Centre for Fish, Fisheries and Aquatic Ecosystems Research

ANNUAL REPORT 2012
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Kimberley North east – photo by Simon Allen

Inside Cover Page:
Indo-Pacific bottle nosed dolphins and research team - photo by Simon Allen

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September 2013
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1. MANAGEMENT BOARD

Chair
Professor David Macey

Director
Professor Neil Loneragan

Deputy Director
Associate Professor Alan Lymbery

Centre member
Professor Lynnath Beckley

Centre member
Professor Malcolm Tull

Head of school
Associate Professor Carolyn Jones

Alcoa Chair, Sustainable Water Management
Professor Richard Harper

Director, Sustainable Ecosystems Research Institute
Professor Bernard Dell

Director, Marine and Freshwater Research Laboratory
Associate Professor Belinda Robson

Director of Research and Development
Mr Philip Hocking

2. ADMINISTRATIVE DETAILS

Centre members as at December 2012

Director
Neil Loneragan PhD (SE)

Academic staff
Lynnath Beckley PhD (SE) Halina Kobryn PhD (SE)
Kate Bryant PhD (SE) Alan Lymbery PhD (HS)
Max Cake PhD (SE) Philip Nicholls PhD (HS)
Jennie Chaplin PhD (SE) Malcolm Tull PhD (LB)
Howard Gill PhD (SE) Mike Van Keulen PhD (SE)

Adjunct/Emeritus appointments
Zaven Arzoumanian PhD Rod Lenanton PhD
Stuart Bradley PhD Hector Lozano Montes PhD
Bob Clarke PhD Peter Madsen PhD
Jeffrey Dambacher PhD Brett Molony PhD
Rob Doupe PhD Stephen Newman PhD
Nick Dunlop PhD Brad Norman MPhil
David Fairclough PhD Gavin Partridge PhD
Daniel Gaughan PhD Margaret Platell PhD
Norm Hall PhD Ken Pollock PhD
Alex Hesp PhD Jeremy Prince PhD
Steeg Hoeksma PhD Peter Rogers DSc
Greg Jenkins BSc Magnus Wahlberg PhD
Dave Johnston PhD Richard Warwick PhD

Research Fellows
Simon Allen MSc (SE) David Holliday (SE)
Stephen Beatty PhD (SE) John Huisman PhD (SE)
Lars Beijer PhD (SE) Sarah Metcalf PhD (LB)
Belinda Cannell PhD David Morgan PhD (SE)
Peter Cousins PhD (SE) Ian Potter PhD (SE)
Joseph Christensen PhD (LB) Joshua Smith PhD (SE)
Hugh Finn PhD (SE) James Tweedley PhD (SE)
Steeg Hoeksema PhD (SE) Fiona Valesini PhD (SE)

Research staff
Claire Smallwood (SE) Gordon Thomson (SE)

Gordon Thomson (SE)

Kristin Wouters (SE)
PhD students

<table>
<thead>
<tr>
<th>Name</th>
<th>Institute</th>
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<tbody>
<tr>
<td>Jo Marie Acebes (AE*)</td>
<td>Thea Linke (SE)</td>
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<tr>
<td>Mark Allen (SE)</td>
<td>Karen Marshall (SE)</td>
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<td>Simon Allen (SE)</td>
<td>Fiona McAule (SE)</td>
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<tr>
<td>Farhan Bokhari (HS)</td>
<td>Shannon McCluskey (SE/UW)</td>
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<tr>
<td>Alex Brown (SE)</td>
<td>Frazer McGregor (SE/AIMS/UWA))</td>
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<td>Amanda Buckland (SE)</td>
<td>Heather McLetchie (HS)</td>
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<td>Janja Ceh (SE/AIMS)</td>
<td>Glenn Moore (SE)</td>
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<td>Warren Chisholm (SE)</td>
<td>Mikayla Morine (HS/SE)</td>
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<td>Natasha Coen (SE)</td>
<td>Jon Murphy (HS/SE)</td>
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<td>Alan Cottingham (SE)</td>
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<td>Rainbo Dixon (SE/UAdel)</td>
<td>Owen O'Shea (SE/AIMS)</td>
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<td>Emily Fisher (SE)</td>
<td>Nicole Phillips (SE)</td>
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<td>Ben French (SE)</td>
<td>Mahmoud Rashnavadi (HS/SE)</td>
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<td>Sarah Fretzer (SE)</td>
<td>Rebecca Roberts (SE/LB)</td>
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<td>Michelle Gardner (SE)</td>
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<td>Susan Gibson–Kueh (HS)</td>
<td>Kate Sprog (SE)</td>
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<td>Kate Greenfield (SE)</td>
<td>Alicia Sutton (SE)</td>
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<td>Adrian Hordyk (SE)</td>
<td>Calais Tink (SE)</td>
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<td>Michelle Ingram (HS)</td>
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<td>Michael Klunzinger (HS/SE)</td>
<td>Julien Tyne (SE)</td>
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<td>Mark Langdon (SE)</td>
<td>Lauren Veale (SE)</td>
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<td>Elaine Lek (SE)</td>
<td>Sharon Yeo (SE/CSIRO)</td>
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MPhil/MSc students

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<th>Name</th>
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<tr>
<td>Valissa Buchanan (SE)</td>
<td>Kimberley Mars Ekamper (SE)</td>
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<td>Tanya Carroll (SE)</td>
<td>Krista Nicholson (SE)</td>
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<td>Daniel Gibbons (SE)</td>
<td>Elena Sulin (SE)</td>
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<td>Helen Hunt (SE)</td>
<td>Jeff Whitty (SE/JCU)</td>
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<td>Chris Johnson (SE)</td>
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Honours students

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<tr>
<td>Douglas Anderson (SE)</td>
<td>Hayley Matyear (SE)</td>
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<td>Kaija Antipas (SE/CSIRO)</td>
<td>Abby Mitchell (SE)</td>
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<tr>
<td>Fionna Cosgrove (SE)</td>
<td>James Raeside (SE)</td>
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<td>Sherrie Chambers (SE)</td>
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<td>Lisa-Marie Harrison (SE)</td>
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AE Faculty of Arts and Education (* through Asia Research Centre)
AIMS Australian Institute of Marine Science
CSIRO Commonwealth Scientific and Industrial Research Organisation
DEC Department of Environment and Conservation
DoF Department of Fisheries
ECU Edith Cowan University
HS Faculty of Health Sciences
JCU James Cook University
LB Faculty of Law and Business
SE Faculty of Science and Engineering
UAdel University of Adelaide
UTAS University of Tasmania
UW University of Washington
UWA University of Western Australia
DIRECTOR’S REPORT

The research areas of staff and students in the Centre for Fish, Fisheries and Aquatic Ecosystems Research (CFFAER) incorporate the activities of researchers across four Schools in the University (in 2012 these were: Biological Sciences and Biotechnology, Environmental Sciences, Veterinary and Biomedical Sciences and the School of Business). The focus areas of research for the Centre include population and community biology, estuaries, biological oceanography, systematics, fisheries and ecosystem modelling, recreational fishing, biology and conservation of sawfish, dolphins, dugongs, whales and penguins, marine protected areas, restocking, aquaculture, genetics and fish health. Research by Centre members contributes to the Excellence in Research for Australia (ERA) assessment of the University primarily in Fisheries Science, Ecology, Zoology, Genetics and Evolution and Environmental Management – all areas that were ranked at or above the international average in 2012. Murdoch University is the only University in Western Australia to be assessed for Fisheries Science and only one of four universities across Australia to be assessed in this field of research in the ERA assessments of 2010 and 2012. This report provides summary information on the achievements of Centre members in three areas: Publications (including conferences), Supervision of Postgraduate and Honours students and Research Income for 2012 and partly for 2013. It also provides a summary of some of the significant changes in the University and the Centre during 2012 and 2013 that will influence the future scope and directions of the Centre.

Changes in the University and Centre environment

Since the appointment of Professor Richard Higgott as Vice Chancellor of Murdoch University in August 2011, significant changes have been initiated across the University as he has placed emphasis on enhancing Murdoch’s reputation as a leading research-intensive University during his term as Vice-Chancellor. Under his leadership, the University has developed a strategic plan for the period from 2012 to 2017, which clearly focuses the University’s activities around the core values of excellence in research, excellence in teaching and community engagement. In February 2012, Professor David Morrison was appointed as Deputy Vice Chancellor of Research and Professor Ann Capling as Deputy Vice Chancellor Academic. The University was restructured from 14 to eight Schools in January 2013 and the Curriculum was reviewed and a new curriculum is being implemented in January 2014. Centre members now belong to the School of Veterinary and Life Sciences and the School of Governance and Management. The Centre has adapted to the new research agenda by pursuing and establishing collaborative projects within the University and also with external researchers and stakeholders.

As part of developing strategic research directions across the University, Professor Morrison commissioned a review of all Centres and Institutes at Murdoch, including the CFFAER. The December 2012 report, from the internal review by Professor Bernard Dell, recognised that the Centre was one of significant, active research strength in the University and should be continued after an external review in September 2013. It also identified that in recent years, research effort has expanded significantly into species of conservation significance in marine and estuarine environments and that there is a perception of a loss of critical expertise in fisheries research. The report recommended that consideration be given to repositioning the Centre to focus on fisheries science and that the University consider creating a new Centre, with a focus on wildlife and conservation biology, linking terrestrial and aquatic research across the University. The Centre Strategy Group and the Centre Board endorsed these recommendations in early 2013.

