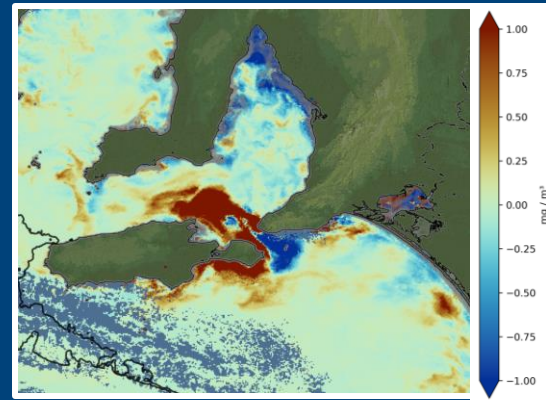


Establishing an **Algal Bloom** early detection, monitoring & forecasting system



Mark Doubell, C. James, H. Bastos de Oliveira, P. Malthouse, I. Moody, C. Tensubam, M. Gordon, A. Hutchison, J. Kent, T. Bui

2 June 2026 – OFABR Symposium

OFFICE FOR ALGAL BLOOM RESEARCH



Government of South Australia
Department of Primary Industries
and Regions



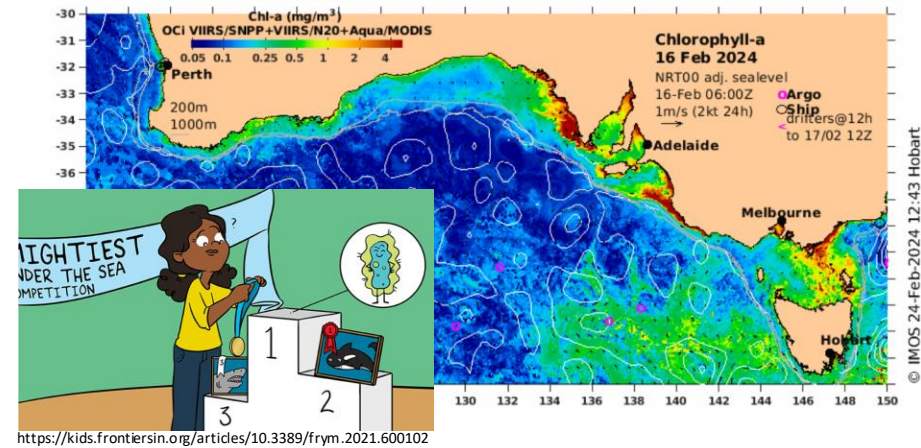
SARDI SOUTH AUSTRALIAN
RESEARCH AND
DEVELOPMENT
INSTITUTE



Australian Government

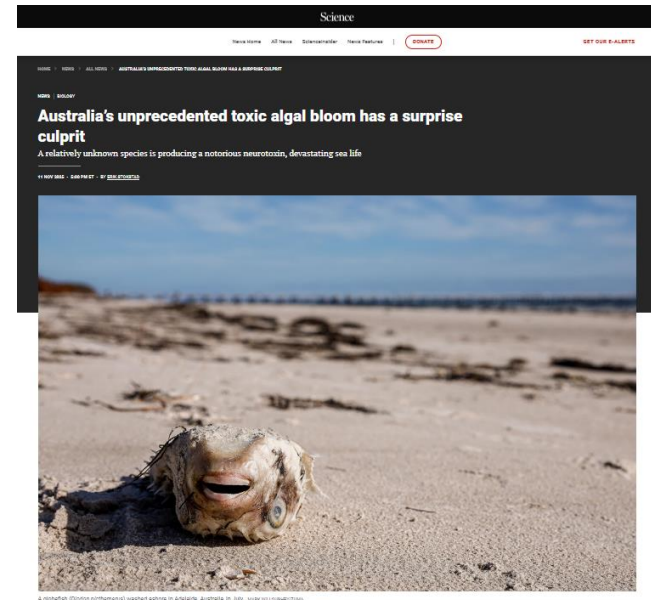
Phytoplankton

- base of marine food webs, generate ~50% of global oxygen & regulate the global climate.
- Approx. 200 out of over >5000 marine phytoplankton are harmful & can negatively impact the environment and human activities (Hallegraeff et al., 2021)



