



NCCARF

National  
Climate Change Adaptation  
Research Facility

Adaptation Research Network  
MARINE BIODIVERSITY AND RESOURCES

# marine adaptation bulletin

volume three, issue one | autumn 2011



## IN THIS ISSUE

The Marine Adaptation Network – a review of 2010 .....	2
Education- getting the message out about marine adaptation to climate change ..	3
International Perspective - Getting the message: communicating marine climate science to stakeholders .....	4
Impacts of climate change stressors on early development of the sea urchin <i>Centrostephanus rodgersii</i> .....	5
The Naturaliste Marine Discovery Centre and Seaweed Educators' Expo 2011 .....	6
Conservation Council of SA Citizen Science Initiatives .....	7
NARP projects announced.....	8

## At a glance

The Adaptation Research Network for Marine Biodiversity and Resources will foster an inclusive, collaborative and interdisciplinary research environment that generates outputs relevant for policy-makers and managers to develop appropriate climate change adaptation responses.

### INVESTMENT

Australian Government Department of Climate Change through the National Climate Change Adaptation Research Facility (NCCARF) hosted by Griffith University

### FRAMEWORK

Five interconnecting themes (integration, biodiversity & resources, communities, markets, policy)

### HOST INSTITUTION

University of Tasmania

### CONVENOR

Associate Professor Neil Holbrook

### TIMEFRAME

2009-2012

## Convenor's Spot



Welcome to the first issue of the Marine Adaptation Bulletin (MAB) for 2011.

One of the primary issues in relation to effective marine

climate change adaptation, from a series of focused strategy meetings held with marine sector representatives across Australia in Oct/Nov 2010, was identified to be communication and education. Based on our observations and listening to all of the discussions across seven meetings - one in each state and the Northern Territory - the most significant message arising from these meetings was interpreted to be the high importance placed on science-stakeholder communication and consultation that comprises of targeted, clear and accessible information exchange.

While initially feeling a little nervous about the possible tensions that may exist between the marine sectors – commercial and recreational fishing,

marine aquaculture, conservation management, and marine tourism – this was quickly eased at these meetings with the highly constructive roundtable discussions openly considering the complex cross-sectoral issues and concerns associated with maintaining marine biodiversity and individual livelihoods in the presence of future impacts from climate change. The continuing conversations that also followed the meetings demonstrated the resolve of participants that we need to get this right – at least as best as we can.

The theme of this Bulletin is Communication and Education. This is clearly an area that will be critical into the future, in particular given the non-acceptance of human-induced climate change that still exists amongst a significant proportion of the population, and the associated climate change ‘debates’ that continue in some parts of the media.

Neil Holbrook.

## How to contribute

*If you would like to contribute an article to the Marine Adaptation Bulletin please write to [arnmbr@arnmbr.org](mailto:arnmbr@arnmbr.org) or call 03 6226 2134.*

# The Marine Adaptation Network – a review of 2010

The Marine Adaptation Network made significant advances in 2010. The Network **membership** grew to a total of 624 by the end of 2010 (now totals 700) – with increased representation from Commonwealth and State governments, fishing and tourism industries, universities, non-government organisations and private sectors.

**The National Climate Change Adaptation Research Plan (NARP)** was released on 26 March 2010. Alongside this release, \$5.5 million of funding for marine climate change adaptation projects was announced. The Network convenor and coordinator, assisted by FRDC and Marine Adaptation Network organisers, visited key locations around Australia on very short notice to provide information sessions about the NARP for potential grant applicants seeking to submit expressions of interest. Successful Eol applicants were asked to submit full applications in the second half of 2010, which have now been announced – see page 8 of this edition of MAB.

A series of **focused strategy meetings with government, peak body/industry and NGO stakeholders** in all States and the Northern Territory during October and November 2010 facilitated important climate change discussions and priority considerations by, and between, the aquaculture, commercial fishing, recreational fishing, conservation and tourism sectors. These stakeholder meetings with key representatives from each sector and the climate change office in each State/Territory, provided a forum for outlining concerns, discussing adaptive management and assessing climate change impacts within and between sectors.

Industry and government stakeholders have made important contributions to our quarterly **Marine Adaptation Bulletins** with articles across marine issues from different stakeholder perspectives. Several international organisations joined our network in 2010, with some contributing interesting articles about global concerns that resonate within the Australian context.