Achievements of Centre Members

In 2012, the staff and students of the Centre have continued to publish a substantial number of papers in international journals (38), one book, two book chapters, and four major technical reports. These publications include many with international collaborators, covering a wide range of research topics such as estuarine fish and invertebrates, heavy metal pollution of estuaries, the biology of fish and invertebrates, lamprey biology and marine mammal biology, behaviour and conservation. The information for publications available in 2013 indicates another productive year for the Centre. During 2012, Centre members worked on 44 externally funded research projects, with a total research income of $2.89 million, including $1.24 million of nationally competitive Category 1 research funds (13 projects). In 2013, significant new grants have been obtained from the Recreational Fishing Trust Initiative, Natural Resource Management, the Fisheries Research and Development Corporation and Chevron Australia.

The activities of research students continue to be a vital part of the Centre’s success, with many Postgraduate and Honours students currently enrolled, as well as eight PhD completions in 2012 and
a further four PhD completions and two PhD Theses submitted in 2013. The number of PhD completions and their associated publications highlights the significance of the Centre for providing research training in fisheries and aquatic ecosystem research.

Research highlights

Some of the research highlights in marine fisheries, ecosystem, sawfish and marine mammal research include the initiation of research plans for the WA Marine Science Institution (WAMSI II) research in the Kimberley and the development of new models for recreational fisheries and communicating information to decision makers as part of the PhD studies by Emily Fisher and Calais Tink, and new growth models for species that move offshore with ontogeny and that are found at different latitudes (by Elena Sulin). These studies involve close collaboration with Emeritus Professor Norm Hall and Dr Alex Hesp at the Department of Fisheries. Research Professor Ian Potter and Dr Howard Gill continued their international and national collaborations on lamprey biology, systematics and vision systems.

The working group for the Vice Chancellor’s initiative on Estuaries, Catchments and Nearshore Environments (ECANSE), led by Professor Nick Costa with senior research fellow, Dr Fiona Valesini, identified five areas of development for this initiative: 1) developing partnerships and collaborations to enhance research in estuaries; 2) developing an exemplar project to illustrate the principals of partnership and collaboration on ECANSE, linked to the priorities of management and the community; 3) building international collaborations through seeking candidates for a WA Fellow on estuaries and a Sir Walter Murdoch Distinguished Professorship in Estuaries; 4) contributing to developing and holding the Healthy Estuaries Forum and Workshop and 5) building links between estuarine research and increasing the aspirations of secondary students in the Peel and Rockingham regions for tertiary training. Significant time was spent in discussing the ECANSE initiative with WA government departments and the WA Marine Science Institution (WAMSI), particularly around the feasibility of establishing a node for estuarine research within the WAMSI framework. The ECANSE initiative has built support for an initiative on estuarine research and management within WA Government and significant support for an initial project in the Peel region. Recently, the WAMSI established a working group on Estuarine Science to explore the establishment of an Estuaries node within the WAMSI.

Detailed biological research continued on the Black Bream (Acanthopagrus butcheri) in the Swan-Canning and Blackwood estuaries, the Western Striped Grunter (Pelates octolineatus) in the Peel-Harvey estuary and adjacent coastal waters, the Sea Sweep (Scorpius aequippinnis) on the south coast, the Harlequin Fish (Othos dentex) on the south and west coast, Wrasse (Coris auricularis, Notolabrus parilus and Opthalmolepis lineolata) of the central west coast and flathead (Platycephalus laevigatus and Leviprora inops) in south-western Australia. The research on flathead applied the approaches from studying tree rings (dendrochronology) to investigating the pattern of growth in the otoliths (ear bones) of fish to study the influence of climate variability on growth. Many of these studies have involved collaboration with Emeritus Professor Norm Hall, and Adjuncts at the Department of Fisheries, including Dr Alex Hesp and Dr David Fairclough. These studies provide rigorous, detailed information on growth and mortality, feeding and size and age at maturity and maximum size and age that is fundamental for developing informed management plans for these species.

Staff and students in the CFFAER have continued to be very active in undertaking research on species of conservation significance, such as the dolphin populations of the Bunbury region, Swan River, Shark Bay and the Kimberley, Freshwater Sawfish in the Kimberley and Pilbara, dugongs in the Pilbara and on Fairy Penguins in Cockburn Sound. Significant new funding was gained from Chevron Australia for research on sawfish (Dr David Morgan) and dugong (Dr Amanda Hodgson) as part of the Wheatstone project in the Onslow region of the Pilbara. Remote sensing and tagging technology have been used to understand the movement and home ranges of whale sharks, fairy penguins and freshwater sawfish. In freshwater, a major NRM strategic grant (Drs Stephen Beatty and David Morgan) is researching the ecology and prioritising threats to the south-wests most endangered freshwater fishes: the Western Trout Minnow, Balston’s Pygmy Perch, and Little Pygmy Perch, a recently described new species by Drs Morgan, Beatty and Mark Adams (South Australian Museum). The freshwater group has also contributed to two recently completed projects, funded by the National Climate Change and Adaptation Research Facility (NCCARF), and published research books that included developing environmental thresholds for south-west freshwater fishes for use in climate change modelling and developing an in-stream barrier prioritisation strategy for southern Australia (Drs Beatty, Morgan, Lymbery and Mark Allen). The impacts of invasive species, such as Eastern
Mosquitofish and Goldfish, on biodiversity and system function have also been an important focus of activity. The freshwater and estuarine groups have recently completed an assessment of the Vasse-Wonnerup estuarine and freshwater fish communities including mapping, prioritising and controlling pest species. The latter project is also using acoustic tags to track the movement of Goldfish and provide information to guide Goldfish control programs. The Australian Biological Research Survey has funded new research on the molecular phylo-geography of freshwater fishes in south-western Australia.

Research on fish health included studies of the health of cultured and wild aquatic species, principally in freshwater. Current research projects in this area are addressing the causes and consequences of stream salinisation, the role of invasive species in disrupting food webs and transmitting diseases, the development of sustainable inland saline aquaculture and understanding parasitic diseases of wild and cultured aquatic species. New funding was gained to study introduced freshwater fishes and their co-invading parasites from the Australia and Pacific Science Foundation.

The Cetacean Research Unit (MUCRU) continued to expand their research areas, international collaborations and research income from competitive research-, industry- and government grants. In 2012, the Unit published 13 peer-reviewed journal publications and raised in excess of $1,200,00 in research funds – including $520,000 in category 1 competitive grants. New research initiatives commenced in 2012 included efforts to: evaluate abundance and genetic connectivity of snubfin and humpback dolphin in the Kimberley region; identify humpback whale breeding areas in the Great Barrier Reef Marine Park, develop dugong aerial surveys and satellite tagging; develop passive acoustic methodology for monitoring Australian snub-fin and Indo-Pacific humpback dolphins. In 2012/2013, the Unit initiated a collaborative research project with Duke University and Marine Ventures Foundation entitled Coastal Walkabout. Coastal Walkabout is an open access, dynamic, citizen science initiative that utilises smart phone technology and social media to engage and motivate local communities to gather scientific observations within the coastal, estuarine and near-shore environments. The Coastal Walkabout smart-phone apps will be launched in October/Nov 2013. In 2013, an international collaboration with Professor Peter Madsen (Aarhus University), Associate Professor Dave Johnston (Duke University) and Associate Professor Lars Bejder and Dr Josh Smith commenced to investigate a) the fine scale movements and habitat-use of humpback whales and b) the ambient ocean noise in these regions and the increased human activity in north-western Australia on these whales. Research has also been initiated with the Department of Fisheries to investigate the mitigation of whale entanglements in the western rock lobster fishery, Western Australia’s most valuable commercial fishery.

Conferences and collaborations

The University and Centre members were very active in the organisation of Healthy Estuaries 2111 Forum and Workshop, held in Mandurah in October 2012. Dr Jane Chambers was the Convenor for this Forum and Workshop and the Chair of the working group, with representatives from the Department of Water, Swan River Trust, SERCUL, Canning City Council, and University of Western Australia, that organised this event which featured Professor Mike Elliott, from the University of Hull, as the invited International Speaker. The recommendations and summary from the Forum and Workshop have been posted on the Centre website (http://www.murdoch.edu.au/Research-capabilities/Centre-for-Fish-Fisheries-and-Aquatic-Ecosystems-Research/). Several students also participated in the Australian Society of Fish Biology (ASFB) conference and workshop held in Adelaide in July 2012. The quality of the research by the students, their supervisors and collaborators was recognised at this conference where Murdoch students received three of the nine student awards: Adrian Hordyk won the Gilbert P Whitley Senior student award for best oral presentation by a PhD student for his research on new approaches for stock assessment of data poor fisheries; Elena Sulin won the Victorian Department of Primary Industry award for best oral presentation on the biology of sub-tropical or temperate fish for her work on growth models of King George Whiting (Sillaginodes punctata) at different latitudes; and Jonathan Murphy won the award for best research proposal on freshwater fauna. Adrian and Elena Sulin also won ASFB travel awards. In 2013, Research Professor Ian Potter was awarded the prestigious Australian Marine Science Association's (AMSA) Silver Jubilee Award in recognition of his lifetime contributions to marine science. Professor Lynnath Beckley completed her two-year term as AMSA president in 2012 and in 2013, Professor Neil Loneragan was re-elected as a Councillor for the Asian Fisheries Society and elected as Vice-President of the Asian Fisheries Society. He will be involved in the planning for the 11th Asian Fisheries and Aquaculture Forum in Hanoi, Vietnam for 2016.
Centre members hosted a number of international visitors during 2012 and 2013 (Dr Michael Krüetzen – University of Zurich, Professor Mike Elliott – University of Hull, Professors Bob Clarke and Richard Warwick – Plymouth Marine Laboratories,) and national visitors (Associate Professor Greg Skilleter – University of Queensland, Dr Margaret Platell – University of Newcastle, and Dr Brendan Ebner – CSIRO and James Cook University). Professors Elliott, Clarke and Warwick gave public seminars at Murdoch that were well attended and generated lively discussion.

