

Faculty of Computing, Health and Science
Research Group, Research Centre or Research Institute Report

RESEARCH UNIT NAME: Centre for Marine Ecosystems Research

RESEARCH UNIT LEVEL: II

REPORT TYPE: Annual report

YEAR: 2009

BRIEF OVERVIEW:

Members of the CMER have a strong track record of obtaining external research income from a wide range of industry and national competitive sources. In 2009, income which exceeded \$0.5M and 26 research papers, of which 42% were published in A* and A category journals, while a further 23% were published in B category journals under the ERA system. The publications produced by CMER in 2009 constituted 8% of all ISI-listed publications produced by ECU in 2009. A notable feature of the publication record is the large number of collaborative papers, reflecting the close and complementary research occurring within the group as well as with external research collaborators. There were 2 HDR completions in 2009.

MEMBERSHIP:

Research Staff	Adjunct Staff	Students
Mr Rob Czarnick	Dr Russ Babcock	Ainslie Denham
Mr Adam Gartner	Dr Ray Masini	Adam Gartner
Dr Christine Hanson	Dr Mads Thomsen	Thibaut de Bettignies
Associate Professor Glenn Hyndes	Dr Fernando Tuya	Gary Choney
Ms Karina Inostroza	Dr Mat Vanderklift	Jason How
Professor Paul Lavery		Karina Inostroza
Dr Kathryn McMahan		Justin King
Mrs Wendy Mills		Peter Kiss
Dr Pippa Moore		Peter Michael
Dr Britta Munkes		Michael Mulligan
Ms Michelle Newport		Jose Placido Escano Roepstorff
Associate Professor Ute Mueller		Tracey Rodwell
Dr Adriana Verges		Charu Lata Singh
Dr Thomas Wernberg		Carli Telfer
		Candace Willison

NEW & ONGOING RESEARCH PROJECTS:

Project	Funding Source	Investigators	2009 Actual External & Internal Income	Total income for grant
Interactions Between <i>Halophila ovalis</i> and <i>Caulerpa racemosa</i> in the Swan River.	Ernest Hodgkin Trust	Wernberg	2,400	2,400
Attributes of a Sustainable Reef: Seagrass and Associated Megafauna.	Great Barrier Reef Foundation	McMahon	3,000	3,000
Do Different Levels of Fishing Pressure, Through Spatial Management, Influence Communities and Ecological Interactions in Seagrass Meadows in South Western Australia.	Rottneest Island Authority	Inostroza, Moore, Hyndes	3,517	3,517
Seagrass health survey (Becher Point to Fremantle Region).	Dept of Environment WA	Lavery	8,176	153,682
The Effects of Ocean Acidification on Trophic Interactions in Temperate Seagrass Assemblages.	ECU	Moore, Hyndes, Wernberg	21,458	21,458
Seagrass TIME - Trophic Cascades in Marine Ecosystems.	European Commission	Lavery, Munkes	36,608	308,175
Impact of Dredging on Coral Communities.	Woodside Energy Ltd	Lavery, McMahon	43,371	276,459
The Role of Herbivory in Ameliorating the Effects of Nutrient Enrichment in Marine Ecosystems.	CSIRO	Lavery, Munkes	50,000	368,000
Research Study into Seagrass Wrack Movement at Geographe Bay.	UWA	Lavery, McMahon	97,273	372,500
Biodiversity assessment, ecosystem impacts of human usage and management strategy evaluation Node 3.2.	WAMSI; ECU	Hyndes, Vanderklift, Verges	98,888	405,650
Trophic Interaction and Ecosystem Modelling - WAMSI Node 4.3.	WAMSI; ECU	Hyndes, Moore	136,982	421,381
Rates and processes of <i>Posidonia sinuosa</i> degradation in south-west Australia.	Karrakatta Club, ECU	Willison, Lavery, McMahon	3,327	3,327

PUBLICATIONS :

