

# Adelaide Coastal Water Quality Improvement Plan

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# The Adelaide Coastal Water Quality Improvement Plan (ACWQIP) provides a long-term strategy to achieve and sustain water quality consistent with community expectations for Adelaide's coastal waters.

## Summary

Issues of poor water quality, loss of seagrass, declining reef health and sediment instability were noticed by the Adelaide community, environmental managers and researchers as early as 60 years ago. The strategies and actions presented within the ACWQIP provide a path forward that aligns with community agreed values for water quality improvements to Adelaide's coastal waters over the next 20 to 40 years.

Central to the Plan is the 'value' of the coast and coastal waters. The coastal waters and coastline have an important economic value for South Australia's tourism, commercial activity, fishing, land values, and coastal and marine-based recreation. The area also encompasses



social and environmental values including a high aesthetic and scenic value, a carbon storage value associated with the seagrass beds, and a high ecological value borne from the estuarine and marine systems that form part of the broader

bioregion of Gulf St Vincent. The coastline and the coastal waters of Adelaide have cultural and spiritual connections for both Aboriginal and non-Aboriginal peoples.

Extending the length of the Adelaide metropolitan coast, the ACWQIP project area covers over 70km of coastline from Port Gawler in the north, to Sellicks Beach in the south, including the catchments that drain into these waters. Geographically the coast and coastline holds spiritual and cultural significance for the traditional owners. The study area is home of the Kaurna and Ramindjeri Aboriginal peoples.

The management zone of the ACWQIP encompasses the shore to a few kilometres offshore, rather than the 20km offshore that is identified in the Adelaide Coastal Waters Study (ACWS) [Fox et al 2007]. The Plan divides the study area into four management areas: Northern coastal waters, Port waterways, Metropolitan coastal waters and Southern coastal waters.

The impetus for the Plan has been the decline in health of seagrass beds and reefs off the Adelaide coastline and change in quality of water caused by an increase



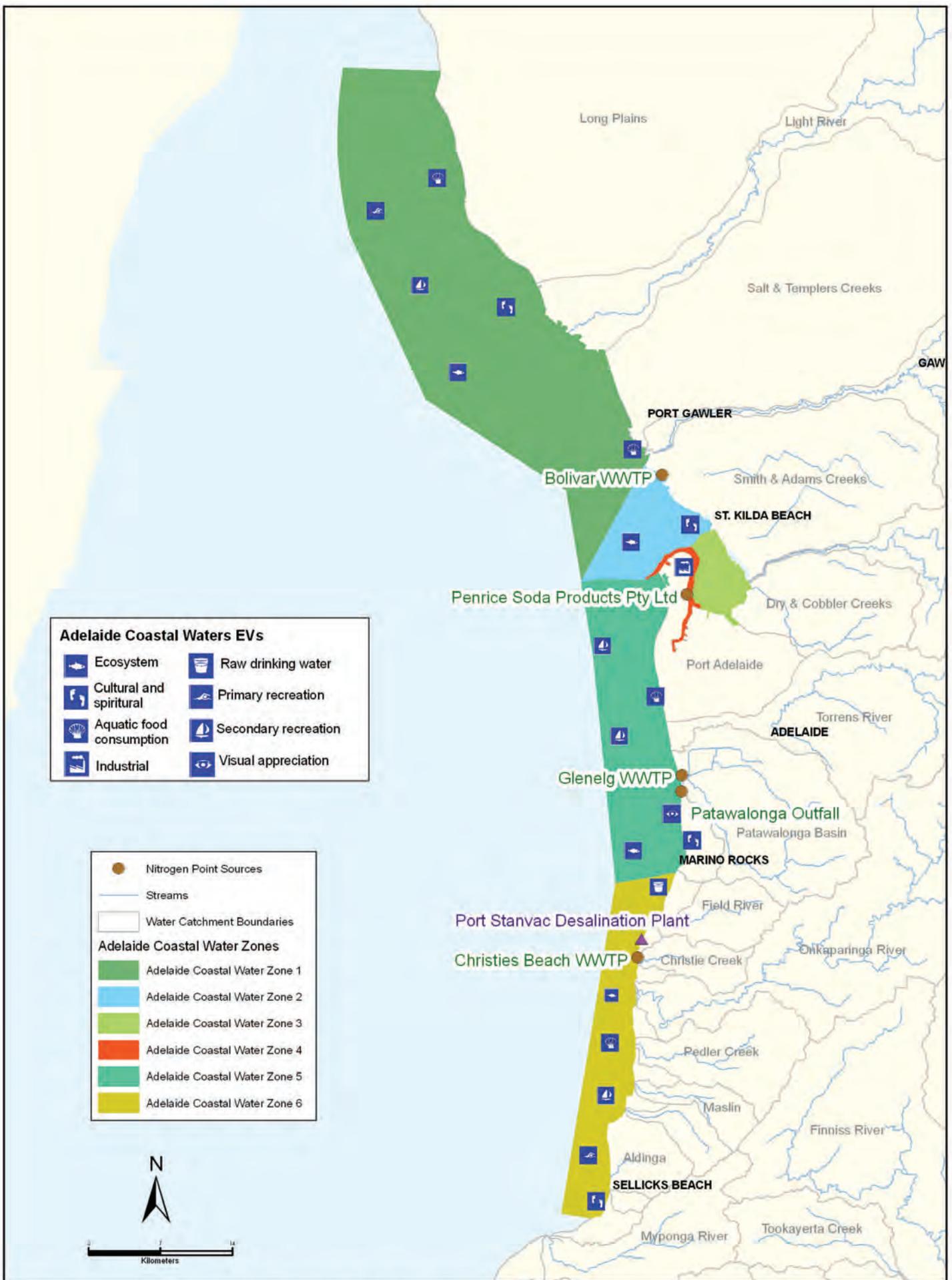
in nutrients (primarily nitrogen), suspended solids (or sediments) and coloured dissolved organic matter (CDOM) from discharges to the coast. Over time, industrial discharges, wastewater treatment plants (WWTs) and stormwater have promoted the growth of epiphytes and reduced light levels for seagrass which destroys the ecosystems and alters the integral structure of the coastal waters and habitats.

