Vision
‘Turning the tide’
A high quality of life and coastal ecological health can be achieved through effective management.

Mission
To deliver decision-making tools, understanding and knowledge necessary for the effective planning, management and ecosystem health of coastal zones, estuaries and waterways.

CRC Objectives
The goal of the CRC is to bridge the gaps – between science and the community, and between science and decision-making, policy and planning. To achieve this goal, the CRC will develop:

- Integrated frameworks and decision-making tools for planning, management and evaluation of resource use options and conflicts, targeting initially the impacts of major significance in urban, industrial and agricultural catchments in tropical and sub-tropical regions of Australia
- Management and restoration options and strategies for enhanced ecosystem health and quality of life
- Technologies for assessment, monitoring and commercial use including remote-sensing, acoustic and stereo-video technology, databases, interpretation, visualisation and simulation modelling tools
- Skills for the Australian consulting industry, local government, community groups and industry
- Training options for integrated resource management in the coastal zone

Our partners
Core participating organisations in the Cooperative Research Centre for the Coastal Zone, Estuary and Waterway Management:
- Brisbane City Council
- Central Queensland University
- CSIRO
- Curtin University of Technology
- Defence Science and Technology Organisation
- Geoscience Australia
- Griffith University
- James Cook University
- Queensland Department of Natural Resources and Mines
- Queensland Department of Primary Industries and Fisheries
- Queensland Environmental Protection Agency
- The University of Queensland
- The University of Western Australia

The Cooperative Research Centres (CRC) Program is an Australian initiative in which separate research groups with common interests work together for a common goal. The centres aim to work with industry to focus and promote excellence in research and development.

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Highlights in brief

A national estuaries package was completed in collaboration with partners to address the decline of the nation’s highly-valued urban and rural estuary ecosystems. The package includes conceptual and predictive modelling tools, an interactive website, a national network of estuary managers and scientists, shared databases, scientific publications and a reference book. The project was a finalist in the 2004 Eureka Prizes for outstanding science.

A new book, Where river meets sea: Exploring Australia’s estuaries, examines the ecology, physical processes and health of the nation’s 974 estuaries. The 288-page colour book also considers the cultural and economic significance of our estuaries and takes readers on a state-by-state tour, including case studies of estuary management. It was compiled by leading researchers, managers and educators from around Australia.

Coastal water habitat maps were produced to assess and monitor shallow water benthic habitats for managers of estuarine and in-shore coastal areas. The project, officially launched by the Federal Minister for Science in Perth, is developing shallow water assessment technologies, benthic biology and habitat classification, coastal geomorphology and classification, and toolkits for user groups.

Twenty-one full time doctoral and masters level students, and five associate students, were supported. A number of CRC doctoral scholarship holders successfully completed their theses during the year. Five students were awarded their PhDs.

The CRC purchased one of the world’s most advanced seabed-mapping tools. The Reson SeaBat 8125 uses high resolution, 3-dimensional imaging to map the seabed and its properties. The technology was used to assess coastal environments, and detect underwater habitat in depths up to 90 metres, at Sydney Harbour, Cockburn Sound and the Recherche Archipelago.

Social research highlighted that governments have difficulty sharing decision-making responsibilities for environmental action with industry and community stakeholders, and in identifying when particular natural resource management problems are best solved by partnership-based solutions. A ‘decision tree’ was developed to assist decision-making about citizen participation models.

Port Curtis was found to be generally free of contaminants. Most heavy metal and inorganic contaminants were below the recommended regulatory guidelines for marine waterways and sediments. The report found
that while there was no direct threat to human health or environmental systems, some areas of the estuary were not as good as others.

The OzEstuaries website was updated to include a condition assessment of Australian estuaries, conceptual models to illustrate biophysical processes, fact sheets, an online GIS, and links to relevant State, national and international websites. The updated version was launched at the CRC staff workshop at Coolangatta. A survey of estuary planners and managers rated the online database very highly.

Predictive models were developed to show how sediments and nutrients move from the Fitzroy River estuary into Keppel Bay. Results from field surveys were combined with Queensland Government data to build models of the composition and volume of sediment and nutrients moving into the Great Barrier Reef region.

The Citizen Science Toolbox was launched to assist community groups, government and industry to improve their participation and partnerships in coastal decision-making. Natural resource researchers, planners and managers, used the online toolbox in various regions of Australia, and overseas. An evaluation indicated high levels of satisfaction and use. Workshops, in-service training and seminar presentations were conducted to market the toolbox in Australia and overseas.

A survey of marine life in ‘no-take’ zones of Moreton Bay Marine Park found larger fish numbers and sizes in areas where fishing is prohibited, compared with fish found outside those areas. Results from sample sites found 10 times as many legal-size male mud crabs compared to areas outside the no-take zones. Catch rates of yellowfin bream were five times higher. The results are being used by Queensland EPA to review the effectiveness of zoning plans in the marine park.

A joint Coastal and Catchment Hydrology CRC study in south-east Queensland demonstrated the importance of vegetated riparian zones in reducing the amount of nitrate flowing into waterways, thereby protecting downstream aquatic ecosystems. Natural resource planners in Queensland have integrated the results into stream and catchment planning.

An information paper provided an innovative, systems-based approach to document the connections between individual components of various ecosystems in central Queensland. It was used by the Fitzroy Basin Association (FBA) to set future targets for natural resource management. Stakeholders were better positioned to make decisions on social, economic, environmental and institutional considerations, and to design appropriate risk management strategies.

An increased number of multidisciplinary, jointly-authored scientific papers, books, conference proceedings, technical reports and articles in the media were published and made available to CRC clients, stakeholders and the public.

The CRC facilitated a number of meetings and workshops among Queensland Agricultural Industry groups, government and the community to discuss Property Level Management planning. The workshops resulted in agreement to form a steering group to develop an integrated and consistent framework for property level planning.

Six new groups have partnered with the CRC to undertake specific research projects as a result of activities undertaken for the rebid.
Joint Chair and CEO report

The Coastal CRC has gone from strength to strength in this, its fifth year of operation. The year saw the successful completion of many of the Centre's first phase of projects and adoption of outputs. Highlights included ecosystem health understanding and assessment, regional planning, a citizen science toolbox and improved management and decision-making processes built on innovative science. The second phase of research and development is well underway, addressing the emerging needs for the coastal zone in partnership with stakeholders.

Staff and partners are congratulated for steadfastly supporting the goal of the Coastal CRC, which is to bridge the gaps between science and planning, policy and community for better coastal management. It is internationally recognised that this approach, while difficult, is critical to ensure ongoing economic growth and sustainable coastal development. The role played by the Coastal CRC is unique in Australia where responsibility for coastal management is fractured across three tiers of government, numerous community groups and coastal industry.

It seems ironic that Australians take this valuable coastal zone for granted. Australia has one of the largest marine territories in the world and is responsible for the sixth largest coastline. The zone is rich in geographic, geological and biological diversity as well as being socially and culturally complex. We have a strong coastal culture with the vast majority of the population living within 50 kilometers of the sea. With the weight of this evidence it is astounding that Australia has no coordinated coastal policy legislation or leadership but rather a mix of overlapping and conflicting roles and responsibilities.

On closer inspection, several factors explain this paradox. Key among these is that our coastal zone is immense: it seems almost impossible to damage it. Supporting this perception is the fact that other countries, including some neighbours, have bigger problems with coastal degradation than Australia. Moreover, Australia’s well-known love affair with the coast ends abruptly at the beach for most people. Other coastal features like estuaries, wetlands and shallow water habitats remain out of sight and mind and are not highly valued by many Australians. In reality, these areas are of immense economic and ecological value acting as the nurseries and kidneys of the coastal ecosystem.

In fact, it may be the dimension of the coast that is the key problem. Australia already has a vast national capacity of coastal management knowledge, skills and experience in specific regions and disciplines. The Coastal CRC has proven this by bringing together some of the most experienced coastal researchers and man-
agers in the world. What is needed is more investment in such coordination to allow broad-scale issues to be tackled. Indeed, a comprehensive survey of Australian coastal managers this year showed conclusively that synthesis of existing knowledge into planning schemes and socio-economic tools to overcome institutional dysfunction, failed communication and poor integration are equally important as fundamental discovery science. A coordinated approach addressing the needs of coastal managers is exactly what the Coastal CRC strives to achieve by producing tools, processes and knowledge to assist decision-makers, industry and the community to solve the difficult coastal issues that are impossible for any single group.

This is particularly important today and over the next twenty years as the Australian coast becomes increasingly battered by the ‘Sea Change’ population shift, climate change, cumulative impacts and increasing population pressures in general. Added to this is a constantly increasing socio-cultural emphasis on meaningful environmental protection linked to economic growth and development. This balance can be achieved only through linking world-class environmental, social and economic understanding with management, planning, policy and the community.

The Coastal CRC has demonstrated the best research model to date to support this clear need. Unless management is done in a cooperative and coordinated fashion, integrated coastal zone management will always be an elusive concept. The Coastal CRC will continue to investigate ways of clearly demonstrating what Coastal stakeholders now have come to understand. The long-term benefit of investment in cooperative research is as crucial and more valuable to coastal growth than the short-term financial gain from direct investment in individual projects. The Coastal CRC will continue to promote integrated management and work towards developing tools, techniques and processes that facilitate coordination and cooperation for the coast. What the Coastal CRC has started and done so well must be continued in the future.

Summary

The Coastal CRC brings together numerous organisations and scientists from around Australia. We connect researchers and practitioners in economic, planning, environment, history, social science and engineering disciplines. We also have strong support from several private sector organisations. Our national networks and products have been used by management agencies, industry and the community to improve coastal management and help save millions of dollars in environmental repair. We have produced online guides to enhance community involvement in natural resource decision-making and databases to help local authorities manage estuaries. We have developed decision-support systems and ecosystem health monitoring programs for local groups to make better decisions. We are designing new technology for cheaper remote-sensing and coastal mapping. We have facilitated strong local, interstate and international collaboration among scientists, managers, policy-makers, educators and stakeholder groups. The CRC also supports many outstanding postgraduate researchers and provides professional training for coastal managers.

This year, considerable effort went into preparing a re-bid application to the Federal Government for continued funding from 2006-12. Most of our current partner organisations agreed to continue and a number of new organisations including several private companies agreed to become partners. Unfortunately, our application was unsuccessful.

It would be a great pity if the Coastal CRC was unable to continue after 2006 due to discontinued Federal government funding. That is why we are actively investigating alternative options to maintain our successful work in the future. Staff and Board members are discussing a range of ideas and options.
A collaborative approach is essential to understand and conserve the coast because no single agency or group is charged with management of the coastal zone and knowledge needs span many disciplines. The coast is a region of transitions that result in environmental, cultural and jurisdictional complexity. This complexity and diversity in environmental, economic and social dimensions make its management susceptible to institutional dysfunction, communication breakdown, trans-boundary conflicts and interdisciplinary barriers. Coastal zones are highly productive, sensitive and dynamic. The delivery of resources and services depends strongly on multiple, trans-boundary interactions with the land, atmosphere, open sea and sea bottom.

The Coastal CRC seeks to promote this sort of integration in projects in numerous catchments around Australia by bringing together researchers with decision-makers from management agencies and community groups. One way is to work with regional natural resource management (NRM) groups and we have been fortunate to be involved in a number of genuinely successful partnership approaches with such groups. The CRC has partnerships with ten of these groups in Queensland, Western Australia, South Australia and Victoria. For example, in the Fitzroy and Port Curtis region of Queensland, the Fitzroy Basin Association has been a leader in demonstrating how regional NRM groups can partner meaningfully with a range of stakeholders. The CRC is working with this group and assisted in the development of their regional plan, one of the first to be endorsed in Queensland. A similar relationship has been formed with Natural Resource Management SEQ.

In Victoria, the Coastal CRC worked with a partnership among seven organisations including NRM groups, to bring together a diverse range of scientific and community information about Western Port Bay. The work promoted understanding and consensus among local stakeholders on the magnitude of key stressors affecting the region.

In South Australia, the Coastal CRC developed links with the Barker Inlet Port Estuary Committee to increase the scientific knowledge of the Barker Inlet environment. A similar partnership is emerging with other NRM and local government groups in the Sydney Harbour and Brooklyn estuary catchments of New South Wales.

In Western Australia, the CRC has forged strong relationships with State and local government agencies, and regional NRM groups, concerned with the ecosystem health of coastal waters at Cockburn Sound, Esperance and Peel-Harvey Inlet.

Responsibility for the coastal zone is of necessity shared among many groups, and these regional groups will play a key role in furthering cooperative and inclusive management arrangements for the Australian coast.

Australia’s 59,700 km coastline is the sixth largest in the world. The majority of Australians live within 50 km of the coast and many are participating in the ‘Sea Change’ population shift to the coast. Consequently, it might be expected that there is already a vast national capacity for coastal management knowledge, skills and experience. Indeed this is true; as the Coastal CRC has proven in its short five-year history by bringing together some of the most experienced coastal researchers in the world. The problem is that knowledge, skills and experience are dispersed across a range of agencies, universities, community groups and research institutions. The Coastal CRC is the only national organisation that brings these dispersed groups together to improve coastal planning and management.
The Cooperative Research Centre for Coastal Zone, Estuary and Waterway Management (Coastal CRC) is an unincorporated joint venture among the following parties:

- Brisbane City Council (BCC)
- Central Queensland University (CQU)
- Commonwealth Government
- CSIRO
- Curtin University of Technology (Curtin)
- Defence Science and Technology Organisation
- Geoscience Australia (GA)
- Griffith University (GU)
- James Cook University (JCU)
- Queensland Environmental Protection Agency (QEPA)
- Queensland Department of Natural Resources and Mines (QNR&M)
- Queensland Department of Primary Industries and Fisheries (QDPI&F)
- The University of Queensland (UQ)
- The University of Western Australia (UWA)

The Coastal CRC operates a management company, Coastal Zone Australia Ltd., to hold the intellectual property in trust and manage contractual issues.

Current Board members

- Mr Will Bailey AO, Independent (Chair)
- Dr Elizabeth Truswell, Independent (Deputy Chair)
- Dr Roy Green AO, Independent
- Mr Barry Ball, Brisbane City Council
- Professor Errol Payne, Central Queensland University
- Professor Paul Greenfield, The University of Queensland
- Dr Colin Chartres, CSIRO
- Professor Helene Marsh, James Cook University
- Professor Lex Brown, Griffith University
- Mr Bob Speirs, Queensland Environmental Protection Agency
- Mr Don Begbie, Queensland Department of Natural Resources, Mines and Energy
- Mr Andrew Wyatt, SGI Inc.
- Dr Clinton Foster, Geoscience Australia (observer)
- Dr Tony Tate, Curtin University of Technology
- Dr Alistar Robertson, The University of Western Australia
- Dr Paul Grieve, Queensland Department of Primary Industries and Fisheries
- Dr David Heilbronn, Defence Science and Technology Organisation
- Dr Barry Jones AO, Foundation Chair and Consultant to the Board
- Professor Henry Nix AO, is the CRC Visitor
The Board consists of independent and user nominees and regulates all operations of the Centre including determining strategic development, reporting to the Commonwealth Government, approving projects, the annual budget and financial arrangements. It met five times during the year.

