Operational oceanographic support during South Australia's unprecedented Harmful Algal Bloom

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2025 Forum for Operational Oceanography

SARDI
SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE

Government of South Australia
Department of Primary Industries and Regions

- **Since mid-March, SA has been impacted by an ongoing HAB event of unprecedent size & duration**

  - ~30% of states coastline impacted
  - extensive marine mortalities
  - novel brevetoxin producer '*Karenia cristata*' (Murray *et al.*, Nature Ecology & Evolution, in review)
  - impacted aquaculture, fishing, tourism & communities
  - State (parliamentary) & Federal (senate) enquiries


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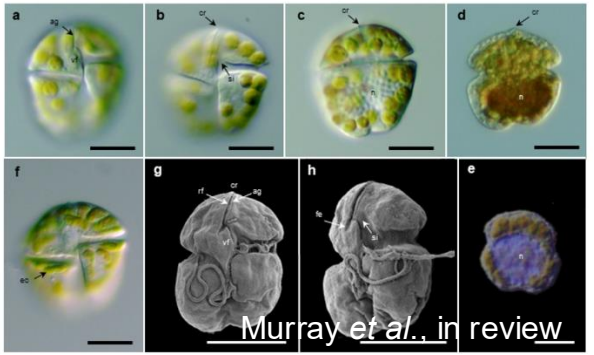
By Lauren Thomson

Micro-algae milkshake cause found after surfers fall ill and dead sea life washes ashore at Fleurieu Peninsula

Surfers have developed ear, eye and throat infections after entering the water at the popular beaches.

The public is being urged to contact FISHWATCH on 1800 065 522 in the event of fish kill events in SA rivers or coastlines. Credit: Supplied.



