Lizard Island

research station

Lizard Island

newsletter 1994 - 1995

sponsored by the LIZARD ISLAND REEF RESEARCH FOUNDATION

AUSTRALIAN MUSEUM

LIZARD ISLAND REEF RESEARCH FOUNDATION

The Lizard Island Reef Research Foundation is an independent trust established to raise funds for the Station and to support research on the Great Barrier Reef. The Foundation funds capital developments at the Station and directly funds research through the Lizard Island Doctoral Fellowship. Since its inception in 1978, the Foundation has raised over one million dollars to facilitate research on the Great Barrier Reef.

Patrons

Raymond Kirby
Henry and Jacqueline Loomis
Sir John Proud
Robert Purves
Charles Warman
Brian Wiesener

Board of Trustees in 1994/95

Kenneth Coles (Chairman)
Andrew Green (Secretary and Treasurer)
John Barraclough, AM
George Bennett
Lord Catto of Cairncatto
James Creer
Malvin Eutick, PhD
Desmond Griffin, AM, PhD
Trevor Haworth**
Vivian King**
Raymond Kirby
Hon. John Moore, MP
Theodore Onisforou
Hon. Peter Phillips, AM
Sir John Proud, BE, Hon DEng*
Robert Purves
Nicola Ward, PhD**
Charles Warman
Patricia Watson
* retired during the year
** new Trustee

Members in 1994-95

John Allpass
Geoff and Shona Ballantyne
George Bennett
Mr and Mrs Tony Berg
Lord Catto of Cairncatto
Arthur and Prue Charles
Mr and Mrs David Clarke
Ken Coles and Rowena Danziger
Peter and Diana Daly
Christopher and Lois Dibden
Michael Dowe
Claude Fay
Peter Goadby
Andrew Green & Collete Garnsey
Donald and Leslie Fry
Alison and Bill Hayward
Trevor Howarth
Mr and Mrs Grant Jagelman
David C. Jones
Raymond Kirby
Geoff Lee AM OAM and Judy Lee
Mr and Mrs Solomon Lew
Peter and Kate Mason
Sir Robert Mathers OMRI and Lady Mathers
Susan Morgan
Myer Foundation (2)
Graham and Glynn O'Neill
Theo and Michelle Onisforou
Robert Purves
Anders Ousback & Dov Sokoni
Mr James Packer
Mr Kerry Packer
Mrs Ros Packer
Mr and Mrs W. Page Hannify
Geraldine Paton
Fiona and Matthew Playfair
Hon. Peter Phillips, AM
Sir John and Lady Proud
Mary Read
Aden Ridgeway
Alan & Lynn Rydge
Charles and Sandra Shuetrim
Dick Smith
Frank Talbot
Nell and Herman Slade Trust
Malcolm and Lucy Turnbull
Anthony and Glee Vereker
Charles Warman
Sir Bruce and Lady Watson
Steven & Jane Wilson
Bill Winning

The following donors have contributed over $10,000 in total

Henry and Jacqueline Loomis
The James N Kirby Foundation
Sir John Proud
Mr Charles Warman
The Queensland Government
Madingly Victorian Charitable Trust
Dick and Phillipa Smith
Raymond E Purves Foundation
Suntory Ltd
The Japan Foundation
Esso Australia
Readers Digest Services
Mr Brian Wiesener
Federal Republic of Germany
Westpac Banking Corporation
Lord Catto of Cairncatto
NQEA Australia
Alcan Australia Ltd
Apollo Sports Company Ltd
Commonwealth of Australia

Significant non-monetary contributions this year

Captain Cook Cruises Ltd.
Coles Myer Ltd.
Jardine Shipping Company
Lizard Island Lodge
Qantas Airways Ltd

Lizard Island research station

newsletter 1994 - 1995

This newsletter covers the period 1 July 1994 to 30 June 1995.

Please address any queries about the Station to the Directors, Dr Anne Hoggett and Dr Lyle Vail at:

Lizard Island Research Station
PMB 37
Cairns QLD 4870
Australia

Phone and fax: (070) 60-3977
International: 61 70 60-3977

Educational groups can charter the resort's dive boat *Volare* for a trip to the outer reef

Situated in the pristine waters of the northern Great Barrier Reef, the Lizard Island Research Station provides housing and research facilities for scientists and educational groups. The Station is a facility of the Australian Museum and it supports research into all aspects of the biology, ecology, oceanography, geology, history, management and conservation of the Great Barrier Reef.

Our mission is to increase understanding of the Great Barrier Reef by fostering high quality scientific research. Providing superior research facilities is central to the achievement of the mission.

Lizard Island research

Evolutionary ecology of corals

How closely related are corals of the same species on the east Australian coast? Are the genes mixed among a large interbreeding population or are there pockets of isolation? For the past four years, a team led by Dr Terry Hughes (James Cook University) and Dr David Ayre (University of Wollongong) has been investigating the population genetics of corals on the east coast of Australia between Lizard Island and Lord Howe Island. The major objective is to measure simultaneously numerous life history traits of corals in combination with estimates of the amounts of gene flow (dispersal by larvae) and genetic diversity at sites along 2,500 km of coastline. Ten common species were chosen based on their life histories (e.g. how long they live, how they reproduce) to test how these traits influence their genetics. Over 6,000 tissue samples have been collected and assayed using electrophoresis.

The genetic analyses indicate that some corals (particularly brooding species) have restricted dispersal. Indeed, genetic differences among some local populations around Lizard Island are amongst the largest reported for marine organisms. The study also revealed that brooding corals have a pronounced geographic gradient in genetic diversity, which is much greater closer to the equator than in more isolated populations to the south. Clearly, the level of gene flow and recruitment among reefs has important implications for biogeography, the maintenance of genetic diversity, population dynamics, the ability to recover from cyclones and outbreaks of crown-of-thorns starfish, and the management of marine parks.

Crown of Thorns Starfish are at it again

The apparent abundance of Crown of Thorns starfish (COTS) has increased markedly at Lizard Island over the past year. As well as increasing numbers of large adults, many smaller (hand-sized) individuals are now visible to the casual observer during the day. The Research Station has kept a log of COTS numbers observed casually by researchers since October 1993. The average number of COTS seen by divers in 1993/94 was 0.6 per dive and this has doubled to 1.2 per dive during 1994/95 (n=1612 dives covering 50 m or more of reef). Last year, the greatest number of COTS seen on a single dive was 18; this year, it was 56. Away from Lizard, the average number of COTS sightings per dive was 1.5 at North Direction Island, 3.7 at MacGillivray's Reef, but only 0.1 on the outer barrier reefs between Hicks Reef and Number 10 Ribbon Reef.

A team from the Great Barrier Reef Marine Park Authority comprising Dr Brian Lassig, Udo Engelhardt and Doris Englehardt visited the Station this year to conduct a fine-scale survey of COTS abundance. They found COTS all around Lizard Island with the highest densities on the leeward side. Their data show that there are actually about ten times more COTS present than are observed by a diver who is not actively searching for them.