The Network was represented with presentations at local, national and international **conferences** in 2010. In April, as part of the ICES/PICES 'Effects of climate change on fish and fisheries' symposium in Sendai Japan, Biodiversity and Resources Theme representatives convened an international workshop where the identification of potentially vulnerable areas or hotspots to be monitored, as determined by sea surface temperatures, was explained. The workshop explored the idea of establishing a global network of scientists, managers and policy makers covering these hotspots to promote consistency in data collection and reporting. The workshop was attended by 50 delegates and 12 presentations were given by invited participants.

Network strategic planning, scoping and furthering activities in the annual workplan, was held in April 2010. Coordination of sectoral case-study papers, with an interdisciplinary approach, was a key activity. Regular Network Connections meetings were also held throughout the year, with teleconferencing for those interstate, to maintain planning and feedback processes.

The Network convenor and coordinator participated in national NCCARF meetings of the eight networks. Informed appraisal of administrative practices and innovative approaches to challenges in each network was made. Discussion also centred on suggestions for forward planning and continued communication between the networks.

An important report for the edible oyster industry entitled **Climate Change Adaptation in the Australian Edible Oyster Industry: an Analysis of Policy and Practice** (Leith and Haward 2010) <[www.nccarf.edu.au/marine/content/index.php/site/resources\\_extended/oyster\\_report/](http://www.nccarf.edu.au/marine/content/index.php/site/resources_extended/oyster_report/)> was released in August 2010, and comprises of a full report, executive summary, and information sheet. State-based information fact sheets were also drafted for New South Wales, Victoria and South Australia (released in 2011), and four issues in volume two of our primary publication, the Marine Adaptation Bulletin, were also released in a new format.

**Research support grants** were offered in 2010 for Honours and Masters students with projects in marine adaptation to climate change. From the applications, five grants were awarded for diverse climate change adaptation projects ranging from *An integrated approach to the development of climate change adaptation policy and management strategies in Torres Strait, QLD* to *Effects of climate-driven East Australian Current (EAC) strengthening on kelp morphology and reproduction*. Project profiles have been published in Marine Adaptation Bulletins. Other projects included *Establishing marine protected areas within South Australia* and *The interactive effects of ocean acidification, ocean warming and hypercapnia on larval development of keystone echinoderms* and *Impacts of climate change stressors on early development of the sea urchin *Centrostephanus rodgersii** (see article in this MAB).

The updated **website** reflects developments in the Network. There are now links to: the Australian Ocean Data Network (AODN) – a data sharing initiative for researchers; reports from the Oceans Day at Cancún, Mexico; several case studies in the community based participatory research principles program; the quarterly publications of the Marine Adaptation Network Bulletin; and the Network's Facebook page. From the Resources tab, the updated annotated bibliography of relevant books and journal articles can be accessed. Websites with information about upcoming marine-specific conferences can also be found via the Events tab.

The Marine Adaptation Network has continued to encourage cooperation, discussion and collaboration between marine sectors, to address common concerns about impacts of climate change, and to inform members of developments in marine climate change adaptation. With seminars, meetings, workshops and regular communications, networking has broadened and been enhanced; existing contacts have been reinforced. The Network website continues to evolve as a resource. Collaborative, interdisciplinary research has been promoted and support given to students researching various

aspects of marine adaptation. Their work will inform future policies and management decisions. Looking ahead, we plan to further enhance our engagement with all marine biodiversity and living marine resource sectors as we communicate new

developments, and share knowledge with and between, our growing network and beyond.

See [www.nccarf.edu.au/marine](http://www.nccarf.edu.au/marine) for more information.

## Education- getting the message out about marine adaptation to climate change

*Melissa Nursey-Bray, Co-theme leader - Communities*

Climate change, its impacts and solutions, is at the forefront of a collective global consciousness. Instituting adaptation frameworks that can assist marine professionals to respond to climate change, yet be tailored to specific sectoral needs, is crucial. Professionals working at the coalface of the climate change challenge need to build new skills and create innovative solutions in marine management contexts. There are a number of challenges in creating management frameworks that are climate friendly while meeting the needs of different sectors. Embedding adaptation in education is one of them.

### **What are some of the key challenges in developing education in ways that enhance marine adaptation to climate change?**

First – the fluidity of the marine environment, and the fact that, in comparison to public understanding of other ecosystems, general knowledge about the marine environment is sparse, largely due to the fact that people can't 'see it'; a problem frequently encountered by those trying to progress the idea of marine protected areas.