Murray *et al.*, in review

Algal bloom outbreak

2024

Edithburgh jetty - view 1

Edithburgh jetty - view 2

Claris wreck - view 1

2025

Edithburgh jetty - view 1

Edithburgh jetty - view 2

Claris wreck - view 1

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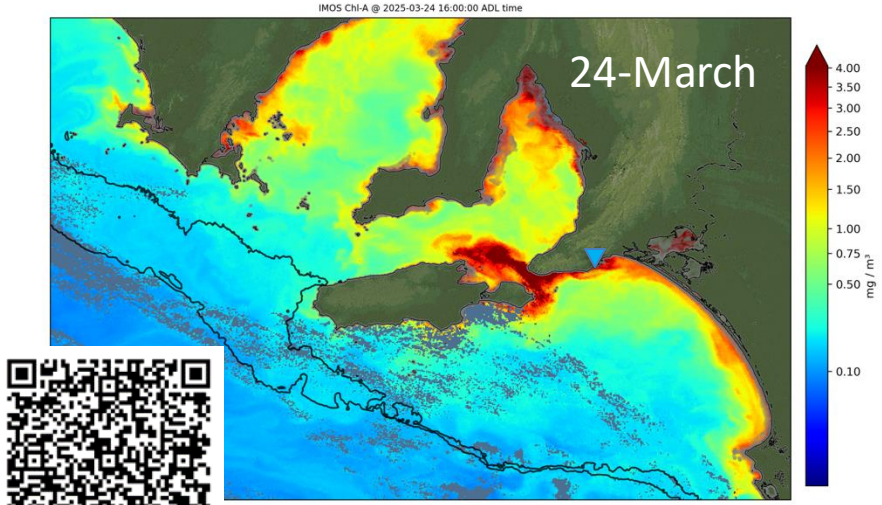
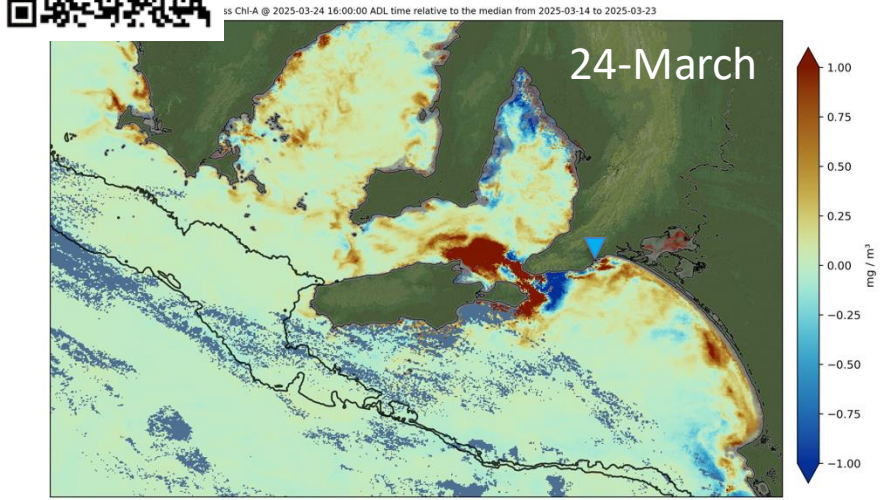
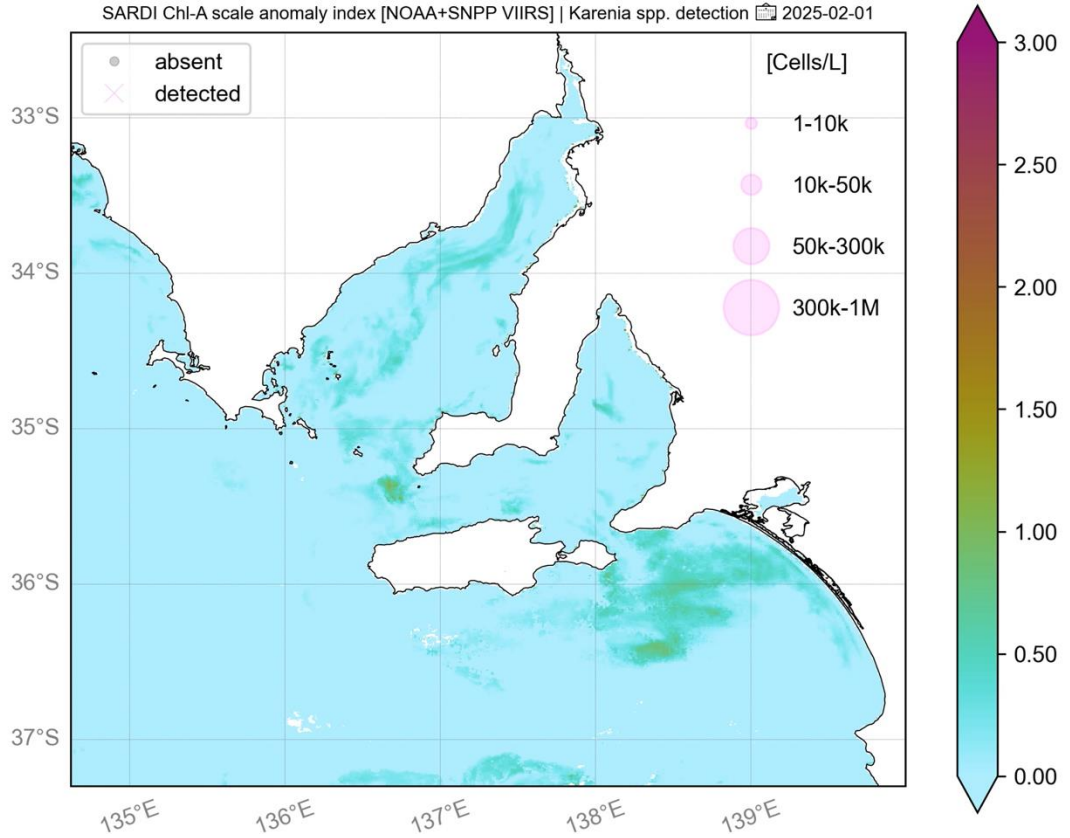
- **SARDI weekly situational updates** have relied on available data & tools to inform gov, industry & public:
  - Chla, SST & MHW products
  - ocean models (hind/now/forecast)
- Complimented by:
  - SA Gov water sampling for HAB identification
  - citizen science



