Australian Coral Reef Society Newsletter

Number 44, April 2015

Founded in 1922

A society promoting the scientific study of Australian coral reefs

In this issue

Inside this issue

Schooling fish at Osprey Reef,
Photo by Matt Curnock
www.tethys-images.com

Editorial foreword

Dear Members,

We hope you enjoy this 44th edition of the Australian Coral Reef Society's annual newsletter. 2014 was a pivotal year for Australian reefs, with multiple decisions at the local, state, and federal levels weighing heavily on the current status and the future fate of our iconic coral reefs. As ACRS Vice-President Dr Andrew Hoey aptly described, the Great Barrier Reef is at a "Crossroad". ACRS councillors and representatives contributed to the numerous discussions on the activities at Abbott Point, the Queensland fisheries review, the Reef 2050 long-term Sustainability Plan and the GBRMPA Strategic Assessment.

With the determination of the UNESCO World Heritage listing swinging in the balance, and hotly-contested topics like climate change making headlines all over the world, ACRS members are on the forefront of the best-available science to inform future marine management decisions. While not everything is black and white, these critical issues should not be ignored, and we are proud of our members for presenting their research in national and international arenas. As the oldest coral reef society in the world, we like to think we are as 'lively' as the ecosystems we study, and we look forward to participating in more of these important discussions over the next year.

Our members may also have noticed we have made some new perks over the last year. We strongly believe in rewarding our constituents, and this year the council made some important decisions regarding the student research awards (now offering up to five awards including the Terry Walker and Danielle Simmons Prizes) and the newly minted ACRS medal, which is bestowed to Early Career Researchers and Established Career Researchers in alternating years for their contributions to the science and conservation of Australian coral reefs.

Our 88th Annual ACRS Conference was held in Brisbane 27-29 August 2014. Over two action-packed days we heard about effects of *Symbiodinium* on reef-building coral communities, the result of reefs "typhooned" during fieldwork, and the increased risk of crown-of-thorns out-breaks on the Great Barrier Reef. Keynote speakers included Professor Michael Kingsford, Dr Adriana Vergés and Dr Janice Lough. We are very excited about our upcoming conference at Daydream Island 28-31 July 2015 and hope you will join us there for more stimulating talks, workshops and discussions!

The 2015 newsletter is similar to the format from 2014, with updates from our student award winners, research station news, student highlights and the award-winning photos from last year's conference, and some "hot off the press!" publications from our membership. We would like to use the newsletter to showcase our member's work; photos, short submissions and recent research innovations have been included for your reading pleasure.

Our 2015 newsletter represents a shift from our long-time newsletter gurus Daniel Wangpraseurt and K-le Gomez to a larger team. We would especially like to thank Daniel for making an indelible contribution to the ACRS council and past newsletters as he will be moving on to a new post doc, a new country, and new opportunities!

Cover photo

Male *Pseudanthias squammipinnis*
Taken by Tom Bridge, Tethys Images

The Australian Coral Reef Society boasts a talented membership, both in the sciences and other pursuits. Many of the photos in this edition of the newsletter were taken by ACRS members.

The cover photo was taken by Tom Bridge. If you would like to see more of Tom's stunning work, check out Tethys Images at **www.tethys-images.com**, which is a collaboration of several marine researchers, including Matt Curnock and Ed Roberts, another ACRS member.

Tiffany Sih, Marian Wong, and K-le Gomez

Message from the President

Since our last newsletter much has happened on the political front that is of concern to stewards of our coral reefs. With our "wagons in a circle" we continue to oppose unsustainable dredging and dredge-dumping activities associated with CSG development in Queensland, and keep a watchful eye on developments in the Commonwealth Marine Reserve review. A new Queensland Labor government immediately made a high-profile appointment of Dr Steven Miles, Minister for Environment and Heritage Protection and Minister for National Parks and the Great Barrier Reef. While promising, the fact that he has not replied to my letter in early March (re-sent 2 weeks ago) regarding ACRS capacity, does not engender confidence!

On a lighter front, the Society has been active in the social media, publicising the work of ACRS scientists and others. Thanks to Councillors, especially Lauren and Tiffany for getting ACRS out of the stone-age into Facebook, Twitter, etc.!

Our 2014 Annual conference in Brisbane was a great success, many thanks to Selina Ward and her team! On the near horizon is the 2015 ACRS Annual Scientific Conference, to be held July 28-31 at Daydream Island resort. At last, a conference out on the Reef itself! We anticipate this to be a popular event so I suggest getting your Abstracts and Rego in ASAP.