Second, the issue of uncertainty – how does one educate people about uncertainty or find reassurances that the projected carbon emissions scenarios provide a sound basis for stakeholders to respond to projected climate change impacts. Indeed, how does one communicate climate change in this context<sup>1</sup>? This is increasingly challenging in situations where marine planners are trying to tailor local solutions, but in the context of global climate change projections.

Third, climate change lacks immediacy for people - climate change is effectively a 'creeping' problem that needs an immediate response, a notion hard to communicate let alone implement. This is amplified by the disjuncture between people's experience of the 'weather' and discourse about climate change. If people cannot 'see' climate change, but rather reconcile it as being simply an 'unusual weather pattern', to convince them that climate change is real and something that really needs to be taken seriously and responded to, it is that much harder<sup>2</sup>. Moreover, the notion of adaptation per se is difficult – it is both an 'old' term and a new enterprise. Stakeholders will veer between feeling they have nothing to learn as they 'have been adapting for generations', or it is something that is so broad it is hard to apply in local contexts. What does adaptation mean at the coalface?

Finally - most professionals currently working in the area of climate change adaptation are bedevilled by a lack of time. Qualified in their own right, they cannot contend with the idea of undertaking further training in the area of climate

change adaptation – a challenge that has been encountered in the development of climate change adaptation curricula for maritime professionals<sup>3</sup>. One way forward is to consider the role of social learning, which with respect to sustainable development is based on the participatory processes of social change and societal transformations<sup>4</sup>. This can make the goals and stakes that are involved in transformation processes much clearer and achieve better, more democratic solutions to environmental problems, fostering the implementation of agreed measures.

Social learning is based on the idea that social change requires critical self-reflection, and the development of participatory, multi-scale, democratic processes, which help shape the political and economic conditions towards improvement of the current situation<sup>5</sup>. By adopting lessons learned from management practice, different sectors within a community can build adaptive management frameworks which will go some way towards embedding learning as a management process, as much as being a formal endeavour. As such it becomes daily practice, and can build mutual trust between and within sectors, and build on results from adaptations implemented. This approach works well providing an 'on the job' approach to learning anchored or enhanced by formal learning/education. Education can be a tool to help build adaptation in the marine domain. However, education must be understood in its widest sense, and embed formal and informal learning, and social learning practice to ensure effective and ongoing adaptation in marine contexts.

"Education, in addition to being a human right, is a prerequisite for achieving sustainable development ... education for sustainable development can provide critical reflection and greater awareness and empowerment so that new visions and concepts can be explored and new methods and tools developed."<sup>6</sup>

### **References**

1. Moser S, Dilling L (2007) *Creating a climate for change: communicating climate change*. Cambridge Press. ISBN: 9780521869232
- 2&3. Nursey-Bray, M (2010) 'Climate change adaptation in Australia: education, training and achieving social and political outcomes' in *International Journal of Climate Change Strategies and Management*, Vol 2, No 4 pp 393 - 402
4. Pahl-Wostl, C (1995) A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change* 19 (2009) 354–365
5. Pahl-Wostl, C (2002) Towards sustainability in the water sector – The importance of human actors and processes of social learning *Aquat. Sci.* 64 (2002) 394–411
6. United Nations Economic Commission for Europe (UNECE). (2005). *UNECE Strategy For Education For Sustainable Development*. CEP/AC.13/2005/3/ Rev.1. Vilnius, 17-18 March 2005: UN Economic and Social Council.

# International Perspective - Getting the message: communicating marine climate science to stakeholders

Paul Buckley, UK marine climate change impacts partnership secretariat, Centre for Environment, Fisheries & Aquaculture Science (Cefas), Pakefield road, Lowestoft, Suffolk, UK.

The marine realm can often appear to be the poor cousin to terrestrial environments when it comes to understanding and communicating climate change science. Challenges the marine community face in getting our messages across were made very clear by Anthony Richardson and Elvira Poloczanska from the CSIRO following the publication of the most recent IPCC report in 2007<sup>1</sup>. There were 28,586 significant biological changes in terrestrial systems noted in that report, but only 85 from marine and freshwater systems<sup>2</sup>.

This relative dearth of information is largely reflected at national levels, with research into marine climate change issues suggested to be lagging some 10 years behind atmospheric and terrestrial systems. In the UK, we have long instrumental records to draw on from around our coast and seas, and some of the most advanced climate modelling capabilities in the world at the Met Office Hadley Centre. In 2009, the UK climate impacts programme published their first marine scenarios report, less advanced than for the atmospheric environment, but representing a huge step forward for the UK marine community.

