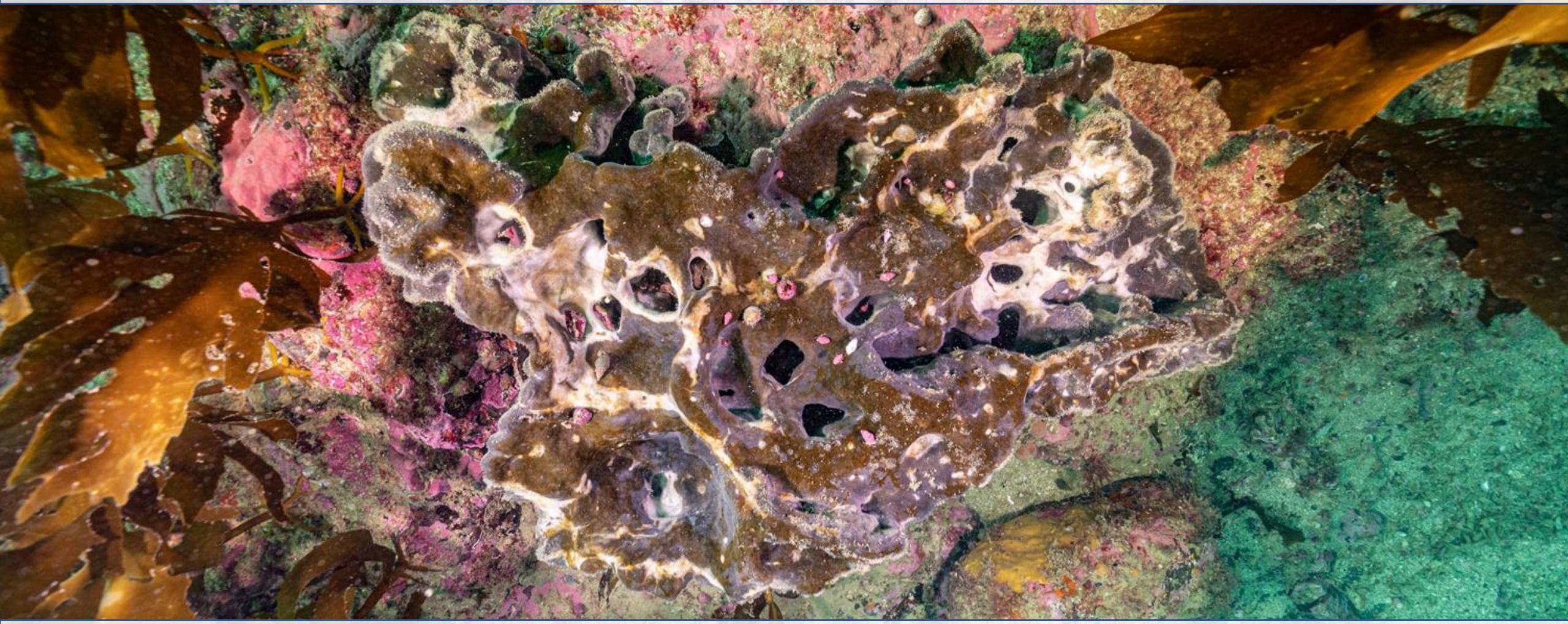
# Novel effects of an unprecedented marine heatwave on a temperate reef ecosystem



**Arie Spyksma, Celia Balemi, Paul Caiger, Kelsey Miller & Nick Shears**
**Leigh Marine Laboratory, Institute of Marine Science**

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# Climate change increases marine heatwaves harming marine ecosystems

ScienceBrief Review OCTOBER 2021

Thomas Wernberg[1,2], Dan A. Smale[3], Thomas L. Frölicher[4,5] and Adam J. P. Smith[6]

1 UWA Oceans Institute & School of Biological Sciences, University of Western Australia (UWA), Australia.
2 Institute of Marine Research, His 4817, Norway.
3 Marine Biological Association of the United Kingdom, The Laboratory, Citadel Hill, Plymouth, UK.
4 Climate and Environmental Physics, Physics Institute, University of Bern, Bern, Switzerland.
5 Oeschger Centre for Climate Change Research, University of Bern, Bern, Switzerland.
6 School of Environmental Sciences and Tyndall Centre for Climate Change Research, University of East Anglia (UEA), Norwich, UK.

The New York Times

# *Like in 'Postapocalyptic Movies': Heat Wave Killed Marine Wildlife en Masse*

An early estimate points to a huge die-off along the Pacific Coast, and scientists say rivers farther inland are warming to levels that could be lethal for some kinds of salmon.

**Analysis**

# Weather tracker: Mediterranean Sea hit by major marine heatwave

*Matt Andrews for Metdesk*

No respite from record-breaking temperatures as the ocean warms and wildfires rage on land

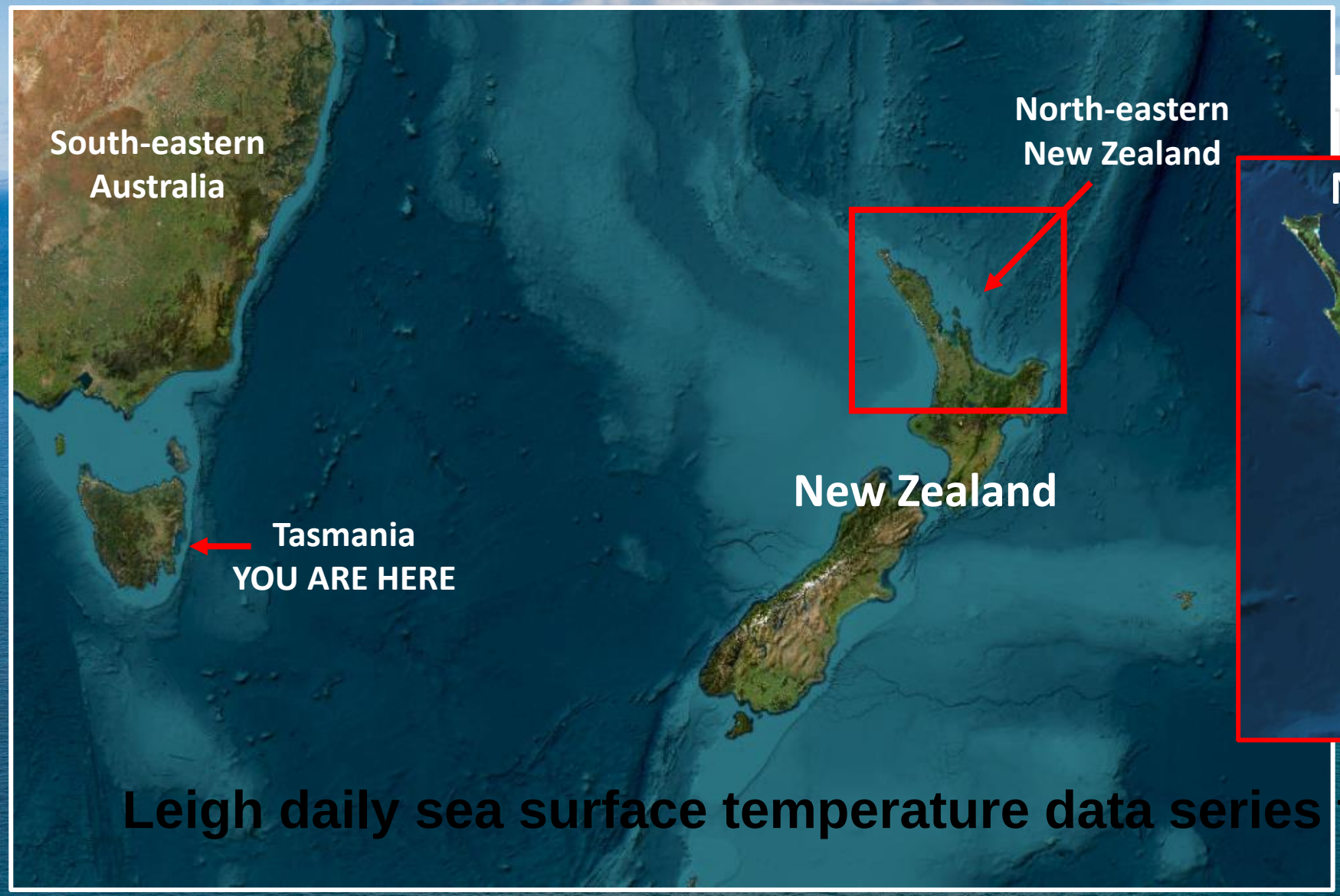
Maritime heatwaves have destroyed up to 90% of coral populations in parts of the Mediterranean, with sea fans particularly hard hit. Photograph: Jesus Cobaleda Atencia/Alamy