SA's 'Karenia' bloom

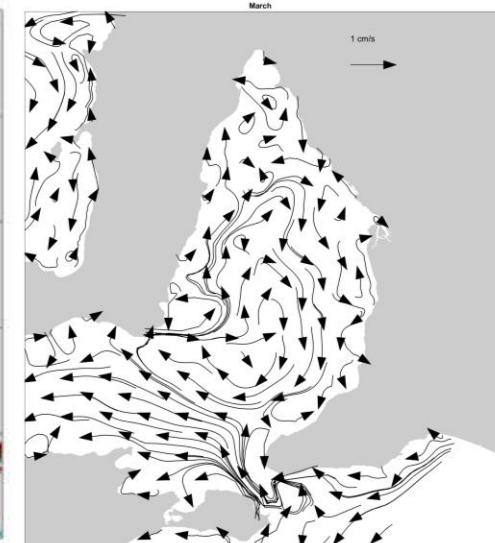
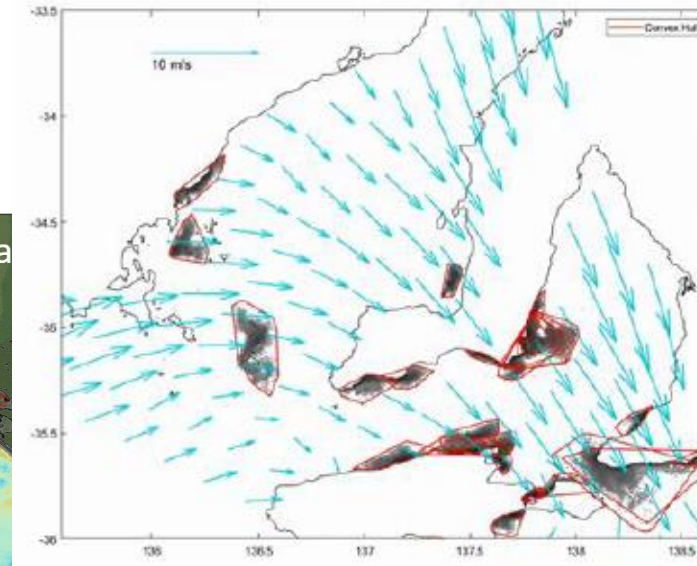
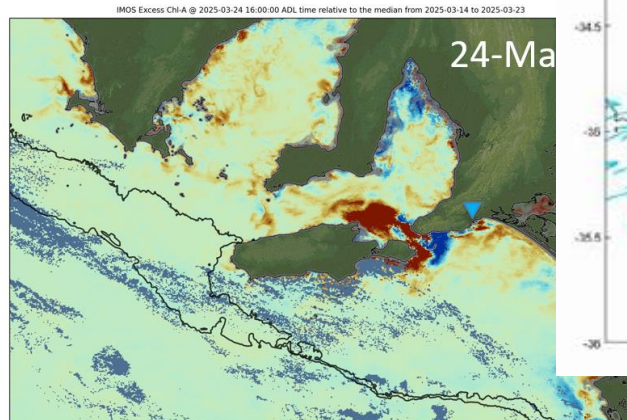
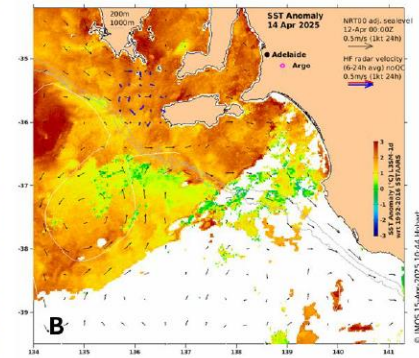
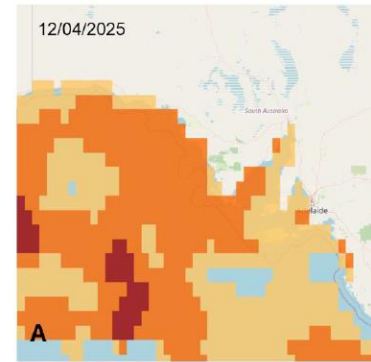
- caused extensive marine mortalities
- included a relatively unknown toxin producing species (*K. cristata*) (Murray et al. 2026, accepted)
- Impacted all marine industries & communities (aquaculture, fishing, tourism, recreation, human health)



SARDI weekly situational updates

informed government, industry & public on development & movement of the bloom using:

