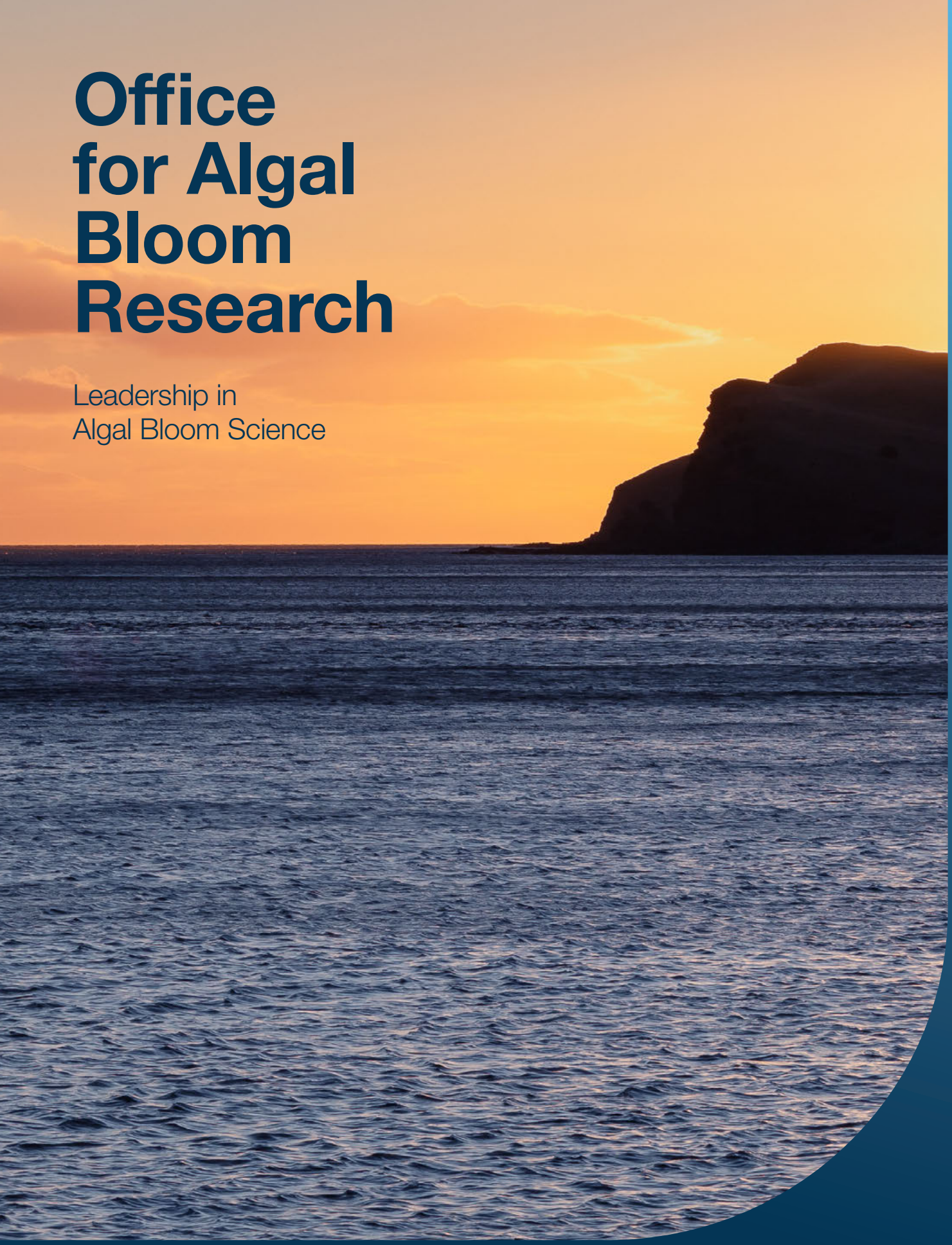
Office for Algal Bloom Research

Leadership in
Algal Bloom Science



OFFICE FOR ALGAL BLOOM RESEARCH

Government of South Australia
Department of Primary Industries and Regions

SARDI SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE

Australian Government

The Department of Primary Industries and Regions cares for the Country and communities of South Australia.

We ensure the land, sea, water and sky are healthy for future generations and strive to better understand their spiritual and cultural significance for Aboriginal people across the state.

In the spirit of reconciliation, our commitment is to build progressive and trusting relationships, to share knowledge and learn from each other.

We recognise and own a difficult past, and together we will walk forward.

We acknowledge the many Aboriginal people of this Country as the oldest continuous living culture in the world.

Graphic elements designed by Ngarrindjeri artist, Jordan Lovegrove.

Foreword

The algal bloom affecting parts of South Australia's coastline since early 2025 has highlighted the growing challenges posed by harmful algal blooms and other unprecedented events to our environment, economy and way of life.

