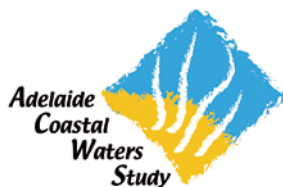


Adelaide Coastal Waters Study Overview

A summary of the study,
outcomes and
recommendations

February 2008





The Adelaide Coastal Waters Study (ACWS) was initiated, in 2001, by the South Australian (SA) Environment Protection Authority (EPA), in response to concerns about declines in coastal water quality, as well as the loss of more than 5,000 ha of seagrass along the Adelaide metropolitan coastline. The aim of the study was to develop an understanding of the coastal ecosystem of the Adelaide near-shore coastal environment in order to better manage this area.

Study objectives and focus

The objective of the ACWS was to develop the knowledge and tools to enable sustainable management of Adelaide's coastal waters by identifying causes of ecosystem changes and the actions required to halt and reverse the degradation. The study focused on seagrass loss, seafloor changes and water quality.

The initial phase of the study quantified nutrient inputs from land, air and groundwater sources. Physical models were then used to describe water movement to predict how and where contaminants were being dispersed.

The study has focused on the area of Gulf St Vincent from Port Gawler in the north to Sellicks Beach in the south and extended approximately 20 km offshore. Although important, the Port River and associated estuary and wetlands were not a primary focus for the ACWS. However, the input of nutrients and some other contaminants from these sources to the coast has been investigated in the ACWS. The Port Waterways Water Quality Improvement Plan has developed nutrient reduction targets for discharges to the Port River and Barker Inlet.

The ACWS has involved the development of a conceptual model to determine how different components of water quality may be impacting on the health of the marine environment, and seagrasses in particular.

Outcomes from the ACWS

The study has resulted in:

- new knowledge and understanding about Adelaide's coastal waters, the growth of seagrass and impacts of nutrient inputs on seagrasses
- 14 recommendations providing options for management action
- a proposal for an integrated environmental monitoring program
- 7 *City to Sea* newsletters
- 20 technical reports on the findings of the research.

Reports and findings of the ACWS can be accessed on the Adelaide Coastal Waters Study webpages at www.epa.sa.gov.au/acws.html

The *Adelaide Coastal Waters Study, Final Report, Volume 1, Summary of Study Findings (November 2007)* identifies that management actions need to work towards improved environmental outcomes by reducing inputs to Adelaide's coastal waters. The study has 14 recommendations of which the first five are focused on the reduction of inputs.

The findings from the ACWS indicate that nutrient rich inputs from stormwater, sewage treatment plants and industrial discharges are the main causes for loss of seagrasses along the Adelaide coastline. Other findings include:

- Water circulation patterns and the physical shape of the Adelaide coastline combine to keep discharges to the coast close to shore thereby exacerbating seagrass loss and water quality problems. The predominant water movement pattern is northerly in summer and southerly in winter.
- Winter catchment flows are of 90–120 gigalitres (GL) per year and are high in nutrients, particularly nitrates, and summer outflows are of the order of 5–8 GL per year and characterised by highly coloured water. Northern and southern inputs alternate seasonally in terms of their significance.
- Excess nutrient loads play a direct role in enrichment of coastal waters, promote epiphyte (a living organism usually a plant or algae that grows on a plant) growth on seagrass and seagrass decline.
- Nutrient loads to Adelaide's coastal waters have increased by a factor of 30 to 50 times compared to conditions prior to European settlement on the Adelaide coastline.
- High levels of suspended solids in the near-shore waters mainly due to stormwater flows are a contributing factor to seagrass loss, due to turbidity and are also a major cause of Adelaide's poor recreational water quality.
- Loss of seagrass is problematic because it is an important ecosystem component and a fisheries habitat. It can also lead to exposure of underlying sediments.
- *Amphibolis* seagrass grows well at high light levels and low nutrient levels and may spread horizontally at rates of up to 20–50cm/yr. *Posidonia* species appear to have a more resilient growth strategy 'hanging in there' more effectively in deeper water and during adverse conditions. It grows slower at rates between 0–30cm/yr.
- *Amphibolis* has a lower food storage capacity than *Posidonia* and is more of a pioneer species which appears to play a re-colonising role. Circumstantial evidence points to a preferential loss of *Amphibolis* from the seagrass beds along the coast. The result being seagrass beds in which re-growth and re-colonisation rates are reduced.