# Extreme marine heat has become the 'new normal': More than HALF of the ocean surface has experienced excessively warm temperatures since 2014, study warns

- Experts from the Monterey Bay Aquarium studied 150 years of ocean records
- Using data from 1870–1919, they created a benchmark of surface temperatures
- This allowed them to define what has historically constituted 'extreme heat'
- They found that by 2019, 57 per cent of the ocean experienced such conditions
- Extreme heat harms crucial marine ecosystems like coral reefs and kelp forests

By IAN RANDALL FOR MAILONLINE
**PUBLISHED:** 06:00 AEDT, 2 February 2022 | **UPDATED:** 06:10 AEDT, 2 February 2022

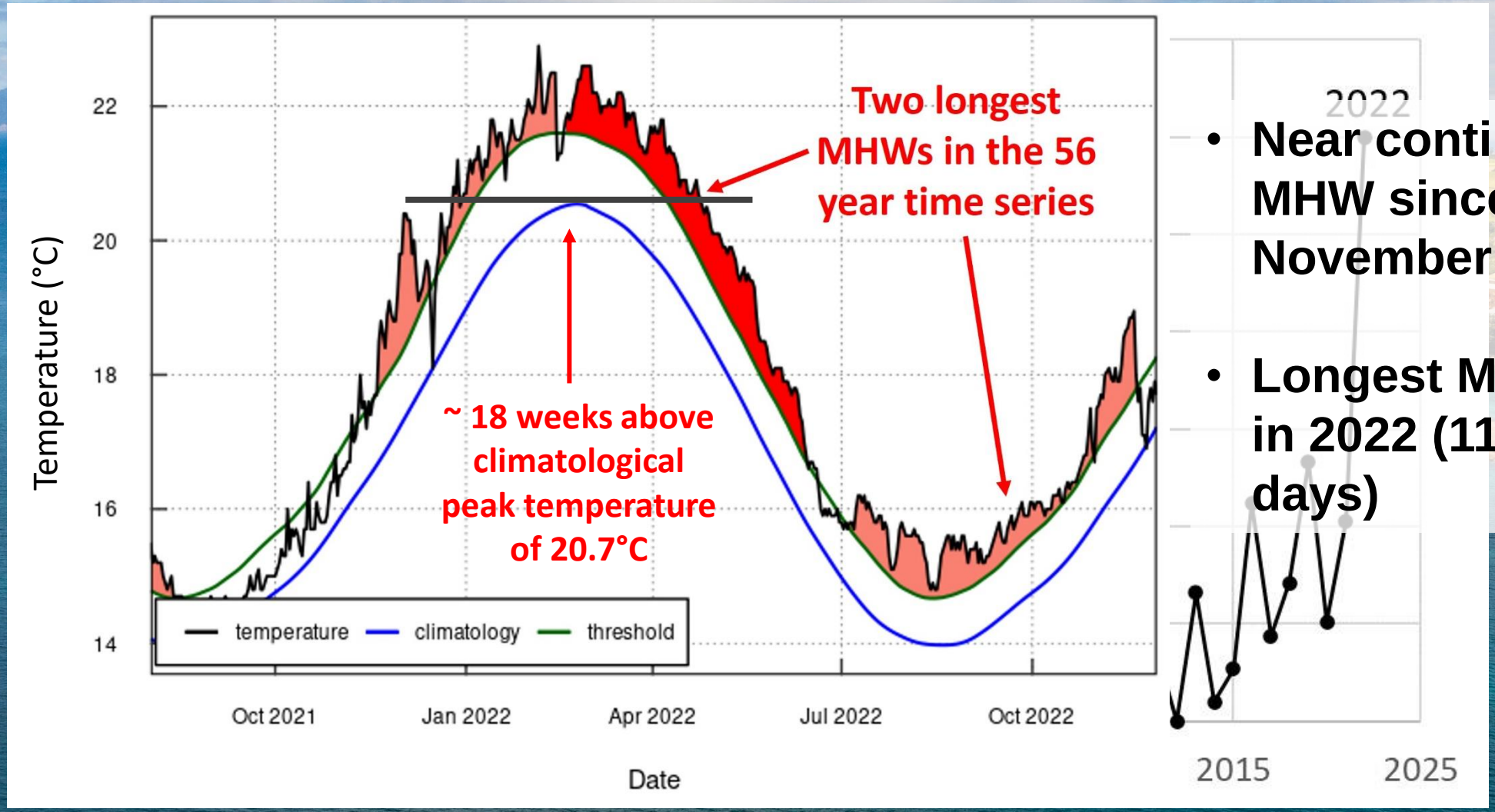
# The situation in north-eastern New Zealand