Centre people

After many years at Murdoch as an undergraduate and postgraduate student, followed by several postdoctoral research fellowships, Dr Alex Hesp left Murdoch to take up a position with the Department of Fisheries WA in March 2012. Alex has made very significant contributions to research in the Centre, particularly in the areas of fish biology and fisheries modelling, supervising postgraduate and Honours students and in undergraduate teaching. We are fortunate to retain a strong connection with Alex through his appointment as an Adjunct Senior Lecturer and thank him for his contributions over many years. The Centre also gained significant commitments for extending the contracts of leading researchers: in 2012, Dr Lars Bejder was appointed to a five year position as research Associate Professor, and after international advertisement, Dr Fiona Valesini was appointed to a five year position as a senior research fellow on estuarine ecology as part of the ECANSE initiative. Dr David Morgan and Dr Stephen Beatty, of the Freshwater Fish and Fish Health Unit, both commenced five-year contracts in 2013, with 50% funding from the University. In 2013, we welcomed Dr Joel Williams from the University of Melbourne, who was appointed as a Research Fellow on the ecology of black bream in the estuaries of south-western Australia and the extension of the contract of Dr Peter Coulson, as a research fellow with a focus on the biology of squid and bight redfish. Peter and Joel will be working closely with Research Professor Ian Potter, who is the Principal investigator on these projects. The Centre was also successful in gaining three Sir Walter Murdoch Distinguished Professors in 2012 and 2013. These fellowships, which are designed to enhance international collaborations and develop joint category 1 funding proposals, were awarded to: Professor Ken Pollock, North Carolina State University, for developing new quantitative approaches for fisheries; Professor Peter Madsen, Aarhus University in Denmark, for investigating the responses of marine mammals to anthropogenic noise; and Professor Mike Elliott, University of Hull, for estuarine ecology and the management of estuaries. In 2013, we also welcomed Dr Brett Moloney from the Department of Fisheries as an Adjunct Associate Professor.

Acknowledgements

The Centre gratefully acknowledges the support that we have received for our research from the FRDC, WAMSI, the Australian Marine Mammal Centre, Chevron Australia, the Department of Fisheries, and many other government and industry partners and collaborators. We thank Professor David Morrison, and the Dean of the former School of Biological Sciences and Biotechnology, Associate Professor Carolyn Jones, and the Dean of the new School of Veterinary and Life Sciences, Professor David Hampson, for their support during 2012 and 2013. On a personal note, after 8 years as Centre Director, I stepped down in February 2013 and Dr Howard Gill was appointed as Interim Centre Director. I would like to thank all Centre members for their contributions to the Centre during my term as Director, particularly the Strategy Group, the Board, the Chairman of the Board, Professor David Macey, and Associate Professor Alan Lymbery as Deputy Director. I would also like to acknowledge the Deans of the former School of Biological Sciences and Biotechnology, Associate Professors Max Cake and Carolyn Jones, for their support of the Centre, advice and guidance during this time, and the five Deputy Vice Chancellors of Research from 2005 to 2013: Professor Andris Stelbovics, Professor Jim Reynoldson, Professor David Doepel, Professor John Pluske and Professor David Morrison. I will continue at Murdoch University in my positions as Professor of Fisheries Science and Head of the Academy of Environmental and Conservation Sciences, and with my research and supervision of students in the area of fisheries ecology, and in teaching Sustainable Management of Fish and Wildlife Management and Ecology. I look forward to continuing to work with people in the future in this capacity.

Neil Loneragan, Director 2012, Immediate past Director
Committee membership/Community service

Stephen Beatty
- Australian Society for Fish Biology (Executive Council)
- Australian Society for Fish Biology (Alien Fishes Committee, State Representative)
- Margaret River Hairy Marron Recovery Team
- Bennett Brook Cichlid Taskforce

Lynnath Beckley
- Honours Committee, Environmental Science (ES)
- School Advisory Committee (Industry), ES
- Editor – School Annual Report ES
- Marine Science Deputy Programme Chair
- Board member, Centre for Fish, Fisheries and Aquatic Ecosystems Research
- African Journal of Marine Science (Editorial Board)
- Australian Marine Sciences Association (President National Council till 2012)
- Australian Marine Sciences Association (WA Branch Committee member)
- Rottnest Island Authority (Environmental Advisory Committee member)
- Australian Society for Fish Biology (Recreational fishing research committee member)
- Sustained Indian Ocean Biogeochemical and Ecological Research (International Scientific Committee member)
- Monitoring Recreational Fisheries -Victoria DPI and FRDC (Technical Advisory Committee member)
- Integrated Marine Observing System (WA Node), Scientific Reference Group (Murdoch representative)

Lars Bejder
- Board member of the Society for Marine Mammalogy
- Chair of the Education Committee for the Society of Marine Mammalogy
- Member of the steering-committee for the International Whaling Commission’s Large-scale whale-watching research initiative (LaWE)
- Board of Management for the Bunbury Dolphin Discovery Centre, Bunbury, Western Australia

Belinda Cannell
- Member of Shoalwater Islands Marine Park focus group
- Invited speaker for Shoalwater Islands Marine Park Discovery Series
- Department of Environment and Conservation - advice on effect of different management activities on Little Penguins

Jennifer Chaplin
- University Appeals Committee

Joseph Christensen
- Secretary of the Australian Association for Maritime History

Howard Gill
- Board, School of Biological Sciences and Biotechnology
- Academic Chair, Biological Sciences and Conservation and Wildlife Biology, Murdoch University
- School of Biological Sciences and Biotechnology Teaching and Learning Committee
- Faculty of Science and Engineering Teaching and Learning Committee
- Murdoch University Animal Ethics

Norm Hall
- Editorial Advisory Committee of Marine and Freshwater Research
- Northern Prawn Fishery Resource Assessment Group
- Department of Fisheries - Advice on matters relating to the stock assessment and management of fisheries

Alex Hesp
- Executive Committee member of Australian Society for Fish Biology (ASFB)
- Education Committee member of Australian Society for Fish Biology (ASFB)
- Board member of West Australian Fish Foundation

David Holliday
- Australian Marine Sciences Association (WA Branch Committee member)

Halina Kobryn
- Board and Standing Committee member of Western Australian Satellite Technology and Applications Consortium (WASTAC)
- Member of Murdoch University Academic Council

Neil Loneragan
- University Appeals Committee
- Board, School of Biological Sciences and Biotechnology
- BSB Research Committee
- WA Fisheries Research Advisory Board
- WA Rock Lobster Ecosystem Effects of Fishing Scientific Reference Group
AWARDS/COMMITTEE MEMBERSHIP cont...

• Research Subcommittee, Rock Lobster Industry Advisory Council
• Western Australian Marine Science Institute Steering Committee for Ecosystem Based Fisheries Management (Node 4)
• International Scientific Committee, 5th International Symposium on Stock Enhancement and Sea Ranching
• Councillor, Asian Fisheries Society
• Western Australian Fish Foundation

Alan Lymbery
• Zoological Parks Authority Research Board
• Managing Editor, Pacific Conservation Biology
• Editor, Biodiversitas
• Editor, IJP-parasites in Wildlife
• Australian Society for Parasitology, Council member
• School of Veterinary and Biomedical Sciences, Honours Committee

David Morgan
• Executive Council of the Australian Society of Fish Biology - WA representative
• Threatened Species Committee (Australian Society for Fish Biology) – WA State representative
• Alien Fishes Committee (Australian Society for Fish Biology) – WA State representative
• Recreational Freshwater Fisheries Stakeholder Sub-committee – Committee member
• Fitzroy River Fishway Steering Committee
• Sawfish Expert Review Panel
• Bennett Brook Cichlid Taskforce
• Member – Australian New Guinea Fish Association

Ian Potter

• Editorial Board of Environmental Biology of Fishes

Claire Smallwood
• Australian Marine Sciences Association (WA Branch Committee member)

Malcolm Tull
• Vice-President, International Maritime Economic History Association
• President, Economic Society of Australia, Western Australian Branch
• Treasurer, Australian Association for Maritime History

Fiona Valesini
• Deputy Chair of the Coastal and Marine Reference Group for Perth Region NRM

Mike van Keulen
• Academic Chair Marine Science
• Director of the Coral Bay Research Station
• University Dive Officer (University level)
• President: North West Research Association
• Member: Council of the Royal Society of WA
• Member: Committee of the Australian Marine Sciences Association (WA Branch)
• Member: WA State Marine Policy Stakeholder Group
• Member: Marine Reserve Council of WA
• Maintain and coordinate two high-profile international e-mail research discussion lists: Seagrass Forum and Mangrove
• Managing Editor: Pacific Conservation Biology
3. RESEARCH ACTIVITIES

Research objectives

The main ongoing objectives of the Centre for Fish and Fisheries are to:

1. Undertake high quality research that addresses questions fundamental to the understanding of biological, ecological and evolutionary processes in aquatic ecosystems.