Refereed Journals

- Arthur K, McMahon K, Limpus CJ, Dennison WC (2009) Feeding ecology of green turtles (*Chelonia mydas*) from Shoalwater Bay, Australia. *Marine Turtle Newsletter* 123: 6-12.
- Collier C.J., Lavery P.S., Ralph P.J., and Masini R.J. (2009). Shade-induced response and recovery of the seagrass *Posidonia sinuosa*. *Journal Experimental Marine Biology & Ecology* 370:89-103.
- Crawley K.R., Hyndes G.A., Vanderklift M.A., Reville A.T., and Nichols P.D. (2009). Allochthonous brown algae are the primary food source for consumers in a temperate, coastal environment. *Marine Ecology Progress Series*. 376: 33-44.
- Doropoulos C., Hyndes G.A., Lavery P.S., and Tuya, F. (2009). Dietary preferences of two seagrass inhabiting gastropods: Allochthonous vs autochthonous resources. *Estuarine Coastal and Shelf Science*. 83, 1: 13-18.
- Eklof J.S., McMahon K., and Lavery P.S. (2009). Effects of multiple disturbances in seagrass meadows: shading decreases resilience to grazing. *Marine and Freshwater Research*. 60: 1317-1327.
- Firth L.B., Crowe T.P, Moore P., Thompson R.C. and Hawkins S.J. (2009). Competition between key species on temperate rocky shores: a proposed method to identify potential effects of climate change. *Global Change Biology*. 15: 1413-1422.
- Hanson C.E., McLaughlin M.J., Hyndes G.A., and Strzelecki J. (2009). Selective uptake of prokaryotic picoplankton by a marine sponge (*Callyspongia* sp.) within an oligotrophic coastal system. *Estuarine Coastal and Shelf Science*. 84: 289-297.
- Hawkins S.J., Sugden H.E., Mieszkowska N., Moore P.J., Poloczanska E.S., Leaper R., Herbert R., Genner M.J., Moschella P.S., Thompson R.C., Jenkins S.R., Southward A.J., and Burrows M.T. (2009). Consequences of climate-driven biodiversity changes for ecosystem functioning. *Marine Ecology Progress Series*. 396: 245-259
- Lavery P., McMahon K., Mulligan M., and Tennyson A. (2009). Interactive effects of timing, intensity and duration of experimental shading on *Amphibolis griffithii*. *Marine Ecology Progress Series*. 394: 21-33.
- McMahon KM, Waycott M (2009). New record for *Halophila decipiens* Ostenfeld in Kenya based on morphological and molecular evidence. *Aquatic Botany* 91: 318-320.
- Nyberg C.D., Thomsen M.S., and Wallentinus I. (2009). Flora and fauna associated with the introduced red algae *Gracilaria vermiculophylla*. *European Journal of Phycology*. 44: 395-403.
- Ortega-Borges L., Tuya F., and Haroun R.J. (2009). Does depth and sedimentation interact with sea urchins to affect algal assemblage patterns on eastern Atlantic reefs? *Journal of Shellfish Research*. 28: 947-955.
- Ortega-Borges L., Tuya F., and Haroun R.J. (2009). The sea urchin *Diadema antillarum* (Phillipi, 1845) influences the diversity and composition of the mobile mega-invertebrate community on the rocky bottoms of the Canary Archipelago. *Revista de Biología Marina Oceanografía*. 44: 489-495.