Leigh Marine Laboratory


Leigh daily sea surface temperature data series from 1967 - present

# Warming ocean coupled with intense La Niña has fueled a series of prolonged MHW through 2021 - 2022





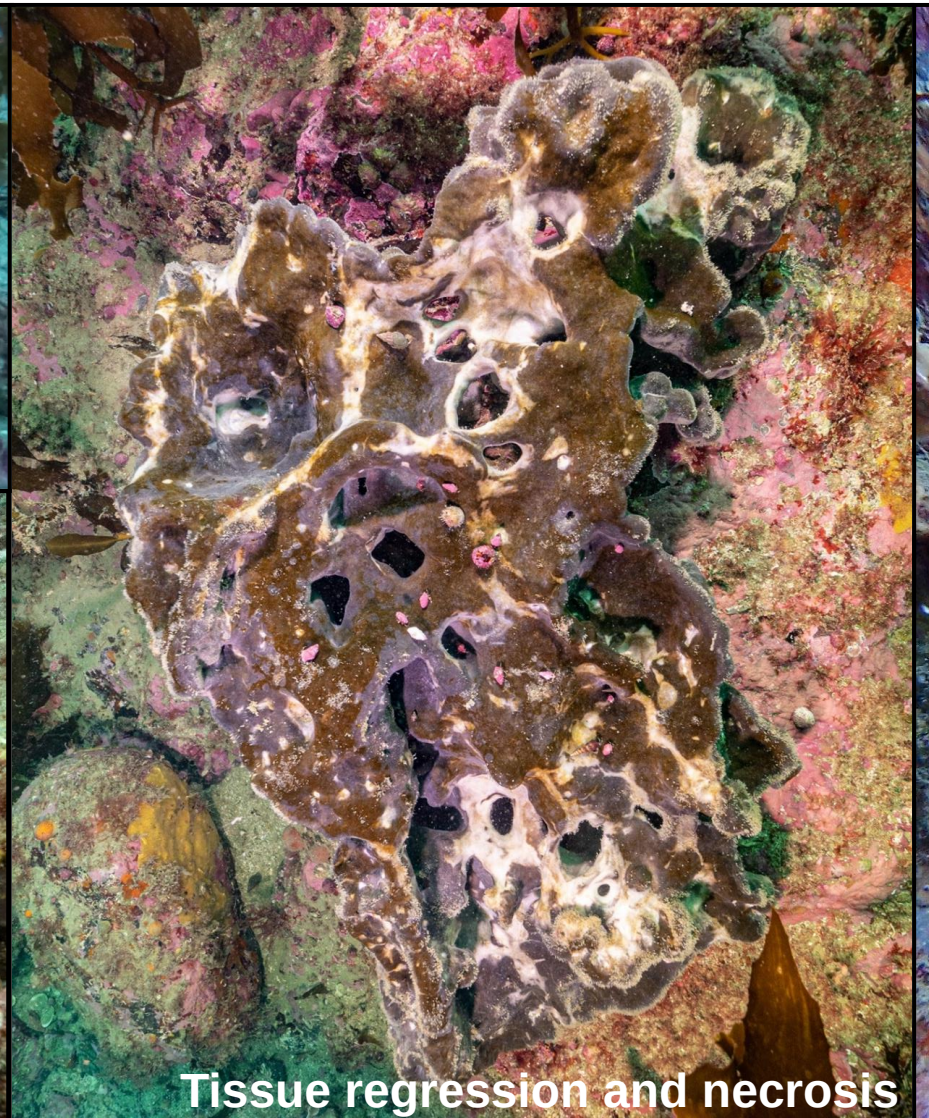


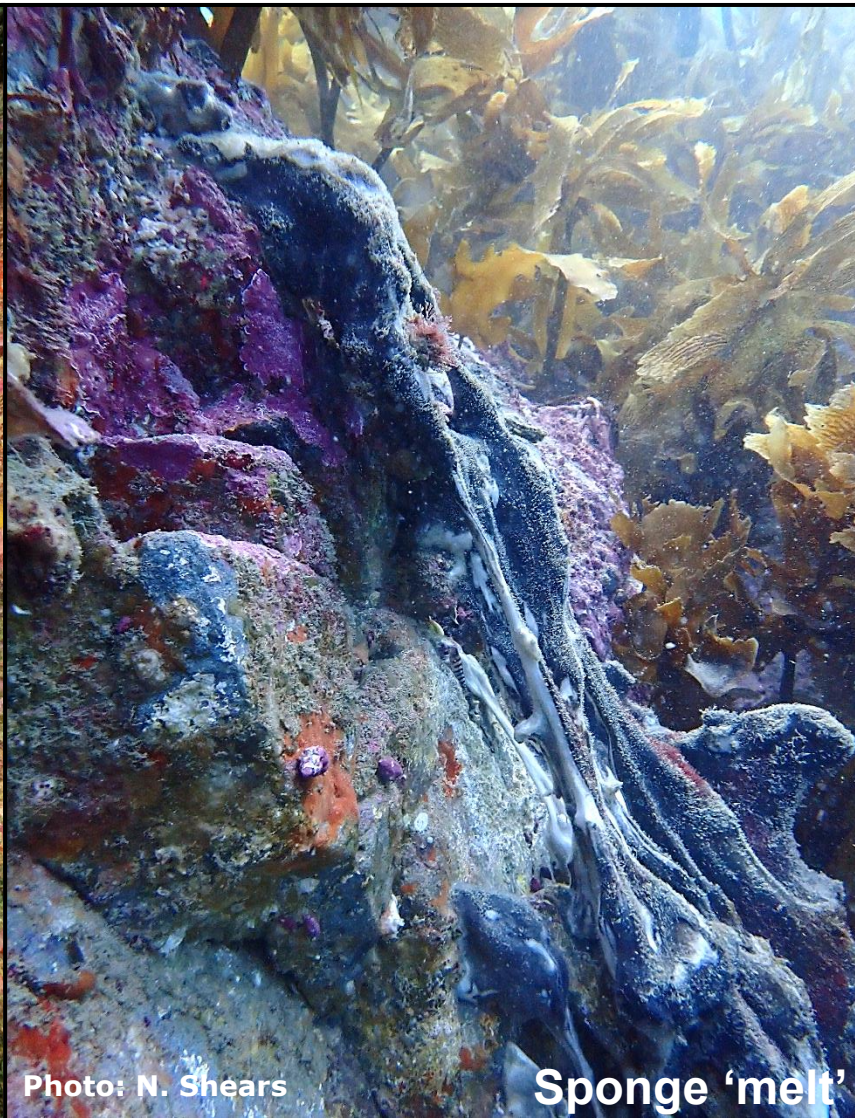
- Near continuous MHW since November 2021
- Longest MHWs ever in 2022 (117 and 137 days)

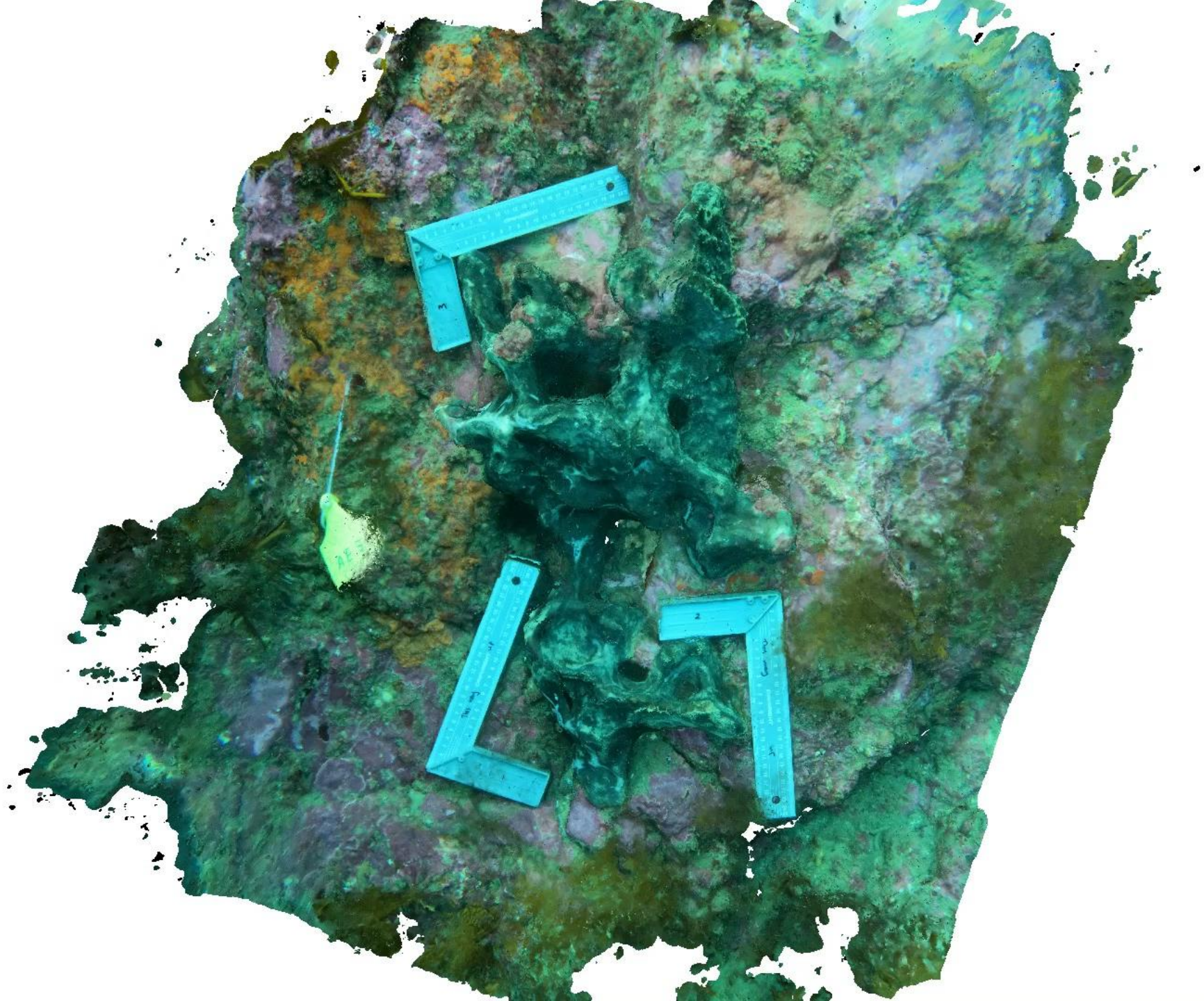
***What MHW impacts are we observing on north-eastern New Zealand reefs?***