2. Communicate the results of our pure and applied studies to the wider scientific community through publishing in international journals and presentations at relevant national and international conferences.

3. Provide research students with rigorous and intellectually-stimulating training in contemporary biological, ecological and genetic approaches to fish biology, fisheries and conservation science, with particular emphasis on developing their quantitative skills.

4. Maintain strong research collaboration with scientists both within and outside Australia.

5. Undertake the research required to provide managers with sound quantitative data that can be used to develop policies for conserving fish resources and the environment, and also marine conservation planning.

6. Communicate, through peer reviewed technical reports, papers, seminars and discussions, the implications of the results of the above studies to scientists, managers and stakeholders.

7. Continue to attract the funding required to undertake the high quality research that is essential for this group to remain at the forefront of fisheries science and to provide the data required by fisheries, conservation and environmental managers to develop appropriate management plans.

The wide range of studies undertaken by the staff in the Centre are aimed at enhancing our knowledge of particular fundamental biological processes in fishes and of aquatic ecosystem functioning in general, as well as addressing urgent management issues. These studies have been planned to involve postgraduate students and thereby ensure that the Centre produces fish biologists, fishery scientists, ecologists and conservation biologists with the relevant and high quality research training required to help fulfil the future needs of resource management and scientific agencies.

The research activities in the Centre have been organised into three inter-related and overlapping themes:

1. Ecosystems and Community Ecology;

2. Biological Processes and Evolution (including population biology and genetics), to better reflect the role of our research in providing knowledge for Ecosystem Based Fisheries Management and marine and freshwater conservation planning;

3. Specialist Research Areas (including Fish health, Social and economic assessment and Remote sensing)

The achievements of Centre members are summarised below under Publications (including conferences), Postgraduate and Honours students and Research Income.
4. PUBLICATIONS for 2012

Books 2012


Book Chapters 2012


Refereed publications in 2012


Cannell B., Wooler R., Bradley S., Chambers L., (2012), Poorer breeding by little penguins near Perth Western Australia is correlated with above average sea surface temperatures and a stronger Leeuwin Current, Marine & Freshwater Research: advances in the aquatic sciences, 63:914-925.


Coulson, PC, Potter, I, Hall, N 2012, The biological characteristics of Scorpius aequipectinis (Kyphosidae), including relevant comparisons with those of other species and particularly of a heavily exploited congener., Fisheries Research, 125-126, 272-282


French, B, Platell, ME, Clarke, KR, Potter, IC 2012, Ranking of length-class, seasonal and regional effects on dietary compositions of the co-occurring Pagrus auratus (Sparidae) and Pseudocaranx georgianus (Carangidae), *Estuarine, Coastal and Shelf Science*, 115, 309-325


Hall, NG, Bartron, C, White, WT, Dharmadi and Potter, IC 2012, Biology of the Silky Shark Carcharhinus falciformis (Carcharhinidae) in the eastern Indian Ocean, including an approach to estimating age when timing of parturition is not well defined., *Journal of Fish Biology*, 80, 1320-1341

Hallett, C S, Valesini, F, Clarke, K, Hesp, S, Hoeksema, SH 2012, Development and validation of fish-based, multimetric indices for assessing the ecological health of Western Australian estuaries, *Estuarine, Coastal and Shelf Science*, 104-105, 102-113


Lek, E, Fairclough, D, Hall, N, Hesp, S, Potter, I 2012, Do the maximum sizes, ages and patterns of growth of three reef-dwelling labrid species at two latitudes differ in a manner conforming to the metabolic theory of ecology?, *Journal of Fish Biology*, 81(6), 1936-1962


Travers, M, Potter, I, Clarke, RC, Newman, S 2012, Relationships between latitude and environmental conditions and the species richness, abundance and composition of tropical fish assemblages over soft substrates, *Marine Ecology - Progress Series*, 446, 221-242


**Other Publications in 2012**


**Conference and workshop presentations in 2012**


Belton, G., Prud’homme van Reine, W.F., Huisman, J.M., Draisma, S.G.A. &
5. PUBLICATIONS for 2013

Book Chapters/Special Issues in Press


Refereed publications in 2013


**Refereed publications in press for 2013 and 2014**


Loneragan NR, Jenkins GI, Taylor MD (accepted). Marine stock enhancement, restocking and sea ranching in Australia: future directions and a synthesis of two decades of research and development. *Reviews in Fisheries Science*


**Other Publications in 2013**


**Conference and workshop presentations in 2013**

Beatty, S., Morgan, D. & Tweedley, J.R. (2013). Salted fish: a review of fishes in extreme salinity and how anthropogenic changes in salinity have driven community shifts in Western Australia. 9th Indo Pacific Fish Conference. Okinawa, Japan.

Chabanne, D., Finn, H. and Bejder, L. (2013) Community size, composition,
and association patterns of Indo-Pacific bottlenose dolphin (Tursiops aduncus) in the Swan Canning Riverpark, Perth (WA). In: 3rd Biennial South West Marine Conference, Bunker Bay, Western Australia.


5. POSTGRADUATE STUDENTS AND THEIR RESEARCH TOPICS

PhD students (completed in 2012)

Janja Ceh
The role of microbial communities in reef-building corals of Ningaloo Reef, Western Australia
Supervisors: Mike van Keulen (SE), David Bourne (AIMS)

Warren Chisholm
The stability of shallow coastal sediments with and without seagrasses. completed, awaiting conferral.
Supervisors: M van Keulen (SE), E Paling (now SKM), J Verduin

Ashlee Jones
Characteristics of the elasmobranch fauna in the bycatch of commercial fisheries in south-western Australia.
Supervisor: Ian Potter (SE)

Michael Klunzinger
Ecology and life history of the freshwater mussel *Westralunio carteri* (Iredale 1934) in the south west of Western Australia
Supervisors: A Lymbery (HS), D Morgan and S Beatty (SE)

Mark Langdon
The ecology of the grazing urchin *Echinometra mathaei* at Ningaloo Marine Park. submitted and conferred 2012.
Supervisors: M van Keulen (SE), E Paling (now SKM)

Thea Linke
Trophic interactions in the faunas of the Swan Estuary and Wilson Inlet, Western Australia.
Supervisors: Ian Potter, Fiona Valesini and Luke Twomey (SE)

Glenn Moore
Phylogeography of marine fish species of the genus *Arripis* with sympatric and allopatric breeding populations in Australian waters.
Supervisors: Jennie Chaplin and Ian Potter (SE)

Owen O’Shea
The biology and ecology of stingrays (*Dasyatidae*) at Ningaloo Reef, Western Australia. Submitted 2012, conferred 2013
Supervisors: M van Keulen (SE), M Meekan (AIMS), M Thums (AIMS)

Mahmoud Rashnavadi
*Impacts of salinisation on freshwater fishes in south-western Australia* Supervisors: A Lymbery, D Morgan and S Beatty (SE).

Rebecca Roberts
*Economic strategies for coastal disaster risk reduction; A case study from Exmouth.* Supervisor: L Beckley (SE) and M Tull (LB).

Holly Smith
*Population dynamics and habitat utilisation in bottlenose dolphins, Bunbury, Western Australia.*
Supervisors: Lars Bejder, Halina Kobryn, Stuart Bradley (SE) and Kelly Waples (DEC)

Joanna Tonge
*Place attachment amongst campers at Ningaloo* Supervisor: L Beckley (SE), S Moore and M Ryan.

PhD students (enrolled/examined/submitted/pending correction in 2012)

Jo Marie Acebes
*Historical catches of large marine vertebrates in the Sulu-Sulawesi Sea: changing perceptions and conservation management implications in the Philippines.*
Supervisors: Malcolm Tull (LB) and James Warren (AE*)

Mark Allen
*Biodiversity of fish in the Raja Ampat region of eastern Indonesia* Supervisor: N Loneragan (SE).

Simon Allen
*Dolphin populations of north-western Australia* Supervisors: N Loneragan (SE), K Pollock

Farhan Bokhari
*The effects of salinity on riparian arthropod communities and consequences for ecosystem function.* Supervisor: Alan Lymbery (HS)

Alex Brown

Amanda Buckland
*Trophic pathways of fish in the Swan-Canning estuary* Supervisor: N Loneragan (SE)
Natasha Coen  
Implications of habitat type for the hyperbenthos for four morphologically divergent estuaries in south-western Australia.  
Supervisors: Ian Potter and Fiona Valesini (SE)  

Alan Cottingham  
Factors influencing the life-history characteristics of the Black Bream Acanthopagrus butcheri in the Swan-Canning Estuary.  
Supervisors: Alex Hesp and Norm Hall (SE)  

Rainbo Dixon  
A taxonomic revision of the brown algal genus Sargassum (Fucales: Sargassaceae) from Australia.  
Supervisor: John Huisman, Mike van Keulen (SE), Fred Gurgel (UAdel)  

Emily Fisher  
An exploration of the effectiveness of alternative strategies for managing fish species with different biological characteristics. Supervisors: Alex Hesp and Norm Hall (SE)  

Ben French  
The determination of the diets of Snapper and Silver Trevally, the construction of a food web for the demersal fish community in South-Western Australia and biology of Harlequin Fish. Supervisors: Ian Potter and Margaret Platell (SE)  

