

The program provides scientific and technical advice across government, industry and the community in respect of key issues in the management of marine environments. These include, but are not restricted to, developing our understanding about processes that degrade the environment, climate change, developing tools to assess and mitigate environmental impacts and rehabilitate environments, conducting environmental assessments and conducting research on how fished species interact with their environment.

### Overview:

This program was established on July 1, 2001, is led by Dr Jason Tanner, and focuses its research through five subprograms, Environmental Assessment, Mitigation and Rehabilitation; Aquaculture Environment; Marine Pests; Benthic Ecology and Threatened Endangered & Protected Species. Currently the group has about 20 staff and ten students, based at West Beach.

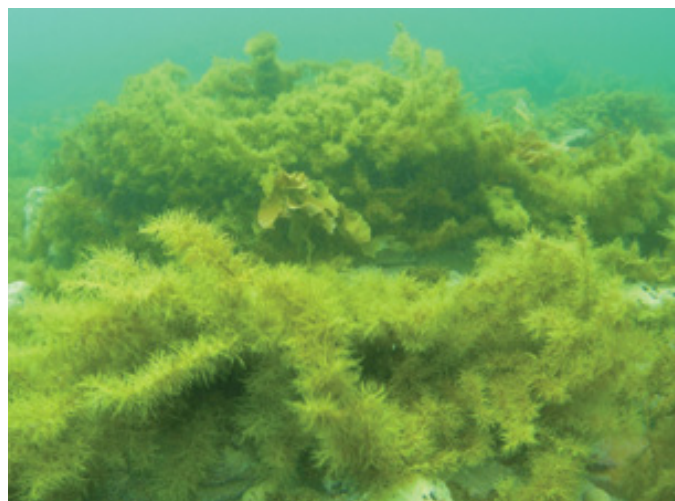
Key staff have affiliate appointments at both Adelaide and Flinders Universities, and supervise honours and PhD students through both institutions.

### Environmental Assessment, Mitigation and Rehabilitation

Focuses on developing principles for assessing environmental impacts and addressing questions on how to mitigate these affects or rehabilitate degraded habitats. Past projects include studies to assess the likely impact of dredging of Outer Harbour, determining the causes of seagrass loss along the Adelaide coast, habitat modelling of the Coorong, baseline surveys for the Adelaide desalination plant, and a large reef health survey. The later has enabled us to detect trends in reef health over the last ten years, and also provides a comparison of the performance of scientific divers and the community-based Reef Watch program. Current projects include studies to assess the potential for rehabilitating seagrass habitats along the Adelaide coast, Predicting the impacts of climate change on marine invertebrate distributions, and seagrass condition monitoring. The group also conducts commercial environmental assessment projects. Staff have expertise in benthic ecology, environmental chemistry, marine botany and spatial modelling.

### Aquaculture Environment

Conducts research to enhance the environmental sustainability of the aquaculture industry. Key projects include undertaking a feasibility study for Integrated Multitrophic Aquaculture to reduce nutrient inputs from finfish farming, and environmental monitoring for the tuna and finfish industries. The group had a close involvement with the recently completed Aquafin CRC - examining the wastes produced by tuna farming, and how nutrients cycle through the environment, developing methods for regional-scale assessments of aquaculture, developing genetic techniques for determining local impacts, and in collaboration with CSIRO, developing an integrated hydrodynamic and biogeochemical model of the tuna farming area. We have recently completed and/or are working on several projects to provide PIRSA Aquaculture



the information they require to develop new aquaculture zones and establish carrying capacities within zones and leases.

### Marine Pests

Conducts research to determine the distribution of, and potential eradication strategies for, introduced marine pests. Research on eradication and management strategies led to the most successful large-scale removal of *Caulerpa taxifolia* worldwide. A recently completed risk assessment defined the potential for spread of the alga and surveillance and management priorities. The program has undertaken two federal projects: the development of PCR detection systems for three priority marine pests in collaboration with SARDI Plant & Soil Health, and a risk assessment of the marine pest risks associated with Australian aquaculture industries. The Marine Innovation SA (MISA) initiative has a firm commitment to expansion of biosecurity R&D, with recent appointments covering micro-algae, molecular diagnostics, and spatial modelling. A key component of the initiative is development of physical containment facilities for aquatic biosecurity research in Adelaide.

### Benthic Ecology

This program focuses on conducting ecological studies on hard and soft substrate communities. In particular, research is conducted on the population and community organisation of bottom dwelling fauna, and on trophic linkages between benthos and demersal fish. The program undertakes benthic research on coastal, shelf and deep-sea environments throughout southern Australia. A large component of this research is directed towards the selection and ongoing assessment of State and Commonwealth Government marine reserves (including the Great Australian Bight Marine Park). We are currently working with SA DENR to conduct biodiversity surveys in coastal waters. The group also collaborates on research to understand the population dynamics of the fished species and ways to improve harvesting strategies. The program further undertakes research on the ecological impact of these fisheries.





### Threatened, Endangered & Protected Species

This program focuses on the ecology and management of marine protected species. The primary areas of research include a broad-scale study of the pelagic ecology of the eastern Great Australian Bight, with a focus on the role of small pelagic fish, and the effects of fishing on populations of seabirds and marine mammals. Implicit in this research is an understanding of the trophic pathways that sustain commercial fish production and high trophic-level predator populations, and the development of ecological performance measures and reference points to assess the ecological sustainability of fisheries and ecosystem health. The application of ecological models and ecological performance measures for other management purposes such as marine protected area planning and management, and the application of high trophic-level predators as sentinels of change in marine ecosystems, especially in climate change research, are also being developed. Other projects include research to support the conservation and management of the threatened Australian sea lion. This includes research on the population and foraging ecology of the species to support conservation and management objectives, and the development of mitigation strategies to reduce the impacts of bycatch in commercial fisheries.



### Dr Jason Tanner Science Leader

Dr Tanner has 21 years experience in marine ecology, working in both tropical and temperate systems. He has published 41 papers, most in high profile international journals. He has been heavily involved in several major projects, including a suite of large multidisciplinary studies to assess the environmental impacts of aquaculture and to inform aquaculture planning.



Other large projects include the environmental assessment of proposed dredging operations at Outer Harbour, and the assessment of environmental risks associated with introduced *Caulerpa taxifolia*. He currently leads a project on integrated multitrophic aquaculture, and another on climate change effects on marine invertebrates.

Dr Tanner has a particular interest in the landscape ecology of seagrasses, and especially the consequences of habitat fragmentation and arrangement on the fauna that live in seagrass meadows. He has also been heavily involved in a major project funded by DENR to develop a new technique for seagrass rehabilitation along the Adelaide coast, and has undertaken several studies looking at environmental influences on seagrass health. Another area of interest is the ecology of introduced marine species, particularly to develop an understanding of the potential impacts these species may have on our ecosystems. Earlier work at SARDI involved a study with the prawn industry to examine the impacts of commercial trawling on benthic fauna.

Prior to moving to SARDI, he spent eight years researching the population and community ecology of benthic invertebrates on coral reefs, involving extensive field surveys and experimental work, as well as modelling. This is continuing, with the current focus being long-term (five years) dynamics of corals.

Dr Tanner maintains close involvement with several universities, and participates in teaching. At the undergraduate level, he has contributed to courses on coral reef ecology, marine ecology, biometrics and population modelling, while at the graduate level he has supervised ten honours and four PhD students.

### Contacts

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