- Initial sampling to identify HAB species (Murray et al. 2026, accepted)
- remote sensing: chl-a, SST & MHW
- ocean models (seasonal hindcasts & forecast)



Complimented & informed by:

- government water sampling programs
- citizen science (iNaturalist, PIRSA Fishwatch)
- IMOS historical and event-based data
- oceanographic modelling attempts to predict seasonal persistence (Kämpf 2026)

J. Kämpf

Continental Shelf Research 297 (2026) 105631

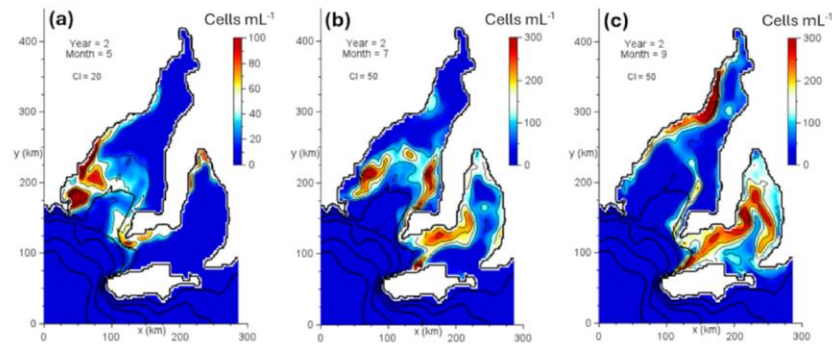
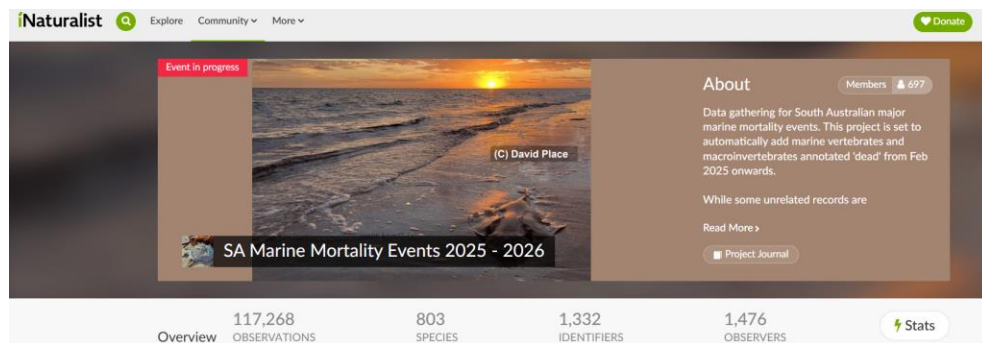
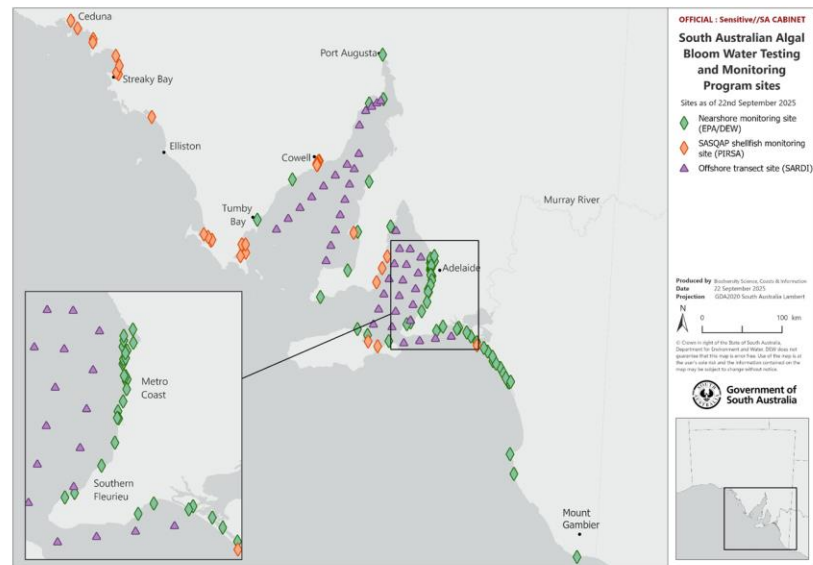


Fig. 16. Model forecast of *K. cristata*. Same as Fig. 14, but for the period January–May 2026.