Beyond the significant impacts on marine ecosystems, the bloom has affected coastal businesses and communities that rely on a healthy and accessible coastline.

In response, the State and Australian Governments have committed more than $160 million to address this challenge, including the $102.5 million Algal Bloom Summer Plan. This investment reflects a shared determination to act decisively, supporting communities now, while strengthening Australia's capacity to anticipate, understand and respond to future events.

The Office for Algal Bloom Research, hosted in South Australia at the South Australian Research and Development Institute (SARDI), is a central part of this commitment. Supported by a $3.2 million investment, the Office will coordinate integrated algal bloom science, linking monitoring, modelling and response, and delivering the long-term research needed to protect ecosystems, industries, wellbeing and public health.

We invite governments, researchers, industry and communities from across Australia to partner with us in this nationally significant initiative.

Senator the Hon. Murray Watt
Federal Minister for the Environment and Water

Hon. Peter Malinauskas
Premier of South Australia

From the Executive Director SARDI

The harmful algal bloom that emerged across South Australian waters in March 2025 was unprecedented in both scale and duration. It challenged marine industries, coastal communities and natural ecosystems in ways not previously experienced in this state. It reinforced the critical importance of trusted, applied science in supporting government, industry and communities through complex and rapidly evolving environmental events.

Throughout the event, scientists from the South Australian Research and Development Institute (SARDI) worked extensively on the water and in the laboratory to understand bloom dynamics, ecosystem impacts and emerging risks. They integrated oceanographic observations, satellite imagery, moorings, hydrodynamic modelling and analytical science. This provided timely, evidence-based intelligence and advice during a period of considerable uncertainty.

The 2025 bloom also highlighted the depth of capability within SARDI, spanning oceanography, phytoplankton taxonomy, algal culturing, molecular diagnostics, fisheries assessment and marine ecosystem science. Together, these capabilities provide a strong foundation for assessing and responding to ecological, fisheries, aquaculture and food safety impacts.

The response was strengthened through close collaboration across government, and alongside industry and community partners. SARDI also partnered with researchers and organisations across Australia and internationally to better understand the event and identify future priorities. Combined with specialised marine research facilities at West Beach, these partnerships provide a strong platform for collaborative, co-invested research that delivers practical outcomes for industry, government and coastal communities.

The establishment of the Office for Algal Bloom Research represents an important step forward in strengthening Australia's capability in harmful algal bloom detection, preparedness and response. The office will enhance expertise in phytoplankton taxonomy, algal culturing and marine biotoxin research, while expanding surveillance technologies, monitoring systems, predictive modelling and analytical capacity to support a more coordinated and science-driven approach to marine ecosystem risk.

SARDI is proud to lead this work and welcomes opportunities to collaborate nationally and internationally to strengthen harmful algal bloom science, preparedness and response capability for the future.

Professor Mike Steer
Executive Director, SARDI

Harmful Algal Blooms: An Important Challenge

Harmful algal blooms (HABs) represent a significant and evolving challenge for South Australia and the nation, with impacts extending across marine ecosystems, fisheries and aquaculture, public health and coastal communities. These large-scale microalgae blooms can cause fish kills, affect wildlife, disrupt seafood production, affect human health and impact recreational use of coastal environments.

South Australia's most recent algal bloom, dominated by *Karenia* species, highlights the dynamic and unpredictable nature of these events, with movement and intensity influenced by ocean conditions, weather and environmental variability.

HABs are increasingly associated with broader environmental change. Elevated sea surface temperatures linked to marine heatwaves, along with shifting oceanographic conditions are recognised as key contributing factors influencing bloom development, persistence and spread.

Government agencies continue to work together to monitor the situation, protect the environment and support coastal communities and businesses, while remaining vigilant to the possibility of future blooms.

This growing risk profile underscores the need for integrated, science-led capability to improve monitoring, prediction and response. Strengthening capacity in harmful algal bloom research will support informed decision-making, reduce impacts on industries and communities, and enhance preparedness for future harmful algal bloom events.

Our Mission

Advancing HAB Science

Delivering integrated and connected science to enable early detection, improve prediction and support rapid, evidence-based response to harmful algal blooms.