We hold our annual AGM (and Barbecue!) in Townsville on May 22nd, and I urge you to attend if you can. It should be an interesting event. While we have a very healthy membership of around 300, I am concerned that quite a few senior coral-reef scientists are not members. I suggest that your membership is extremely important to bolster your professional society and to set a good example to your students.

Selma and Giverny recently attended the annual Science meets Parliament event in Canberra as ACRS representatives. This event allows unparalleled access to pollies and gets us the inside scoop on what motivates them!

Signing off, I want to wish members every success for 2015, and look forward to seeing you at Daydream 2015!

Best fishes,

Dave

Your ACRS council

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Mr Daniel Wangpraseurt
University of Technology, Sydney

ACRS in 2014

With your help we can understand, protect and maintain Australia's coral reefs for generations to come!

Follow ACRS in social media!

LIKE US ON facebook

follow us on twitter

Photo: Pedro Pereira

Become a member!

Renew your membership!

Donate - it's tax-deductable!

Join us for the upcoming AGM 22 May 2015 James Cook University, Townsville

Did you know that ACRS is now giving out **the ACRS medal** to *Early Career Researchers* and *Established Researchers* in alternating years?

Find out about nominating a scientist!

As of 2014, the ACRS Council decided to award up to five **Student Research Awards**! The Terry Walker and Danielle Simmons Prizes have also been increased to $4000 and student research awards to $2500 each.

Beginning in 2014, ACRS is now on Facebook and Twitter.

Here is some information from our Social Media Team:

We have over 500 followers on Twitter and over 1,900 'Like's on Facebook and continuing to grow!

Our posts generally reach several hundred FB users, with our top-performing posts reaching over thousands of people! And this is all organically (i.e. no paid promotion).

We want to engage more people with the news from ACRS members - so don't forget to connect with us and we can 'share' your information in our social media channels.

Some of the years's most exciting stories:

Scientist's Commentary by Dr Andrew Hoey **"The Great Barrier Reef at a Crossroad"**

ACRS Submissions

ACRS has continued to play an important role in providing advice to government and other organisations in the past year and one crucial element of this is in producing submissions and reports.

As we are all aware, we are in a time of controversy for the GBR. In its fragile state, decisions made now will have great impacts on the future health of the reef. I don't recall a time when the GBR has been the topic of so much debate and political importance, with reef questions playing a role in the recent Queensland election. With this backdrop, our expertise has been sought for comment and review of numerous documents and plans. ACRS members have been interviewed in the media frequently, both within Australia and across the international media.

ACRS provided a submission on the Reef 2050 Longterm Sustainability Plan in late October which praised the positive aspects of the plan but was critical of many sections. It can be found **here.**

The final version of the plan was released recently and many ACRS members have been asked to make comment.

ACRS also provided advice on request for a senate enquiry into management of the GBR. This posed specific questions and our response can also be found **here.**

An ACRS report on Abbott Point Port Development was released in March to the public and has generated considerable interest. The Guardian wrote and **article on the report** and this has been shared to date 6796 times.

ACRS also supported a letter of support for the development of a Great Kimberley Marine Park. This was a Science Statement of Support for a Network of Marine Reserves.

ACRS Council looks forward to coordinating these important responses in the future.

Dr Selina Ward

Science meets Parliament

ACRS councillors Selma Klanten and Giverny Rodgers

This year ACRS again sent representatives to the annual **Science Meets Parliament** conference in Canberra. I was able to attend the two days of science communication workshops and political meetings with Selma Klanten. Around 200 scientists attend this event each year which is open to researchers from all disciplines.

On our first day we heard from a range of interest groups on how to better communicate our science to the media, policymakers and parliamentarians. Speakers included journalists, CEOs, lobbyists, academics and professional science communicators. We were given the opportunity to work on condensing our research down into a 60 second pitch in preparation for our meetings with parliamentarians. The highlight of the sessions for me was a talk by Nobel Laureate, Professor Brian Schmidt. The workshop was followed by a gala dinner in the Great Hall, Parliament House with plenty of networking opportunities.

Day two was our chance to meet with parliamentarians face to face in small groups. I met with South Australian Greens Senator Penny Wright, whilst Selma was lucky enough to meet with Federal Member for Flinders and Minister for the Environment Greg Hunt. Both meetings were very successful and discussed issues such as threatened species, climate change, women in science, funding and STEM education. We also had a chance to attend Question Time in the afternoon.