Whilst these developments are encouraging, a 2005 national policy report into the state of the UK seas<sup>3</sup> said nothing substantial about the impacts of climate change on the marine environment. In recognition of this clear disconnect between scientific and policy communities, a new co-ordinating committee, the Marine Climate Change Impacts Partnership (MCCIP) was established, aimed specifically at transferring knowledge from scientists to policy makers. MCCIP brings together government, scientists, NGOs and industry, and is supported (financially and politically) by the UK and devolved administration governments.

In July 2010, we launched our latest Annual Report Card on marine climate change impacts. The 2010-11 Report Card<sup>4</sup> is the most comprehensive, peer-reviewed assessment ever undertaken on UK marine climate issues, and involved contributions from over 100 scientists from 40 leading UK science institutes. It plays a vital role in translating often complicated and conflicting scientific messages into a format that can be readily understood and applied, becoming a necessary tool for effective, evidence-based policy-making on UK marine climate issues. The Report Card details clear changes in ocean climate around the UK. Increasing sea temperatures in recent decades appear to have important knock on effects for marine food webs, with significant northward movements of some marine species (e.g., plankton, fish) and changes to coastal habitats. Whilst future directional changes seem assured (rising sea levels, acidification and further temperature increases), significant uncertainties about rates and magnitude of change persist. Reporting 'responsibly'

on just what we do and do not know has been a key cornerstone of the MCCIP process. Communicating uncertainty in a transparent and unambiguous manner is probably the most important (and appreciated!) aspect of our reporting. It is also important to recognise that, as well as adverse effects, there could be some future opportunities, e.g., UK summer tourism and new fisheries.

The Report Cards have a high profile in the UK, both through ministerial launch events and worldwide media coverage. They have been the basis for similar report cards around the world (including the successful Australian Report Card) and an effective mechanism for providing scientific evidence to decision makers. The UK Report Card was shortlisted for two national civil service science awards in 2010.

In July, the MCCIP steering committee announced its intention to champion marine climate change adaptation issues in the UK through the instigation of its "Climate Smart Working"

initiative (<[www.mccip.org.uk/adaptation.aspx](http://www.mccip.org.uk/adaptation.aspx)>) as a five-year programme with sector-specific guidance to develop strategies for action and to recognise priority needs for building adaptive capacity.

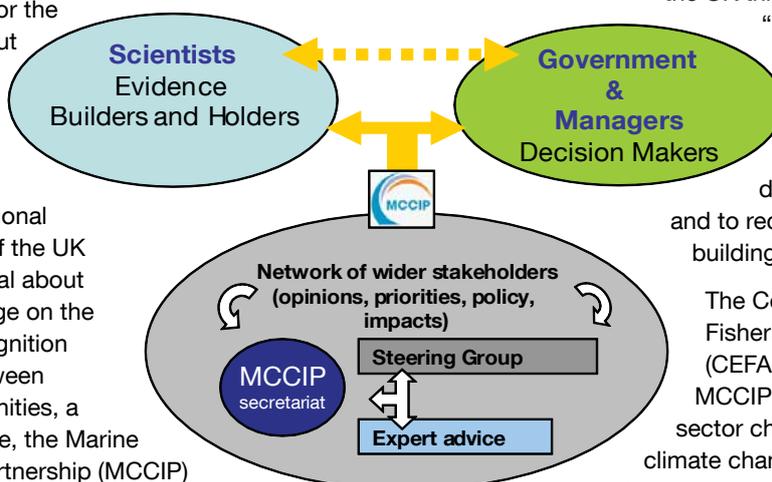
The Centre for Environment, Fisheries and Aquaculture Science (CEFAS) hosts the secretariat for MCCIP and acts as the marine sector champion for the first UK climate change risk assessment exercise, a statutory requirement of the 2008 Climate Change Act. Risk assessment will consider key risks to a wide range of sectors (ranging from transport to forestry to marine) and will include an economic analysis. The first report will be laid before parliament early in 2012, and every five years thereafter.

In our short history, MCCIP has enjoyed useful exchanges with the Australian marine climate impacts and adaptation communities and we hope that this continues into the future.