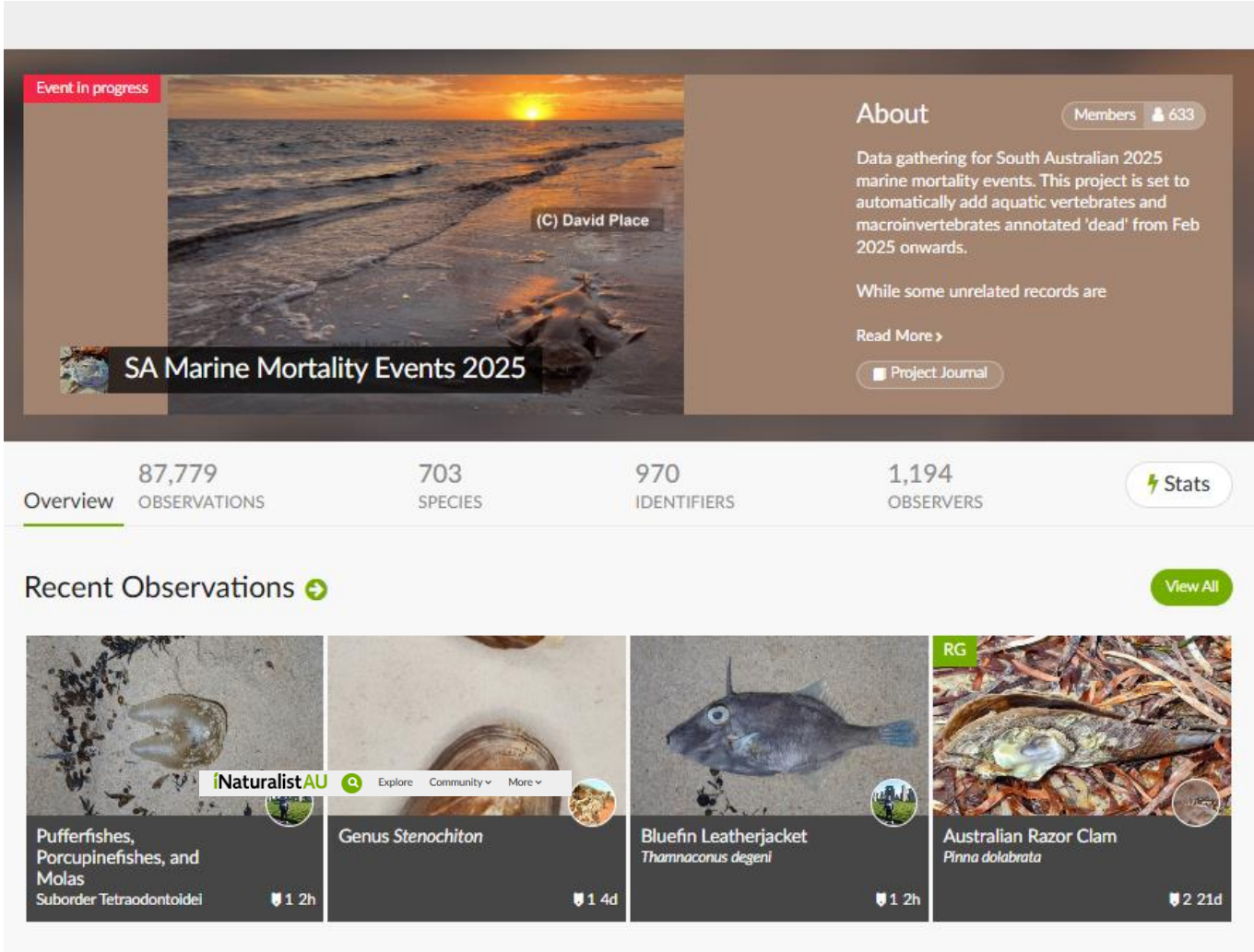


Chla anomaly animation includes:

- magnitude of daily chla increases above the 21-year (2002-2023) median conditions
- all SA Gov. sampling for *Karenia spp.*
- fish kills reported to PIRSA FishWatch

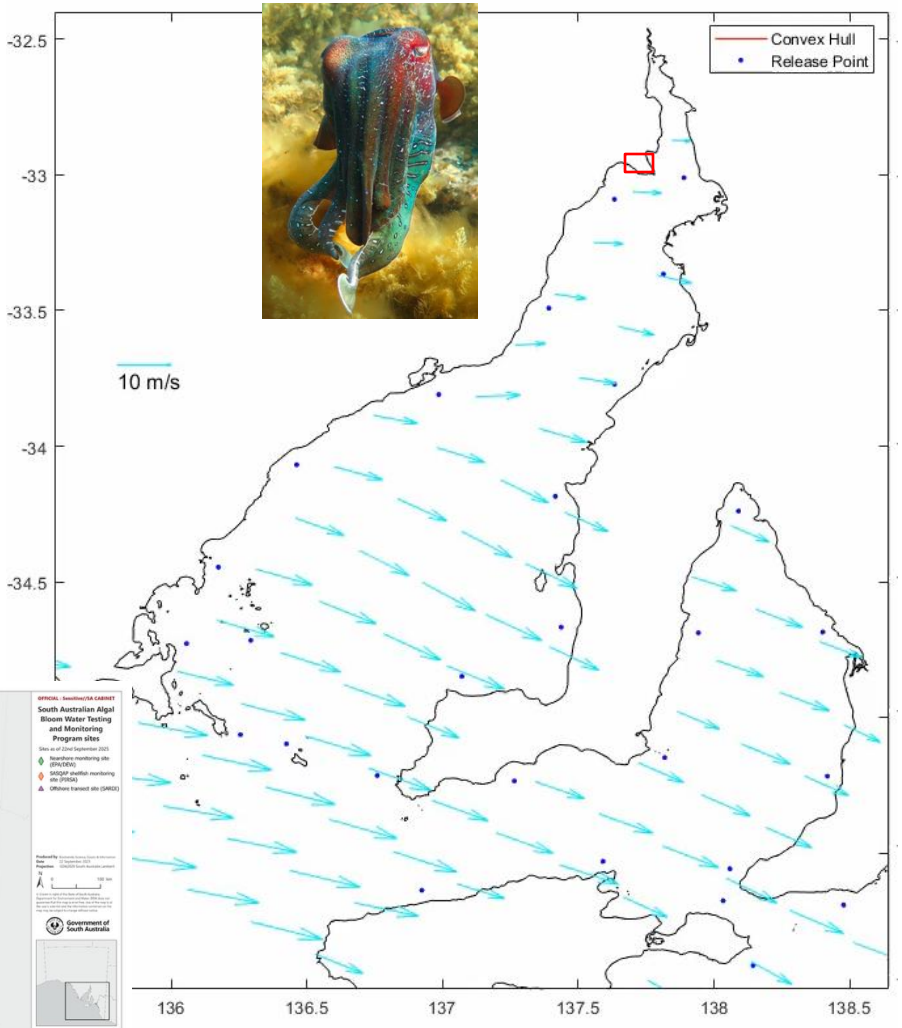


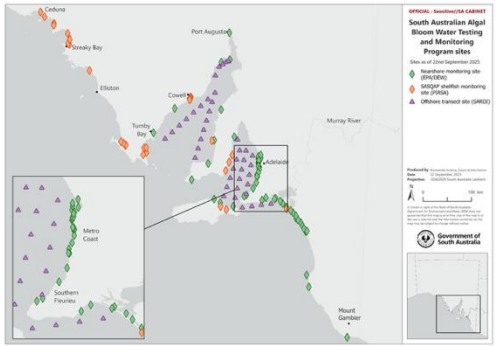
- Citizen Science iNaturalist



- **Model now/forecasts** are used to understand the trajectory of water masses out to 5-days

