

Dear SA Algal Bloom Committee Secretary

I wish to make the following submission to the current Select Committee Inquiry on SA Algal Blooms. Unfortunately I am overseas on holidays in the UK until 23 August without access to my PC so have produced this submission from my phone as best I can. My apologies for any lack of formatting or incomplete referencing.

I am a former senior fisheries researcher and manager in three States - as well as a former federal (AFMA) Commissioner - and while I am certainly not a scientific expert on algal blooms, I have studied this matter closely over the last few months from a number of angles out of genuine interest and concern for our marine environment and many friends & colleagues who depend on it for a living.

I have addressed most of the TOR below -

□ contributing environmental, land management or water quality factors

There are a range of factors that may have contributed to both the inception and progression of this bloom. Those that have had the most prominence include -

A) Nutrients from River Murray outflows in the 2022/23 floods, both inorganic (fertiliser) & organic (rotting fish etc).

B) A major Bonney upwelling event in early 2024 contributing inorganic nutrients

C) Record drought conditions in 24/25 summer & autumn and associated low wind, low swell & sunny conditions

D) Associated with C) above a high level of water stratification due to the calm conditions and high sunlight levels, both ideal for *Karenia* growth.

E) a marine heatwave with surface waters 2-3 degrees above average which extended from the west as far away as northwestern WA.

F) associated with E) a large die-off of seagrasses & macrophytes including kelps which potey fed the bloom when plants decomposed (given that *K. Mikimotoi* is a "mixotroph" i.e. it can source nutrients either direct from the water column (photosynthesis) or by "eating" dissolved organic carbon particles.

It is my considered view that A) and B) had little impact on the current bloom due to the lapse of time. The ocean is an incredibly dynamic system and these nutrients in my opinion would have dissipated in the system before now. The early 2024 upwelling event no doubt drove a large

beneficial surface bloom of diatoms during that year - beneficial as this results in high productivity and survival of rock lobster larvae etc.

In my opinion the heatwave was a factor in the Km bloom as evidenced by the fact that *Karenia mikimotoi* bloomed last in SA in 2013 west of Coffin Bay when the last heatwave conditions were encountered in SA. This 2013 bloom resulted in significant mortalities but over a smaller geographic area.

But as Vandersea et al (2020) found when documenting a large *K. mikimotoi* bloom in Kachemak Bay in 2013, the common factors across a wide range of historical Km blooms around the world were a) vertical stratification of the water body and b) a source of nutrients - <https://www.sciencedirect.com/science/article/abs/pii/S1568988319301799>

Unfortunately we don't have comparable empirical data & water samples to that which was available to the Kachemak Bay study before, during & after the bloom so it is extremely difficult to identify a clear cause here with a high level of confidence.

My best guess is that it was a confluence of factors that led to this bloom especially C) - E) and perhaps F) above. It must be remembered that Km can actually outcompete other potential bloom algae in a relatively low surface water nutrient environment due to its ability to move downwards through the water column at night to get nutrients from dissolved organic carbon and to photosynthesise near the surface during the day.

□ ecological, economic, cultural and social impacts of algal blooms with particular reference to:

- tourism, commercial and recreational fishing industries,
- regional and coastal communities, and
- marine biodiversity and ecosystem health;

The impacts on affected industry groups is broad and deep including every fishing and aquaculture related business operating in or supplying products to businesses operating in bloom affected waters and regional business that rely on tourism income right through to main street gift shops and bakeries.

I personally visited Ardrossan during the school holidays and the jetty was a ghost town on a calm day when you expected it to be shoulder to shoulder. Dead fish littered the bottom. The jetty is the lifeline for that town and without it the town is dead.

In terms of ecological and biodiversity impacts in my view there has been insufficient attention paid to monitoring the status of a couple of vulnerable species especially the coastal stingaree (*Urolophus hirsutus*) which is classified as endangered under the IUCN red list. While the original listing may have paid too much emphasis on trawl catch declines without considering diver observations at shallower depths (Baker pers.comm.), this refuge area will have been most impacted by the Km bloom and the species is pretty much endemic to both gulfs & not found anywhere else.

