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LIZARD ISLAND
RESEARCH STATION

Supported by the Lizard Island Reef Research Foundation
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Australian Museum Lizard Island Research Station 2012



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6 College Street Sydney NSW 2010 Australia

t +61 2 9320 6000

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LIZARD ISLAND RESEARCH STATION 2012



A facility of the Australian Museum

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Directors
Dr Lyle Vail and Dr Anne Hoggett

Lizard Island Research Station
PMB 37
Cairns QLD 4870
Australia

Phone: + 61 (0)7 4060 3977
Fax: + 61 (0)7 4060 3055
Email: lizard@austmus.gov.au
www.australianmuseum.net.au/Lizard-Island-Research-Station



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AUSTRALIAN MUSEUM DIRECTOR'S REPORT

Australia risks losing one of its crown jewels, the Great Barrier Reef. Alarming statistics coming from the Australian Institute for Marine Research suggest that we lost nearly half the Reef's coral cover between 1985 and 2012, from a combination of storm damage, coral bleaching and Crown of Thorns Starfish predation. If we add the growing risks from coastal port development and climate change (sea level rise and ocean acidification in particular) then the Reef is in for a tough time.

There is such concern about human impacts that the World Heritage status of the Great Barrier Reef is under threat too. Loss of that status would call into question Australia's ability to look after its natural assets. These factors clearly illustrate the need for ongoing and intensive

work into our understanding of the Great Barrier Reef, and its response to change.

The Australian Museum's main contribution to Great Barrier Reef research is to operate one of the world's best tropical marine research stations at Lizard Island, with the generous support of the Lizard Island Reef Research Foundation. While we don't directly control the research carried out, our Lizard Island team ensures that the researchers who come from all over the world are doing high quality research that contributes to a useful body of knowledge.

Thanks to the generosity of the Foundation and several individual donors, we are able to offer a range of fellowships, and for these we do specify the area of research.



Increasingly this research is directed to understanding the threats to the Reef, and how it might respond or adapt to threats and change.

My sincere thanks, and those of the Trustees of the Australian Museum, go to the generous supporters and Trustees of the Lizard Island Reef Research Foundation. Without their support we would know much less about the Great Barrier Reef.

FRANK HOWARTH PSM
Director, Australian Museum

RESEARCH STATION DIRECTORS' COMMENT

In 2012, a new phase begins for LIRS. The 30th Anniversary Development – seven years of major improvements to infrastructure – is complete. On page 10, we outline a new strategic plan that will see LIRS build on its strengths as a valuable facility for coral reef research. In developing the plan, we consulted with users and others. The size of LIRS became an important baseline issue: some called for more space and facilities but most indicated that the station is already large enough. The decision to stay at the current size considered these views and was ultimately based on cost/benefit analysis.

What would be gained by getting bigger? More aquarium space would enable larger-scale experiments and provide some efficiencies. More lab space would reduce crowding during peak periods, and more visitor

accommodation would probably lead to higher usage and hence greater research output.

And what about the costs? More "things" means more maintenance and administration. LIRS has operated with four full-time staff since 1990. During that period, capacity has increased by nearly 50% (from 25 to 37 visitor places) and usage is 2.6 times higher (from 3200 to 8300 visitor nights per year). If LIRS increased further in size, additional full-time staff would be needed with all the associated ongoing and capital costs. Then there are the environmental costs. With more infrastructure, we would use more fresh water, produce more carbon emissions and other waste, and research projects would inevitably start impacting each other in the field. Finally, consultation revealed that researchers like working at LIRS partly because of the congenial and research-friendly



atmosphere – and many feared that would be lost if the station continued to grow.

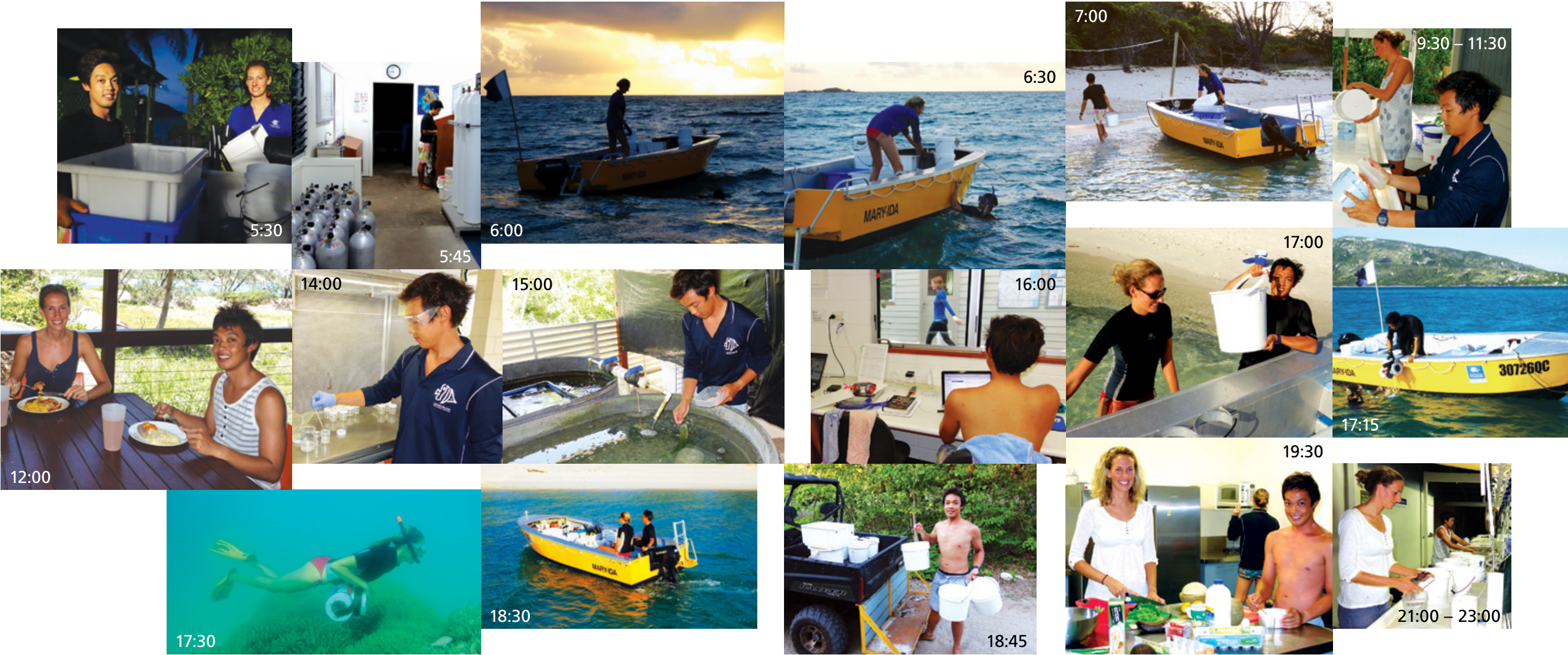
In our view, the costs of getting bigger far outweigh the benefits. Research output of LIRS is high: this year, we supported 113 projects and recorded 94 new scientific publications. With the support of the Lizard Island Reef Research Foundation, our plan for the future will ensure that a similar level of achievement is sustainable into the future.

ANNE HOGGETT AND LYLE VAIL
Directors, LIRS

RESEARCH AT LIRS



02



03

A DAY IN THE LIFE

WHO: Derek Sun (PhD student at the University of Queensland) and volunteer assistant Johanna Werminghausen (did research for her MSc at LIRS in summer 2010/11 from University of Tuebingen, Germany).

THE PROJECT: Derek is finding out how parasites (particularly bloodsucking gnathiid isopods) impact the growth, survival and performance of young reef fish.

WHY? This work builds on previous studies by Derek's supervisors and their students that have shown the

importance of cleaner wrasse in maintaining the health of reef fish through their cleaning activities.

WHAT'S GOING ON? Derek and Johanna are in the middle of a field experiment that runs for 12 consecutive days in which work starts at dawn and finishes late at night. They're using

special traps to determine temporal variation in the infection rate by gnathiid parasites of juvenile damselfish. They deploy the traps at sunrise and sunset then process and preserve the samples to take back to UQ. In between, they have to maintain ongoing aquarium experiments - and themselves.

HOW LONG DOES IT TAKE? Derek is in the third year of his PhD. For this project, he has made eight visits to LIRS for a total of 228 days so far, with more to come in 2013. He's published one paper already, listed in this newsletter.

HOW IS THE WORK FUNDED? Derek is supported by an Australian Postgraduate Award and a generous grant by the Sea World Research and Rescue Foundation Inc. All research at LIRS is subsidised by the Australian Museum and the LIRRF.

