Australian Museum

Lizard Island Research Station Upgrade
1 July 2011 to 30 June 2012

21 November 2012

nature culture **discover**

Australian museum

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Highlights

- The Upgrade Project was virtually completed in 2011/12. The following projects were carried out:
  - The boat upgrade was completed with commissioning of the 10th new dinghy under the project, *Mary-Ida*.
  - Staged purchase of laboratory equipment continued, including new microscopes costing about $70,000.
  - The generator shed was refurbished with a new soundproofed front wall.
  - Petrol storage and handling was improved with the acquisition of four Intermediate Bulk Containers.
  - The tractor purchased in 2005 was traded for a new one.
- Research and operational highlights during 2011/12 were:
  - LIRS was well-used by Australian and international researchers (projects are listed in Appendix 1; institutional affiliations of researchers are summarised in Table 1). Their research is a major contribution to knowledge of coral reef biology and ecology.
  - At least 116 scientific papers and theses dated 2011 were published (Appendix 3).
  - Usage of LIRS exceeded the planned level of 7,000 visitor nights in 2011/12 for the fourth consecutive year. Total usage was 7,408 person nights in total (excluding staff) including 5,263 person nights (71%) for research (researchers plus postgraduate research students; Appendix 2).
  - Seven new fellowships and one new grant were awarded to start in March 2012: four fellowships to PhD students, three fellowships to early career researchers and a grant to a team of researchers from two institutions (Table 2).
  - Funding of up to $81,000 is available to award five additional fellowships to start in March 2013.
  - Funding of $30,000 is available to award a grant in 2013 that will improve the sustainability of the recreational reef fishery (Peter Teakle Sustainable Fishing Grant).
  - The Lizard Island Reef Research Foundation's capital fund continues to grow. The income from this fund will support ongoing maintenance of LIRS.

Difficulties

- National harmonisation of state-based workplace health and safety regulations is still underway with implications for both boating and diving that could adversely affect operations at LIRS (and elsewhere). LIRS has been active in both processes to press the case for reef science.
- The batteries that are an integral part of the solar power system are deteriorating. An inadequate charging regime is emerging as the likely cause. We are in discussions with both the battery supplier (Exide) and the company that provides the hardware and software for charging the batteries (SMA).

Research and research training

Representatives of 30 institutions from 8 countries and two independent researchers conducted research at LIRS during 2011/12, comprising 124 researchers in total (Table 1). They conducted 104 research projects (Appendix 1). Research usage exceeded 5,000 person nights for a second consecutive year (Appendix 2).

Table 1: Source and academic level of research users during 2011/12

Country	Institution	Senior Researchers	Student Researchers				Total
			PhD	MSc	Hons	U/grad	
Australia	Australian Institute of Marine Science	4					
	Australian Museum	2					
	Australian National University	1	2		1		
	Griffith University	1	1				
	James Cook University	16	22				
	Macquarie University	1					
	Monash University	1					
	Northern Fisheries, DAFF, Qld Govt	1					
	University of Sydney		1				
	University of Queensland	14	6	1			
	University of Western Australia	1					
	University of Wollongong	2					
	WA Environment & Conservation	1					79
Germany	Ruhr University Bochum	1	2				
	University of Tuebingen	1	1				5
New Zealand	Auckland University of Technology	1		1			
	University of Auckland	1	3				
	University of Otago		1				
	Independent	1					8
Norway	University of Oslo	2					2
Portugal	Instituto Superior de Psicologia	1	1				2
Switzerland	University of Neuchatel	1	3	1			5
UK	University of Bristol	3	3				
	University of Cambridge		1				
	University of St Andrews	1					
	Zoological Society of London	1					
	Independent	1					10
USA	School for International Training					4	
	University of California Berkeley	1	1				
	University of Maryland Baltimore Cty	2	3				
	University of Miami	1					
	Washington University St Louis	1					13
TOTAL		**65**	**51**	**3**	**1**	**4**	**124**

Support for research

The Lizard Island Reef Research Foundation continued to support field research at Lizard Island in 2011/12 in two ways: by providing fellowships and grants awarded to researchers by the Australian Museum, and by providing funds for development and maintenance of LIRS.

Fellowships and grants current in 2011/12 are shown in Table 2.