Sarah Fretzer  
Analysing the effects of anthropogenic activities on different aquatic ecosystems in Western Australia and identifying ecosystem based management policies that provide long-term sustainability. Supervisors: Norm Hall (SE), Jeffrey Dambacher (CSIRO), Hector Lozano-Montes (CSIRO), Brent Wise (DoF)  

Michelle Gardner  
Genetic determination of the stock structures of pink snapper (Pagrus auratus) and baldchin groper (Choerodon rubescens). Supervisors: Jennie Chaplin and Ian Potter (SE)  

Susan Gibson-Kueh  
Diseases of Asian seabass and barramundi. Supervisors: Phil Nicholls and Alan Lymbery (HS)  

Kate Greenfield  
Survey methodologies for dolphins in south-western Australia Supervisors: L Bejder, A Hodgson, H Kobryn, N Loneragan (SE)  

Adrian Hordyk  
Developing assessment methods for data poor fisheries Supervisors: N Loneragan (SE) and J Prince (Biospherics)  

Michelle Ingram  
The effect of salinity on the resilience of riparian ecosystems Supervisor: A Lymbery (HS)  

Vanessa Jaiteh  
Shark fisheries and livelihoods in eastern Indonesia Supervisors: N Loneragan (SE), Warren  

Elaine Lek  
Comparisons between the biology of three temperate species of wrasse (Labridae) in different habitats and different regions. Supervisors: Ian Potter and David Fairclough (SE)  

Karen Marshall  
Enzymatic mechanism(s) involved in the partitioning of fatty acids into either catabolic or anabolic processes. Supervisors: Max Cake and Ian Potter (SE)  

Fiona McAleer  
Fish and fish migrations in the Blackwood River Yarragadee discharge zone – including the age growth reproduction of Tandanus bostoki. Supervisors: David Morgan, Howard Gill and Stephen Beatty (SE)  

Shannon McCluskey  
Foraging ecology of dolphins in the south-western Australia Supervisors: N Loneragan, L Bejder (SE)  

Frazer McGregor  
Trophic Interactions of Manta alfredi in lagoonal systems of Ningaloo Reef. Submitting 2013. Supervisors: M van Keulen (SE), M Meekan (AIMS), A Waite (UWA)  

Heather McLetchie  
Molecular diagnosis of crayfish plague (Aphanomyces astaci). Supervisors: Stan Fenwick and Phil Nicholls (HS)  

Mikayla Morine  
Exotic parasites of freshwater fishes in south-western Australia Supervisors: A Lymbery (HS), Ryan, S Beatty and D Morgan (SE).  

Jon Murphy  
The molecular phylogeography of freshwater fishes in south-western Australia Supervisors: A Lymbery (HS), Ryan, D Morgan and S Beatty. (SE)
Brad Norman
Long-term monitoring of Whale Sharks at Ningaloo and the global database Supervisors: N Loneragan and D Morgan (SE).

Nicole Phillips
Conservation genetics of Pristis sawfishes in Australian waters.
Supervisors: Jennie Chaplin and David Morgan (SE)

Kate Sprogis
Biology and habitat modelling of bottlenose dolphins in south-western Australia
Supervisors: L Bejder, K Pollock (SE)

Alicia Sutton
Biogeography and trophic ecology of Indian Ocean krill Supervisor: L Beckley (SE)

Calais Tink
Exploration of interactions between recreational fishers, fish and management in South Western Australia using loop analysis and agent-based modelling.
Supervisors: Alex Hesp and Norm Hall (SE)

Joanna Tonge
The influence of place attachment on the management of marine parks: Ningaloo as a case study.
Supervisors: Susan Moore, Lynnath Beckley (SE) and Maria Ryan (ECU)

Natalie Toon
Catchability of Western Rock Lobster (Panulirus cygnus); the influence of temperature, light intensity, lobster size, moult stage and commercial fishing apparatus. 
Supervisors: Neil Loneragan and Howard Gill (SE)

Mike Travers
Comparisons between the species compositions of the fish faunas over reefs and soft substrates in tropical waters of north-western Australia.
Supervisors: Ian Potter (SE) and Steve Newman (DoF)

Julian Tyne
Quantifying the effects of human interactions on spinner dolphins in resting bays in Hawaii, and assessing the effectiveness of time area closures as a proposed mitigation approach.
Supervisors: Lars Bejder, Neil Loneragan and Ken Pollock (SE)

Lauren Veale
The characteristics of the fish faunas of the Peel-Harvey Estuary and Leschenault Estuary with comparisons over a thirty-year period.

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Supervisors: Lars Bejder, Neil Loneragan and Ken Pollock (SE)

Lauren Veale
The characteristics of the fish faunas of the Peel-Harvey Estuary and Leschenault Estuary with comparisons over a thirty-year period.
Supervisors: Ian Potter, Steeg Hoeksema, Alex Hesp and Peter Coulson (SE)

Kristel Wenziker
The population dynamics and habitat usage of Sousa chinensis and Tursiops truncates found in the Ningaloo area. Supervisors: Mike van Keulen, Lars Bejder (SELS), Kelly Waples (DEC), Guido Parra (UQ)

Sharon Yeo
Supervisors: M van Keulen (SE), J Keesing (CSIRO)

MPhil/MSc students (completed 2012)

Daniel Gibbons
Spatial distribution of Coastal access tracks in the remote west Kimberley. Supervisors: L Beckley and H Kobryn (SE).

Krista Nicholson
Population estimation and group relationships of dolphins in Shark Bay, WA. Supervisors L Bejder, K Pollock (SE)

Helen Hunt
Monitoring interactions between marine wildlife and commercial tour-vessels in Shark Bay, Western Australia. Supervisors H. Kopbryn, L. Bejder (SE)

Elena Sulin
Comparisons of the size and age compositions and growth of King George Whiting (Sillaginodes punctata) in different regions of south-western Australia. Supervisors: A. Hesp, N. Hall (SE)

MPhil/MSc students (enrolled/examined/pending correction in 2012)

Valissa Buchanan
Impact of desalination on dolphins in south-western Australia Supervisors: L Bejder, K Pollock (SE)

Tanya Carroll
Classification of Ningaloo beach material using hyperspectral data: A turtle nesting beach application. Supervisors: H Kobryn and L Beckley (SE)
Chris Johnson
Modern and historical data identify sperm shale ( Physeter macrocephalus) habitat offshore of SW Australia. Supervisors: L Beckley and H Kobryn (SE)

Kimberley Marrs Ekamper
On the edge: a baseline survey of marginal coral communities at Lancelin Island, Western Australia. Suspended for medical reasons. Supervisors: M van Keulen (SE)

Jeff Whitty
Tracking Australia’s biggest freshwater fish, the Freshwater Sawfish ( Pristis microdon) Supervisor: D Morgan (SE)
6. HONOURS STUDENTS AND THEIR RESEARCH TOPICS

Honours students (completed in 2012)

**Douglas Anderson**
*Spatial, seasonal and inter-annual patterns in whale shark sightings at Ningaloo Reef: the influence of environmental factors on tour operator interactions and sightings of individuals.*
Supervisors: N Loneragan and H Kobryn (SE)

**Barbara Green**
*Photo-identification and population characteristics of Indo-Pacific bottlenose dolphins.*
Supervisors: N Loneragan and H Finn (SE)

**Lisa-Marie Harrison**
*A standardised method for the comparison of skin lesions among bottlenose dolphin populations in coastal areas.*
Supervisors: N Loneragan, L Bejder and S Beatty (SE)

**Hayley Matyear**
*Algal distribution and succession within a disturbed coral reef environment, completed June 2012.*
Supervisors: M van Keulen (SE)

**Abby Mitchell**
*The effects of turbulence on windrows in Posidonia sinuosa meadows, completed November 2012.*
Supervisors: J Verduin, M van Keulen (SE)

**James Raeside**
*The ecology of the bottlenose dolphin (Tursiops aduncus) in the Peel-Harvey Estuary.*
Supervisors: L Bejder and H Finn (SE)

**Myrto Robert**
*A morphological and molecular approach to species question about Pseudocaranx in Western Australian waters.*
Supervisor: L Beckley (SE)

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**Honours students**
(enrolled/examined/submitted/pending correction in 2012)

**Kaija Antipas**
*Size demography of Faviidae corals at Hall Bank Reef, Fremantle, started July 2012, part-time for 18 months. Supervisors: M van Keulen (SE), D Thomson (CSIRO)*

**Fionna Cosgrove**
*Colonisation of jetty pilings at Busselton jetty, started February 2012, part-time for two years. Supervisors: M van Keulen (SE), M Wildsmith (Ocean Vision)*

**Sherrie Chambers**
*Growth of whale sharks at Ningaloo. Supervisors: D Morgan and N Hall (SE)*
# 7. SUMMARY OF RESEARCH FUNDING