Science Meets Parliament encourages scientists to look at their research in a different way. I was certainly able to do this and learnt a lot about how to best communicate science to different interest groups. It was also great to meet scientists from a range of disciplines to exchange ideas and experiences. Science Meets Parliament allows researchers to see a different application for their work outside of academia. I got a lot out of the trip would certainly recommend the experience for anyone wanting to learn how to talk about their research more effectively.

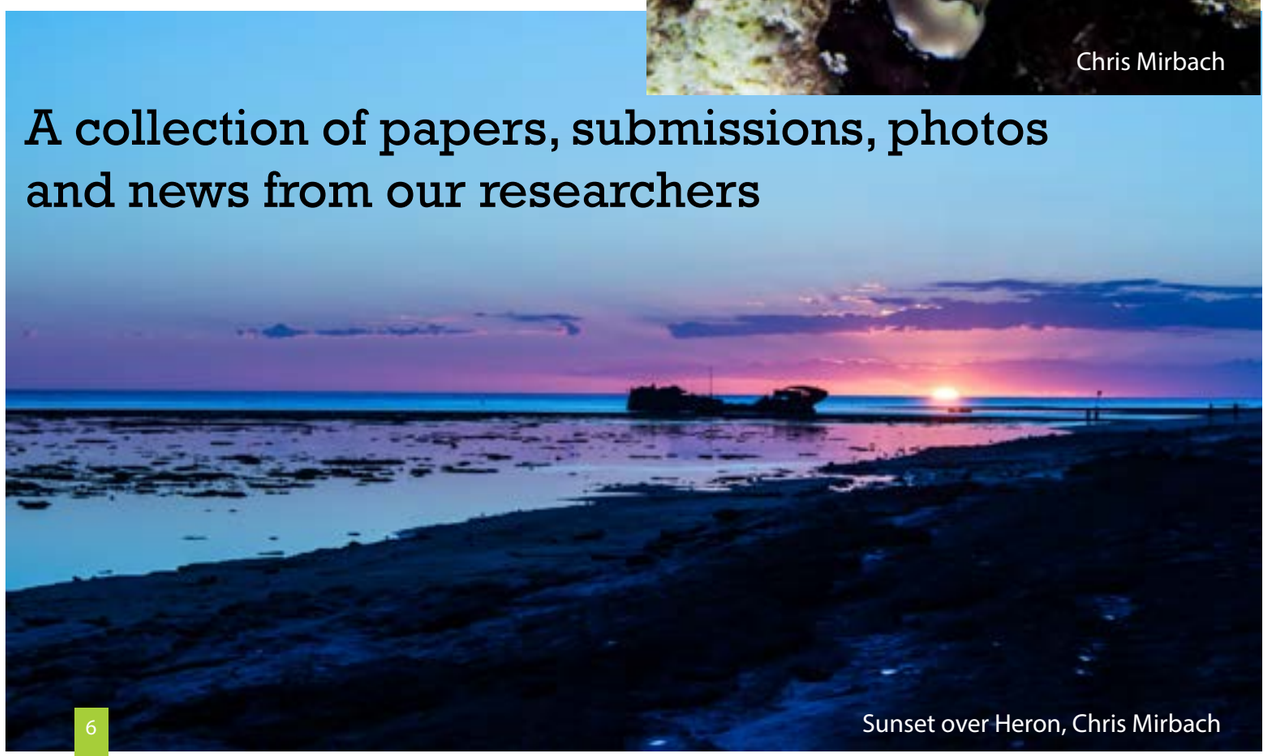
Background image by Matt Curnock, Tethys Images

Matt Curnock, Tethys Images

Inspiration from our members

Chris Mirbach

A collection of papers, submissions, photos and news from our researchers



Sunset over Heron, Chris Mirbach

Where are crustaceans on coral reefs?

From the publication:

Kramer MJ, Bellwood DR, Bellwood O (2014) Benthic Crustacea on coral reefs: a quantitative survey. *Marine Ecology Progress Series* 511: 105-116. DOI: 10.3354/meps10953

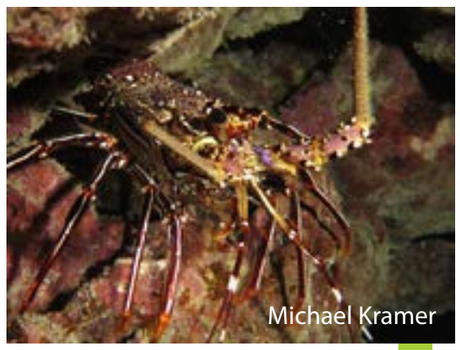
Michael Kramer

A gammarid amphipod

Crustaceans have long been an important but overlooked component of the coral reef fauna. Despite general awareness of their existence, only those with the keenest eyes or the best local knowledge were able to find these incredible animals. And yet, the abundance of crustaceans exceeds that of fishes by four orders of magnitude. A recent publication sheds some light on the ecological importance of crustaceans within various microhabitats on the Great Barrier Reef.