Our Role

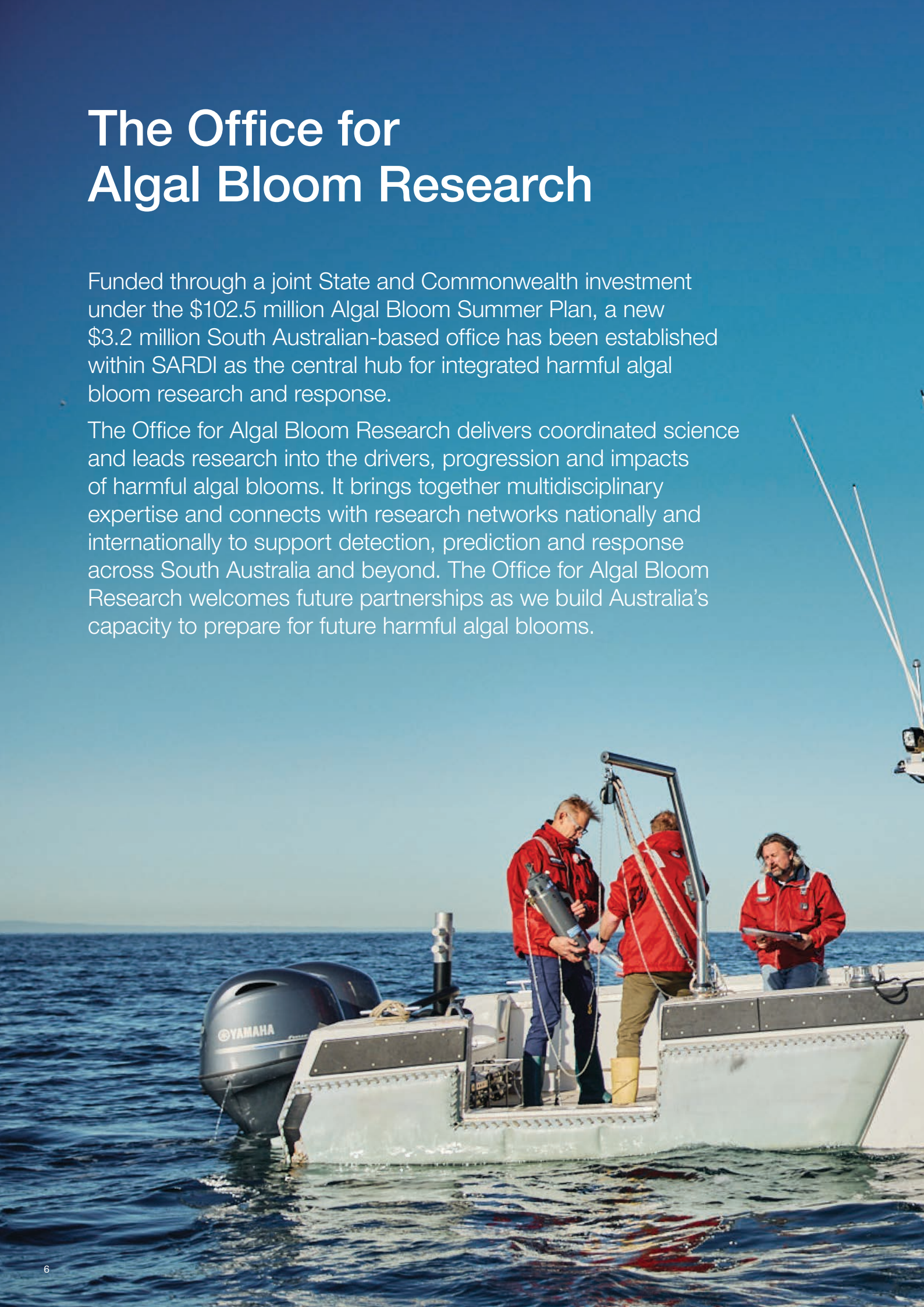
From Science to Action

Coordinating harmful algal bloom science, translating research into operational decision-making and supporting resilience across government, industry and communities.

The Office for Algal Bloom Research

Funded through a joint State and Commonwealth investment under the $102.5 million Algal Bloom Summer Plan, a new $3.2 million South Australian-based office has been established within SARDI as the central hub for integrated harmful algal bloom research and response.

The Office for Algal Bloom Research delivers coordinated science and leads research into the drivers, progression and impacts of harmful algal blooms. It brings together multidisciplinary expertise and connects with research networks nationally and internationally to support detection, prediction and response across South Australia and beyond. The Office for Algal Bloom Research welcomes future partnerships as we build Australia's capacity to prepare for future harmful algal blooms.



Additional Capacity - Building on SARDI's Existing Strengths

Biological Oceanographer

Leads research into ecosystem drivers of HABs, linking physical ocean processes with biological responses in plankton communities.

Oceanographic Modeller

Develops and applies numerical models to forecast HAB movement, severity and duration, supporting early warning systems and industry response.

Climate Change Modeller

Assesses long-term climate ocean interactions and the influence on HAB risk, supporting strategic planning and adaptation across government and industry.

Image Analysis and Coding Technologist

Operates and enhances automated image processing pipelines using Imaging FlowCytobot (IFCB) systems. Enable rapid detection and classification of phytoplankton species through AI-driven image analysis.

Algal/Phytoplankton Taxonomist

Provides specialist taxonomic expertise to identify and culture harmful algal species. Integrating microscopy, molecular, and imaging technologies to support shellfish safety and ecosystem health.

