



Lizard Island Research Station

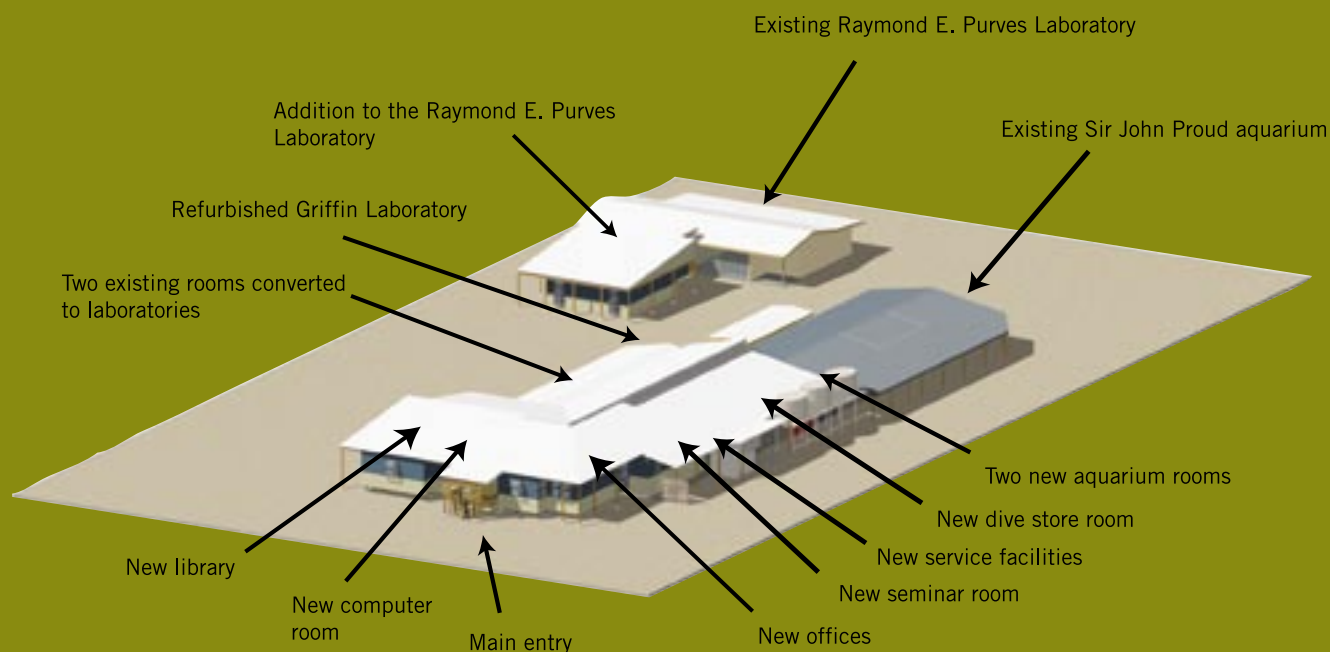
Newsletter 2004

Published March 2005

Sponsored by the
Lizard Island Reef
Research Foundation

Lizard Island Research Station

A Facility of the Australian Museum
2004



Architect's image of the new complex to be constructed in 2006 and 2007.

Lizard Island Research Station Newsletter 2004

This newsletter covers events during 2004.
Published March 2005.

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All photographs by Lyle Vail or Anne Hoggett unless otherwise indicated.

Australian Museum Director's Report

Discovery of the world's smallest fish rated amongst the world's top 100 science stories for 2004, as compiled by the US based *Discover* magazine. The research behind the discovery of the world's smallest fish was largely carried out from the Australian Museum's Lizard Island Research Station.

One of the key challenges facing Australia is to understand the amazing place that is Australia's Great Barrier Reef. We need to understand how it works, what life lives in, about, on and from it (including the world's smallest fish!). More importantly we need to understand what threats face it.

Meeting those challenges would not be possible without an effective network of research stations from which research can be conducted. The establishment of the Lizard Island Research Station by the Australian Museum in the early 1970s was a key response to that challenge. The Lizard Island Research Station now constitutes the best amongst a network of largely university based research stations along the Great Barrier Reef. Unfortunately, existing federal funding mechanisms have been focused more on the university based stations and Lizard Island is being systematically discriminated against in this area.

Notwithstanding this, the Station has been immensely successful thanks largely to the leadership of its Directors, Drs Anne Hoggett and Lyle Vail. Anne and Lyle, supported by other staff members have ensured that the Research Station functions like clockwork, and is able to attract researchers from within Australia and from all over the world. Indeed, in 2004 the Research Station attracted international researchers from Germany, USA, UK, Switzerland, South Africa, Norway and Canada. This illustrates the important international role of the Research Station.

The other key factor to the ongoing success for the Research Station is the unstinting support from the Lizard Island Reef Research Foundation, and also support from the Coral Reef and Marine Science Foundation. The Australian Museum is greatly indebted to the Lizard Island Reef Research Foundation's supporters and Trustees, and particularly acknowledges the hard work during 2004 of the Foundation Chairman Mr Ken Coles and Foundation Trustee Mr Charlie Shuetrim. Their passion for the Research Station was instrumental in gaining generous support of \$1.56 million from the Ian Potter Foundation. I also wish to acknowledge the ongoing support from the Research Station neighbours, especially the Lizard Island Resort, now operated by Voyages.

Given the Lizard Island Reef Research Foundation's success in fundraising, the renewal and expansion of the Research Station is now able to commence, and the Research Station will be able to maintain its place as one of the world's leading coral reef research stations.

Frank Howarth



Photo: Carl Bento



30th Anniversary Development: 2004 was a great year

by Charlie Shuetrim

Lizard Island Research Station (LIRS) aims to be a leading contributor to the understanding and conservation of coral reefs by facilitating world class scientific research and research training for the next generation of coral reef scientists and managers.

Having commenced operations in 1973, much of its infrastructure requires refurbishment. To add to the challenge, LIRS is bursting at the seams. Usage has increased by 81% since 1990 and today's scientists require more sophisticated equipment.

