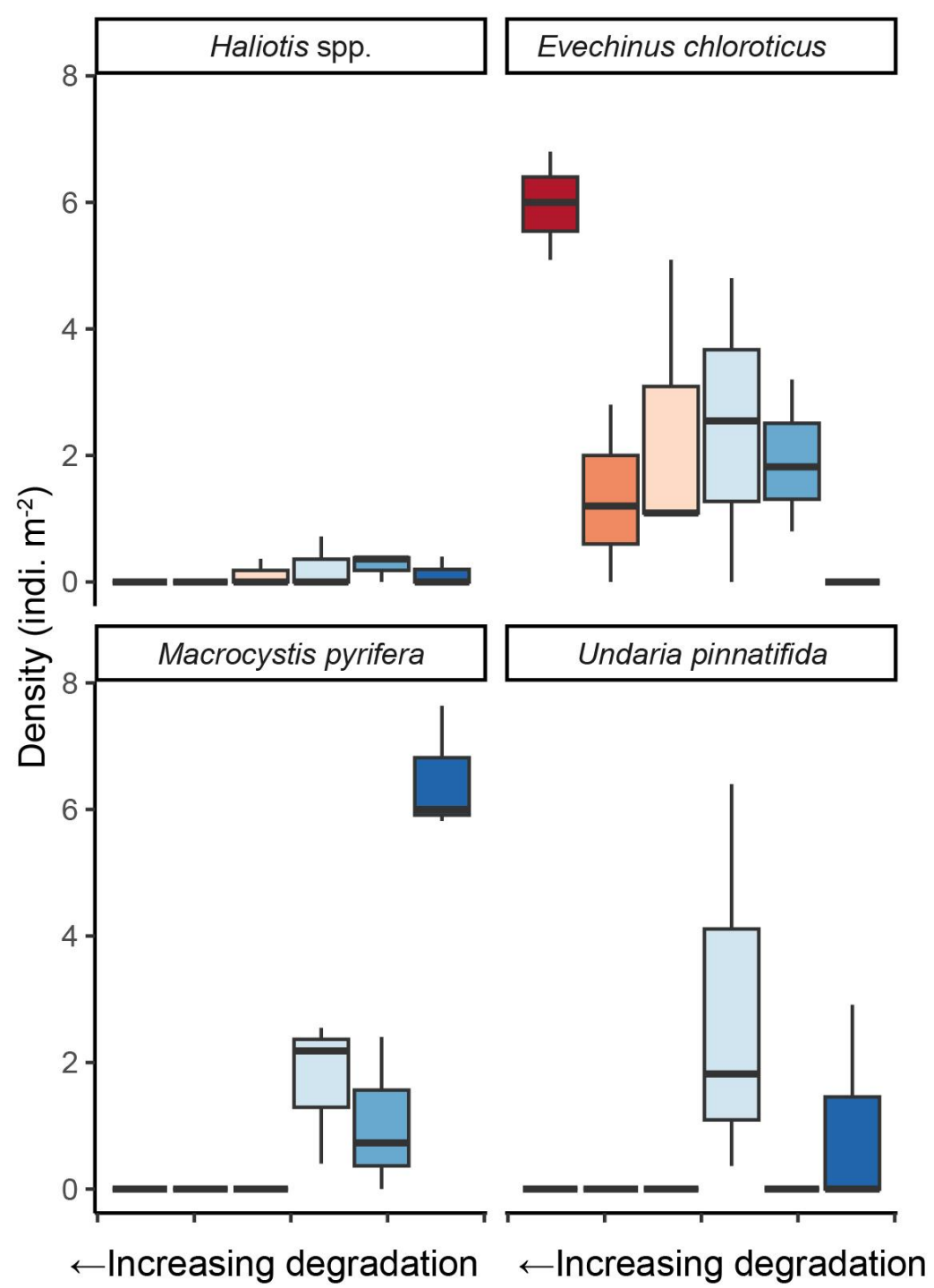


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