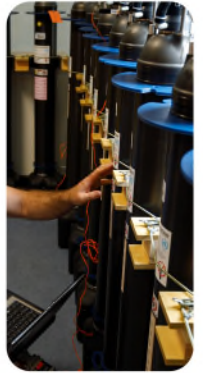
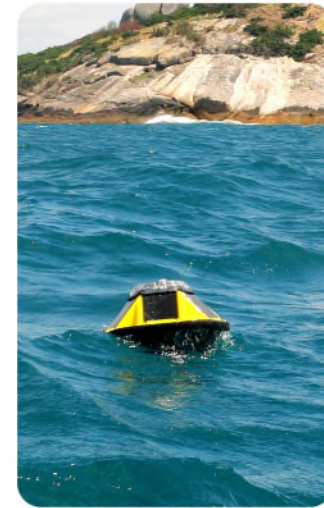


Addressing the national needs of marine extreme event monitoring



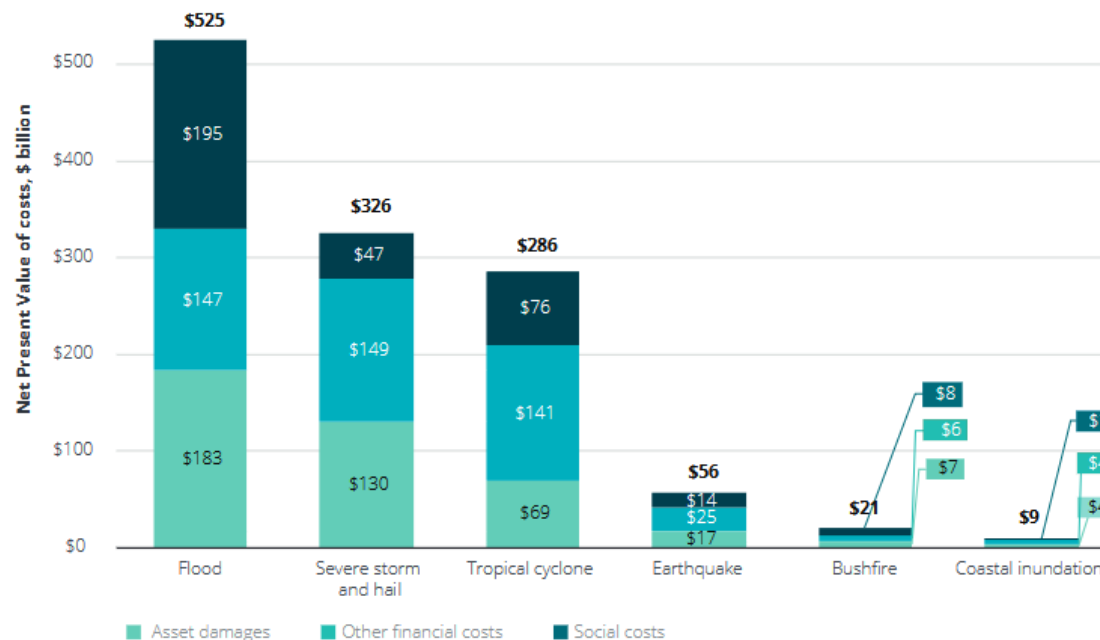
Event-Based Sampling Sub-Facility Steering Committee



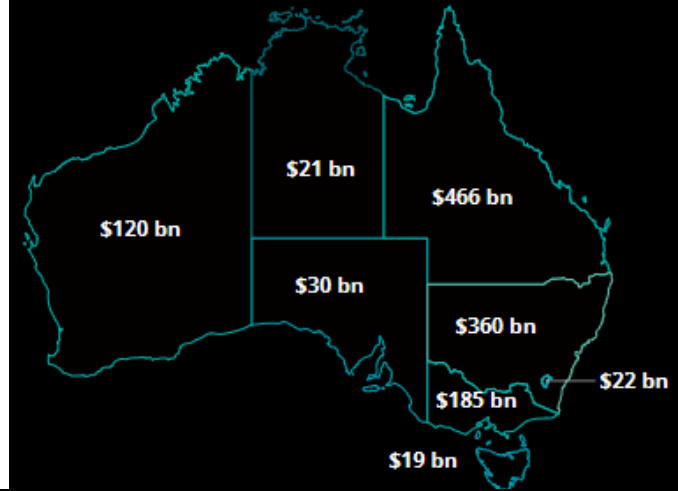
IMOS acknowledges the Traditional Custodians and Elders of the land and sea on which we work and observe, and recognise them as Australia's first marine scientists and carers of Sea Country. We pay our respects to Aboriginal and Torres Strait Islander peoples past and present.