## 7.1 List of projects and research income for 2012

<table>
<thead>
<tr>
<th>Name</th>
<th>Project Description</th>
<th>Funding Body</th>
<th>Duration</th>
<th>2012 prop’n ($)</th>
<th>Total funding ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allen, M.; Morgan D. and Beatty, S.</td>
<td>Development of a strategic action plan for the protection of the aquatic biodiversity values of the Cape to Cape region.</td>
<td>Department of Environment and Conservation</td>
<td>2012-14</td>
<td>7,408</td>
<td></td>
</tr>
<tr>
<td>Allen, S., Bejder, L., and Frere, C.</td>
<td>Snubfin and humpback dolphin abundance and genetic connectivity in the Kimberley region, Western Australia</td>
<td>AMMC</td>
<td>2012-14</td>
<td>67,230</td>
<td>127,230</td>
</tr>
<tr>
<td>Allen, S., Bryant, K., Kruetzen, M., Pollock, K., Loneragan, N. and Bejder, L.</td>
<td>Genetic structure and abundance of fishery-impacted dolphin populations of the Pilbara region, North-Western Australia.</td>
<td>AMMC</td>
<td>2010-12</td>
<td>24,859</td>
<td>361,000</td>
</tr>
<tr>
<td>Beatty, Stephen</td>
<td>Rush Creek Fishway 2011: determining fish usage and comparison with 2010 migrations.</td>
<td>Department of Water</td>
<td>2011</td>
<td>6,721</td>
<td></td>
</tr>
<tr>
<td>Stephen Beatty, James Tweedley, Alan Lymbery, David Morgan &amp; Ian Potter</td>
<td>Control of introduced fish and crayfish in the Vasse-Wonnerup Ramsar Wetland</td>
<td>Caring for Our Country</td>
<td>2011-13</td>
<td>147,433</td>
<td>215,006</td>
</tr>
<tr>
<td>Bejder, Lars</td>
<td>Megafauna line transects off Binningup</td>
<td>Water Corporation</td>
<td>2010-12</td>
<td>222,450</td>
<td></td>
</tr>
<tr>
<td>Bejder Lars A Prof - Hodgson Amanda Dr</td>
<td>Society of Marine Mammalogy Conference</td>
<td>Perth Convention Bureau</td>
<td>2011</td>
<td>6,716</td>
<td>9,000</td>
</tr>
<tr>
<td>Bejder, L. and Loneragan, N.</td>
<td>An ecosystem approach to estimating the viability of bottlenose dolphin populations exposed to industrial-port and tourism activities in SW Australia</td>
<td>BHP Billiton Worsley Alumina, Bunbury Port Authority, City of Bunbury, Department of Environment and Conservation, Dolphin Discovery Centre, Newmont Boddington Gold, South West Development Commission, WAPRES</td>
<td>2011-13</td>
<td>70,500</td>
<td>246,200</td>
</tr>
<tr>
<td>Bejder Lars A Prof - Loneragan Neil Prof</td>
<td>SWMRP - Phase 2 - South-West Marine Research Program</td>
<td>Bunbury Port Authority</td>
<td>2011-14</td>
<td>85,500</td>
<td>205,700</td>
</tr>
<tr>
<td>Cannell, Belinda and Fiona Valesini</td>
<td>The effect of a boat ramp at Becher Point on the food resources of Little Penguins on Penguin Island</td>
<td>DEC</td>
<td>2010-14*</td>
<td>36,591</td>
<td>169,774</td>
</tr>
<tr>
<td>Name</td>
<td>Project</td>
<td>Funding Body</td>
<td>Duration</td>
<td>2012 prop’n ($)</td>
<td>Total funding ($)</td>
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<tr>
<td>Cottingham Alan Williams Joel Dr - Mr - Potter Ian Prof</td>
<td>An investigation into the recent recruitment success of Black Bream Acanthopagrus butcheri in the Blackwood River Estuary and its implications for restocking</td>
<td>WA Fish Foundation (WAFF)</td>
<td>2012</td>
<td>10,776</td>
<td>11,853</td>
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<tr>
<td>Finn, H.</td>
<td>Coastal &amp; Estuarine Dolphin Project</td>
<td>Fremantle Ports</td>
<td>2011-14</td>
<td>30,000</td>
<td>120,000</td>
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<tr>
<td>Finn, H.</td>
<td>Coastal &amp; Estuarine Dolphin Project</td>
<td>Cockburn Sound Management Council</td>
<td>2012</td>
<td>5,000</td>
<td>5,000</td>
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<tr>
<td>Gleiss Adrian Mr - Morgan David Dr</td>
<td>Does locomotor performance compromise freshwater residence in sharks</td>
<td>National Geographic Society</td>
<td>2011</td>
<td>13,843</td>
<td>14,600</td>
</tr>
<tr>
<td>Hall, Norman &amp; Hesp Alex</td>
<td>Exploration of the effectiveness of alternative management of responses to variable recruitment</td>
<td>Fisheries Research and Development Corporation</td>
<td>2008-12*</td>
<td>51,200</td>
<td>256,000</td>
</tr>
<tr>
<td>C. Hallet</td>
<td>Assessment of estuarine condition based on the fish assemblage index</td>
<td>Swan River Trust</td>
<td>2012</td>
<td>29,000</td>
<td></td>
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<tr>
<td>C. Hallet</td>
<td>Document the effects of an algal bloom on the ecological condition of the Swan-Canning Estuary</td>
<td>Swan River Trust</td>
<td>2012</td>
<td>2,460</td>
<td></td>
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<tr>
<td>C. Hallet</td>
<td>Assess alternative scoring systems and to determine the optimal system for grading of the Fish Community Indices</td>
<td>Swan River Trust</td>
<td>2012</td>
<td>11,043</td>
<td></td>
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<tr>
<td>Hallett, Chris &amp; James Tweedley</td>
<td>Benthic macroinvertebrate survey of the upper Swan-Canning River to monitor the effects of artificial oxygenation</td>
<td>Swan River Trust</td>
<td>2010-12</td>
<td>23,000</td>
<td>73,000</td>
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<tr>
<td>Name</td>
<td>Project</td>
<td>Funding Body</td>
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<tr>
<td>A. Hesp, N. Hall, L. Beckley and B. Molony (DoF)</td>
<td>Predicting the impacts of shifting recreational fishing effort towards inshore species</td>
<td>FRDC</td>
<td>2010-13*</td>
<td>81,731</td>
<td>326,924</td>
</tr>
<tr>
<td>Hodgson, A.</td>
<td>Using Unmanned Aerial Vehicles to survey marine mammals: development of methodology and a comparison with manned aerial survey estimates</td>
<td>AMMC</td>
<td>2010-13</td>
<td>133,454</td>
<td>400,363</td>
</tr>
<tr>
<td>Hodgson, A. / MU</td>
<td>Dugong aerial surveys and satellite tagging - Wheatstone</td>
<td>URS/Chevron</td>
<td>2012-13</td>
<td>445,463</td>
<td>764,662</td>
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<tr>
<td>Hodgson, A. / MU</td>
<td>Dugong Research Plan - Wheatstone</td>
<td>Curtin/Chevron</td>
<td>2012</td>
<td>74,671</td>
<td>74,671</td>
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<tr>
<td>Hodgson Amanda Dr - Smith Joshua Dr - Loneragan Neil Prof</td>
<td>Wheatstone pre-construction Dugon Research scope</td>
<td>Chevron</td>
<td>2011-13</td>
<td>340,951</td>
<td>1,257,156</td>
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<tr>
<td>Holyoake, C., Stephens, N., Warren, K. and Bejder, L.</td>
<td>Collection of baseline data on humpback whale (<em>Megaptera novaeangliae</em>) health and causes of mortality for long-term monitoring in Western Australia</td>
<td>Woodside</td>
<td>2011-12</td>
<td>39,600</td>
<td>109,500</td>
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<tr>
<td>Huisman, John</td>
<td>Marine Benthic Algae of the Great Barrier Reef, Rhodophyta: Acrosymphytaceae, Nemastomataceae, Schyzymeniaceae, Dumontiaceae, Ceramiaceae and Rhodomelaceae</td>
<td>Australian Biological Resources Study</td>
<td>2009-12*</td>
<td>8,725</td>
<td>34,902</td>
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<td>Huisman John Dr</td>
<td>National Species Lists Completion of the Australian Marine Algal Name Index Macro-algae</td>
<td>Department of the Environment Water Heritage and the Arts (DEHWA)</td>
<td>2010-12</td>
<td>7,011</td>
<td></td>
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<tr>
<td>Johnston, D. and Bejder, L.</td>
<td>Quantifying the effects of human interactions on spinner dolphins in resting bays in Hawaii, and assessing the effectiveness of time area closures as a proposed mitigation approach</td>
<td>US NOAA</td>
<td>2009-12</td>
<td>50,800</td>
<td>110,000</td>
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<td>Name</td>
<td>Project</td>
<td>Funding Body</td>
<td>Duration</td>
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<tr>
<td>Klunzinger Michael Mr - Gill Howard Dr - Lymbery Alan A Prof - Morgan David Dr - Beatty Stephen Dr - Walker Keith - Graf Daniel - Jones Hugh</td>
<td>The molecular phylogeography of freshwater fishes in south-western Australia - Jon Murphy Student</td>
<td>Australian Biological Resources Study (ABRS)</td>
<td>2012-15</td>
<td>10,000</td>
<td>30,000</td>
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<tr>
<td>Klunzinger Michael Mr - Lymbery Alan A Prof</td>
<td>Biology and ecology of the vulnerable freshwater mussel Westralunio Carteri of South-west Western Australia</td>
<td>Holsworth Wildlife Research Endowment</td>
<td>2012-13</td>
<td>6,000</td>
<td>6,000</td>
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<tr>
<td>Klunzinger Michael Mr - Lymbery Alan A Prof - Morgan David Dr - Beatty Stephen Dr</td>
<td>Pre-rehabilitation Aquatic Fauna Survey of the Lower Serpentine River</td>
<td>South East Regional Centre for Urban Landcare (SERCUL)</td>
<td>2012</td>
<td>6,000</td>
<td>6,000</td>
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<tr>
<td>Kobryn Halina Dr</td>
<td>Mapping and monitoring of mangroves in Darwin Harbour using remote sensing methods</td>
<td>Cardno Global Infrastructure Services Consultancy</td>
<td>2012</td>
<td>6,840</td>
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</tr>
<tr>
<td>Loneragan, Neil &amp; Alex Hesp</td>
<td>Establishment of self-sustaining facility for fisheries modelling and multivariate analysis, and for effective management of extremely large fisheries databases.</td>
<td>FRDC</td>
<td>2008-12*</td>
<td>30,000</td>
<td>150,000</td>
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<tr>
<td>Loneragan Neil Prof - Morgan David Dr - Norman Bradley Mr</td>
<td>Assessing the impacts of the ecotourism industry on the whale sharks of Ningaloo Marine Park, providing recommendations to minimise stress to these threatened animals.</td>
<td>The Winifred Violet Scott Estate</td>
<td>2012</td>
<td>60,000</td>
<td>60,000</td>
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<tr>
<td>Lymbury, Alan; David Morgan &amp; Stephen Beatty</td>
<td>ARC seed money - research into the sustainability of fishes of Snake Creek and their swimming abilities for future fishway design</td>
<td>Liveringa Station</td>
<td>2009-13*</td>
<td>36,500</td>
<td>183,000</td>
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<tr>
<td>Lymbery Alan A Prof - Morgan David Dr - Beatty Stephen Dr</td>
<td>Killing with kindness? Removing introduced fishes may amplify parasitic infections in native fishes</td>
<td>The Australia and Pacific Science Foundation</td>
<td>2012</td>
<td>4,750</td>
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<tr>
<td>Name</td>
<td>Project</td>
<td>Funding Body</td>
<td>Duration</td>
<td>2012 prop’n ($)</td>
<td>Total funding ($)</td>
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<tr>
<td>Lymbery Alan A Prof - Robson Belinda Dr - Chambers Jane Dr - Morgan David Dr - Beatty Stephen Dr - Mathews Ty - Howson T.J. - Chester E.T. - Close Paul - Davies Peter - Cook</td>
<td>Novel methods for managing freshwater refuges against climate change in southern Australia.</td>
<td>National Climate Change Adaptation Research Facility (NCCARF)</td>
<td>2011</td>
<td>102,200</td>
<td>340,735</td>
</tr>
<tr>
<td>Morgan David Dr - Beatty Stephen Dr</td>
<td>Assessment of potential impacts to sawfishes based on modeling of dredge and sediment disposal</td>
<td>BHP Billiton Limited</td>
<td>2012</td>
<td>10,140</td>
<td>11,000</td>
</tr>
<tr>
<td>Morgan David Dr - Beatty Stephen Dr - Hoeksema S</td>
<td>Halting the infestation of the aggressive freshwater fish the Pearl Cichlid in the Swan River catchment.</td>
<td>DAFWA Department of Agriculture and Food WA (DAFWA)</td>
<td>2011</td>
<td>20,588</td>
<td>45,588</td>
</tr>
<tr>
<td>Potter Ian Prof</td>
<td>Determination of Snapper and Silver Trevally and construction of a food web for the demersal fish community in South-Western Australia</td>
<td>Fisheries Research and Development Corporation</td>
<td>2009-11</td>
<td>7,451</td>
<td>74,503</td>
</tr>
<tr>
<td>Robson Belinda Dr - Chambers Jane Dr - Morgan David Dr - Beatty Stephen Dr</td>
<td>Adapting to climate change: a risk assessment and decision framework for managing groundwater dependent ecosystems with declining water levels.</td>
<td>National Climate Change Adaptation Research Facility (NCCARF)</td>
<td>2011-13</td>
<td>250,000</td>
<td>311,161</td>
</tr>
<tr>
<td>Smith, J</td>
<td>Passive acoustics of coastal dolphins: developing passive acoustic methodology for monitoring Australian snub-fin (Orcaella heinsohni) and Indo-Pacific humpback (Sousa chinensis) dolphins</td>
<td>AMMC</td>
<td>2012-14</td>
<td>146,800</td>
<td>440,400</td>
</tr>
<tr>
<td>Tweedley James Dr - Beatty Stephen Dr</td>
<td>Control of introduced fish and crayfish in the Vasse-Wonnerup Ramsar wetland</td>
<td>Caring for Our Country</td>
<td>2012-13</td>
<td>116,718</td>
<td>215,006</td>
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<tr>
<td>Name</td>
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<td>Funding Body</td>
<td>Duration</td>
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<td>Total funding ($)</td>
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</tr>
<tr>
<td>James Tweedley &amp; Jane Chambers</td>
<td>Sediment accumulation and resuspension in the Vasse-Wonnerup Wetlands and its impact on nutrient status and ecological health</td>
<td>South West Catchments Council</td>
<td>2012-13</td>
<td>4,992</td>
<td>14,976</td>
</tr>
<tr>
<td>James Tweedley, Stephen Beatty &amp; Alan Lymbery</td>
<td>Increasing community awareness of feral fish in the Vasse-Wonnerup Wetland</td>
<td>Coastwest</td>
<td>2012-13</td>
<td>0</td>
<td>8,006</td>
</tr>
<tr>
<td>Van Keulen, M</td>
<td>Review of Mangles Bay Marina Based Tourism Precinct – Public Environmental Review</td>
<td></td>
<td>2012</td>
<td>2880</td>
<td>2880</td>
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<tr>
<td>Waite, A (UWA), L. Beckley, P. Thompson (CSIRO), M. Feng (CSIRO), N. Caputi (DoF), A. Jeffs (UAuckland) &amp; S. deLestang (DoF)</td>
<td>Biological oceanography of Western rock lobster phyllosoma larvae</td>
<td>FRDC</td>
<td>2010-13*</td>
<td>98,331</td>
<td>393,324</td>
</tr>
</tbody>
</table>