FELLOWSHIPS AND GRANTS

Six fellowships and one grant were awarded in 2012 by the Australian Museum for field-intensive research at Lizard Island. Funding is provided by the Lizard Island Reef Research Foundation and its donors: The Ian Potter Foundation; the Hermon Slade Raiatea Foundation, the John and Laurine Proud Estate Trust, the Yulgilbar Foundation, and the Teakle Foundation.

Details of the conditions and selection criteria for fellowships and grants can be found in the Lizard Island Research Station section of the Australian Museum's web site. Applications close in August or September each year for funding that becomes available in March of the following year.

As well, four special grants were awarded to allow participation in field trips to Lizard Island for delegates of the 12th International Coral Reef Symposium, held in Cairns during July.

	Maximum value	First awarded	Number awarded this year (total)
Lizard Island Doctoral Fellowship	\$24,000	1984	2 (40)
Ian Potter Doctoral Fellowship at Lizard Island	\$24,000	2006	1 (9)
Isobel Bennett Marine Biology Fellowship	\$11,000	2008	1 (5)
John & Laurine Proud Fellowship	\$11,000	2008	1 (6)
The Yulgilbar Foundation Fellowship	\$11,000	2009	1 (6)
Peter Teakle Sustainable Fishing Research Grant	\$30,000	2011	1 (2)
Special grants	Varies	1998	4 (7)
TOTAL			11 (76)



MARTINA PRAZERES
2013 Ian Potter Doctoral Fellow at Lizard Island
The University of Queensland
Benthic foraminifera as a tool for detecting environmental and ecological changes on the Great Barrier Reef

The Great Barrier Reef is under threat from both global and local impacts. Sea surface temperatures in the GBR have risen by 0.4°C within the last century and are predicted to increase 1-3°C by 2100. This causes significant negative impacts on coral communities due to global bleaching events. More locally, coral communities are adversely affected if they lie in the path of river flood plumes that are polluted with nutrients such as fertilisers and with sediment which reduces light penetration.

Coral reef waters are normally very low in nutrients and sediment – that's why they're so clear. Reef-building corals and many other reef animals are well adapted to live in such conditions because they have symbiotic relationships with microscopic plants: the animal provides shelter within its body for the plant and the plant produces food for the animal using sunlight. Changes in nutrient loads could disrupt the finely balanced nutrient cycling pathways of this symbiotic relationship.

Foraminifera are single-celled reef animals (although some are as large as your thumbnail) whose shells can be an important component of reef sand. Like corals, some forams have symbiotic relationships with plants and they can be overgrown by seaweeds when nutrient levels and temperature are high. Forams respond to environmental changes more quickly than corals because they are smaller and have shorter life spans.

Martina will assess how large benthic forams respond to varying levels of temperature, light and nutrients by measuring their health using novel tools that can detect biochemical changes. This will improve our understanding of how increases in nutrient loading and climate change will interact and affect forams. It will also assess the potential for using forams as bioindicators of shifts in the environment caused by local and global changes on the GBR.

Top middle: Bluefin Trevally, *Caranx melampygus*.



FABIO CORTESI
2013 Lizard Island Doctoral Fellow
University of Basel, Switzerland and The University of Queensland
Ecological and molecular basis for colour polyphenism in *Pseudochromis fuscus*

Coral reef fish are among the most colourful and beautifully patterned organisms on the planet but our understanding of the function and evolution of such coloured visual signals is limited. Three ways in which we can start to unlock the processes that have created such diversity in colours and patterns is to understand: 1) the molecular mechanisms that create the colours, 2) how such visual signals are perceived by other species (predators, competitors and potential mates), and 3) how this drives the evolution of such signals. To investigate these questions Fabio will use an innovative, multidisciplinary approach combining behavioural, neurophysiological, cell histological and molecular methodologies with the coral reef fish *Pseudochromis fuscus* as a model system.

On the Great Barrier Reef, *P. fuscus* has two distinct colour morphs: brown and yellow. Previous studies have revealed the species can change colouration from yellow to brown within two weeks. This colour change suggests that different morphs are part of the same polyphenic population. However, the molecular processes that enable colour change and the ecological processes initiating it remain unclear. Possible molecular explanations include differences in colour gene expression, pleiotropy (when a single gene controls multiple phenotypic traits), or a switch to an alternative genetic pathway. Ecological explanations for polyphenism include crypsis via background matching in morph specific habitat, imitation of damselfish to increase foraging success (aggressive mimicry), and/or imitation of damselfish to decrease predation pressure (social mimicry). Fabio's approach is to use gene expression assays and genetic sequencing to tackle the molecular part of the question. For the ecological question, Fabio will use a combination of behavioural, observational and neurophysiological approaches.

Understanding how biodiversity evolves has been one of the central questions in natural sciences for centuries. Fabio's research is contributing to this big question by studying the evolution of a complex mimicry system.



HANNE THOEN
2013 Lizard Island Doctoral Fellow
The University of Queensland
Understanding the complex visual system of mantis shrimps, a new form of colour processing?

Mantis shrimp are colourful marine crustaceans that are common on coral reefs and have a reputation as aggressive predators. With up to 16 photoreceptors and the ability to see polarized light, the mantis shrimp has possibly the most complicated colour vision in the animal kingdom. For comparison, the human visual system has only three colour receptors. Twelve of the mantis shrimps photoreceptors encode different colours and of these, four are in the ultraviolet part of the spectrum, enabling them to see colours that we can only imagine.

However, the actual complexity of their colour vision has long been questioned. Preliminary data indicate that the high-spectral-resolution colour vision that these animals potentially possess might be destroyed at a higher level of visual processing. However, definitive proof of this is lacking. The goal of Hanne's research is to determine if mantis shrimp "truly" have 16-dimensional colour vision.

Hanne will use several techniques to understand how mantis shrimps use their colour receptors. Behavioural experiments in the LIRS aquarium will determine how well they discriminate between different sets of colour, giving an indication of how they see colour signals. Electrophysiological recordings from each photoreceptor will be used to determine the exact spectral (colour) sensitivities of a species. Finally, Hanne will use fluorescent techniques to trace neurons beneath the retina, mapping out how much processing occurs in the eyes themselves, and how this information is sent to the brain.

This research will greatly enhance knowledge of the visual and learning capabilities of these crustaceans. A better understanding of how they process spectral information might lead to the development of novel optical technologies. If it turns out that mantis shrimp colour vision is cruder than suggested by its retina, then this will naturally lead to the question of why they have so many visual pigments.

FELLOWSHIPS



DR DANIELLE DIXON

2013 Yulgilbar Foundation Fellow

Georgia Institute of Technology

Ability of obligate coral dwelling fishes to protect corals from damage

Coral reefs are in global decline with seaweeds (macroalgae) commonly replacing corals. Drivers of decline are debated, but major stresses that suppress corals can also enhance seaweeds - such as overfishing of animals that eat seaweeds, pollution, ocean heating, acidification, and coral disease. As reefs continue to convert from coral to macroalgal dominance, there is increasing need to understand interactions that enhance coral resilience or suppress seaweed impacts on corals.

Some seaweeds are allelopathic, which means they produce chemicals that affect the growth and survival of nearby organisms. Goby fishes that live symbiotically with acroporid corals may play a key role in defending their coral home from such a seaweed. The behaviour of both the fish and the coral can be affected by chemicals emitted by the algae. A worrisome recent discovery is that such chemically-mediated behaviours can be disrupted or even reversed by changes in ocean pH (i.e. prey are attracted to predator odours rather than fleeing from them). With ocean acidification, critical aspects of chemical communication in the sea may be destabilized, risking loss of key processes underlying reef resilience. However, first, a baseline understanding of the important marine interactions is vital. Enhancing our understanding of how coral dwelling gobies protect their host from damage is the focus of Danielle's research.

Danielle's research is aimed at answering the following questions: 1) Is the protection of their host coral a common service provided by the coral dwelling gobies? 2) What role does the obligate coral crab play in algal removal? 3) Are the corals providing the gobies with a specific food supply in exchange for continued protection as seen in the ant/plant relationship? and, 4) Do gobies offer more protection when residing in their preferred coral host rather than a less preferred species? In addition the lineages for both corals and gobies will be examined to determine if specific goby lineages are aligned with specific coral species.