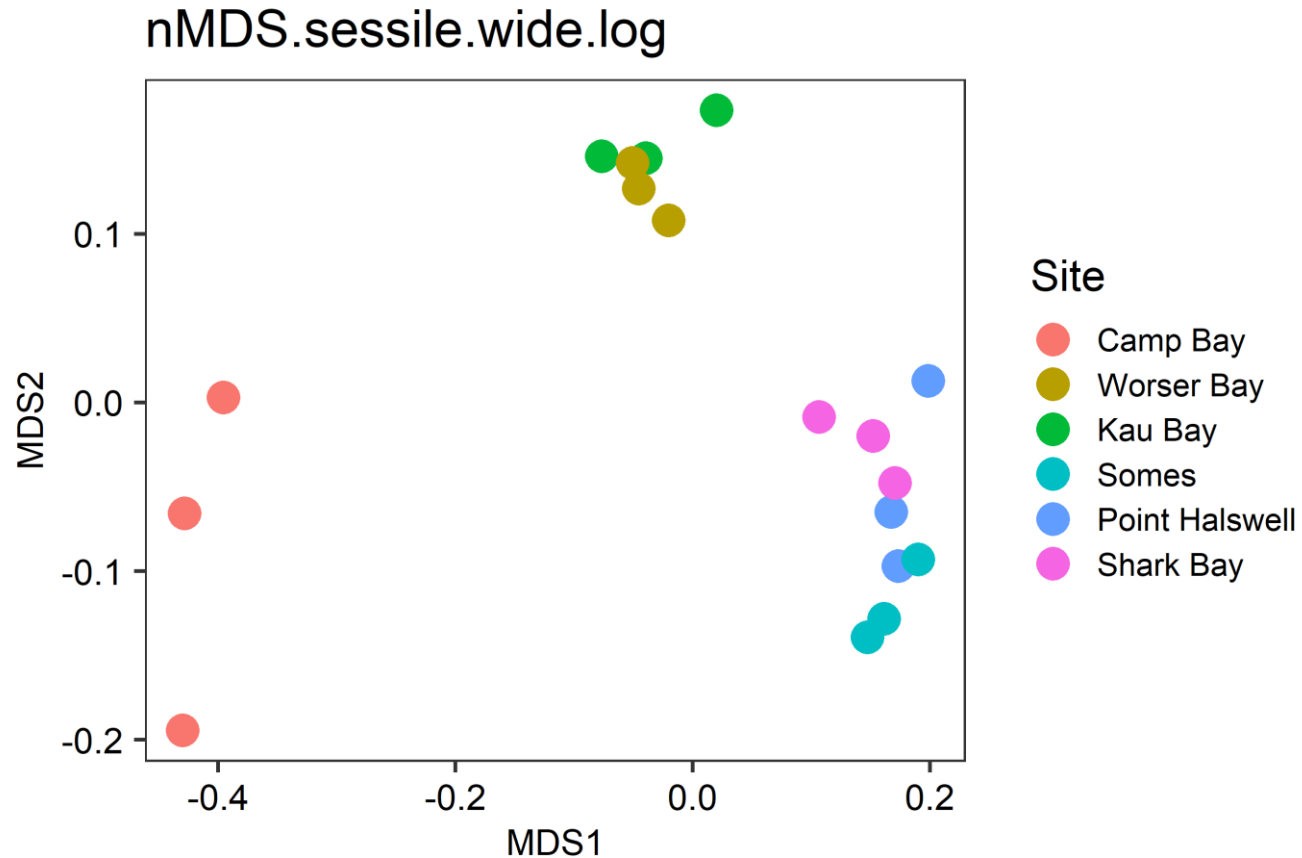