The 30th Anniversary Development is raising funds for the refurbishment and upgrade of the infrastructure at LIRS. Launched in February 2003, total committed funds now exceed \$2.5 million.

The highlight of the year was the decision by the Governors of The Ian Potter Foundation to grant \$1.5 million towards this 30th Anniversary Development. In 2004, The Ian Potter Foundation (IPF) conducted an extensive study into the funding of coral reef research on the Great Barrier Reef. The conclusion by the IPF was that *"the LIRS facility is known and acknowledged for its excellence around Australia and around the world"*.

In addition, we thank the following donors who have made generous commitments to the project this year:

- The Balnaves Foundation announced a grant of \$80,000 towards the construction of new light and temperature controlled aquarium rooms.
- The Coral Reef & Marine Science Foundation granted US\$25,000.
- Alison & Bill Hayward offered to fund the construction of a new storage building.
- Chris Joscelyne offered to fund the researchers' computer and network facilities.
- Mr. Grant Hunt, CEO of Voyages, was delighted to confirm the commitment of Voyages to this 30th Anniversary Development. Voyages acquired the Lizard Island Resort from P&O during 2004.
- A number of other donors have also contributed to this 30th Anniversary Development.

As the result of the funds now available, the Directors of LIRS have reviewed all of their requirements for the refurbishment and upgrade of the Research Station. The total cost will be \$4.5 million over the period 2005 to 2010. Vigorous efforts are continuing to raise the balance of the funds required.

The fund raising committee (Charlie Shuetrim, Chairman, Ken Coles and Andrew Green) wish to thank all of the people who have helped in this 30th Anniversary Development during the year.



John Gough, Tom Healy, Anne Hoggett, Rosemary Gough, Sandy Shuetrim and Bev Healy.
Photo: Charlie Shuetrim



Developments during 2004

Planning for future developments was a major project during 2004. PAC Architects in Cairns has been retained to design several new buildings that will be constructed in 2005, 2006 and 2007. The Station will be able to continue its operations as usual throughout the building period by careful timing, use of temporary accommodation units, and the early construction of a new storage shed and a general-purpose, open-air building.

Fundraising committee chairman Charlie Shuetrim, Sandy Shuetrim and engineer Geoff Greenham attended a site meeting with the architect, Bill Phillips, in November. We thank them for their valuable contributions to the process.

The following important improvements were undertaken during the year. All projects were funded by the LIRRF except for the fresh water reticulation upgrade which was funded by the Australian Museum.

- LIRS is a small, isolated community that must provide its own essential services. Fresh water is pumped from a bore to storage tanks and then distributed around the Station in an **underground reticulation system**. The thirty year old reticulation system was replaced this year with over 1.2 km of new pressure pipe. Considerable time and effort had been spent repairing leaks in the old system so the new pipes ensure reliability of supply and reduce maintenance.



- A new commercial kitchen was installed in **Suntory House** along with new floor coverings in the kitchen and dining area. A similar upgrade was completed in Kirby House in 2003 which means that the two largest visitor houses have recently had substantial refurbishments that greatly enhance the facilities for educational groups and researchers.
- Although the Station enjoys an excellent diving and boating safety record, additional safety equipment was installed to comply with the Australian Standard for scientific diving. **VHF radios and oxygen resuscitation equipment** are now carried in all twelve of the Station's boats at all times.
- An **honour board** listing all Lizard Island Doctoral Fellows was suggested and funded by LIRRF trustee Gordon Moffatt. The honour board is now on display at the Station.
- The Sir John Proud Aquarium System was built in 1995 and it is one of the most heavily used parts of the Station. The pipes that distribute seawater from the header tanks to various sections of the aquarium were extensively reworked this year to improve **seawater supply** to all areas of the aquarium system during periods of peak demand.

The LIRRF also provided funds this year to continue the ongoing replacement schedule for a 4WD vehicle and outboard motors and to purchase a new solar hot water system, furniture and a refrigerator for the visitor houses, laboratory furniture, additional aquaria tanks, new tractor tyres and to replace some ageing snorkelling equipment.

Barker College heads out for a snorkel



Doctoral Fellowships

The Lizard Island Reef Research Foundation has funded the Lizard Island Doctoral Fellowship Program since its inception in 1984. This highly competitive and prestigious program provides financial support for up to three years of field-intensive coral reef research at the Lizard Island Research Station by outstanding PhD candidates. Each Fellowship is worth up to A\$6,000 per year for up to three years. An additional \$1,000 per annum may be granted to assist with additional travel costs if the successful applicant is enrolled at a foreign university. Twenty-six Fellowships have been awarded since the program's inception with at least one Fellowship being awarded annually.

We are pleased to announce that the Ian Potter Foundation has granted the Lizard Island Reef Research Foundation \$60,000 for the Doctoral Fellowships program. This will allow the LIRRF to fund an additional three-year Doctoral Fellowship in 2006, 2007 and 2008. In recognition of the Ian Potter Foundation's generous support, one of the two Fellowships awarded in each of those years will be known as the **Ian Potter Doctoral Fellowship at Lizard Island**.

Information about the 2006 Lizard Island Doctoral Fellowships will be available at www.lizardisland.net.au by July 2005.

Fellowship research during 2004

Three doctoral fellows undertook their final Fellowship field trips to Lizard Island in 2004: **Justine Becker** (2002 Fellow, University of Queensland), **Line Bay** (2003 Fellow, James Cook University) and **Chris Fulton** (2003 Fellow, James Cook University). All three Fellows have made extensive use of LIRS facilities and have successfully completed their field studies.

Justine is the first to experimentally examine the interactions between cleaner shrimp and client fish and to determine some factors affecting the outcome of these interactions. She was able to demonstrate that parasite loads affect the choice of client in cleaner shrimp and that this varies according to the hunger level of the cleaner shrimp. In addition, she found that cleaner shrimps may be important in affecting the diversity of fish within an area due to their ability to attract certain clients.