NSAC provided comment and advice on the research activities, project structure and the delivery of results. NSAC consisted of the following members:

- Councillor Mike Berwick, Douglas Shire Council (Chair until November 2003)
- Ms Diane James, Victorian Coastal Council (Chair from November 2003)
- Mr John Bishop, Queensland Farmers’ Federation
- Mr Mike Bugler, Consultant
- Dr Alastair Birtles, Marine and Community Network
- Mr Blair Wood, National Land and Water Resources Audit
- Mr John Doohan, Sunfish
- Ms Debbie Heck, Australian Association for Environmental Education
- Mr John Hirst, Association of Australian Ports and Marine Authorities
- Ms Judy Horsfall, Central Queensland Port Authority
- Emeritus Professor Ian Lowe AO, Griffith University
- Mr Stewart McFarlane, Queensland Chamber of Commerce and Industry
- Mr Richard Nott, Environment Australia
- Professor John Penrose, Curtin University of Technology
- Mr Bill Sawynok, Fitzroy Basin Association
- Dr Nick Schofield, Land and Water Australia
- Mr Ken Stallman, Landcare and Catchment Management Council
- Professor Bruce Thom, Advisor to DIPNR, Visiting Professor at UNSW Faculty of the Built Environment
Dr Roger Shaw, Chief Executive Officer, Coastal CRC (until September 2003)
Dr Rob Fearon, Chief Executive Officer, Coastal CRC (from September 2003)
Dr Regina Counihan, Coastal CRC
Dr Darryl Low Choy, Griffith University

Executive management

Dr Roger Shaw retired as Chief Executive Officer September 2003 and Dr Rob Fearon took over the position. The Centre Visitor, Professor Henry Nix AO, continued as a mentor and a link with the National CRC Program, and attended several staff and Board meetings.

The Centre’s CEO and secretariat are based at the Indooroopilly Sciences Centre in Brisbane.

The Executive Management Group advises the CEO and manages the day-to-day activities of the Coastal CRC. These activities include staff management, ensuring quality of research, integration of activities, stakeholder participation and allocation of resources. The group, which met monthly to coordinate the Coastal CRC and its activities comprised:

Dr Roger Shaw and Dr Rob Fearon, CEO, Coastal CRC (Chair)
Dr Paul Lawrence, Theme Leader – Decision Frameworks (Queensland Department of Natural Resources and Mines)

Dr James Whelan, Theme Leader – Citizen Science and Education, (Griffith University)

Professor Rodger Tomlinson, Theme Leader – Management and Restoration (Griffith University)

Dr Peter Gehrke, Theme Leader – Ecosystem Processes (CSIRO)

Dr Ron Johnstone, Theme Leader – Assessment and Monitoring (The University of Queensland)

Mr Bob Noble, Agricultural (Fitzroy) Project Manager (Queensland Department of Natural Resources and Mines)

Ms Maria Vandergragt, Urban (South-east Queensland) and Industrial (Port Curtis) Project Manager (Central Queensland University)

Ms Rachel Mackenzie, Science to Enable Adaptive management for Sustainability (SEAS) Project Manager (Coastal CRC)

Prof John Penrose, Coastal Water Habitat Mapping Project Manager (Coastal CRC)

Dr Regina Counihan, Science Leader (Coastal CRC)

Mr David Cameron, Business Manager (Coastal CRC)

Mr Don Alcock, Communication Manager (Coastal CRC)

Ms Karen Snowden, Finance and Projects Officer (Coastal CRC)
Coastal CRC project structure

The centre began its second phase of three-year projects in July 2003. Projects are focussed on five key areas to maximise commercialisation and utilisation. Three of these projects are place-based in urban (SEQ), industrial (Port Curtis) and agricultural (Fitzroy) catchments. The fourth is focussed on shallow water habitats in study areas in the Recherche Archipelago (WA), Cockburn Sound (WA), Sydney Harbour (NSW), Moreton Bay (Qld), the Fitzroy and Keppel Bay (Qld). The final project is focussed on integration of regional outputs for national application. Within each of the five projects, sub-projects address four key coastal issues (or packages), namely wetlands management, benthic-mapping, contaminant dynamics, and governance and partnerships. Utilisation and commercialisation are maximised at the project level through local project managers and a commercialisation manager. Science is integrated across the proposals by theme leaders who are each responsible for one package.
Commercialisation, technology transfer and utilisation are ensured at the project level by appointment of dedicated project managers with direct links to local stakeholders. This section describes some of the highlights realised in each of the projects during the year.

**Urban (south-east Queensland) project**

**Manager: Maria Vandergragt**

South-east Queensland is a rapidly developing urban area encompassing two of the fastest-growing cities in Australia, namely Brisbane and Gold Coast. Correspondingly, the pressure on coastal areas and waterways is intense. Surrounding land use commonly impacts local estuaries and other waterways, and many have high concentrations of sediments, nutrients and some toxicants. Coastal planning and competing demands for the use of natural resources are key issues.

The Coastal CRC worked with stakeholders from State and local government, community groups and agricultural and other stakeholders and had close links with the Moreton Bay Waterways and Catchments Partnership. The Partnership is responsible for coordinating and implementing agreed management actions for waterways in the region and has established links with a variety of stakeholders, particularly local and State government agencies. The Coastal CRC linked with the CRCs for Catchment Hydrology and Freshwater Ecology to complete joint projects that provided decision-making tools and information for stakeholders. It also worked with the regional NHT funded group, the Natural Resource Management South East Queensland Inc (NRMSEQ), and with Coastcare to develop natural resource management plans.

**Highlights**

- A report on the Sewage Overflow Abatement Project (SOAP), undertaken in partnership with Brisbane City Council, was completed. The research team devised a remote monitoring system that keeps continual watch on the sewage system valves to monitor sewage overflows and sends an immediate alert when sewage spills. Technical recommendations to improve the ecosystem and public health near overflows were made to Brisbane City Council, which has agreed to continue developing the techniques and apply them to non-tidal urban waterways in Brisbane. The council’s sewage management policy has relied keenly on the information produced by the project.
An analysis of nutrient dynamics in habitats in Moreton Bay provided data in addition to information gathered from remote-sensing, acoustic mapping and water quality monitoring – demonstrating how data from different scales can be integrated to assess the health of coastal habitats efficiently and effectively. Such data is used by Moreton Bay Waterways and Catchments Partnership and Queensland EPA to enhance an ecosystem monitoring program for Moreton Bay.

Remote-sensing techniques developed specifically for Moreton Bay were incorporated into the monitoring program of the Moreton Bay Waterways and Catchments Partnership. This group is incorporating CRC-driven remote-sensing research with numeric models developed by the Coastal CRC, into the regional monitoring program, which was originally managed and developed by the CRC. This program includes an annual report card of ecosystem health which extensively influences State and local government policy and planning.

The cause of Brisbane River’s high turbidity was further explained by research into suspended sediment formed by flocculation of fine, cohesive particles. Sediment in the Brisbane River does not have enough time to settle, which is why the river is muddy. The large tidal intrusion means the tidal velocities are much higher than in the past, due to dredging at the river mouth. Information collected will lead to better management of river sediment in estuaries with high tidal movements. The issue of turbidity is a highly publicised and critical political issue in SEQ.

Research into the effectiveness of partnerships between government and community groups for managing natural resources in south-east Queensland found that power relationships often conflict with and negatively affect the outcomes of regional planning. While regional representation is widespread, and assists with information sharing and collaboration, there is not always an equal partnership, particularly between government and non-government groups. The study indicated that new regional NRM governance arrangements present obstacles to many partnerships, and the lack of shared power and responsibility means effective partnerships between government, communities and industry are difficult. CRC researchers are working with a number of regional groups to develop solutions to these problems.

Agricultural (Fitzroy) project
Manager: Bob Noble

Scientific information and research from the CRC continued to be integrated into natural resource planning and management in the Fitzroy region through collaboration with other partners and associates with a ‘source-to-sea’ focus. The Natural Resource Management Plan developed by the Fitzroy Basin Association for the area, with support from the Coastal CRC through the Central Queensland Information Paper, was the first to be formally endorsed in Queensland. Support to the FBA continued with advice, data and rigorous planning activities provided for the Fitzroy coastal and Boyne/Calliope catchments.

Collaboration with Great Barrier Reef Marine Park Authority in the re-zoning of marine bioregions continued through staff involvement in the Capricorn Local Marine Advisory Committee. Strong linkages were also made with Livingstone Shire Council in their planning for urban water supplies through the Community Reference Group and the independent Technical Panel.

Research teams were active in the estuary and coastal areas of the Fitzroy River; both in the field and working with stakeholders. Collaboration with natural resource
managers and communication with stakeholders included a number of seminars and question-and-answer sessions.

Sediment, nutrient and contamination dynamics in the Fitzroy estuary provided primary water quality data and knowledge that will be fundamental for the protection of the estuary and Great Barrier Reef.

Stakeholder analysis of the Fitzroy catchment identified all stakeholder groups involved in catchment management activities and mapped their values, aspirations and attitudes to the coastal zone. This information also allowed the design of the Central Queensland Healthy Waterways publicity campaign to be targeted and cost efficient.

Modelling of the Fitzroy produced computer models of the hydrodynamics (water currents and mixing), fine sediment dynamics and biogeochemistry for the Fitzroy estuary. The models will be used as a tool to predict how changes in the delivery of freshwater, sediments and nutrients from the catchment will impact on the ecological function of the estuarine system.

Highlights

- Accreditation of the regional Natural Resource Management Plan through FBA with the support of the Coastal CRC.
- Wrap up of phase one research with a summary brochure and several comprehensive technical reports well received by stakeholders in the region.
- Implementation with stakeholder ‘buddies’ of phase two multidisciplinary research into water quality and contaminant dynamics, wetland resources and function, fisheries productivity and environmental flows, governance and partnership arrangements, beach stability and restoration, coastal water habitat mapping and environmental history.
- Uptake of current research findings into marine, water supply and coastal natural resource planning processes by the following:
  - Capricorn Local Marine Advisory Committee of the Great Barrier Reef Representative Area Program
  - Livingstone Shire Community Reference Group and Technical Panel for the Capricorn Coast Water Supply
  - ‘Source-to-sea’ collaborations with State agencies
  - as well as several conferences and scientific publications.
- Continued sponsorship of the Central Queensland Healthy Waterways public awareness campaign.

Industrial (Port Curtis) project

Manager: Maria VanderGragt

CRC data and research findings were incorporated into the development of the Port Curtis Monitoring Program sampling design. Sampling sites for CRC water quality, bio-monitoring and habitat monitoring were used as a basis for the new program. Contaminant risk assessment findings and data were sought after and utilised by industry and agency stakeholders in developing monitoring and assessment strategies and for regional NRM planning.

Recommendations and findings from two reports: the Central Queensland Healthy Waterways Survey and the Indigenous Coastal and Waterways Resource Management: Current Reflections and Future Directions, were incorporated into local natural resource management planning strategies by the FBA, DNR&M, DPI&F and EPA.

Highlights

- A numerical hydrodynamic model was developed for local stakeholders at Port Curtis and Gladstone. Data from the model was incorporated into the Australian Maritime Authority database and used to develop an integrated monitoring design for Port
Curtis. The model considerably advances understanding of water movement in Port Curtis and provides greater knowledge of the oceanography of the region. Stakeholder need for the CRC work was demonstrated by ongoing interest in further research and development of the model.

- A survey of 1000 whelks collected in Port Curtis found up to 43% of female snails were affected by imposex, previously linked to the presence of the anti-fouling agent tributyltin. The prevalence was related to shipping intensity with a decreasing gradient of the number of affected snails from inner harbour to outer harbour. However, the incidence and severity reported in this study was not severe in comparison to other Australian studies, where up to 100% of snails were affected.

- A two-year study found Port Curtis to be generally free of contaminants. Most heavy metal and inorganic contaminants were well below the recommended regulatory guidelines for marine waterways and sediments, plants and animals. The team measured hundreds of bio-physical samples from a range of sites throughout the port region and found there to be no human or ecological health risks that could be linked to local industrial activities. Interim results of ongoing research on inshore waters and sediments indicate elevated concentrations of several trace metals (including copper) at a number of sites within Port Curtis. Phase one Contaminant Risk Assessment findings and data have been sought after and utilized in developing monitoring strategies, regional NRM planning and for decision-makers in government agencies.

- Sampling sites for Coastal CRC water quality and bio-monitoring projects were used as a basis for the marine monitoring sampling strategy sites for the Port Curtis Integrated Monitoring Program. This program, run by local industry stakeholders, is based on earlier work by the Coastal CRC.

- The intertidal wetlands sub-project provides ecological information about Port Curtis to manage human uses of the coastal system. Nearly 100 species of fish, 50 species of invertebrate, and five species of sea snakes were identified in the collections. The results show a remarkable diversity of fish species for a soft-sediment habitat. The resource maps, linked to a Geographic Information System (GIS), will be produced for natural resource planners, industry and local stakeholders to use for future coastal developments and environmental monitoring.

Science to enable adaptive management for sustainability (SEAS)

Manager: Rachel Mackenzie

Research conducted by the Coastal CRC has national application. To effectively distribute research results throughout Australia, the CRC developed a new suite of projects to integrate the outcomes of the place-based research, with a national focus. Fostering links between scientists, estuary managers and the community continued through the National Estuaries Network and the National Stakeholder Advisory Committee.

Highlights

- The knowledge integration and exchange project will provide a decentralised store for information about Australia’s coastal region. This capacity builds on existing tools such as the OzEstuaries database and website (www.ozestuaries.org). The project team worked closely with stakeholders to develop a database for the Estuarine, Coastal and Marine Indicators for Regional Monitoring data, and other water quality information. The team also obtained input from state estuary managers throughout Australia through the National Estuaries Network.
The characteristics of many estuaries in Australia are poorly documented, particularly for those estuaries in a near-pristine condition. The Pristine Estuaries project is mapping the habitats of a selection of estuaries, facilitating a comparative analysis geomorphology of relatively minor catchment disturbance. The project team collaborated with Conservation Volunteers Australia and the National Estuaries Network in delivering the outputs of the project to date.

The use of modelling to simulate coastal waterways has huge potential but requires careful selection of model platforms and associated monitoring regimes. The modelling, monitoring and management project fostered greater linkages between management needs and modelling and monitoring, and began developing a decision-support tool.

The Citizen Science Toolbox, an online resource to improve community consultation, communication and participation in natural resource management, was adopted by many government agencies and community groups in Australian and internationally. For example, the Queensland Environmental Protection Agency, one of the Coastal CRC’s partner agencies, engaged the citizen science research team to deliver a two-day professional development program based on the toolbox’s principles, resources and case studies. The in-service program, conducted in December 2003, included community engagement practitioners and managers from several State government departments. Feedback from participants confirmed the practical value of the toolbox and training program to natural resource stakeholder groups.