DR ANDREW HOEY

2013 Isobel Bennett Marine Biology Fellow

ARC Centre of Excellence for Coral Reef Studies, James Cook University

Influence of macroalgal beds on the functional impact of herbivorous fishes

Coral reefs are in decline worldwide, with many of them shifting from being coral-dominated to being overgrown by large fleshy seaweeds. In countries where people harvest the weed-eating fishes (such as parrotfish, surgeonfish and rabbitfish) with spearguns, nets and so on we are seeing a fundamental change in the nature of reefs from coral to weed. While the causes of such reef degradation are well established, we do not know how reef inhabitants (in particular fishes) respond to this seaweed overgrowth.

Andy will simulate various stages of reef degradation by transplanting seaweeds at different densities onto small patches of reef surrounding Lizard Island. Remote underwater video cameras will record how reef fishes respond to the patches of seaweed. Importantly, the project will assess how density, size and composition of seaweed patches influence patterns of habitat use and feeding of weed-eating fish. Underwater video cameras will directly quantify the presence and feeding activities of herbivorous fishes within and adjacent to the manipulated and natural macroalgal stands. To determine if any avoidance (or preference) extends beyond the macroalgal stands themselves (i.e. edge effects) video cameras will also be positioned at varying distances from habitat boundaries.

By understanding how fishes respond to seaweed overgrowth this project will not only identify the mechanism/s that may lead to the proliferation of seaweeds on degraded reefs, but also identify ways to arrest and reverse such seaweed overgrowth. These outcomes will provide a framework for predicting future changes on coral reefs and will identify temporal windows of opportunity in which management actions may be most effective.

Top left: Injecting Crown of Thorns Starfish with sodium bisulphate.
Top right: Researchers Vanessa Messmer (right) and Megan Feeg.



DR JAIRO RIVERA

2013 John and Laurine Proud Fellow

ARC Centre of Excellence for Coral Reef Studies, James Cook University

Novel method for controlling outbreaks of *Acanthaster planci*

Outbreaks of the Crown of Thorns Starfish, *Acanthaster planci*, have had catastrophic effects on many reefs in the Indo-Pacific and they are the major cause of coral loss in the Great Barrier Reef. During outbreaks, high densities of *A. planci* can consume >90% of corals across vast tracts of reef habitat. On Australia's Great Barrier Reef, outbreaks of *A. planci* account for about 40% of recorded coral loss since 1995. In the near-term, control of outbreaks of *A. planci* is the most immediate and effective mechanism by which to reverse sustained declines in the abundance of live coral cover on the Great Barrier Reef.

Current best practice for killing *A. planci* is to inject individual starfish with sodium bisulphate (dry acid). However, this requires injection of the solution into multiple areas of the starfish. Failure to do so often results in only localized tissue damage and subsequent survival of the animal. Moreover, the high concentrations and volumes of sodium bisulphate that are used in controlling outbreak populations can potentially have detrimental effects on reef ecosystems when used on a large scale since it is a strong oxygen scavenger. Developing more effective and less harmful methods to control COTS outbreaks is therefore imperative.

In previous studies, Jairo showed that several distinct components (mainly beef protein extracts) of the common and widely available media culture (TCBS) are capable of causing rapid mortality in *A. planci*, and thereby could provide novel and non-toxic options to control outbreaks. The aim of Jairo's current study is to determine the lethal doses of these beef protein extracts and ensure that there is no risk of transmission of disease to non-target species such as fishes, corals and other echinoderms. Advantages of using protein extracts for controlling *A. planci* compared to sodium bisulphate include: 1) animal protein extracts like peptone and oxgall are not toxic chemicals; 2) only low concentrations of these extracts are needed and;

3) mortality rates are 100% with even small, single doses (10 ml per starfish, as opposed to 25 ml of sodium bisulphate delivered into multiple locations within each starfish). Using protein extracts to control outbreaks of *A. planci* is potentially a much more efficient and effective method compared to current best practice.



DR TIMOTHY CLARK¹ (left)

DR STEVEN COOKE²

DR ANDREW TOBIN³

PROF MORGAN PRATCHETT⁴

DR VANESSA MESSMER⁴

2013 Peter Teakle Sustainable Fishing Research Grant

- ¹ Australian Institute of Marine Science
- ² Carleton University, Canada
- ³ Fishing and Research Centre, James Cook University
- ⁴ ARC Centre of Excellence for Coral Reef Studies, James Cook University

Vulnerability and survival of fish released following fisheries encounters: towards lower post-release predation and more sustainable catch-and-release fishing.

Fishes are often returned to the water following a fisheries interaction because 1) they are not the desired target species, 2) they are not legally harvestable (e.g., do not fall within size limits, exceed bag limits, etc) or 3) the anglers have a strong conservation ethic and practice voluntary catch-and-release. While these practices promote sustainable fishing, little is known of the recovery rates of released fishes or the role of post-release predation. This last point is particularly relevant on the Great Barrier Reef where the number of predators is relatively high, thus necessitating strategies that will optimise fish condition at the time of release in order to minimize predation.

Using a combination of aquarium and field experiments at Lizard Island, this project will investigate the role of predation in determining the survival of released fishes. In addition, Tim and colleagues will assess the recovery rates of exhausted fishes under different environmental conditions (e.g. summer vs winter) with the aim of determining the most appropriate handling techniques to minimize post-release predation. This research will focus on short-roaming coral reef fishes like coral trout

FELLOWSHIPS



and stripey snapper as well as some important pelagic species such as mackerel and trevally. Notably, almost nothing is known of the ecology and vulnerability of near-shore pelagic species despite them being an important component of commercial and recreational fisheries.

This project has three specific objectives:

- 1 Quantify the species-specific behavioural, cognitive and physiological impairments of fishes following simulated (lab-based) fisheries encounters;
- 2 Devise appropriate strategies for assisting the recovery of different species under different environmental conditions, and develop a set of guidelines for fishers targeting reef-based or pelagic species; and
- 3 Apply the recovery techniques to fishes following a real catch-and-release encounter in the natural environment during summer and winter.

ASSOC PROF JOSE CARLOS SICONI SEOANE

Federal University of Rio de Janeiro, Brazil

“Cainho” has been working with coral reefs in Brazil for 6 years as a member of several organisations involved in coral reef monitoring, preservation and education. These groups actively promote reef education and resource consciousness. He is on the steering committee of Coral Vivo, which has trained about 500 secondary school teachers on coral reef basics, as well as about 50 marine park guards and tourist guides from coastal municipalities in Brazil.

ANDALUS PUNONGBAYAN

PhD student, University of the Philippines

As a PhD student in the Philippines, Andalus is involved with the restoration of damaged reefs. This requires proper identification of potentially resilient species for mass culture and transplantation and detection of ecological processes that inhibit/facilitate recovery. The coral restoration initiative is expanding to include more and more sites in the Philippine Archipelago, and there is a current need for more manpower to implement restoration-related activities. Andalus participated in the coral identification workshop which will help her make a greater contribution to building her country’s capacity to manage and hopefully restore coral-dominated ecosystems.

CHRISTOPHER POONIAN

PhD student , University of Nottingham, UK

Chris is a PhD student whose work focuses on the Bedu’s sociocultural interactions with coral reefs and associated resources in South Sinai. While the majority of his work is based on social science methodologies, he also plans to conduct coral reef surveys at principal fishing grounds. Participation in the coral identification workshop greatly improved his knowledge of coral species identification. He also works part-time for an NGO, Community Centred Conservation (C3), and is involved in long-term capacity-building, research and conservation programmes in Madagascar, Fiji and the Philippines.

PROFILE OF A FORMER FELLOW

DR CAMPBELL DAVIES

Campbell Davies was the 1990 Lizard Island Doctoral Fellow. After finishing high school in Melbourne he moved to Townsville to enrol at James Cook University where he did his undergraduate, Honours and PhD degrees. His PhD research at LIRS involved trapping and tagging over 2,000 fish in the Lizard Island lagoon. From recapture data he was able to determine rates of growth, mortality, recruitment and movements of large reef fish such as coral trout.

Since completing his PhD, Campbell’s career has focussed on applied marine science, in particular the spatial ecology of fish and fisheries and the development of adaptive management systems. Over the past twenty years he has been involved in marine research and management issues from the tropics (Great Barrier Reef Effects of Line Fishing, tropical tuna) to the Antarctic (Australia’s Toothfish and Icefish fisheries).

Since leaving tropical Queensland in 2001, Campbell has been based in Hobart where he has held senior positions leading marine research and management



programs. For the past six years he has led the pelagic and international fisheries research area for CSIRO. He is currently a member of the Commission for the Conservation of Southern Bluefin Tuna and the Tropical Tuna Management Advisory Committee (Australian Fisheries Management Authority).

Top middle: Hanne Thoen conducts behavioural experiments on mantis shrimp.
Top right: Coral Identification Workshop.