Line's research is significant because it is one of the first comprehensive attempts to understand the evolution of

species' borders in the wild. Many species have distinct geographical borders but there are no obvious barriers to range expansion. How such borders evolve has long intrigued biologists, because their existence suggests a failure of natural selection to produce adaptations to conditions beyond the edge of the current range. If species' borders are indicative of a failure to adapt, peripheral populations should be less well adapted to local conditions compared to more centrally located ones. Line's project explored gene flow in some common species of coral reef fishes and how it changes across the species' range. Preliminary results suggest that there are significant differences in the genetic composition of species sampled in the centre of their range compared to those sampled at the margin of their range.

Chris assessed the extent to which wave energy and swimming performance shape the distribution and abundance patterns of fishes on reefs, with a focus on species from seven reef fish families. One area of investigation discovered strong trends between the level of wave-induced water motion in habitats and the distribution of fishes. This can be explained by swimming mode and sustained speed, and it is important in determining why species occur in some habitats and not in others. This information is critical when selecting marine reserve areas for the management and conservation of coral reef ecosystems.

Cathie Page (2004 Fellow, James Cook University) had a very busy field program in 2004 as she undertook four major trips to LIRS. Cathie is investigating disease in corals on outer barrier, mid-shelf and in-shore reefs in the vicinity of Lizard Island. This research is important because it is the first attempt to understand the spatial distribution and the current biological and ecological impact of coral disease on the Great Barrier Reef, and is topical due to a recent world-wide increase in coral disease.





Chris Fulton shows flow chamber to Bev and Tom Healy.
Photo: Charlie Shuetrim



Cathie Page

2005 Doctoral Fellowships

The selection process was streamlined in 2004 for the award of the 2005 Fellowship. It is now a two-stage process. Candidates submit a one page pre-application along with their CV. The selection committee then invites a small number of applicants to submit a full proposal and only these are sent for external review. Sixteen pre-applications were received for the 2005 Fellowship and seven of these were invited to submit full applications.

Most of the full applications received were of a very high calibre. We are pleased to announce that Stefan Walker and Marian Wong of James Cook University, Townsville were each awarded a 2005 Lizard Island Fellowship. Normally only one new Fellowship is offered each year but, for 2005, funds for two new Fellowships were available through a budget reshuffle and additional generosity from the Lizard Island Reef Research Foundation. Although both were eligible for three years' support starting in 2005, Marian requires only one year's funding and Stefan requires only two.

Stefan Walker's project is entitled "The sociobiology of life history transitions and lifetime fecundity in harem reef fish". This is an innovative study that brings together various methodologies concerning individual lifetime fecundity (that is, lifetime reproductive potential) and its variability within and between populations of a harem reef fish, *Parapercis cylindrica*. If successful, this will be the first study to determine the lifetime fecundity of any species of fish. Thus far, success in this task has been limited largely to terrestrial organisms and amongst animals, most often in birds.

Obtaining quantitative measurements of lifetime reproduction in these fishes and then linking them to sex change, reproductive output, and population demography will provide a powerful foundation on which to test current theory on the evolution of animal mating systems and sexual selection. It will also be the first study to rigorously assess the effect of intraspecific density on individual lifetime fecundity and population reproductive output in any fish species. Finally, Stefan proposes to examine the behavioural interactions amongst females within mating groups and their effects upon reproductive activity.

Marian Wong's project is entitled "The evolution of social and mating systems in coral reef fish: An application of reproductive skew theory". Her primary goals are to (1) understand why monogamy has evolved in a small, coral-dwelling reef fish, *Paragobiodon xanthosomus*, despite the presence of other potentially reproductive group members, and (2) to employ reproductive skew theory to understand the evolution of social groups in which subordinate group members obtain little direct reproductive benefits.

Living in groups is not an easy task. Resources are usually limited, and must be divided between individuals in some way. Social inequalities may arise in groups, for example due to size or age differences, and these can result in the formation of dominance hierarchies with those at the top of the ladder claiming a larger share of resources at the expense of others. Reproduction is one such resource that may be divided between group members, although there exists considerable intra- and interspecific variation in the way it is shared. Understanding this variability in reproductive partitioning has led to the development of a theory known as 'reproductive skew'.

Skew theory has never before been applied to reef fish which is surprising given the tremendous diversity of social and mating systems these species exhibit. Marian seeks to understand how group living evolves when asymmetries in competitive ability exist among group members and, concomitantly, how these patterns of group living contribute to emergent patterns of social organization such as a monogamous mating system and territoriality. Because social interactions often play a critical role in demographic processes (i.e., who reproduces, who disperses), the impact of this study goes far beyond simply identifying how environmental conditions and resources influence social behaviour. This study, which includes a combination of observational and experimental field studies, will provide important information for the on-going debate about the role of post-settlement factors and density dependence for fishes on coral reefs. Marian's results will be of particular interest to reef fish biologists but also to marine and terrestrial ecologists.

Lizard Island Reef Research Foundation

By Ken Coles

FOUNDER

Sir John Proud[^]

PATRONS

Dr Des Griffin AM

Mr Raymond Kirby AO

Mr Henry Loomis and Mrs Jacqueline Loomis

Lady Proud

Mr Robert Purves

Prof Frank Talbot^{*}

Mr Charles Warman AM

TRUSTEES

Mr Kenneth Coles AM (Chairman)

Mr Andrew Green (Secretary and Treasurer)

Mr Charlie Shuetrim (Chairman, Appeal Committee)

Prof Mike Archer[#]

Dr Penny Berents

Mr James Bildner

Prof Ronnie Harding

Mr Trevor Haworth AM

Mrs Alison Hayward

Mr Frank Howarth^{**}

Mr Chris Joscelyne

Mr Vivian King

Mr Raymond Kirby AO

Mr Gordon Moffatt AM

Mr Bill Page-Hanify AM

Mr Robert Purves

Prof Stephan Schnierer

Mr Charles Warman AM

[^] deceased

^{*} new Patron in 2004

^{**} new Trustee in 2004

[#] resigned during 2004

The Lizard Island Reef Research Foundation is an independent trust established to raise funds for the Lizard Island Research Station and to support research on the Great Barrier Reef. Its major commitments are to the Doctoral Fellowships program and to capital developments at Lizard Island. More than \$5 million has been raised by the Foundation since its inception in 1978, including \$2.5 million for the 30th Anniversary Development. This was the second year of the 30th Anniversary Development. Trustee Charlie Shuetrim, as Chairman of the Appeal Committee, has reported separately on its great success. See inside the back cover for Members, who donate \$1,000 or more, and Friends of the Foundation in 2004.