The Victorian Departments of Sustainability and Environment and Primary Industries (Community Engagement Unit) incorporated the toolbox within their Community Engagement Workbook. Their online workbook also promotes the toolbox. The toolbox is used in community engagement training to expand the repertoire of methods for staff to use when developing natural resource community engagement plans. More than 40 practitioners endorsed the toolbox in an overseas evaluation survey.

The Remote-Sensing for Coastal Water Quality project addressed stakeholder requirements for regularly updated maps of coastal environments, in particular, maps showing water quality (sediment load and other bio-optical variables such as chlorophyll a) and aquatic vegetation (seagrass, algal blooms). The project team is conducting the most extensive field- and image-based surveys of aquatic vegetation and water quality undertaken in Moreton Bay. This survey establishes direct collaboration and data sharing between several CRC project teams (Coastal Water Habitat Mapping, Benthic Habitats and Remote-Sensing), the Queensland Environmental Protection Agency, and the Port of Brisbane Corporation. The toolkit will instruct scientists and managers on how to implement approaches for supporting adaptive management. This pilot study will enable coastal managers nationally to incorporate more easily information derived from remote-sensing in the management of coastal areas.
Coastal water habitat mapping project

Manager: Prof John Penrose

The coastal water habitat mapping project represents the work associated with the supplementary bid of the CRC. Adoption of the research is to be achieved through:

1. development of tools collaboratively with stakeholders, and
2. a commercialisation program driven by a commercialisation manager.

The project has been underway for one year.

Highlights

• Technical training programs were held in Sydney and Perth and, with assistance from the Australian Academy of Technological Sciences and Engineering, a joint Aust/US workshop focussing on swath technology was successfully undertaken at the University of New Hampshire, USA. This involved 10 CRC personnel including three PhD students.

• Particular focus is being given to the development of a toolkit and training program for community, commercial and government organisations intending to use the technology for applications in other coastal regions of Australia, and overseas. A framework has been created and will be tested against stakeholder needs and further developed over the next year.

• Fieldwork was particularly strengthened by partner and stakeholder involvement. UWA, Curtin, GA, DSTO, Fugro Survey and Sonardata all contributed strongly to the coastal surveys, and continuous interaction with Reson (an SME affiliated to the CRC) has been maintained.

• Strong links have been developed with the Fremantle Port Authority and Fugro Survey during a coastal mapping project in Darwin Harbour.

• Presentations on the project were made to senior staff at the Western Australian Department of Conservation and Land Management, who provided the initial motivation for the project proposal. A number of other seminar presentations have been made internationally and within Australia.

• The NSW Marine Parks Authority (MPA) contracted the Coastal CRC to prepare a comprehensive habitat map of Cape Byron Marine Park. This was undertaken by The University of Western Australia (UWA), using the techniques such as side-scan sonar to produce a ‘sound picture’ of the sea floor, followed by extensive use of underwater cameras to confirm the nature of the sea-floor habitats. Detailed maps were produced to show accurately the distribution of habitats within the marine park. The NSW MPA indicated the habitat maps will form the base of information from which the management of the marine park will be progressively developed and implemented with the preparation of similar habitat maps for the remaining marine parks along the NSW coast to follow.

• Cockburn Sound and Owen Anchorage, near Perth WA, have been extensively influenced by a range of industrial and marine activities over the last century. In particular, there have been substantial losses of seagrasses on the eastern side of Cockburn Sound, due mainly to nutrient enrichment from industrial discharges. The Coastal CRC was contracted by the Cockburn Sound Management Authority to undertake detailed habitat mapping on the eastern flats of Cockburn Sound and by Cockburn Cement to undertake detailed mapping of seagrass in Owen Anchorage. The work was undertaken by UWA and Curtin University and made use of traditional aerial photography, hydro-acoustic techniques of sidescan sonar and multi-beam bathymetry, supplemented by extensive underwater surveys using cameras. The habitat maps supported policy and management actions for water quality management, commercial activities and future development in the area.
Externally-funded projects

As well as the five core project areas, the CRC undertakes externally-funded research, when this complements existing work and strategically aligns with the CRC’s goals and mission. These projects are chosen to maximise uptake of CRC outputs regionally and nationally.

Brisbane Airport environment options

The potential development of a third runway at Brisbane Airport highlighted the need to better understand the mangrove habitats of Moreton Bay to reduce the impacts of development. The Coastal CRC facilitated a workshop and produced a briefing paper for the Brisbane Airport Corporation which examined the options to enhance the functionality of specific mangrove communities, offset losses in functionality, perform mangrove restoration and link science with policy in the area of mangrove understanding, protection and rehabilitation. The briefing paper examined the properties and values (monetary equivalent) of natural mangrove ecosystem goods and services, and what the perceived and real gains/benefits from mangroves were. The paper assisted participants, and Brisbane Airport Corporation, to prioritise the options available to mitigate the loss of mangroves at the airport.

Central Queensland coastal planning

This project built on the work undertaken during the preparation of the Central Queensland Information Paper. It was undertaken in partnership with the Fitzroy Basin Association and focussed on the completion of the Central Queensland Strategy for Sustainability under the Natural Heritage Trust Program. Working with researchers, planners, scientific and regional stakeholders, the CRC prepared an integrated NRM plan for the Boyne and Calloipe catchments. The plan will contribute to the draft Fitzroy River and Coastal Catchments sub-regional plan, and the Central Queensland Strategy for Sustainability 2 (CQSS2).

Coastal indicators (MEWG) project

‘Estuarine, Coastal and Marine Habitat Integrity’ is one of ten ‘matters for targets’ to be addressed by regional NRM bodies for their integrated natural resource management plans under National Action Plan for Salinity and Water Quality (NAPSWQ) and National Heritage Trust 2 (NHT2) arrangements. To assess the performance of these programs in improving natural resource condition, indicators of resource condition are being developed under the National NRM Monitoring and Evaluation Framework. An estuarine, coastal and marine indicators package was developed for the Monitoring and Evaluation Working Group (MEWG) through the Department of Environment and Heritage. It is designed to assist in the identification and selection of indicators relevant to a specific NRM region and meet the monitoring needs. It identifies 15 major components of the environment that, when changed by human or other activities, can result in degradation to natural resources, such as aquatic sediments, nutrients and hydrodynamics. Information is provided on each of the indicators to help choose the most appropriate monitoring strategy. Guidance on standard methodologies for measuring the indicator is also provided.

Great Barrier Reef wetlands incentives

This project investigated the uptake of voluntary conservation and sustainable land practices by private landholders in Queensland, evaluated the role of incentives, surveyed the attitudes of private landholders in the reef catchment and recommended best approaches to increased sustainable land management and conservation on private land. It gave a snapshot of the capacity of NRM regions and local governments in the reef catchments to promote sustainable land management practices and conservation on private land, qualified adoption of wetland conservation measures, and assessed landowner attitudes to wetlands and wetland conservation programs and incentives.
Future directions and models for social and institutional research

A scoping study assisted Land and Water Australia (LWA) to plan its future investment in social and institutional (S&I) research, and to prepare a detailed five-year investment plan. It provided advice to the Board of LWA on research questions and themes for investment in research, target audiences for the outputs of future investment in S&I research, opportunities for value-adding investment/outputs through partnerships, and best possible structures to integrate S&I research within LWA’s research portfolio.

Input-output transactions table in the Murrumbidgee catchment

This project, in conjunction with Griffith University and Catchment Hydrology CRC, prepared an input-output transactions table using Australian New Zealand Standard Industry Classifications (ANZSIC) for the Goulburn-Broken catchment. It incorporated the Local Government Areas within the geographical area of interest, to include economic modelling of at least four major agricultural sectors in the catchment (horticulture, rice, sheep and livestock, and vegetable production).

National Land and Water Resources Audit (NLWRA)

A consortium of CRCs (Freshwater Ecology, Catchment Hydrology, Coastal, Landscape Environments and Mineral Exploration) and CSIRO Water for a Healthy Country Flagship was formed to conduct an initial scoping study on the design of the next National Land and Water Resources Audit (2007). The study included a draft summary, reporting framework, work plan and task budget for 2004-5. A second phase will develop the framework further.

Crown of thorns starfish program review

Queensland Government Premier’s Department commissioned the CRC to conduct an independent technical analysis of the effectiveness of the crown-of-thorns starfish mitigation project, which is conducted by the Association of Marine Park Tourist Operators. A desktop study was undertaken of all progress reports for the current mitigation project, and included confidential discussions with technical experts and participants in the program.
While adoption and commercialisation are ensured through close links with stakeholders at the project level, scientific quality of outputs and integration of research is maintained through processes that cut across the projects. The key process is through the four main packages of the CRC, which are delineated by the issues being addressed. Each package is championed by one or more of the Centre’s five Theme Leaders who ensure that research is integrated across projects. The four packages are wetlands, governance and partnerships, benthic mapping, and contaminant dynamics.

Wetlands

Coordinated by Ecosystem Processes theme leader, Dr Peter Gehrke

Package aim

The aim of integrating the CRC’s wetlands research is to improve the management of coastal wetlands through better understanding of the processes that drive environmental, social and economic issues relevant to wetlands management.

The Wetlands package is focused on understanding the ecosystem processes within wetlands that contribute to their environmental, social and economic values in order to develop better management options and improved management decisions for the use and conservation of coastal wetlands. Processes include the role of freshwater inflows, groundwater hydrology, nutrient biogeochemistry, nutrient transformations through foodwebs, connectivity between wetlands and estuaries, and contributions of wetlands to estuarine fisheries production. This package of projects also examines the techniques to improve our ability to collect and use environmental information more effectively.

Projects are concentrated in sub-tropical regions of south-eastern and central Queensland, based on agricultural (Fitzroy), industrial (Port Curtis) and urban (south-east Queensland) land-uses. Overarching projects aim to integrate these studies within an economic framework for improved wetland management across different catchment types.

Research integration highlights

- Coastal wetlands have historically been modified by coastal development and changes in land use within catchments, with little understanding of their role in coastal ecosystems. Remnant wetlands now evoke strong emotive arguments for conservation and rehabilitation that cannot always be supported on the basis of known contributions of wetlands to
ecosystem function. This package of projects seeks to address the broad range of issues ranging from improving conceptual models of wetland ecosystems based on scientific understanding, through the environmental, social and economic values provided by wetlands, to devising options for rehabilitating wetlands to defined target conditions. The intended outcome of these projects is sound, defensible scientific information to justify public investment in conservation and restoration of wetlands to achieve coastal sustainability.

- Fresh water allocation processes in Australia currently place greater emphasis on the needs of freshwater ecosystems compared with estuaries, because the role of freshwater inflows in estuarine ecosystems is not well understood. The Fitzroy Environmental Flows project has provided compelling evidence for the role of climate and high flows during summer in stimulating fish production in the Fitzroy estuary, linking economic and ecological production in the estuary to water management in the catchment.

- Fish have been found to feed in all available intertidal habitats, including saltmarshes inundated only during spring tides, emphasising the critical role of connectivity between habitats in maintaining energy flow, and the opportunistic use of energy sources. Detritus-based foodwebs in isolated wetland pools are important for fishery species when wetlands are not connected to the rest of the estuarine system.

- Linking research on wetland processes with biogeochemical studies of flow and ecological production in the Fitzroy Estuary (Contaminants package), provides a quantum leap in understanding the ecology of tropical estuaries, and the implications for catchment management, environmental flows, water quality in GBR coastal waters, and the value of ecosystem services provided by tropical estuaries.

- A review of regulatory controls for wetlands identified that none of the legislation relevant to wetland management has the primary aim of protecting wetlands. Effective wetland protection through existing legislation therefore requires a detailed knowledge of statutory instruments and extensive coordination between different levels of government, as well as a comprehensive knowledge of wetland ecosystem functions and values.

- A conceptual model for the role of freshwater inflow to estuaries identifies physical and chemical changes, changes in primary production, and resultant changes in trophodynamics, species move-
Governance, partnerships and decision frameworks

Coordinated by Decision Frameworks theme leader, Dr Paul Lawrence and Citizen Science theme leader, Dr James Whelan

The Governance, Partnerships and Decision Frameworks package seeks to understand and promote effective institutional arrangements and to synthesise information for sustainable natural resource management and informed decision-making. Common themes of the package are: (1) collaborative management (2) industry-community partnerships (3) integrated information and knowledge systems, and (4) environmental indicators and decision-making frameworks as elements of regional NRM arrangements (e.g. National Action Plan for Salinity and Water Quality, and Natural Heritage Trust Agreement 2). The research is underpinned by the principles of adaptive management and the CRC’s mission to bridge the gaps between science, the community and decision-makers by fostering collaborative coastal zone science and processes of social learning.

The outcomes from this package will demonstrate the processes and benefits of a science-based business delivery framework that recognises integration, coordination and continuous improvement for regional partnerships and effective NRM planning and decision-making. These outcomes are expected to be practical and relevant to State and local government agencies, as well as catchment management authorities involved in regional planning.

Research integration highlights

- Research presentations and workshops to state and national groups on governance and improved institutional arrangements, including presentations to Queensland EPA Community Engagement training program; Earthwatch annual gathering at Marysville (Vic); Rio Tinto Community Consultation Workshop, Gladstone (Qld).
- A ‘Human Dimensions of Natural Resource Management’ (‘Humdimmers’) network has steadily expanded its membership to more than 80. The network hosts monthly lunchtime research seminars and an active electronic discussion group.
- Property level planning workshops were conducted to assist property scale planning and decision-making in Queensland. This level of interaction between agency planners and policy advisors, industry representatives and community bodies succeeded in developing better relationships across these sectors and identified commonalities from a number of planning frameworks. In the context of NAP and NHT2 regional resource plans, management actions are seen as the main delivery mechanism for achieving water quality and salinity resource targets, and therefore represent an important component of regional decision-making.
- A series of discussions with agencies and the Fitzroy Basin Association (FBA) explored the current approach to resource planning in central Queensland within an adaptive management framework. The discussions identified challenges and approaches to work under a regional partnership model. From these interactions, key issues were identified for progress under the Enabling Adaptive Management project, with particular emphasis on providing (third party) support for a review of the Neighbourhood Catchments delivery model for FBA, and facilitating regional interactions to identify links, roles and coordination of NRM activities (in-kind contributions) provided by State agencies. This is expected to ensure partnerships between government, industry and community sectors are strengthened and made more cohesive.
- The Citizen Science Toolbox was launched in December 2003. The toolbox site has attracted favour-
able review from agencies and community engagement practitioners internationally as well as being used in full as a training resource by the Victorian Department of Sustainability and Environment and the Queensland EPA.