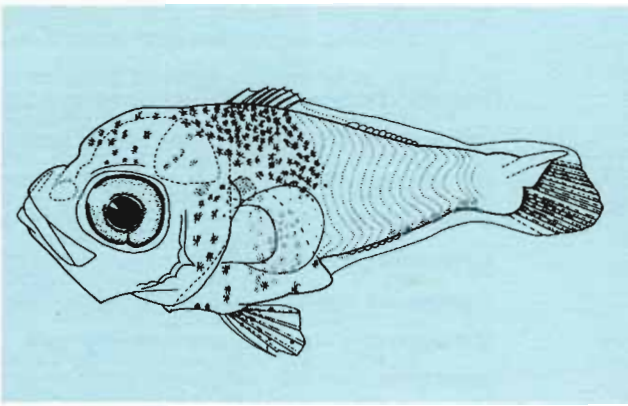
Dr Richard Stump and assistants tagging Crown-of-Thorns starfish in one of the new aquarium rooms

Another team led by Dr Richard Stump and funded by the CRC Reef Research Centre is conducting an investigation into the population dynamics of COTS around Lizard Island with special emphasis on age structure, density, growth rates and movement patterns. Preliminary results show that there has been substantial recruitment of COTS over the past seven years. Since there is a large number of juveniles and young adults in the population, adult numbers are likely to continue to increase.

Out in the Blue

The larvae of nearly all coral reef fishes live in open water. This has profound implications for the ecology of these fish populations and for their management. At present, we have little knowledge of the behaviour of fish larvae in open water and it is important to close this gap if we are to understand larval distributions, to realistically model larval dispersal, to understand the processes of settlement, and determine to what extent reef fish populations are open or closed. These topics are of considerable theoretical and applied importance. For example, an understanding of larval behaviour could be used to enhance settlement of desirable species on over-exploited reefs. An ARC-funded project being conducted at the Station is helping to fill this important gap in our knowledge.

Larval fishes are not passive with respect to water movement but it is not clear how passive movement is avoided. Sense organs of fish larvae are well-developed and form early in the larval stage but little is known of their capabilities or their influence on behaviour. A major question that remains to be answered is, how do larvae find a small reef in a very big ocean when it is time to leave open water? Direct field observation of larval behaviour is difficult due to their small sizes and transparent bodies, and the fact that there is a lot of water mixed up with the fish!



A damselfish larva

The approach of a research team led by Dr Jeff Leis of the Australian Museum has been to capture fish larvae in light traps, then to release and observe them at a time and place chosen by the team. Researchers using SCUBA follow the larvae, recording swimming direction, depth and speed. The team has found that fish larvae are surprisingly strong swimmers (supporting the recent results of Ilona Stobutzki's aquarium-based study, outlined later in this newsletter), with good control of depth and very good directional capability in the relatively featureless blue of open water. Most intriguing, they seem to be able to detect the reefs of Lizard Island from distances of at least one kilometre and swim in a directional way in relation to them. During 1995/96, Jeff's team will continue observations in open water and begin a series of settlement enhancement experiments to try to determine the stimuli (hearing, vision, smell?) that the larvae use to detect coral reefs when it is time for them to leave open water.

Lizard Island Doctoral Fellowship

The Lizard Island Doctoral Fellowship is funded by the Lizard Island Reef Research Foundation. A new Fellowship is awarded each year and usually runs for three years, so there are usually three Doctoral Fellows conducting research at the Station each year. Each Fellow receives $4,833 per year for travel, bench fees and other costs associated with field trips to Lizard Island. The Fellowship is always hotly contested and the quality of the funded research is very high. The Fellowship is open to PhD candidates conducting significant long-term field studies in a scientific discipline relevant to the Great Barrier Reef. For information about the 1996 Fellowship, see the last page of this newsletter.

James Cook University appears to have a strong grip on the Lizard Island Doctoral Fellowship as one (or more) of its students has been a successful applicant since 1989. This excellent run clearly reflects the high quality of applications produced by these students. However, a contributing factor to this institution's success may be its familiarity with Lizard Island and with the Station's facilities and capabilities: JCU is the largest single institutional user of the Station. Students interested in applying for the Fellowship who have little or no first-hand experience of using the Station may be able to improve their chances by discussing their ideas with the Station's Directors first.

Update on Lizard Island Doctoral Fellows

The 1995 Doctoral Fellowship was awarded to Ilona Stobutzki (James Cook University) for her work on the swimming and sensory capabilities of larval and juvenile fishes. Ilona's work is showing that, far from being inert particles carried passively by water currents, larval and juvenile fishes are actually strong swimmers. By placing small fish in a raceway and swimming them "till they drop", Ilona has recorded an impressive 8-day, 140 km swim by a surgeonfish less than 10 mm long. Fishes of several other families have been found to swim almost as far. These unexpected results challenge accepted ideas about movements of pre-settlement fishes and suggest different strategies for conserving and restoring reefs. The next stage of Ilona's study is to determine whether (and how) these small fishes use their capabilities to influence the site of settlement on the reef. During the year, Ilona made two trips totalling 53 days at the Station.

Vicki Hall (1994 Doctoral Fellow; James Cook University) continued her work on injury regimes and regeneration in reef corals. In 1994/95, Vicki spent 50 days over four trips conducting surveys and field experiments, the results of which are still being analysed. Further experiments are planned for 1995/96.

Dirk Zeller (1993 Doctoral Fellow; James Cook University) made four trips totalling 148 days to the Station during the year to conduct his work on the movements of coral trout. Two spawning aggregation sites were located by following coral trout tagged with ultrasonic transmitters, and fish were found to travel between one and five kilometres to join these aggregations. Dirk's study so far indicates that the coral trout population in the Lizard Island area is probably in an unsustainable situation: 44% of his small sample of tagged trout were caught by recreational fishers in just three months, and the highly vulnerable spawning aggregation sites are in areas open to fishing. Dirk plans to increase the sample size of tagged trout and hence the confidence level of his results in the spring and summer of 1995/96.

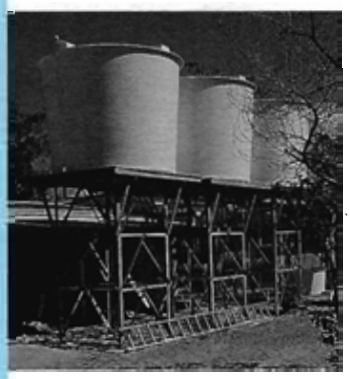
Four past Doctoral Fellows, all from James Cook University, either submitted their theses or received their PhD degrees during the year. Congratulations to Lexa Grutter (1993 Doctoral Fellow), Vicki Nelson (1992), Alison Green (1991) and Campbell Davies (1990).

Developments

After several years of fund-raising and planning, substantial capital developments were achieved at the Station this year. These developments are a new seawater aquarium system to be known as the Sir John Proud Aquarium, extensions to Kirby and Suntory houses, and extension of the Raymond E. Purves Laboratory. All three projects were constructed by the same contractor between April and June 1995.