Foundation Members' Events

The eleventh annual Members' dinner was held on 23rd August 2004 at the Wharf Restaurant on Sydney Harbour. Ken Coles welcomed the one hundred people who attended the dinner and thanked them for their support. He then asked Professor Frank Talbot to stand and announced that the Trustees, in recognition of his having started the Research Station and of his long term interest in it, had made him a Patron of the Foundation. Frank Howarth, Director of the Australian Museum introduced the guest speaker Professor Terry Hughes of the Centre for Coral Reef Biodiversity at James Cook University in Townsville. He said that the Barrier Reef is not pristine. He spoke about the threats to it and indicated the directions that research is taking to improve its conservation. Professor Hughes was later recognized as the coral reef scientist whose papers were the most cited in the world by other scientists. The wine was generously donated by Fesq & Company, Shaw & Smith and Port Philip Estate.

The seventh annual lunch for Victorian Members, attended by eighteen people, was hosted by Ken Coles and held in the Board Room of the Athenaeum Club in Melbourne on 13th May 2004. Frank Howarth gave an illustrated address about the Research Station and the Australian Museum of which it is a part.



Patrons Des Griffin and Frank Talbot
with Janette Griffin and Sue Talbot at the
Members' dinner.



Scott Purves



Rhett Purves

He spoke also about the history of the Australian Museum and the role of the Museum as a custodian of the flora and fauna of Australia. Gordon and Jacqueline Moffatt attended; Gordon is a Trustee of the Foundation.

The annual dinner in Sydney and the luncheon in Melbourne are not fund raising events, but are intended to thank existing donors and to interest others in the Foundation's work.

Late in December 2003, we welcomed Roy and Gloria Caldwell to Sydney. Roy, who is a Trustee of the Coral Reef and Marine Science Foundation, was spending a sabbatical in Australia and much of it working at Lizard Island. In February 2004, Charlie and Sandy Shuetrim and Ken Coles and Rowena Danziger attended the fund raiser at the Explorer's Club in New York which James Duplessie organized for the Coral Reef and Marine Science Foundation. It was a very enjoyable and successful event raising nearly \$35,000 from about one hundred guests who attended.

Members' prizes

Each year all Members of the Foundation are entered into a draw for two fantastic prizes. One is a stay for two at the Lizard Island Resort with return airfares to Lizard Island from within Australia, and the other is a four night cruise for two to Lizard Island aboard the Captain Cook Cruises ship *Reef Endeavour* with return airfares to Cairns from within Australia. These two prizes are generously sponsored by P&O Australian Resorts and by Captain Cook Cruises respectively.

In 2004 Stephen and Nanette Ainsworth were drawn as winners of the Resort prize and Dick and Pip Smith won the *Reef Endeavour* cruise.

LIRS Note: Ken Coles initiated the dinner in 1994 and the lunch in 1998 and continues to organize them personally. Ken is thanked for his long-term success in drawing together people who are interested in supporting the Lizard Island Research Station.

Foundation visitors

Foundation Members and Trustees are always welcome to visit the Station when they are in the area. The following people associated with the Foundation visited during 2004:

- Geoff and Liz Haddy
- Ken Coles AM and Rowena Danziger AM
- Rob Purves made two visits, the first to discuss planned extensions to the Purves Laboratory and the second with sons Rhett and Scott and friends Peter & Gwen Carlisle.
- Charlie and Sandy Shuetrim hosted a visit by Ian Potter Foundation Governors John Gough AO and Prof Tom Healy AO, and their wives Rosemary Gough and Bev Healy in June.
- Charlie and Sandy visited again in November, with their engineer friend Geoff Greenham. This visit was timed to coincide with a site visit by the architect for the 30th Anniversary Development. We thank them all for their valuable input into the planning process.
- Susan Preedy visited with her mother Sheila Preedy
- Rod and Margaret MacDonald
- Barry Lindsay (Voyages) and Thomas Johnson (Lend Lease)
- Captain Bob Buchanan (Captain Cook Cruises)



Anne Hoggett, Terry Hughes and Ken Coles



For the record...

Rezoning the Great Barrier Reef

A new Zoning Plan for the whole Great Barrier Reef Marine Park (GBRMP) came into effect on 1 July. It sets aside more than 30% of the GBRMP in “no take” areas, spread across all identifiable habitat types. The Great Barrier Reef Marine Park Authority (GBRMPA) is to be congratulated for achieving this excellent result for the environment in the face of enormous controversy and varied stakeholder interests. Some have argued that the protected proportion of the GBR is not large enough, but it is a strong first step.

A substantial network of “no take” areas does more than protect the organisms that could otherwise be taken. By keeping key functional groups (particularly plant-eating fishes) intact, reef systems are better equipped to recover from external shocks. “No take” areas also act as sources of larvae for non-protected areas which can assist their recovery after impacts.

GBRMPA overhauled the management of scientific research in the Marine Park as part of the rezoning process. In recognition of the research that is conducted at Lizard Island, there are now several places in the vicinity that are zoned to allow for scientific research but not other extractive activities. The Australian Museum has signed a Memorandum of Understanding with the Great Barrier Reef Marine Park Authority and has produced a Code of Conduct for research within the GBRMP. These allow Australian Museum staff to do certain kinds of research in the Scientific Research Zones without a permit. This avenue is open to other research institutions.

LIRS supports high achievers

Australia is the world leader in coral reef science according to citation rankings published by ISI Essential Science Indicators this year. James Cook University, the Australian Institute of Marine Science, Australian National University, University of Queensland and the Australian Museum rank 1st, 2nd, 14th, 15th and 20th respectively in the world (among 1644 institutions in 103 countries)

for citations in coral reef science from 1994 to 2004.