FIELD TRIP GRANTS FOR ICRS PARTICIPANTS

A major scientific conference, the 12th International Coral Reef Symposium, was held in Cairns during July and LIRS hosted two field trips for delegates (see page 14), one of which was a coral identification workshop. The Lizard Island Reef Research Foundation provided grants to enable four people to participate in a trip. The grant winners had never been to the Great Barrier Reef before. They were selected on the basis of their ability to contribute to coral reef conservation efforts, as shown below.

DR VINEETA HOON

Managing Trustee, Centre for Action Research on Environment Science and Society, Chennai, India

Vineeta runs a non-profit organisation and has been working since 1997 to raise awareness and improve management to protect coral reefs in India. Her group has developed a toolkit for teachers to integrate marine examples into school education and it conducts regular workshops in schools close to the four coral reef regions in India. A recent success was to help the Lakshadweep islanders to obtain grants to build an environment education centre in exchange for which the islanders have promised to put aside an area for conservation for the period of 10 years.

RESEARCH BY FELLOWS IN 2012

Fellowships supported research by nine scientists during 2012 (year of award shown in parentheses).

LIZARD ISLAND DOCTORAL FELLOWS

F. Joseph Pollock, James Cook University (2011)
Dominique Roche, Australian National University (2012)
Justin Welsh, James Cook University (2012)

IAN POTTER DOCTORAL FELLOWS

Sandra Binning, Australian National University 2011
Oona Lonnstedt, James Cook University (2012)

ISOBEL BENNETT MARINE BIOLOGY FELLOW

Dr Vanessa Messmer, James Cook University (2012)

JOHN & LAURINE PROUD FELLOWS

Dr Michael Berumen, King Abdullah University of Science and Technology (2009)
Dr Nichola Raihani, Zoological Society of London (2010)

YULGILBAR FELLOW

Dr Shelby Temple, University of Bristol (2012)

PETER TEAKLE SUSTAINABLE FISHING RESEARCH GRANT

Dr Timothy Clark, Aust. Institute of Marine Science,
Dr Steven Cooke (Carleton University), Dr Andrew Tobin,
Dr Vanessa Messmer and Prof Morgan Pratchett (James Cook University) (2012)

THE FUTURE OF LIRS



Top left: Nesting Crested Terns, *Thalasseus bergii*.
Below: David Shannon (left) and Ken Coles.

LIZARD ISLAND REEF RESEARCH FOUNDATION

Thanks to completion of the 30th Anniversary Development, LIRS now has excellent and appropriate infrastructure to support coral reef research into the future. The results of a widely advertised online survey in 2011 strongly endorse this statement. In response to the questions “What are we doing wrong?” and “What other things could we be doing?”, by far the most frequent response from users and other interested people was “Nothing”. Other responses included: don’t get bigger because staff won’t cope; don’t spoil it; it’s not broken so don’t fix it; no need to look for new initiatives, existing work is complex enough to occupy the facilities.

The most frequent gripe was the speed, reliability and cost of internet access. This was largely rectified by switching from satellite to 3G as soon as the mobile net extended to Lizard Island in 2011. While not without its challenges during setup, the system is working well with greater speed, higher reliability and much lower cost than with satellite. Respondents raised numerous other issues about LIRS including access, cost, and the high demand for aquarium space. They also made some interesting and thoughtful suggestions for future directions. Ideas and concerns raised by stakeholders were considered and incorporated into a five-year strategic plan during 2012.

The plan seeks to ensure that research at LIRS is sustainable, both financially and environmentally. The Lizard Island Reef Research Foundation is an essential partner for achieving that. Under the plan, LIRS will remain at its current size and its priority will continue to be provision of excellent support for research. New initiatives include: additional funding to meet some of the essential need for high-quality maintenance; increasing the funding available for research at LIRS; developing knowledge of the biodiversity of the Lizard Island area and making it readily accessible; and improving community outreach.

The following vision of LIRS in 2018 will be realised if the plan is implemented successfully.

OPERATIONS

- Occupancy is 7000 to 8000 visitor nights per year
- Four permanent staff are assisted by temporary staff, contractors, interns and volunteers
- Existing buildings are in excellent condition

- All equipment is in excellent condition, replaced and maintained as required
- New kinds of equipment have been acquired to meet clear research needs
- The only new item of major infrastructure is an expansion of the alternative (non-diesel) energy supply
- The working and living atmosphere at LIRS is congenial, efficient and conducive to new scientific collaborations

RESEARCH

- At least 80 scientific publications are produced each year
- At least 65% of occupancy is for research
- Six fellowships for field work are awarded annually
- One grant is awarded annually for a targeted field of research similar to the existing Teakle Grant for Sustainable Fishing
- Up to four postgraduate students make extended visits to LIRS through internships each year
- A salaried postdoctoral fellow, based at the Australian Museum or a university, conducts a vibrant coral reef research program at LIRS, involving colleagues and students
- A taxonomic workshop involving up to 20 international experts has been held and a substantial scientific contribution has been published
- Lizard Island is recognised worldwide as a location at which biodiversity is exceptionally well documented
- An online resource about the biodiversity of Lizard Island is well-used by scientists and students: it contains at least 1,800 species and is still growing
- Easily accessible records of research sites and collections made at Lizard Island since 2000 enhance the research process

OUTREACH

- LIRS engages well with the public through regular media releases, a vibrant blog and Facebook page, tours, web sites, and newsletter
- A mobile application, the Lizard Island Field Guide, is popular with island visitors
- At least 15% of occupancy is by student groups for educational field trips, mostly operated by schools and universities for their own students
- The next generation of Australian coral reef scientists is further nurtured through annual subsidised field trips to Lizard Island for competitively-selected Year 11 students

FOUNDER

Sir John Proud¹

PATRONS

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Dr Des Griffin AM
Mr Trevor Haworth AM
Mr Raymond Kirby AO
Mr Henry Loomis¹ and Mrs Jacqueline Loomis
The Ian Potter Foundation
Lady Proud¹
Mr Robert Purves AM
Thyne Reid Foundation
Prof Frank Talbot AM
Dr Charles Warman AM¹

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Mr Andrew Green (Secretary & Treasurer)⁴
Mr David Shannon⁵
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Mr Paul Connor
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Mr Trevor Haworth AM
Mr Frank Howarth PSM
Mr Chris Joscelyne
Mr Vivian King
Mr Raymond Kirby AO
Dr Lynne Madden⁶
Mrs Fiona Playfair
Mrs Heather Power
Mr Robert Purves AM

¹ Deceased

² New Patron in 2012

³ Retired as Chairman in June 2012, remains a Trustee

⁴ Retired in March 2012 after 34 years as Trustee

⁵ Appointed as Chairman in June 2012

⁶ New Trustee in 2012



BOARD CHANGES

After 19 years as Chairman of the LIRRF, Ken Coles stepped down from the position in June 2012. He leaves an outstanding legacy of achievements that were highlighted in last year’s newsletter. We sincerely thank Ken and his wife Rowena Danziger for their efforts and dedication over so many years and we are grateful that Ken has decided to remain a Trustee of the Foundation.

We welcome David Shannon as the new Chairman. He has served as a Trustee since 2005 and took up his new role on Ken’s retirement. David has hit the ground running. His main focus is to implement strategies for expanding the Foundation’s fund-raising bases while acknowledging the challenges of generational change among Trustees and Members and the current economic climate. We look forward to working with David in order to help him attain the Foundation’s goals.

Another milestone was Andrew Green’s decision in March 2012 to step down from the Board. Andrew was appointed as Secretary, Treasurer and Public Officer to the LIRRF when it was established in 1978 and he is the last of the inaugural officeholders. In recognition of his 34-year contribution, Andrew was made a Patron of the LIRRF in June 2012. We sincerely thank Andrew for his unwavering support of LIRS over so many years.

We also welcome Dr Lynne Madden who joined the Board this year.

AM staff member Gail McCarthy has provided excellent administrative support to the LIRRF for many years. With all the changes, the LIRRF has decided to manage its own administration from 2012 so Gail will no longer be involved. We thank Gail for her long-term involvement.

The Lizard Island Reef Research Foundation is an essential partner with the Australian Museum in the success of LIRS. Since 1978, it has provided funds for capital development of the Station and to support research through Fellowships and Grants. It remains committed to helping LIRS achieve its goals into the future.

LIZARD ISLAND REEF RESEARCH FOUNDATION



MEMBERS

Members of the Foundation support LIRS by donating \$1000 or more per year. This regular source of funding is essential to the operations and development of LIRS. Please see the inside back cover for this year's Members.