Notably, the ACWQIP draws heavily from the accepted scientific findings of the ACWS (Fox et al 2007). The study established that nitrogen and sediment inputs were the main contributors to issues impacting on Adelaide's coastal water quality and seagrass health. Care has been taken to ensure that the ACWQIP also aligns well with major relevant national and state plans, and contemporary reports being prepared by the EPA.

Extending over a six-year period, consultation, communication and engagement with stakeholders have been central to the development of the ACWQIP. Consultation with agency, scientific, and community 'experts' (including traditional landowners) has deliberately encouraged community engagement in the decision-making process to increase the 'ownership' of the project outcomes. Significantly, the consultation resulted in the community vision for Adelaide's coastal waters that guides the ACWQIP.

The ACWQIP is a facilitating document that provides a common vision and expects input from all partners to achieve successful outcomes. Through consultation it has established community agreed environmental values (EVs) and a range of water quality objectives (WQOs) that inform management strategies and provide a structure against which to benchmark and monitor changes in the coastal waters.

The ACWQIP embraces the notion of ecosystem services, advocates the application of water sensitive urban design (WSUD) and promotes the (catchment to coast) philosophy. These initiatives combined advocate that activities occurring on the land impact on the coastal waters and require appropriate management.



**Adelaide Coastal Water Quality Improvement Plan**  
 Water Quality Management Sections  
 Showing Environmental Values and Nitrogen Point Sources Discharges

The catchment to coast concept provides a framework for understanding the land to coast connection as a whole, including the transportation of material (by flowing surface water) that is ultimately deposited at the coast.



The ACWQIP culminates in eight strategies, which complement and encompass the 14 recommendations in the ACWS. The ACWQIP strategies connect with a series of detailed actions, designed to sustain and reinvigorate the beaches,

coastal waters, seagrass and reef systems of Adelaide.

The Plan promotes the highest level of protection for each section of Adelaide's coastal waters. This includes a reduction in nitrogen loads to around 600 tonnes per year, a reduction in sediment loads of 50% from 2003 levels and steps to reduce the amount of CDOM in waters discharged by rivers, creeks, and stormwater drains.