Paul.Buckley@MCCIP.org.uk, tel +44 (0)1502 524314  
Contact: [office@mccip.org.uk](mailto:office@mccip.org.uk) Website: [www.mccip.org.uk](http://www.mccip.org.uk)

## References

- Rosenzweig C. et al. (2007) Climate Change 2007: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden, C E. Hanson (eds). Cambridge Univ. Press, Cambridge, pp. 79–131.
- Richardson AJ & Poloczanska ES (2008) Under resourced and Under Threat. Science 6 June 2008: 1294-1295.
- Charting Progress: An Integrated assessment of the UK seas (2005). Department for Environment, Food and Rural Affairs (Defra), 130pp.
- Baxter JM, Buckley PJ and Wallace, CJ (eds). (2010) Marine Climate Impacts Annual Report Card 2010-2011 (MCCIP 2010). Summary Report, MCCIP, Lowestoft, 12pp. [www.mccip.org.uk/arc](http://www.mccip.org.uk/arc)



# Impacts of climate change stressors on early development of the sea urchin *Centrostephanus rodgersii*

Shawna Foo, School of Medical Sciences, University of Sydney



Figure 1. Adult *C. rodgersii*. Photo: David Harasti

The sea urchin, *Centrostephanus rodgersii* (Fig. 1) is an ecological engineer, forming barrens habitats (Fig. 2) that have a major influence on biodiversity and ecosystem function. Southern encroachment of the East Australian Current has facilitated migration of *C. rodgersii* into Tasmania, and this has caused major change in economically significant kelp habitat with a negative impact on abalone and rock lobster fisheries. This project, supported by the Marine Adaptation Network, investigated the effects of climate change driven ocean acidification and warming on the developmental success of this species. Climate change is altering ocean conditions through acidification and warming with serious

implications for marine biota. Ocean warming and acidification affect physiology and skeleton formation in marine invertebrate larvae. Assessing the effect of climate change stressors on the development and calcification in *C. rodgersii* will provide empirical data to predict the resilience of this species to climate change. These data will inform development of policies for adaptive management of marine resources.



Figure 2. Barrens habitat. Photo: David Harasti

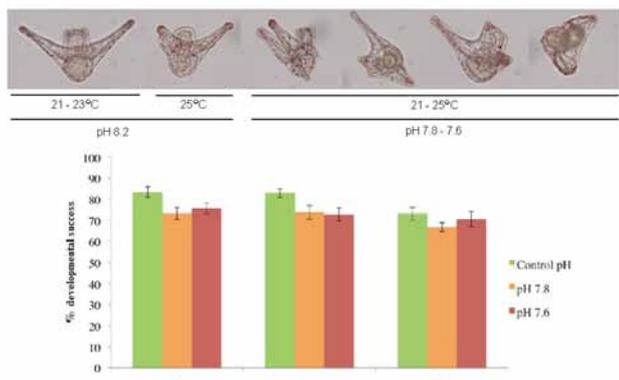


Figure 3. % normal larvae ( $\pm$ SE) across combinations of 3 temperatures (21, 23 & 25°C) and 3 pH levels (8.1, 7.8 & 7.6) as projected for 2100. Inset shows effect of treatments of larval morphology.

## Sensitivity of *C. rodgersii* larvae

The effects of warming and acidification on the larval development of *C. rodgersii* were investigated by raising embryos in near future ocean change conditions (+2-4°C and -0.3-0.5pH units). It was found that a decrease of 0.2 pH units and an increase of 4°C significantly decreased the presence of normally developing larvae (Fig. 3).

## Adaptive capacity of development

The potential for an adaptive (genetic) response of early development in *C. rodgersii* to ocean change was investigated in a quantitative genetics study. The results showed that eggs and sperm are not created equal. Some embryo genotypes were more tolerant to climate change stressors than others (Fig. 4). The resilience of some progeny to climate change stressors indicates that early development of *C. rodgersii* has the ability to adapt to a changing ocean.

## Implications for management of *C. rodgersii* and its ecological impacts

Tolerance of the early life stages of *C. rodgersii* to ocean temperature and pH change projected for 2100 indicates that the reproductive success of this sea urchin in eastern Australia will not be impeded by climate change, at least with respect to early development. Thus this species *may* be able maintain its current distribution in eastern Australia. Management responses aimed at limiting the impact of *C. rodgersii* and the barrens it creates may be needed to ensure the desirable function of marine ecosystems and associated commercial fisheries. Further research investigating the long term effects of ocean warming and acidification on *C. rodgersii* (e.g., to the adult stage), and research investigating the tolerance of co-occurring (e.g., abalone, lobster) species to climate change stressors, will help to identify the impact of *C. rodgersii* on marine biodiversity in a changing ocean.