Molecular Technologist

Delivers rapid molecular detection of HAB species and associated toxins, applying qPCR, metabarcoding and emerging technologies to support seafood safety and environmental management.

Oceanography Field Technician

Coordinates and supports oceanographic field operations, deploying and maintaining sensors, moorings and autonomous systems to deliver high quality data for HAB monitoring.

This capability is delivered through a coordinated platform of complementary science programs.

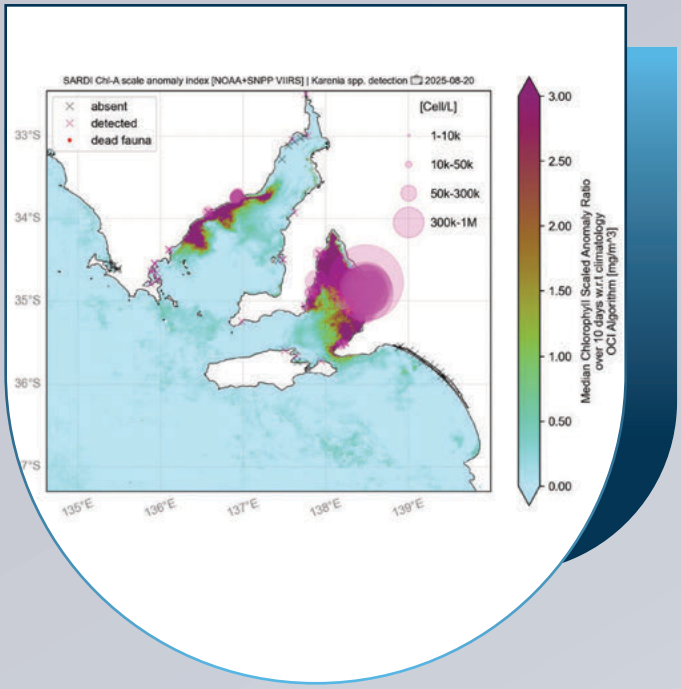
Integrated Capability

Fisheries Monitoring and Response

SARDI's fisheries science team provides scientific leadership and operational capability to support government and industry during harmful algal bloom events and other major marine ecosystem disruptions.

This capability integrates rapid-response survey design, high-frequency environmental and biological sampling, fisheries-independent monitoring, and near real-time data collection and analysis to assess ecosystem condition, fisheries impacts, stock status and recovery trajectories. Strong partnerships with commercial fishers, industry associations and regional stakeholders further strengthen SARDI's ability to deliver targeted field operations and timely scientific intelligence across affected regions.

Combined with expertise in fisheries assessment, marine ecology and ecosystem science, these capabilities support adaptive management responses and provide critical evidence to inform government decision-making, industry response and long-term resource sustainability.



Oceanography

SARDI's oceanography program undertakes integrated research and provides scientific and technical advice to support industry, government and research partners.

The team combines physical, chemical and biological oceanography to understand and model the transport and dispersal of heat, pathogens, pollutants, nutrients, algae and other marine plankton.

This collaborative research is underpinned by essential ocean observations from the national Integrated Marine Observing System (IMOS) and strong modelling partnerships with the Bureau of Meteorology, including development of the eSA Marine hydrodynamic and wave forecasting system, and the Coastal Research Infrastructure (CoastRI) supported through the National Collaborative Research Infrastructure Strategy.

Integration of observational data from *in situ* sampling and satellite platforms with modelling has been critical in detecting, tracking and understanding the most recent harmful algal bloom, informing coordinated updates to government, industry and the public.

Ongoing investment and collaboration with CSIRO, IMOS and national and international partners will further strengthen this capability, providing the data and predictive tools required to improve detection, monitoring and forecasting of future HAB events at state and national scale.