Through the SKIE project (Software for Knowledge Integration and Exchange), activities produced the following achievements:

- A trial decision-making toolbox called Decision Analyst was developed to support participatory decision making where there are trade-offs to consider across environmental, economic, social and instructional factors. This Java-sourced application has extended functionality with several weighting algorithms (JavaAHP, SMARTER) that can be customised for a range of applications, as well as import/export to MS Excel. The toolbox will complement the existing Facilitator decision-support tool.

- OzEstuaries factsheets were restructured into the Human Effects on Landscape Processes (HELP) framework by the Queensland Department of Natural Resources and Mines as a series of flowcharts. These charts synthesise the cause and effect processes and impacts arising from land-based management actions. The model was significantly enhanced to show the relationships between management practices, coastal processes and potential environmental impacts.

- Drafts of two modules of the SKIE website were developed. Environmental values of various estuaries were collected and added to a database, and programming for an interface to interrogate this data commenced. Information was assembled from the Estuarine, Coastal and Marine Indicators for Regional NRM Monitoring project, and a database developed. A web interface to interrogate this database and to show additional information for coastal NRM issues was devised.

- A partnership was developed with the Tropical Savannas CRC in adaptive management frameworks (AMF) for natural resource management. While the Coastal Zone projects are focussed on the detail of enabling adaptive management at the study management scale, Tropical Savannas are using the AMF to define criteria to evaluate healthy regional arrangements across Queensland and northern Australia. The CRCs agreed to establish a network for sharing research findings.

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**Benthic mapping**

Coordinated by Assessment and Monitoring theme leader, Associate Professor Ron Johnstone

The aim of the benthic mapping package is to develop shallow water mapping and assessment methodologies and also create tools that make these techniques more accessible to coastal managers. Research is integrated into usable products with the cooperation of a number of small-to-medium enterprises (SMEs) involved in the work and also through commercialisation, driven by a commercialisation manager.

Integration of outputs is ensured through a specific sub-project focussed on delivering a web-based tool as well as a guidebook that describes the available technologies, their costs, advantages and disadvantages, and how best to access them. This tool will be used for information dissemination and for commercial promotion in conjunction with SME partners and affiliates. It will describe the science behind the techniques as well as analysing how different methodologies could best be integrated for optimal outcomes.
Research integration highlights

- A Reson 8125 swath sounder system was deployed in Sydney Harbour and along the West Australia coast at the Recherche Archipelago and Cockburn Sound.
- Side scan and video technology were deployed at several Australian inshore study sites and a range of geological fieldwork has been undertaken at coastal areas in the Recherche and Cockburn regions. This included sub-bottom profiling, coring and grab sampling together with associated sediment analysis.
- Protocols for data lodgement with Geoscience Australia were established and implemented, and a review of satellite remote-sensing data sets applicable to each of the sites was completed.
- Work on techniques used for assessing fish assemblages is proceeding, as is the development of an understanding of sampling system design suited to the range of tools being deployed.
- Initial analysis of nutrient cycles in shallow marine habitats was undertaken in conjunction with broad-scale remote-sensing to demonstrate the power of integration across assessment scales.

Contaminant dynamics

Coordinated by Management and Restoration theme leader Associate Professor Rodger Tomlinson

The contaminant dynamics package aims to explore the inputs, processing and fate of a range of contaminants in near-shore coastal environments. This research involves a range of process studies and numerical modelling approaches combined with remote-sensing. A specific sub-project examining how monitoring and modelling can best be combined for optimal management of waterways will produce a guide for coastal managers. This package integrates a range of biophysical data and knowledge on ecosystem processes, particularly through predictive models that allow decision-makers to consider scenarios based on currently planned management options.

Research integration highlights

- Metal bioaccumulation bioassay involves the development of suitable techniques for analysis of metal accumulation for small quantities of algae. A considerable challenge is the analysis of low concentrations of metals bound to the algal cell surfaces. The work on contaminant pulses is at laboratory development stage. These tools will be transferable to other systems, both within Australia and overseas.
- A two-year study found Port Curtis generally free of contaminants. Most heavy metal and inorganic contaminants were well below recommended regulatory guidelines for marine waterways and sediments, plants and animals. Research assessed levels of risk for contaminants in coastal waters, sediments, oysters, crustaceans, seagrasses and some fishes. The study found that, while there was no direct threat to human health or environmental damage, some areas of the estuary system were not as good as others. The team measured hundreds of bio-physical samples from a range of sites across the port region and found no human or ecological health risks that could be linked to local industrial activities. Elevated levels of dissolved trace metals in some sediments around the Port were likely to result from natural background sources, such as ore deposits, although there are no land-based geochemical surveys to verify this. Interim results of a waters and sediment survey indicate elevated concentrations of several trace metals (including copper) at a number of sites. Offshore metal concentrations are comparable with uncontaminated coastal regions of Australia.
- A hydrodynamic numerical model was developed for the Port Curtis area.
- The model resolves the coastal area from The Narrows, including Curtis and Facing Islands in the north
to Rodds Bay in the south, and extends offshore to approximately the 30 m isobath. It can be applied to investigate phenomena at a regional scale. It is nested within a larger scale regional model allowing the influence of the Fitzroy River (through The Narrows) to be determined. The intertidal zone was not incorporated so the model is not suitable for investigating the circulation around highly local features. Issues the model may address include:

- flushing rates of the estuary
- tracer distributions resulting from point-source releases
- connectivity and residual circulation dynamics
- interaction of estuarine waters with the offshore environment, or with Rodds Bay

The model was designed to address environmental impacts. For these purposes, tracer transport over multiple tidal cycles is the main output to date. Simulations and associated analyses provide a representation of the flow and distribution characteristics of the port environment. They show that:

- tidal range varies within the port
- large tides ensure the water column is well-mixed with little variation from the surface to the bottom contributing to significant re-suspension of sediment
- particles in the estuary undergo large displacement due to the tidal motion and little nett displacement of particles over multiple tidal cycles
- there are extended flushing times in the vicinity of 19 - 24 days with shorter flushing times for Rodds Bay due to good offshore exchange
- flow degenerates into a series of gyres towards the northern end of the port
- residual currents act to bring material into the estuary rather than out
- predictions can be made for particle dispersal from locations of interest

The model is currently at a pilot stage and has been subjected to limited calibration with respect to sea level, but not current flow, salinity or temperature. It is thought the current model should provide realistic, but not necessarily definitive predictions of water column mixing and advection. A successful evaluation of the model will provide greater certainty of the effectiveness of the model, advanced understanding of the hydrodynamics of Port Curtis and establish an important new baseline for consideration in planning, development and monitoring activities in Port Curtis.

Scientists from the Department of Natural Resources and Mines and Griffith University advanced the understanding of sub-surface riparian zone processes in a joint project with the CRC for Catchment Hydrology. The study showed that these zones are important in reducing the amount of nitrate flowing into waterways. This can help protect downstream aquatic ecosystems and lessen the risk of problems such as algal blooms occurring. The flow of nitrate-rich groundwater and surface runoff from agricultural and urban areas may increase the risk of algal blooms in coastal and freshwater systems. The process of ‘denitrification’ is performed by specialised soil bacteria that remove nitrate permanently from the riparian zone by converting it to nitrogen gas.

The Sewage Overflow Abatement Project (SOAP) investigated impacts of sewage overflows into a small urban estuary during wet and dry weathers. The project showed that overflows have a large impact on water quality until tidal exchange flushed contaminants from the waterway. However, these potential impacts were small compared to those caused by stormwater. This information supports policy of investment in sewage and stormwater treatment.
The postgraduate education program seeks to build a culture that links formal education at doctoral, masters and other levels with the ethos and applied action research projects of the Coastal CRC. This involves support for students’ own research projects, participation in related CRC projects and the immersion of students in a coordinated professional development and training program that complements the traditional research training provided by a postgraduate degree.

**Highlights**

- An Education Committee met bi-monthly and provided planning and advice for education and training activities. The committee was responsible for the development and evaluation of a range of seminars and assisted with the needs of individual students.

- The Education program continues to offer students the opportunity to participate in various forms of professional development activities. These activities included short courses, workshops and practical activities.

- The Young Water Scientist of the Year Award is designed to highlight the valuable role played by the Water Forum CRCs in training the scientists of the future. The five CRCs in the Water Forum group are the CRCs for Coastal Zone Estuary and Waterway Management, Catchment Hydrology, Freshwater Ecology, Waste Management and Pollution Control LTD, and Water Quality and Treatment. These CRCs are developing a new generation of scientists with a special blend of skills that include quality science, good communication skills and an understanding of industry. Ross Johnston was a finalist in the 2004 Award and presented his research on habitat-related distribution of small fish in tropical estuaries during Riversymposium 2004 in Brisbane.

- Ross Johnston was also a finalist for the CRC Association (CRCA) student awards and presented his research at the CRCA Conference held in Adelaide during June 2004. He argued that any development that reduces the extent of shallow habitat jeopardises estuarine nurseries and the fish populations that rely on them. His research findings indicate that the preservation of shallow coastal and estuarine habitats is crucial to conserve fisheries stocks and to the maintenance of fish species diversity in Australia.

- PhD students Melanie Cox, Michelle Graymore and Luis Neumann attended a CRC Leadership and Career Development Course in Melbourne, Septem-
bber 2003. The course, run by the University of Melbourne’s Business School, covered knowledge and skills in leadership, motivation, communication and team processes.

- A student seminar series complemented the education program throughout the year. These seminars were presented, often in addition to existing university seminar commitments. The audience varied from between 20 to 45 participants with representatives from various stakeholder groups, research participants, Executive Management Group members, CRC staff and other students. The seminars were also held separately for management staff at Queensland’s EPA in Brisbane during 2003. The following students gave presentations:
- The Coastal CRC supported 21 full-time research higher degree students through one of the CRC’s partner universities. The studies included MPhil and PhD candidates with research topics relevant to the CRC’s objectives. New research higher degree scholarships were made available for successful applicants and commenced in second semester 2003 and first semester 2004.
- Five associate and affiliate students were supported to conduct their research within a collaborative environment with senior scientists, attend conferences and access information relevant to their studies.

Completion of research

Seven students submitted their research theses for examination. They were:

- Julie Anorov PhD GU
- Damien Burrows PhD JCU
- Margaret Gooch PhD GU
- Luis Neumann PhD UQ
- Peter Oliver PhD GU
- Bronwyn Powell MEnvSc GU
- Dana Thomsen PhD GU

Five students were awarded their degrees within the reporting period: Damien Burrows, Margaret Gooch, Luis Neumann, Bronwyn Powell and Dana Thomsen.

Student attendance at conferences.

International

• Christie Schacht participated in the 9th Australasian Port and Harbour Conference in New Zealand, 9–12 September, 2003.

National


• Linda Cobiac was invited to attend Our Shared Future – UK/Australia Future Leaders’ Dialogue in Sydney, 15–16 April, 2004.


• Tara Cully and Samantha Fox attended the Coast to Coast 2004 Conference, Hobart, April, 2004.

• Philip Haines attended the 12th Annual NSW Coastal Conference in Port Macquarie, 4–7 November, 2003.
### Postgraduate Students - Scholarships

<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
<th>Sship</th>
<th>Univ</th>
<th>Start</th>
<th>Research Project Title</th>
<th>Principal Supervisor</th>
<th>Associate Supervisor/s</th>
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<tbody>
<tr>
<td>Anorov, Julie</td>
<td>PhD</td>
<td>Full</td>
<td>GU</td>
<td>10.04.2000</td>
<td>Integrative study of coastal wetland characteristics and geomorphic processes in a south east Queensland catchment</td>
<td>Pat Dale GU)</td>
<td>Bernie Powell (NRM) Margaret Greenway (GU) John Chappell (ANU)</td>
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<td>Baker, Ronald</td>
<td>PhD</td>
<td>Full</td>
<td>JCU</td>
<td>14.01.2002</td>
<td>Biological connectivity within and between estuarine and coastal nursery grounds in the Fitzroy/Port Curtis management areas</td>
<td>Marcus Sheaves (JCU)</td>
<td>tba</td>
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<td>Baxter, Katrina</td>
<td>PhD</td>
<td>Top up</td>
<td>UWA</td>
<td>25.08.2003</td>
<td>Reconciliation, modelling and prediction of sea floor terrain and marine habitat characteristics within the Recherche Archipelago</td>
<td>Kimberly Van Niel (UWA)</td>
<td>Mark Shortis (RMIT) Gary Kendrick (UWA)</td>
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<tr>
<td>Beal, Cara</td>
<td>PhD</td>
<td>Full</td>
<td>UQ</td>
<td>04.03.2002</td>
<td>Tool kits to predict water quality in non-sewered subdivisions</td>
<td>Neal Menzies (UQ)</td>
<td>Ted Gardner (NRM) Gary Kendrick (UWA)</td>
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<td>Bickers, Andy</td>
<td>PhD</td>
<td>Top up</td>
<td>UWA</td>
<td>25.08.2003</td>
<td>Broad scale assessment of marine habitat and benthic community structure using sonar and video techniques</td>
<td>Gary Kendrick (UWA)</td>
<td>John Penrose (Curtin)</td>
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<td>Burrows, Damien</td>
<td>PhD</td>
<td>Full</td>
<td>JCU</td>
<td>24.07.2000</td>
<td>The role of insect leaf herbivory in the ecology of the mangroves <em>Rhizophora stylosa</em> and <em>Avicennia marina</em></td>
<td>Rhondda Jones (JCU)</td>
<td>Richard Pearson (JCU)</td>
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<td>Burton, Eddie</td>
<td>PhD</td>
<td>Op</td>
<td>GU</td>
<td>29.01.2002</td>
<td>Distribution, fate and toxicity of trace metals in coastal sediments</td>
<td>Ian Phillips (GU)</td>
<td>Darryl Hawker (GU)</td>
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<td>Chatfield, Brenton</td>
<td>PhD</td>
<td>Top up</td>
<td>UWA</td>
<td>02.02.2004</td>
<td>Use of GIS for spatial modelling and prediction of marine benthos</td>
<td>Gary Kendrick (UWA)</td>
<td>Kimberly Van Niel (UWA)</td>
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<td>Cobiac, Linda</td>
<td>PhD</td>
<td>Full</td>
<td>UQ</td>
<td>24.03.2001</td>
<td>Decision support for sustainable management of urban stormwater</td>
<td>Hugh Possingham (UQ)</td>
<td>Milani Chaloupka (CRC) Jackie Robinson (UQ)</td>
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<td>Start</td>
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<td>Integrative indicators for ecosystem health on human welfare</td>
<td>Ron Johnstone (UQ)</td>
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<td>Examining the effects of economic development on the carbon sink and coastal protection functions of wetlands in the Gladstone region</td>
<td>Tor Hundloe (UQ)</td>
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<td>Diatloff, Nicole</td>
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<td>01.05.2000</td>
<td>Wastewater management in low population density areas: An integrated framework for sustainability</td>
<td>Jurg Keller (UQ)</td>
<td>Roger Shaw (CRC) Thomas Loetscher (UQ)</td>
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<td>Graymore, Michelle</td>
<td>PhD</td>
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<td>The sustainable human carrying capacity of south east Queensland</td>
<td>Roy Rickson (GU)</td>
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<td>Guest, Michaela</td>
<td>PhD</td>
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<td>GU</td>
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<td>Stable isotope analysis of estuarine food webs</td>
<td>Rod Connolly (GU)</td>
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<td>Patterns of habitat/micro-habitat use by fishes in estuaries</td>
<td>Marcus Sheaves (JCU)</td>
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<td>Mapping mangrove ecosystems using remotely sensed data to determine structure and composition as ecosystem health indicators</td>
<td>Stuart Phinn (UQ)</td>
<td>Pat Dale (GU) Norm Duke (UQ) Alex Held (CSIRO)</td>
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<td>Tony Howes (UQ)</td>
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<td>Forming effective partnerships in natural resource management</td>
<td>John Fien (GU)</td>
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<td>Parnum, Iain</td>
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<td>Full</td>
<td>Curtin</td>
<td>15.03.2004</td>
<td>Identifying coastal sea floor properties using single and multibeam sonar</td>
<td>Alexander Gavrilov (Curtin)</td>
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<td>Fish faunas in floodplain wetland habitats an agricultural area</td>
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<td>Pillans, Richard</td>
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<td>15.03.2000</td>
<td>Physiological ecology of the euryhaline bull-shark, <em>Charcharhinus leucas</em>, in the Brisbane River</td>
<td>Craig Franklin (UQ)</td>
<td>Gordon Grigg (UQ)</td>
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<td>Modelling the kinetics of toxicant bioaccumulation in bivalves for use as a water quality modelling and monitoring tool</td>
<td>Peter Bell (UQ)</td>
<td>Milani Chaloupka (CRC)</td>
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<td>Spatial analysis of catchment characteristics in relation to water quality using remote sensing and geographic information systems</td>
<td>Stuart Phinn (UQ)</td>
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<td>Transferable development rights for conservation in Queensland</td>
<td>Bill Crane (UQ)</td>
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<td>Schacht, Christie</td>
<td>PhD</td>
<td>Full</td>
<td>GU</td>
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<td>Flocculation and deflocculation in estuaries</td>
<td>Charles Lemckert (GU)</td>
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<td>Scriffignano, Jason</td>
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<td>Remote sensing techniques for monitoring mangrove ecosystem health indicators</td>
<td>Alistair Melzer (CQU)</td>
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<td>Sheaves, Janine</td>
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<td>Full</td>
<td>JCU</td>
<td>11.03.2002</td>
<td>The effect of altered stream flow on benthic invertebrate communities along the freshwater-estuarine gradient of coastal streams</td>
<td>John Collins (JCU)</td>
<td>Richard Pearson (JCU) Satish Choy (NRM)</td>
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<td>Stowar, Marcus</td>
<td>PhD</td>
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<td>Development of rapid biological assessment techniques based on benthic macrofauna for estuaries in south east Queensland</td>
<td>Greg Skilleter (UQ)</td>
<td>Alan Jones (Aust Mus) Andrew Moss (EPA)</td>
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<td>25.08.2003</td>
<td>Techniques for the interpretation of acoustic backscatter from marine benthic communities</td>
<td>Alexander Gavrilov (Curtin)</td>
<td>Rob McCauley (Curtin) Gary Kendrick (UWA)</td>
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<td>Watson, Dianne</td>
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<td>UWA</td>
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<td>Techniques for assessing the relative abundance, density and length frequency of coastal demersal fish assemblages</td>
<td>Gary Kendrick (UWA)</td>
<td>Euan Harvey (UWA)</td>
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<td>Wilson, Jane</td>
<td>PhD</td>
<td>Top up</td>
<td>JCU</td>
<td>12.02.2001</td>
<td>The impact of modified flow on the trophic organisation and function of estuarine fish faunas</td>
<td>Marcus Sheaves (JCU)</td>
<td>Julie Robins (DPI)</td>
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### Postgraduate Students – Associates and Affiliates