Sir John Proud Aquarium

Named in honour of the founding Chairman of the Lizard Island Reef Research Foundation, the Sir John Proud Aquarium was funded through an Australian Research Council (Mechanism C) grant to James Cook University and the Australian Museum. The old aquarium facility was demolished and the new facility was constructed in its place. For improved seawater supply, there is a new saltwater pump in addition to the two old pumps, a new intake line (still to be installed) running parallel with the old line, and header tank storage of 30,000 litres which is almost four times the volume of the old system. There is almost twice as much space on outdoor aquarium benches as in the old system, and this space is mostly under clear acrylic roofing which allows light penetration similar to that of shallow reef waters but protects researchers from ultraviolet radiation and rain. The space available for large outdoor tanks on sand has been substantially increased and this area is under a shadecloth roof. The old aquarium room which doubled as a store room has been replaced by two larger aquarium rooms which will be airconditioned at a later date. There is now a separate store room with a freshwater wet bench for cleaning aquaria and fittings. An airconditioned culture room and outdoor growout areas for both phytoplankton and zooplankton are new features of the aquarium system, as is the filtering system which can deliver seawater filtered to one micron to selected areas of the facility. Other new installations are a much-needed larger generator to power the new facilities, and a composting toilet to serve the aquarium and laboratory area.



Increased header tank storage at the Sir John Proud Aquarium

The Sir John Proud Aquarium

Extensions to Kirby and Suntory Houses

The house extensions were funded by the James N. Kirby Foundation and from the proceeds of the sale of R.V. *Sunbird*. Kirby and Suntory houses each have an additional bedroom, increasing the capacity from eight to ten beds per house, and the dining areas and verandahs have been enlarged. Although funding was insufficient to provide roofing over part of the verandah extensions during the construction period, these roofs will be constructed as early as possible in 1995/96. Vinyl flooring has been installed in all bedrooms and in the kitchen/dining areas. Perhaps the biggest change is in the demolition of the old bathroom at each house and its replacement with two new ones that include indoor composting toilets. Timber slat floors keep the bathrooms dry and the composting toilets are working very well so far.

Extension to Raymond E. Purves Laboratory

Stage II of the Raymond E. Purves Laboratory was fundec largely by the Raymond E. Purves Foundation. It comprises an air-conditioned room on the eastern end of the existing laboratory and is fitted with a freshwater sink, benches and shelves. This room has always been planned as a functional extension of the original lab. Stage I is used for messy work such as dissecting fish, rough-sorting samples and preserving specimens, and for this reason it is open and airy. The additional airconditioned space provided by Stage II allows specimen processing to proceed to more delicate stages nearby.

Kirby House after the extensions

Steve Purcell and assistants processing sediment samples in the Purves Laboratory

Founding Chairman retires

Sir John Proud was the founding Chairman of the Board of Trustees of the Lizard Island Reef Research Foundation (LIRRF) and has been a member of the Board until his resignation at the age of 87 in November 1994. Before there was any bandwagon to jump on, Sir John recognised the value of the Great Barrier Reef and the need for research to ensure its conservation. He translated this recognition into action during his association with the LIRRF. Sir John has been a source of leadership and vision and has made significant personal donations. In his letter of resignation, Sir John noted, "The LIRRF has been a great success. Over its short 17 year life it has harvested capital of over 1 million dollars, produced over 400 research papers, sired several Doctors of Philosophy and established a well-equipped Research Station that attracts scientists world wide." The success of the LIRRF is in no small measure due to Sir John's personal effort and leadership. The new Sir John Proud Aquarium has been named in recognition of his contribution and achievements. We who are associated with the Station thank him and wish him well for the future.

Membership News

The inaugural Members' dinner was held on the Australian Museum's Rooftop on 12 October 1994. The dinner was attended by 69 people and the guest speakers were Mr Robyn Williams (past Trustee of the LIRRF and past President of the Australian Museum Trust) and Dr Anne Hoggett (Co-Director of the Lizard Island Research Station).

The goal of achieving 100 Members of the Foundation, each of whom pay $1,000 (tax-deductible) per year, is well on its way to realisation with 53 Members having joined during its first full year of operation. The Station's Directors were pleased to welcome Members Tony Vereker and Peter and Kate Mason to the Research Station during their respective visits to Lizard Island during the year.

There were three Members' prizes in 1994/95. A five-night holiday for two at the Lizard Island Lodge including first class air travel was won by Charles and Sandra Shuetrim. A four-night *Reef Escape* cruise for two including first class air travel was won by Geoff and Shona Ballantyne. A three-night holiday for two at the Country Comfort Outrigger Hotel in Cairns including first class air travel was won by Aden Ridgeway. Congratulations to all these Members and thank you to the sponsors, Australian Resorts Pty. Ltd., Captain Cook Cruises, Coles Myer Ltd, Country Comfort Outrigger Hotel, Qantas Airways Ltd, and the Suncorp Group.

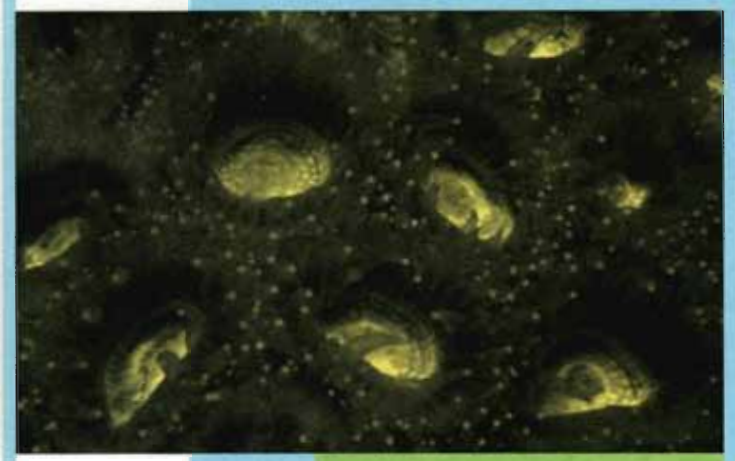
Membership of the Lizard Island Reef Research Foundation carries considerable benefits, not the least of which is the knowledge that Members are contributing significantly to knowledge and conservation of the Great Barrier Reef. Please direct enquiries about becoming a Member to either the Directors of the Research Station (070 60-3977) or to Gail McCarthy at the Australian Museum (02 320-6110).

Foundation Chairman, Kenneth Coles (left) and Australian Museum Director, Des Griffin

Coral Spawning Sweepstakes

The inaugural Coral Spawning Sweepstakes in 1994 was won by Pat Pierce, who submitted one of the 14 correct entries. The peak of the coral spawning at Lizard Island occurred at about 9 pm on 22 November 1994. The prize is a four-night cruise for two on the luxurious *Reef Escape* to Lizard Island and other Reef locations with first class air travel to Cairns. Congratulations to Mrs Pierce and thanks to the sponsors, Captain Cook Cruises, Qantas Airways Ltd. and Coles Myer Ltd.