Of the twenty top-cited authors in coral reef research between 1994 and 2004, nine have worked at LIRS and five have done a substantial amount of their research at LIRS. Two of the top twenty (Dr Julian Caley and Dr Lexa Grutter) are former Lizard Island Doctoral Fellows.

Winter coral bleaching

Corals that live in shallow water can be exposed to the air for several hours during extreme low tides. At Lizard Island, such tides occur during the winter months and at the hottest time of the day. Corals can clearly cope with this regularly-occurring stress under normal circumstances. At Lizard Island, exposed portions of corals have been observed to bleach and then recover completely, and many such colonies live for decades or more. However, at mid-shelf and outer barrier reefs in the Lizard Island area during the winter of 2004, there was widespread and severe bleaching followed by mortality of the exposed parts of both soft and hard coral colonies. Corals in these areas had partially bleached the summer before. It is possible that unusual mortality in winter was due to low tide exposure stress occurring when the corals were still in a weakened state from summertime stresses.

Staff

There were no staff changes in 2004. Lyle Vail and Anne Hoggett completed their 14th year as Directors, and the maintenance positions continue to be shared by two couples, Lance and Marianne Pearce during summer and Bob and Tania Lamb during winter. Renie Hood and Snow Amos are again thanked for assisting Lance and Marianne as volunteers when Lyle and Anne were on leave early in the year.

Usage

Record usage by core user groups was achieved again this year. Researchers, postgraduate students and student groups used the Station for 5,058 person days. Other users (volunteers, contractors and official guests) bring the total usage for 2004 to 5,805 person days.



Bench fees

The Station's users are charged a bench fee according to their category of usage. The fee is subsidised by the Australian Museum Trust and the Lizard Island Reef Research Foundation. It covers shared, self-catering accommodation, use of a small boat, laboratory and aquarium facilities, and scuba tanks and air fills to qualified divers. The fee changes each year on 1 January to cover costs. Researchers and student groups who are applying for grant funding should include a margin for these annual increases. The schedule for 2004 and 2005 is (A\$ including GST, per person per night):

	2004	2005
Researcher	\$97.00	\$100.00
Researcher's assistant	\$85.00	\$88.00
Postgrad student (own project)	\$37.00	\$38.00
Postgrad's assistant	\$33.00	\$34.00
School or university group	\$60.00	\$62.00
Commercial	\$180.00	\$185.00

For individuals staying for 28 consecutive days or longer, a 10% discount applies to the whole of their bench fee. Other costs involved in conducting research or bringing an educational group to the Station, such as airfares, barge freight, food, diving gear hire, are detailed on the Station's web site.



More winter bleaching of exposed coral

Volunteer programs

LIRS offers two volunteer programs. The Station Volunteer Program provides valuable experiences for the 20 to 30 volunteers accepted each year. The work is maintenance, not research, but many volunteers are recently qualified biologists who are eager to live on a field station and mix with researchers. The Research Volunteer Program invites people to register to assist with research. Many volunteers in this program have science backgrounds and are qualified divers. LIRS provides researchers with details of research volunteers who are available at the appropriate time. The researcher then contacts prospective volunteers and makes arrangements independently. Details of both programs are available on the Station's web site.

Station volunteers this year were:

Snow Amos, Gabrielle Cairns, Jason Carroll, Amanda Crawford, Mikey Denner, Gregor Dunham, Michelle Dyer, Renie Hood, Wes Karn, Sandy Kiely, Katharina Krusche, Martina Loesle, Katrina Marsden, Dr Sara Piddlesden, John Pryce, Lil Pryce, Dr Bill Quinlan, Jacob Sauer, Andreas Simon, Sophie Stojic, Anthony Taylor, Greg Wassell.

Monitoring

Monitoring activities undertaken during 2004 included collecting data on: weather parameters, water temperature, crown-of thorns starfish abundance, human usage and numbers of potato cod at the Cod Hole, numbers and species of sharks seen by divers, and the fate of particular coral colonies following the severe coral bleaching event in 2002.

Tours

Tours of the Station for Resort guests are conducted on Mondays and Fridays from 9.30 to 11 am. A tour for other island visitors, mainly campers and yachties, is conducted from April to November from 11 am to 12.30 pm on Mondays only. The tours are popular and an effective means of communicating the research being done at the Station.

Research Projects & Participants

Project leaders who are postgraduate students are indicated with an asterisk (*).

Mating behaviour and sexual conflict in simultaneously hermaphroditic sea slugs (Opisthobranchia) (October 2003/ February)

*Nils Anthes (University of Muenster, Germany)

Mating conflicts in hermaphroditic sea slugs (October 2003/ February)

*Annika Putz (University of Muenster, Germany)

The role of selective mortality in the early life history traits of coral reef fishes (October 2003 to February, October to January 2005)

*Monica Gagliano (James Cook University) assisted by Vanessa Messmer, Dr Johanna Mader, Dr Mark McCormick, Stefan Walker, Karin Kassahn, Sylvia Kowalewsky, Ben Higgins, Annika Putz, Martin Hasshoff, Martial Depczynski and James Moore

Thermal adaptation and the evolution of species' borders in coral reef fishes (December 2003/ January, June,

*Line Bay (James Cook University) assisted by Rhona McPhee, Karin Kassahn, Monica Gagliano and Martial Depczynski, and accompanied by Ewan McPhee, Kalle McPhee, Tasman McPhee and Graham Teakle

Ontogeny of behaviour in larval fishes (December 2003/ January)

Dr Jeff Leis (Australian Museum) assisted by Matthew Lockett, Domine Clark, Sam Leis, Sue Bullock, and Mark Brown

Ontogeny of sensory abilities in larvae of marine fishes (December 2003/ January)

*Kelly Wright (University of New South Wales) assisted by Andrea Belanger

Parasites of pre- and post-settlement coral reef fish (December 2003 to February, March/ April)

*Jennifer Pickering (University of Queensland)

Coral disease (January)

*Meir Sussman (James Cook University)

Community structure of parasites in wrasses (January, May)

*Gabriela Munoz (University of Queensland)