Recommendations

The following recommendations are taken from the ACWS Final Report titled, The Adelaide Coastal Waters Study, Final Report, Volume 1, Summary of Study Findings, (November 2007).

- 1 As a matter of priority, steps must be taken to reduce the volumes of wastewater, stormwater and industrial inputs into Adelaide's coastal environment. This should be done within the context of an overarching strategy designed to remediate and protect the metropolitan coastal ecosystem.
- 2 The total load of nitrogen discharged to the marine environment should be reduced to around 600 tonnes per annum (representing a 75% reduction from the 2003 value of 2,400 tonnes).
- 3 Commensurate with efforts to reduce the nitrogen load, steps should be taken to progressively reduce the load of particulate matter discharged to the marine environment. A 50% load reduction (from 2003 levels) would be sufficient to maintain adequate light levels above seagrass beds for most of the time. The reduced sediment load would also contribute to improved water quality and aesthetics.
- 4 To assist in the improvement of the optical qualities of Adelaide's coastal waters, steps should be taken to reduce the amount of CDOM (coloured dissolved organic matter) in waters discharged by rivers, creeks and stormwater drains.
- 5 While the available data suggests that toxicant levels in Adelaide's coastal waters pose no significant environmental risk, loads from point sources such as the Port River, WWTPs (waste water treatment plants), and drains should continue to be reduced. Routine monitoring of toxicant loads and concentrations should be undertaken every 3–5 years.
- 6 Develop and implement a comprehensive and integrated environmental monitoring program that will enable natural resource managers and all stakeholders to evaluate changes in the coastal marine environment over time and at various spatial scales.
- 7 Maintain and develop the comprehensive data-base of historical inputs generated by this study. It is suggested that a single entity be created to oversee the administrative functions associated with data collection, storage/retrieval, analysis, and reporting. This entity should also assume responsibility for the ongoing maintenance and application of the various models produced by ACWS so as to ensure that they remain both relevant and accessible. Consideration should also be given to the establishment of a research/monitoring coordination body. A primary function of this body would be to prioritise ongoing and future research activities, and to seek and allocate funding in accordance with these priorities.
- 8 Implement a long-term monitoring program to assess seagrass quality (or 'health') at sites adjacent to land-based discharges and at suitable reference sites.
- 9 Implement a long-term monitoring program of the outer depth margin of *Posidonia* meadows in Holdfast Bay.
- 10 Implement a long-term monitoring program of seagrass meadow fragmentation at a range of sites in Holdfast Bay.
- 11 Undertake detailed mapping of the distribution of *Amphibolis* across the Adelaide metropolitan area, determine the lower depth limit of seagrasses in Holdfast Bay, and map seagrasses in the southern metropolitan area between Seacliff and Sellicks Beach.
- 12 Undertake a spatially intensive nitrogen stable isotope survey to determine the offshore and northern extents of nitrogen influence from WWTP and industrial outfalls along the Adelaide metropolitan coastline, and also characterise nitrogen stable isotope signatures of potential nitrogen sources.
- 13 Undertake an audit of key environmental assets in the southern metropolitan coastal region; identify risks to those assets and develop an integrated management plan to mitigate the risks. The applicability of management actions developed in response to the findings of this study to halt and reverse ecosystem degradation in the northern regions should be investigated with a view to adopting it (possibly with modification) in the southern region.
- 14 Adelaide's coastal marine environment must be managed as a component of a system that integrates catchment management, urban and rural land use, demographics, urban and industrial development, climate change/climate variability and water re-use.