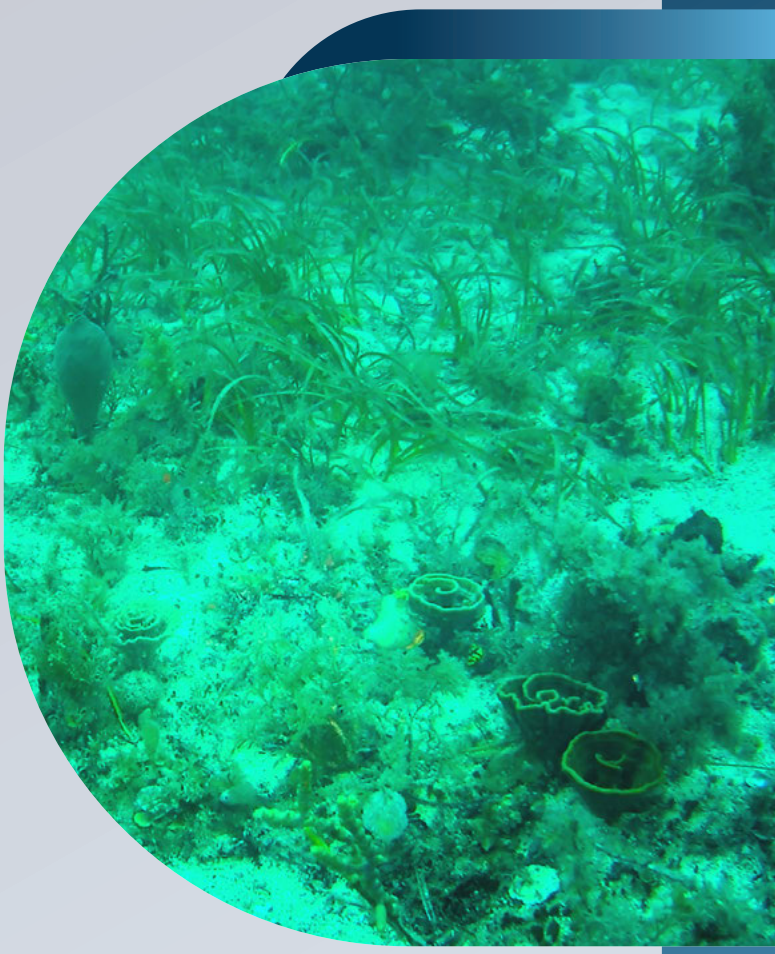
Aquaculture

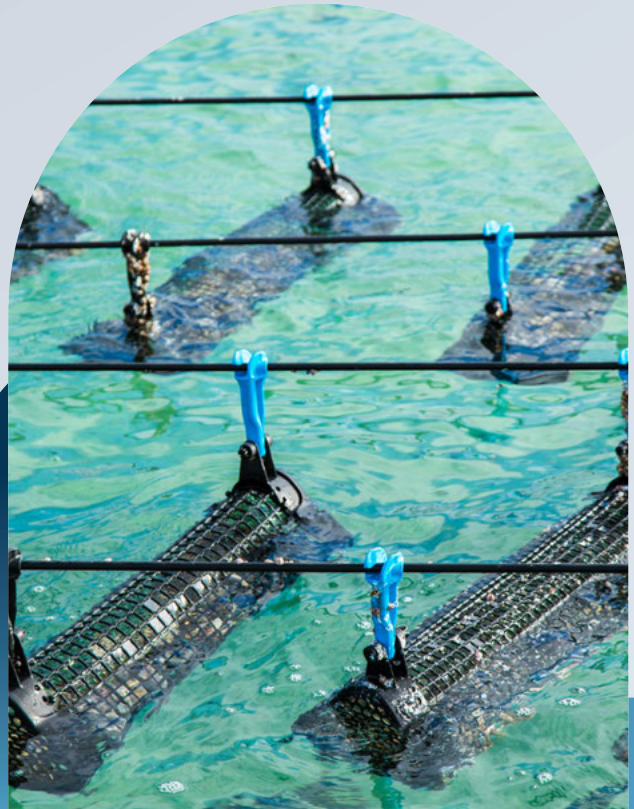
SARDI's aquaculture science program supports sustainable aquaculture development and resilience during harmful algal bloom events through applied scientific and technical capability across government, industry and the community.

Advanced research infrastructure enables controlled and replicated trials that reflect commercial farming systems and natural environmental conditions. Facilities at the South Australian Aquatic Sciences Centre (SAASC) include integrated laboratory and hatchery systems, pool farm infrastructure, controlled environment rooms, and large-scale raceway and tank configurations. Flexible systems operate across flow through and recirculating environments using multiple water sources, supporting applied research and robust experimental design.

This capability is further strengthened by integrated analytical services within the SARDI Environment and Analytical Laboratories, including the Marine Biotoxin Laboratory. Working closely with the South Australian Shellfish Quality Assurance Program (SASQAP) and industry, accredited biotoxin monitoring and testing ensures water quality and seafood safety standards are maintained, providing timely, evidence based advice to support industry response and protect public health during HAB events.

The South Australian Aquatic Biosecurity Centre (SAABC) complements this capability through PC2-level biosecure research infrastructure. Co located at Roseworthy with Adelaide University, the facility enables applied research into aquatic pathogens, pests and environmental risks at scale, with specialised recirculation, filtration and sterilisation systems supporting secure, multi-project investigations into species health and biosecurity.





Impact and Recovery Modelling

SARDI's marine ecosystems program provides integrated scientific capability to assess ecological risk, ecosystem impacts, and recovery processes supporting evidence-based advice for government and industry.

The team applies quantitative, statistical, and ecosystem modelling frameworks built on extensive long-term observational datasets collected across fisheries, aquaculture, oceanographic, and environmental monitoring programs to understand and predict ecosystem responses to HABs and other marine disturbances.