Algal bloom exposes 'limitations' in government monitoring programs, Senate inquiry finds

By Thomas Kelsall

Environmental Management

Tue 11 Nov 2025



The 207-page report tabled on Tuesday makes 14 recommendations. (ABC News: Che Chorley)



“HABs are complex oceanographic phenomena that require multidisciplinary study ranging from molecular and cell biology to large-scale field surveys, numerical modelling, and remote sensing from space.” D. M. Anderson, 2009

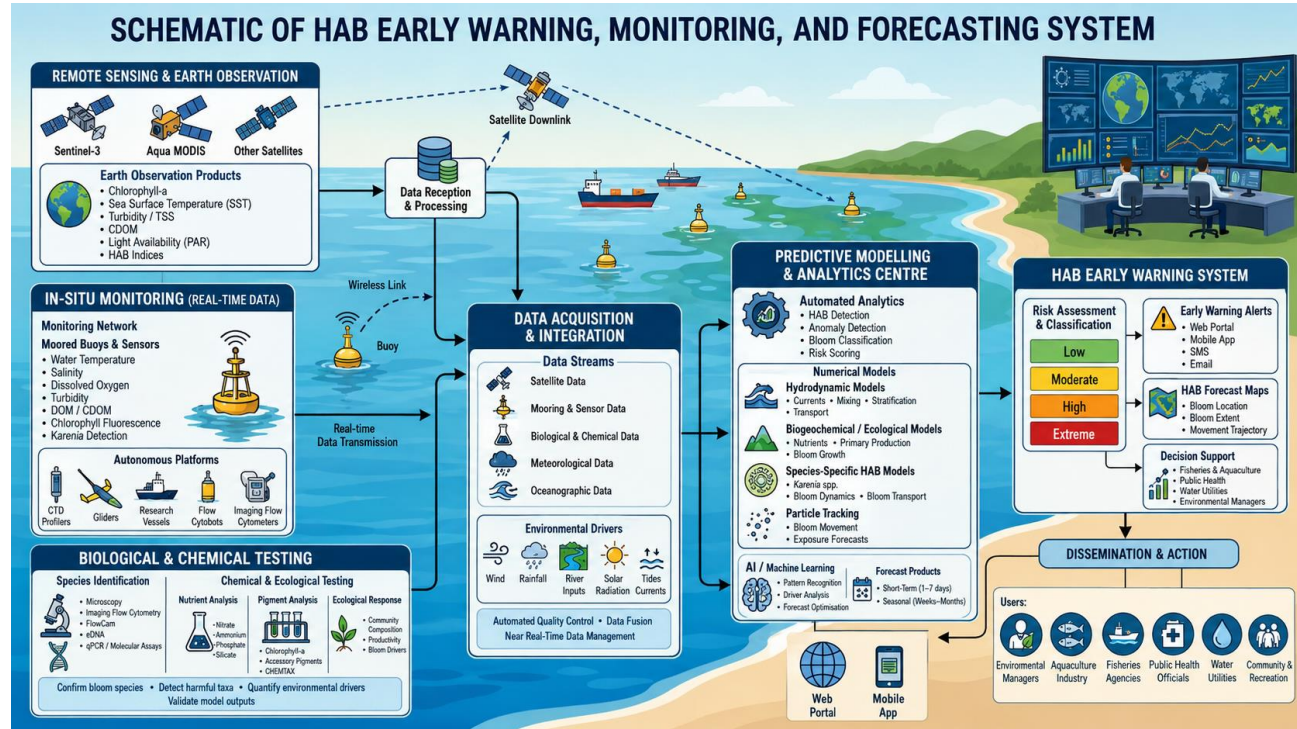
- State & Federal inquiries identified the limitations of existing HAB preparedness, monitoring & research in Australia.
- HABs are complex & the underlying cause of HABs is often unknown.
- Since HABs are not predictable, **early detection** & multi-disciplinary monitoring (data) is required to be better prepared to respond to & mitigate future events.