- Ramirez R., Tuya F., and Haroun R.J. (2009). Spatial patterns in the population structure of the whelk *Stramonita haemastoma* (Linnaeus, 1766) (Gastropoda: Muricidae) in the Canarian Archipelago (eastern Atlantic). *Scientia Marina*. 73: 431-437.
- Rennie S., Hanson C.E., McCauley R.D., Pattiaratchi C., Burton .C., Bannister J., Jenner J., and Jenner M.N. (2009). Physical properties and processes in the Perth Canyon, Western Australia: Links to water column production and seasonal pygmy blue whale abundance. *Journal of Marine Systems*. 77:21-44.
- Smale, D.A. and Wernberg, T. (2009). Satellite-derived SST data as a proxy for water temperature in nearshore benthic ecology. *Marine Ecology Progress Series*. 387: 27–37.
- Stæhr P.A. and Wernberg T. (2009). Physiological responses of *Ecklonia radiata* (Laminariales) to a latitudinal gradient in ocean temperature. *Journal of Phycology*. 45:91-99.
- Thomsen M.S., McGlathery K.J., Schwarzcild A., and Silliman B. R. (2009). Distribution and ecological role of the non-native macroalga *Gracilaria vermiculophylla* in Virginia salt marshes. *Biological Invasions*. 11: 2303-2316.
- Thomsen, M. S., Wernberg, T., Tuya, F., and Silliman, B.R. (2009). Evidence for Impacts of Nonindigenous Macroalgae: A Meta-Analysis of Experimental Field Studies. *Journal of Phycology*. 45: 812–819.
- Thomsen M.S., Wernberg T., Silliman B.R., and Josefson, A.B. (2009). Broad-scale patterns of abundance of non-indigenous soft-bottom invertebrates in Denmark. *Helgoland Marine Research*. 63: 159-167.
- Tuya F., and Haroun R.J. (2009). Phylogeography of Lusitanian Macaronesia: biogeographic affinities in species richness and assemblage composition. *European Journal of Phycology*. 44: 405-413.
- Tuya F., Wernberg T., and Thomsen M.S. (2009). Colonization of gastropods on subtidal reefs depends on density in adjacent habitats not on disturbance regime. *Journal of Molluscan Studies*. 75: 27-33.
- Tuya F., Wernberg T., and Thomsen M.S. (2009). Habitat structure affect abundances of labrid fishes across temperate reefs in south-western Australia. *Environmental Biology of Fishes*. 86: 311-319.
- Vanderklift M.A., Lavery P.S., and Waddington K.I. (2009). Intensity of herbivory on kelp by fish and sea urchins differs between inshore and offshore reefs. *Marine Ecology Progress Series*. 376:203-211.
- Vergés A., Alcoverro T., Ballesteros E. (2009). The role of fish herbivory in structuring the vertical distribution of canopy algae (*Cystoseira* spp.) in the Mediterranean. *Marine Ecology Progress Series*. 375: 1-11.
- Wernberg T. (2009). Spatial variation in juvenile and adult *Ecklonia radiata* (Laminariales) sporophytes. *Aquatic Botany*. 90: 93-95.

Reports

- Hyndes G., and Hanson C. (2009). Ecological Interactions in Coastal Marine Ecosystems: Trophodynamics Final report on the outcomes from a SRFME collaborative project.

- Lavery P. (2009). Monitoring of Seagrass Meadows on The Eastern Shore of Garden Island, Western Australia, 2009. Report to the Commonwealth Dept of Defence. Centre for Marine Ecosystems Management Report 2009-03.
- Lavery P & McMahon K (2009). Research priorities for improving the capacity to manage dredging impacts on tropical coral communities in Western Australia. Workshop discussion & outcomes. Report No 2009-4. Centre for Marine Ecosystems Research, Edith Cowan University, Perth, Australia.
- Lavery, P, Pattiaratchi, C, Oldham, C, McMahon, K, Branco, B, Weyer, J, Hetzel, Y, Newport, M, Hancock, S (2009). Research study into seagrass wrack movement in Geographe Bay. Stage 1 Report to Department of Transport. 171 pp.
- McMahon, K (2009). Attributes of a sustainable reef: seagrass and associated megafauna. A report to the Great Barrier Reef Foundation. 8 pp.
- Thomsen M.S., & Wernberg T. (2009). Drift algae, invasive snails and seagrass health in the Swan River: patterns, impacts and linkages. Final report to the Swan River Trust: SCRIP project 2008-09. Report no. CMER-2009-02. Pp. 105.
- Wernberg T., Campbell A., Coleman M.A., Connell S.D., Kendrick G.A., Moore P.J., Russell B.D., Smale D., and Steinberg P.D. (2009). Macroalgae and temperate rocky reefs. In: Poloczanska E.S., Hobday A.J., Richardson A.J. (eds) A Marine Climate Change Impacts and Adaptation Report Card for Australia 2009. NCCARF Publication 05/09, p 1-21.