The ACWQIP provides a high degree of certainty in that the targets are achievable and pollution reduction strategies can be planned for within the implementation of the Plan. Many partnership actions are already taking place across the Adelaide region in line with the strategies and targets provided in the ACWQIP.

Importantly, the ACWQIP provides a framework of sustainable targets for the Adelaide coast, against which the community can judge progress, and against which regulatory agencies such as the EPA can assess improvement in performance of dischargers (including both point and diffuse catchment and stormwater sources).

The Plan contains 11 sections including information on stakeholder and community input, links with other plans, current water quality and ecosystem condition, estuarine environmental flows, current partner commitments and actions and the community ACWQIP vision, environmental values (EVs) and water quality objectives (WQOs) along with the eight strategies for implementation. It will be implemented adaptively so that as more is learnt about the coastal system, strategies and actions will be reassessed and further refinement of solutions can occur.



It is important to note that ACWQIP is only the first step in achieving water quality objectives for Adelaide's coastline and coastal waters, but it is an exciting step and it is achievable.

The ACWQIP is an invitation for all South Australians to care for their coast.

As stated in the words of the Traditional Owners: Healthy lands, sea and waterways equate to healthy people.

## Nutrient and sediment inputs to Adelaide's coastal waters

Nutrients, primarily nitrogen and phosphorus loads, sediments (or suspended solids) and to a lesser extent coloured dissolved organic matter, have been found to impact Adelaide's coastal waters and reef health, and are key issues for water quality and seagrass health.

The ACWS identified wastewater treatment plants and Penrice Soda Holdings to be the biggest contributors of nutrients to coastal waters. Stormwater from catchments was found to be the biggest contributor to sediment loads.

## Reducing nutrient loads



The ACWS recommends a reduction in nitrogen loads of approximately 75% from 2003 levels (Table 1) to halt seagrass loss and create conditions that support seagrass restoration.

The measurement of nutrient and sediment loads for the Adelaide coastal waters was mostly undertaken in 2003.

Significant reductions in nutrient load discharges from WWTPs, Penrice Soda Holdings and stormwater have occurred since the 1990s (Table 1). This has been achieved through changes in practices and technology improvements.

Existing commitments to projects supporting nitrogen load reductions for Adelaide's coastal waters will achieve around a 50% reduction from 2003 levels. Further nitrogen reductions should occur over time through successive environmental improvement programs at Penrice Soda Holdings and upgrades to wastewater treatment plants. Such improvements are vital given the additional volumes of wastewater associated with the planned population increases for Adelaide.

The cost of building highly efficient WWTPs to further reduce nitrogen loads to Adelaide coastal waters is high,



as are the energy costs to run them. Wastewater reuse may be a more cost-effective solution as it offers economic return for investment. 'Water for Good, a plan to ensure our water future to 2050' (Office for Water Security 2009) outlines

further actions aimed at securing a water supply for the Adelaide region and some of these actions will also benefit Adelaide's coastal waters.

Stormwater and wastewater reuse schemes are presently operational in Adelaide however far more reuse is needed to adequately reduce nitrogen loads to coastal waters. Comprehensive strategies to maximise the economic use of wastewater and stormwater are being developed by SA Water in partnership with other government agencies.

## Reducing sediment loads

The ACWS recommends a reduction in sediment loads of 50% from 2003 levels (Table 1) to allow sufficient light levels for seagrass to grow.

Initial reductions of sediment loads have been observed (Table 1) as a result of environmental improvement programs at Penrice Soda Holdings, upgrades to WWTPs and on-ground works by the Adelaide and Mount Lofty Ranges Natural Resource Management Board and local councils.

Appreciable drops are expected in the future through implementation of the Adelaide and Mount Lofty Ranges Natural Resource Management Regional Plan and The 30-Year Plan for Greater Adelaide (Department of Planning and Local Government 2010) which will contribute towards achieving long-term targets for sediment loads.

Use of WSUD will assist in contributing towards achieving water quality improvement targets in the ACWQIP.

While use of this approach for new design and development will prevent further stormwater and sediments from

reaching Adelaide's coastal waters, these measures need to be applied to all redevelopments and infill development within Adelaide as the population increases to see coastal water quality improvement. In areas of Adelaide where redevelopments do not occur, retrofitting and behaviour change is required that reflects principles of WSUD.