Table 2: Fellowships and grants current in 2011/12

Fellowship/Grant	Year of Award	Duration	Fellow	Institution	Value of Award	Amount in 2011/12
Lizard Island Doctoral Fellowship	2011	2 years	F. Joseph Pollock	James Cook University	$16,000	$8,000
	2012	2 years	Justin Welsh	James Cook University	$16,000	$8,000
	2012	1 year	Sharon Wismer	University of Neuchatel	$8,000	$8,000
Ian Potter Doctoral Fellowship at Lizard Island	2011	2 years	Sandra Binning	Aust. National University	$16,000	$8,000
	2012	1 year	Oona Lonnstedt	James Cook University	$8,000	$8,000
	2012	1 year	Dominique Roche	Aust. National University	$8,000	$8,000
Isobel Bennett Marine Biology Fellowship	2012	1 year	Dr Vanessa Messmer	James Cook University	$11,000	$11,000
John & Laurine Proud Fellowship	2012	1 year	Dr Ashley Frisch	James Cook University	$11,000	$11,000
Yulgilbar Foundation Fellowship	2012	1 year	Dr Shelby Temple	University of Bristol	$11,000	$11,000
Peter Teakle Sustainable Fishing Grant	2012	1 year	Dr Timothy Clark *et al*	Aust. Inst. of Marine Science	$30,000	$30,000
TOTAL						**$111,000**

Funding is also available through the LIRRF to continue supporting research in 2012/13, as follows:

- Five new fellowships in existing programs to start in 2013, valued at up to $81,000.
- A second Peter Teakle Sustainable Fishing Grant to start in 2013 and valued at up to $30,000.

In 2011/12, the LIRRF provided the following contributions for development and maintenance of LIRS:

- $50,000 for the Upgrade Project.
- $38,757 to support additional developments at LIRS outside of the Upgrade Project.

Education

The research station provides an opportunity for students to experience and begin to understand the complexities of the coral reef environment. The educational program is usually conducted by teachers or lecturers from the students' own institution although some engage consultants to provide expert knowledge. Eight student groups from seven institutions used the Station's facilities in 2011/12, as follows:

Barker College
Brighton Grammar School
Geelong College Preparatory School
Trinity Anglican School
RMIT University
School for International Training (2 groups)
University of Texas Austin

Intellectual Property

No LIRS Intellectual Property of potential commercial value was developed during 2011/12.

Performance

Key performance indicators for the LIRS Upgrade Project are detailed at Item 8, Schedule A of the Head Agreement. Performance in 2011/12 is assessed against those indicators here: all have been met and many have been far exceeded.

KPI	Result
Education and skills development: access for research and education to at least 15 postgraduate students per annum	59 students (Table 1 and Appendix 1) – KPI achieved
Collaboration: usage by 15 research institutions per annum from 2008 to 2016	30 institutions (Table 1) – KPI achieved
Collaboration: facilitate research visits by 30 visiting scientists per annum	65 non-student researchers (Table 1 and Appendix 2) – KPI achieved
Collaboration: enter into eight new research, industry or business collaborations by the end of the 10th year from practical completion (i.e. by 2017/18)	Northern Fisheries (DAFF, Queensland Government) became the 11th new collaborator since 2006 – KPI achieved
Research and development excellence: 60 scientific publications dated 2011 (and each subsequent year to 2015)	116 publications (Appendix 3) – KPI achieved
Technology transfer: establishment of information-sharing activities	The summer seminar series continued at LIRS in 2011/12 – KPI achieved
Investment in research: best endeavours by AM to continue its association with, and to receive support from, the Lizard Island Reef Research Foundation and others for LIRS	See section above, Support for Research – KPI achieved

Investment in research: earn enough from activities at LIRS to cover salaries, fuel, maintenance and reimbursable expenses	See Appendix 6 – KPI achieved
Construction: Complete construction project as planned	All construction works completed in 2010/11 – KPI achieved
Other projects: Complete other projects as planned – New boats – Replace existing boats – Upgrade laboratory equipment – Replace tractor – Upgrade diving facilities – Improve bulk fuel facilities – Improve waste disposal facilities – Upgrade access track	 Complete Complete Complete Complete Complete Complete Complete No further upgrade intended - KPI achieved

Commercialisation

As required in Clause 4 of the Proceeds of Commercialisation Agreement, the following information is provided:

4.2 (a) None of the events listed in Clause 3.1 occurred in 2011/12, so the AM did not make any notifications to the Department.

(b) Two research projects involving current and former Australian Museum staff were carried out in 2011/12. Dr Zoe Richards conducted biodiversity research at LIRS with colleagues from other institutions in September 2011. Dr Jeff Leis with assistants Amanda Hay and Jack O'Connor conducted research into larval fish behaviour with colleagues from other institutions at LIRS in Nov/Dec 2011 and Jan/Feb 2012.

(c) One Australian Museum staff member is currently known (as at November 2012) to be conducting research at LIRS during 2013/14. Dr Jeff Leis will again lead a multi-institutional team on research visits in late 2012.

(d) Entities involved in conducting research at LIRS in 2011/12 are listed in Table 1 and Appendix 1.