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<th>Name</th>
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<tr>
<td>Cook, Perran</td>
<td>PhD</td>
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<td>The importance of benthic remineralisation and its relationship with nutrient cycling and pelagic productivity in coastal ecosystems</td>
<td>Barry O'Grady (UTAS)</td>
<td>Ed Butler (CSIRO) Rhys Leeming (CSIRO) Bradley Eyre (SCU)</td>
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<td>Fox, Samantha (nee Lewis)</td>
<td>PhD</td>
<td>Assoc</td>
<td>CQU</td>
<td>A conceptual framework for the initiation, development and implementation of holistic and integrated coastal, estuarine and port ecosystem health monitoring programmes, and planning and management strategies</td>
<td>Alistair Melzer (CQU)</td>
<td>Stewart Lockie (CQU)</td>
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<td>*Gooch, Margaret</td>
<td>PhD</td>
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<td>GU</td>
<td>Volunteering – linking social capital, learning, and environmental care</td>
<td>John Fien (GU)</td>
<td>Roy Rickson (GU) Jeni Warburton (UQ)</td>
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<td>Haines, Philip</td>
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<td>Assoc</td>
<td>GU</td>
<td>A theoretical basis for the assessment of sustainability of ICOLLS of south-east Australia</td>
<td>Rodger Tomlinson (GU)</td>
<td>Bruce Thom (UNSW)</td>
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<td>Hudson, Kelly</td>
<td>MEnvSc</td>
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<td>GU</td>
<td>Evaluation of multi-tier governmental relations for integrated coastal management</td>
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<td>Community participation and institutional change in the National Action Plan on water quality and salinity in the Fitzroy Basin, Queensland</td>
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<td>PhD</td>
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<td>Communication in collaborative research organisations</td>
<td>Sue McKay (UQ)</td>
<td>Cindy Gallois (UQ) Jeffery Puttam (UQ)</td>
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<td>Community-based research: Perception and possibilities</td>
<td>John Fien (GU)</td>
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<td>Van Kerkhoff, Lorrae</td>
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<td>Integrated environmental research: From independent experts to post-modern process managers</td>
<td>David Dumaresq (ANU)</td>
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<td>The importance of benthic remineralisation and its relationship with nutrient cycling and pelagic productivity in coastal ecosystems</td>
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<td>An operational theory of communicative action for citizen participation in catchment management</td>
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- CRC Catchment Hydrology students who are affiliate students with the Coastal CRC
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<td>Burrows, Damien</td>
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<td>Partner</td>
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<td>03.04.2004</td>
<td>The reevaluation of the role of insect leaf herbivory in the ecology of mangrove ecosystems with reference to <em>Avicennia marina</em> and <em>Rhizophora stylosa</em></td>
<td>Rhondda Jones (JCU)</td>
<td>Richard Pearson (JCU)</td>
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<td>Clouston, Elizabeth</td>
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<td>Linking the ecological and economic values of wetlands: A case study of the wetlands of Moreton Bay</td>
<td>John Tisdell (GU)</td>
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<td>Carbon and nitrogen cycling on intertidal mudflats in a temperate Australian estuary</td>
<td>Barry O’Grady (UTAS)</td>
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<td>Development of indicators for assessing and monitoring nutrient influences in coastal waters</td>
<td>Bill Dennison (UQ)</td>
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<td>Dow, Ruth</td>
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<td>An expanded economic assessment methodology for the Queensland resource planning process</td>
<td>Robert Cramb (UQ)</td>
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<td>Dunbar, Stephen</td>
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<td>Respiratory, osmoregulatory and behavioural determinants of distribution of tropical marine hermit crabs</td>
<td>Michael Coates (CQU)</td>
<td>Steve McKillup (CQU)</td>
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<td>Jones, Mary-Anne</td>
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<td>Assessing the risk from chemical contaminants in the Port Curtis estuary, Australia</td>
<td>Leo Duivenvoorden (CQU)</td>
<td>Bob Noble (NR&amp;M)</td>
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<td>Australian estuary management: Drivers and perspectives</td>
<td>Jes Sammut (UNSW)</td>
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- CRC Catchment Hydrology students who are affiliate students with the Coastal CRC
Collaboration between research teams, partner organisations, stakeholder groups and the community is vital to the success of the Coastal CRC. Strategies used to achieve effective linkages included:

- high-level stakeholder advisory groups for all five project areas
- stakeholder ‘buddy’ system for all sub-projects
- strong support by partner organisations for multi-agency research tasks
- maintenance of internal communication through team meetings, personal contacts, newsletters, reports, meetings, workshops and emails
- provision of opportunities for CRC researchers, students and stakeholders to meet at workshops, conferences, project meetings, advisory committees and informally
- linkage of integrated research tasks and projects across themes
- regular reporting of progress to agencies and stakeholder groups
- dedicated project managers to link with local stakeholder groups in each management study area
- communication plans for all sub-projects

Annual staff workshop

A staff workshop was held at Greenmount Resort, Coolangatta, in September 2003 and was attended by 120 CRC researchers, staff, students and stakeholders. The workshop provided an excellent opportunity to plan future multidisciplinary projects, recognise achievements, get together socially and strengthen networks within and between teams. Sessions were also organised to promote research results, link with stakeholder groups and develop management and marketing skills.

Board functions with stakeholders

The Board met with the Coastal CRC’s National Stakeholder Advisory Committee in Brisbane and Coolangatta. The meetings discussed research projects and the Coastal CRC’s re-bid application to the Commonwealth Government.

Regional stakeholder advisory groups

Coastal researchers and Fitzroy region stakeholders met in Yeppoon to discuss progress of several CRC-Fitzroy River Basin projects and investigate ways to integrate research results with the Central Queensland Strategy for Sustainability. The meeting helped to exchange in-
formation and identify emerging issues. Representatives from various fishing, farming, local council, government and Indigenous organisations participated to review projects, identify new knowledge needs and discuss long-term planning strategies for the region. Stakeholder groups, especially the Fitzroy Basin Association and Sunfish Queensland, worked closely with scientists and assisted them to undertake water quality, fisheries and remote-sensing fieldwork.

The Coastal CRC developed collaborative linkages with community support officers of a new regional body, Natural Resource Management South East Queensland Inc and the CEO, Dr Rob Fearon, joined the executive committee. NRMSEQ is working to build an integrated natural resource management plan for the region, and to ensure environmental planning, investment, action and monitoring is more strategic. Several officers link into some CRC research projects, as ‘stakeholder buddies’, and joint projects may be developed in the future. The CRC worked closely with this network to promote toolkits and research products to local NRM organisations in the region.

Collaboration with research agencies

Research collaboration with the Tropical Savannas CRC extended the use of adaptive management frameworks for natural resource policy. Both CRCs undertake research into the benefits of this process. The two organisations established a network for sharing findings. Theme leaders reviewed papers from several conferences on this topic to ensure the material was sound and scientifically defensible. A new suite of research projects in the Governance, Partnerships and Decision Frameworks package is providing considerable scientific benefit. The projects entail close liaison with government, community and industry organisations, particularly with regional NHT2 and NAP bodies. This team commenced fieldwork and collaborated closely with Board members and staff of NRMSEQ and grass roots groups in south-east Queensland.

Geoscience Australia staff collaborated with Conservation Volunteers Australia to verify estuarine condition and sedimentary habitat maps of estuaries. Conservation Volunteers ground-truthed maps produced by the Near-Pristine Estuaries project at several estuaries they visited for their conservation activities.

James Seager visited Bruce Barker and Alan Williams at CSIRO Marine Science (Hobart) to develop technical aspects of using lasers in underwater environments. Calibration algorithms and laser construction were developed for the Coastal Water Habitat Mapping project on the CSIRO laser system. Mark Shortis, of RMIT in Melbourne, was also involved in developing algorithms for the automation and photogrammetric aspects of the project.

Production of the Citizen Science Toolbox required extensive collaboration with a number of local, State and Federal government agencies, industry and non-government organisations, universities and other research institutions. They included Mosman Council (NSW); Byron Shire Council; Gold Coast City Council; Tweed Shire Council; Surfcost Shire Council; NSW Coastal Council; SEQ 2021; Qld EPA; Coastcare NSW; CSIRO Land and Water; Crescent Head Residents and Ratepayers Association; Crescent Head Malibu Club; Tuross Estuary/Coila Lake Management Committee; Landcare and Catchment Management Groups in south-east Queensland; Clyde River Shellfish Growers Association; WBM Engineering and Environmental Consultants; Surfrider Foundation; Marine Discovery Centre, Bondi Beach; Spirit of Surfing Foundation; Universities: Griffith University; The University of Qld; Central Qld University; The Australian National University; Macquarie University.

In conjunction with the CRC for Catchment Hydrology, James Whelan organised a symposium series entitled ‘Respect, Reflect, React’ in Brisbane, Canberra, Mel-
bourne and Emerald. Speakers and facilitators included Tim Smith, James Whelan, postgraduate students Dana Thomsen, Margaret Gooch and Peter Oliver, and agency representatives from each of the four areas. The series attracted 150 participants from government agencies, research institutions and community groups.

In May 2003, the Coastal CRC conducted a workshop for the Earthwatch Institute. The workshop was entitled ‘Integrating Science and Communities’ and covered a range of issues including community involvement in scientific research, the role of non-government organisations (NGOs), understanding volunteerism, partnerships, social learning, community engagement in decision-making and measuring and monitoring.

International visits

The Coastal CRC encourages research staff and students to travel overseas to present their work and establish international collaboration in their research area. A number of scientists travelled overseas to present at international conferences. They included:

Dr Jenny Stauber visited Environment Canada to discuss latest research on algal-metal interactions, contaminant toxicity and bioassays. She attended the Society for Environmental Toxicology and Chemistry (SETAC) conference in Texas, USA, where she presented research on how water quality parameters affect the toxicity of metals to microalgae. She was part of an expert committee for the Organisation for Economic Cooperation and Development (OECD) to revise toxicity test methods for algae and duckweed (in Washington DC, USA) and visited Bulgaria as a member of WHO’s 11th Final Review Board for risk assessment of chemicals, part of their international program on chemical safety. As President of the Australasian Society for Ecotoxicology (ASE), she attended the joint ASE/SETAC Asia Pacific conference in New Zealand, where she presented work on contaminant and toxicity monitoring of Sydney Olympic Park.

Citizen science researchers James Whelan and Peter Oliver presented at the International Sustainable Development Research Conference in the UK, and established links with Friends of the Earth (England and Scotland), Dr Jim Crowther from the Department of Community Education at University of Edinburgh, Stephen Midgley and Manson Wright from the Scottish Executive and the Scottish Coastal Forum; Tim Chapple, CEO of the Thames Estuary Partnership; and Dr Laurence Cox, a researcher on the sociology of social movements at the National University of Ireland.

Vicky Vicente-Beckett of the School of Chemical & Bio-medical Sciences at Central Queensland University, visited staff at the Department of Environmental Engineering University of Delaware and the College of Marine Science, USA, to share information on the fate and bioavailability of metals in aquatic environments. She collaborated with Professor George Luther (Lewes Campus) on the electrochemistry of metal sulfides in deep marine sediments. These meetings assisted her involvement in the contaminant assessment projects at Port Curtis.

