

Climate Change Adaptation – Marine Biodiversity and Fisheries

The National Climate Change Adaptation Research Plan (NARP) for Marine Biodiversity & Resources identifies research priorities in five sectoral areas: marine aquaculture, commercial and recreational fishing, conservation management, tourism and recreational uses, and cross-cutting issues. The plan, developed under the guidance of the National Climate Change Adaptation Research Facility (NCCARF) is supporting 14 research projects which are underway responding to these priorities. Funded through partnership between the Australian Government Department of Climate Change & Energy Efficiency (DCCEE) and the Fisheries Research and Development Corporation (FRDC) the Principal Investigators have provided in the table below a brief summary of their project's progress, as of June 2011. If you would like further information please contact nccarf@nccarf.edu.au.

Project Number	Principal Investigator	Summary	End Date	Project Progress as of June 2011
2010/506 FRDC-DCCEE	Neville Barrett	This work builds on data collected from past surveys to determine shifts in distribution and abundance of species. It will suggest adaptation strategies for fishery and marine park managers.	30/4/2014	Based on a long-term database spanning over 20 years of the abundance of temperate reef biota in southern NSW and Tasmania, and another database of the abundance of reef taxa collected all around Australia (Reef Life Survey project), this project is developing adaptive management strategies from models of the changes of abundance distributions of organisms. These temporal changes relate to environmental parameters such as temperature, which will inform potential management decisions. Preliminary analysis of patterns in both the biological and physical datasets has now commenced following collation of the required information.
2010/510 FRDC-DCCEE	Ron Thresher	A model to predict the effects of ocean acidification and climate change on the distribution of deep reef corals and biota will be the outcome of this project.	1/7/2012	A preliminary model has been developed in collaboration with US and NZ researchers, and is being validated against existing data on the modern distribution of <i>Solenosmilia variabilis</i> - Australia's key reef-forming deep sea coral. The ages of fossil corals have also been determined, and are being checked to those factors that have caused changes in the depth distribution of <i>S. variabilis</i> in the past, as a possible indication of responses to future climate change.
2010/521 FRDC-DCCEE	Dean Jerry	By determining thermal tolerances and associated consequences of thermal adaptation in barramundi stocks across tropical Australia, this project will guide adaptation strategies for commercial fishers and aquaculturists.	31/12/2013	Barramundi from three genetic strains (NT, far Nth Qld, Central Qld) have been acquired, acclimated and are currently undergoing physiological testing to determine their relative thermal tolerances. A new flow cytometric technique has been developed based on using live/dead fin cells as an indicator of an individual's thermal tolerance to remove need to actually thermally challenge whole organisms. DNA has also been extracted from thousands of barramundi from around Australia for molecular genetic work. Preliminary modelling of effects increased temperature will have on barramundi aquaculture production has begun and suggest that the barramundi aquaculture industry may benefit from increased growth rates and expansion of farmable area. Finally parasites in aquaculture risk assessments have been conducted.
				
2010/524 FRDC-DCCEE	Daniel Gledhill	The project will investigate changes in distribution of rocky reef fishes in eastern Australia over the last forty years using historical spearfishing records. Results will be interpreted with spearfishing clubs to understand changes and suggest adaptation strategies for recreational fishers.	31/5/2013	Project members have continued working with both New South Wales and Victorian spearfishers to access sensitive historic competition records. A scientific liaison has been appointed by both the NSW and Victorian representative bodies to work with the project team, ensuring close collaborative relationships.
				
2010/532 FRDC-DCCEE	Michael Lockwood	This project will identify adaptive governance and management arrangements for conserving marine biodiversity in the context of climate change.	27/9/2013	Case study areas have been selected as the Whitsunday region (Cth/Qld waters), Tweed-Morton region (Cth/Qld/NSW waters) and Freycinet bioregion (Cth/Tas waters). Data have been collected on the biophysical, institutional, social and economic characteristics of these regions. Requirements for adaptive governance and management of marine biodiversity have been developed through analysis of the literature, consultations with our agency and technical advisory groups, and judgements of an expert panel.
2010/533 FRDC-DCCEE	Alistair Hobday	This work will provide an insight into the effects of climate change on a number of iconic species, develop adaptation options, and recommend best-practice monitoring.	30/1/2013	1. The first workshop has been held (March 27-28), 21 researchers attended. 2. A popular article describing the project has been submitted to Australasian Seabird Bulletin, and published May 2011. A second article has been published in the Marine Adaptation Network's quarterly bulletin (Volume 3, Issue 2, Winter 2011, p. 2). 3. Environmental data extractions to aid individual researchers undertaking climate analysis on their own data have been provided by the project team, and collaborative analysis commenced for a number of other data sets.
2010/534 FRDC-DCCEE	Andrew Davis	This project will make available to the oyster industry information that will assist in identifying environmental changes that affect production and will assist in planning for the future.	24/12/2012	A suite of water quality, catchment, climatic, industry and governance related information that is of potential relevance to the oyster industry in NSW has been identified, categorised and prioritised through four NSW workshops and one national workshop. The priority data/information needs are consistent within both industry and across governance agencies and are primarily temporal trends of chemical, biological and physical parameters of water condition. Selected meta data and raw data for this information has been sourced from custodians and is currently being aligned and structured for effective and useful delivery through an online map-based portal.