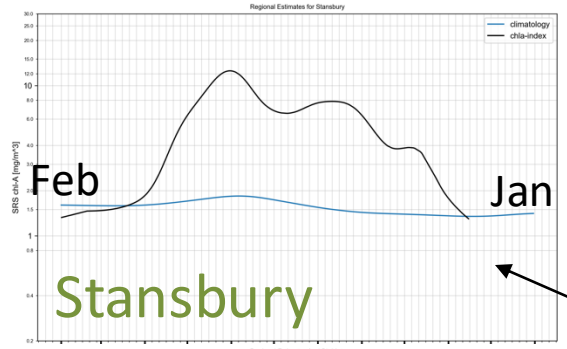
- best used with satellite chla and HAB water sampling observations to inform decision making

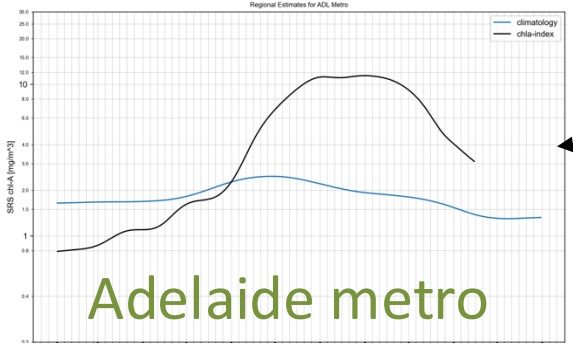


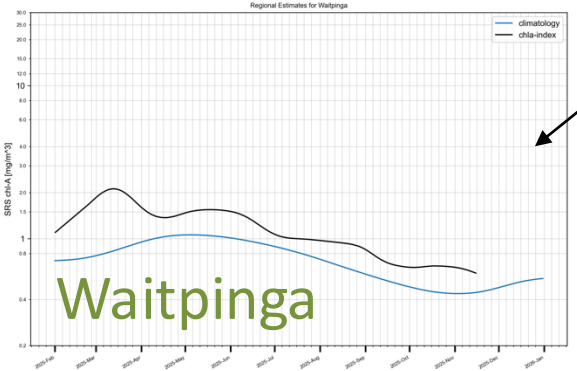


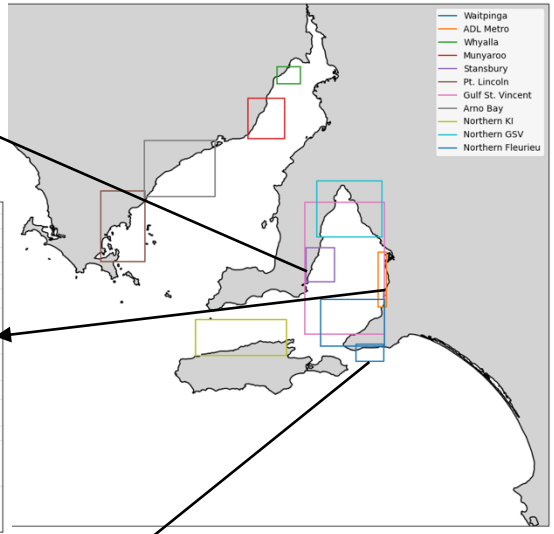
- **Chla trends** have provided a greater understanding of sub-regional changes in algal concentrations

- spatially averaged daily averages compared to the 21-year (2002-2023) median conditions