Impacts of extreme events

- Natural disasters cost the Australian economy \$38B per annum and is projected to rise to \$73B per annum by 2060¹
- Environmental impacts are incalculable
- Some of these are marine events but **does not include** events like HAB's, marine heatwaves, or downstream impacts (e.g. river runoff)
- At some point, what are now “events”, may become normal



Total costs of natural disasters under a low emission scenario over the next forty years

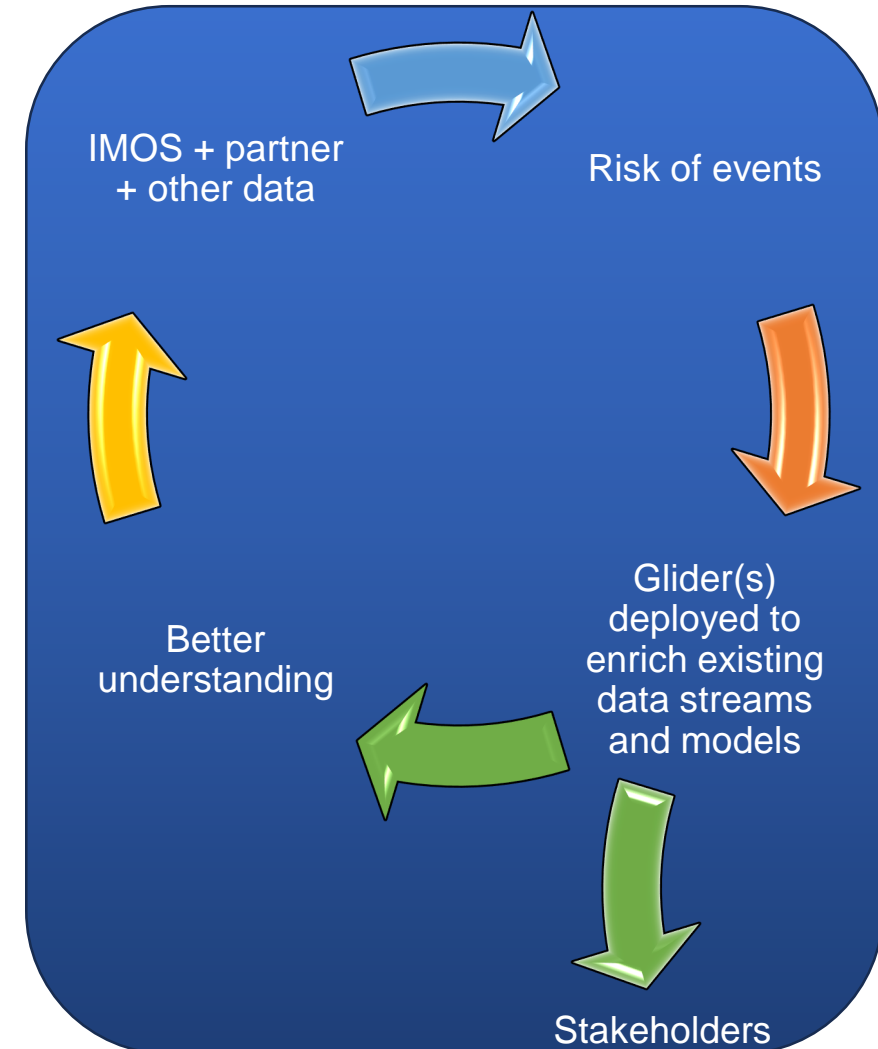


¹ Deloitte Australia (2021) Special Report: Update to the economic costs of natural disasters in Australia. Australian Business Roundtable for Disaster Resilience & Safer Communities