The pygmy thornyback skate (*Dentiraja flindersi*) is another “data deficient” but potentially vulnerable species of concern here. Dead specimens of both species have been recorded on the inaturalist site but I have seen nothing from either the State or Federal Government agencies in terms of any status reports or recovery plans which to me is astonishing given the IUCN red list status of one of them.

- ☐ the cultural and economic impacts on Indigenous communities, including any loss of access to traditional fishing;

No comment provided

- ☐ the coordination of state and federal government responses, including support, industry engagement and scientific advice;

This was clearly piecemeal and dysfunctional from the start and took at least 4 months for any semblance of a coordinated response system or level of agreement to be reached, either between agencies within the State or between State & Federal bureaucracies or between senior State & Federal politicians and policy makers.

Individual State agencies e.g. PIRSA have some accomplished scientific staff with relevant expertise and as an agency they probably did as good a job as they could within available resources but there was a clear need for dedicated staff to communicate more openly and informatively with the general and scientific public in real time.

There was genuine confusion in the community on who or what agency was responsible for the algal bloom and this allowed conspiracy theories to also bloom on social media in particular.

The formation of a task force in July was a good move but should have happened before May at the latest.

Despite our integrated marine observation system (IMOS) we are a long way behind other jurisdictions e.g. the USA & UK in terms of federal legislation and managing federal/State jurisdictional issues around harmful algal blooms. It is clear to me that the Commonwealth in Australia needs to take the lead here, perhaps through an agreement on HABs negotiated through the Offshore Constitutional Settlement which has been used to ensure coordinated management of a number of fisheries e.g. southern bluefin tuna commercial catches are managed by the Feds from the high water mark out to the limit of the EEZ.

This would stop the farcical situation where the Federal Minister said prior to finally visiting SA in July that the bloom was largely confined to State waters, inferring that it wasn’t really a Federal issue. It may have ended up in the gulfs but it certainly began in Commonwealth waters more than 3nm outside of the baselines.

I would further recommend that the Australian Government give strong consideration to introducing a HAB Act similar to the Harmful Algal Bloom and Hypoxia Research and Control Act (HABHRCA) first passed in 1998 and amended several times since, which aims to address the scientific understanding and management of harmful algal blooms (HABs) and hypoxia (low oxygen levels) in US waters. See <https://www.epa.gov/habs/harmful-algal-bloom-and-hypoxia-research-and-control-amendments-act-habhrca> This helped to establish the lead Commonwealth

role in the research and management of HABs principally through NOAA. I have personally been in contact with NOAA staff over there in relation to current studies on mitigation of red tides including use of modified clay. I was able to facilitate contact between PIRSA senior staff and NOAA experts on this issue.

In my view CSIRO should be the logical lead national agency on all marine & River Murray HAB events - harmful algal blooms do not recognise State boundaries.

- ☐ the current support and recovery arrangements for impacted industries and communities, including:
 - financial support for fishing, tourism and other impacted businesses,
 - community resilience services, and
 - research, monitoring and restoration efforts;

As I have said previously research, monitoring and restoration efforts have been severely lacking due to inadequate resourcing, funding, and coordination and lack of federal leadership.

Community and business support has also been late to determine, unclear and inadequate. It should simply have followed the COVID criteria and applied to any business that could show a 30% downturn from 2024 to 2025 that can be attributed to the bloom regardless of the type of business. Complicating it like they did is just prolonging the pain for businesses that need the cash flow now.

When it comes to community resilience cash flow comes first.

- ☐ the adequacy of long-term monitoring, forecasting and prevention strategies, including funding and institutional support for marine science and environmental data collection;
- These are clearly inadequate for HABs in particular and need national and federal attention, legislation and funding as I have said previously.

- ☐ any related matters.

The communication of health advice has confused many e.g. it took months to advise that it wasn't advisable to eat shellfish in HAB affected waters despite oyster farms being closed due to finding brevetoxins in the oysters. While it is acknowledged that *K. mikimotoi* is not toxic to humans, an algal species as yet unknown is seemingly resulting in brevetoxins being found in oysters. In my view Gulf St Vincent & KI & then Port Lincoln should have been closed to all bivalve shellfish collection given that brevetoxins were found in farmed oysters across a wide area.

I would welcome the opportunity to address the Select Committee on the above.

Yours sincerely
David Hall