Delaware North Australia Parks and Resorts, operator of the Lizard Island Resort, is a major supporter of the Members program. Each year, the company donates to the LIRRf a 3-night stay for two people at the Resort. Members go into a draw to win this wonderful prize, which the LIRRf supplements by providing airfares within Australia. This year's prize was won by long-term Members Lynton and Susan Morgan.

This year, Delaware North Australia Parks and Resorts increased its support for the LIRRf with an excellent offer for LIRRf Members: a 20% discount at the Lizard Island Resort for stays of three or more consecutive nights. As well, all resort guests are now able to make a donation to the LIRRf as they check out. We thank the Delaware North Australia Parks and Resorts for its generous support. Our gratitude goes to Robyn Pontynen (General Manager, LI Resort) and Shaun Grant (Assistant General Manager, LI Resort) for their support of these initiatives and to Trustee Charlie Shuetrim for his help in getting them established.

The annual dinner for Members was held at the Wharf Restaurant's new location, Pier 2 on Sydney Harbour on 20 June 2012 with about 100 people attending. Wine for the evening was contributed by James Kirby. This dinner was a very special occasion with tributes given to:

- Ken Coles on his retirement as Chairman of the LIRRf
- Charlie Shuetrim in recognition of his outstanding success with fundraising for the 30th Anniversary Development
- Andrew Green on his appointment as a Patron of the LIRRf
- Lance and Marianne Pearce on their retirement as long-term Museum staff members at LIRS.

Frank Howarth, Director of the Australian Museum, was MC for the evening. Catherine Livingstone, President of the Australian Museum Trust, highlighted the important research being done at LIRS and gave a heart-felt thanks to Lance and Marianne for their 24 years of dedicated service. The main speaker of the evening was Ken Coles.

He recounted some of the challenges and triumphs experienced during his 19 years as Chairman. Ken's moving speech captivated the audience which they acknowledged with a standing ovation.

The 2012 annual Melbourne luncheon was scheduled for 22 June but was cancelled due a conflict of dates with many potential attendees. However, some Members expressed a desire to meet so Ken Coles and Rowena Danziger organized an "impromptu" lunch for about 10 people on the day at the Athenaeum Club.



VISITORS

People associated with the Lizard Island Reef Research Foundation who visited during the year include:

- Charlie and Sandy Shuetrim
- Ian and Jill Reid
- Ken Coles and Rowena Danziger
- David and Daniela Shannon
- Des and Janette Griffin
- Michael Kirby with son and friends
- Dick and Pip Smith with friends
- Peter and Nina Teakle

Above: Sandy and Charlie Shuetrim.

NEWS FLASH 20% DISCOUNT AT LIZARD ISLAND RESORT

We are delighted to announce that Delaware North (owners and operators of Lizard Island Resort) will offer a 20% discount on any room at any time** to members of the Lizard Island Reef Research Foundation. The only condition is that you book for a minimum 3 night stay.

This is a very generous offer to promote the wonderful work being done at Lizard Island Research Station and we are most grateful to Delaware North for their support.

We encourage all members to avail themselves of this very generous offer. A visit to Lizard Island is an exceptional experience, both at the Resort and the Research Station. The Resort consistently makes the Top 10 Hotels of the World list and the Research Station is widely acknowledged as one of the best tropical marine field research stations in the world. What better place is there to visit?

This is also a golden opportunity for our Foundation to attract new members. The discount offered by the Resort more than covers the \$1,000 annual membership donation to Lizard Island Reef Research Foundation and enables these new members to sample for themselves the delights of the Lizard Island Resort and the fascinating work being done at Lizard Island Research Station.

HOW TO BOOK:

Telephone Lizard Island Resort reservations on 1300 863 248 and mention that you are a member of the Lizard Island Reef Research Foundation.

Details of the Resort are on their web site at: www.lizardisland.com.au
If you have any questions re this offer please contact Charlie Shuetrim:
t 0416 215 251 e cshuetrim@sancha.com.au

** This offer is not available last week in October or Christmas to New Year Period



Above shows an aerial view of the Lizard Island Group. Pure white sand on the beach in front of the Resort. Laze on the beach or snorkel from the beach out to the coral that surrounds the adjacent headland.



Lizard Island Resort is the northern most resort located directly on the Great Barrier Reef, with 24 powdery-white beaches and 40 luxurious suites.



Enjoy secluded picnics on private beaches, five star cuisine and indulging spa treatments. Sail a catamaran, dive the outer barrier reef, go fishing.



FOR THE RECORD



ICRS CONFERENCE FIELD TRIPS

The International Coral Reef Symposium is a major international scientific conference, held every four years. In July 2012, the 12th ICRS was held in Cairns, Queensland, hosted by the ARC Centre of Excellence for Coral Reef Studies and James Cook University. It brought together about 2500 people from 80 countries. LIRS hosted two 4 night field trips to Lizard Island for some of the delegates. The weather was unseasonally rainy and exceptionally windy; conditions could not have been much worse. Despite this, both groups went snorkelling and diving every day and got a feel for the Great Barrier Reef.

WORLD HERITAGE DELEGATION

The UN body that lists World Heritage areas has become concerned about recent government approvals for extraction and industrial development adjacent to the Great Barrier Reef World Heritage Area. An international delegation visited the GBR in March to assess these issues. The trip included a stay at LIRS where the delegates were able to see healthy reef and the impact of Crown of Thorns Starfish. Following that trip, the World Heritage Committee asked Australia not to permit any new port or infrastructure development outside of existing ports and to conduct a strategic assessment. Australia is due to report to the World Heritage Committee in early 2013 and it risks having the GBR listed as World Heritage in Danger.

CROWN OF THORNS STARFISH OUTBREAK

Coral-eating Crown of Thorns Starfish (COTS) are again at “outbreak” levels on reefs in the Lizard Island area. Since the last outbreak between 1993 and 1998, corals had recovered strongly in most locations around the island. LIRS dive log records show an increasing number of sightings over the past few years culminating in the current outbreak. To protect some local reef areas, LIRS staff and visitors kill COTS opportunistically by injecting them with sodium bisulphate (under permit). Almost 1000 individuals were killed at Lizard Island in the last three months of 2012.

BENCH FEES

Per person per night, Including GST	2012	2013
Researcher	\$124.00	\$128.00
Researcher's assistant	\$110.00	\$113.00
Postgrad student (own project)	\$48.50	\$50.00
Postgrad's assistant	\$43.50	\$45.00
School or university group	\$78.00	\$80.50
Commercial	\$233.00	\$240.00

DEVELOPMENTS

In 2012, two new research microscopes were purchased with funds provided by the Thyne Reid Foundation under the 30th Anniversary Development. Both the compound fluorescence scope and the dissecting microscope have state-of-the art digital photography attachments. Other projects included: fitting the generator shed with a new sound-attenuating front wall, repainting two visitor houses (Kirby and Suntory), and replacing one of the seawater header tank towers.

STAFF

Lance and Marianne Pearce retired after 24 years of service in March this year. Bob and Tania Lamb began their normal six-monthly winter rotation but Tania suffered an injury in July for which she had to seek treatment and Bob naturally accompanied her. Lance and Marianne had returned for a short time to help out with the ICRS trips and they were able to stay on to complete that shift. This enabled operations at LIRS to continue without disruption, for which we thank them deeply. Tania is recovering, but too slowly to allow her to return to work in 2013. We hope to see both her and Bob back on the island in April 2014.

We welcome new maintenance staff Stewart Pulbrook and Kim Demamiel to LIRS. They started in September 2012 and overlapped for several weeks with Lance and Marianne to gain familiarity with their new jobs. Kim and Stewart have agreed to stay on beyond their six-monthly contract to cover the winter period in 2013 that would normally have been worked by Bob and Tania.

TOURS

Tours of LIRS are conducted for resort guests on Monday mornings. A tour for other island visitors, mainly campers and yachties, is conducted between May and October at 11am on Mondays. Additional booked tours are given throughout the year to resort guests and passengers on cruise ships. At other times, visitors are welcome to call into the station to view the Sir John Proud Aquarium and courtyard displays but guided tours are not available.