Event-Based Sampling Sub-Facility

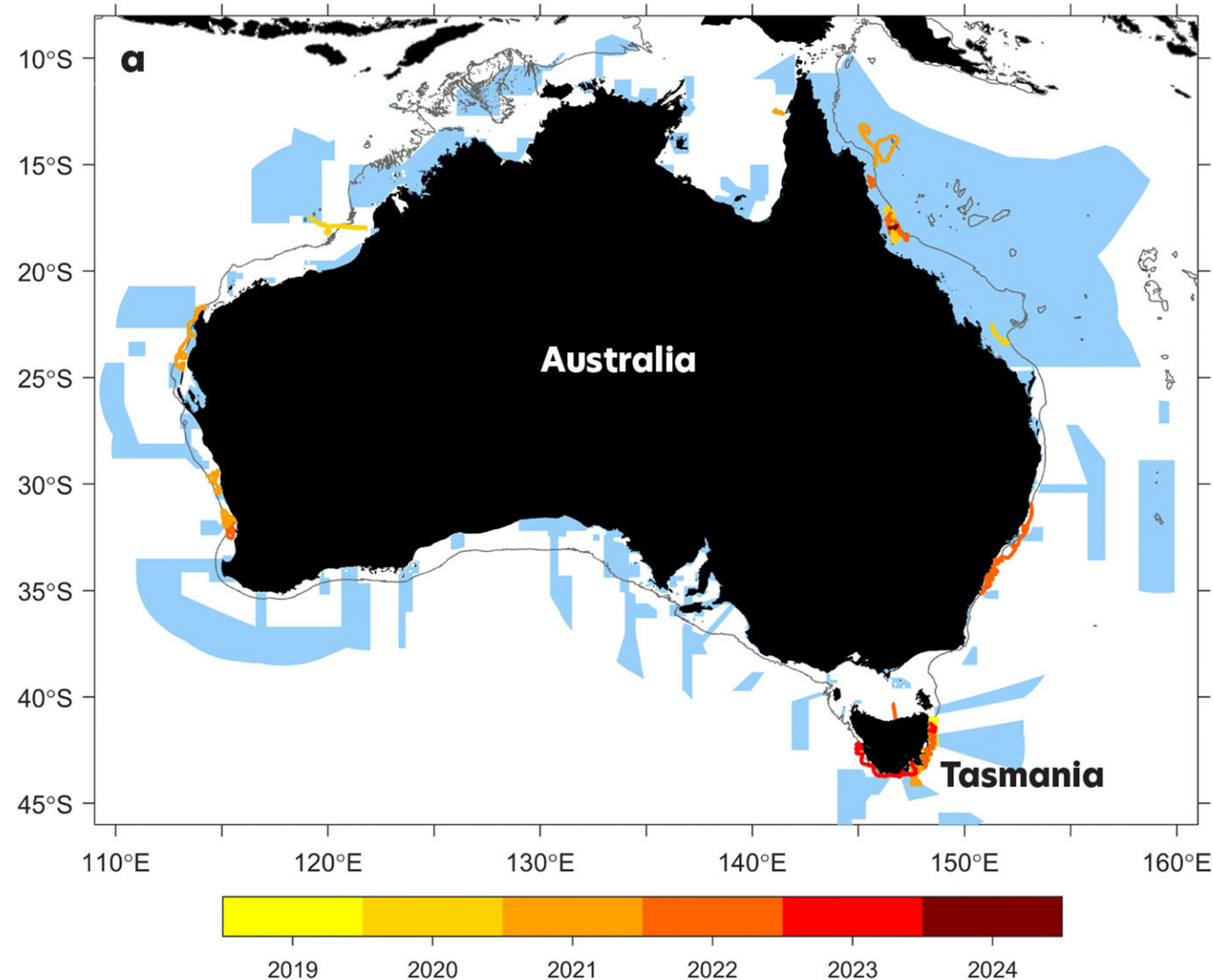


- The Facility focusses on episodic events
- Likelihood and location of events forecast using long-term data (IMOS-enabled and partners) and models
- Mobile sensing platforms deployed to enhance existing data with high resolution spatiotemporal data
- Glider missions funded but further leveraging possible
- Increased capacity in 24/25 FY from 4 to 8 possible missions per year
- High occurrence of marine heatwaves in recent years but also large scale river runoff events