Site

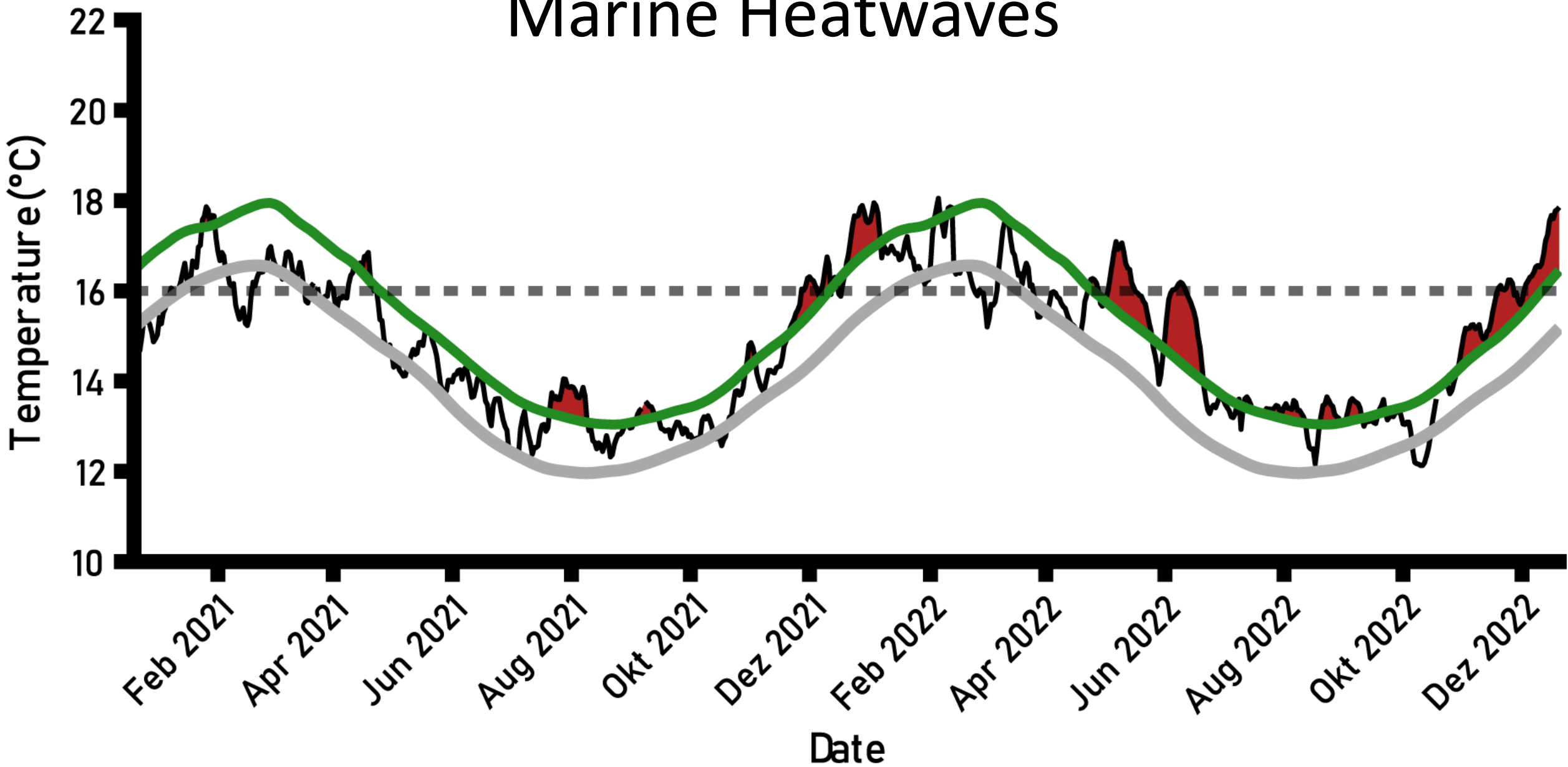
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