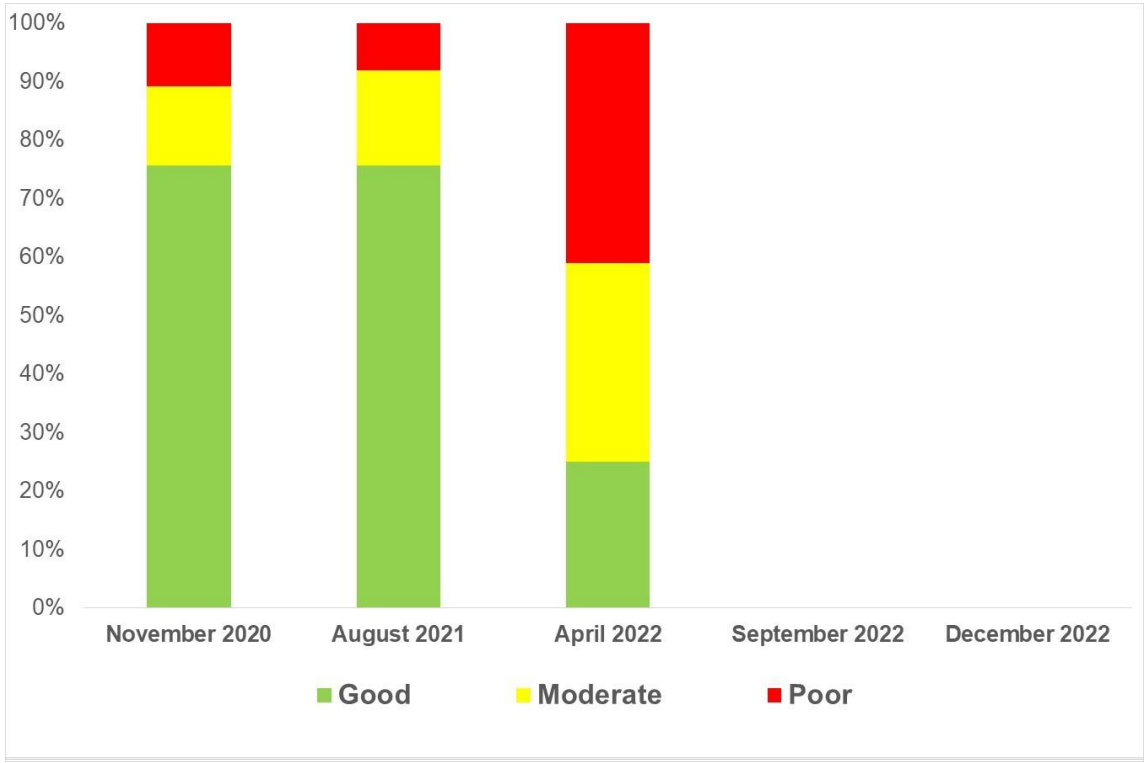
# Sponges in trouble



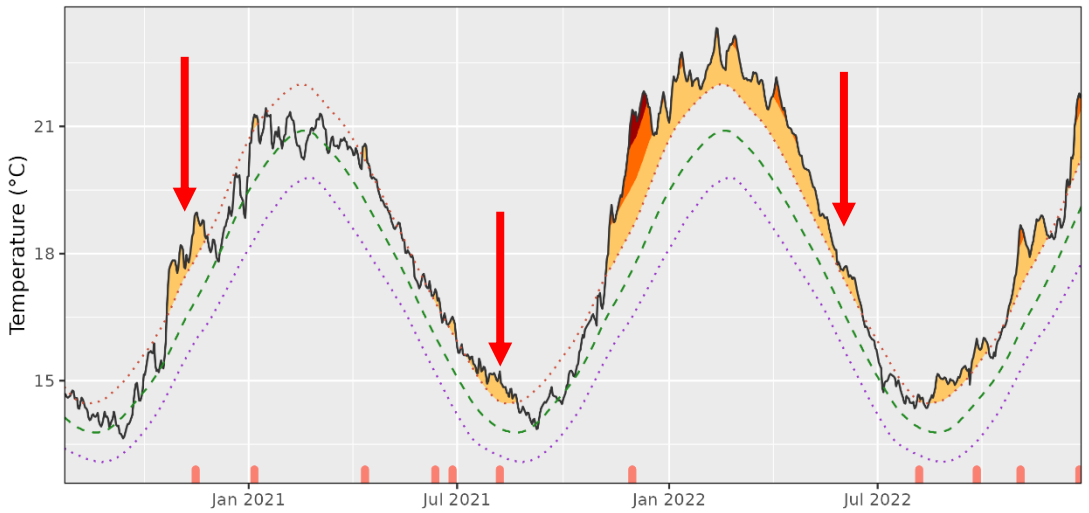


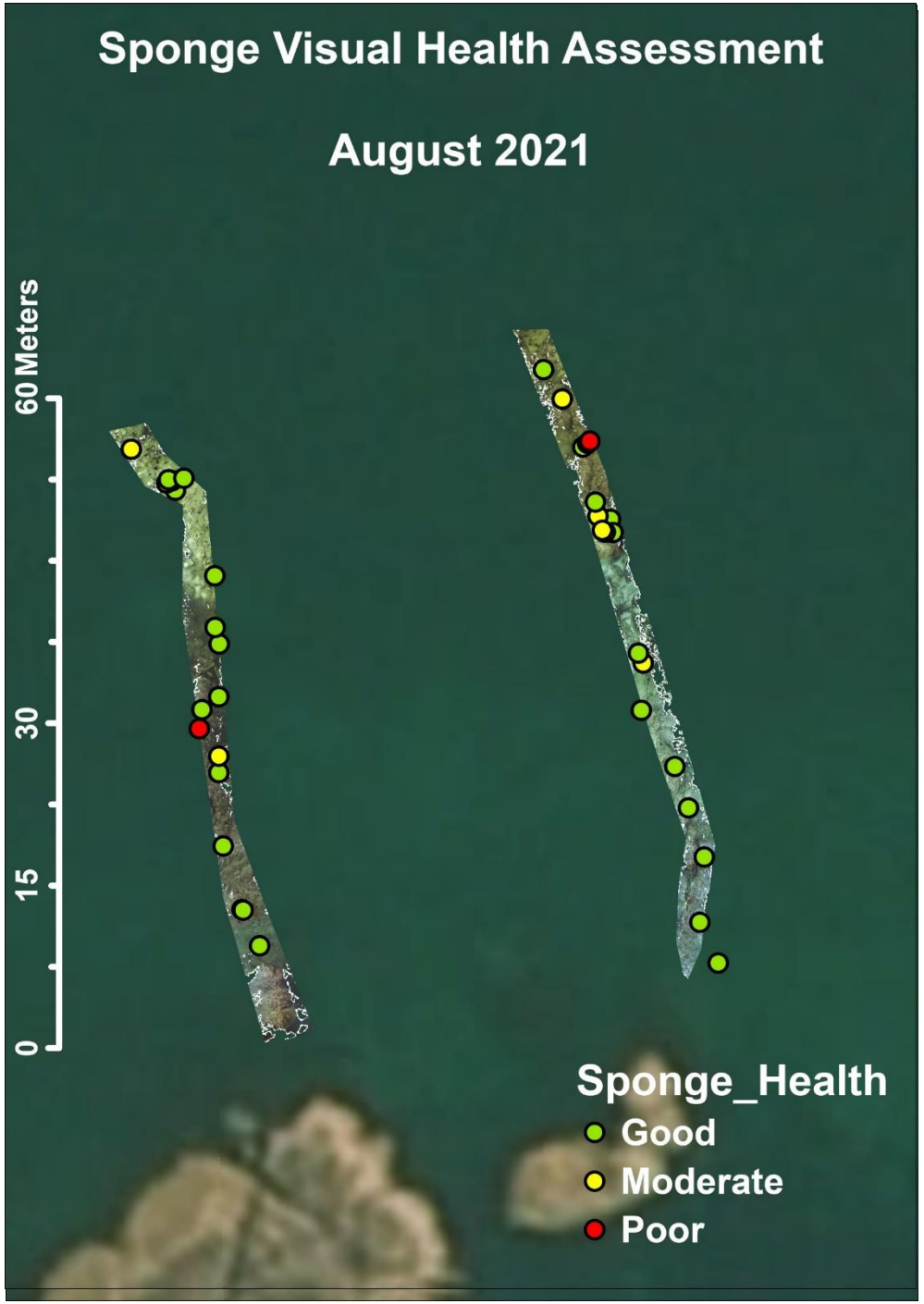