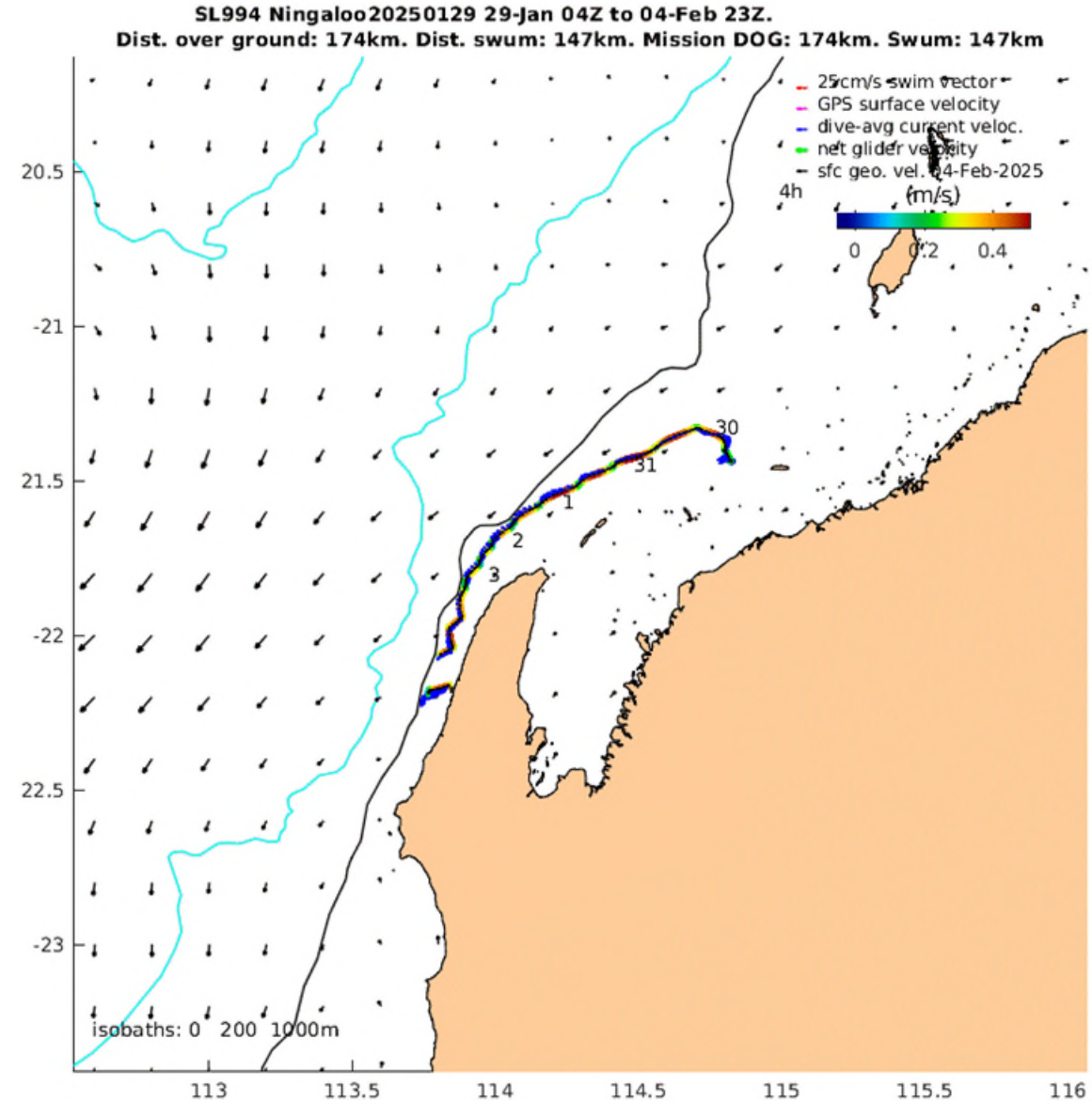
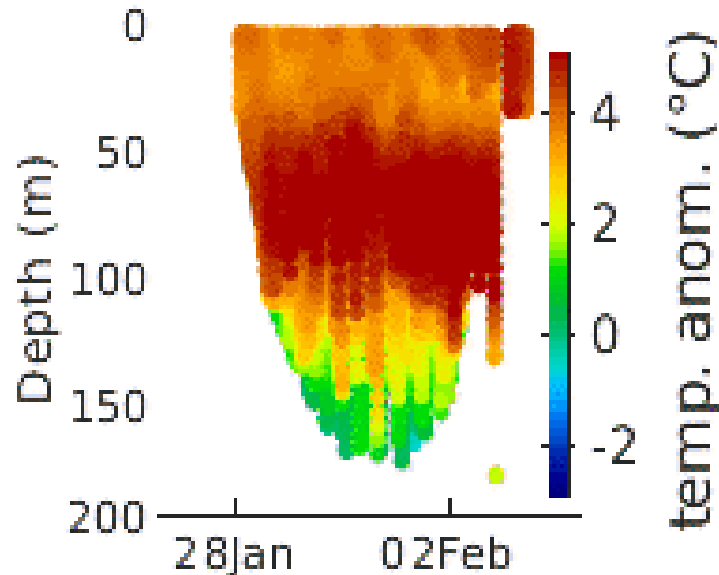
National footprint

- Missions have occurred around the country
- Event-Based Sampling Facility is a sub-Facility of the Glider Facility which runs routine missions
- Some of the gaps are covered by routine missions deployed by the Glider Facility with some missions leveraged for event data
- “Limited” to 200m depth contour and range from deployment locations and logistics providers