Ecological significance of coral disease on the Great Barrier Reef (January, July, December)

Dr Bette L. Willis (James Cook University) accompanied by Rick, Reanna and Shannon Willis in December

Prevalence and impact of coral disease (January, July/ August, November, December/ January 2005)

*Cathie Page (James Cook University) assisted by Stephen Neale, Damian Thomson, Ben Robinson, Daniel Simpson and Christine Colmar

Influence of temperature on spread and transmission of coral disease on the Great Barrier Reef (January, May)

*Holly Boyett (James Cook University) assisted by Neal Cantin

Cleaner fish food preferences (January)

Dr Alexandra Grutter (University of Queensland) assisted by Conor Jones and Ivan Grutter

Mortality of small predators and the effects of small predators on the recruitment and diversity of coral reef fishes (January)

Dr Glenn Almany (James Cook University)

Interactions between cleaner shrimp and fishes: is this mutualism? (January/ February)

*Lyn Raphael (University of Queensland)

The neuroecology of labrids (January/ February)

*Viviana Gamboa (University of Queensland)

Wave energy and the structure of reef fish assemblages: the role of swimming performance (January/ February, June, July/ August, November/ December)

*Christopher Fulton (James Cook University) assisted by Katherine Dunn, Neal Cantin, Nicolai Konow, Andrew Hoey, Tony Sunderland

Does the cleaner shrimp/ fish mutualism fit a biological market? Ecological significance of cleaner shrimp (January/ February)

*Justine Becker (University of Queensland) assisted by Lynda Curtis

The role of *Anilocra apogonae* (Isopoda: Cymothoidae) in the reproductive and competitive behaviour of the five-lined cardinalfish (January/ February, November/ December)

*Rachel Fogelman (University of Queensland) assisted by Gay Marsden, Lynda Curtis, Angela Crean and Andreas Simon

Reproduction and spawning of crinoids (January/ February)

Dr Chris Lowe (University of California Berkeley) assisted by Chad Harris

Demography of chaetodontids (January/ February)

*Michael Berumen (James Cook University) assisted by Dr Morgan Pratchett, Deborah Pratchett, Danielle De Vere and Annika Persson



Influence of coral degradation on fish (January to March, November/ December)

*David Feary (James Cook University) assisted by Lisa Peacock, Annika Persson, Christina Knight and Christine Colmar

The evolution of monogamy in reef fish (January to March, November/ December)

*Marian Wong (James Cook University) assisted by Andrew Macnee, Annika Persson, Dr Lynne Van Herwerden, Bryan Murphy and Jean-Paul Hobbs

Antifouling surfaces modelled from nature (February)

*Andrew Scardino (James Cook University) assisted by Lauren Keech

Ecological significance of small cryptic fishes (February, June)

*Martial Depczynski (James Cook University) assisted by Monica Gagliano and Annika Persson

Phylogeny and historical significance of the bivalve order Arcoida (Mollusca) (February/ March)

*Louise Crowley (American Museum of Natural History)

Quantification of mass balance of CaCO₃ accumulated within the reef systems around Lizard Island (February/ March)

*Siwan Rees (Southampton University, UK) assisted by John Davis

Population structure of soritid foraminifera (February/ March)

*Megan Harrison Cevalco (City University of New York, USA)

Stomatopod signals (February/ March, April)

Prof Roy Caldwell (University of California Berkeley) assisted by Gloria Caldwell

The unseen effects of micropredators on fish health (March, November/ December)

*Conor Jones (University of Queensland) assisted by Lynda Curtis, Angela Crean and Rae Schlecht

Do mucus cocoons defend against parasites in *Chlorurus sordidus*? (March/ April, August)

*Jenna Rumney (University of Queensland)

Vision in stomatopods (April)

Prof Justin Marshall (University of Queensland) assisted by Kylie Jennings and Alan Goldizen

Colour vision in fish (April)

Dr Justin Marshall (University of Queensland) assisted by Alan Goldizen and Kylie Jennings

Polarisation signals in fish and stomatopods (April)

Dr Justin Marshall (University of Queensland) assisted by Kylie Jennings and Alan Goldizen

Colour change of the facial uv patterns of *Pomacentrus amboinensis* (April)

Dr Uli Siebeck (University of Queensland)

Sex recognition of juveniles by adult males in the yellow damselfish, *Pomacentrus amboinensis* (April)

*Gregor Dunham (World Learning, USA)

The ability of *Pomacentrus amboinensis* to remember conspecifics: are their ultraviolet facial patterns used for neighbour recognition (April)

Anthony Taylor (World Learning, USA)

Ultraviolet/ visible colouration of reef fishes (April)

Prof George Losey (University of Hawaii) assisted by Jill Zamzow and Dr Peter Nelson and accompanied by Judy Losey

Interaction between cleaner wrasse and territorial damselfish (April/ May)

Dr Karen Cheney (University of East Anglia, UK)

Cleaning interaction with predators (April/ May, August)

Dr Alexandra Grutter (University of Queensland) assisted by Mark Johnson and Lynda Curtis

Cleaning symbiosis in light of mucus sunscreens (April/ May)

*Jill Zamzow (University of Hawaii)

The role of ontogenetic colour change in social interaction in damselfish (April/ May, October/ November)

*Samantha Waller (University of Queensland) assisted by Tom Lisney

Cryptogonimid nematodes from lutjanid species in the tropical Indo-Pacific (May)

*Terrence Miller (University of Queensland)

Taxonomy, phylogeny and coevolution of the Sanguinicolidae in Australian waters (May)

*Matthew Nolan (University of Queensland)

Trematode parasites of Great Barrier Reef fishes (May)

Dr Thomas Cribb (University of Queensland) and Dr Rod Bray (Natural History Museum, UK)

Sex recognition in *Pomacentrus amboinensis* (May)

Dr Uli Siebeck (University of Queensland)

Ultraviolet communication in *Pomacentrus amboinensis* (May)

Dr Uli Siebeck (University of Queensland)



Geelong College before a night snorkel

Learning with Australians: coral reefs a case study (May)