International links

Linkages were made with a number of international organisations to organise the 2nd Coastal Zone Asia Pacific conference for September 2004 in Brisbane. An international planning team, with representatives from the Coastal Development Centre in Thailand, New Zealand Coastal Society, Hawaii University and South Pacific Environment Program assisted the conveners, Don Alcock (CRC) and Tim Smith (CSIRO) to plan the conference program. More than 260 delegates will attend the conference, many from developing countries in the region. The International Oceanographic Committee will assist, fund and support the conference in 2006.

The Coastal CRC continued its relationship with the International Geosphere-Biosphere Program: Land-Ocean Interactions in the Coastal Zone (LOICZ). The project is in its second phase (2003-2012) and has the mandate to enhance collaborative and interdisciplinary research of global coastal change in the Earth system and its human
dimensions. An application was made to the Department of Education, Science and Training (DEST) to host a regional LOICZ node for Australasia to improve integration and quality of outcomes directly relevant to regional situations (targeted at both scientists and science-user communities), while providing in return an operational interface to the global network of scientific peers. While the application was unsuccessful, discussions continued between the CRC and The University of Queensland to support a technical exchange program in the region.

Collaboration with other research groups

The Coastal CRC was involved with the following organisations for joint research, training and communication activities:

1. National

Commonwealth Government

- Australian Institute of Marine Science
- Bureau of Meteorology
- Department of Agriculture, Forestry and Fisheries
- Defence Science and Technology Organisation
- Environment Australia

- Geoscience Australia
- Great Barrier Reef Marine Park Authority
- Land and Water Australia
- National Oceans Office

Australian universities

- Australian National University
- Central Queensland University
- Curtin University of Technology
- Griffith University
- James Cook University
- Murdoch University
- Southern Cross University
- Sunshine Coast University
- The University of Queensland
- The University of Western Australia
- University of Newcastle
- University of New South Wales

CRC and Australian research organisations

- Centre for Research on the Ecological Impacts of Coastal Cities
- CSIRO Atmospheric Research
- CSIRO Land and Water
- CSIRO Marine Research

- CSIRO Mathematical and Information Sciences
- CRC for Catchment Hydrology
- CRC for Freshwater Ecology
- CRC for Sustainable Tourism
- CRC for Tropical Rainforest Ecology and Management
- CRC for Water Quality and Treatment Inc
- CRC Reef Research Centre
- Fisheries Research and Development Corporation

State Government

Queensland

- Department of Innovation and Information Economy
- Department of Local Government and Planning
- Department of Natural Resources and Mines
- Department of Primary Industries and Fisheries
- Department of State Development
- Environmental Protection Agency
- Rockhampton Port Authority

New South Wales

- Department of Infrastructure, Planning and Natural Resources (DIPNR)
- Department of Land and Water Conservation
- Environmental Protection Agency
- Marine Parks Authority
Victoria
- Central Coastal Board, Port Phillip and Western Port Catchment Management Authority
- Department of Sustainability and Environment
- Environmental Protection Agency
- Melbourne Water
- Parks Victoria

Western Australia
- Department of Conservation and Land Management
- Department of Fisheries
- Water and Rivers Commission

Tasmania
- Department of Primary Industries, Water and Environment

Local Government
- Brisbane City Council
- Caboolture Shire Council
- Calliope Shire Council
- Douglas Shire Council
- Gladstone City Council
- Gold Coast City Council
- Ipswich City Council
- Livingstone Shire Council

- Noosa Shire Council
- Redland Shire Council
- Rockhampton City Council

Community organisations
- Australian Marine Conservation Society
- Australian Marine Sciences Association
- Barker Inlet Port Estuary Committee
- Bremer Catchment Association
- Central Coastal Board, Victoria
- Coastcare Australia
- Cockburn Sound Management Council
- Darumbal-Noolar Murree Aboriginal Corporation
- Fitzroy Basin Association
- Fitzroy Basin Elders’ Committee
- Glenelg Hopkins Catchment Management Authority
- Great Barrier Reef Marine Park Management Advisory Committee (Port Curtis)
- Lake Macquarie Project Management Committee
- Moreton Bay Waterways and Catchments Partnership
- Natural Resource Management SEQ
- NSW Coastal Council
- Queensland Conservation Council

- Sunfish Queensland
- Victorian Coastal Council
- Waterwatch Queensland
- Western Australia Maritime Museum
- Western Catchments Group Inc
- World Wide Fund for Nature
- Yarrahapinni Wetlands Reserve Trust

Private companies and industry associations
- ACIL Tasman
- Advanced Analytical Australia Pty Ltd
- AgForce
- Aldoga
- Association of Australian Ports and Marine Authorities
- Brisbane Airport Corporation
- Brisbane Water
- Canegrowers
- Cotton Australia
- DA Lord & Associates Pty Ltd
- Fremantle Ports
- Fugro Survey Pty Ltd
- Georeality Pty Ltd
- Metocean Engineers Pty Ltd
2. Overseas

Government agencies
- Environment Canada
- Ministry of Coasts and Small Islands, Indonesia
- US Army Corps of Engineers (Coastal Engineering Research Centre)
- US Department of Agriculture
- US EPA

International organisations and programs
- Coral Reef Management and Planning Program, Indonesia
- Eastern Europe Regional Environment Council
- Institute of Hydro Engineering, Polish Academy of Sciences
- International Geosphere-Biosphere Program: Land-Ocean Interactions in the Coastal Zone
- IUCN: The World Conservation Union
- South Pacific Regional Environment Programme, Samoa
- United Nations Environment Programme
- Western Indian Ocean Marine Science Association

Universities and research institutions
- Coastal Development Centre, Kasetsart University, Thailand
- Delft Hydraulics Laboratory, The Netherlands
- European Space Agency
- Institute for Environmental Studies, Amsterdam Free University
- National Space and Aeronautical Agency, USA
- National Institute of Water and Atmospheric Research, New Zealand
- San Francisco Estuary Institute, USA
- University of British Columbia, Canada
- University of Georgia, USA
- University of Hong Kong
- University of Maryland, USA
- University of Newcastle, United Kingdom
- University of South Pacific, Fiji
- University of Stockholm, Sweden
- Virginia Institute of Marine Sciences, USA
- Vrije Universiteit, The Netherlands
- Woods Hole Oceanographic Institute, USA
In 2003-04, approximately 271 people were involved in Centre activities, including 60 positions funded at least partially by the CRC, and 37 postgraduate students and associates.

July 2003 saw the commencement of phase two projects under a new matrix management structure, with projects primarily organised around integrated regional delivery with ‘packages’ developed around issues to ensure integration of quality science.

It also signalled the commencement of the CRC’s successful supplementary program, with significant new staff and scholarship appointments and capital equipment purchases. The annual staff retreat remains the most critical event each year in both integrating and motivating research outputs.

The CRC continues to exceed operational targets for revenue and project delivery.
<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
<th>% of total working time in CRC</th>
<th>Major role in Centre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr Roger Shaw</td>
<td>Department of Natural Resources, Mines and Energy</td>
<td>100%</td>
<td>CEO of the Centre to September 03, consultant to July 04</td>
</tr>
<tr>
<td>Dr Rob Fearon</td>
<td>Coastal Zone Australia Ltd</td>
<td>100%</td>
<td>Science Leader to September 03, CEO to June 04</td>
</tr>
<tr>
<td>Dr Paul Lawrence</td>
<td>Department of Natural Resources, Mines and Energy</td>
<td>40%</td>
<td>Theme Leader Decision Frameworks</td>
</tr>
<tr>
<td>Dr Tim Smith to September 03, Dr James Whelan to June 04</td>
<td>Griffith University</td>
<td>40%</td>
<td>Theme Leader Citizen Science and Education</td>
</tr>
<tr>
<td>Prof Rodger Tomlinson</td>
<td>Griffith University</td>
<td>30%</td>
<td>Theme Leader Management and Restoration</td>
</tr>
<tr>
<td>Dr Peter Gehrke</td>
<td>CSIRO Land and Water</td>
<td>20%</td>
<td>Theme Leader Ecosystem Processes</td>
</tr>
<tr>
<td>Dr Ron Johnstone</td>
<td>The University of Queensland</td>
<td>30%</td>
<td>Theme Leader Assessment and Monitoring</td>
</tr>
<tr>
<td>Dr Regina Counihan</td>
<td>Coastal Zone Australia Ltd</td>
<td>100%</td>
<td>Project Manager Science to Enable Adaptive management for Sustainability, National Management Study to September 03, Science Leader to June 04</td>
</tr>
<tr>
<td>Ms Maria Vandergragt</td>
<td>Central Queensland University</td>
<td>100%</td>
<td>Industrial and Urban Study Project Manager</td>
</tr>
<tr>
<td>Mr Bob Noble</td>
<td>Department of Natural Resources, Mines and Energy</td>
<td>66%</td>
<td>Agricultural Study Project Manager</td>
</tr>
<tr>
<td>Prof John Penrose</td>
<td>Coastal Zone Australia Ltd</td>
<td>50%</td>
<td>Project Manager Coastal Water Habitat Mapping</td>
</tr>
</tbody>
</table>
Books and chapters


Reports


ary. CRC for Coastal Zone, Estuary & Waterway Management, Brisbane.


Publications and patents

Coastal CRC


Refereed journal articles


Breitfuss, M.J., Connolly, R.M. and Dale, P.E.R. (2004). Densities and aperture sizes of burrows constructed by Helograpsus haswellianus (Decapoda: Varu-


Conference papers


The objectives of the Centre’s communication strategy are as follows:

- Facilitate interactive communication with key CRC stakeholders and, in particular, ensure the research processes and results are used by stakeholder and interest groups.
- Ensure that staff, students and partner organisations in the CRC are aware of plans, activities, results and outcomes.
- Promote a distinctive and positive image for the Coastal CRC and national CRC Program through various products and services in conjunction with partner and associate organisations.
- Enhance organisational partnerships, use and application of our research, and links with information users.

Activities during the year included:

**Stakeholder communication**

The monthly e-newsletter, Flotsam and Jetsam, continued to inform CRC staff, students and other stakeholders about CRC research projects, coastal zone issues, research, events, conferences and training opportunities in Australia and overseas. More than 1200 people receive the newsletter, which has an estimated total readership of over 2000.

A National Estuary Network continued to provide an opportunity for State and Territory estuary managers to contribute and share data and information on Coastal CRC projects. The network met twice during the year to discuss national coastal issues and technical links.

The third phase of the Central Queensland Healthy Waterways television campaign was planned with stakeholders to show how science, management and community action are helping to keep catchments and waterways healthy. Sponsors include the Coastal CRC, Fitzroy Basin Association, Rockhampton City Council, Livingstone Shire Council, Mornish Landcare Group and the Great Barrier Reef Marine Park Authority. Twelve new 60-second information segments will be broadcast throughout the region on WIN Television in 2004.

**Internal communication**

An annual Coastal CRC staff workshop was held at Greenmount Resort, Coolangatta, attended by more than 120 staff and students who presented progress reports, integrated projects and developed closer linkages with other researchers and stakeholder groups. Information posters were produced by task leaders and students.
A reference booklet was given out to staff and students at the annual workshop to provide information and administrative guidelines on postgraduate studies, project management, study areas, project milestones, publications, intellectual property and a contact list.

A large number of workshops, project team meetings, seminars, half-yearly milestone reports, annual project reviews and informal meetings were held or produced by staff, students and stakeholders throughout the year. The milestone reports were made available to project leaders, executive staff, stakeholder advisory committee members and Board members.

Communication planning workshops were conducted with several project teams and communication plans were developed for all new projects and milestone reporting.

Executive management group meetings were held monthly for theme leaders and management study area coordinators to plan events, review progress, consider new projects and discuss issues of strategic importance.

Email news groups were used extensively to selected staff, project leaders, postgraduate students, executive members and stakeholders to keep in regular contact and advise of upcoming events, seminar invitations and data sharing.

## External communication

The website was revised to improve its design and content about coastal research information, links to related organisations and regular news updates. The Coastal CRC continuing to work with Surfrider Foundation Australia to develop a database for the human impacts on Australian beaches project. The project is one of Surfrider’s core research and education projects designed to raise awareness of issues affecting Australian beaches, and provide recommendations to help mitigate impacts and better manage beach environments.

Information about CRC research achievements since 2000 was sent to most Australian State and Federal Members of Parliament. A list of how the Coastal CRC has contributed to coastal planning and ecosystem health in many areas was acknowledged in writing by more than 60 MPs, with many praising the CRC’s efforts for its national scientific, training and networking services.

An online bibliography of scientific publications and reports was developed at: [www.coastal.crc.org.au/Publications/index.asp](http://www.coastal.crc.org.au/Publications/index.asp). The list includes 300 papers produced by researchers and postgraduate students since 2000. Many publication references have abstracts, online links and complete papers in PDF format. They are searchable by keyword or author surname.

A media skills workshop was conducted for 12 staff and students at the annual workshop. The training led to the publication of a number of research stories in several media outlets.

A corporate display was produced to promote the Coastal CRC and its research. Eight major displays were organised:

- CRC stakeholder workshop in Port Curtis (July 2003)
- Coastal CRC staff workshop in Coolangatta (September 2003)
- International Riversymposium in Brisbane (September 2003)
- CRC stakeholder workshop in Rockhampton (October 2003)
- Shallow Water Survey conference in Sydney (November 2003)
- Launch of the Coastal Water Habitat Mapping project in Perth (December 2003)
- Coast to Coast national conference in Hobart (April 2004)
- Cooperative Research Centres Association conference in Adelaide (June 2004)

The Coastal CRC sponsored the 2004 Healthy Waterways science award in south-east Queensland that recognises excellence in applied research by an organisation or individual. Coastal CRC Research Award ($1,500) was
won jointly by the University of Sunshine Coast and Griffith University (Gold Coast) who collaborated to research the effects of brown water river plumes on near-shore ecosystems in south-east Queensland.

**Book launch**

A major book on Australia’s estuaries was launched. *Where River Meets Sea: Exploring Australia’s Estuaries*, describes the value and status of Australia’s 974 estuaries. It covers their health, geography, science, management and ecological functions – from isolated tide-dominated estuaries in Australia’s tropical north to those shaped by waves in southern, temperate waters. There is a report for each State, chapters about how people use and value coastal catchments and waterways, the impacts of human development on natural ecosystems, and how estuaries can be better managed in future. This book was compiled by leading coastal researchers, managers and educators from around Australia.

**Media publicity**

More than 20 media releases were distributed. Major news media stories included:

- Assessing effectiveness of Moreton Bay’s marine reserves
- Floating sensor to measure Fitzroy River turbidity
- Integrated science helps Fitzroy River managers
- CRC sonar technology images of Sydney Harbour
- Launch of updated OzEstuaries database
- Timeline to tracks fisheries’ history in Queensland
- Economic value of Australia’s estuary services
- Habitat maps of Port Curtis wetlands

Media publicity generated by the Coastal CRC, listed below, shows an analysis of coverage in newspapers, radio stations, television stations and magazines compared to the past four years (in brackets).