## Implications for water quality and seagrass



The ACWQIP has set specific targets to reduce the nutrient and sediment loads to Adelaide's coastal waters in line with the ACWS recommendations. If these targets are achieved there should be improvements to Adelaide's coastal water quality, a halt in seagrass loss and eventually a recovery of seagrass meadows.

Recommendations from the ACWS have shaped strategies and actions for implementation in the water quality improvement plan. These strategies involve partnership approaches with a number of key agencies and stakeholders aimed at achieving reductions set out in the ACWS recommendations for nitrogen and sediments.

Actions undertaken by the EPA, Department of Environment, Water and Natural Resources, the Adelaide and Mount Lofty Ranges Natural Resource Management Board, local governments and households will also contribute towards achieving these reductions. The strategies and actions proposed for water quality improvement in the plan have been developed to reflect community agreed environmental values for Adelaide's coastal waters. Regular monitoring of the coastal system will be done to continually reassess these strategies implemented from the plan.

**Table 1: Nitrogen and suspended solid loads for the past, present and future**

Water input sources	Nitrogen (tonnes/year)				Suspended solid loads(tonnes/year)			
	1975–85	2003	2012	2030 Target	1975–85	2003	2008	2030 Target
WWTPs	2,279	1,136	911	300	7,005	1,580	1,060	760
Penrice	1,300	1,000	550	250	100,000	1,780	810	890
Stormwater	639	357	150	50	9,160	6,860	6,180	3,430
<b>Totals</b>	<b>4,218</b>	<b>2,493</b>	<b>1,611</b>	<b>600</b>	<b>116,165</b>	<b>10,220</b>	<b>8,050</b>	<b>5,080</b>

Sources: Draft ACWQIP and ACWS Final Report (Fox et al 2007)

## Vision for Adelaide's coastal waters:

Healthy aquatic ecosystems where environmental, social and economic values are considered in equal and high regard in a balanced management approach that aims to see the return of the 'blue line of seagrass' closer to shore by 2050.



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## ACWQIP strategies and specific actions required for improvement in water quality and return of seagrass closer to shore over the next 2 to 5 years



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### STRATEGY 1: Reduce nutrient, sediment and coloured dissolved organic matter discharges (CDOM)

- EPA continues to work with SA Water and Penrice Soda Holdings to reduce nutrient and sediment loads
- Encourage practical action for sediment and CDOM reductions
- Encourage uptake and implementation of WSUD across Adelaide region

### STRATEGY 2: Promote integrated reuse of wastewater and stormwater across Adelaide

- Undertake further investigative work regarding options to facilitate greater integrated reuse of stormwater and wastewater
- Develop pilot or regional area projects for integrated reuse of stormwater and wastewater (refer to Action 1-3 in the Stormwater Strategy, Department for Water 2011)

### STRATEGY 3: Further investigate sources and volumes of sediment and coloured dissolved organic matter (CDOM)

- Further investigate sources of CDOM and sediments for catchment modelling
- Identify practical and prioritised action that can be taken for reductions in CDOM and sediments from catchments

### STRATEGY 4: Integrate monitoring for cumulative impact assessment across Adelaide region

- Facilitate integrated monitoring of cumulative impacts and emerging issues across agencies for Adelaide's coastal waters
- Investigate and coordinate gap and operational funding for monitoring that needs to be done to meet recommendations of ACWS
- Support ongoing monitoring of reef and seagrass condition to integrate with other monitoring activities

### STRATEGY 5: Model and evaluate the impacts of climate change, human impacts and population growth implications for Adelaide's coastal waters

- Information from CDOM and sediment investigations and integrated monitoring activities to be fed into future modelling work
- Model projection of WWTP inputs and outflows as a result of population change

### STRATEGY 6: Establish planning and funding priorities for water initiatives for Adelaide's coastal waters

- Identify priority funding areas for projects with multiple benefits (incorporate triple bottom line accounting into project planning)
- Trial investigations for storage and reuse of water normally discharged to coast in winter months

### STRATEGY 7: Undertake seagrass mapping and rehabilitation work

- Develop and update Seagrass Ready maps that integrate water quality and sediment information
- Further support for seagrass rehabilitation work

### STRATEGY 8: Build community capacity to take action for water quality improvement

- Use existing Healthy Waters networks and local government contacts to get messages across to community regarding how it can take action for water quality improvement
- Further develop linkages with Kaurna and Ramindjeri peoples regarding community water quality messages



## How can you help improve Adelaide's coastal water quality?

### Take action

The health of Adelaide's coastal waters is everybody's responsibility. Individuals can play a role in reducing water use and improving water quality. Sending less water into sewage and stormwater systems will ultimately reduce the impact on the health of our marine waters. You can begin by using less water in your daily activities and reuse water where practical.