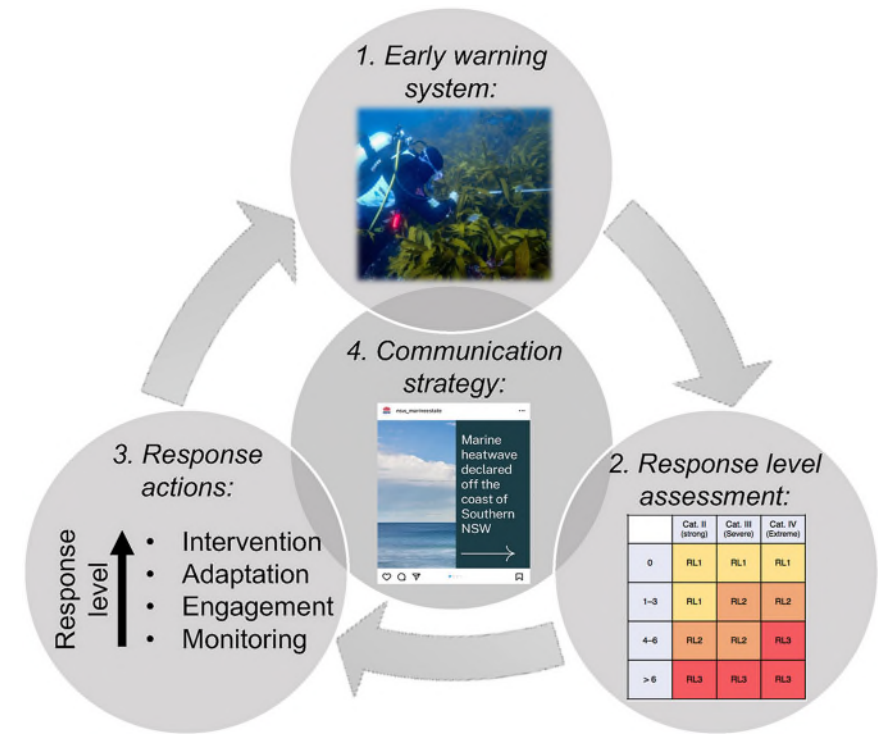
Data improves understanding

- The data from the gliders complements other data streams to provide a more complete 4D picture by increasing spatial and temporal resolution
- For example, note the high temperature anomaly between 50-100m which would be missed by other technologies




National response


- Response plans to **acute** events are growing in number
- Heatwaves have been the most targeted to date
 - NSW and Western Australia most mature state plans
 - Tasmania imminent
 - Some are ecosystem based (e.g. GBRMPA)
- DCCEEW and DAFF funding Emergency Preparedness Plans for environmental impacts from events via State bodies
 - Need more links to practitioners and understanding of how they operate



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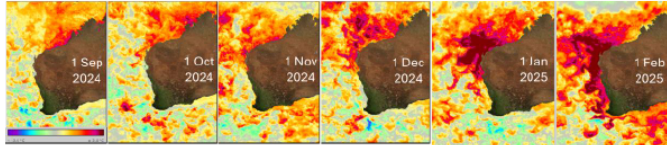


Marine Heatwave Conditions in Western Australia Marine Waters

Date of Issue: 7 February 2025
Issued By: WA Department of Primary Industries and Regional Development (DPIRD)

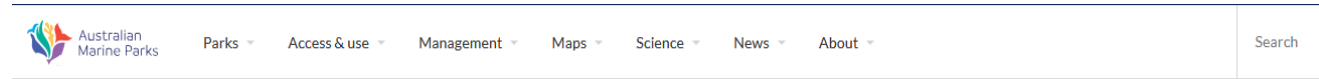
Overview

Marine heatwave (MHW) conditions extend across **all Bioregions** of Western Australia. MHW conditions in the Gascoyne Bioregion have reached the same intensity as the 2011 event and the likelihood of further intensification is high as we move through this peak summer period.



Informing stakeholders of the possible

- Practitioners need to know what marine information could be delivered quickly to inform responses and preparedness
 - Plan improvements e.g. (NSW Marine Heatwave Response Plan)
 - Some stakeholders probably do not realize what might be possible



Australian Marine Parks / Science / Scientific publications / Assessment of the 2024 marine heatwave on five reefs in the central Coral Sea Marine Park

Assessment of the 2024 marine heatwave on five reefs in the central Coral Sea Marine Park