(e) Entities that propose to use LIRS in 2012/13, as known at November 2012, are:

Research
Auckland University of Technology
Australian Institute of Marine Science
Australian Museum
Australian National University
Consiglio Nazionale delle Ricerche
Cornell University
Instituto Superior Psicologia Lisbon

James Cook University
Macquarie University
Monash University
Northern Fisheries Centre, Queensland Government
Norwegian University of Science and Technology
School for International Training
Southern Cross University
University of Auckland
University of California Davis
University of Cambridge
University of Glasgow
University of Miami
University of Neuchâtel
University of New Mexico
University of Oslo
University of Queensland
University of Saskatchewan
University of Seville
University of St Andrews

Student and other groups
Barker College
Brighton Grammar School
Geelong College Preparatory School
RMIT University
School for International Training
Trinity Anglican School
University of Maryland
Two groups of delegates from the International Coral Reef Symposium

(f) No commercialisation activities were undertaken during 2011/12.

(g) It is unlikely that any commercialisation activities will be undertaken in 2012/13.

(h) Four current AM employees were engaged in Research at LIRS during 2011/12. No AM employees were engaged in Commercialisation activities during 2011/12. [Refer 4.2 (b) above]

(i) Financial and in-kind contributions made by AM to LIRS are shown in Appendix 6.

(j) Not applicable for 2011/12.

(k) Not applicable for 2011/12.

Proposal for future reports

Compiling this Annual Report is a time-consuming exercise. Now that all major components of the Upgrade Project are complete, we propose here an alternative reporting arrangement to reduce that cost.

The proposal hinges on using the annual LIRS newsletter ("Newsletter") to provide part of the information required and an additional document ("Supplementary Report") to provide the remainder. The Newsletter includes complete lists of projects and publications: similar lists comprise more than half the of the current Annual Report. The lists differ between documents only in the timing: calendar year for the Newsletter and financial year for the Annual Report. Below, we show Clause 8 of the Head Agreement and our proposal (in italics) to meet the reporting requirements in a new way.

Clause 8 of Head Agreement: ANNUAL REPORT

8.1 Subject to clause 8.5, AM must by the date specified in Item 9 of Schedule A each year during the term of this Agreement submit to the Department a report ("Annual Report") which must include the following information:

(a) details of the LIRS Activities conducted in the Year or the part of such Year occurring during the term of this Agreement including:

(i) any highlights, breakthroughs or difficulties encountered;

Highlights and breakthroughs are covered in the Newsletter but some difficulties may not be. If that occurs, additional information will be provided in the Supplementary Report.

(ii) progress in the area of research, education and training, collaboration and user involvement, commercialisation and the application of research results generally;

Most of these items are covered in the Newsletter, including the extensive list of publications. Items not covered in the Newsletter will be included in the Supplementary Report.

(iii) development of any LIRS Intellectual Property of potential commercial value;

This will be in the Supplementary Report.

(iv) a list of all personnel who participated in the LIRS Activities;

A list of all project leaders is provided in the Newsletter. It was agreed by the Review Committee some years ago that the Annual Report did not need a complete list of personnel as long as a list of project leaders and their institutional affiliations were included.

(v) detailed information required for the evaluation of AM's achievement of the Key Performance Indicators;

This information will be provided in the Supplementary Report. Many of the KPIs relate to milestones in implementation of the Upgrade Project and all of those are now complete. We will provide information to evaluate the achievement only of ongoing KPIs.

(vi) the information described in clause 4 of the Proceeds of Commercialisation Agreement;

This will be provided in the Supplementary Report.

(vii) evidence that AM has made the AM Contribution due and owing as at the date of the Annual Report;

No AM contribution is listed for 2011/12 or subsequent years so this item will

no longer form part of the Annual Report.

(viii) evidence that AM has received the Donor Contribution due and owing as at the date of the Annual Report; and

The entire Donor Contribution has now been made. No Donor Contribution is listed for 2011/12 or subsequent years so this item will no longer form part of the Annual Report.

(b) any other relevant matters that the Department may reasonably request.

Any such additional information will be included in the Supplementary Report.

8.2 The report provided under clause 0 must also contain any additional matters in relation to the Research, LIRS Project or the LIRS Activities that may be reasonably requested from time to time by the Department. AM must, if reasonably requested by the Department, amend its Annual Report to include any information required by clause 0 that is not contained in the Annual Report submitted by AM.

Any such additional information will be included in the Supplementary Report.

8.3 The provision to the Review Committee of a copy of the audited annual report prepared by AM together with a letter from AM containing any information required by clause 0 that is not contained in AM's audited annual report will discharge AM's obligation to provide the information set out in clause 0.