Installing water efficient appliances wherever possible will also be of benefit. You can reduce the quantity of stormwater going down drains by designing gardens that allow for rainwater to absorb into the ground and by installing rainwater tanks.

Also, get involved with coast and marine community groups. Many are linked to local government, the Adelaide and Mount Lofty Ranges Natural Resource Management Board and the Conservation Council of SA and raise awareness of issues relating to Adelaide's coast and marine environment. These groups also provide a voice for community views on progress toward a healthy Adelaide coast.

### References

Department of Planning and Local Government (2010) *The 30-Year Plan for Greater Adelaide*.

Department of Water (2011) *Stormwater Strategy, The Future of Stormwater Management*.

Fox DR, Batley GE, Blackburn D, Bone Y, Bryars S, Cheshire A, Collings G, Ellis D, Fairweather P, Fallowfield H, Harris G, Henderson B, Kampf J, Nayar S, Pattiaratchi C, Petrusевичs P, Townsend M, Westphalen G and Wilkinson J 2007, *The Adelaide Coastal Waters Study Final Report, Volume 1: Summary of Study Findings November 2007*.

Office for Water Security (2009) *Water for Good Plan 2009*.

### Get informed

For updates on water policy and information on water quality get onto the EPA website or one of the other suggested website links.

You can view the plan on the EPA website at: [www.epa.sa.gov.au](http://www.epa.sa.gov.au)

### Website links

Environment Protection Authority (SA) – South Australia's water quality  
[www.epa.sa.gov.au/water\\_quality.html](http://www.epa.sa.gov.au/water_quality.html)

Environment Protection Authority – Adelaide Coastal Waters Study reports  
[www.epa.sa.gov.au/acws.html](http://www.epa.sa.gov.au/acws.html)

National Water Quality Management Strategy  
[www.environment.gov.au/water/quality/nwqms/index.html](http://www.environment.gov.au/water/quality/nwqms/index.html)

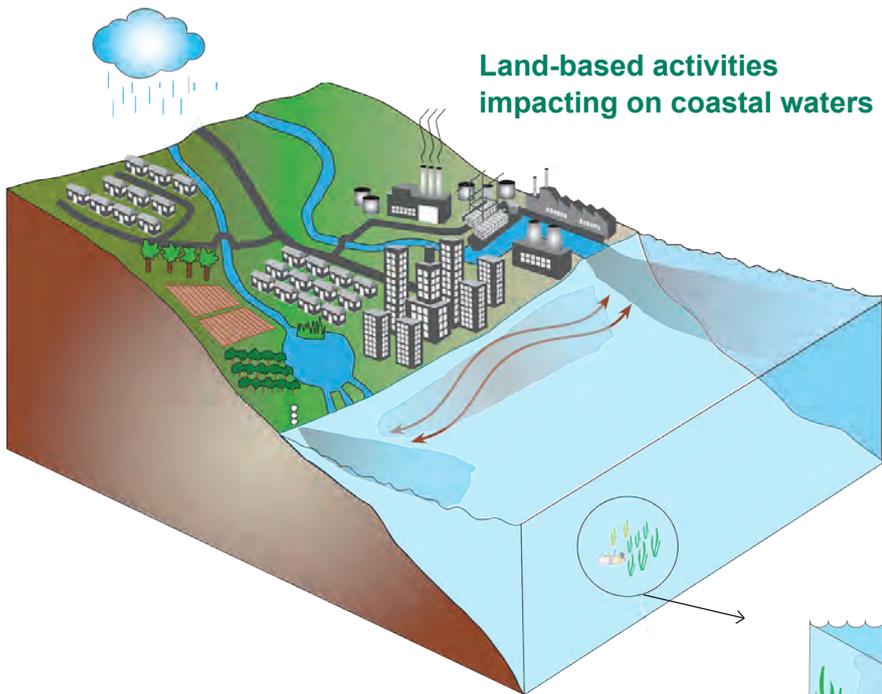
Water Connect  
[www.waterconnect.sa.gov.au](http://www.waterconnect.sa.gov.au)

