Coastal Climate Change Range Extension Database & Mapping Project

(CCC REDMAP)

Project Team

The Tasmanian Aquaculture & Fisheries Institute (TAFI) is an Institute within the University of Tasmania that supports the development and sustainable management of living marine resources. TAFI has over 140 scientists, technicians & support staff and is governed by a board chaired by the Secretary of the Department of Primary Industries and Water (DPIW) and including representatives from DPIW, the University, the aquaculture and wild fisheries industries, and a representative from the community.

We have assembled a project team of TAFI staff with substantial expertise from within the Sustainable Fisheries and Marine Environment Program areas, and the new Climate Change Theme area (cross-cutting across all sections of TAFI).

The project team includes:

- Dr Gretta Pecl, Scalefish Research Group & Climate Change Theme area
- Assoc Prof Stewart Frusher, Sustainable Fisheries Research Program Leader & Climate Change Theme Leader
- Dr Jeremy Lyle, Scalefish & Recreational Fisheries Research Group Leader
- Dr Graham Edgar, Marine Biodiversity Research Group
- Dr Rick Stuart-Smith, Marine Biodiversity Research Group
- Peter Walsh, Data Manager

Project Leader

Dr Gretta Pecl has published extensively in the area of marine ecology and resource management, including several papers and reports assessing the potential impacts of climate change. She has a proven track record of academic achievement and community and industry engagement, as well as demonstrated excellence in project management including financial and staffing resources.

Project Summary.

Climate change is leading to redistribution of marine species and is thus altering ecosystem dynamics as species either extend or shift their geographic ranges polewards with warming waters. This is a major, immediate challenge confronting our marine environments and fisheries policy- and decision-makers. The project will build a web-based on-line database and mapping capability where members of the public can submit data on catches/observations

of species that may be undergoing range shifts and/or expansions along the coastal waters of Tasmania. Volunteer recording schemes or 'citizen science' such as this e.g., the Birds Australia Atlas, can generate huge amounts of valuable information for researchers, involve communities and raise public awareness of conservation issues. Importantly, the REDMAP website will provide a place where students, teachers, and the general community can access current information on climate change in one of the fastest warming regions of the world. It will also serve to showcase to students some of the exciting and highly relevant research activities being undertaken around Australia by scientists and students from UTAS and CSIRO. On the website, students and teachers could download fact-sheets targeted at primary or high-school students and plot locations of reports for species and time periods selected. Outreach aspects of the website would also reinforce the existence and relevance of the project to many Tasmanian families, providing a feedback loop encouraging participation in the project and production of more data.

Temperature monitoring of coastal waters at Maria Island, Tasmania, has recorded a warming of over 2°C in 62 years, more than 3 times the global average warming rate, linked to a strengthening of the warm-water East Australia Current. Global models predict this warming will continue with greatest warming in the southern hemisphere in the Tasman Sea. This will have profound implications for marine ecosystems, and the economic and social systems that depend on them. The east coast of Tasmania region is expected to provide an early warning signal for likely impacts on our marine resources. Range extensions on the east coast of Tasmania linked to warming temperatures have already been recorded in coastal snails, barnacles, fish, and sea urchins including a few species from north of the Bass Strait that were previously absent from Tasmania. The 'double-whammy' of warming temperatures and increased transport by the East Australia Current may bring many more mainland species to Tasmanian waters in the near future with implications for local ecosystems and economies. For example, an increase in sea urchins in Tasmanian waters linked to warming has negative implications for Tasmania's rock lobster fishery.

A key issue raised in discussions at International, National and State forums is the need to assess potential impacts that species relatively new to our coasts may have on the ecosystems they are expanding into. A major challenge in addressing these issues, particularly in Australia, is the scarcity of monitoring programs that would inform us of changes in the distributions of our marine species. Additionally, species at the edges of their distributional limits are also by nature initially uncommon. Research projects targeting these species, with the aim of identifying potential ecological impacts of the newcomers in their new habitats, then have problems in reliably obtaining animals in cost-effective and efficient ways. Tasmania has a relatively large commercial fishing community, a very high participation rate in recreational fishing, and a high number of other individuals utilising marine waters, e.g. yachting and scuba diving. These individuals spend many hours on or in the water and can potentially provide many more observations than the best research or monitoring team at a fraction of the cost. Recreational and commercial marine users have strong interests in preserving and learning about their local marine biodiversity and a good reputation for strong participation in research activity. REDMAP is a web-based on-line database with mapping

capabilities where members of the public could submit data on catches/observations of key 'species of interest', along with their contact details. Importantly, community participation in this way creates for individuals the sense (and in this case, the reality) that they are actively and constructively helping with a major issue currently facing the global community – people can log on and literally see 'their' data point on the map.

The site would feature fact-sheets on marine species we suspect are expanding their ranges south, up-to-date recording of species found in Tasmanian waters, and details on associated research (what, why and how). People providing biological samples for research, e.g. earbones or stomach contents, or submitting a photo to verify the data (i.e. data quality would be ranked), would go into the draw to receive a quarterly prize. Samples such as earbones can be used for ageing fish, telling us how old the intruding animals are – older animals may indicate migrating adults whilst very young fish may suggest a population newly established in Tasmania. Stomach contents tell us what the newcomers are eating and therefore part of the story of how new species are interacting with existing components of the ecosystem.