* = estimated by apportioning the total funding evenly across the years of the project

**2012 TOTAL FUNDING:** $2,887,971 (44 projects)

**2012 Category 1 FUNDING:** $1,244,828 (13 projects)
### 7.2 List of projects and research income for 2013

<table>
<thead>
<tr>
<th>Name</th>
<th>Project</th>
<th>Funding Body</th>
<th>Duration</th>
<th>2013 prop’n $</th>
<th>Total funding ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allen, M.; Morgan D. and Beatty, S.</td>
<td>Development of a strategic action plan for the protection of the aquatic biodiversity values of the Cape to Cape region.</td>
<td>Department of Environment and Conservation</td>
<td>2012-14</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>Allen M.; Morgan D.; Beatty S.</td>
<td>Aquatic Fauna Study Blackwood River at Southampton WA</td>
<td>Water Corporation</td>
<td>2013</td>
<td>29,900</td>
<td>62,000</td>
</tr>
<tr>
<td>Allen M.; Morgan D.; Ramsay A.</td>
<td>Pilbara Freshwater Fish Education Project: A Field Guide and Underwater Documentary</td>
<td>State NRM Office</td>
<td>2013-14</td>
<td>25,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Allen Simon</td>
<td>General ad-hoc consultancy Simon Allen</td>
<td>Various</td>
<td>2013</td>
<td>7,457</td>
<td>7,457</td>
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<tr>
<td>Beckley L.; Buchanan P.</td>
<td>The Chaetognatha of the Leeuwin Current: biogeography and ecology</td>
<td>Department of Sustainability Environment Water Population and Communities</td>
<td>2013</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Beckley L.; Feng M.; Waite A.; Thompson P.; Caputi N.; Delestang S.; Jeffs A.</td>
<td>The biological oceanography of western rock lobster larvae</td>
<td>Fisheries Research and Development Corporation</td>
<td>2011-13</td>
<td>4,545</td>
<td>11,000</td>
</tr>
<tr>
<td>Beckley L.; Smallwood C.; Kobryn H.; Moore S.; Burton M.</td>
<td>Human use patterns impacts values and aspirations for coastal waters of the Kimberley 2.1A</td>
<td>WAMSI Western Australian Marine Science Institution</td>
<td>2012-15</td>
<td>205,721</td>
<td></td>
</tr>
<tr>
<td>Beckley Lynnath Prof - Sutton A.</td>
<td>Trophodynamics of krill off south-western Australia</td>
<td>ANZ Charitable Trust Australia</td>
<td>2013</td>
<td>7,500</td>
<td>7,500</td>
</tr>
<tr>
<td>Beckley L.; Sutton Alicia Ms</td>
<td>Drivers of krill zoogeography in the Indian Ocean: the implications of poleward flowing boundary currents</td>
<td>Department of Sustainability Environment Water Population and Communities</td>
<td>2013</td>
<td>500</td>
<td>500</td>
</tr>
</tbody>
</table>