Financial information as provided in past Annual Reports and in the current Annual Report at Appendix 6 will be provided in the Supplementary Report. This information is based upon audited records at the AM.

Annual Reports up to 2010/11 included a letter from the Director of the Australian Museum certifying that the Donor Contribution and the AM Contribution had been paid in that year. There are no such contributions required in 2011/12 and subsequent years so a letter will no longer form part of the Annual Report.

8.4 Where the obligation of AM to report on any of the matters specified in clause 0 is subject to any confidentiality obligations owed by AM by way of law or legally enforceable agreement AM must use its reasonable endeavours to obtain all necessary consents to enable AM to provide the information specified in clause 0.

No change.

8.5 In relation to the first Year, AM must submit the Annual Report to the Department by 30 November 2007.

No longer relevant.

Schedule A, Item 9: Final Date for delivery of Annual Report (ref. clause 0)
30 November

Change to 30 May. The first of the new reports will cover the six month period from July to December 2012 and subsequent reports will be for calendar years.

Appendix 1

Research projects and project leaders 2011/12

GBR Ocean Observing System
Scott Bainbridge, Australian Institute of Marine Science

Testing the adaptive capacity of corals to climate change: a demographic approach
Dr Andrew Baird, James Cook University

Can coral reef fish change their shape to suit their environment?
Sandra Binning (PhD student), Australian National University

Competition and coexistence in the butterflyfish community
Shane Blowes (PhD student), James Cook University

Microbial nitrogen fixation in the hindgut of marine herbivorous fishes
Lilly Bojarski (PhD student), University of Auckland

UV vision in mantis shrimp
Michael Bok (PhD student), University of Maryland Baltimore County

The effects of coral stressing on the feeding preferences of Acanthaster planci
Harriet Booth (Undergrad student), School for International Training

Respirometry of fish
Yoland Bosiger (field leader for Prof Mark McCormick), James Cook University

Feeding of herbivorous fishes on cryptic surfaces.
Simon Brandl (PhD student), James Cook University

UV-induced DNA damage and UV avoidance
Christoph Braun (PhD student), University of Queensland

Behavioural responses to coral bleaching by a coral-feeding fish
Rohan Brooker (PhD student), James Cook University

Cooperative and cognitive aspects of cleaning symbiosis
Prof Redouan Bshary, University of Neuchatel

Stomatopod behaviour
Prof Roy Caldwell , University of California Berkeley

Role of the neurohormone arginine vasotocin on cleanerfish conspecific related behaviour

Sonia Cardoso (PhD student), Instituto Superior de Psicologia Lisbon

The role of territorial grazer behaviour and community structure in coral reef trophic dynamics
Jordan Casey (PhD student), James Cook University

Electrophysiology of vision in stomatopods
Dr Tsyr-Huei Chiou, University of Queensland

Comparisons of visual capabilities of cephalopods
Wen-Sung Chung (PhD student), University of Queensland

Climate change and physiological recovery from fisheries interactions
Dr Timothy Clark, Australian Institute of Marine Science, and Prof Morgan Pratchett, Dr Vanessa Messmer and Dr Andrew Hoey, James Cook University

The role of hindgut symbionts in protein uptake and recycling in marine herbivorous fishes
Prof Kendall Clements, University of Auckland, Prof Howard Choat, James Cook University, and Lindsey White, Auckland University of Technology

Effects of coral bleaching on coral-dwelling fishes
Darren Coker (PhD student), James Cook University

Biodiversity of coral assemblages
Prof Sean Connolly, James Cook University

Metabolic scaling in reef corals
Prof Sean Connolly, James Cook University

Carbon dioxide versus bicarbonate ion use by coral reef macroalgae
Chris Cornwall (PhD student), University of Otago

Seasonal effects on the behaviour, performance and physiology of butterflyfishes
Christopher Cvitanovic (PhD student), James Cook University

Hormonal correlates of interspecific behaviour
Alizee Derendinger (MSc student), University of Neuchatel

Properties of natural polarized light fields in air and water
Prof Tom Cronin, University of Maryland Baltimore County

Hydrodynamic disturbances on coral reefs
Marcela Diaz (field leader for Dr Joshua Madin), Macquarie University

Assessment of mechanisms of carbon use in coral reef macroalgae
Dr Guillermo Diaz Pulido, Griffith University

Calcium carbonate production of benthic foraminifera
Steve Doo (pre-Phd pilot study), University of Sydney

Explaining coral species abundances: linking morphology to demography
Dr Maria Dornelas, University of St Andrews

Distribution, abundance and diversity of the Lapita cultural complex on the GBR coastline of Australia
Matthew Felgate, Independent researcher, Prof Ian McNiven, Monash University and Dr Sean Ulm, James Cook University