Objectives: Establish an early detection & monitoring system to:

- 1. better understand the drivers & ecology of HABs**
- 2. improve the response & mitigate future events**

Four interactive components:

1. In-situ monitoring & real-time *Karenia* detection
2. Improved remote sensing
3. Large data acquisition & integration to support R&D
4. Predictive modelling

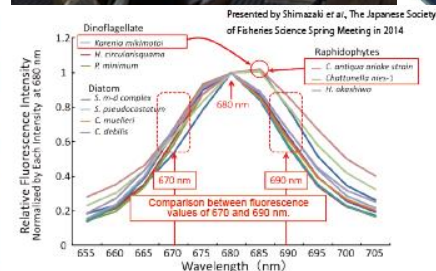
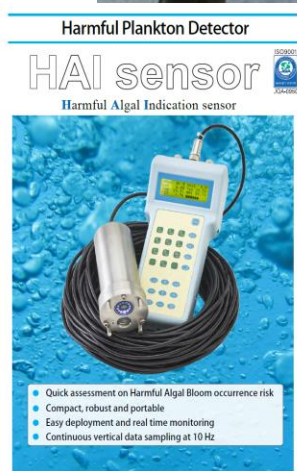
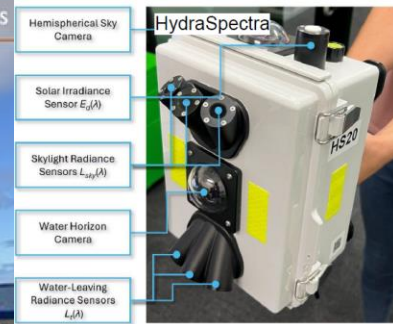
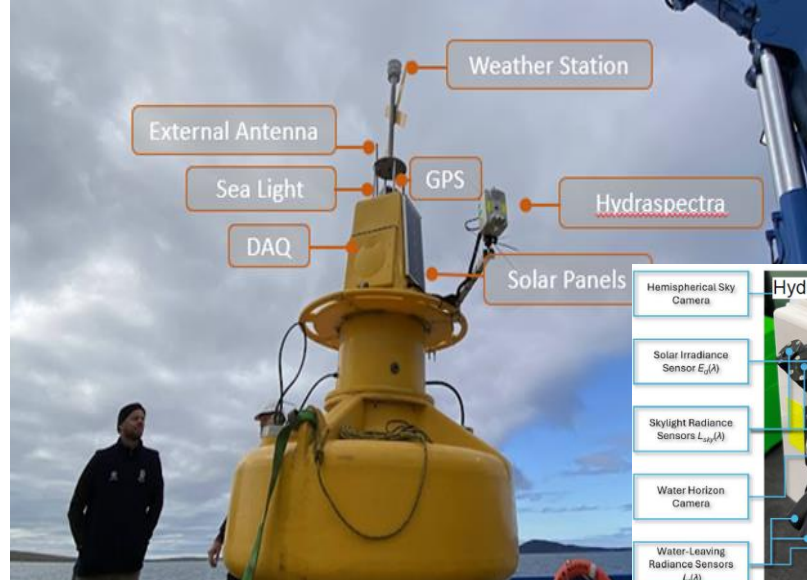


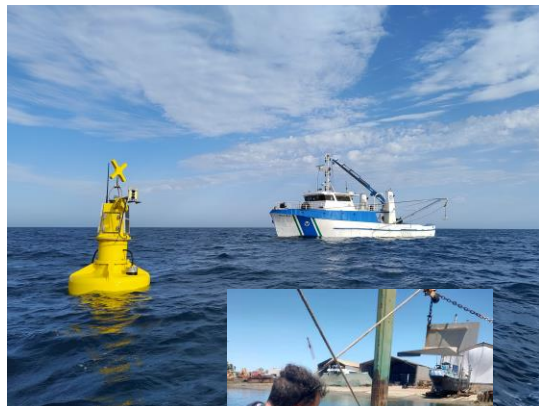
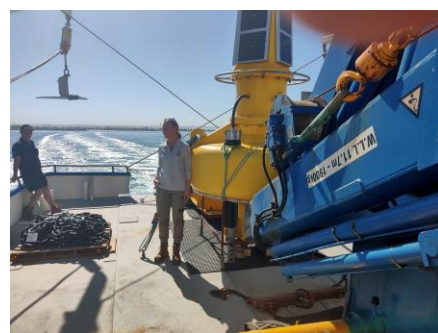
Insitu early detection & monitoring