Study stakeholders and management

An ACWS Steering Committee was formed during the late 1990s with representatives from the SA EPA, SA Water, Transport SA, the then Catchment Water Management Boards of Torrens, Patawalonga and Onkaparinga [now the Adelaide and Mount Lofty Ranges Natural Resources Management (AMLR NRM) Board], Primary Industries and Resources SA (PIRSA), Coast Protection Board, Mobil Australia, AGL Torrens Island, Conservation SA, Local Government Association and South Australian Fishing Industry Council. The steering committee directed the ACWS over the period 2001 to 2007. The CSIRO project-managed the ACWS which was delivered through a range of research organisations and individuals. Now that the ACWS has been completed the steering committee has been disbanded.

A committee to guide the development and implementation of the response to the ACWS will be formed in 2008.

Implementation of some recommendations from the ACWS will come under the Adelaide Coastal Water Quality Improvement Plan (ACWQIP) – an Australian Government Coastal Catchments Initiative – being developed during 2008. Future works by companies such as SA Water and Penrice Soda Products, and actions undertaken by the AMLR NRM Board, local government, Environment Protection Authority and Department for Environment and Heritage will contribute towards achieving the recommendations of the ACWS.

What can you do?

Everyone can play a role in conserving water each day and sending less water into our sewage and stormwater systems that will ultimately impact on the health of our marine waters. These are some reminders of what you can do to reduce the discharge of nutrient rich waters to Gulf St Vincent:

- use less water in your daily activities (e.g. half fill the sink when doing the dishes),
- re-use water where practical (e.g. direct washing machine water onto the garden).
- use phosphate free detergents for washing clothes and the dishes,
- ensure run-off from your property does not contain fertilisers, sediments, leaf litter, pesticides or other toxic substances.

The health of Adelaide's coastal waters is everybody's responsibility.

Further information

For general information please contact:

Environment Protection Authority
GPO Box 2607, Adelaide SA 5001

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Facsimile: (08) 8124 4670

Freecall (country): 1800 623 445

Email: epainfo@epa.sa.gov.au

Internet: www.epa.sa.gov.au

Adelaide Coastal Waters Study Reports

The ACWS technical and final reports may be viewed at:
www.epa.sa.gov.au/acws.html

Links to tips to save and re-use water

SA Water: www.sawater.com.au

Environment Protection Authority (SA) – Water quality:
www.epa.sa.gov.au/water_quality.html

Other links

Adelaide and Mount Lofty Ranges Natural Resources Management Board: www.amlrnm.sa.gov.au

City of Onkaparinga: www.onkaparinga.sa.gov.au

City of Marion: www.marion.sa.gov.au

City of Holdfast Bay: www.holdfast.sa.gov.au

City of West Torrens: www.wtcc.sa.gov.au

City of Charles Sturt: www.charlessturt.sa.gov.au

City of Port Adelaide Enfield: www.portenf.sa.gov.au

City of Salisbury: www.salisbury.sa.gov.au

City of Playford: www.playford.sa.gov.au

District Council of Malalla: www.mallala.sa.gov.au

Photographs

- 1 Cover page, Onkaparinga Estuary and Port Noarlunga, EPA
- 2 Glenelg foreshore, EPA
- 3 Patawalonga, EPA
- 4 Divers in seagrass, courtesy of PIRSA
- 5 View of industry on LeFevre Peninsula, courtesy of Penrice
- 6 Coastline view from Seacliff, EPA
- 7 Torrens Outlet, EPA
- 8 Aerial view of Port Adelaide, courtesy of Penrice
- 9 *Posidonia* seagrass with fruits, courtesy of Simon Bryars, Department for Environment and Heritage
- 10 Glenelg sewage outlet, EPA