Larval visual ecology of stomatopod crustaceans
Kate Feller (PhD student), University of Maryland Baltimore County

Oculae camouflage of stomatopod larvae
Kate Feller (PhD student), University of Maryland Baltimore County

Do fish use polarization to see through veiling light?
James Foster (PhD student), University of Bristol

Ecosystem function of rabbitfishes (Siganidae) - movement patterns of Siganus lineatus
Rebecca Fox (PhD student), James Cook University

How does climate influence seaweed patch dynamics on the Great Barrier Reef?
Dr Christopher Fulton, Australian National University, Dr Martial Depczynski, Australian Institute of Marine Science, Dr Thomas Wernberg, University of Western Australia

Tropical versus subtropical maximum quantum yields in seaweeds
Patrick Gartrell (PhD student), Griffith University

Adaptations to a cleaning life: a comparative approach
Simon Gingins (PhD student), University of Neuchatel

The ecological role of sediments on coral reefs
Christopher Goatley (PhD student), James Cook University

Underwater CCD polarization sensor
Dr Viktor Gruev, Washington University St Louis

Modelling the influence of sea level rise on reef accretion at Lizard Island
Dr Sarah Hamylton and Prof Colin Woodroffe, University of Wollongong, and Dr Chris Roelfsema, University of Queensland

Fluid composition of the reproductive organs of *S. quadrispinosum* and *S. pohnpei*

Marissa Henderson (Undergrad student), School for International Training

Predation pressure as a factor in social monogamy of mantis shrimp, Pullosquilla thomassini
Leslie Hillman (Undergrad student), School for International Training

Identity of predators of juvenile coral reef fish
Dr Tom Holmes, WA Department of Environment & Conservation

Metabolic scaling in reef corals
Dr Mia Hoogenboom, James Cook University

Polarising vision and behaviour in stomatopods
Dr Martin How, University of Queensland

Ecological significance of coral disease on the Great Barrier Reef
Dr Emily Howells (field leader for Prof Bette Willis), James Cook University

Ultrastructure and function of the hindgut in marine herbivorous fishes
Kate Johnson (PhD student), University of Auckland

Spatial distribution and quality of structure for large reef fishes.
James Kerry (PhD student), James Cook University

Relative importance of body pattern in humbug damselfish: background matching or disrutpive camouflage?
Julia Lange (MSc student), University of Queensland

Precopuatory stabbing in a hermaphroditic sea slug
Rolanda Lange (PhD student), University of Tuebingen

Orientation in fish larvae
Dr Jeff Leis, Australian Museum, Dr Claire Paris, University of Miami, Dr Uli Siebeck and Dr Kerstin Fritsches, University of Queensland

Spatial & temporal patterns of coral reef connectivity
Libby Liggins (PhD student), University of Queensland

Predator-prey interactions and the importance of sensory cues in a changing world
Oona Lonnstedt (PhD student), James Cook University

Social learning as an anti-predator response in coral reef fish
Rachel Manassa (PhD student), James Cook University

The visual ecology of retinal ganglion cells in reef fish

Prof Justin Marshall, University of Queensland, and Prof Hans-Joachim Wagner, University of Tuebingen

Polarisation vision
Prof Justin Marshall, University of Queensland

Seagrass monitoring
Catherine McCormack, Northern Fisheries Centre, DAFF, Queensland Government

Monitoring of fish and corals around Lizard Island
Prof Mark McCormick, James Cook University

Protein uptake in marine herbivorous fishes
Selena McMillan (PhD student), University of Auckland

Ageing study of giant clams
Dr Mark Meekan, Australian Institute of Marine Science

Effects of flow on antipredator responses
Mathew Mitchell (PhD student), James Cook University

Opsins in extraocular photoreceptors
Alexandra Nahm (PhD student), University of Maryland Baltimore County

Physiological effects of high temperature and carbon dioxide on reef fish
Prof Goran Nilsson and Dr Jonathan Stecyk, University of Oslo, Prof Phil Munday and Dr Jodie Rummer, James Cook University

Effects of environmental correlates on foraging ecology of Sand Perch
Jess Nowicki (PhD student), James Cook University

Spatial patterns at the neighbourhood scale of scleractinian corals
Simone Pennafirme Ferreira (PhD student), James Cook University

Competition, habitat selection and imprinting of coral gobies
Pedro Pereira (PhD student), James Cook University

Population dynamics of the giant clams Tridacna gigas and T. derasa
Dr David Phillips, Independent researcher

How the coral trout got its spots - the function of reef colour patterns and visual ecology
Genevieve Phillips (PhD student) and Dr Karen Cheney (supervisor), University of Queensland