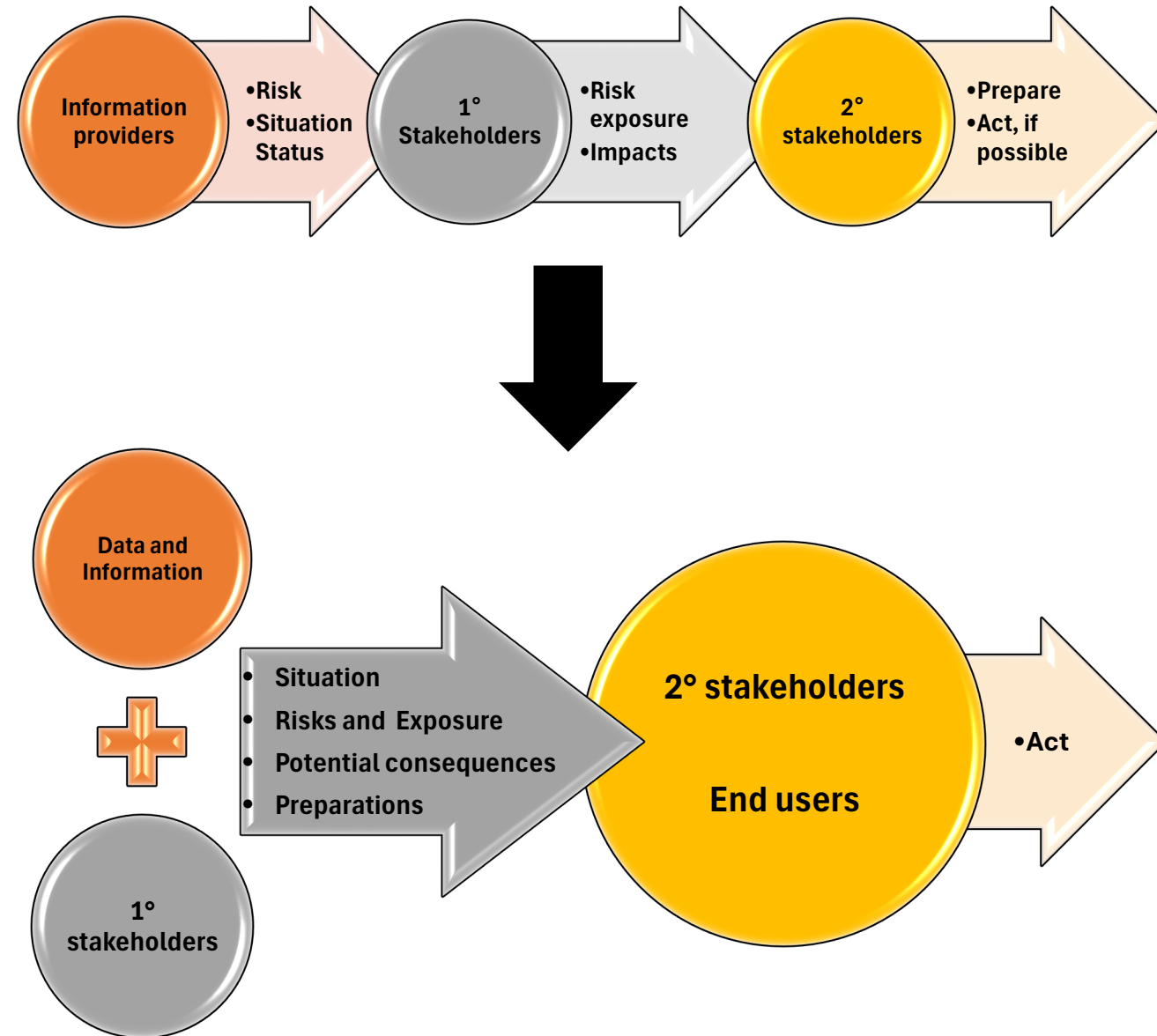


Recommendations

- Surveys in the next 6-12 months will be critical to determine the broader impacts of this heatwave on shallow coral communities within the CSMP, and the potential recovery of coral populations from previous bleaching events.
- Retrieving the temperature loggers deployed throughout the CSMP in February 2023 and February 2024 is critical to determine the levels of heat stress corals experienced throughout the region, and understand the responses of these communities to these disturbances. This would also enable us to groundtruth satellite-derived temperature data with in situ recordings of water temperatures.