Water Sensitive SA  
[www.watersensitivesa.com](http://www.watersensitivesa.com)

SA Water  
[www.sawater.com.au](http://www.sawater.com.au)

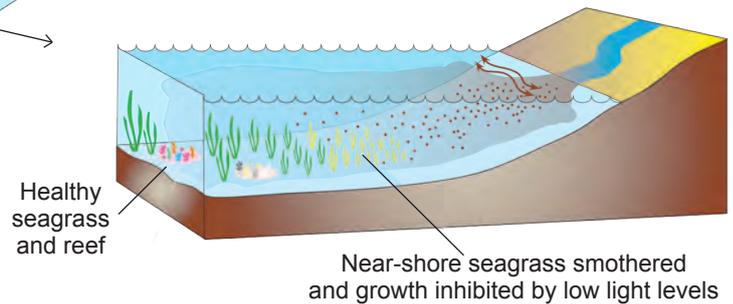
### Further information

Environment Protection Authority  
GPO Box 2607, Adelaide SA 5001  
Telephone: (08) 8204 2004  
Facsimile: (08) 8124 4670  
Freecall (country): 1800 623 445  
Email: [epainfo@epa.sa.gov.au](mailto:epainfo@epa.sa.gov.au)  
Website: [www.epa.sa.gov.au](http://www.epa.sa.gov.au)



**Land-based activities impacting on coastal waters**

**Impact of sediment and coloured dissolved organic matter on seagrass**



Healthy seagrass and reef

Near-shore seagrass smothered and growth inhibited by low light levels

## Adelaide Coastal Waters Steering Group



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The Adelaide Coastal Waters Steering Group was established during 2008 to oversee the finalisation of the ACWQIP. The close liaison between the organisations involved has been of great importance to its

development and planned implementation. The Steering Group includes representatives from:

- Adelaide and Mount Lofty Ranges Natural Resource Management Board
- Coast Protection Board
- Conservation Council of SA
- Department of Environment, Water and Natural Resources
- Department of Planning, Transport and Infrastructure
- Department of the Premier and Cabinet
- Department of Sustainability, Environment, Water, Population and Communities (Australian Government)
- Department of Treasury and Finance
- Environment Protection Authority
- Local Government Association
- Penrice Soda Holdings
- Primary Industries and Regions SA
- SA Water
- South Australian Recreational Fishing Advisory Council
- Stormwater Management Authority

## Contributing Authors

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## Photographs

**Cover, clockwise from top left:**

- 1 Christies Beach (EV – Primary recreation), EPA
- 2 Bolivar WWTP (EV – Industrial use), EPA
- 3 Sunset at Glenelg Jetty (EV – Visual appreciation), SATC
- 4 Divers (EV – Primary recreation), PIRSA

**Inside:**

- 5 Recreational fisherman on Largs Bay jetty (EV – Human consumption), EPA
- 6 Adelaide city and River Torrens, (EV – Visual appreciation), EPA
- 7 Seagrass (EV – Ecosystem), DENR
- 8 Aerial view of Glenelg WWTP (EV – Industrial use), DENR
- 9 Adelaide coastline (EV – Visual appreciation), SATC
- 10 Adelaide desalination plant (EV – Raw drinking water), SA Water
- 11 Kingston Park (EV – Visual appreciation), EPA
- 12 Adelaide Sailing Club (EV – Secondary recreation), Jason Bekin
- 13 Stormwater flows in Sturt River (EV – Industrial use), EPA
- 14 Christies Creek outlet (EV – Industrial use), EPA
- 15 Beach scene Glenelg (EV – Primary recreation), SATC
- 16 Aerial view of Port Adelaide (EV – Industrial use), Penrice
- 17 Dolphins (EV – Cultural and spiritual values), EPA