

Capability Statement

South Australian Harmful Algal Bloom

Environment Institute



Overview

The Environment Institute has nationally important research expertise in marine, coast and freshwater ecosystem science, which is critical to understanding, monitoring, developing solutions, restoring and building future resilience to the unfolding algal bloom crisis impacting southern Australian coastal waters.

Our researchers are national leaders and champions of change in understanding the drivers of loss and restoration across a range of ecosystems, including fisheries and fish health, seagrass communities, kelp forests, shellfish reefs, mangroves and saltmarshes.

Our multidisciplinary approach brings together marine biology, social sciences, psychology, health, education, economics, legal studies and community wellbeing to drive policy development, legislative change, and social and ecological progress.

We also have a broader range of expertise working in freshwater, estuarine and coastal systems such as the Coorong and Lower Lakes, and includes hydrologists, ecologists, biogeochemists, engineers, architects, modellers, economists and social scientists, working in collaboration with the water sector and water users.

Research priorities and experience

What is needed	Our expertise	Partners and roles
Understand what is happening – toxic algal bloom impact assessment and monitoring		
A broader understanding of which species are affected, extent of impact, and spatial and temporal spread of impact. Integrated monitoring to examine water quality, algal concentration, temperature, pH, oxygen concentration, nutrient load, together with species and ecosystem impact. Improved species identification and presence monitoring and toxicity of HAB (current and historical via sediment analysis and DNA profiling). Observations in critical water bodies – including Coorong, Lower Lakes, Mouth of the Murray River, and Spencer Gulf and Gulf of St Vincent, and with key ecosystems and species (e.g. cuttle fish in Spencer Gulf). DNA barcoding of species being washed up on the shores for identification and survey purposes.	Ecosystem and algal monitoring expertise particularly around river and coastal systems	SARDI and DEW monitoring expertise and programs, SA Museum for collections management, State Herbarium for HAB vouchers.
Develop models to understand drivers of HAB and improve future predictions		
Using monitoring and environmental data to develop a model of what is driving the HAB, enabling critical understanding of the relationships and drivers of the event - is it due to floods or climate, what is the role of dust? Predictive framework for long-term mitigation to avoid future events. Identify the origin/inoculum of HAB using sediment dating techniques and understand inter-species interactions between HABs and potential algicidal microbes that feed on them and may provide a future control mechanism.	Ecosystem and species impact modelling expertise in a range of temperate and tropical ecosystem to develop correlation and mechanistic models of climate driven marine ecosystem response.	SARDI/IMOS oceanographic modelling groups, DEW Marine Group.
Impact assessments and predictions for key economic and threatened species		
A focus on key economic, threatened and charismatic species – e.g. fishery species, oysters, leafy sea dragon, cuttlefish – undertake population surveys and impact and risk assessments and combine with previous work to understand the drivers of population dynamics and longer-term/ conservation implications and options for these species.	Expertise in dynamics of fish, fisheries and threatened species	DEW and SARDI have ongoing surveys but UoA expertise required to analyse data sets
Species and ecosystem resilience testing		
Understand the physiological limits and resilience of key-stone species that enable a broader ecosystem resilience. For example, the sensitivity of species like sea grass, reef-building species and functionally important fish to algal levels, heat and nutrient loads determines the capacity of these species and they ecosystems they support to survive and adapt in the future. Being able to conduct experiments in large tank systems, as well as controlled field tests, is the only way to ascertain this information, and is critical to underpin efforts to model and predict future species and ecosystem responses and management options (see above).	Physiology expertise for a range of fish, cephalopod, plant and algal species	SARDI have large scale tank systems and expertise for physiology testing.
Socioeconomic impact		
A broad piece of work is required to properly document the economic impact and longevity prediction of the HAB across fishery production and associated industries. Whilst SARDI is undertaking some of this work, we can offer additional socio-economic expertise, for example what are the broader socio-economic benefits and ecosystem services that can be offered by rebuilding marine ecosystems for future resilience.	Our researchers have undertaken a broad range of ecosystem service and socio-economic assessment work for seagrass and reef-based systems	SARDI have significant capability and long-standing economic data and analytical capability around fisheries economic value, and predictions for these.