Governance for impact

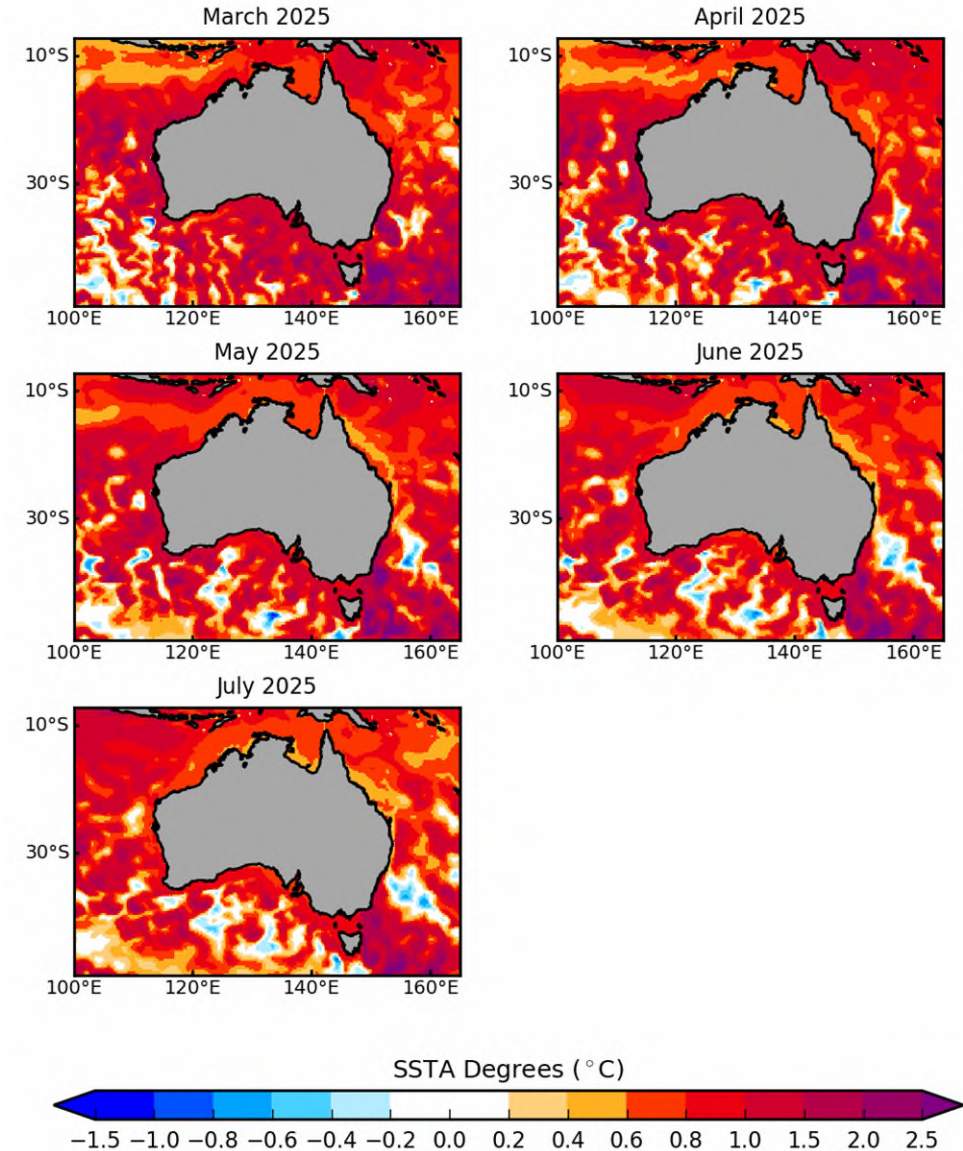
- Engagement is not linear but collaborative
- Steering Committee includes data and information producers, science users and a growing number of stakeholders
- Decision-making is science-based, and stakeholder engaged in near real-time
- Not just about guiding decisions but also relationship building between providers and users
- Responsive engagement between decision-making meetings





Challenges for the Facility

- Monitoring extreme events imposes a risk in that the events can complicate the activity itself
 - Cyclones cut roads preventing shipment of gliders
 - River runoff can form a freshwater density barrier
 - But can also give significant lead time if the event will result from a land-based incident (e.g. 2-3 months for floodwaters to reach a river mouth)
- Shift from localized events to broadscale events
 - Current very hot summer is having multiple marine impacts in multiple locations of high value, interest and concern
- Vessels
 - For launch and retrieval, emergency response
- 24/7 attention during missions
- Focus on episodic events impacts ability to generate standalone academic outputs but they are now commencing