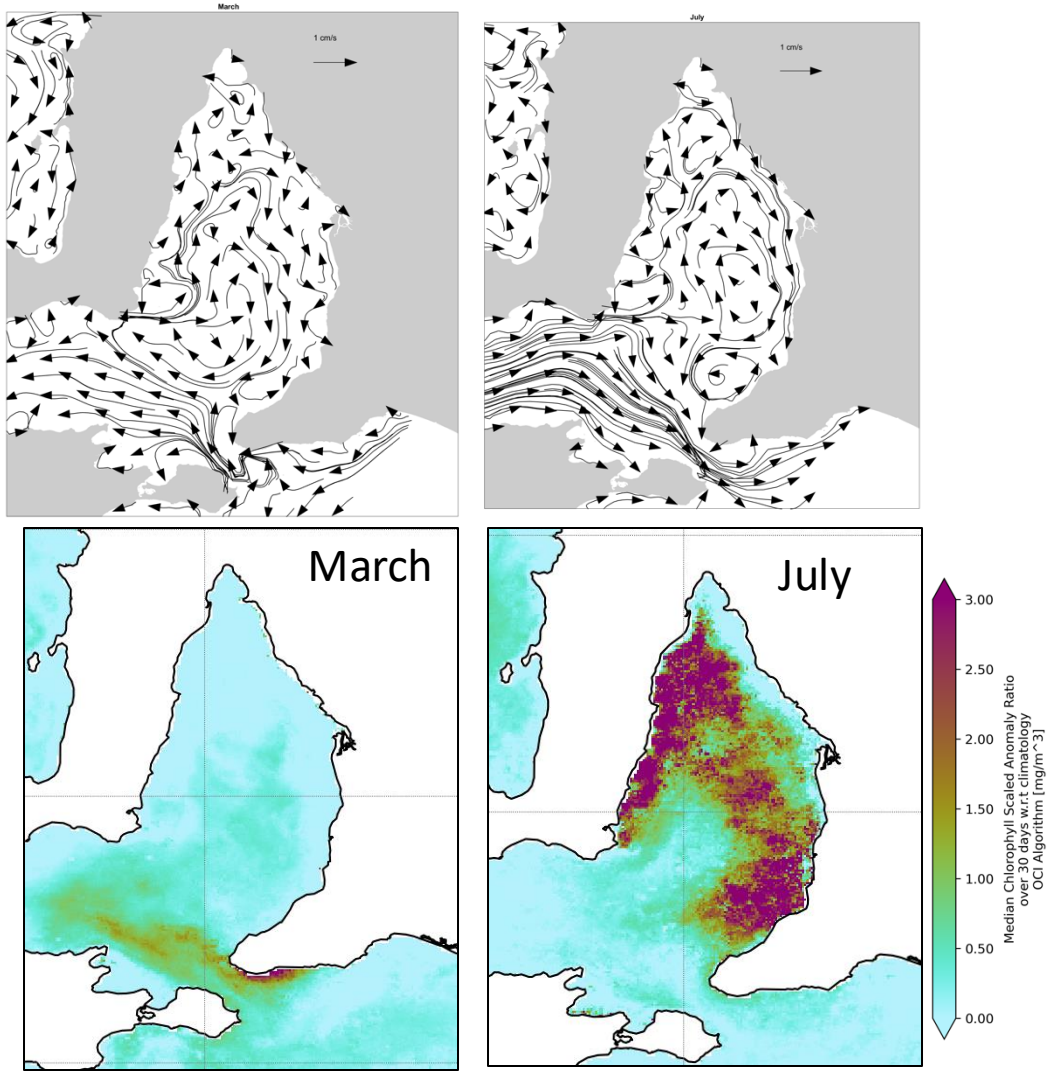








- **Model hindcasts** of the mean circulation (5-year average) provide an understanding of expected longer-term movement & spread of bloom