* = estimate by apportioning total project funding across the years of the project
<table>
<thead>
<tr>
<th>Name</th>
<th>Project</th>
<th>Funding Body</th>
<th>Duration</th>
<th>2013 prop’n ($)</th>
<th>Total funding ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bejder L.; Loneragan N.</td>
<td>SWMRP - Phase 2 - South-West Marine Research Program</td>
<td>Bunbury Port Authority</td>
<td>2011-14</td>
<td>70,500</td>
<td>205,700</td>
</tr>
<tr>
<td>Bejder, L.; Henderson, D and Loneragan N.</td>
<td>Coastal Walkabout: Initiating a Citizen Science Network for Western Australia</td>
<td>Lotterywest</td>
<td>2013</td>
<td>50,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Bejder, L., Parra, G.</td>
<td>Use of Geographic Information Systems in cetacean research</td>
<td>AMMC</td>
<td>2013</td>
<td>44,000</td>
<td>44,000</td>
</tr>
<tr>
<td>Cottingham, A and Potter I.</td>
<td>Results and implications of monitoring the biological characteristics of restocked and wild Black Bream, <em>Acanthopagrus butcheri</em>, in the Blackwood River Estuary.</td>
<td>WA Fish Foundation</td>
<td>2013</td>
<td>11,853</td>
<td>11,853</td>
</tr>
<tr>
<td>Cottingham, A and Potter I.</td>
<td>Determining the locations of spawning of Black Bream (<em>Acanthopagrus butcheri</em>) in the Blackwood River Estuary and the factors that influence the recruitment its larvae</td>
<td>WA Fish Foundation</td>
<td>2013</td>
<td>25,260</td>
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<tr>
<td>Cottingham, A and Potter I.</td>
<td>Continuation of monitoring the biological characteristics and contribution to the fishery of restocked Black Bream <em>Acanthopagrus butcheri</em>, in the Blackwood River Estuary</td>
<td>WA Fish Foundation</td>
<td>2013</td>
<td>9,670</td>
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<tr>
<td>Name</td>
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<tr>
<td>Coulson P.p</td>
<td>Determining the dynamics of WA squid populations through research and recreational fishing</td>
<td>RecFishWest</td>
<td>2012-15</td>
<td>171,939</td>
<td>377,573</td>
</tr>
<tr>
<td>Coulson P. and Potter I.</td>
<td>Providing critical scientific advice for sustainable management of demersal scalefish on the south coast of Western Australia</td>
<td>Department of Fisheries WA</td>
<td>2012-15</td>
<td>90,151</td>
<td>198,818</td>
</tr>
<tr>
<td>Hall, N.; Beckley L.; Hesp A.</td>
<td>Predicting the impacts of shifting recreational fishing effort towards inshore species</td>
<td>Fisheries Research and Development Corporation</td>
<td>2010-13*</td>
<td>30,000</td>
<td>326,924</td>
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<tr>
<td>Hallett, C. and Tweedley, J.</td>
<td>Monitoring the ecological condition of the Swan-Canning Estuary using Fish Community Indices</td>
<td>Swan River Trust</td>
<td>2013-15</td>
<td>37,590</td>
<td>121,655</td>
</tr>
<tr>
<td>Hodgson A. and Loneragan N.</td>
<td>Using Unmanned Aerial Vehicles to survey marine mammals: development of methodology and a comparison with manned aerial survey estimates</td>
<td>Australian Antarctic Division - Australian Marine Mammal Centre (AMMC)</td>
<td>2010-13*</td>
<td>110,100</td>
<td>440,400</td>
</tr>
<tr>
<td>Hodgson A.; Smith J. and Loneragan N.</td>
<td>Wheatstone pre-construction Dugon Research scope</td>
<td>Chevron Australia</td>
<td>2011-13</td>
<td>471,340</td>
<td>1,257,156</td>
</tr>
<tr>
<td>Klunzinger M.; Gill H.; Lymbery A.; Morgan D.; Beatty S.; Walker K.; Graf D. and Jones H.</td>
<td>The molecular phylogeography of freshwater fishes in south-western Australia - Jon Murphy Student</td>
<td>Australian Biological Resources Study (ABRS)</td>
<td>2012-15</td>
<td>10,000</td>
<td>30,000</td>
</tr>
<tr>
<td>Klunzinger M.; Gill H.; Lymbery A.; Morgan D.; Beatty S.; Robert J. and Davies S.</td>
<td>Protecting maintaining and restoring refuges for aquatic life within the Yule Brook Waterway and Bickley Reservoir.</td>
<td>South East Regional Centre for Urban Landcare (SERCUL)</td>
<td>2012-14</td>
<td>10,000</td>
<td>60,000</td>
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<tr>
<td>Kobryn H.</td>
<td>Mapping and monitoring of mangroves in Darwin Harbour using remote sensing methods</td>
<td>Cardno Global Infrastructure Services Consultancy</td>
<td>2012-13</td>
<td>29,340</td>
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<tr>
<td>Name</td>
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<tr>
<td>Loneragan, N.; Tweedley, J.; Chaplin, J.; Trayler K. and Jenkins, G.</td>
<td>Stock enhancement of the Western School Prawn (<em>Metapenaeus dalli</em>) in the Swan-Canning Estuary; evaluating recruitment limitation, environment and release strategies</td>
<td>FRDC (50%), Swan River Trust (50%)</td>
<td>2013-15</td>
<td>133,000</td>
<td>200,000</td>
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<tr>
<td>Moheimani, N. and Tweedley, J.</td>
<td>Algal nutrition for larval Western School Prawns, <em>Metapenaeus dalli</em>;</td>
<td>Challenger Institute of Technology</td>
<td>2013-15</td>
<td>10,000</td>
<td>19,380</td>
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<tr>
<td>Morgan D. and Beatty S.</td>
<td>Assessment of the fish and crayfish fauna of the Angove River Autumn 2013 2013</td>
<td>Bio Diverse Solutions</td>
<td>2013</td>
<td></td>
<td>8,775</td>
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<tr>
<td>Morgan D. and Norman B.</td>
<td>Monitoring the world’s largest fish: the whale shark (<em>Rhinocodon typus</em>) - Brad Norman</td>
<td>Holsworth Wildlife Research Endowment</td>
<td>2013</td>
<td>6,700</td>
<td>6,700</td>
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<tr>
<td>Parra, G. Bejder, L. Allen, S. Frere and Pollock, K</td>
<td>Population size, habitat use and genetic structure of Australian humpback dolphins (<em>Sousa chinensis</em>) around the North West Cape, Western Australia</td>
<td>AMMC</td>
<td>2013-15</td>
<td>205,906</td>
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<tr>
<td>Potter, I.</td>
<td>Collection of biological data for Black Bream in Western Australia</td>
<td>Department of Fisheries WA</td>
<td>2013-16</td>
<td>64,932</td>
<td>477,315</td>
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<tr>
<td>Robson B.; Chambers J.; Morgan D. and Beatty S.</td>
<td>Adapting to climate change: a risk assessment and decision framework for managing groundwater dependent ecosystems with declining water levels.</td>
<td>National Climate Change Adaptation Research Facility (NCCARF)</td>
<td>2011-13</td>
<td>61,070</td>
<td>311,161</td>
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<tr>
<td>Smith, J.</td>
<td>Passive acoustics of coastal dolphins: developing passive acoustic methodology for monitoring Australian snub-fin (<em>Orcaella heinsohni</em>) and Indo-Pacific humpback (<em>Sousa chinensis</em>) dolphins</td>
<td>Australian Antarctic Division - Australian Marine Mammal Centre (AMMC)</td>
<td>2012-14</td>
<td>133,455</td>
<td>440,400</td>
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<td>Funding Body</td>
<td>Duration</td>
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<td>Total funding ($)</td>
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</tr>
<tr>
<td>Tweedley, J.; Beatty, S.</td>
<td>Control of introduced fish and crayfish in the Vasse-Wonnerup Ramsar wetland</td>
<td>Caring for Our Country</td>
<td>2012-13</td>
<td>98,288</td>
<td>215,006</td>
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<tr>
<td>Tweedley, J. Beatty S. and Lymbery, A.</td>
<td>Increasing community awareness of feral fish in the Vasse-Wonnerup Wetland</td>
<td>Coastwest</td>
<td>2012-13</td>
<td>8,006</td>
<td>8,006</td>
</tr>
<tr>
<td>Tweedley, J.; Beatty, S. and Lymbery, A.</td>
<td>Monitoring the fish fauna of the Vasse-Wonnerup wetland system following a substantial fish kill event</td>
<td>Geocatch</td>
<td>2013-13</td>
<td>15,000</td>
<td>15,000</td>
</tr>
<tr>
<td>Tweedley, J. and Chambers, J.</td>
<td>Sediment accumulation and resuspension in the Vasse-Wonnerup Wetlands and its impact on nutrient status and ecological health</td>
<td>South West Catchments Council</td>
<td>2012-13</td>
<td>9,984</td>
<td>14,976</td>
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<tr>
<td>Valesini F. and Cannell B.</td>
<td>Study of the effect of a boat ramp at Becher Point on the food resources of Little Penguins on Penguin Island</td>
<td>Department of Environment and Conservation</td>
<td>2010-14</td>
<td>25,046</td>
<td>87,227</td>
</tr>
</tbody>
</table>

* = estimated by apportioning total project funding across the years of the project

**2013 TOTAL FUNDING:** $2,388,101 (40 projects)

**2013 Category 1 FUNDING:** $ 872,156 (14 projects)
8. ACKNOWLEDGEMENTS

The CFFAER would like to acknowledge ongoing support from the following:
ACKNOWLEDGEMENTS cont...

And
Shark Bay Resource
Nickol Bay Professional Fishers Association
Winifred Violet Scott Foundation

Ningaloo Flagship Collaboration
Fund Cluster

[Logos of participating institutions]
South West Marine Research Program
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Dolphin
DISCOVERY CENTRE

CITY OF BUNBURY

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resourcing the future

Worsley Alumina

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SOUTH WEST DEVELOPMENT COMMISSION

WAPRES

ILUKA

MILLARD MARINE

BEMAX
INCORPORATING CABLE SANDS

Department of Environment and Conservation
Our environment, our future

Murdoch University