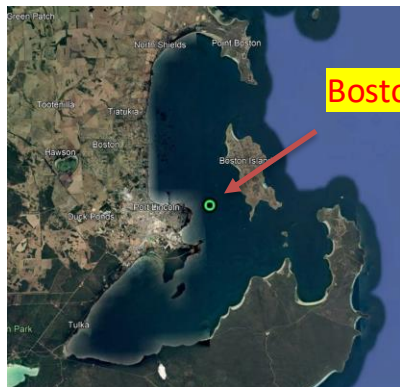
- Consists of 7 coastal monitoring platforms
- Includes real-time measures of temperature, salinity, chlorophyll, turbidity, dissolved oxygen
- new sensors for the early detection of multiple HAB species
- Complimented by regular water sampling (nutrients, algal ID, eDNA) to understand bloom drivers

Data used to:

- Support HAB related research
- calibrate & validate improved remote sensed & predictive models

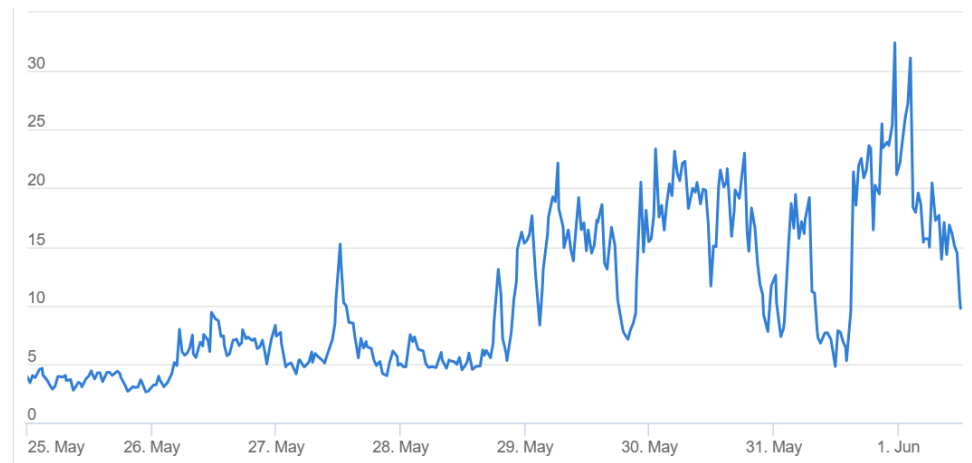




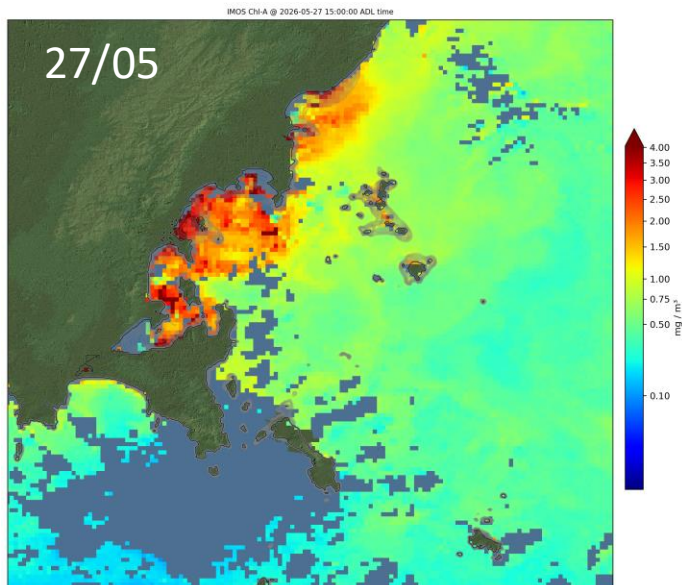
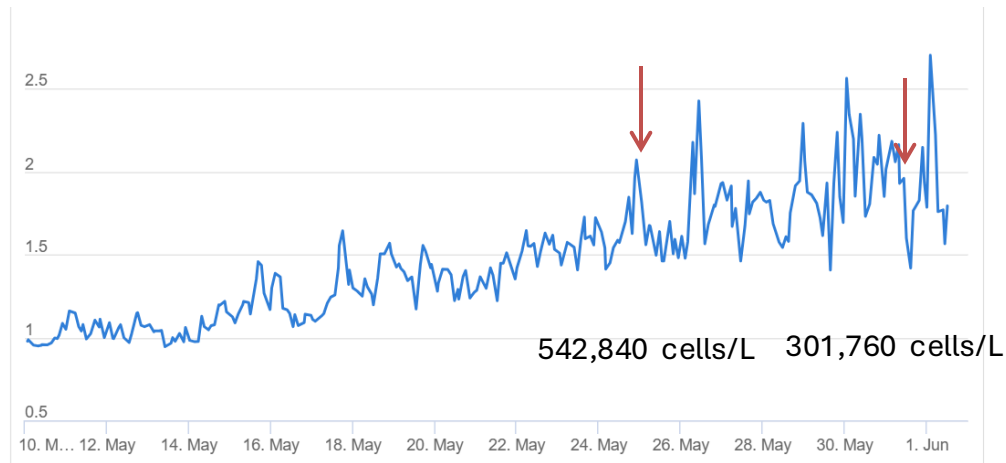