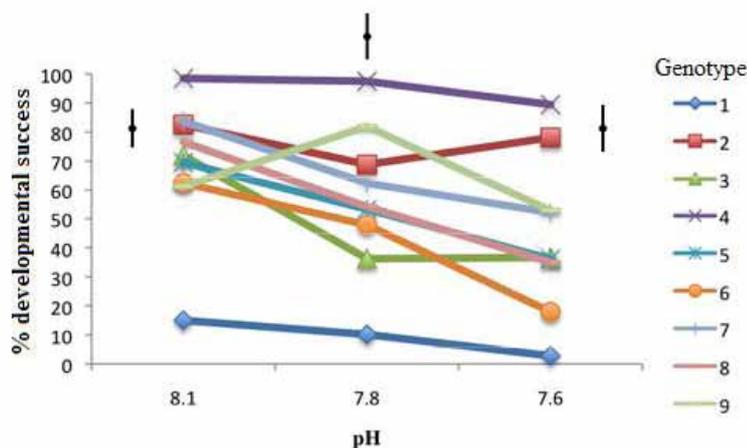


Figure 4. Performance of 9 embryo genotypes across 3 pH levels (8.1, 7.8 & 7.6).

# The Naturaliste Marine Discovery Centre and Seaweed Educators' Expo 2011

Lisa Hill, Community Education Officer, Naturaliste Marine Discovery Centre, Department of Fisheries WA

The Naturaliste Marine Discovery Centre (NMDC) is the Western Australian Department of Fisheries' education facility located at Hillarys Boat Harbour. Open to the public, the NMDC is a great place to visit to learn more about WA's unique marine life and the role of the Department of Fisheries.

As well as the marine life on display in the NMDC aquariums, there are interactive exhibits including touch screens and touch pool sessions where visitors can interact with an array of animals, including a shark. It offers a dynamic education program offered to teachers and students from kindergarten to tertiary level, which incorporates a range of fun hands-on learning activities that capture students' interests guiding them on a discovery tour of our oceans and the amazing life therein. An important component of the education program at the NMDC is participation in Seaweed, the Marine Education Society of Australasia's (MESA) major annual education campaign, aimed at increasing understanding and appreciation of the sea and all of its living organisms.

The theme for Seaweed 2011 was 'Spotlight on Marine Science'. This theme profiled marine science and highlighted the value and significance of research in informing us about marine and coastal environments and how we can be better equipped to preserve them. This theme links well with the research the Department of Fisheries does to ensure sustainable fish stocks in WA. For the sixth successive year, the Department of Fisheries hosted Seaweed Educators' Expo, held on 25 February 2011. Over 30 teachers and educators attended to learn more about marine science. They in turn will impart the knowledge to others in the community, in schools and in classrooms.

An impressive itinerary for the Educators' Expo offered a range of activities. The opening address for the Expo was given by WA's Chief Scientist, Professor Lyn Beazley. Highlighting the importance of education in conserving our marine and coastal environments, she gave an inspiring introduction to participants about the impacts of climate change and how humans can adapt management to deal with these challenges.

A popular morning activity was the 'Near Shore Reef Discovery' activity delivered by Marine Studies staff from Padbury and Ocean Reef Senior High Schools. Participants visited a survey site at Mettams Pool to learn how WA Fisheries researchers assess the health of abalone stocks along the metropolitan

coast. This was followed up by a snorkelling session observing research transects of reef and marine life.

Participants were offered a tour with the Department of Fisheries' Research Vessel, the *RV Naturaliste*. Fisheries Research Officer Errol Sporero organised for the vessel to be docked at Hillarys Marina for the morning and a guided tour was given by skipper, Paul Pittorini. It was a great opportunity for educators to explore the vessel and to see first-hand how research is conducted and how that research contributes to sustainable fisheries management.

Three afternoon presentations about marine science education programs available in WA were given. Mark Staniforth, a science teacher at St Mary's Anglican

Girls School, spoke of the school's involvement in the national Coral Watch program. The education team from the Rottnest Island Authority hosted *Intertidal Discovery*, an activity showing teachers how to incorporate simple population monitoring activities into their marine education programs. Department of Fisheries' staff member, Michael Burgess, provided a 'sneak peak' at a new online

education resource soon to be launched in WA. This resource, an initiative of the Department of Fisheries and Woodside Energy, is called Marine WATERS (Western Australian Teacher Education Resources). The primary phase of this marine focused, integrated online resource went live at the end of March 2011 and is already proving to be a fantastic tool for educators across WA.