<table>
<thead>
<tr>
<th>Regional media</th>
<th>State and national media</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Print</strong></td>
<td><strong>Print</strong></td>
</tr>
<tr>
<td>22 (28) (17) (15) (10)</td>
<td>9 (12) (7) (14) (6)</td>
</tr>
<tr>
<td><strong>Radio</strong></td>
<td><strong>Radio</strong></td>
</tr>
<tr>
<td>18 (28) (14) (36) (9)</td>
<td>6 (5) (4) (9) (8)</td>
</tr>
<tr>
<td><strong>Television</strong></td>
<td><strong>Television</strong></td>
</tr>
<tr>
<td>14 (11) (17) (7) (4)</td>
<td>11 (9) (8) (21) (11)</td>
</tr>
<tr>
<td><strong>Magazines</strong></td>
<td><strong>Magazines</strong></td>
</tr>
<tr>
<td>2 (4) (4) (4) (5)</td>
<td>14 (10) (9) (10) (6)</td>
</tr>
</tbody>
</table>

**Future activities:**

- implement communication plans and products for research packages
- continue local sponsorship and produce new information segments for the Central Queensland Healthy Waterways media campaign
- ensure all technical reports and scientific papers are available for easy online access at the Coastal CRC website
- host the international Coastal Zone Asia Pacific conference in September 2004.
List of presentations

Stakeholder – Government presentations

<table>
<thead>
<tr>
<th>Date</th>
<th>Who</th>
<th>Title/Event</th>
<th>Audience/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>03/07/03</td>
<td>Rob Fearon</td>
<td>Law and policy lecture</td>
<td>The University of Queensland</td>
</tr>
<tr>
<td>03/07/03</td>
<td>Rob Fearon</td>
<td>Wetlands management</td>
<td>Brisbane Airport</td>
</tr>
<tr>
<td>12/07/03</td>
<td>Jenny Stauber</td>
<td>Risk assessment of contaminants in Port Curtis</td>
<td>Coastal stakeholders, Gladstone</td>
</tr>
<tr>
<td>18/07/03</td>
<td>Rob Fearon</td>
<td>SEQ project advisory group meeting</td>
<td>SEQ project advisory group</td>
</tr>
<tr>
<td>21/07/03</td>
<td>Rob Fearon</td>
<td>Lecture on environmental law</td>
<td>The University of Queensland Stradbrooke Island Research Station</td>
</tr>
<tr>
<td>25/07/03</td>
<td>Rob Fearon</td>
<td>Environmental aspects of NRM groups</td>
<td>NRMSEQ</td>
</tr>
<tr>
<td>27/07/03</td>
<td>Andy Bickers</td>
<td>Marine habitat mapping</td>
<td>NSW Marine Parks Authority staff</td>
</tr>
<tr>
<td>29/07/03</td>
<td>Roger Shaw</td>
<td>Landscapes in equilibria: Managing for resilience</td>
<td>Keynote address to the Main Roads Conference, Toowoomba</td>
</tr>
<tr>
<td>04/08/03</td>
<td>Rob Fearon</td>
<td>Proposed CRC rebid options</td>
<td>Fitzroy Basin Association, Rockhampton</td>
</tr>
<tr>
<td>08/08/03</td>
<td>Rob Fearon</td>
<td>Process of Bremer Study</td>
<td>Scientific Expert Panel, Brisbane</td>
</tr>
<tr>
<td>11/08/03</td>
<td>Arnold Dekker</td>
<td>Earth observation for aquaculture: detection, monitoring and warning</td>
<td>SARDI-Aquatic Sciences, Adelaide</td>
</tr>
<tr>
<td>20/08/03</td>
<td>Rob Fearon</td>
<td>Briefing on CRC research to politicians</td>
<td>Brisbane Science in Parliament</td>
</tr>
<tr>
<td>02/09/03</td>
<td>Rob Fearon</td>
<td>Bremer project development</td>
<td>Bremer steering committee, Brisbane</td>
</tr>
<tr>
<td>Date</td>
<td>Who</td>
<td>Title/Event</td>
<td>Audience/Location</td>
</tr>
<tr>
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</tr>
<tr>
<td>11/09/03</td>
<td>Rob Fearon</td>
<td>Bremer River catchment report</td>
<td>Industry and Ipswich City Council, Ipswich</td>
</tr>
<tr>
<td>12/09/03</td>
<td>Chris Marshall</td>
<td>Aquatic Ecosystem Health and Water Resources Planning</td>
<td>QDPIF, QEPA and QNR&amp;M staff</td>
</tr>
<tr>
<td>15/09/03</td>
<td>Ian Halliday</td>
<td>Freshwater flows in estuarine fisheries production</td>
<td>Water policy, planning and management &amp; fisheries stakeholders</td>
</tr>
<tr>
<td>15-19/09/03</td>
<td>Rob Fearon</td>
<td>NSAC and annual workshop</td>
<td>Coolangatta, Gold Coast</td>
</tr>
<tr>
<td>21/09/03</td>
<td>Andy Bickers</td>
<td>Marine habitat mapping</td>
<td>NSW Marine Parks staff, Byron Bay</td>
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<tr>
<td>23/09/03</td>
<td>Rob Fearon</td>
<td>NRMSEQ Plan development</td>
<td>Ipswich</td>
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<tr>
<td>01/10/03</td>
<td>Rob Fearon</td>
<td>Remote sensing in Coastal CRC</td>
<td>The University of Queensland</td>
</tr>
<tr>
<td>01/10/03</td>
<td>Ian Webster</td>
<td>Coastal Modelling (CM-2)</td>
<td>Fitzroy stakeholder workshop, Rockhampton</td>
</tr>
<tr>
<td>01/10/03</td>
<td>Ian Webster</td>
<td>Coastal Modelling (CM-2)</td>
<td>Fitzroy stakeholder workshop, Yeppoon</td>
</tr>
<tr>
<td>03/10/03</td>
<td>Rod Connolly and Maria Vandergragt</td>
<td>Intertidal wetlands at The Narrows, Port Curtis</td>
<td>Southern Pacific Petroleum, Gladstone</td>
</tr>
<tr>
<td>15/10/03</td>
<td>Rob Fearon</td>
<td>CRC activities to Logan City Council staff</td>
<td>Logan City Council</td>
</tr>
<tr>
<td>20/10/03</td>
<td>John Bennett</td>
<td>Enabling adaptive management</td>
<td>Citizen science workshop, Griffith University</td>
</tr>
<tr>
<td>25/10/03</td>
<td>Chris Marshall</td>
<td>Monitoring environmental flows</td>
<td>Australia New Guinea Fishes Association, National Convention, Brisbane.</td>
</tr>
<tr>
<td>28/10/03</td>
<td>Chris Marshall</td>
<td>Monitoring ecological outcomes of the Fitzroy Basin Water Resource Plan</td>
<td>Stakeholders workshop and public forum, Yeppoon</td>
</tr>
<tr>
<td>Date</td>
<td>Who</td>
<td>Title/Event</td>
<td>Audience/Location</td>
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<tr>
<td>28/10/03</td>
<td>Rob Fearon</td>
<td>CRC activities to Fitzroy stakeholders</td>
<td>Yeppoon</td>
</tr>
<tr>
<td>29/10/03</td>
<td>Steve Mullins</td>
<td>Shifting sands: remembering seascapes, and learning to live in coastal communities</td>
<td>Faculty of Arts, Health and Sciences, CQU, Rockhampton</td>
</tr>
<tr>
<td>31/10/03</td>
<td>Regina Counihan</td>
<td>Western Port Launch</td>
<td>Western Port, Victoria</td>
</tr>
<tr>
<td>04/11/03</td>
<td>Rob Fearon</td>
<td>Brief CEOs and Chairs of CRCCH and CRCFE on rebid plans</td>
<td>Sydney</td>
</tr>
<tr>
<td>06/11/03</td>
<td>Arnold Dekker, Vittorio Brando, Janet Anstee, Alan Marks, Guy Byrne, Paul Daniel</td>
<td>Hyperspectral Airborne and Satellite Remote Sensing for Detection and Mapping of Water Column and Benthic Optical Properties</td>
<td>EHMP-SEP meeting, Brisbane and AIMS, Townsville</td>
</tr>
<tr>
<td>06/11/03</td>
<td>Arnold Dekker</td>
<td>Remote sensing for natural resource management</td>
<td>NSW Coastal Conference, Port Macquarie</td>
</tr>
<tr>
<td>08/11/03</td>
<td>Arnold Dekker</td>
<td>Spatially Comprehensive Products for Moreton Bay</td>
<td>National Estuaries Network meeting, Hobart</td>
</tr>
<tr>
<td>10/11/03</td>
<td>Rob Fearon</td>
<td>Brief QFF and QFVG (GrowCom) on Property Planning research</td>
<td>Brisbane</td>
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<tr>
<td>11/11/03</td>
<td>Rob Fearon</td>
<td>Brief WA DPI staff on rebid activity</td>
<td>Perth</td>
</tr>
<tr>
<td>12/11/03</td>
<td>Rob Fearon</td>
<td>Brief to WA stakeholders about rebid proposal</td>
<td>Perth</td>
</tr>
<tr>
<td>15/11/03</td>
<td>Lynda Radke</td>
<td>Near Pristine Estuaries Project</td>
<td>National Estuaries Network Meeting, Hobart</td>
</tr>
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<td>26/11/03</td>
<td>Rod Connolly</td>
<td>Intertidal wetlands in Port Curtis</td>
<td>QEPA staff, Gladstone</td>
</tr>
<tr>
<td>26/11/03</td>
<td>Leonie Andersen</td>
<td>Contaminant assessment of Port Curtis</td>
<td>QEPA staff and local industry, Gladstone</td>
</tr>
<tr>
<td>26/11/03</td>
<td>Rob Fearon</td>
<td>Brief Water Quality Reef Advisory Committee of rebid activities to</td>
<td>Townsville</td>
</tr>
<tr>
<td>Date</td>
<td>Who</td>
<td>Title/Event</td>
<td>Audience/Location</td>
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</tr>
<tr>
<td>27/11/03</td>
<td>Rob Fearon</td>
<td>Presentation to stakeholders on rebid directions</td>
<td>Melbourne</td>
</tr>
<tr>
<td>01/12/03</td>
<td>Rob Fearon</td>
<td>Presentation to CEOs of 5 CRCs and Qld stakeholders on progress and rebid activity</td>
<td>Brisbane</td>
</tr>
<tr>
<td>02/12/03</td>
<td>John Bennett</td>
<td>Adaptive management community engagement</td>
<td>QEPA staff seminar, Brisbane</td>
</tr>
<tr>
<td>08/12/03</td>
<td>Jackie Robinson and Rachel Mackenzie</td>
<td>Sustainable Land Management and Wetlands Conservation</td>
<td>DEH technical workshop, Townsville</td>
</tr>
<tr>
<td>11/12/03</td>
<td>Rob Fearon</td>
<td>Presentation to industry partners on rebid progress</td>
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<td>07/01/04</td>
<td>Rob Fearon</td>
<td>Brief QEPA staff on CRC activities</td>
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<tr>
<td>13/01/04</td>
<td>Rob Fearon</td>
<td>Brief EO, Western Catchments Group on Property Level Planning</td>
<td>Ipswich</td>
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<td>22/01/04</td>
<td>Rob Fearon</td>
<td>Bremer River audit outcomes</td>
<td>Ipswich</td>
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<td>30/01/04</td>
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<td>Property Level Planning for industry, community and government stakeholders</td>
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<td>CRC rebid activities for SEQ science support group</td>
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<td>Rob Fearon</td>
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<td>Melbourne</td>
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<td>Rob Fearon</td>
<td>Recommendations on future research for Bremer River, SEQ Scientific Expert Panel</td>
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<td>16/02/04</td>
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<td>Brief UDIA on rebid activities</td>
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<td>Rob Fearon</td>
<td>Presentation on CRC outcomes to NRMSEQ staff</td>
<td>Brisbane</td>
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<td>Date</td>
<td>Who</td>
<td>Title/Event</td>
<td>Audience/Location</td>
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<td>Jurek Piorewicz</td>
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<td>Livingstone Shire Council</td>
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<td>Causeway Lake sedimentation</td>
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<td>08/03/04</td>
<td>Arnold Dekker and Vittorio Brando</td>
<td>Large scale monitoring of water quality from river to ocean across the Great Barrier Reef.</td>
<td>GBRMPA managers, Townsville</td>
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<td>12/03/04</td>
<td>Rob Fearon</td>
<td>Update Water Quality Reef Advisory Committee on CRC rebid</td>
<td>Townsville</td>
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<td>28/04/04</td>
<td>Chris Marshall</td>
<td>Can we understand flow requirements for biological community-level responses?</td>
<td>QNR&amp;M staff review of aquatic science quality</td>
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<td>28/04/04</td>
<td>Rachel Mackenzie</td>
<td>Citizen Science toolbox</td>
<td>Rio Tinto staff - Gladstone</td>
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<td>04/05/04</td>
<td>John Penrose</td>
<td>The Coastal Zone CRC</td>
<td>Curtin University</td>
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<td>07/05/04</td>
<td>Jacqueline Balston</td>
<td>Climate impacts on the barramundi fishery</td>
<td>Gulf MAC Meeting</td>
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<td>12/05/04</td>
<td>Rob Fearon</td>
<td>Property Level Planning developments</td>
<td>Brisbane</td>
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<td>20/05/04</td>
<td>Marcus Sheaves</td>
<td>Flood plain wetland research directions</td>
<td>QEPA staff, Brisbane</td>
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<td>20/05/04</td>
<td>Rachel Mackenzie, Marcus Sheaves, Rod Connolly and Karen Danaher</td>
<td>Wetlands research</td>
<td>QEPA staff, Brisbane</td>
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<td>23/05/04</td>
<td>Jackie Robinson and Rachel Mackenzie</td>
<td>Sustainable Land Management and Wetlands Conservation</td>
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<td>27/05/04</td>
<td>John Penrose</td>
<td>Coastal Water Habitat Mapping in the Coastal Zone CRC</td>
<td>The University of New Hampshire, Durham</td>
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<td>27-28/05/04</td>
<td>James Whelan</td>
<td>Is there true potential for community engagement?</td>
<td>National Conference of the International Association for Public Participation, Brisbane.</td>
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<td>09/06/04</td>
<td>Rob Fearon</td>
<td>Public Good Valuations of CRC Research – CRCA conference</td>
<td>Adelaide</td>
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<td>10/06/04</td>
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<td>Property level planning</td>
<td>Regional NRM group collective – Brisbane</td>
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<td>Coastal CRC activities for Barker Inlet Port Estuary Committee</td>
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<td>18/06/04</td>
<td>Julie Anorov</td>
<td>Acid Sulfate Soils: Formation, Identification, Sampling &amp; Analysis</td>
<td>Australian National University, Canberra</td>
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<td>22/06/04</td>
<td>Ian Ramsay and Tony Howes</td>
<td>3M project workshop</td>
<td>The University of Queensland</td>
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<td>24/06/04</td>
<td>Roger Shaw</td>
<td>Convergent decision making: Multi-objective prioritisation of proposed actions</td>
<td>Board of NRMSEQ, Brisbane</td>
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<tr>
<td>25/06/04</td>
<td>Lynda Radke and Emma Murray</td>
<td>Near Pristine Estuaries Project</td>
<td>National Estuaries Network Meeting, Lennox Heads</td>
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<tr>
<td>25/06/04</td>
<td>Arnold Dekker</td>
<td>Large scale monitoring of water quality from river to ocean across the Great Barrier Reef</td>
<td>CRC National Estuaries Network meeting, Ballina</td>
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<td>30/06/04</td>
<td>John Penrose</td>
<td>Developments in Benthic Habitat Mapping using Acoustics</td>
<td>Marine Conservation Branch, WA Dept of Conservation and Land Management, Perth</td>
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### Seminars and workshop presentations