OISST for the Noises – Aug. 2020 – Dec. 2022

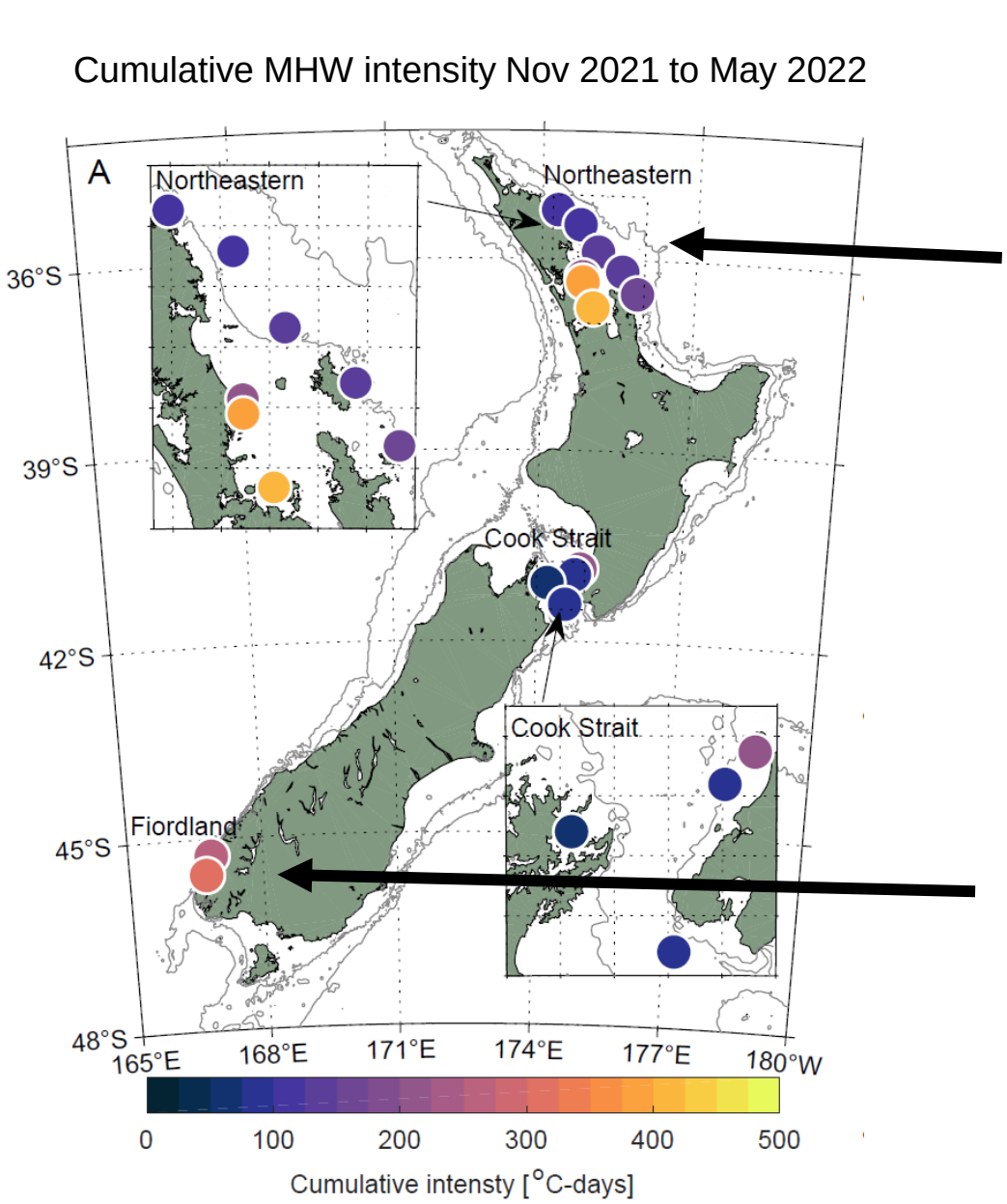


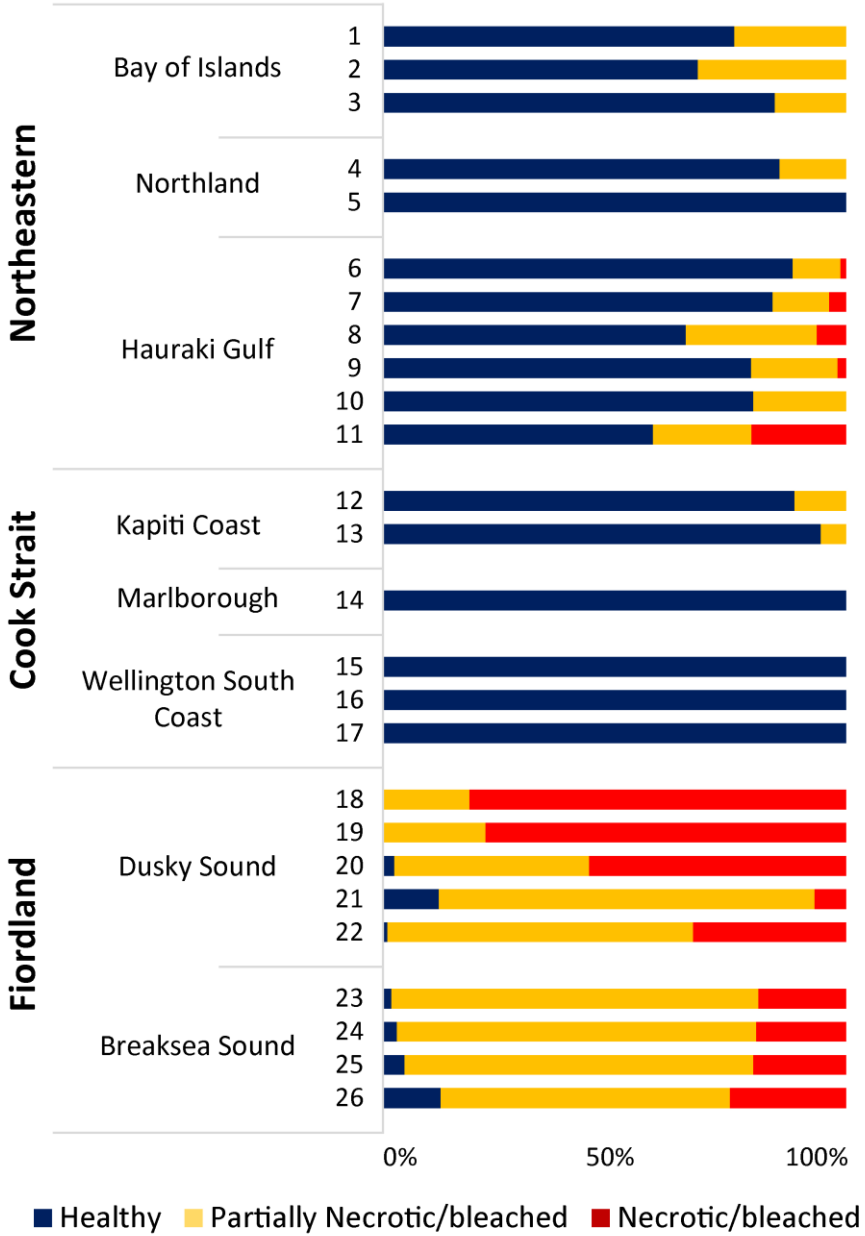

Marine Heatwave Tracker - Schlegel, R. W. (2020)