Boston Bay Mooring

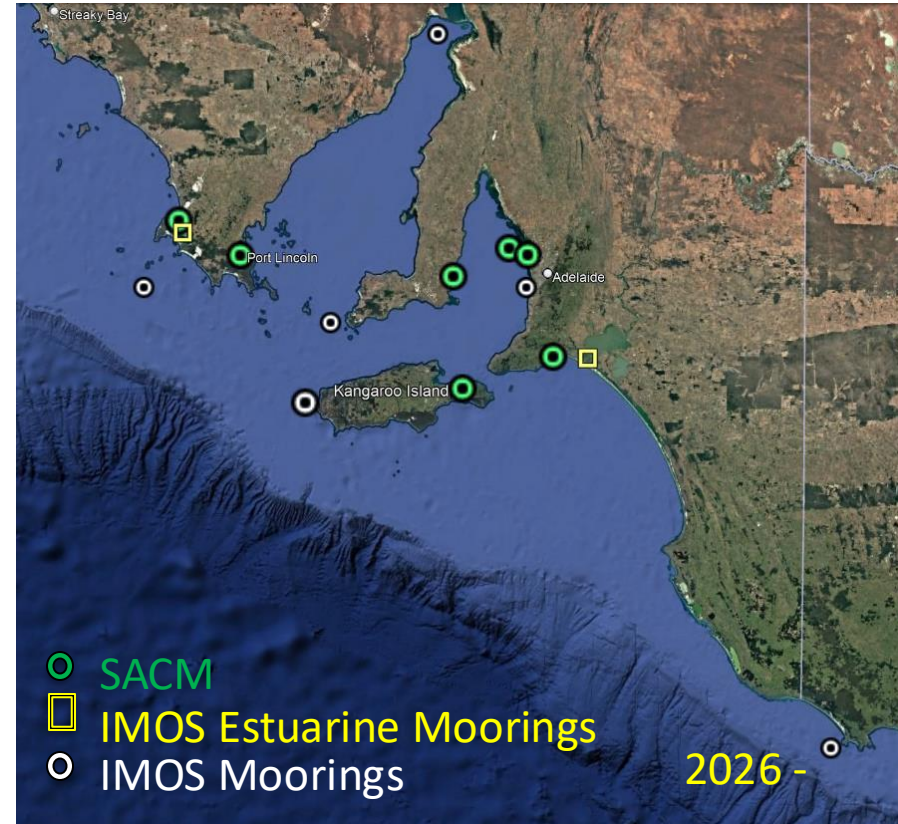
CHL
(RFU)



FSI KARENIA
INDICATOR

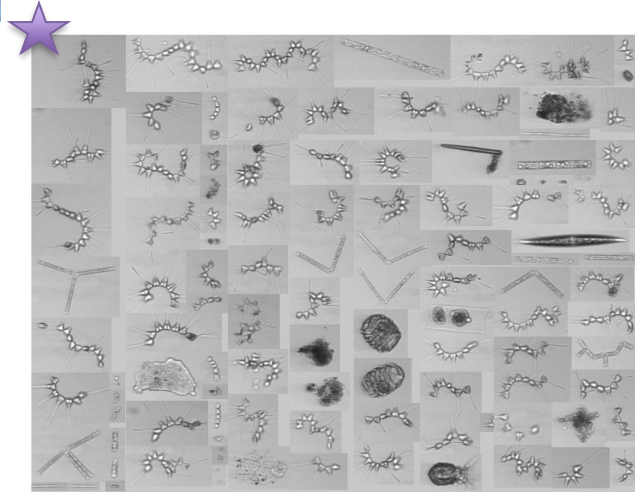
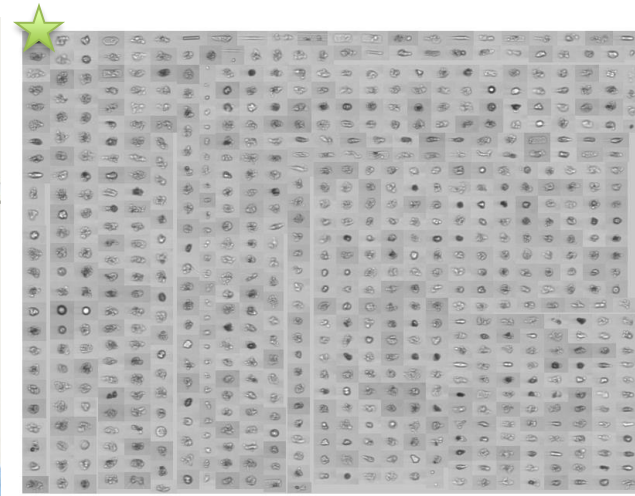