Synthesising data and expertise generated across SARDI activities, the program delivers whole-of-ecosystem assessments of HAB impacts and ecological forecasting to inform response and recovery planning under increasing environmental change. These approaches support the translation of complex environmental and ecological observations into an integrated understanding of trophic impacts, potential ecological vulnerabilities, and system resilience to support adaptive management and coordinated HAB response activities.

Specialised Research Facilities

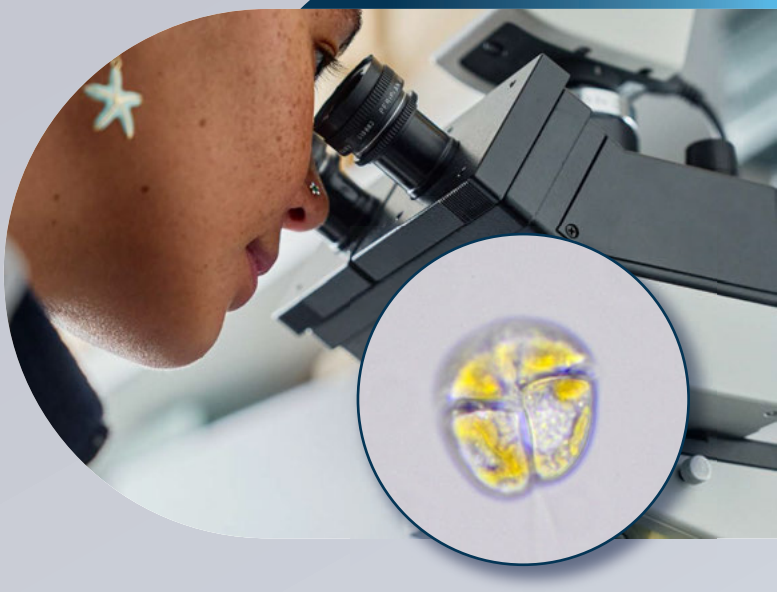
Molecular Sciences Laboratory

SARDI's Molecular Sciences Laboratory (MSL) delivers advanced molecular capability to support harmful algal bloom detection, analysis and research.

The laboratory includes dedicated workspaces with specialised equipment for sample processing, DNA/RNA extraction, sample quantification, PCR and qPCR, *in situ* hybridisation, and secure sample storage across a range of temperature-controlled systems.

The facility enables end-to-end molecular assays to be undertaken, including complete preparation of metabarcoding libraries across diverse sample types, and analysis of DNA barcoding and next-generation sequencing data. Assay optimisation, in silico design and *in situ* testing are also routinely performed in the MSL to robustly test and validate assay development and implementation.

These capabilities are applied to support species-level identification of algal pure cultures, assess spatial and temporal shifts in the environmental algal community composition, and deliver rapid detection and quantification of targeted species. The laboratory also enables enhanced analysis of preserved samples through single-cell isolation and molecular techniques, strengthening the overall resolution and value of monitoring and response activities.



Phytoplankton Identification

During the harmful algal bloom event, SARDI rapidly established dedicated offshore phytoplankton monitoring capability to support South Australia's response. This included the rapid upskilling of scientific staff to undertake *Karenia* cell identification and enumeration, significantly expanding the state's monitoring and analytical capacity during a period of heightened demand.

Through close collaboration across government agencies, regional staff networks and industry, coordinated sampling was undertaken across South Australia's extensive coastline to deliver timely surveillance of bloom activity and emerging risks. This integrated approach strengthened statewide monitoring coverage and supported evidence-based decision-making, industry response and community communication.

Samples were analysed at SARDI's West Beach laboratories, where specialist phytoplankton expertise was complemented by SASQAP and its established marine biotoxin and food safety capability.