Is there behavioural modality in the swimming and foraging behaviour of coral reef fishes?
Jessica Pink (Hons student) and Dr Chris Fulton (supervisor), Australian National University

Coordination abilities in cleaner wrasse pairs
Ana Pinto (PhD student), University of Neuchatel

Large scale variation in partial mortality in adult coral colonies
Chiara Pisapia (PhD student), James Cook University

Understanding White Syndrome in the Indo-Pacific
Joseph Pollock (PhD student), James Cook University

Developmental genetics of stomatopod vision
Dr Megan Porter, University of Maryland Baltimore County

Seasonal effects on the behaviour, performance and physiology of butterflyfishes
Morgan Pratchett (PhD student), James Cook University

Mechanisms promoting cooperation in cleaning mutualism
Dr Nichola Raihani, Institute of Zoology, Zoological Society of London

Manage ecosystems, monitor species
Dr Zoe Richards, Australian Museum

Crown-of-Thorns tagging
Dr Jairo Rivera Posada, James Cook University

Polarised vision in fish and cephalopods
Dr Nick Roberts and Dr Shelby Temple, University of Bristol, and Prof Justin Marshall, University of Queensland

Bio-physical interactions and predator-prey relationships in coral reef fishes
Dominique Roche (PhD student), Australian National University

Effect of waves and currents on seagrass distribution and productivity
Dr Megan Saunders, Assoc Prof Tom Baldock , Dr Chris Brown , and Dr David Callaghan, University of Queensland

Intracolonial genetic variation in corals
Max Schweinsberg (PhD student) and Prof Ralph Tollrian (supervisor), Ruhr-University Bochum

Quantifying polarization vision in reef inhabitants
Milly Sharkey (PhD student), University of Bristol

Role of exogenously administered steroid hormones on individual behavioural decisions in cleaner fish
Dr Marta Soares, Instituto Superior de Psicologia Lisbon

The comparison of the freshwater cichlid and marine reef fish visual system
Dr Sara Stieb, University of Queensland

The role of parasites and cleaning behaviour in coral reef fish recruitment
Derek Sun (PhD student), University of Queensland

Physiological effects of high temperature and carbon dioxide on reef fish
Dr Jonathan Stecyk, University of Oslo

Diversity of coral ectosymbionts
Jessica Stella (PhD student), James Cook University

The impact of ocean acidification on the reproduction and growth of scleractinian corals
Sebastian Striewski (MSc student), Ruhr-University Bochum

Seeing the reef in a new light: polarization imaging of the reef and its inhabitants
Dr Shelby Temple, Dr Nick Roberts and Prof Julian Partridge, University of Bristol

Colour vision in mantis shrimp
Hanne Thoen (PhD student), University of Queensland

Impact of herbivorous fish on coral recruit survival
Melanie Trapon (PhD student), James Cook University

Molecular evolution of cephalopod venom proteins
Eivind Undheim (field leader for Assoc Prof Brian Fry), University of Queensland

Investigation of toxins from the superfamily Conacea
Eivind Undheim (field leader for Prof Richard Lewis), University of Queensland

Cooperative hunting between groupers, moray eels and octopus
Alex Vail (PhD student), University of Cambridge

Status signalling and signal-receiver behaviour in reef fish
Dr Stefan Walker, James Cook University

Spatial ecology of coral reef fishes.
Justin Welsh (PhD student), James Cook University

Foraging ecology of sand perch, *Parapercis cylindrica*
Meghan Werft (Undergrad student), School for International Training

Role of predation pressure in establishment of behavioural syndromes
James White (MSc student), James Cook University

Protein measurement in seaweeds
Loretta White (MSc student), University of Auckland

Measuring spectra of the polarizing maxillipeds of stomatopod crustaceans
David Wilby (PhD student), University of Bristol

Ontogeny of cognition in bluestreak cleaner wrasse, *Labroides dimidiatus*
Sharon Wismer (PhD student), University of Neuchatel