In their paper, Michael Kramer, David Bellwood and Orpha Bellwood quantified the abundance, biomass and productivity of crustaceans within five major coral reef microhabitats: live coral, dead coral, coral rubble, epilithic algal matrix (EAM) and sand. Incredibly, dead coral contained over three orders of magnitude and three times more abundance and biomass, respectively, than live coral per unit area. The main contributing taxon to crustacean abundance was harpacticoid copepods, whereas decapods provided the greatest biomass. However, dead coral was not particularly common on the studied reef. When the data was evaluated in terms of microhabitat coverage on an average square metre of coral reef, coral rubble unequivocally supported the greatest abundance, biomass and productivity of crustaceans.

When compared to fishes on a coral reef, crustaceans are far more abundant and have a biomass that is only ten times less. This is understandable, considering that the mean size of a crustacean is 0.8 mm, whereas an average coral reef fish is approximately 40 mm. In terms of productivity estimates, it appears likely that dead coral may be one of the most productive habitats in the world, after Californian macrophytes and Wadden Sea mussel beds. Despite the overwhelming value of dead coral and coral rubble as crustacean-rich microhabitats, the authors caution that these results should not be misconstrued; a reef devoid of live coral may be ideal for crustaceans in the short term, but devastating for the ecosystem in the long term. Although live coral may contain only a few relatively large crustaceans, it is an essential component that provides the structural foundation for other microhabitats. But from the death of live coral, dead coral and coral rubble support the incredible abundance, biomass and productivity of one of the greatest trophic resources on coral reefs: Crustacea.



Michael Kramer

No-take marine reserves moderate diseases of reef-building corals

From the publication:
Lamb JB, Williamson DH, Russ GR and BL Willis (In press). Protected areas moderate diseases of reef-building corals by reducing damage from fishing. *Ecology.*

Joleah Lamb conducting coral-disease surveys

Coral disease – a global cause of reef degradation and a huge problem for managers

Globally, an estimated 275 million people live within 30 km of corals reefs. Declines in hard coral cover by an average of 50% on Indo-Pacific reefs and 80% on Caribbean reefs in the last 30 years highlight an emerging coral reef crisis for both humans and reef-associated species. Coral diseases have contributed significantly to these declines, but little is known about factors underlying disease outbreaks, leaving marine managers with few options compared to their terrestrial counterparts.

No-take marine reserves reduce coral diseases in the Great Barrier Reef Marine Park

Terrestrial and aquatic parks and protected areas have been critical for providing protection from anthropocentric forms of physical damage to flora and fauna, and it is well-known that pathogen invasion often succeeds physical wounding and injury across taxa. Despite these connections, there have been no studies attempting to link reductions in ecosystem damage with disease moderation as a result of protection. Here, we surveyed over 80,000 scleractinian corals around the inshore fringing reefs of the Whitsunday Islands and report a four-fold decrease in diseases that affect numerous iconic reef-building species located within no-take marine reserves compared to nearby non-reserves. This is the first study to suggest a direct mechanism in which protected areas reduce diseases affecting a keystone organism.