The Coral Spawning Sweepstakes will be run again in 1995. The prize is a four- night cruise for two aboard Captain Cook Cruise's new ship, the *Reef Endeavour*, to Lizard Island and other Reef locations with business class air travel between Sydney or Brisbane and Cairns. The prize has been generously donated again by Captain Cook Cruises and Qantas Airways Ltd. To enter, guess the date and time to the nearest hour of the peak coral spawning near the Lizard Island Research Station in 1995. Each guess costs $10 and the closing date is 31 October 1995. Sweepstakes time is in Lizard Island time, which is one hour behind Eastern Summer Time. Send your guess(es) with a cheque or credit card number, expiry date and signature (Bankcard, Visa or Mastercard only) to:



The Coral Spawning Sweepstakes
Lizard Island Reef Research Foundation
The Australian Museum
6 College Street
SYDNEY NSW 2000

Credit card entries may also be sent
by fax to (02) 320 6074.

Some hints:

1. Spawning normally occurs a few days after the full moon in early summer and one to five hours after sunset.
2. Full moons occur on 7 November 1995 and 7 December 1995.
3. On the dates of the full moons, sunset will occur at 6.25pm and 6.41pm respectively.

The winner will be the person who guesses the correct date and time, which will be determined by the Directors of the Lizard Island Research Station. In the event of more than one correct entry, the winner will be drawn by ballot. If there are no correct entries, the closest entry will be declared the winner. The winner will be notified by mail and name published in *Nature Australia* and *Muse*. The prize is transferable but not cash redeemable, and is valid for 12 months.

Staff

There were no changes to the permanent staff of four full-time people during the year. Anne Hoggett and Lyle Vail have been the Directors since August 1990, and Lance and Marianne Pearce have been the Maintenance Officer and Accommodation Officer, respectively, since September 1988. Marianne and Lance were on leave from March to September 1994, and their positions were filled very ably by Lois Wilson and Terry Ford during this period. Jamie Colquhoun and Lois Wilson were employed to assist with preparation and completion of the building projects in April and May/June 1995, respectively. Kellie Hellyer left her post as Home Tutor to Alex Vail in September 1994 after nearly three years on the island. Helen Burke and Margaret Hoggett each filled this position temporarily, and Susan Bruce arrived to complete the 1995 school year in March.

Phil Munday in the photomicroscope room

Bench fees and other research costs

Visiting researchers are charged a bench fee that covers self-catering shared accommodation, use of a small boat, most laboratory and aquarium facilities, and scuba tanks and air fills for qualified divers. The fee is subsidised by the Australian Museum Trust. For visits longer than 28 consecutive days, a 10% discount applies to the whole period.

The fee schedule is unchanged from last year. For non-student projects, the fee is $75 per day for the principal scientist and $65 per day for each assistant. For postgraduate student projects, the fee is $29 per day for the student and $25 per day for each assistant. Attractive rates are offered to groups of school and university students undertaking course work directed by teachers or lecturers from their own institutions.

Other costs involved in conducting research at Lizard Island include airfares between Cairns and Lizard Island (currently $338 return), barge freight for food and other supplies from Cairns ($8 per grocery carton, increasing to $9 on 1 January 1996), and food (the supermarket bill plus a small cartage fee for delivery to the barge depot - varies from $6 to $15 per person per day). Use of most laboratory and aquarium facilities is included in the bench fee, but an extra fee is charged for any equipment that requires a larger-than-normal generator to be run. This includes the freeze-dryer, the aquarium room airconditioner, the seawater filter and any other powerful equipment brought by researchers. Use of a small dinghy is included in the bench fee. If a larger boat is needed, the additional fuel cost is recouped on a distance basis and it may be necessary to hire a boat driver at a cost of $40 per hour. High quality snorkelling gear and two sets of regulator/gauges and buoyancy compensators are available for hire at reasonable rates.

Diving

During the year, 4,924 dives were logged representing 5,809 hours underwater. This is similar to the amount of diving logged last year. As usual, most diving was conducted in very shallow water: 31% of dives were to 5 m depth or less, 45% to 6 - 10 m, and 24% to depths greater than 10 m.

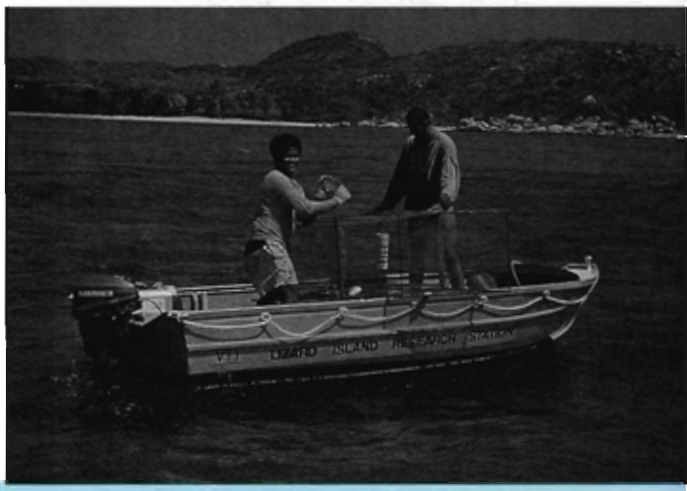
Monitoring

The Station continued to record air temperature (maximum and minimum) and rainfall daily, and water temperature at 3 m depth at one location every hour. The monthly water quality sampling for the Great Barrier Reef Marine Park Authority also continued. Parameters measured are wind direction and speed, swell direction and height, cloud cover, temperature and salinity profiles, and chlorophyll concentration at four sites close to Lizard Island and four off-reef sites extending halfway to the mainland and half way to the outer reef.

Visitor statistics

During the construction works, there was accommodation for only four researchers at a time so the Station was operating at a very reduced capacity for two months between April and June 1995. Despite this, usage in 1994/95 was almost as high as last year's record level indicating that occupancy was very high during the remainder of the year. Commercial users, volunteers and official guests are included in the total usage figures but not in research and educational usage. The relatively large difference between these two figures is due to significant usage of the Station by the British film group, Image Quest (a commercial user) for the second consecutive summer. Sixty-five research projects were carried out during the year.