Feedback from participants and sponsors, who attended the 2011 Seaweed Educators' Expo and gained new insights into the complexities of marine science, was exceptionally positive.

The Department of Fisheries would like to thank everyone who contributed to the day and to all the sponsors who were involved with what was another successful Seaweed Educators' Expo.

To find out more about what's on offer at the NMDC, or about Seaweed Educators' Expo, please contact the centre on (08) 9203 0112, Monday to Friday or visit:

[www.nmdc.com.au](http://www.nmdc.com.au).

For more information on Seaweed around Australia visit:

[www.mesa.edu.au](http://www.mesa.edu.au).



Above: The participants enjoy a guided tour of the top deck of the *RV Naturaliste* (top). Photo: Department of Fisheries.

# Conservation Council of SA Citizen Science Initiatives

*Alex Gaut, Biodiversity Program Co-ordinator, Conservation Council SA*

The Conservation Council of South Australia is the peak non-government environment body for the state, with approximately 50 member groups, representing approximately 60,000 people. It currently manages several initiatives that contribute to monitoring and protection of the South Australian marine environment. Two of the projects have a strong focus on increasing the involvement and capacity of the community through citizen science. The other two projects have a focus on increasing the capacity and engagement of the conservation sector with regard to both marine conservation and fisheries management.

Reef Watch (SA) is a multi award-winning citizen science program and the longest running coast/marine citizen science program in Australia, established in 1997. A key objective of Reef Watch is to improve the community's knowledge of South Australia's reefs and the marine environment. Reef Watch volunteers are trained to monitor intertidal and subtidal reefs, and information gathered from these surveys is used to provide an indicative assessment of their condition,

improve understanding, and contribute to improved management of these habitats. This ultimately increases the community's awareness and provides them with the ability to be involved in decision making to do with the marine and coastal

environment. In a recent analysis of data gathered by volunteers, a decline in the health of a metropolitan subtidal reef was identified. Without the help of our volunteers, many changes in SA's marine environment would go unnoticed. The long term data gathered by Reef Watch may also be useful in identifying trends related to climate change effects and it also supports other marine ecology research.

The 'Feral or In Peril' program provides training and identification slates to divers, snorkelers, boaters, fishers and others regarding introduced marine pests and native species of conservation concern. The program has identified a number of species about which opportunistic sightings should be reported for environmental management purposes because they are either of conservation concern ('in peril') or pose a significant environmental threat ('feral'). A measure of the program's success is indicated through the identification of the first European Fan Worm on Kangaroo Island (KI) by volunteers involved in this program, leading to the development of a KI marine pest project

in partnership with the KI Natural Resources Management Board. Climate change presents a challenge when it comes to pest species as changes in ocean characteristics are likely to favour pest species, such as 'aquarium' Caulerpa (*Caulerpa taxifolia*), gaining a foothold in SA waters.

To facilitate further involvement of the broader community with issues concerning the marine environment, Conservation Council SA has appointed a Community Conservation Officer. The role will increase the involvement and capacity of the community with regard to marine conservation, and strengthen relationships between stakeholders. One aspect of this role is to support the wider community to make informed decisions with regard to marine parks.

A few years ago Conservation Council SA was invited, as the peak environmental body in SA, by the Spencer Gulf and West Coast Prawn Fishermen's Association (SGWCPFA) in conjunction with PIRSA Fisheries, to participate in a ground-breaking

co-management project. The Spencer Gulf Prawn Fishery (SGPF) was already noted for the extent to which industry members are involved in the day to day running of the fishery. Co-management is a way for fisheries to develop more effective, efficient and equitable management regimes for dealing with the plethora of issues relating to harvesting a public resource. However, the SGWCPFA recognised the need for engagement with the conservation sector

for assessing such management models. The scope of the project covered requirements to: meet legislative controls; ensure sustainability; provide transparency of industry processes; and provide a level of confidence to all stakeholders.

The project led to two major outcomes:

1. Identification of the need for a community-based fisheries officer to support the conservation sector to be more informed and engaged with fisheries management issues; and
2. SGWCPFA, state government and Conservation Council SA are currently trialing the preferred co-management model that was developed through the project – Conservation Council SA now has a seat at one of the fishery's sub-committees.