What is needed	Our expertise	Partners and roles
Understanding the psychological impact of HAB-induced loss and grief on societies and Indigenous communities		
Climate grief is an increasing concern for the mental health of communities that experience environmental disasters, and for some Indigenous communities this can also mean the loss of important cultural connections and histories. In some places families have stopped visiting beaches due to the sense of fear, loss and grief associated with the HAB and we need to understand the broader mental health and socio-cultural implications for short- and longer-term recovery for communities, including indigenous groups.	Our researchers have undertaken a range of psychological, social and cultural impact studies on non-indigenous and indigenous communities connected with coastal systems and in relation to climate impacts.	We have good relationships with a range of coastal communities and Indigenous groups across SA.
Restoration of critical marine ecosystems		
Anecdotal information suggests that the impact of the algal bloom has been lower in sea grass systems and around oyster reefs, and that both systems that can provide important nutrient buffering. However, in some cases these ecosystems have also been impacted. To provide future resilience, a range of ecosystem restoration activities are required, particularly for seagrass meadows and reefs. Further research to understand how to fast track the seeding of meadows and settlement of reefs is required, and overall, how to improve the efficiency of recruitment and establishment and long-term survivability. A prioritisation exercise is also required to identify the critical areas where to start this work.	Our researchers have a broad range of experience in restoration work for seagrass and reef systems across South Australia and also nationally and in partnership internationally	DEW have been a key enabler of sea grass meadow and reef system restoration, along with philanthropic (The Nature Conservancy) and not for profit organisations (OzOcean).
Outreach and education on what can be done and what to expect under climate change		
The role of outreach and education to inform communities and what is happening, what people can do about it and also what to expect in the future is an important part of a broader public understanding of climate disasters.	Our researchers have extensive experience in education and public outreach programs around marine systems, particularly with schools, including programs like the Fab Five and Toys for Turtles.	DEW, landscape boards and schools are important delivery and enabling partners.
Policy, legal and system changes		
The HAB, whilst recognised as a 'serious environmental event' has still not been recognised as a 'national emergency'. The Commonwealth Government has also cited limitations in defining a 'major disaster' (to unlock Centrelink funding) and an 'eligible natural disaster' (which would provide access to the Disaster Recovery Funding Arrangements). Our experts have argued for a review of the policy and legal frameworks for disasters and nationally significant emergencies, including to support a systems planning approach to assessing future risks and improving long term adaptation and mitigation.	Our researchers have a broad range of legal and policy expertise on biodiversity and environmental impacts and also in the systems planning and risk frameworks around environmental disasters	DEW, SARDI, landscape boards and a range of State Government partners will be important for this work.
Assessment of efficacy of marine protected areas system		
Understand whether the current marine park system in SA has provided adequate protection for marine species in the face of the HAB outbreak. Utilising the available monitoring and impact data, will allow an analysis of the efficacy of the current park boundaries and whether other areas need to be considered for inclusion to offer a fully comprehensive marine park system.	Modelling work to assess the efficacy of park boundaries and protection areas has been conducted	DEW marine section has important expertise and data relating to marine park complementarity (i.e. Reef Life Survey protocol).
Health impacts on people and animals		
In addition to the mental health challenge, there are also potential long-term physiological health impacts due to contaminated water and soil, and potentially food/water-borne diseases and accumulated toxins. The One Health implications of the HAB outbreak are important to consider, and understanding the key causes of risk for animals and humans toxic from the current outbreak and for future will be critical to limit further impact.	Extensive experience in environmental health risk assessment, disease surveillance, animal and vet science, epidemiological field investigation and data analysis	SA Department of Health, Commonwealth Department of Health and Ageing, Presentative Health SA, SARDI.

Impact in action

Contributions and thought leadership on the harmful algal bloom

On 23 July 2025, the Senate referred the causes, frequency, scale and duration of recent algal blooms in South Australian marine and coastal environments inquiry to the Environment and Communications References Committee for inquiry and report by 28 October 2025.

The Environment Institute lodged a submission to the Parliament of Australia Senate Inquiry into Algal Blooms in South Australia - submission 40 of 44, accessible at: https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/AlgalBloom48P/Submissions

Terms of reference

The causes, frequency, scale and duration of recent algal blooms in South Australian marine and coastal environments, with particular reference to:

- a. contributing environmental, land management or water quality factors;