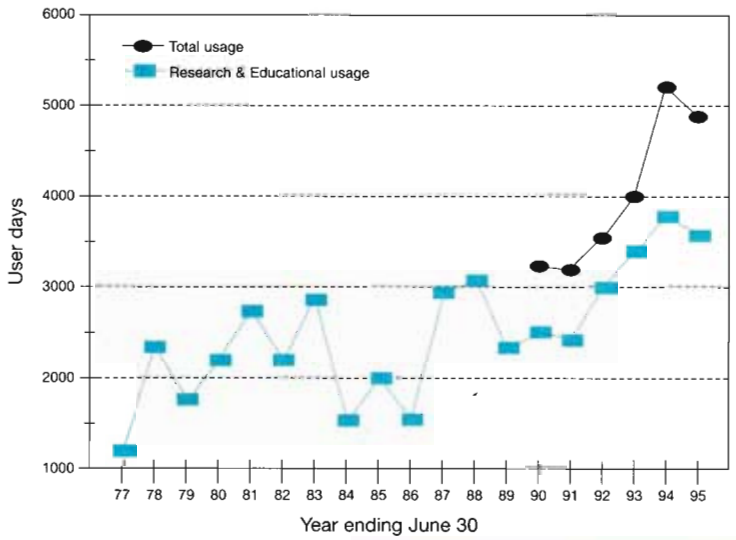
Rohan Pratt with transplanted corals



Vincent Hilomen and Spiro Tzioumis prepare to drop a Z-trap for fish population studies

Volunteer program

Volunteers are an essential component of the Station's labour force - so many things just would not be done without their assistance. Our thanks this year go to: Simone Aeberhard, Michael Baer, Nicki Behrens, Leane Bernard, Cara Biega, Helen Burke, Patti Cameron, Jamie Colquhoun, Andrew Cumming, Stuart Denman, Karen Diele, Ralph Diele, Peter Emmerman, Terry Ford, Perry Hankinson, Pam Hill, Renie Hood, Achille Iadeluca, Liri Latimore, Andrew Lie, Sharon Miller, Ian Mudge, Roberta Murchison, Kate O'Donnell, Steve Purcell, Katja Rodriguez, Sandra Sloan, Jan Stoeger, Jessie Williams, and Carol Wilson. In addition to the usual hole-digging, cleaning and painting done by volunteers, many of these people helped prepare for and clean up after the building projects carried out this year.



Tours

Tours of the Station continued to be popular with island visitors on Mondays and Fridays at 9.30 am, and informal visits were also made by many people. During 1994/95, the number of day visitors to the Station was approximately 1,500.

The following day visitors received a special welcome: Gordon Charlie and Dan Charlie (Native Title claimants to Lizard Island) and associates; Tony Vereker (Member, Lizard Island Reef Research Foundation); Peter and Kate Mason (Members, Lizard Island Reef Research Foundation); Professor Frank Talbot, Sue Talbot and a group of Friends of the Smithsonian Institution.

Research projects and participants

The following projects were carried out at the Station during the year. An asterisk (*) indicates that the researcher is a postgraduate student.

Coralline sponges of the Lizard Island Group
Dr Joachim Reitner and Gert Wörheide (University of Göttingen, Germany), Dr Mattias Bergbauer (Technical University of Berlin, Germany) and Volker Thiel (University of Hamburg, Germany) accompanied by Dorothea Hause-Reitner, Silke Rostius and Katharina Rostius

Observation of calcareous encrusting biota
Dr Bill Martindale (Home Oil Company, Canada) assisted by Tom Boreen

Pilot study for coral reef rehabilitation program
Dr Ursula Kaly (James Cook University, Townsville) assisted by Dr Geoff Jones and Ian Keay

Restoration of coral reefs
*Rohan Pratt (James Cook University, Townsville) assisted by Gabriel Codina, Michelle Binder, Bridget Green and Simon Harding

Effects of physical damage on hard corals
*Vicki Hall (James Cook University, Townsville) assisted by Robyn Cumming, Lachie McLeay, Francis Pantus, Patrick Sutton and Larnie Linton

Coral diseases
*Liz Dinsdale (James Cook University, Townsville) assisted by Esther Koh and Gabriel Codina

Microbiological analysis of diseased corals
*Esther Koh (James Cook University, Townsville)

Coral ecology
Dr Terry Hughes (James Cook University, Townsville) assisted by Andrew Baird, Liz Dinsdale, Stuart Watson and Morgan Pratchett

Growth and mortality of juvenile corals
*Stuart Watson (James Cook University, Townsville) assisted by Dearne Sauer, Zoe Rosser and Ross Thomas

Coral genetics
Dr Terry Hughes (James Cook University, Townsville) and Dr David Ayre (University of Wollongong) assisted by Rachel Standish, Jackie Wolstenholme and Liz Dinsdale

Molecular taxonomy of sea anemones
Dr Daphne Fautin (University of Kansas, USA) assisted by Dr Bob Buddemeier

Observations of anemones and anemonefishes
Fernando Nostrapour (Steven Birch Aquarium, Scripps Institution of Oceanography, USA)

Definition of genera in the polychaete family Eunicidae
Dr Kristian Fauchald (Smithsonian Institution, USA) assisted by Kate Attwood and Dr Michael Stuckey

Biodiversity of dead coral substrates
Dr Pat Hutchings (Australian Museum, Sydney) assisted by Kate Attwood and Dr Michael Stuckey

Free-living polyclad flatworms from Lizard Island
Dr Leslie Newman (University of Queensland, Brisbane) assisted by Dr Andrew Flowers, Carolyn Peterkin and Hugh Peterkin

Stomatopod vision
Dr Justin Marshall (University of Sussex, England)

Commensal amphipods associated with ophiuroids and crinoids
Dr Peter Castro (California State Polytechnic University) and Roger Springthorpe (Australian Museum)

Novel toxins of cone shells
*Jon-Paul Bingham and Dr Peter Andrews (Drug Design and Development Centre, University of Queensland) assisted by Barbara Collins, Heather Andrews, Sally Andrews and Susie Andrews

Preliminary studies on decapods
Dr David Armstrong and Dr Janet Armstrong (University of Washington, USA)

Rare mollusc species in soft lagoonal sediments
*Jamie Colquhoun (James Cook University, Townsville) assisted by Gabriel Codina

Studies on juvenile crown-of-thorns starfish
Dr Richard Stump (Consultant, Townsville) assisted by Karen Diele and Kirsten McAllister

Fine-scale surveys of Crown-of-Thorns starfish
Udo Englehardt and Dr Brian Lassig (Great Barrier Reef Marine Park Authority, Townsville) assisted by Doris Englehardt

Sperm activation in echinoderms
Dr Richard Miller (Temple University, USA) assisted by Kenneth Anthony and Pia Rheinlander

Exploratory visit to examine rocky intertidal communities
Dr Jane Lubchenko and Dr Bruce Menge (Oregon State University, USA) accompanied by Alexei and Duncan Menge

Dispersal of coral reef fish larvae
Dr Maria Milicich and Dr Geoff Jones (James Cook University, Townsville) assisted by Luke Smith, Darryl Smith, Ian Keay, Peter Roman and Gabriel Codina

Effects of competition and predation on small reef fishes
Dr Geoff Jones (James Cook University, Townsville) assisted by Ian Keay

Relationships between reef fishes and their habitats
*Craig Syms (James Cook University, Townsville) assisted by Tara Anderson, Bryce Stewart, Kate Painter and Kate Buckley

Ecology and reproductive biology of an amenone fish
*Emma Bradshaw (James Cook University, Townsville) assisted by Paul Stanley

Movement patterns of large reef fishes using telemetry
*Dirk Zeller (James Cook University, Townsville) assisted by Peter Walsh, Jamie Colquhoun, Simon Kerville, Bill Smith and Carole Eros