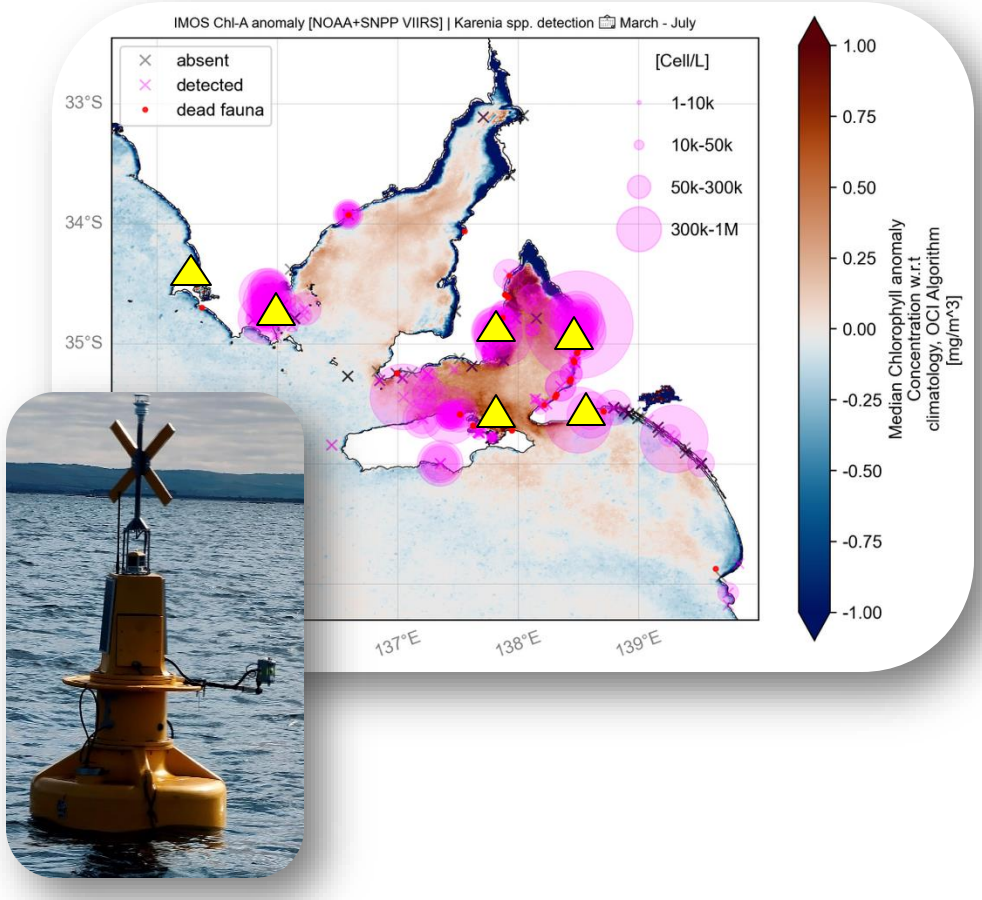


- Significant State and Federal government investment into HAB research and monitoring
- includes establishment of '**Office for Algal Bloom Research**' with an emphasis on developing HAB research capability
- Multiple positions now advertised

Keyword search 'SARDI'

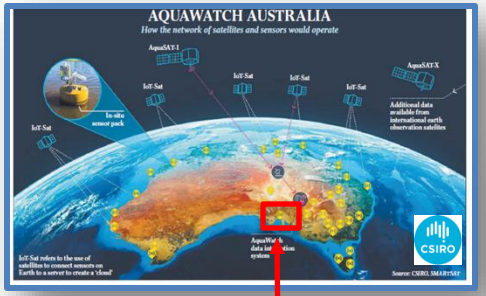
Early Detection & Monitoring System

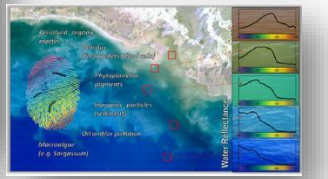
- Locations based on:
  - HAB source locations
  - circulation & connectivity
  - shellfish aquaculture & community locations