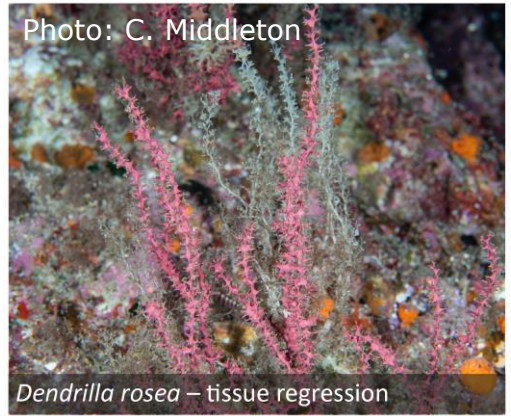
# Marine heat waves drive bleaching and necrosis of temperate sponges (2022)

James J. Bell, Robert O. Smith, Valerio Micaroni, Francesca Strano, Celia A. Balemi, Paul E. Caiger, Kelsey I. Miller, Arie J.P. Spyksma, Nick T. Shears *Current Biology*








# Rapid expansion of *Symplegma brakenhielmi*

- Tropical/subtropical ascidian (first recorded in NZ in 2015)

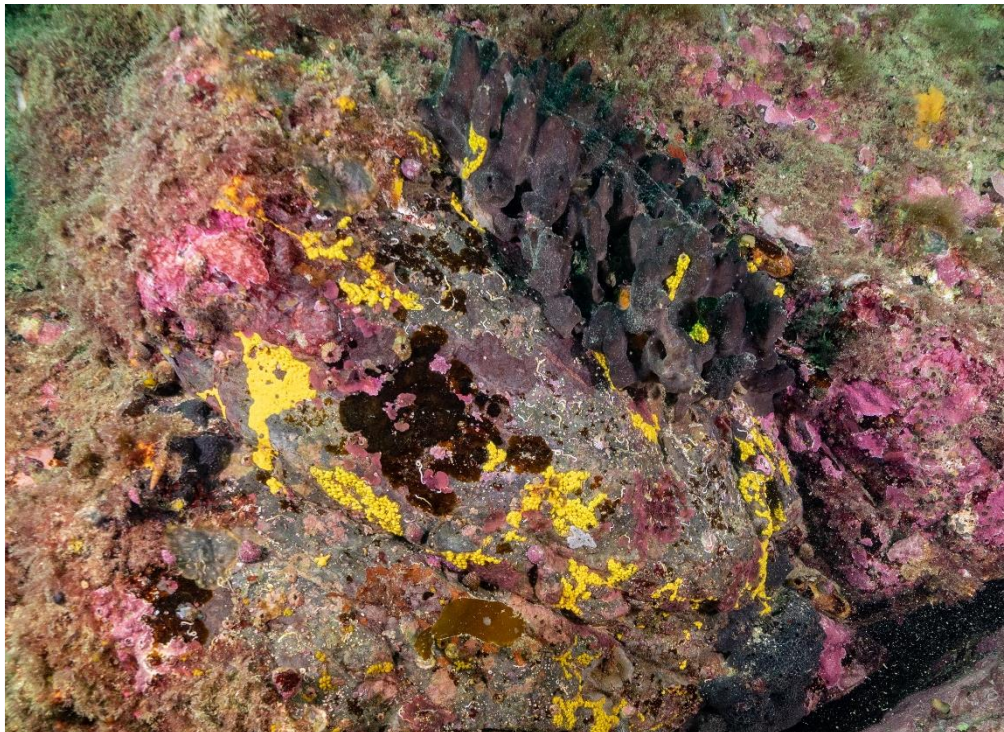
- Growing on and over sponges, other ascidians, seaweeds, mussels and rock lobster….

Photos: N. Shears

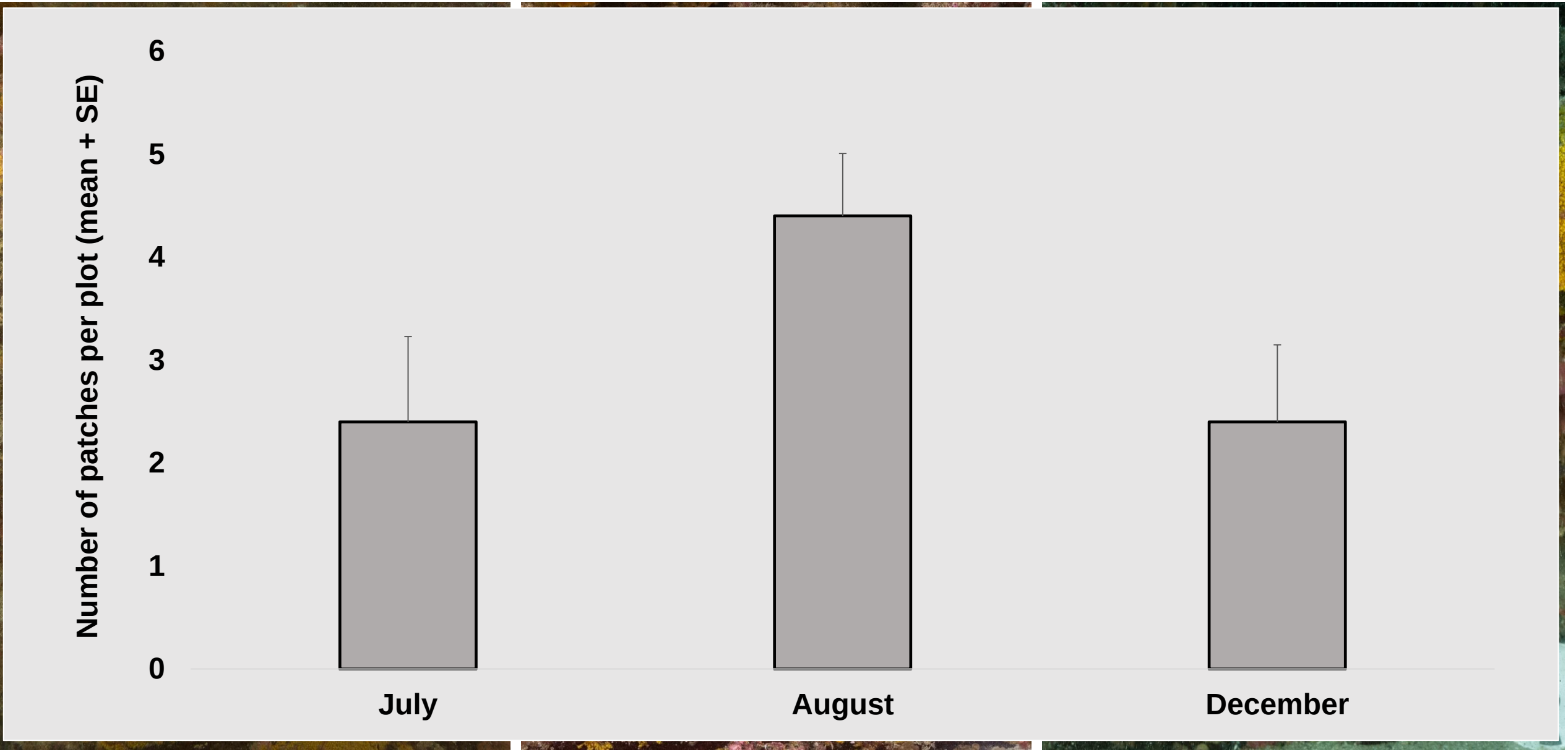
# May 2022 – Lobster inside marine reserve