HIGHER DEGREE BY RESEARCH LOAD:

Student	Canditure
Thibaut de Bettignies	PhD
Ainslie Denham	PhD
Adam Gartner	PhD
Jason How	PhD
Tracey Rodwell	PhD
Charu Lata Singh	PhD
Gary Choney	MSc
Peter Kiss	MSc
Michael Mulligan	MSc
Jose Placido Escano Roepstorff	MSc
Carli Telfer	MSc
Candace Willison	MSc
Karina Inostroza	Honours
Peter Michael	Honours

HIGHER DEGREE BY RESEARCH COMPLETIONS:

Lachlan MacArthur (PhD).

Thesis title: Habitat use, movements and trophic linkages of the western rock lobster, *Panulirus cygnus*, within the shallow coastal waters of Western Australia.

Chongdee Srinoparatwatana (PhD).

Thesis title: Population biology of two key fish species and the dynamics and management of the trap fishery in Beung Borapet, Thailand.

Peter Michael (Honours).

Thesis title: Regional differences in the piscine drivers of macroalgal herbivory in a coral-reef marine park

VISITORS AND COLLABORATIONS:

Local

Strong collaborations have continued with Dr Mat Vanderkluft and Dr Russ Babcock at CSIRO through Western Australian Marine Science Institute projects, and with Associate Professor Carolyn Oldham and Prof Chari Pattiaratchi at UWA and Dr Tony Chiffings at DHI Consulting on seagrass wrack dynamics, particularly in relation to decomposition and transport. Recommendations for a research plan to improve capacity to predict impacts of dredging was finalised for Woodside and interactions with Dr Ray Masini, Dr Cameron Sim and Mr Kevin McAlpine from Department of Environment and Conservation, and collaborations with those DEC staff continue with the development of standard operating procedures for seagrass health monitoring. Dr Shaun Wilson (DEC) and Dr Dan Smale (UWA) were invited to give SONS seminar. Both Shaun and Dan have ongoing collaborations with CMER researchers.

National

Kathryn McMahon invited Len McKenzie from the Queensland Department of Primary Industries and Fisheries to give a SONS seminar on the 'Local eyes, Global wise: Seagrass-Watch monitoring program'. Glenn Hyndes and Pippa Moore invited Dr Hugh Pederson, Myriax Software, to give a seminar on recent developments in four dimensional data visualisation techniques. Hugh is collaborating with Glenn and Pippa on the analysis and visualisation of their western rock lobster tracking research.

International

Dr Rebecca McLeod from University of Otago visited Glenn Hyndes to explore field sites and collect preliminary samples for her New Zealand Science and Technology Postdoctoral Fellowship, on which Glenn is an official mentor. This two-week visit aimed at establishing some baseline data for future research as part of the fellowship.

Pippa Moore was invited on to an international working group towards understanding the impact of climate change on marine systems. The working group, funded by the National Center for Ecological Analysis and Synthesis, includes participants from 12 institutions and 8 countries. Dr Chris Read (SAHFOS) visited Pippa Moore and also gave a SONS seminar on climate change impacts on North Sea pelagic communities.

Assoc. Prof. Marianne Holmer from the University of Southern Denmark visited CMER. During her two-week visit, she collaborated with Mads and Thomas on estuarine research, more specifically interactions between drift algae and seagrasses in the Swan River Estuary. Marianne is an expert on biogeochemical interactions between seagrasses, sediments and associated biota.

CMER hosted ARC-NZ Vegetation Function Network working group #66 – Estuarine Drift Algae. The group met to assess global patterns of impacts of drift algae in estuaries. The group compiled drift algal ‘impact’ studies and extracted and compared standardized effects sizes through meta-analysis. The working group was convened by Mads Thomsen (ECU). Also in the working group was Marianne Holmer (University of Southern Denmark), Mat Vanderklift (CSIRO), Brian Silliman (University of Florida) and Thomas Wernberg (ECU). The group is currently building a database of climate change impacts in the marine environment on which to undertake meta-analyses. The group expects to publish numerous high impact publications as well as developing ongoing international collaborative projects.

Paul Lavery Kathryn McMahon and Glenn Hyndes were visited by Dr Miguel-Angel Mateo from the Centre for Advanced Studies of Blane (CEAB) Spain, funded through the CHS visiting fellow scheme. Miguel and Paul collaborated on a study investigating the carbon storage capacity of Australian seagrass meadows, and Miguel provided valuable input into the Paul and Kathryn’s seagrass wrack dynamics research project and Candace’s associated Masters project.