- Significant expansion in ocean monitoring
- Connecting estuaries to coast & open ocean
- Discussions underway to access data via IMOS /AODN



Large-scale surveys

- **Objective:** to identify potential source regions of HABs (Karenia) and their relationship to environmental drivers (i.e. upwelling vs. downwelling periods, coastal vs. offshore nutrient sources)
- Oceanographic water and sediment sampling complimented by **Insitu Flow Cytobot** (IFCB) technology to provide increased surveillance of HAB types



Collaborative partnerships

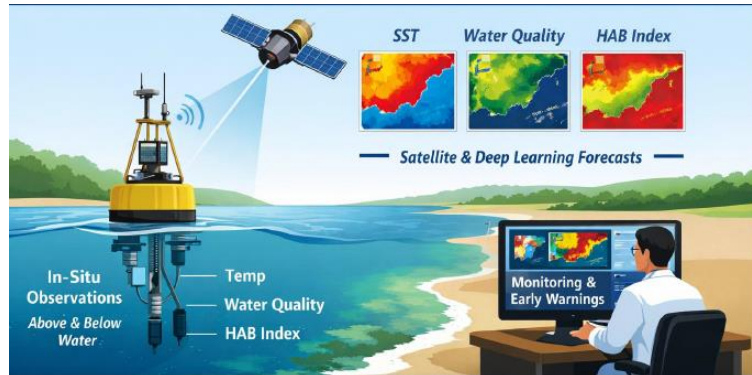
- SARDI is partnering with CSIRO to grow state & national capability in detecting and predicting HAB using integrated remote sensing, AI and ocean modelling methods

CSIRO

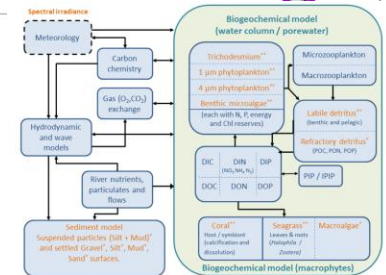
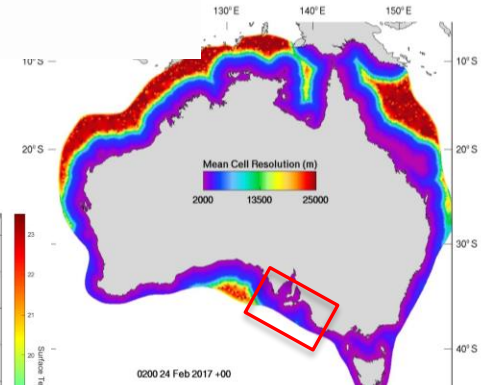
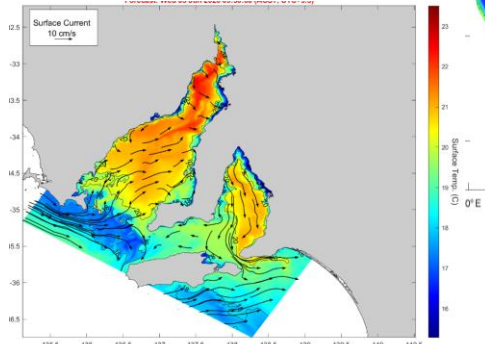
AquaWatch
Australia

Delivering enhanced water
quality monitoring to protect
our most vital resource - water

Australia's National Science Agency



Coastal Environmental
Modelling Team



Thank you to the many partners for their continued support