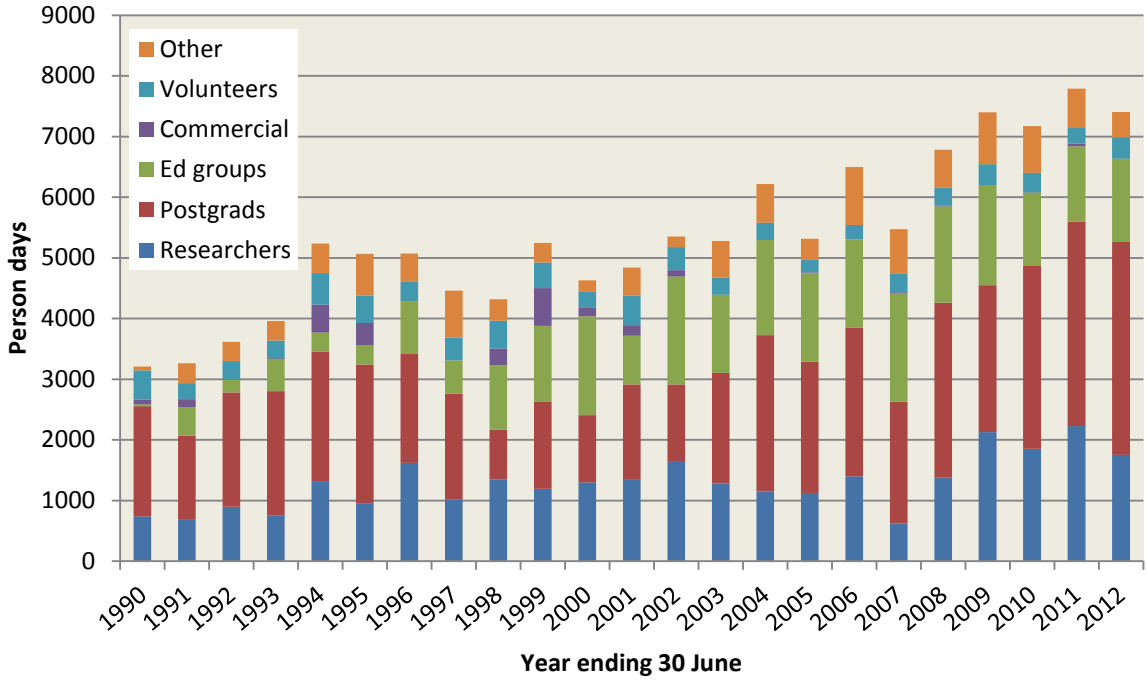
Reefs on the edge
Erika Woolsey (PhD student), James Cook University

The effects of environment and demography on social and genetic monogamy and biparental care in the lysiosquilloid stomatopods
Molly Wright (PhD student), University of California Berkeley

Appendix 2

Personnel

The graph below shows participation in LIRS Activities by various user groups.



Appendix 1 lists the names and institutional affiliations of all research project leaders who participated in LIRS activities between 1 July 2011 and 30 June 2012.

LIRS staff in 2011/12 were:

Dr Lyle Vail (Director)
Dr Anne Hoggett (Director)
Bob Lamb (Maintenance)
Tania Lamb (Maintenance)
Lance Pearce (Maintenance)
Marianne Pearce (Maintenance)
Julian Foerster (Temporary, Maintenance)

A film crew from ABC TV used LIRS for commercial purposes in 2011/12. Participants were:

Prof Terry Hughes
Mary Jo Boyle
Paul Castellaro
Roslyn Lawrence
Ruben Meerman
Brett Ramsay

Student groups from four Australian high schools, one Australian University and two US universities used LIRS for educational purposes in 2011/12, as follows:

Barker College
Brighton Grammar School

Geelong College Preparatory School
Trinity Anglican School
RMIT University
School for International Training
University of Texas Austin

Appendix 3

Publications dated 2011 based on work at LIRS

1. Aguado, M.T., G. San Martin and M.E. Sidall, 2011. Systematics and evolution of syllids (Annelida: Syllidae). *Cladistics, 27*: 1-17.

2. Ang, T.Z. and A. Manica, 2011. Effect of the presence of subordinates on dominant female behaviour and fitness in hierarchies of the dwarf angelfish *Centropyge bicolor*. *Ethology, 117*: 1111-1119.

3. Anker, A., 2011. Four new infaunal decapod crustaceans (Caridea: Alpheidae and Gebiidea: Axianassidae) from Lizard Island, Australia, one of them also occurring in Moorea, French Polynesia. *Zootaxa, 2734*: 1-22.

4. Baumann, H. and M. Gagliano, 2011. Changing otolith/fish size ratios during settlement in two tropical damselfishes. *Helgoland Marine Research*, doi 10.1007/s10152-011-0255-2.

5. Bay, L.K. and J.M. Caley, 2011. Greater genetic diversity in spatially restricted coral reef fishes suggests secondary contact among differentiated lineages. *Diversity, 3*: 483-502.

6. Bellwood, D.R. and J.H. Choat, 2011. Dangerous demographics: the lack of juvenile humphead parrotfishes *Bolbometopon muricatum* on the Great Barrier Reef. *Coral Reefs, 30*: 549-554.