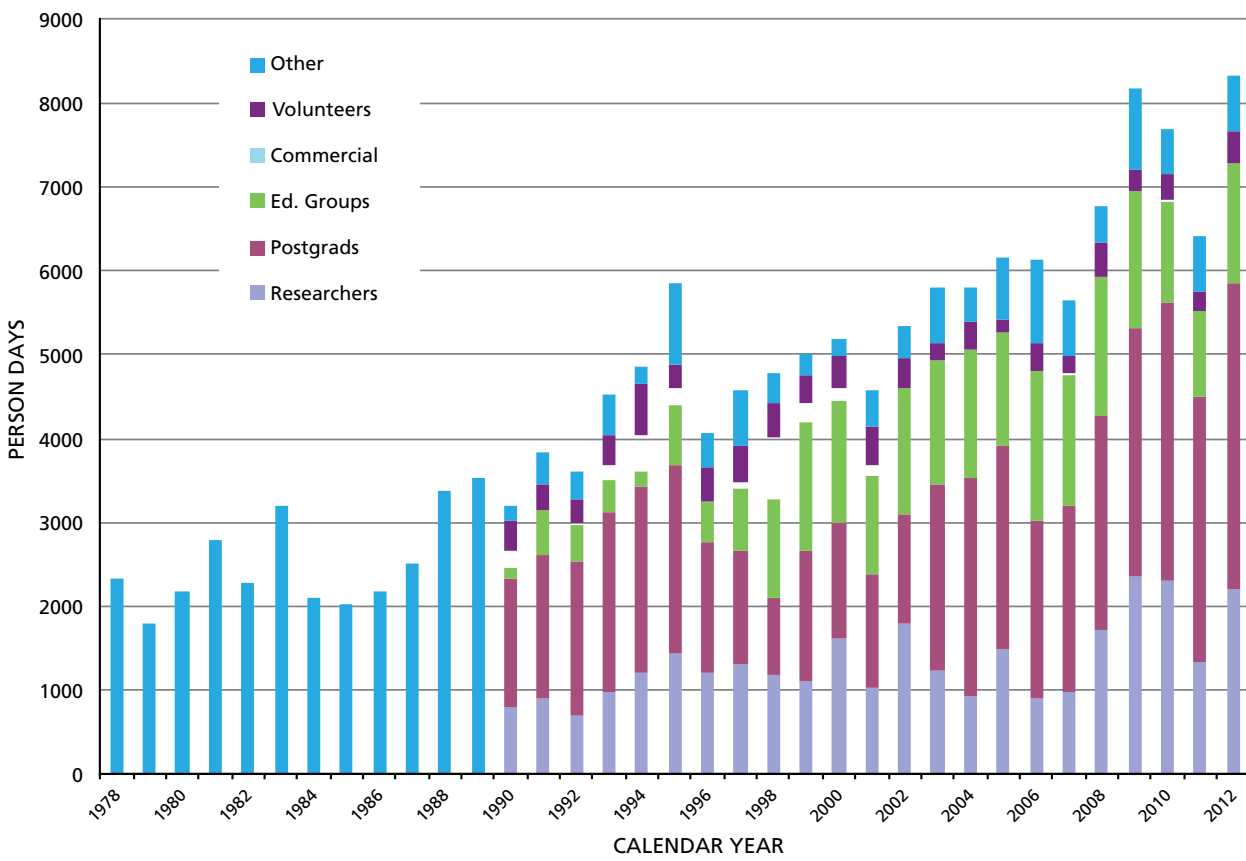
Top left: New staff Stewart Pulbrook and Kim Demamiel.
Top middle: PhD students Genevieve Phillips and Anne Winters using the new microscopes.
Top right: Volunteers Kevin and Carmen Griffen at work.

VOLUNTEERS

Volunteers provide valuable assistance with maintenance and other projects. Our sincere thanks to the following people for their help during 2012: Renie and Snow Amos, John and Linda Binning, Kym Edgerton, Iliana Escobar, Terry Ford, Kimberly Gossard, Carmen and Kevin Griffen, Wil Hendriks, Simon Hunt, Cassie Juan, Patrick and Dieter Lange, Jonathan Partridge, James Poulos, Andrew Sampson, Lisbeth Sandberg, Jan Simpson, Geoff Stearns, Ryan and Karin White, Lois Wilson, Liam Zarri.

In addition, we thank Charlie Makray who continues to provide first aid training for all LIRS staff, tailored to our needs, on a voluntary basis.

USAGE



VISITORS IN 2012

Top left: Intertidal excavation for archaeological research.
Top middle: Preparing for a dive.
Top right: Researchers view the solar eclipse in November.



134 scientists from 35 institutions in 14 countries conducted 113 research projects at Lizard Island in 2012. Of these, 69 were PhD-level scientists, 54 were PhD candidates, 5 were MSc candidates and 6 students conducted research for undergraduate theses. The researchers are listed here with their project titles and institutional affiliations.

SCIENTISTS

DAVID ABREGO²

Collection of crustose coralline algae

ANDREW BAIRD¹

Testing the adaptive capacity of corals to climate change: a demographic approach

REDOUAN BSHARY²⁹

Cooperative and cognitive aspects of cleaning symbiosis

ROY CALDWELL²³

Stomatopod behaviour

DOUG CHIVERS³²

MAUD FERRARI³²

MARK MCCORMICK¹

GORAN NILSSON³⁰

MARK MEEKAN²

Gabazine reverses the detrimental effects of carbon dioxide on fish learning

TIMOTHY CLARK²

VANESSA MESSMER¹

ANDREW HOEY¹

ANDREW TOBIN¹

STEVEN COOK¹³

Climate change and physiological recovery from fisheries interactions

KENDALL CLEMENTS²⁰

ESTHER ANGERT¹⁵

HOWARD CHOAT¹

LINDSEY WHITE¹²

The role of hindgut symbionts in protein uptake and recycling in marine herbivorous fishes

SEAN CONNOLLY¹

Coral demography

THOMAS CRONIN²⁸

Properties of natural polarized light fields in air and water

GUILLERMO DIAZ PULIDO⁶

Assessment of mechanisms of carbon use in coral reef seaweeds (macroalgae)

MARIA DORNELAS³⁴

Explaining coral species abundances: linking morphology to demography

CHRISTER ERSEUS²⁷

Molecular systematics of Clitellata (Oligochaeta)

MATTHEW FELGATE¹⁶

IAN MCNIVEN⁸

SEAN ULM¹

CRAIG SLOSS⁹

Distribution, abundance and diversity of the Lapita cultural complex on the Great Barrier Reef coastline of Australia

MAUD FERRARI³²

DOUG CHIVERS³²

Effect of carbon dioxide and temperature on fish cognition

EVA MCCLURE as field leader

for ALEXANDRA GRUTTER¹¹

Does the infection rate of gnathiids onto fish vary with cleaner presence or between day and night?

ALASTAIR HARBORNE¹¹

The effects of tides on reef flat food webs

ANDREW HOEY¹⁸

Latitudinal variation in the role of herbivores

MIA HOOGENBOOM¹

Metabolic scaling in reef corals

EMILY HOWELLS as field leader

for BETTE WILLIS¹

Ecological significance of coral disease on the Great Barrier Reef

JEFF LEIS³

ULRICKE SIEBECK¹¹

Orientation by fish larvae in the pelagic environment

JAVIER LEON¹¹

A sediment budget for Lizard Island under a changing climate

JOSHUA MADIN⁷

Hydrodynamic disturbances on coral reefs

JUSTIN MARSHALL¹¹

HANS-JOACHIM WAGNER³⁵

The visual ecology of retinal ganglion cells in reef fish

JUSTIN MARSHALL¹¹

Polarisation vision

MARK MCCORMICK¹

Monitoring of fish and corals around Lizard Island

MARK MCCORMICK¹

MARK MEEKAN²

SHAUN KILLEN²⁶

Metabolic predictors of fish behaviour

MARK MCCORMICK¹

SUE-ANN WATSON¹

Influence of elevated carbon dioxide on competitive interaction

YOLAND BOSIGER as field leader

for MARK MCCORMICK¹

Respirometry of predatory fishes

MARK MEEKAN²

Aging study of giant clams

VANESSA MESSMER¹

ANDREW HOEY¹

Effects of climate change on coral trout

GORAN NILSSON³⁰

PHILIP MUNDAY¹

JODIE RUMMER¹

Physiological effects of high temperature and carbon dioxide on reef fish

GORAN NILSSON³⁰

SJANNE LEFEVRE³⁰

Metabolic and behavioural effects of high carbon dioxide

ANDREY OSTROVSKY³⁶

Evolution of matrotrophy in cheilostome bryozoa

JULIAN PARTRIDGE²²

Measuring spectra of the polarizing maxillipeds of stomatopod crustaceans

DAVID PHILLIPS¹⁶

Population dynamics of the giant clams *Tridacna gigas* and *T. derasa*

MORGAN PRATCHETT¹

Seasonal effects on the behaviour, performance and physiology of butterflyfishes

MEGAN PORTER²⁸

Developmental genetics of stomatopod vision

JAIRO RIVERA POSADA¹

Tagging Crown of Thorns Starfish

MICHAEL RASHEED⁵

CATH MCCORMACK⁵

ROSS THOMAS⁵

MARK LEITH⁵

PAUL LEESON⁵

MARLENE FRETZ⁹

Deepwater seagrass dynamics

NICHOLAS ROBERTS²²

JULIAN PARTRIDGE²²

SHELBY TEMPLE²²

Seeing the reef in a new light: polarization imaging of the reef and its inhabitants

ALBERT ROS²⁹

Do coral reef fish without access to cleaner fish invest more in immune protection?