Development of the digestive system in parrotfishes
*Li-Shu Chen (James Cook University, Townsville) assisted by Allen Chen, John Ackerman and Phil Light

Morphological and colour pattern changes in juvenile parrotfishes
*Anne Crook (James Cook University, Townsville) assisted by Allen Chen, John Ackerman and Phil Light

Reproductive success of male *Pomacentrus amboinensis*
*Mike Emslie (James Cook University, Townsville) assisted by Dr Maria Milicich

Effect of stereoid hormone level on the reproductive cycle of *Pomacentrus amboinensis*
Dr Mark McCormick (James Cook University, Townsville) assisted by Leane Makey, David Wilson, Kate Weir and Tom Bowling

Developmental biology of the dartfish, *Pteroleotris evides*

*Leane Makey (James Cook University, Townsville) assisted by Dr Mark McCormick and David Wilson

Formation of settlement checks in reef fish otoliths

*David Wilson (James Cook University, Townsville) assisted by Dr Mark McCormick and Leane Makey

Development and behaviour of early life history stages of damselfishes

*Kathy Kavanagh (James Cook University, Townsville) assisted by Claudia Ludescher, David Stewart and Will Robbins

Demography of lethrinid and lutjanid fishes in the lagoon

*Vincent Hilomen (James Cook University, Townsville) assisted by Spiros Tzioumis and Tonny Laursen

Sediment loads and their implications for algal turf biomass and feeding biology of herbivorous fishes

*Steve Purcell (James Cook University, Townsville) assisted by Jamie Colquhoun and Michael Baer

Habitat selection and persistence in settling pomacentrids and chaetodontids

*Stephanie Slade (James Cook University, Townsville) assisted by Dr Julian Caley and Chad Lunow

Factors influencing demography of a fish population

*Jo Beukers (James Cook University, Townsville) assisted by John Ackerman, Dr Dave Wachenfeld, Mary Wakeford, Gavin Norr and Paul Marshall

Swimming and sensory capabilities of larval and juvenile fishes

*Ilona Stobutzki (James Cook University, Townsville) assisted by Phil Herrald, Jess Morgan and Frances Lee

Fish ecology

Dr David Bellwood (James Cook University, Townsville) assisted by Michael Fogg

Ecology of herbivorous fishes

Prof. Howard Choat and Dr Trevor Anderson (James Cook University, Townsville), Dr Kendall Clements (University of Sydney) and Dr Tony Ayling (Sea Research, Daintree) assisted by Lynda Axe

Developing counting methodology for fishes on outer barrier reefs

Prof. Howard Choat (James Cook University, Townsville) and Dr Tony Ayling (Sea Research, Daintree) assisted by Lynda Axe and Dr Natalie Moltschaniwskyj

Gut microorganisms of surgeonfishes

Dr Kendall Clements (University of Sydney) and Prof. Howard Choat (James Cook University, Townsville) assisted by Lynda Axe and Dr Natalie Moltschaniwskyj

Parasitic fauna in the gut of surgeonfishes

*Nicole Murphy (James Cook University, Townsville)

Sounds produced by damselfish in response to simulated and natural territorial encounters

*Carole Eros (James Cook University, Townsville) assisted by Ulrike Siebeck

Effect of tetracycline tagging on hatching success in a pomacentrid fish

*Chad Lunow (James Cook University, Townsville) assisted by Stephanie Slade

Effect of ultraviolet radiation on skin structure of the damselfish *Acanthochromis polyacanthus*

Dr Barbara Nowak (University of Tasmania, Launceston) assisted by Jon Bryan

Behaviour of fish larvae
Dr Jeff Leis and Sally Reader (Australian Museum, Sydney) and Dr Hugh Sweatman (James Cook University, Townsville)

Piscivory in coral reef fishes
*Bryce Stewart (James Cook University, Townsville) assisted by Chris Ryan

Effect of chaetodontids on corals
*Morgan Pratchett (James Cook University, Townsville) assisted by Dearne Sauer, Zoe Rosser and Ross Thomas

Spawning patterns, hatching success and patterns of egg loss in the staghorn damselfish, *Amblyglyphidodon curacao*
Dr Katheen Cole (Bishops University, Canada)

Cryptic dietary components of damselfishes
*Shaun Wilson (James Cook University, Townsville) assisted by Dr David Bellwood

Trophic diversity in the Pomacentridae
*Vicky Hall (James Cook University, Townsville) assisted by Dr David Bellwood

Habitat specificity within the goby genus *Gobiodon*
*Phil Munday (James Cook University, Townsville) assisted by Zoe Rosser and Kathy Munday

High-frequency temperature measurements on Yonge Reef
*James Leichter (Hopkins Marine Station, USA)

Role of microorganisms in the decomposition of submerged timbers of the historical shipwreck *Pandora*
*Jodie Guthrie (University of Queensland, Brisbane) assisted by Stuart Denman

Vegetation of coral cays
Dr Jacques de Sloover (Université Catholique de Louvain, Belgium)

Influence of seabirds on the vegetation and soils of Eagle Island
*Sandrine Liégeois (Université Catholique de Louvain, Belgium)

Effects of fishing on seabird populations
Dr David Milton (CSIRO, Cleveland) and Dr Geoff Smith (Department of Primary Industries, Brisbane) assisted by Cesca Lejeune

Restoration of vegetation on Lizard Island
Ross Brown (Queensland Department of Environment and Heritage, Cairns) assisted by B. Jackie

Effect of fire management practices on vegetation
Jenni Le Cussan and Sarah Strawbridge (Department of Environment and Heritage, Cairns)

Survey of archaelogical sites on the Lizard Island Lodge lease
Robynne Mills and Greg Mills (Sydney)

Photography of marine planktonic organisms
Image Quest (UK): Peter Parks, Suzi Parks, Christopher Parks, Roger Steene, Zoli Florian, Karen Diele and Justin Peach

Photography of marine organisms
Ko Fujiwara (Tokyo, Japan)

Exploratory visit
Elisabeth Mealey and Chris Harris (Greenpeace, Sydney)

Educational visit
Torgny Holmvall (Skaerholmen School, Sweden)

Group visits

Students from Geelong College Preparatory School (Geelong, Victoria): Lia Bailey, Jordan Barr, Skye Bartlett, Jordana Clark, Brian Cooke, Liam Cooke, Simon Craig, Robert Crittenden, Sophie Farrow, Cameron Galbraith, Shane Groom, Vanessa Hall, Stephanie Holbery, Andrew Napier, Kirsten Rose, Melinda Sullivan and Sonia Woodland; supervised by Lynne Ord, Heather Harris and Catherine Williams

Students from SCECGS Redlands (Sydney): Natalie Chan, Jade Findlay, Nicola Greaves, Alex Hamilton, Fleur Kennedy, Brooke Mainprize, Jessica Reed, Felicity Slater, Leah Thomas, Georgia Toomey, Rebecca Tse, Alex Wellington, Amy Wild, Lincoln Wong; supervised by Rachel Elphick, Don Elphick and Gabrielle Toole.