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2010/535 FRDC-DCCEE management implications of climate change effect on fisheries in Western Australia	Nick Caputi	This project is assessing WA marine environments with particular attention being given to the vulnerability of high value fish species.	31/12/2013	A meeting of the project team has been held to identify the key issues in the project. Work on the oceanographic downscaling of the model has commenced. Case studies are being determined and a preliminary assessment of their sensitivity to climate change is being undertaken using the criteria developed for the South-east Australia fisheries climate change project.
2010/536 FRDC-DCCEE beach and surf tourism and recreation in Australia: vulnerability and adaptation	Mike Raybould	This project is about the relationship between climate change, coastal communities and marine resources.	30/4/2013	Current focus is on developing assessment frameworks for coastal recreation based on existing LGA owned data and previous research for the Gold Coast LGA and Sydney Coastal Councils Group (SCCG). Conceptual valuation frameworks are currently being developed based on literature reviews and previous research by key members of the team. Data from previous research are being re-analysed to develop integrated case studies of the Gold Coast and Sydney regions that will act as templates for future case studies.
2010/542 FRDC-DCCEE a climate change adaptation blueprint for coastal regional communities	Stewart Frusher and Nadine Marshall	The project aims to develop a blueprint for coastal regional communities that enables these communities to understand the biophysical, social and economic implications of climate change on marine resources (commercial and recreational fishing, tourism, aquaculture) and thus facilitate appropriate adaptation options.	30/6/2013	The post-doctoral researchers, based at Murdoch University and the University of Tasmania start on the 17th October to commence mapping out the suite of conceptual qualitative and quantitative models that could be considered to link across the biophysical and socio-economic domains.
2010/554 FRDC-DCCEE effects of climate change on reproduction, larval development, and population growth of coral trout (<i>Plectropomus spp.</i>)	Morgan Pratchett	Climate change effects on the biology and ecology of the highly valued coral trout will be determined, providing valuable information for those involved in fishing and management. Wild fishery and aquaculture implications are being considered.	30/6/2013	<ol style="list-style-type: none"> 1. Laboratory experiments have shown that exposure to acidified conditions has adverse effects on olfactory discrimination and behaviour of larval coral trout. These results are similar to those shown for small (non-commercial) species of coral reef fishes and are likely to have significant ramifications for the survivorship of larval trout in the wild. 2. Field-based sampling has confirmed that coral trout (at least <i>P. maculatus</i>) are strongly dependent upon live coral habitat as juveniles. At Keppell Islands, coral trout preferentially settle in sandy habitats, but are always associated with live colonies of branching coral, mostly <i>Acropora</i>.
2010/564 FRDC-DCCEE preadapting a Tasmanian coastal ecosystem to ongoing climate change through reintroduction of a locally extinct species	Nic Bax	Using highly valued species, including blue groper, the potential for translocating fish as an adaptation policy is being investigated.	30/3/2013	<ol style="list-style-type: none"> 1. A postdoctoral researcher was employed in March 2011 (50% FTE) 2. An information sheet describing the scientific rationale and objectives of the project has been produced. 3. A scientific review of the ecology of the eastern blue groper and its history in Tasmania is currently underway. 4. A scientific paper on the use of managed translocation of species for the benefit of the receiving ecosystem is also being prepared. 5. The first steering committee meeting will be held on 17-10-11. Members include representatives from Tasmanian and Victorian governments. A key agenda item for the first steering committee will be to engage members in providing direction on the best way to develop a national policy (or protocol) on managed translocation.
2010/565 FRDC-DCCEE management implications of climate change impacts on fisheries resources of northern Australia	David Welch	The project will assess potential climate change impacts on key tropical Australian fisheries species and develop appropriate adaptation options for the relevant stakeholder groups.	14/3/2014	In April 2011 the first project workshop was held in Brisbane with all major team members in attendance including fisheries managers and commercial and recreational fishing interests. Key species have been identified with stakeholder input, and currently the team is conducting a review of the selected species which will assess published information on sensitivity to climate variables. Climate projection information for northern Australia is also currently being collated. An upcoming project workshop will collate the above information to determine the analysis approach appropriate for each species.
2011/503 FRDC-DCCEE climate change adaptation - building community and industry knowledge	Jenny Shaw	Focused in 3 regions; south west (Geraldton), south east (St Helens) and tropics (likely Bowen) to better understand community and industry needs in climate knowledge. Also supporting project 2010/542 CCA; blueprint for coastal communities.	30/6/2013	Established project Steering Group. Met with key stakeholders. Entered into partnership agreement with Oceanwatch for Extension Officers in each of the 3 regions. Developed of a number of national workshops. Negotiated with potential partner/co-badging organisations.