JODIE RUMMER¹

Climate change and Great Barrier Reef diversity: potential for coral reef fishes to acclimate to elevated carbon dioxide

MEGAN SAUNDERS¹¹

CHRIS BROWN¹¹

Effects of sea level rise on linked coral reef ecosystems

STEPHEN SIMPSON²⁵

MARK MEEKAN²

MARK MCCORMICK¹

Impacts of boat noise on fish behaviour and physiology

JONATHAN STECYK³⁰

Physiological effects of high temperature and carbon dioxide on reef fish

SARA STIEB^{11,21}

The comparison of the freshwater cichlid and marine reef fish visual system

STEFAN WALKER¹

Status signalling and signal-receiver behaviour in reef fish

SUE-ANN WATSON¹

PHILIP MUNDAY¹

GORAN NILSSON¹

MARK MCCORMICK¹

PAOLO DOMENICI¹⁴

Effect of carbon dioxide on the antipredator response of jumping snails

RESEARCH STUDENTS

KRISTEN ANDERSON¹

Effects of environmental change on the growth rates of branching corals (PhD)

BRIDIE ALLAN¹ with supervisors

MARK MCCORMICK¹ and

PAOLO DOMENICI¹⁴

The effects of temperature and carbon on fish burst responses (PhD)

SANDRA BINNING⁴

Can coral reef fish change their shape to suit their environment? (PhD)

SANDRA BINNING⁴

DOMINIQUE ROCHE⁴

What a drag: The energetic cost of swimming with an ectoparasite (PhD)

SHANE BLOWES¹

Competition and coexistence in the butterflyfish community (PhD)

MICHAEL BOK²⁸

Ultraviolet vision in mantis shrimp (PhD)

SIMON BRANDL¹

Feeding of herbivorous fishes on cryptic surfaces (PhD)

CHRISTOPH BRAUN¹¹

UV-induced DNA damage and UV avoidance (PhD)

ROHAN BROOKER¹

Behavioural responses to coral bleaching by a coral-feeding fish (PhD)

LILLY BOJARSKI²⁰

Microbial nitrogen fixation in the hindgut of marine herbivorous fishes (PhD)

JORDAN CASEY¹

The role of territorial grazer behaviour and community structure in coral reef trophic dynamics (PhD)

WEN-SUNG CHUNG¹¹

Comparisons of visual capabilities of cephalopods (PhD)

CHRIS CORNWALL³¹

Carbon dioxide versus bicarbonate ion use by coral reef macroalgae (PhD)

FABIO CORTESI^{11,21}

Being brown or yellow: ecological and molecular base for colour adaptation in *Pseudochromis fuscus* (PhD)

CHRISTOPHER CVITANOVIC¹

Seasonal effects on the behaviour, performance and physiology of butterflyfishes (PhD)

ALIZEE DERENDINGER²⁹

Hormonal correlates of interspecific behaviour (MSc)

ILIANA ESCOBAR¹⁹

Describing reef fish communities, life stages and microhabitats on a rubble reef (Undergrad)

MEGAN FEEG¹⁹

Thermal impacts on metabolism and swimming performance of coral trout: impacts of a changing climate (Undergrad)

KATE FELLER²⁸

Larval visual ecology of stomatopod crustaceans (PhD)

JAMES FOSTER²²

Do fish use polarization to see through veiling light? (PhD)

PATRICK GARTRELL⁶

Tropical versus subtropical maximum quantum yields in seaweeds (PhD)

SIMON GINGINS²⁹

Adaptations to a cleaning life: a comparative approach (PhD)

CHRISTOPHER GOATLEY¹

The ecological role of sediments on coral reefs (PhD)

KIMBERLY GOSSARD¹⁹

Testing thermal tolerance of reef fish using critical thermal methodology (Undergrad)

JENNIFER JEANS¹

Comparison between rates of photoinactivation and clearance of PS11 protein in the coral symbionts of *Stylophora* (PhD)

KATE JOHNSON²⁰

Ultrastructure and function of the hindgut in marine herbivorous fishes (PhD)

JAMES KERRY¹

Spatial distribution and quality of structure for large reef fishes (PhD)

MICHAEL KRAMER¹

Trophic importance of Crustacea on coral reefs (PhD)

VISITORS IN 2012

Top left: Trinity Anglican School beach cleanup.
Top middle: Red Bass *Lutjanus bohar* and a school of fusiliers.
Top right: PhD student Davina Poulos (right) and Luke Pedini.



JULIA LANGE¹¹
Relative importance of body pattern in humbug damselfish: background matching or disruptive camouflage? (MSc)

ROLANDA LANGE³⁵
Precopulatory stabbing in a hermaphroditic sea slug (PhD)

LUCAS LANGLOIS¹
Relative contributions of autotrophy and heterotrophy to the energy budget of corals from the GBR across a depth gradient (PhD)

GOVINDA LIENART¹
Temperature effects on chemically mediated predator-prey interactions (PhD)

LIBBY LIGGINS¹¹
Spatial and temporal patterns of coral reef connectivity (PhD)

OONA LONNSTEDT¹
Predator-prey interactions in a changing world (PhD)

SELENA MCMILLAN²⁰
Protein uptake in marine herbivorous fishes (PhD)

JOAO MESSIAS¹⁷
The role of dopamine on the modulation of behaviour in the cleaner wrasse *Labroides dimidiatus* (MSc)

MATHEW MITCHELL¹
Effects of flow on antipredator responses (PhD)

KIRSTY NASH¹
Assessment of scale-dependent function in reef fish (PhD)

CARLOS NAVARRO BARRANCO³³
Does artificial light affect natural emergence patterns? (PhD)

CAITLYN NEWPORT¹¹
Object recognition in fish (PhD)

JESSICA NOWICKI¹
Effects of environmental correlates on foraging ecology of Sand Perch (PhD)

JACK O'CONNOR¹⁰
Orientation strategies of larval fish in the pelagic environment (PhD)

JOSE PAULA¹⁷
The role of hormones in cleaner fish behaviour (MSc)

REBECCA PELKA¹⁹
Dinner's on the table: a comparison of butterflyfish feeding habits on table corals across an environmental gradient (Undergrad)

SIMONE PENNAFIRME FERREIRA¹
Spatial patterns at the neighbourhood scale of scleractinian corals (PhD)

PEDRO PEREIRA¹
Competition, habitat selection and imprinting of coral gobies (PhD)

GENEVIEVE PHILLIPS¹¹ with supervisor KAREN CHENEY¹¹
The function of reef fish colour patterns: how did the coral trout get its spots? (PhD)

CHRIS PICKENS¹⁹
Novelty interactions between herbivorous fish and *Sargassum*: insight into macroalgal phase shifts (Undergrad)

CHIARA PISAPIA¹
Intraspecific variation in coral colony condition (PhD)

F. JOSEPH POLLOCK¹
Understanding White Syndrome in the Indo-Pacific (PhD)

DAVINA POULOS¹
Prior residency effects and the dynamics of fish communities in a changing environment (PhD)

JUSTIN RIZZARI¹
Indirect effects of predators on coral reef trophic ecology (PhD)

DOMINIQUE ROCHE⁴
Bio-physical interactions and predator-prey relationships in coral reef fishes (PhD)

MELISSA ROCKER¹
Variation in gene expression and protein concentrations of photosynthetic subunits along a light intensity gradient (PhD)

MILLY SHARKEY²²
Quantifying polarization vision in reef inhabitants (PhD)

LAURA STRONG¹⁹
Effect of cymothoid ectoparasites on lateralization in the Bridled Monocle Bream (Undergrad)

DEREK SUN¹¹
The role of parasites and cleaning behaviour in coral reef fish recruitment (PhD)

HANNE THOEN¹¹
Colour vision in mantis shrimp (PhD)

MELANIE TRAPON¹
Impact of herbivorous fish on coral recruit survival (PhD)

ALEX VAIL²⁴
Cooperative hunting between groupers, moray eels and octopus (PhD)

JUSTIN WELSH¹
Spatial ecology of coral reef fishes (PhD)