COMMUNITY ENGAGEMENT:

Centre members maintained their commitment to engaging with the scientific and broader community, through presentations at conferences, involvement in scientific committees and media (see below table). Members have also been active in reviewing manuscripts for journals including highly ranked journals such as Marine Ecology Progress Series, Estuarine Coastal and Shelf Sciences and Journal of Ecology. In total, staff in the centre reviewed 38 manuscripts in 2009.

Body/Event	Role	Name
Perth Region NRM - Marine Reference Group.	Chair	Glenn Hyndes
Perth Region NRM.	Board Member	
Dept. of Fisheries, WA – Scientific Steering Committee (scientific advice to Fisheries).	Member	
Australian Marine Sciences Association 2009 Conference	Presenter	
Western Australian Coastal Conference	Presenter	
Western Australian Marine Science Institute: Node 4 workshop	Participant	
Department of Environment & Conservation: research priorities for the Walpole and Nornalup Inlets Marine Park	Participant	
Australian Marine Sciences Association 2009:Conference: workshop on coastal connectivity	Chairs	Glenn Hyndes, Paul Lavery & Mat Vanderklift
Dept. of Environment and Conservation – Monitoring survey for marine park planning.	Coordinators	Glenn Hyndes & Paul Lavery
ARC Working Group on Seagrass Evolution	Member	Paul Lavery
Seminar at UWA School of Plant Biology: <i>Seagrass responses to light reduction and their role in coastal connectivity.</i>	Presenter	
Western Australian Marine Science Institute – scientific review panel.	Reviewer	

The Environment Protection and Heritage Council and the Natural Resource Management Ministerial Council Working Group: revision of the Aust. & NZ Water Quality Guidelines - Biological Assessment and Monitoring and Assessment	Member	
8th International Temperate Reefs Symposium	Presenter	Pippa Moore
Western Australian Marine Science Institute: Node 4 workshop	Participant	
Earth Day: organised a stall to educate local primary school children about the threats to marine systems and the organisms that can be found in our local waters.	Member	
Joondalup Weekender- article regarding seahorses.	Interview	
Rocky reef section of national 'report card for marine environments' in relation to climate change	Participant	
NCEAS Working Group towards understanding marine impacts of climate change	Participant	
ARC Working Group on Climate impacts on marine flora	Convener	
ARC Working Group on biogeography of marine flora	Participant	
ARC working group on impacts of algae in seagrass beds	Co-convener	
Rocky reef' section of national 'report card for marine environments' in relation to climate change.	Lead Author & coordinator	
Swan-Canning Research Innovation Program symposium	Presenter	
Australian Marine Science Association Conference	Presenter	Kathryn McMahon
Workshop on seagrass health measurement for Oceanica	Presenter	
Coordinate development of seagrass illustrations and artwork	Coordinator	
Siemans Science Experience and Science Week Presentations to Local high schools	Presenter	
Provide advice to DEC and Rottnest Island Authority on seagrass health monitoring	Participant	

WAMSI Climate Change Symposium	Participant	Adriana Verges
8th International Temperate Reefs Symposium	Presenter	
Indo-Pacific Fish Conference	Presenter	
3rd Annual Ningaloo Symposium	Presenter	
Career-building strategies for women in Academia workshop	Presenter	

FUTURE PLANS AND DIRECTION:

CMER’s major goals for 2010 and beyond will be to:

1. Build on existing strengths in benthic marine ecosystem research using existing and new external collaborations;
2. Maintain and develop research capabilities in its four key research areas: Habitat connectivity and trophic interactions, Management of human impacts, Conservation and fisheries biology, and Stress and disturbance ecology through major funded research projects and appointment of postdoctoral fellows;
3. Build research partnerships with key private industry, government agencies and universities (national and international);
4. Support postdoctoral researchers through externally-funded research income;
5. Build postgraduate enrolments;
6. Build international linkages through visiting researchers and student exchanges.

DATE OF NEXT FORMAL REVIEW:

2013.