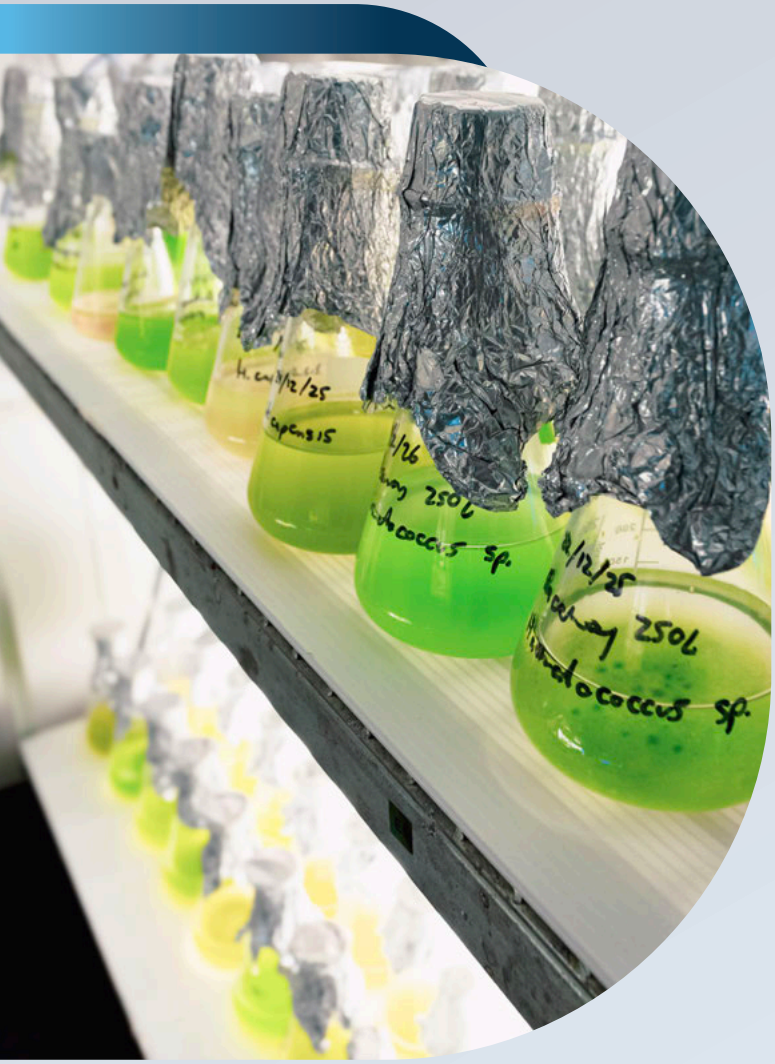
Together, these efforts represent an important advancement in South Australia's harmful algal bloom surveillance and preparedness capability, strengthening early detection, coordinated response and long-term marine ecosystem monitoring.

SARDI Environment and Analytical Laboratories (SEA Laboratories)

SEA Laboratories is a network of specialised analytical, instrumentation and pure culture laboratories established to support fee-for-service work as well as various R&D activities within SARDI.

Algal production laboratories provide expertise and infrastructure capabilities for isolation, pure culture, and upscaling of microalgal and macroalgal cultures. As part of the HAB response, work is underway in developing single cell isolates of key South Australian HAB taxa, upscaling of pure cultures, utilising these cultures for various pilot scale mitigation trials and undertaking various ecophysiological trials.

The analytical laboratories within SEA Laboratories offer state-of-the-art instrumentation capabilities to screen, extract, quantify, purify various metabolites and other novel biologically active compounds of commercial interest from marine biomass. The newly established Marine Biotoxin Laboratory will provide an accredited capability to determine marine algal biotoxins, especially Neurotoxic Shellfish Toxins from shellfish as well as screening and quantification of various algal biotoxins from different matrices.



Oceanography Instrumentation and Moorings Systems

The oceanography research program has played a critical role in developing data collection protocols (based on IMOS national standards), surveys for phytoplankton species abundance and collection of EOVs in the water column (CTD profiles).

The team has also designed and deployed a network of near real-time surface water quality monitoring buoys in key areas across South Australia. These platforms are equipped with a 5-parameter sonde and a HAB monitoring sensor (Chla and specific HAB species). This integrated monitoring capability supports improved detection and tracking of harmful algal bloom events.

Photo credit NESP/IMAS-UTAS

MRV *Ngerin*

The MRV *Ngerin* is South Australia's flagship marine research vessel, purpose-built to support advanced biological and oceanographic investigations in coastal and offshore waters. Operating under a 2B survey classification, the 25 metre vessel is equipped with specialised sampling systems, trawl and trapping gear, hydraulic winches, and onboard wet and dry laboratories enabling the collection and analysis of high-quality environmental and fisheries data at sea.

The *Ngerin* has played a critical role in the recent harmful algal bloom response, supporting deployment of oceanographic monitoring equipment, telemetry buoys, offshore water sampling and fisheries stock assessments under dynamic field conditions.

Through its capacity to deliver multidisciplinary research operations offshore, the vessel supports the collection of essential data to assess ecosystem conditions, species abundance and the impacts of environmental change.

SARDI Small Vessel Fleet & Partnerships

SARDI delivers critical scientific leadership and operational expertise to coordinate small research vessel activities during South Australia's most recent harmful algal bloom event, operating effectively under challenging and rapidly changing field conditions.

This capability integrates SARDI's own fleet of small coastal research vessels with a statewide network of charter operators, enabling flexible, scalable offshore operations. It encompasses survey design, real-time environmental and fisheries data collection, vessel logistics, safety management, and the integration of multidisciplinary research priorities to support timely, evidence-based assessment and response.

Through a strategic partnership with the South Australian Charter Boat Association, offshore sampling capacity has been significantly expanded to sustain high-frequency monitoring across both gulfs. Further collaboration with PIRSA's flagship fisheries patrol vessel (FPV) *Southern Ranger* and patrol fleet has enabled specialised deployments and underwater observations of the bloom, improving understanding of ecosystem impacts.