Conservation Council SA is committed to further protection of the marine environment by working in partnership with our supporters: the Adelaide & Mt Lofty Ranges NRM Board, Caring For Our Country, Biosecurity SA, SARDI Aquatic Sciences, Dept of Environment and Natural Resources, Primary Industries & Resources SA (Fisheries), Fisheries Council of SA, Environment Protection Authority, Department of Trade, Energy and Infrastructure and the Boating Industry Association of SA.



Photos: Courtesy of Reef Watch & Conservation Council of SA



# NARP projects announced

Funded through partnership between the Department of Climate Change and Energy Efficiency and the Fisheries Research and Development Corporation.



NCCARF

National  
Climate Change Adaptation  
Research Facility

Adaptation Research Network  
MARINE BIODIVERSITY AND RESOURCES

**Project 2010/564** — Pre-adapting a Tasmanian coastal ecosystem to ongoing climate change through reintroduction of a locally extinct species. Professor Nic Bax, University of Tasmania.

**Project 2010/554** — Effects of climate change on reproduction, larval development and population growth of coral trout. Morgan Pratchett, James Cook University.

**Project 2010/542** — A climate change adaptation blueprint for coastal regional communities. Dr Stewart Frusher & Nadine Marshall University of Tasmania and CSIRO - Climate Change Adaptation Flagship (CSIRO-CCAF)

**Project 2010/536** — Beach and surf tourism and recreation in Australia: vulnerability and adaptation. Assoc Professor Mike Raybould, Bond University.

**Project 2010/535** — Management implications of climate change effects on fisheries in Western Australia. Dr Nick Caputi, Department of Fisheries, WA

**Project 2010/534** — Ensuring that the Australian oyster industry adapts to a changing climate: a natural resource and industry spatial information portal for knowledge action and informed adaptation frameworks. Assoc Professor Andrew Davis, University of Wollongong.

**Project 2010/533** — Human adaptation options to increase resilience of conservation-dependent seabirds and marine mammals impacted by climate change. Dr Alistair Hobday, CSIRO - CCAF

**Project 2010/532** — Changing currents in marine biodiversity governance and management responding to climate change. Michael Lockwood, University of Tasmania.

**Project 2010/524** — Identification of climate-driven species shifts and adaptation options for recreational fishers: learning general lessons from a data rich case. Daniel Gledhill, CSIRO - CMAR.

**Project 2010/521** — Vulnerability of an iconic Australian finfish (Barramundi, *Lates calcarifer*) and related industries to altered climate across tropical Australia. Assoc Professor Dean Jerry, James Cook University.

**Project 2010/510** — Adapting to the effects of climate change on Australia's deep marine reserves. Dr Ron Thresher, CSIRO - CCAF

**Project 2010/506** — Adaptive management of temperate reefs to minimise effects of climate change: developing effective approaches for ecological monitoring and predictive modelling. Dr Neville Barrett, University of Tasmania.

## Contact us

Adaptation Research Network for  
Marine Biodiversity & Resources  
School of Geography and Environmental Studies  
University of Tasmania, Private Bag 76

Hobart, TAS 7001 Australia

Phone: 03 6226 2134

Fax: 03 6226 7628

E-mail: [arnmbr@arnmbr.org](mailto:arnmbr@arnmbr.org)

Website: <http://www.nccarf.edu.au/marine/>

## THEMES

### Integration

Associate Professor Neil Holbrook

[Neil.Holbrook@utas.edu.au](mailto:Neil.Holbrook@utas.edu.au)

### Biodiversity & Resources

Dr Alistair Hobday

[Alistair.Hobday@csiro.au](mailto:Alistair.Hobday@csiro.au)

### Communities

Professor Tim Smith

[Tim.Smith@usc.edu.au](mailto:Tim.Smith@usc.edu.au)

### Markets

Dr Sarah Jennings

[Sarah.Jennings@utas.edu.au](mailto:Sarah.Jennings@utas.edu.au)

### Policy

Associate Professor Marcus Haward

[Marcus.Haward@utas.edu.au](mailto:Marcus.Haward@utas.edu.au)

If you would like to submit an article to the MAB, please send correspondence to:

[arnmbr@arnmbr.org](mailto:arnmbr@arnmbr.org)

This issue of the Marine Adaptation Bulletin has been compiled by Anna Lucas and Clare Brooker.

MAB Editors: Neil Holbrook and Anna Lucas

## Marine Adaptation Network Partners:



SARDI



The Adaptation Research Network for Marine Biodiversity & Resources is an initiative of the Australian Government Department of Climate Change being conducted as part of the National Climate Change Adaptation Research Facility <http://www.nccarf.edu.au>