Photo: N. Shears

Photo: N. Shears

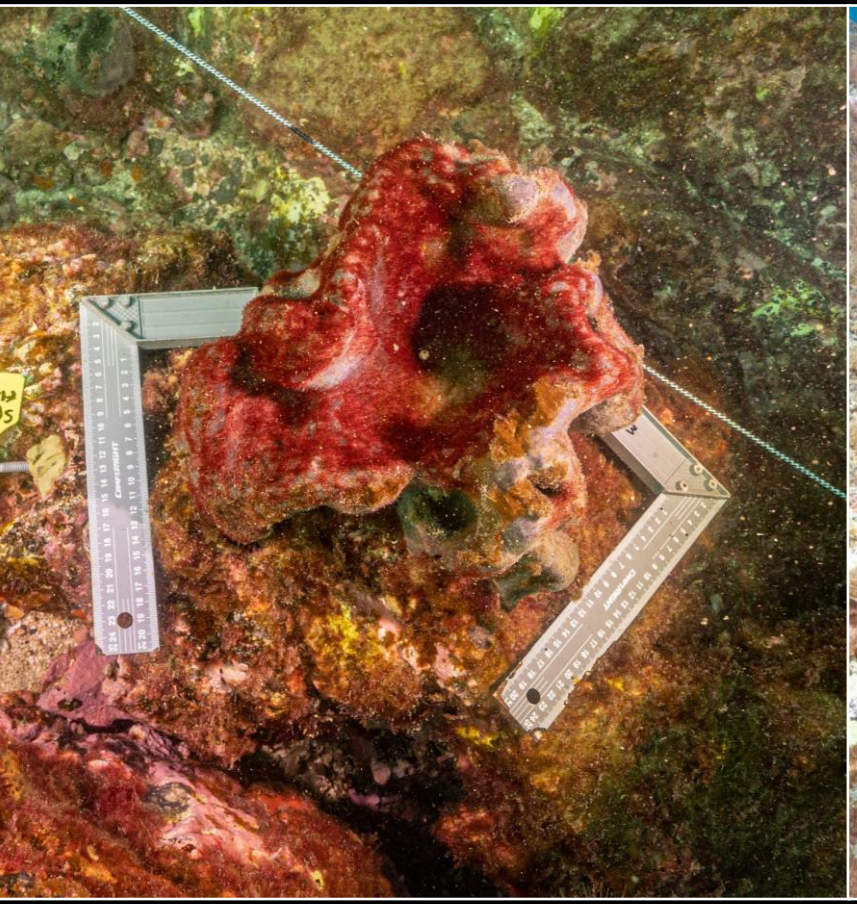


July 2022 August 2022 December 2022




Regression → Expansion →

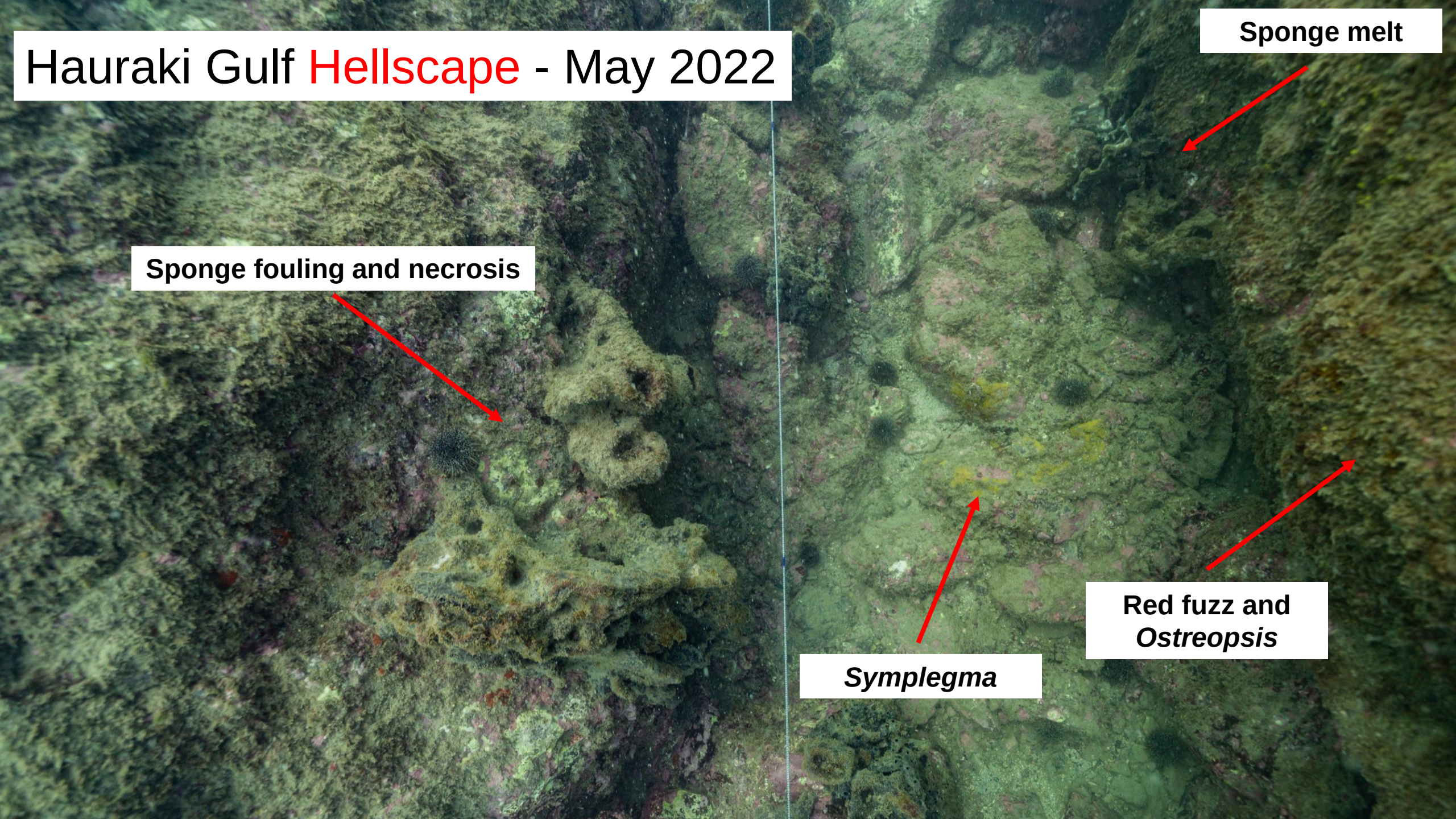
**“Red Fuzz”**

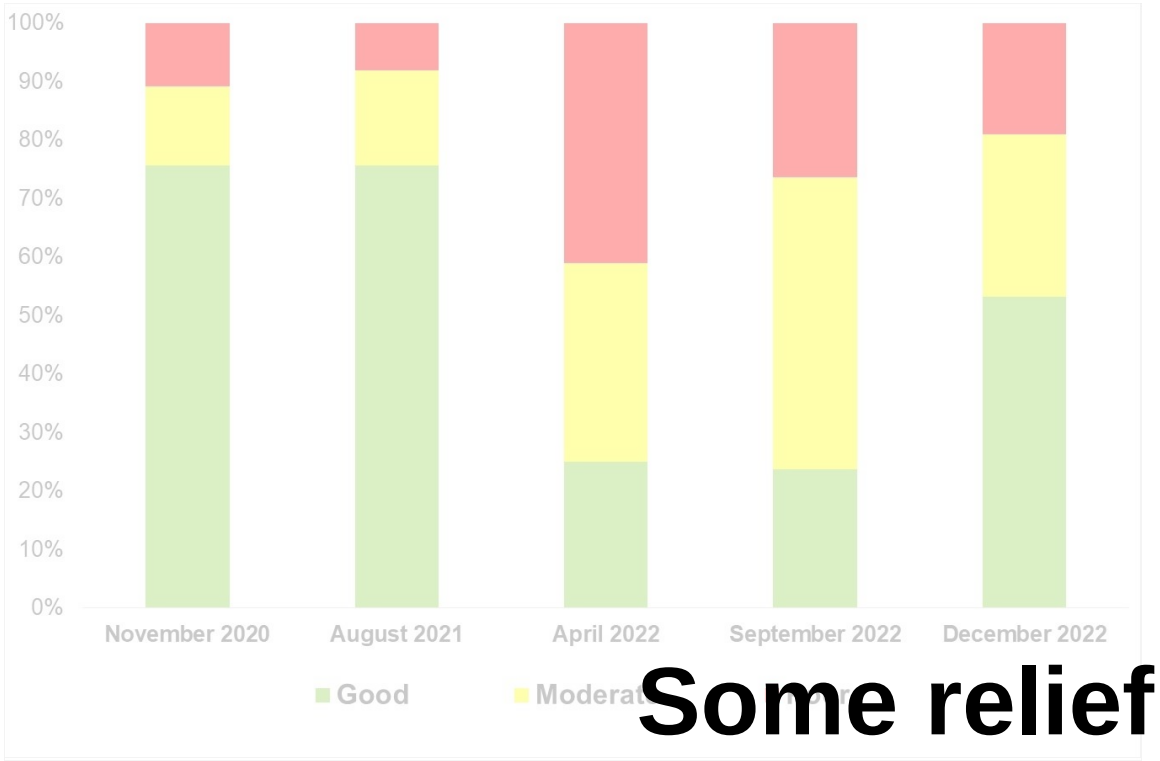


***Ostreopsis siamensis***

***Cellepoaria nodulosa***

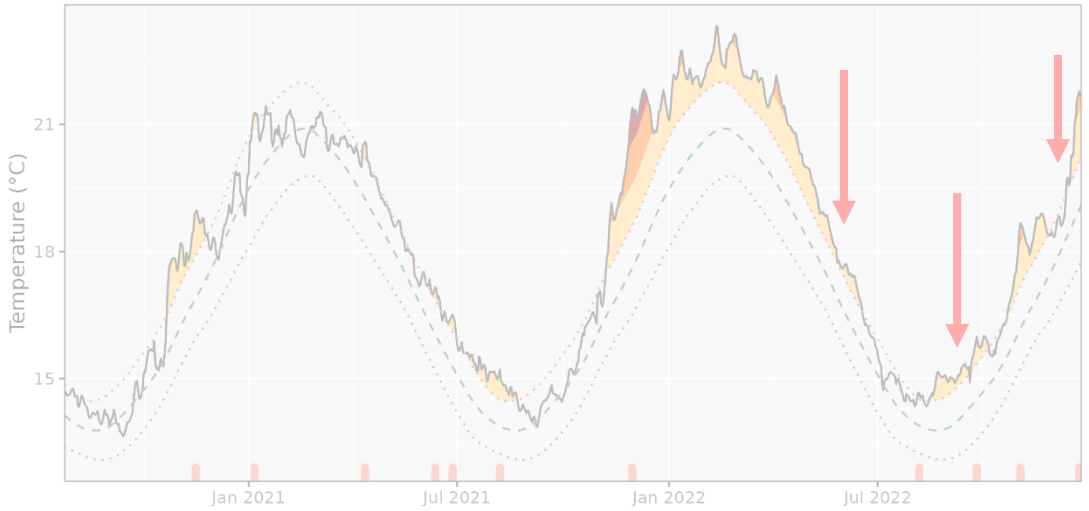
Large, prolonged blooms of filamentous algae (“Red fuzz”), *Ostreopsis siamensis* (toxic dinoflagellate) and *Cellepoaria nodulosa* (invasive bryozoan)


Hauraki Gulf Hellscape - May 2022
Sponge melt
Sponge fouling and necrosis
Red fuzz and
*Ostreopsis*
*Symplegma*