Adult special interest group associated with SCECGS Redlands (Sydney): Peter Castor, Bronwen Castor, Billee Cross, Anthony King, Richard Glover, Pam Glover, Jean Findlay, Ian Findlay, Geoff Kennedy, Rae Kennedy, Marjoe Mainprize, Stephen Whitehead, Faye Whitehead; led by Rachel Elphick and Don Elphick

Other visitors

* Robert Purves (Patron and Trustee of the Lizard Island Reef Research Foundation) visited twice during the year to inspect progress on the developments. He was accompanied by Andrew Robertson and Clare James.

* Other supporters were Ursula Mühlethaler, Rosli Mühlethaler and Christian Mühlethaler from Switzerland.

* Charles Makray (First Aid Training Services, Cairns) gave a refresher course in first aid and resucitation to staff members. He was assisted by Julie Armour.

* Zoli Florian (James Cook University) again visited the Station to service its microscopes.

* Dr Zena Dinesen (Great Barrier Reef Marine Park Authority) and Michael Short (Department of Environment and Heritage) visited to discuss ways in which the research permits system could be improved.

* John Paul Burton-Clemence (Australian Museum) visited to install a videoconferencing link between the Station and the Museum.

* People who visited to participate in the construction works this year were designer Joe Higham, contractors Max Edwards and Jeff Kay-Spratley, and subcontractors and employees Doc, Dennis Cowley, Ray Watkin, Rusty Hennessy, Pete Burt, Frank Baumgart, Cheryl Wilmshurst, Dave Wilmshurst, Paul Kersley, Glen Madden, Dave Denman, Dave Williams, Tom O'Brien, Lance Pearse, Andre Buck, and John Egan.

Publications

The following publications, based in whole or in part on work carried out at the Lizard Island Research Station, were received into the Station's collection during the year. There are now 430 reprints, theses and books in the collection. All visiting scientists are urged to send two copies of papers resulting from work at the Station to be added. A complete list of contributions is available on request.

Bellwood, D.R, 1994. A phylogenetic study of the parrotfishes family Scaridae (Pisces: Labroidei), with a revision of genera. *Records of the Australian Museum*, Supplement 20:1-86.

Brodie, J. and M. Furnas, 1992. Long term monitoring programs for eutrophication and the design of a monitoring program for the Great Barrier Reef. *Proceedings of the Seventh International Coral Reef Symposium, Guam*, 1:77-84.

Bruce, N.L., 1994. The marine isopod *Neocirolana* Hale, 1925 (Crustacea, Cirolanidae) from tropical Australian waters. *Memoirs of the Queensland Museum*, 37(1):41-51.

Bruce, N.L., 1994. Four new genera of marine isopod crustaceans (Sphaeromatidae) from eastern and southern Australia. *Memoirs of the Museum of Victoria*, 54(2):399-438.

Diele, K., 1993. Reproduktionsbiologische und ökologische Freilandstudien and der Landkrabbe *Cardisoma carnifex* (Dekapoda, Brachyura, Gecarcinidae). Diploma thesis, Bayerische Julius-Maximilians-Universität Würzburg, Germany.

Fainzilber, M., R. van der Schors, J.C. Lodder, K.W. Li, W.P.M. Garaerts and K.S. Kits. 1995. New sodium channel-blocking conotoxins also affect calcium currents in *Lymnaea* neurons. *Biochemistry*, 34:5364-5371.

Gates, J. and P. Hoyle, 1990. Lore from the Lizard: Lizard Island Research Station. *Australian Natural History*, 23(4):314-321.

Green, A.L., 1994. The early life history of labroid fishes at Lizard Island, northern Great Barrier Reef. PhD thesis, James Cook University, Townsville.

Grutter, A.S., 1994. Spatial and temporal variations of the ectoparasites of seven reef fish species from Lizard Island and Heron Island, Australia. *Marine Ecology Progress Series*, 115:21-30.

Keable, S.J., 1995. Structure of the marine invertebrate scavenging guild of a tropical reef ecosystem: field studies at Lizard Island, Queensland, Australia. *Journal of Natural History*, 29:27-45.

Kiene, W.E. and P.A. Hutchings, 1992. Long-term bioerosion of experimental coral substrates from Lizard Island, Great Barrier Reef. *Proceedings of the Seventh International Coral Reef Symposium, Guam*, 1:397-403.

Kleeman, K., 1995. Associations of coral and boring bivalves: Lizard Island (Great Barrier Reef, Australia) versus Safaga (N Red Sea). *Beiträge zur Paläontologie*, 20:31-39.

Liégeois, S., 1995. Influence de l'avifaune marine sur la végétation des îles coralliennes. Licencié en Sciences Botaniques Thesis, Université Catholique de Louvain, Belgium.

Mahon, J.L., 1994. Advantage of flexible juvenile coloration in two species of *Labroides* (Pisces: Labridae). *Copeia*, 1994(2):520-524.

McCormick, M.I., 1993. Development and changes at settlement in the barbel structure of the reef fish, *Upeneus tragula* (Mullidae). *Environmental Biology of Fishes*, 37:269-282.

McCormick, M.I., 1994. Variability in age and size at settlement of the tropical goatfish *Upeneus tragula* (Mullidae) in the northern Great Barrier Reef lagoon. *Marine Ecology Progress Series*, 103:1-15.

McCormick, M.I. and B.W. Molony, 1993. Quality of the reef fish *Upeneus tragula* (Mullidae) at settlement: is size a good indicator of condition? *Marine Ecology Progress Series*, 98:45-54.

McCormick, M.I. and J. Shand, 1992. Metamorphosis of the visual and barbel sensory systems at settlement in the reef fish *Upeneus tragula* (Family Mullidae). *Proceedings of the Seventh International Coral Reef Symposium, Guam*, 1:616-623.

McCormick, M.I. and M.J. Milicich, 1993. Late pelagic-stage goatfishes: distribution patterns and inferences on schooling behaviour. *Journal of Experimental Marine Biology and Ecology*, 174:15-42.

Meekan M.G., 1992. Limitations to the back-calculation of recruitment patterns from otoliths. Proceedings of the *Seventh International Coral Reef Symposium, Guam*, 1:624-628.

Patton, W.K., 1994. Distribution and ecology of animals associated with branching corals (*Acropora* spp.) from the Great Barrier Reef, Australia. *Bulletin of Marine Science*, 55(1):193-211.

Pillai, T.G. and H.A. Ten Hove, 1994. On recent species of *Spiraserpula* Regenhardt, 1961, a serpulid polychaete genus hitherto known only from Cretaceous and Tertiary fossils. *Bulletin of the Natural History Museum, Zoology Series*, 60(1):39-104.

Robertson, R., 1981. List of shell-bearing mollusks observed and collected at Lizard Island, Great Barrier Reef, Australia. *Tryonia (Miscellaneous Publications of the Department of Malacology of the Academy of Natural Sciences of Philadelphia)*, 4:1-32.