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<tr>
<th>Date</th>
<th>Speaker(s)</th>
<th>Topic</th>
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<tr>
<td>03/11/03</td>
<td>Lynda Radke</td>
<td>Near Pristine Estuaries Project</td>
<td>National Estuaries Network Meeting, Hobart</td>
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<tr>
<td>01/12/03</td>
<td>Andrew Bickers</td>
<td>Marine habitat mapping using sidescan sonar and video</td>
<td>Shallow Survey, Sydney</td>
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<tr>
<td>06/01/04</td>
<td>Vicky Vicente-Beckett</td>
<td>Screening Risk Assessment of Contaminants in Port Curtis</td>
<td>Uni Delaware – College of Marine Science, USA</td>
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<tr>
<td>01/02/04</td>
<td>Ian Webster</td>
<td>Biogeochemistry and primary production in Australian tropical estuaries</td>
<td>Tropical Rivers Forum, Darwin</td>
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<tr>
<td>02/02/04</td>
<td>Emma Murray</td>
<td><a href="http://www.ozestuaries.org">www.ozestuaries.org</a> - a potential resource for managing tropical estuaries</td>
<td>Sustainable Futures for Australia's Tropical Rivers, Charles Darwin University, Darwin</td>
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<tr>
<td>02/02/04</td>
<td>Emma Murray and Brendan Brooke</td>
<td>Knowledge for the protective management of Australia's near-pristine tropical estuaries</td>
<td>Sustainable Futures for Australia's Tropical Rivers, Charles Darwin University, Darwin</td>
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<tr>
<td>01/03/04</td>
<td>Ian Webster</td>
<td>Estimating nutrient budgets in tropical estuaries subject to episodic flows</td>
<td>Catchment to Reef Conference, Townsville</td>
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<td>04/04/04</td>
<td>David Pullar</td>
<td>Location-based intelligence for environmental impact assessments</td>
<td>Australian Geographers Conference, Adelaide</td>
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<tr>
<td>01/05/04</td>
<td>Andrew Bickers</td>
<td>Marine habitat mapping using sidescan sonar and video with examples from Byron Bay</td>
<td>GeoHab Conference, Galway, Ireland</td>
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<td>01/06/04</td>
<td>Ian Webster</td>
<td>Biogeochemistry and primary production in Australian tropical estuaries</td>
<td>ECSA 37-ERF 2004 Conference, Ballina</td>
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<td>22/06/04</td>
<td>Lynda Radke</td>
<td>Trends in sediment and water quality in relation to riverine sediment loads to estuaries in south Western Australia</td>
<td>Estuaries and Change, ECSA 37-ERF Conference, Ballina</td>
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<td>22/06/04</td>
<td>Andrew Heap</td>
<td>Habitat variability of a large number of near pristine coastal waterways and associated management</td>
<td>Estuaries and Change, ECSA 37-ERF Conference, Ballina</td>
</tr>
<tr>
<td>25/06/04</td>
<td>Lynda Radke and Emma Murray</td>
<td>Near Pristine Estuaries Project</td>
<td>National Estuaries Network Meeting, Lennox Heads</td>
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</tbody>
</table>
Dr Heather Hunter, Principal Scientist for the Queensland Department of Natural Resources, Mines and Energy, was awarded an Australian Day Achievement Medallion by DNR&M.

Environmental engineering PhD student Linda Cobiac was highly commended in the 2004 Queensland Smart Women – Smart State awards. Linda also received a travel scholarship to attend a ‘Youth Encounter on Sustainability’ leadership course in Switzerland (August 2003). Her airfare, transportation, accommodation and tuition were provided by the AGS Summer Institute on Global Sustainability.

The Environmental Planning for south-east Queensland project was awarded a ‘Planning Scholarship, Research or Teaching’ merit award by the 2003 Planning Institute of Australia.

Annual CRC awards

Each year, the Coastal CRC recognises some of the best of its projects in a range of categories. The 2003 Coastal CRC Shield overall winner was awarded to the OzEstuaries project. Winners of other categories, presented at the CRC staff workshop at Coolangatta, were:

**Teamwork, collaboration and synergy award** - Fitzroy Basin Information Paper. Staff included John Augusteyn, John Bennett, Jocelyn Bowden, Dave Cameron, Beth Clouston, Don Cook, Tara Cully, Rob Fearon, Mary-Anne Jones, Paul Jones, Paul Lawrence, Jimima LeGrand, Stewart Lockie, Bob Noble, Bob Packett, Paul Pinjuh, John Platten, Jackie Robinson, David Scheltinga, Roger Shaw, Jan Tilden, Jess Wallwork, Don Yule and Dave Gardiner.

**Future strategic issues award** - OzEstuaries project, led by Craig Smith (Geoscience Australia)

**Excellence in science award** - Coastal Modelling project, led by Ian Webster (CSIRO).

**Stakeholder Needs Award** - Citizen Science Toolbox, led by Tim Smith (Griffith University)

**Project Achievement Award** - Historic Coastlines project: Community Perspectives, led by Steve Mullins (Central Queensland University).

**CRC Corporate Award** - Paul Pinjuh (CRC)

**Innovation and Commercialisation Award** - Western Port integrated systems model of ecological processes, led by Regina Counihan (CRC).

**Student Award for High Achievement** - Luis Neumann (University of Queensland)

**Associate Student Award for High Achievement** - Bronwyn Powell (Griffith University)
**Poster Award** – Andrew Moss (Qld EPA), Melanie Cox (University of Qld) and David Scheltinga (CRC)

**Student Poster Award** – Andy Bickers (University of Western Australia)

**Grants**

The CRC did not apply for grants during this period other than the rebid application to the Federal CRC Program, which was unsuccessful. Funding from other consultancies, contracts and sponsorships is listed in Chapter 7.
Performance indicators

For performance indicator table click here
The Coastal CRC has had a considerable positive influence on Australia’s understanding and management of coastal areas, estuaries and waterways. It has produced a variety of planning tools, databases, planning guides, scientific publications, models and courses to help improve the ecosystem health of coastal areas. It has involved a vast network of scientists, managers, policy makers, students and stakeholder groups in its research, development and extension programs to address a range of social, environmental and economic issues. It has excelled in linking science with stakeholders and community groups, in particular, providing tools, training and support for participatory coastal research projects.

Given the goal of the Coastal CRC to bridge the gaps between science and science users, perhaps the best way to assess the Coastal CRC track record since 1999 is with testimonials by some of those who have benefited from our products and services.

Coastal management issues have not been studied and addressed adequately giving the importance of our coast to our community. This is starting to change through efforts by organisations such as yours, and I hope to see your work continue.

Gavin Jennings, MLC for Melbourne, Vic

...it is important that decision makers and the community have access to good quality science when developing management responses. It is apparent from the list of completed projects that the Coastal CRC has been an active and productive contributor to coastal zone management in Queensland, as well as nationally.

Peter Beattie, Premier of Queensland

The Environmental Protection Agency has enjoyed a productive partnership with the Coastal CRC and, as you know, committed to participation in the proposed rebid. The Queensland Government is concerned about the lack of ongoing Commonwealth Government support for public good CRCs and especially those focussed on coastal management, the Reef and rainforests.

Ross Macleod, Senior Policy Advisor, EPA, Qld

There are clearly a number of significant issues which need to be addressed with respect to the sustainable management of Australia’s coastal zones, including nutrient run-off, sedimentation, urban stormwater and sewage run off... I would take this opportunity to compliment the Coastal Cooperative Research Centre's initiatives in the development of environmental assessment tools, which undoubtedly enhance the effective capacity of those State, Territory and Local authorities responsible for the sustainable management of Australia’s coastal resources.

Davis Llewellyn, Minister for Health and Human Services, Tas
The CRC has been a leader in progressing understanding of the coastal process and the presentation of information to aid the resolution of natural resources issues as they arise.

Blair Wood, Executive Director, National Land and Water Resources Audit

The Coastal CRC has been a leader in facilitating wise use, understanding and protection of estuaries that support Australia’s main population centres. It coordinated a multi-disciplinary team from more than 20 organisations to develop conceptual and predictive models, produced the first ‘state of the environment report’ for estuaries, and created the highly commended ‘OzEstuaries’ database.

Colin Creighton, Director, CSIRO National Research Flagship, Water for a Healthy Country

The list of the CRC’s achievements since it began in 2000 is very impressive and should assist governments, industry and the broader community in ensuring the protection and sustainable use of our coastal zone.

Dr Judy Edwards MLA, Minister for the Environment, WA

The extent of work that the CRC has undertaken in a few short years is impressive and no doubt is already being used by a wide variety of stakeholders... I can see that there may be much that local researchers and environmental professionals can benefit from.

Rob Giles, Chief of Staff, Ministry of Planning and Infrastructure, WA

It is very clear that your organisation is doing important work. Thank you for your leadership in this area.

Sandra Kanck, MLC, Leader Australian Democrats SA

The work undertaken by the Coastal CRC in the development of a range of social, economic and environmental research and management tools is a valuable resource for local communities to protect and improve the environmental health of coastal catchments and waterways.

Peter Sutherland, Deputy Director General, Department of Infrastructure, Planning and Natural Resources, NSW

I just wanted to let you know that the OzEstuaries database is a fantastically useful resource and that I use it at least weekly. I hope it will continue to be updated and over time become an even more comprehensive resource than it already is.

David Dettrick, Senior Environmental Officer, Environment Division, Tas

OzEstuaries is fantastic! It could be used as a community information tool and be linked to sustainability web pages established by councils. The discussion and selection of indicators is also very interesting as the NSW PlanFirst review raises the need to establish and incorporate meaningful indicators into the planning process to monitor land use and environmental issues.

Sharon Cooper, Shoalhaven City Council, NSW

One of my mottos is not to reinvent the wheel so when we found the Citizen Science Toolbox, we knew that a whole section of our Effective Community Engagement : Workbook and Tools had already been developed! We really appreciate the willingness to share such a comprehensive resource and it saved our working group so much time. Practitioners are astounded by the smorgasbord of methods to explore.

Frankie MacLennan, Community Engagement Unit, Departments of Sustainability and Environment and Primary Industries, Vic
# Appendix 1 Glossary of abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>AIMS</td>
<td>Australian Institute for Marine Science</td>
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<tr>
<td>AMF</td>
<td>Adaptive Management Framework</td>
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<tr>
<td>ANU</td>
<td>Australian National University</td>
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<tr>
<td>BCC</td>
<td>Brisbane City Council</td>
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<tr>
<td>CQSS2</td>
<td>Central Queensland Strategy for Sustainability 2</td>
</tr>
<tr>
<td>CQU</td>
<td>Central Queensland University</td>
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<tr>
<td>CRC</td>
<td>Cooperative Research Centre</td>
</tr>
<tr>
<td>CRCCA</td>
<td>CRC Association</td>
</tr>
<tr>
<td>CRCCH</td>
<td>CRC for Catchment Hydrology</td>
</tr>
<tr>
<td>CRCFE</td>
<td>CRC for Freshwater Ecology</td>
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<tr>
<td>CSIRO</td>
<td>Commonwealth Scientific and Industrial Research Organisation</td>
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<tr>
<td>DEST</td>
<td>Department of Education Science and Training</td>
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<tr>
<td>DPI&amp;F</td>
<td>Department of Primary Industries and Fisheries, Queensland</td>
</tr>
<tr>
<td>DIPNR</td>
<td>Department of Infrastructure Planning and Natural Resources, New South Wales</td>
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<tr>
<td>DNR&amp;M</td>
<td>Department of Natural Resources and Mines, Queensland</td>
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<tr>
<td>DSTO</td>
<td>Defence Science and Technology Organisation</td>
</tr>
<tr>
<td>EHMP</td>
<td>Ecosystem Health Monitoring Program</td>
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<tr>
<td>EMG</td>
<td>Executive Management Group</td>
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<tr>
<td>FBA</td>
<td>Fitzroy Basin Association</td>
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<tr>
<td>FRDC</td>
<td>Fisheries Research and Development</td>
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<tr>
<td>GA</td>
<td>Geoscience Australia</td>
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<tr>
<td>GU</td>
<td>Griffith University</td>
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<tr>
<td>GBR</td>
<td>Great Barrier Reef</td>
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<tr>
<td>GBRMPA</td>
<td>Great Barrier Reef Marine Park Authority</td>
</tr>
<tr>
<td>J CU</td>
<td>James Cook University</td>
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<tr>
<td>LOICZ</td>
<td>Land - Ocean Interactions in the Coastal Zone</td>
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<td>MAC</td>
<td>Management Advisory Committee</td>
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<td>MBWCP</td>
<td>Moreton Bay Waterways and Catchments Partnership</td>
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<tr>
<td>MEWG</td>
<td>Monitoring and Evaluation Working Group</td>
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<td>MPA</td>
<td>Marine Parks Authority, New South Wales</td>
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<td>NAPSWQ</td>
<td>National Action Plan for Salinity and Water Quality</td>
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<td>NEN</td>
<td>National Estuaries Network</td>
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<td>NHT</td>
<td>Natural Heritage Trust</td>
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<td>NIWA</td>
<td>National Institute of Water and Atmosphere Research (New Zealand)</td>
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<td>NLWRA</td>
<td>National Land and Water Resources Audit</td>
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<td>NRM</td>
<td>Natural resource management</td>
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<td>Natural Resource Management South East Queensland Inc</td>
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<td>National Stakeholder Advisory Committee</td>
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<td>Silicon Graphics Incorporated</td>
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<td>Sunshine Coast University</td>
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<td>UDIA</td>
<td>Urban Development Institute of Australia</td>
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<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organisation</td>
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<td>UQ</td>
<td>The University of Queensland</td>
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<td>UNSW</td>
<td>University of New South Wales</td>
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<td>UTAS</td>
<td>University of Tasmania</td>
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<td>The University of Western Australia</td>
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