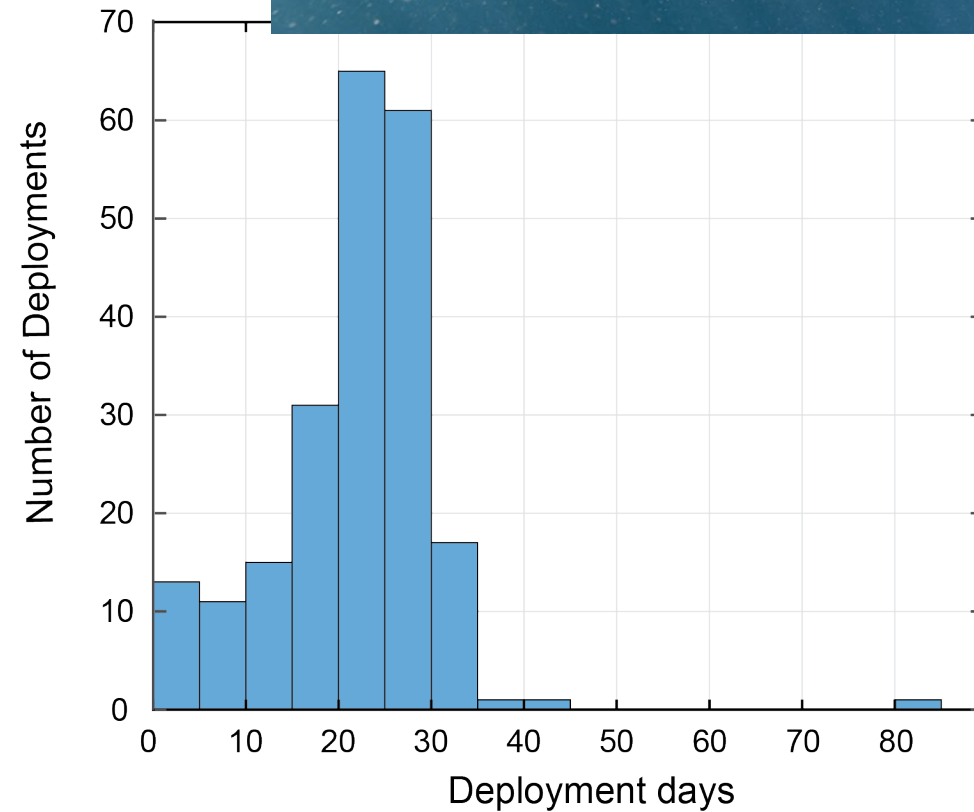
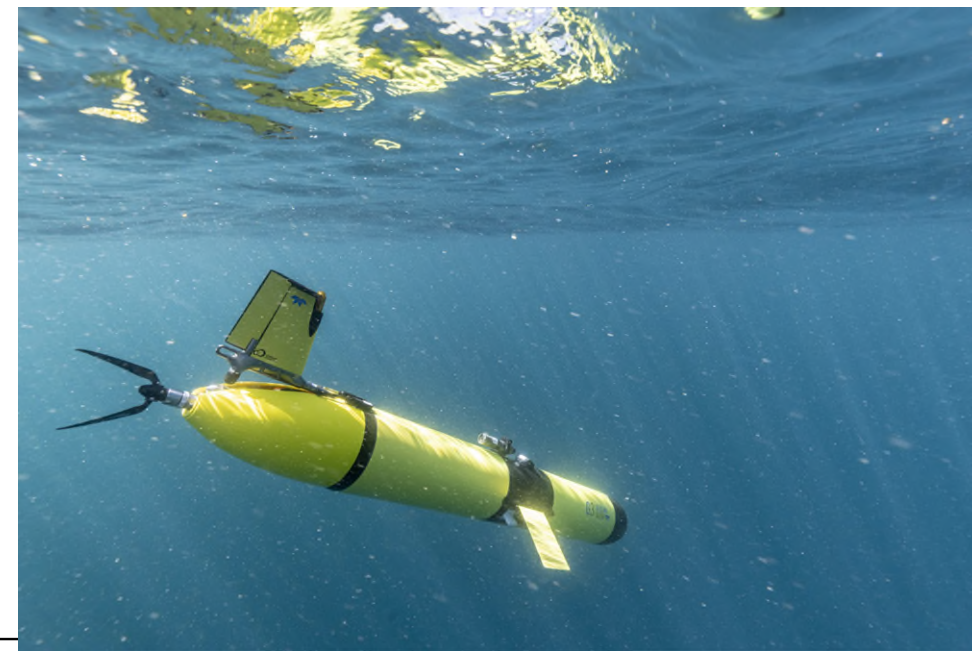
Call for assistance

- One of the major challenges is getting access to small to medium vessels at the wide range of possible/required launch locations around the coastline
- Anyone interested in working together to develop an informal vessel register, please meet with myself, Christine Hanson and Chari over coffee
 - Affordable
 - Accessible and responsive providers
 - FIFO devices and support staff
 - Consider safety responses to risk of events
 - Capable
 - Pass Operator requirements



In a perfect world

- Mobile technologies would become a roaming capability ready and able to head towards an event (standing ready)
 - Needs ability to stay at sea longer
 - Smart piloting to maximise likelihood of being nearer to an event when it starts
- Better able to leverage from other capabilities to have even better, and earlier, forecasts of likely events



In summary

- Facility is becoming increasingly stakeholder involved and not just stakeholder focussed
- High and growing interest from complex suite of stakeholders confronted by diverse event types and growing frequency
- Currently a “watch and understand” capability
- Starting to develop into a “watch, understand and act” capability

Marine heatwaves: a rising challenge for naval warfare

29 Jan 2025 | Quentin Comminsoli



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A marine heatwave in northwest Australia is killing huge numbers of fish. It's heading south

Published: January 29, 2025 3:47pm AEDT

The image shows an aerial view of the ocean with a large, irregularly shaped area of lighter, turquoise water, indicating a marine heatwave. The surrounding water is a darker blue. The text overlay is in white and black.



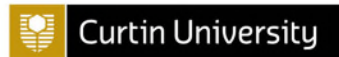
Australia's Integrated Marine Observing System is enabled by the National Collaborative Research Infrastructure Strategy (NCRIS). It is operated by a consortium of institutions as an unincorporated joint venture, with the University of Tasmania as Lead Agent.

PRINCIPAL PARTICIPANTS



SIMS is a partnership involving four universities

ASSOCIATE PARTICIPANTS



IMOS thanks the many other organisations who partner with IMOS, providing co-investment, funding and operational support, including investment from the Tasmanian, Western Australian and Queensland State Governments.