The REDMAP website will provide data to underpin innovative science, and at the same time provide an interactive portal into the science of climate change and an interface to engage Tasmania's general community in active participation in climate change research.

Project Benefits

Recreational and commercial fishing, along with other marine pastimes like scuba diving, are activities strongly entrenched in the Tasmanian culture. The REDMAP project is a facility for Tasmanians to actively participate in generating data that will contribute to research ensuring sustainability of our marine resources and assisting in adaptation for our marine industries. Making the community aware of climate change issues in the marine context is a challenge as the impacts are less visible in comparison to 'dry dams and rivers' and 'forest diebacks'. This proposed website will greatly assist in both raising awareness, and engaging the community, in understanding the impacts of climate change on marine biodiversity and resources. The website will also enhance the University's profile as a key centre for research and teaching into climate change impacts, mitigation and adaptation in the marine domain.

The REDMAP site will:

1. Actively engage people from many organizations and community sectors in the submission of data on sightings/catches of marine species that may be undergoing range expansions, fostering a culture of caring for our natural resources.
2. Provide database and mapping facilities where the general public can generate maps (of locations) and graphs (of either number of sightings or number of species per area) of reported sightings of species selected.

3. Provide an educational resource for teachers to download fact sheets on climate change & the marine environment, and generate maps & graphs demonstrating changes occurring in Tasmanian waters –providing both a global and local focus.

Community support

There is considerable support for this project from a large number of organizations spanning a diversity of community sectors. Both commercial (OceanWatch & Tasmanian Seafood Industry Council representing ≈900 fishers) and recreational fishers (TARFish) strongly support the project, pledging to provide data to the website and distribute information about the website through their electronic and mail networks. St Mary's and Hobart College science teachers are assisting with developing age appropriate fact sheets (on particular species, climate change, current research, how we can help marine industries with adaptation etc) and teaching material for school groups, and the Marine Education Society of Australasia is going to promote the project to Tasmanian and National School communities. Fishcare coordinators would help develop communication and display material including background material for the 100 Fishcare Volunteers, teaching material for the classroom and awareness material for the fishers/interest groups.

Timetable

- January 2009: Employ Science Educator
- January/February 2009: Meeting with scientists to establish which marine species should be highlighted/targeted on website.
- February 2009: Meeting with representatives of participating community groups, teachers and scientists to discuss basics of website design and functioning, promotion of the website, mechanisms for best engaging with each respective community group (e.g. recreational fishers, commercial fishers, scuba divers etc), Liaison with educational groups for advice on presentation and formatting of outputs (maps, tables, graphs), and educational material for school-age groups (primary, early/late high school, and Matric).
- March 2009: Website & database construction commenced. Science educator to liaise with scientists and others to collate material for species fact-sheets, production of PDF pamphlets for each community group to distribute, and basic information sheets on climate change science, impacts of climate change in Tasmanian waters, potential adaptation options for sustainability of our marine resources etc.
- June 2009: Basics of site available off-line to test and demonstrate to user groups to obtain feedback. Populate site with known recent sightings/catches of target species (from Reef Life Survey & any other existing data sources identified).
- July-August 2009: Website fully operational, information materials distributed widely throughout network of community & volunteer partners. Science Educator to present

project at recreational and commercial fishing industry meetings and other community groups.

- August-September 2009: Media release & website launch, involving all project participants & students from the two 'early adopter' schools.
- September 2009: Marine Educator to visit schools, make presentations etc
- October 2009: Follow up with community groups/registered schools to gain feedback on project.
- December 2009: Publicised prize draw for people submitting verified data to website. Public seminars, articles written summarizing outcomes of project and data generated for newspapers, club newsletters, industry magazines etc

Volunteer involvement

Once trained by the Fishcare coordinators, the 100 Fishcare Volunteers active within Tasmania will promote the project, disseminate the material and provide feedback. Reef Life Survey (volunteer marine monitoring program) will provide any relevant data from their SCUBA surveys (this will include species not encountered by other recreational or commercial fishers and will thus greatly complement the developing dataset. Recreational and commercial fishers contributing data will also effectively be 'volunteers'.

Project Management

Project milestones/objectives (as per timetable above) & how they will be evaluated:

- Website & database constructed – website, database & mapping facility will be operational
- Development of information for the general public and teaching resources for schools – materials will be available on the website
- Data on species potentially undergoing range expansions – number and frequency of data submissions
- Dissemination of current research/science of climate change & impacts occurring in Tasmanian waters – number of seminars/talks given by the project Science Educator, number of Fishcare events where the website is promoted, number of project pamphlets distributed via email and post by community partners.
- Education of school students on climate change and impacts in Tasmania – number of school classes that register on the site
- Raising awareness of climate change (and current research at UTAS & CSIRO) in the general community – number of fact-sheets downloaded, maps generated etc.