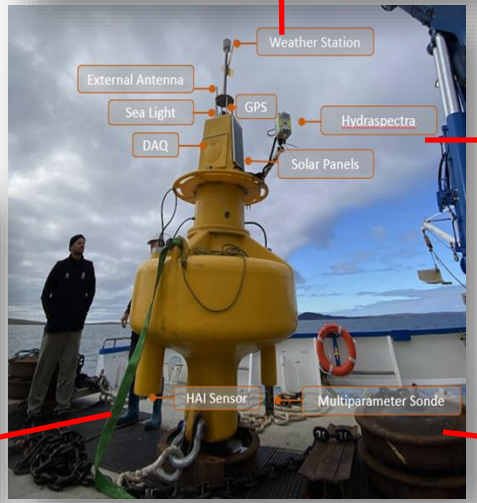


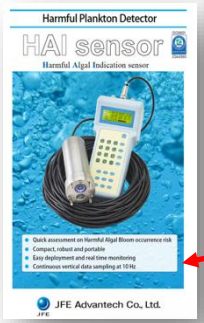
- Oceanographic moorings with state-of-the-art sensors to provide essential data in near real-time

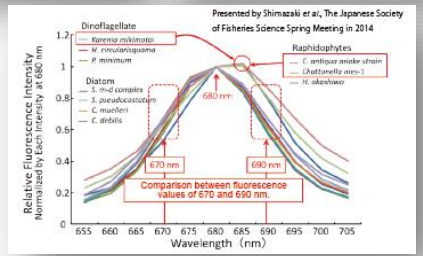
- HAB early detection
- support HAB research
- bloom drivers
- improve satellite detection/ products
- improve predictive capability: AI forecasts / process-based models











Early Detection & Monitoring Network

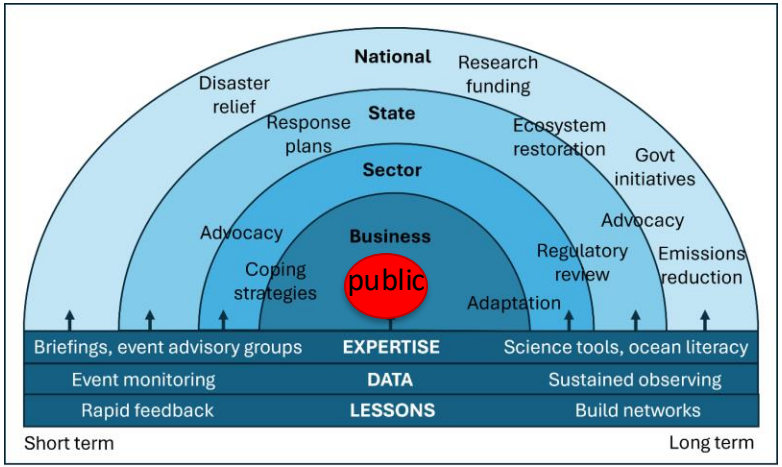
- suite of sensors to include integration of In-situ Flow Cytobots (IFCB)
- near-real time ID of phytoplankton groups/species and their abundance
- AI trained image classification
- supports sensor/satellite cal/validation & underway field surveys

Source NOAA: https://spo.nmfs.noaa.gov/tech-memos/

Source: Dr Don Anderson

- **There are many lessons to be learned from this event**
  - the need for an effective & coordinated emergency response governance structures across national, regional, and local levels to ensure a consistent and effective response
  - increased sustained coastal monitoring, & rapid HAB/toxin ID capabilities
  - provide clear science-based communications to communities and stakeholders
  - citizen science & public involvement/education

Hobday et al. Marine heatwaves and ecosystem-wide impacts in Australian waters during the 2024/25 summer (Oceanography, in review)



Actions & responsibilities in response to extreme events