*Carl Stepath (James Cook University) assisted by Bruce Wynn, Anthony Green, Karlina See Kee, Jennifer Dachroeden, Diane Dessent, Peter Farmilo, Peter Low, Dr Cathy Meehan, Shona Pinkerton, Christine Remington, Barbara Waterhouse, Christopher Cameron and Sandra Gregg

Cooperative and cognitive aspects of cleaning symbiosis (May to July)

Dr Redouan Bshary (University of Neuchatel, Switzerland) assisted by Andrea Hohner

Influence of the social environment on interspecific aggression and physiological mechanisms (May to July)

*Andrea Hohner (University of Neuchatel, Switzerland) assisted by Dr Redouan Bshary and accompanied by Johanna Hohner

Coral reef fish phylogeography and molecular adaptation (June, December/ January 2005)

*Karin Kassahn (James Cook University) assisted by Lewis Anderson

Feeding ecology of chaetodontid fishes (June)

*Nicolai Konow (James Cook University)

Project Nemo - aim for the stars (June)

Monica Gagliano (James Cook University) and Holly Taylor, assisted by Martial Depczynski and Graham Teakle

Variation in reproductive behaviour in a female wrasse, *Halichoeres margaritaceus* (June to August)

*Lori Hosaka La Plante (University of Connecticut, USA) assisted by Kimberly Barber

Episodic-like memory in cleaner fish (June/ July)

Dr Lucie Salwiczek (Max-Planck Institute for Behavioural Physiology, Germany) assisted by Prof Wolfgang Wickler

Changes in vigilance and feeding rates of social foraging groups of fishes (July)

*Kimberly Barber (University of Connecticut, USA)

Pathogens: vectors and reservoirs for coral disease on the Great Barrier Reef (July/ August)

*Meir Sussman (James Cook University)

Damselfish skull evolution (July/ August)

*W. James Cooper (University of Chicago, USA) accompanied by Geeta Sawl

Multi-model sensory integration of wrasses and parrotfishes (July/ August)

*Aaron Rice (University of Chicago, USA)

Evolution and ecology of solar-powered Opisthobranchia (August/ September)

*Ingo Burghardt (University of Bochum, Germany) assisted by Michael Berumen

Islands and fragments - oceanic model systems (September)

Dr Ursula Shepherd (University of New Mexico, USA) assisted by Bill Shepherd

Polarization in twilight/nocturnal skies (September)

Dr Tom Cronin (University of Maryland Baltimore County, USA)

Polarization imaging of underwater environments (September)

Dr Tom Cronin (University of Maryland Baltimore County, USA)

Polarized signalling of stomatopods (September)

*Tsy-Huei Chiou (University of Maryland Baltimore County)

Background research for Master's degree (September/ October)

*Peter Bush (Macquarie University) assisted by Dee Williamson

The sociobiology of life history transitions and lifetime fecundity in haremic reef fish (September to November, November/ December)

*Stefan Walker (James Cook University) assisted by Chris Ryen, Ashley Frisch and Miguel Barbosa

Effects of line fishing - visual surveys of coral trout (October)

Dr Tony Ayling (Consultant to CRC Reef) assisted by Dave Williamson and Gabriel Codina and accompanied by Michelle White

Diversity of forams and diatoms (October)

Dr Sven Uthicke (Australian Institute of Marine Science) assisted by Dr Britta Schaffelke

Neutral community dynamics on coral reefs (October)

*Maria Dornelas (James Cook University) assisted by Jackie Wolstenholme, Scott Burgess, Marie Kospartov, Ailsa Kerswell, Abbi McDonald and Matthew Kosnik

Ontogeny of UV facial patterns in *Pomacentrus amboinensis* (November)

Dr Uli Siebeck (University of Queensland) and *Monica Gagliano (James Cook University)

Fauna and flora survey (November)

Andrew Colvill (Queensland Parks and Wildlife Service) assisted by Suzie Clay, Brenton Haig, Mike Ahrnet and Maureen Collis

Effects of predation on juvenile coral reef fish diversity - are rare species targeted? (November/ December)

*Lisa Peacock (James Cook University) assisted by Dr Glenn Almany and Jarrod Walker



Growth demography and stock structure of north Queensland reef sharks (November/ December)

*Will Robbins (James Cook University) assisted by Chadd Chustz and Christopher Fulton

Survey of coral reef fish for blood parasites and their possible vectors (November/ December)

Dr Nico Smit (Rand Afrikaans University, South Africa) and Dr Lexa Grutter (University of Queensland)

Australia Council for the Arts - visual arts & crafts project (November/ December)

Ruth McDermott (Sydney)

Ecological role of parasites in fish larvae (November to January 2005)

*Angela Crean (University of Queensland) assisted by Dr Lexa Grutter, Dr Mark McCormick, Lynda Curtis, Bryony Dixon and Inga De Vries

The role of herbivory in reef resilience (December)

Prof David Bellwood (James Cook University) assisted by Andrew Hoey, Rebecca Fox and Adam Barnett

Early life history sex determination in reef fishes (December)

Dr Phil Munday (James Cook University) assisted by Jean-Paul Hobbs

Life history of angelfishes (December)

Jean-Paul Hobbs (James Cook University) assisted by Dr Phil Munday

Sustainable Development Centres (December)

*Nathan Walton (Stanford University, USA)

Long-term monitoring of giant clam populations (December/ January 2005)

Dr David Phillips (Independent researcher) assisted by Jackie Robinson and Jacki Macrae and accompanied by Matthew Phillips

Habitat choice and hypoxia tolerance in coral reef fish (December/ January 2005)

Prof Göran Nilsson (University of Oslo, Norway) assisted by Dr Sara Östlund-Nilsson and Jean-Paul Hobbs

University group (March)

Students of World Learning (USA) led by Dr Andrew Lewis, Tony Cummings, Russell Butler, Sarah Martin and Michelle Dyer

School group (April)

Students of Geelong College Preparatory School (Geelong) led by Stuart McCallum, Chris Mitchell and Helen Nicholls

University group (May)

Students of Presbyterian College (USA) led by Dr Jim Stidham, Dr Jim Wetzel and Ruth Hemphill