# Some relief of sorts?

OISST for the Noises – Aug. 2020 – Dec. 2022.

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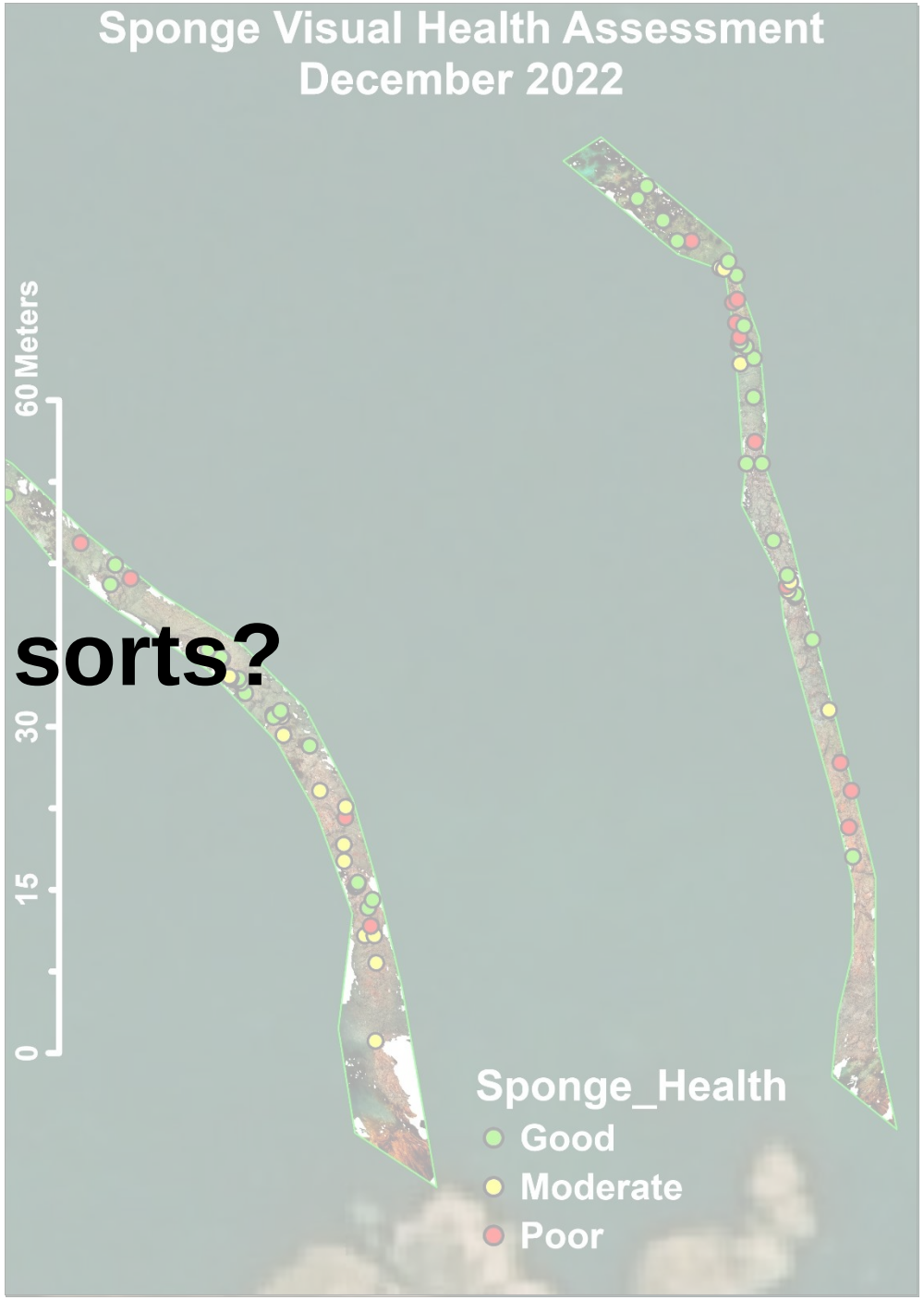

# **Unprecedented** warming and ecological impacts on north-eastern New Zealand reefs

- 2022 was a hot mess.
- Novel impacts that are still unfolding.
  - Monitoring is crucial
- Is this a one off or the start of the new ‘normal’?
- The need for more precautionary management that focuses on building ecosystem resilience.

*Nga mihi nui – thank you*
*(Time to join the charismatic megafauna folk)*

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