Shand, J., 1994. Changes in retinal structure during development and settlement of the goatfish *Upeneus tragula*. *Brain, Behaviour and Evolution*, 43:51-60.

Shand, J. 1993. Changes in the spectral absorption of cone visual pigments during the settlement of the goatfish *Upeneus tragula*: the loss of red sensitivity as a benthic existence begins. *Journal of Comparative Physiology A*, 173:115-121.

Shashar, N., T.W. Cronin, G. Johnson & L.B. Wolff, 1995. Portable imaging polarized light analyzer. *Proceedings of 9th Meeting on Optical Engineering in Israel*. Society of Photo-Optical Instrumentation Engineers, Washington.

Smith, G.C., 1993. Feeding and breeding of crested terns at a tropical locality - comparison with sympatric black-naped terns. *Emu*, 93:65-70.

Stafford-Smith, M.G., 1992. Mortality of the hard coral *Leptoria phrygia* under persistent sediment influx. *Proceedings of the Seventh International Coral Reef Symposium, Guam*, 1:289-299.

Whittington, I.D., G.C. Kearn and M. Beverley-Burton, 1994. *Benedenia rohdei* n. sp. (Monogenea: Capsalidae) from the gills of *Lutjanus carponotatus* (Perciformes: Lutjanidae)from the Great Barrier Reef, Queensland, Australia, with a description of the oncomiracidium. *Systematic Parasitology*, 28:5-13.

Image Quest's jellyfish tank

LIZARD ISLAND RESEARCH STATION

Great Barrier Reef, Australia

A faculty of the Australian Museum

DOCTORAL FELLOWSHIP 1996

The Australian Museum, in conjunction with the Lizard Island Research Foundation, is offering a three year Fellowship to a PhD student to support field work on the Great Barrier Reef based at the Lizard Island Research Station. The Fellowship is available to any student enrolled or about to enrol, in a PhD program. The recipient will carry out significant long term field studies in a scientific discipline relevant to the Great Barrier Reef. The inaugural Fellowships were awarded in 1984, and applications are now invited for the 1996Fellowship.

The Fellowship is intended primarily to pay bench fees at the Lizard Island Research Station for several months field work per year over a period of up to three years. It may also be used to cover some travelling and freight expenses within Australia and to purchase a limited amount of equipment, but it may not be used for living expenses or salary. The total value of the Fellowship is A$14,500 ($4,833 per annum for three years).

The Lizard Island Research Station was established in 1972 by the Australian Museum to support research into all aspects of the biology, geology and hydrology of coral reef ecosystems. Air-conditioned laboratories, boats, diving equipment, running seawater aquaria, and accommodation units are provided at the Station. Lizard Island is situated in an extraordinarily diverse marine ecosystem which is carefully managed as part of the Great Barrier Reef Marine Park. The large size (7 square km) and height (360 m) of Lizard Island with its complex of smaller islands and reefs provides a wide variety of habitats and ensures that field work can proceed in all but the most extreme weather. Lizard Island (14° 40'S, 145° 28'E) is located near the middle of the 50 km wide continental shelf: near-by habitats include turbid coastal reefs, mid-shelf platform reefs, inter-reef soft-bottoms including extensive *Halimeda* beds, sheltered lagoons and high-energy ribbon reefs facing the Coral Sea. Yet, access is easy with many flights into Cairns from international and domestic ports, and daily flights from Cairns to Lizard Island.

Conditions of Award

The applicant must either be in receipt of a scholarship or provide documentation showing how living expenses will be covered during the proposed tenure of the Fellowship. An overseas student may wish to apply for a Fellowship for only one year in order to obtain comparative data with other geographical regions; this would be acceptable provided that the data from Lizard Island contribute significantly to our understanding of the Great Barrier Reef. Fellows are required to report on progress at the end of each year of the grant, and subsequent funding depends upon suitable progress.

Applications

Six copies of the application should be sent to:

Amanda Bruder
LIRS Doctoral Fellowship
Deputy Director's Office
Australian Museum
6 College Street
SYDNEY SOUTH NSW 2000
AUSTRALIA
Internet: pennyb@amsg.Austmus.oz.au
Phone: 61 2 320 6134
Fax: 61 2 320 6056

Information

The Co-Directors
Lizard Island Research Station
PMB 37
CAIRNS QLD 4870
AUSTRALIA

Phone/Fax: (within Australia) 070 60 3977
(international) 61 70 60 3977

CLOSING DATE 1 OCTOBER 1995

Please see application format and information on costs on reverse of this page.

AM

APPLICATION FORMAT

1. Research Proposal

- Name of applicant
- Institution and Department
- Name of supervisor(s)
- Project title
- Objectives (100 words)
- Significance (100 words)
- Research Plan (maximum 5 pages)
  - *Outline experimental design and methodology*
  - *Show sequence of tasks on a yearly timescale*
  - *Indicate work already completed*

- Financial details (maximum 2 pages)
  - *Indicate the number of years for which funding is sought.*
  - *Provide a detailed budget for each year for the whole project (not just the Lizard Island component), including bench fees, travel and other costs.*
  - *Indicate which non-fellowship funding is already guaranteed and how remaining funding (including that for living expenses) will be obtained.*
  - *Justify expenditure in terms of the research.*

2. Curriculum Vitae

- As well as usual personal, educational and professional information, include:
  - *Summary of academic record and achievements*
  - *Publications*
  - *Date of enrolment in PhD program*
  - *The name of a referee who may be contacted regarding the application*

3. Supporting Letter

A letter approving the project from the head of the university department where the applicant will be enrolled must be included with the application. Overseas students must also include a letter from their supervisor indicating the acceptability of overseas field work, and how closely involved the supervisor will be with the project.

COSTS

To assist in preparing budgets, the following costs involved in field work at the Lizard Island Research Station in 1996 are provided. All amounts are in Australian dollars. If you require further information please contact the Co-Directors at LIRS.

DIVING: The Station's diving regulations require that all scuba dives are done by at least two divers; a boat attendant is also required under some circumstances. All projects requiring diving should allow for at least one dedicated assistant, for whom bench fees must be paid. Contact LIRS for further details.

BENCH FEES: PhD students are offered a highly subsidised bench fee at the Lizard Island Research Station, which includes self-catering accommodation, most laboratory and aquarium facilities, use of a small boat, and scuba tanks and weights for qualified divers. In 1996, the rate will be $29 per day for the student and $25 per day for each assistant. For visits of more than 28 consecutive days, the bench fee is reduced by 10% for the entire visit.

FOOD: Food must be ordered from Cairns for delivery by barge every two weeks or by air. Food costs are not covered by the Fellowship.

FREIGHT: Air freight from Cairns is expensive at about $2.00 per kg. Freight carried by the fortnightly barge is $9.00 per grocery carton-sized container. Freight expenses may be paid from Fellowship funds.

TRAVEL: Return airfare between Cairns and Lizard Island is $338. There is no scheduled surface transport.