7. Beninde, J., 2011. Sex in a sea slug: is it all about copulation duration? Diploma thesis, University of Tuebingen.

8. Berumen, M.L., E.D.L. Trip, M.S. Pratchett and J.H. Choat, 2011. Differences in demographic traits of four butterflyfish species between two reefs of the Great Barrier Reef separated by 1,200 km. *Coral Reefs*, doi: 10.1007/s00338-011-0838-z.

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Appendix 4

Seminar series 2011/12

13 December 2011

Dr Sarah Hamylton, University of Wollongong
Remote sensing and sea level rise assessment at Lizard Island

Dr Megan Saunders and Dr Javier Leon, University of Queensland
Effects of waves and currents on seagrass and sediments in the Lizard Island lagoon

20 December 2011

Oona Lonnstedt
Chemical alarm cues and shark behaviour

25 January 2012

Chris Goatley, James Cook University
Sediments, algal turfs and herbivores on coral reefs

23 February 2012

F. Joseph Pollock, James Cook University
Understanding the coral disease White Syndrome on the Great Barrier Reef

1 March 2012

Dr Stefan Walker, James Cook University
The evolution of badges of status and signal receiver behaviour

21 May 2012

Dr Timothy Clark, Australian Institute of Marine Science
Marine science from a fishiological perspective

Dr David Phillips, independent researcher
Lizard Island clam populations: a short history

4 June 2012

Prof Justin Marshall, University of Queensland
The CoralWatch Project

7 June 2012

Dr Shelby Temple, University of Bristol
Seeing the reef in a new light: polarisation vision in cephalopods

Appendix 5

External financial support

The Lizard Island Reef Research Foundation has made the following contributions to the Australian Museum for activities at LIRS, including the Upgrade Project.

LIRRF contribs	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	TOTAL
Upgrade proj.	6,000	41,000	849,000	210,000	849,000	274,000	310,000	480,000	50,000	$3,069,000
Other capital	104,000	21,000	18,621	22,000	52,600	56,000	58,900	62,200	36,419	$431,740
Fellowships	23,000	18,000	24,000	32,000	43,000	65,000	43,100	84,800	95,301	$428,201
Operating	0	0	42,879	41,000	3,500	3,000	4,000	4,000	2,878	$101,257
TOTAL	133,000	80,000	934,500	305,000	948,100	398,000	416,000	631,000	184,598	$4,030,198

The Donor Contribution for 2011/12 (highlighted in yellow) is shown below in the relevant transaction report from Australian Museum, Finance Section.

Accnt.	Period	Jrnl. No.	Jrnl. Line.	Trans. Date	Reference	Amount	Description
5630	2012009	29360	23	20120316	DIR DEP	-50000	DEP FROM LIRRF

No specific Donor Contribution was required under the agreements for 2011/12. The $50,000 provided by the LIRRF covered expenditure on the Upgrade Project during the year.

An in-kind contribution of computers valued at $21,000 was made by the LIRRF in 2006/07. That contribution is not included in the table above.

The SSRFF agreements require the LIRRF to provide a Donor Contribution of $2,550,000 to the Australian Museum and to use its best efforts to raise and pay to the AM an additional $450,000, a total of $3 million. The LIRRF has now paid to the AM $3,069,000 cash plus $21,000 in-kind for the Upgrade Project, a total of $3,090,000. The Donor Contribution has thus now been met and exceeded.

Substantial funding (> $10,000) or new funding commitments were made to the LIRRF between July 2011 and June 2012 by:

- Teakle Foundation
- Ken Coles AM and Rowena Danziger AM
- Vivian and Wendy King
- Robert Maple-Brown AO and Susan Maple-Brown
- The Ian Potter Foundation
- Yulgilbar Foundation
- Trust Company as trustee
- John and Laurine Proud Family Estate Trust

Appendix 6

Operating revenue and expenditure at LIRS in 2011/12

	Year ending 30/06/2012	Amount relevant to KPIs
INCOME		
Sales	403,322	403,322
Donations (excluding donations for capital items)	98,179	
Other revenue	148,097	148,097
Total Income	**649,598**	**551,419**
EXPENDITURE		
Salaries and Related Costs	352,228	352,228
Research	98,301	
Cost of Sales	16,714	
Repairs & Maintenance	47,334	47,334
Freight	17,964	
Travel	18,005	
Fuel & Oils	59,911	59,911
Reimbursable expenses	67,830	67,830
General Operating Expenses	29,553	
Subtotal Expenditure	**707,840**	**527,303**
Net cash cost of services	**31,877**	**(24,116)**
Non-cash expenditure - Depreciation	113,088	
Total Expenditure	**820,928**	
Net cost of services including depreciation	**144,965**	

No AM Contribution is required in 2011/12 and subsequent years (Head Agreement, Schedule A, Item 2). However, the AM did make cash and in-kind contributions to LIRS at similar levels to previous years.