University group (May/ June)

Students of Westminster College (USA) led by Dr Andrew Lewis, Ann Throckmorton, Dave Williamson and Mike Emslie

School group (June/ July)

Students of Ascham School (Sydney) led by Jane Valentine, Edward Sze-Tu, Suze Lewis and Franck Bost

University group (July)

Students of Arcadia University (USA) led by Dr Andrew Lewis and Michelle Dyer

University group (July)

Students of RMIT University led by Dr Brian Leonard, Gale Spring and Dr Ted Rohr

University group (August)

Students of the University of Maryland (USA) led by Bill Higgins, Reid Compton, Stacy Richardson and Wendy Higgins

School group (August)

Students of Haileybury College (Melbourne) led by Dr Andrew Lewis, Kirsten Geppert and Peter Hopwood

University group (August/ September)

Students of University of Guelph (Canada) led by Prof Paul Hebert and Dr Jim Ballantyne

School group (September/ October)

Students of Barker College (Sydney) led by Tim Binet, Miriam Broadhurst and Tim Robards

University group (October)

Students of World Learning (USA) led by Dr Andrew Lewis, Tony Cummings, John Brown and Linda Lewis and accompanied by Carl Schwartz and Lois Schwartz

Other visitors

Prof Pat Rich (Monash University), Prof Tom Rich (Museum of Victoria), Dr Mikhail Fedonkin and Dr Tanya Tumanova (Russian Academy of Science) (observe coral reef environment, December 2003/ January)

Roger Muller (Australian Museum, January)

Bill Phillips (PAC Architects, March)

Michael Holder, Carl Meikle and Quentin Johnson (install new freshwater reticulation, April/ May)

Colin Gilbert, David Barkworth, Matt Barlow, Chris Byrne (replace kitchen in Suntory House, May)



Andrea Hohner collecting fish on the outer reef

Rob Purves (Lizard Island Reef Research Foundation, May)

John Gough AO OBE and Prof Tom Healy AO OBE (Ian Potter Foundation) accompanied by Rosemary Gough and Bev Healy and hosted by Charlie Shuetrim and Sandy Shuetrim (Lizard Island Reef Research Foundation, June)

Ass Prof Jeff McKinnon (University of Wisconsin Whitewater, USA) accompanied by family (reconnaissance for future student group visit, June)

Dr Dan Wood (University of California Santa Cruz) accompanied by Janet Lever Wood, Carol Bury and Rick Bury (observe operations and obtain teaching materials, September)

Allan Ross (microscope service, September)

Robert Purves (Lizard Island Reef Research Foundation) accompanied by Scott Purves, Rhett Purves, Peter

Carlisle and Gwen Carlisle (September)

John Barclay (SCECGS Redlands, Sydney) accompanied by family (reconnaissance for future student group visit, October)

Charlie Shuetrim, Sandy Shuetrim and Geoff Greenham (Lizard Island Reef Research Foundation) and Bill Phillips (PAC Architects) (planning for new developments, November)

Charlie Makray (First Aid Training Services) and Julie Armour (First aid training, November)

Anna Fitch, Phil De Vries, Andrew Mitchell and Anna Fitch (filming for National Geographic documentary on venomous animals, November)

Dr Mary Poteet and Christine Scavo (University of Texas, USA) and Dr Andrew Lewis (Tevene'i Marine) (reconnaissance for university group visit, December)

Publications

The following publications based on work carried out at the Research Station were received into the Station's collection this year. The collection now totals over 900 publications. All visiting researchers are urged to send pdf or hard copies of their papers resulting from work at Lizard Island to the Station.

Almany, G.R., 2002. Role of priority effects and habitat complexity in coral-reef fish communities. PhD thesis, Oregon State University, Corvallis, OR, USA.

Almany, G.R., 2004. Priority effects in coral reef fish communities of the Great Barrier Reef. *Ecology*, 85: 2872-2880.

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Ayre, D.J. and T.P. Hughes, 2004. Climate change, genotypic diversity and gene flow in reef-building corals. *Ecology Letters*, 7: 273-278.

Bay, L.K., J.H. Choat, L. van Herwerden and D.R. Robertson, 2004. High genetic diversities and complex genetic structure in an Indo-Pacific tropical reef fish (*Chlorurus sordidus*): evidence of an unstable evolutionary past? *Marine Biology*, 144: 757-767.

Becker, J.H. and A.S. Grutter, 2004. Cleaner shrimp do clean. *Coral Reefs*, 23: 515-520.

Bellwood, D.R., 2003. Origins and escalation of herbivory in fishes: a functional perspective. *Palaeobiology*, 29: 71-83.

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Bellwood, D.R., T.P. Hughes, C. Folke and M. Nystrom, 2004. Confronting the coral reef crisis. *Nature*, 429: 827-833.

Beukers-Stewart, B.D and G.P. Jones, 2004. The influence of prey abundance on the feeding ecology of two piscivorous species of coral reef fish. *Journal of Experimental Marine Biology and Ecology*, 299: 155-184.

Birrell, C.L., 2003. Influences of benthic algae on coral settlement and post-settlement survival: implications for the recovery of disturbed and degraded reefs. MSc thesis, James Cook University, Townsville.

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- De Sloover, J.R., 2003.** Terrestrial vegetation patterns and plant communities on Pacific coral cays. *Scripta Bot. Belg.*, 24: 155-167.
- Dinsdale, E.A., 1994.** Coral disease on the Great Barrier Reef. Abstract only, p. 17 in "Joint conference on science, management and sustainability of marine habitats in the 21st century". Australian Institute of Marine Science, Townsville, Australia.
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- Gust, N., 2004.** Variation in the population biology of protogynous coral reef fishes over tens of kilometres. *Canadian Journal of Fisheries and Aquatic Sciences*, 61: 205-218.
- Gyuris, E., 2004.** An experimental investigation of the effects of human intrusion into breeding colonies of bridled terns *Sterna anaethetus* in the Great Barrier Reef. *Pacific Conservation Biology*, 9: 265-72.
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