JAMES WHITE¹
Short term consistency in fish behaviour (PhD)

LORETTA WHITE²⁰
Protein measurement in seaweeds (MSc)

DAVID WILBY²²
Measuring spectra of the polarizing maxillipeds of stomatopod crustaceans (PhD)

SHARON WISMER²⁹
Ontogeny of cognition in the cleaner wrasse *Labroides dimidiatus* (PhD)

STUDENT GROUPS

Brighton Grammar School
Led by Andy Lewis

School for International Training
Two groups led by Tony Cummings

University of Texas Austin
Led by Mary Poteet

Geelong College Preparatory School
Led by Darren Coker

RMIT University
Led by Gale Spring and Jeff Shimeta

University of Maryland
Led by Reid Compton, Marcia Shofner, John Merck and Paul Shrewsbury

Trinity Anglican School
Led by Rachel Elphick

Barker College
Led by Sarah Cormio, Rob Paynter and Steve Deveney

OTHER VISITORS

WORLD HERITAGE DELEGATION
Fanny Douvere, UNESCO World Heritage Centre, France

Tim Badman, International Union for the Conservation of Nature, Switzerland

Andrew Skeat, Great Barrier Reef Marine Park Authority

Grahame Byron, Queensland Government, Premier's Department

Greg Terrill, Australian Government, Department of SEWPAC

CORAL IDENTIFICATON WORKSHOP
ICRS pre-conference field trip
Led by **Russell Kelley** and **Rachel Pears**, Coral Identification Capacity Building Program

Alberto Acosta, Pontifica Universidad Javeriana, Colombia

Monica Correia, Universidade Federal de Alagoas, Brazil

Nils Hedberg, University of Stockholm, Sweden

Laetitia Hedouin, University of Perpignan, France

Vineeta Hoon, Centre for Action Research on Environment Science and Society, India

Sean Macduff, University of Hawaii at Manoa, USA

Chris Poonian, University of Nottingham, UK

Andalus Punongbayan, University of the Philippines

Candida Savage, University of Otago, New Zealand

Hilda Soviertzoski, Universidade Federal de Alagoas, Brazil

Yuko Stender, University of Hawaii, USA

Louise Swanson, NSW Curriculum and Learning Innovation Centre, Australia

EXPLORATORY TRIP
ICRS post-conference field trip
Led by Lyle Vail and Anne Hoggett, Lizard Island Research Station

Dianne Brousseau, Fairfield University, USA

Arnold Dekker, CSIRO, Australia

Brian von Herzen, The Climate Foundation, USA

Valeriya Komyakova, University of New South Wales, Australia

Stelios Kondylas, CSIRO, Australia

Bernard Lathuliere, Nancy Université, France

Bertrand Martin-Garin, Aix-Marseille Université, France

Marion Martin-Garin, France

Kevin Menzies, Australia

Lesley Runnalls, University of Reading, UK

Go Suzuki, Seikai National Fisheries Research Institute, Japan

Sara Sawyer, Glenville State College, USA

Pascale Tremblay, Centre Scientifique de Monaco

José Carlos Sícoli Seoane, Federal University of Rio de Janeiro , Brazil

Wendy Wiltse, Environmental Protection Agency, USA

Tao Yuan, China

GBR OCEAN OBSERVING SYSTEM DEVELOPMENT
Australian Institute of Marine Science Led by Scott Bainbridge

DOCUMENTARY FILMING
ABC TV, Catalyst program about Prof Terry Hughes, crew organised by Roslyn Lawrence

ADULT EDUCATION TRIP
Led by Andrew Lewis, Reef Ecotours

MARINE PARK MANAGEMENT
Angela Hurmann, Great Barrier Reef Marine Park Authority

INSTITUTIONS

AUSTRALIAN

- 1 ARC Centre of Excellence for Coral Reef Studies and James Cook University
- 2 Australian Institute of Marine Science
- 3 Australian Museum
- 4 Australian National University
- 5 Fisheries Queensland
- 6 Griffith University
- 7 Macquarie University
- 8 Monash University
- 9 Queensland University of Technology
- 10 University of Technology Sydney
- 11 University of Queensland

INTERNATIONAL

- 12 Auckland University of Technology, New Zealand
- 13 Carleton University, Canada
- 14 Consiglio Nazionale delle Ricerche, Italy
- 15 Cornell University, USA
- 16 Independent researcher
- 17 Instituto Superior de Psicologia Lisbon, Portugal
- 18 King Abdullah University of Science and Technology, Saudi Arabia
- 19 School for International Training, USA
- 20 University of Auckland, New Zealand
- 21 University of Basel, Switzerland
- 22 University of Bristol, UK

- 23 University of California Berkeley, USA
- 24 University of Cambridge, UK
- 25 University of Exeter, UK
- 26 University of Glasgow, UK
- 27 University of Gothenburg, Sweden
- 28 University of Maryland Baltimore County, USA
- 29 University of Neuchatel, Switzerland
- 30 University of Oslo, Norway
- 31 University of Otago, New Zealand
- 32 University of Saskatchewan, Canada
- 33 University of Seville, Spain
- 34 University of St Andrews, UK
- 35 University of Tuebingen, Germany
- 36 University of Vienna, Austria

PUBLICATIONS



In 2012, 94 publications based on work carried out at LIRS were received into the collection. There are now more than 1600 LIRS publications.

1. Bellwood, D.R., A.S. Hoey and T.P. Hughes, 2012. Human activity selectively impacts the ecosystem role of parrotfishes. *Proceedings of the Royal Society B*, 279: 621-629.
2. Binning, S.A., D.G. Roche and C. Layton, 2012. Ectoparasites increase swimming costs in a coral reef fish. *Biology Letters*, 9: 20120927.
3. Booth, H., 2011. Effects of coral stressing on the feeding preferences of the coral predator, *Acanthaster planci*. Undergraduate thesis, School for International Training.
4. Bosiger, Y.J., O.M. Lonnstedt, M.I. McCormick and M.C.O. Ferrari, 2012. Learning temporal patterns of risk in a predator-diverse environment. *PLoS One*, 7(4): e34535.
5. Brooker, R.M., G.P. Jones and P.L. Munday, 2012. Prey selectivity affects reproductive success of a corallivorous reef fish. *Oecologia*, doi: 10.1007/s00442-012-2521-7.
6. Bryan, S.E., A.G. Cook, J.P. Evans, K. Hebden, L. Hurrey, P. Colls, J.S. Jell, D. Weatherley and J. Firn, 2012. Rapid, long-distance dispersal by pumice rafting. *PLoS One*, 7(7): e40583.
7. Bshary, A. and R. Bshary, 2012. Individual differences in foraging strategies of parasitic Sabre-Tooth Blennies. *PLoS One* 7(9): e45998.
8. Burger, T.D., R. Shao, L. Beati, H. Miller and S.C. Barker, 2012. Phylogenetic analysis of ticks (Acari: Ixodida) using mitochondrial genomes and nuclear rRNA genes indicates that the genus *Amblyomma* is polyphyletic. *Molecular Phylogenetics and Evolution*, 64: 45-55.
9. Carter, A.J. and W.E. Feeney, 2012. Taking a comparative approach: analysing personality as a multivariate behavioural response across species. *PLoS One*, 7(7): e42440.
10. Choat, J.H., O.S. Klanten, L. Van Herwerden, D.R. Robertson and K.D. Clements, 2012. Patterns and processes in the evolutionary history of parrotfishes (Family Labridae). *Biological Journal of the Linnean Society*, 107: 529-557.

Top middle: Student group heads out.

Top right: Maori Wrasse, *Cheilinus undulatus*.

Right: Dr Megan Porter is well prepared for intertidal collecting.

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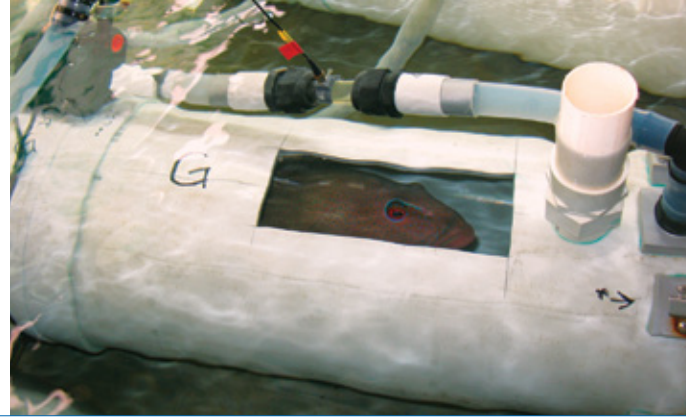
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