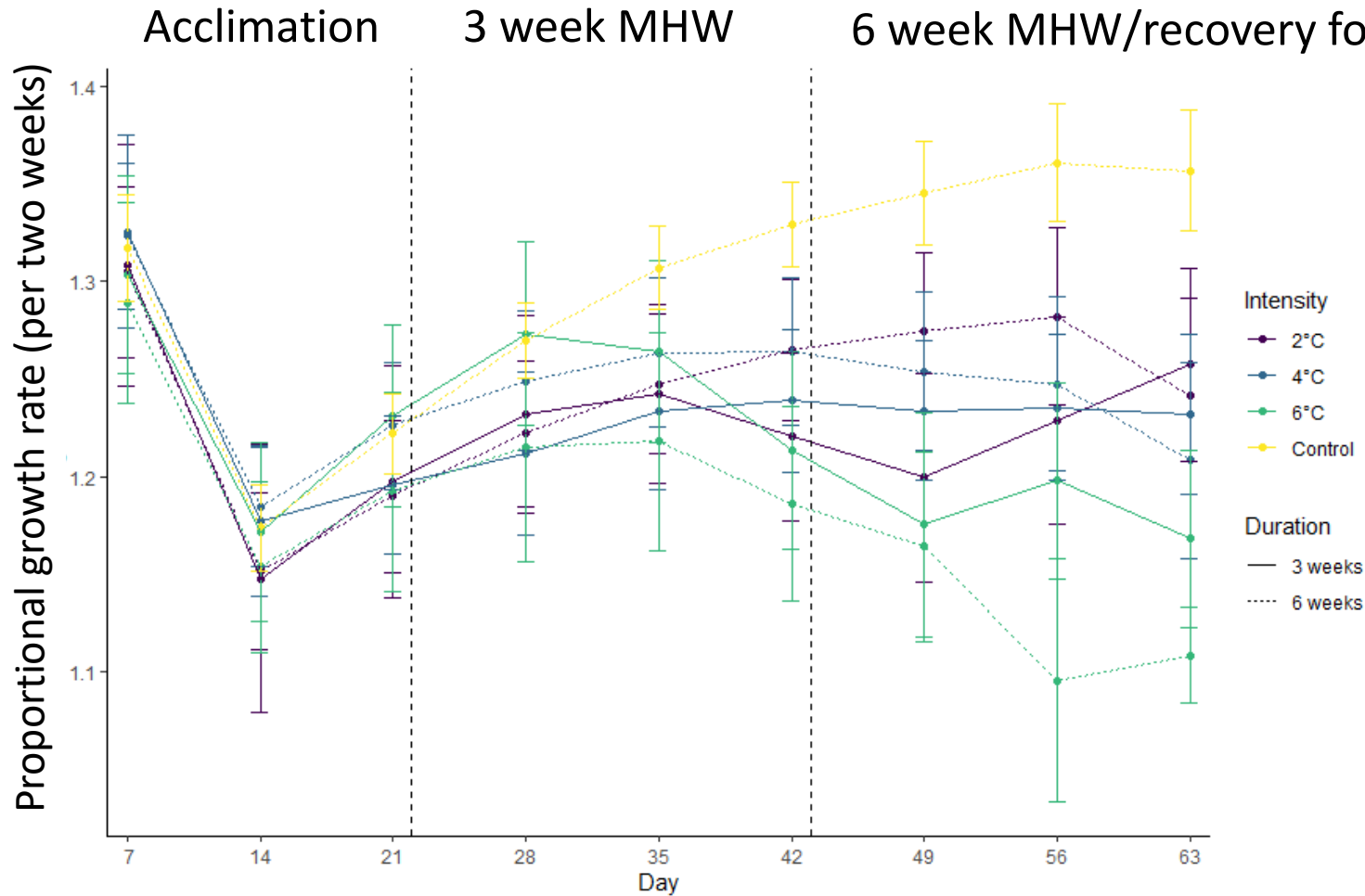
# Subtidal communities