Regular sampling programs, complemented by targeted surveys, generate near real-time data on bloom dynamics, ecosystem condition and fisheries risk, informing responsive management and decision-making.

Restocking Program and Hatchery Systems

SARDI's restocking program provides a mature, delivery ready capability in captive breeding, hatchery production and scientific husbandry proven through the snapper recovery program, with more than 600,000 fingerlings released to date and a further 300,000 scheduled for release this year. Its specialised fin-fish and shell-fish hatchery infrastructure, live feed production and experienced technical workforce enable the development and application of species specific propagation protocols across a range of taxa, from high value commercial species to environmentally sensitive species such as the Weedy Seadragon.

This capability directly supports harmful algal bloom research and response by providing controlled systems to develop and refine breeding and restocking pathways for priority species, including the capacity to rear vulnerable early life stages and implement adaptive operational responses that protect animal welfare and maximise investment value.

South Australian Shellfish Quality Assurance Program (SASQAP)

The South Australian Shellfish Quality Assurance Program (SASQAP) is a long-standing partnership between PIRSA and South Australia's shellfish industry, established in 1994 to protect public health for consumers of South Australian shellfish and support a sustainable, high-quality industry. Managed from Port Lincoln, SASQAP operates a NATA-accredited laboratory delivering microbiological testing and microalgae monitoring, supported by specialist providers for biotoxin and chemical analysis. Jointly funded by PIRSA and industry, the program underpins the safety, quality and premium reputation of South Australian bivalve molluscs across domestic and international markets.

SASQAP classifies harvesting areas, proactively monitoring both waters and bivalve molluscs to ensure they are safe for human consumption when harvested. Bivalve molluscs can accumulate contaminants from their environment and are often consumed raw, this rigorous monitoring is essential to protect consumers. Harvest areas can be closed as a precaution when risks are identified, ensuring only safe product reaches the market. Supported by strong industry and government collaboration along with robust testing standards, SASQAP underpins consumer confidence and the continued growth of South Australia's shellfish industry.


HAB SR Survey
Site 31
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Site 32
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Site 33
HAB SR Survey
Site 38
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Government of South Australia
RESEARCH AND DEVELOPMENT

Delivering Strategic Value for South Australia

Integrated Science Platform

Delivering a coordinated, end-to-end capability spanning field monitoring, laboratory analysis, modelling and forecasting.

Providing a unified and scalable approach to managing harmful algal bloom events.

Cross-Government Impact

Enabling timely, evidence-based decision-making across agencies.

Supporting policy development, operational response, public health advice and industry management.

Leveraged Investment

Creating a platform of excellence that attracts co-investment from national programs, universities and research partners.

Amplifying the value and reach of the state's investment.

Research Leadership

Positioning South Australia as a recognised hub for harmful algal bloom research, fostering collaboration, integration and knowledge sharing.

Resilience and Preparedness

Strengthening the state's ability to respond rapidly to emerging events while building long term capability to manage future risks under changing climate and ocean conditions.

World-Class Science Through Collaboration

Government of South Australia

Department of Primary Industries and Regions
South Australian Research and Development Institute
Department for Environment and Water
Department of the Premier and Cabinet
Department of State Development
South Australian Tourism Commission
Department for Infrastructure and Transport
Office for Recreation, Sport and Racing
SA Health
Department of Treasury and Finance

Australian Government

Department of Climate Change, Energy, the Environment and Water
Department of Agriculture, Fisheries and Forestry
Bureau of Meteorology

Commercial Fishery Associations

Abalone Industry Association of South Australia
Charter Boat Association of South Australia
Gulf St Vincent Prawn Association (GSV Prawn Fishery)
Marine Fishers Association (Marine Scalefish Fishery)
Saint Vincent's Gulf Prawn Boat Owners Association (GSV Prawn Fishery)
South Australian Professional Fishers Association (Marine Scalefish Fishery)
South Australian Blue Crab Pot Fishers Association (Blue Crab Fishery)
Spencer Gulf & West Coast Prawn Association (Spencer Gulf and West Coast Prawn Fishery)
Southern Fishermen's Association (Lakes and Coorong Fishery including Pipi Fishery)
South Australian Northern Zone Rock Lobster Fishermen's Association (Northern Zone Rock Lobster Fishery)
South Eastern Professional Fishermen's Association Inc (Southern Zone Rock Lobster Fishery)

Aquaculture Industry Stakeholders

Australian Southern Bluefin Tuna Industry Association
Seafood Industry South Australia
SA Oyster Growers Association
South Australian Mussel Growers Association
South Australian Shellfish Hatchery Association
Yumbah Aquaculture

Contact us to explore strategic partnerships and collaborative research opportunities that advance innovation and deliver real-world impact.

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