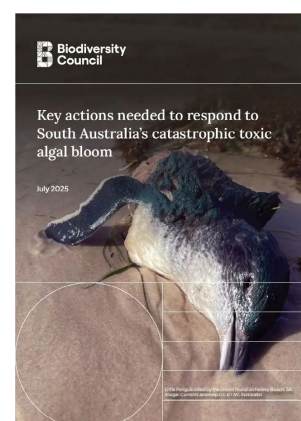
- b. ecological, economic, cultural and social impacts of algal blooms with particular reference to:
 - I. tourism, commercial and recreational fishing industries,
 - II. regional and coastal communities; and
 - III. marine biodiversity and ecosystem health;
- c. the cultural and economic impacts on Indigenous communities, including any loss of access to traditional fishing;
- d. the coordination of state and federal government responses, including support, industry engagement and scientific advice;
- e. the current support and recovery arrangements for impacted industries and communities, including:
 - I. financial support for fishing, tourism and other impacted businesses,
 - II. community resilience services; and
 - III. research, monitoring and restoration efforts;
- f. the adequacy of long-term monitoring, forecasting and prevention strategies, including funding and institutional support for marine science and environmental data collection; and
- g. any related matters.

Reports and recommendations

Released 24 July 2025, The Biodiversity Council coordinated a report “*Key actions needed to respond to South Australia’s catastrophic toxic algal bloom / Biodiversity Council Australia*” to urgently respond to the algal bloom, and to prepare for a more dangerous future nationally.

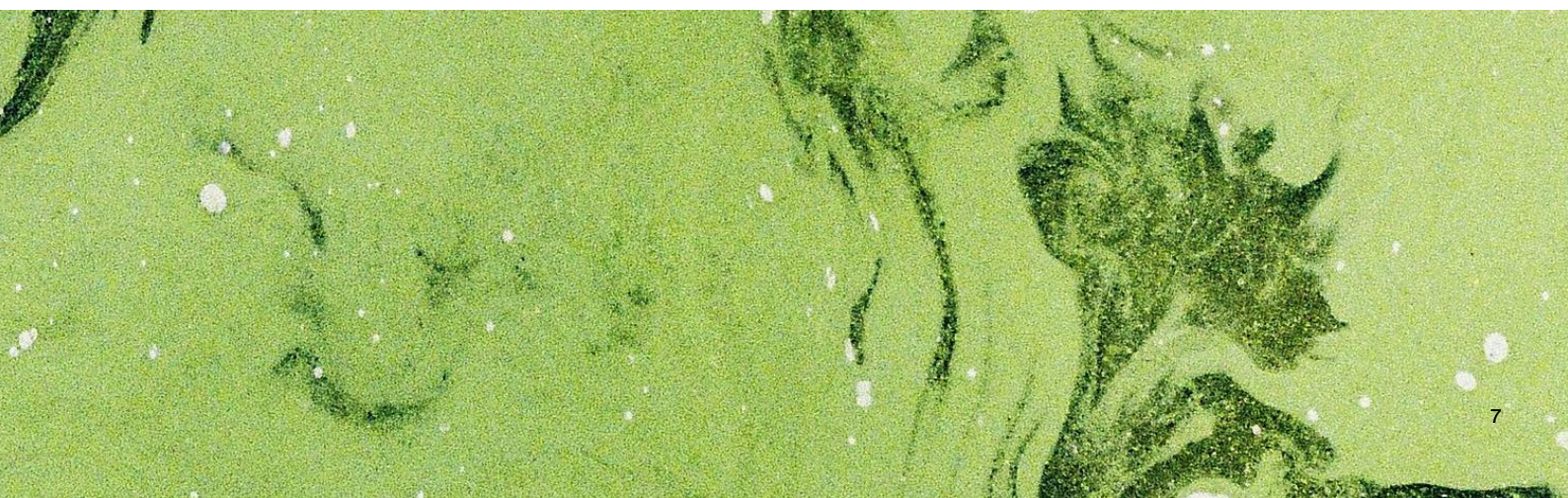
Environment Institute members joined a team of scientists from four Australian universities - The University of Tasmania, Monash University, The University of Melbourne, and The University of Western Australia to produce the report.

<https://biodiversitycouncil.org.au/resources/key-actions-needed-SA-toxic-algal-bloom>



Major funders and partners

- Australian Government Department of Agriculture, Fisheries and Forestry
- Australian Government Department of Climate Change, Energy, the Environment and Water
- Australian Government Department of Industry, Science and Resources
- Australian Research Council
- Commonwealth Scientific and Industrial Research Organisation
- Goyder Institute for Water Research
- Green Adelaide
- SA Government Department for Environment and Water
- SA Government Department of Primary Industries and Regions (PIRSA)
- South Australian Research and Development Institute (SARDI)
- Stormwater Management Authority



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