# Marine Heatwaves



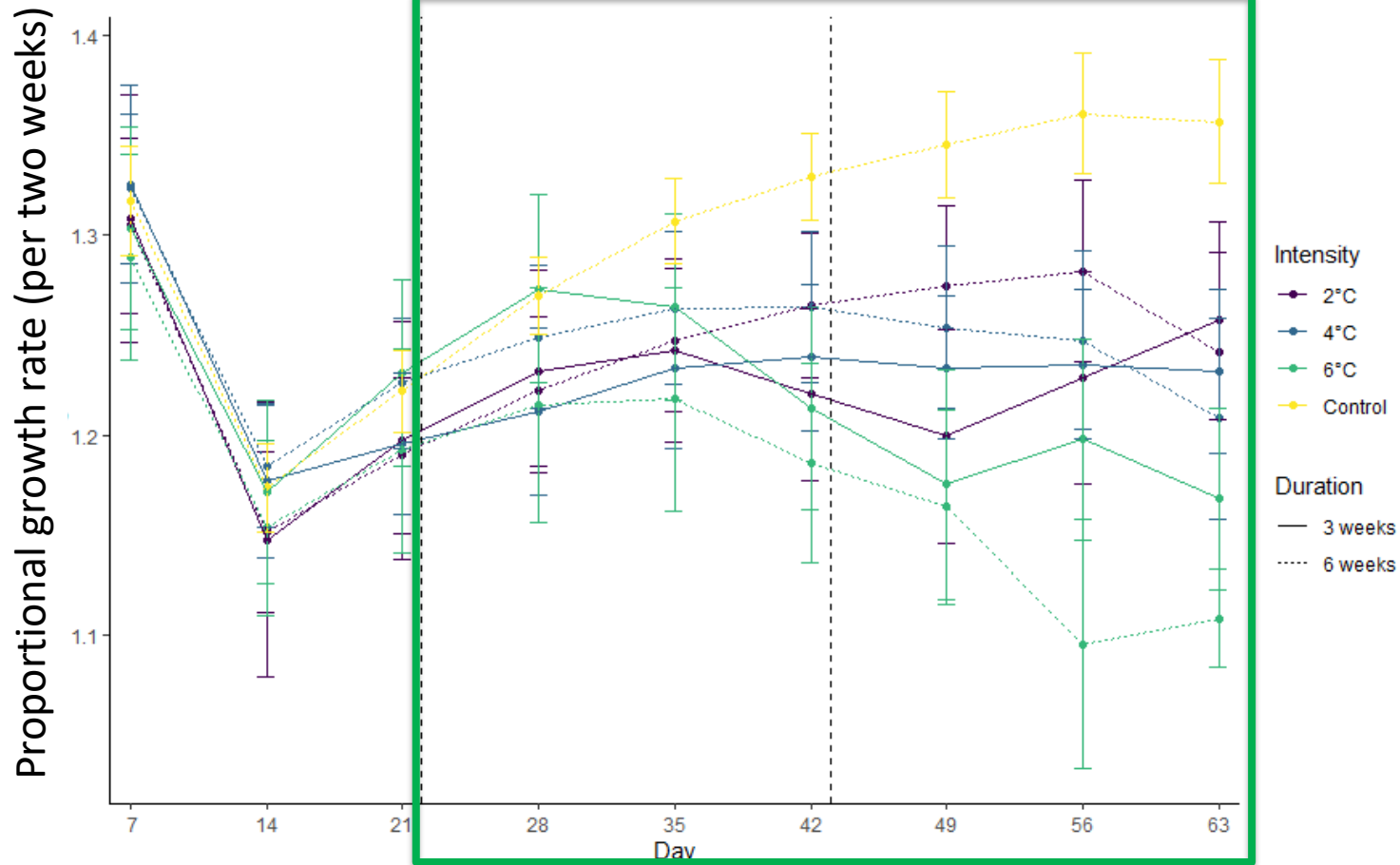
# Longer, more intense MHWs

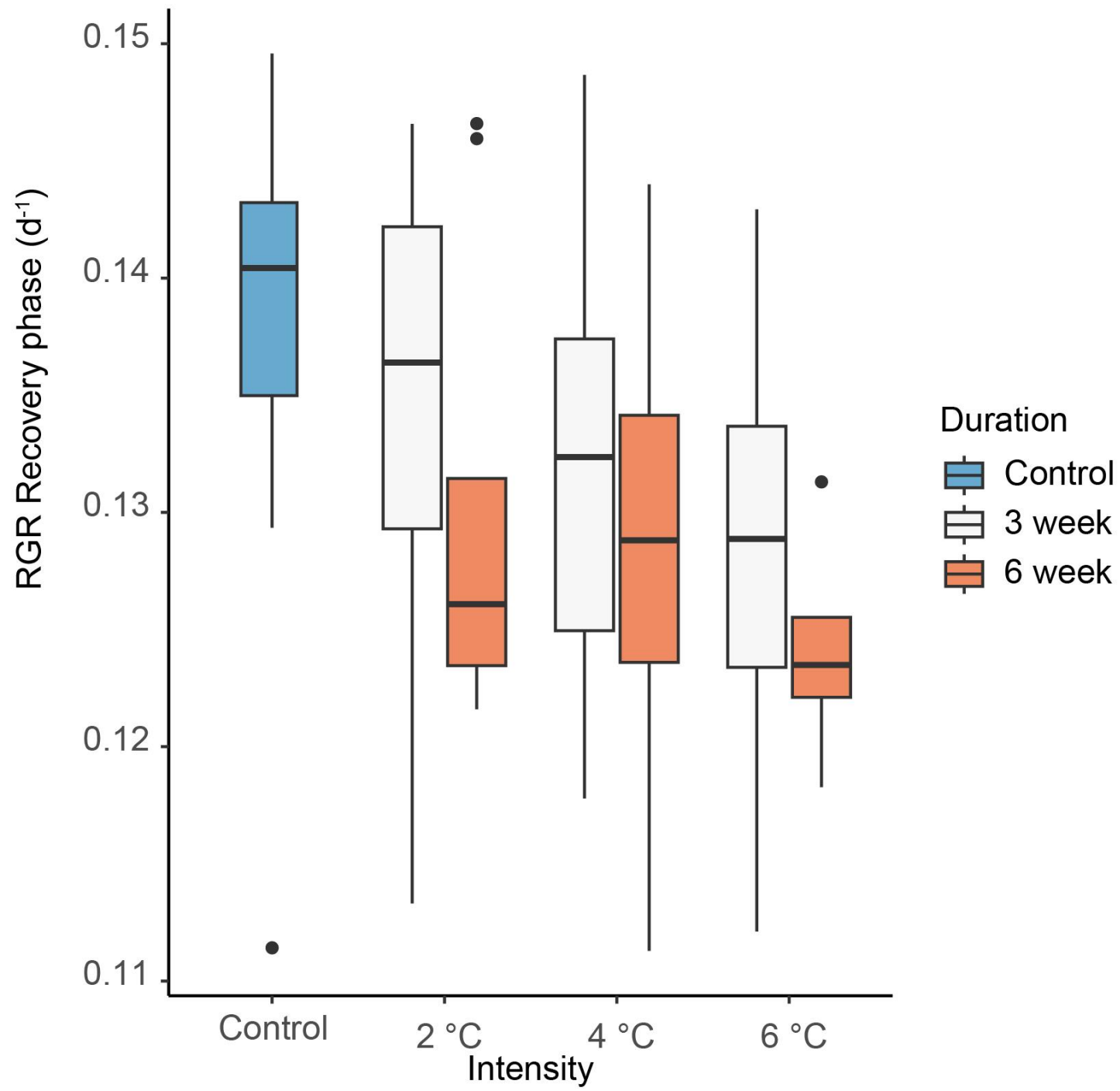


Acclimation

3 week MHW

6 week MHW/  
recovery for 3 week MHW





# Marine heatwaves

- No short-term impact of 2 week MHWs
- Reduced growth *in situ* of those previously exposed to 6° C MHWs
- MHW intensity and duration dictates growth rates
  - Little changes in underlying physiology

# Future?

- Long-term monitoring
- Experimental work on kelp and fucoids (local v. global drivers)
- Testing of the community driven “kina overgrazing hypothesis”
- Future proofed restoration
  - Heat and low light stress breeding
  - Testing of transcriptomic responses

# Large scale community removal of kina at Kau Bay



- Plans to use this in combination with monitoring, transplantation and caging experiments

# Questions?



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