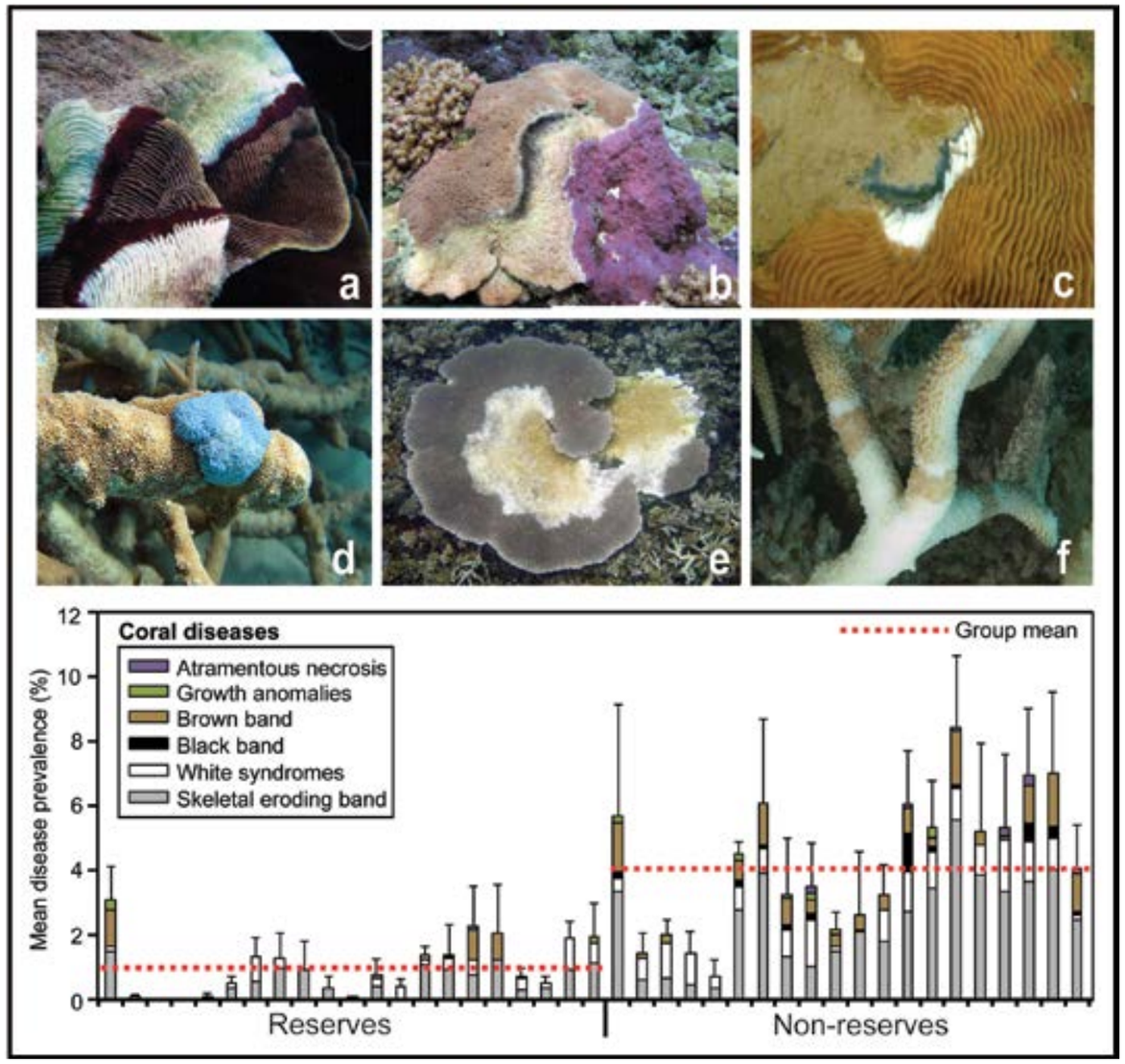
Mechanisms of infection on reefs with fishing activities

By fully assessing 31 potential drivers, we showed that direct protection from physical damage, as a result from fishing itself, is an additional conservation tool for increasing ecosystem resilience in a rapidly changing environment. Just like us, corals are animals that can become injured or wounded. Corals have an immune system to fight pathogens, but if they are stressed in any other way, they are less likely to be able to fight off the infection. We believe that fishing line not only causes coral tissue injury and skeleton damage, but it also provides additional surfaces for potential pathogens to colonise, increasing their capacity to infect wounds caused by entangled fishing line.

Unexpectedly, we recorded significantly higher levels of disease, coral damage and derelict fishing line in non-reserves with fishing gear restrictions than in those without gear restrictions. Fishers targeting stocks perceived to be less depleted, coupled with enhanced site access from immediately adjacent boat moorings, may explain these unexpected patterns. Significant correlations between the distance from mooring sites and prevalence values for a ciliate disease known to infest wounded tissue, coral damage and the abundance of derelict fishing line corroborate this interpretation. This is the first study to link disease with recreational use intensity in a park, emphasizing the need to evaluate the placement of closures and their direct relationship to ecosystem health.

Limitations for marine reserves to moderate diseases of corals

The capacity of marine reserves to moderate coral diseases will depend upon the mechanisms that lead to disease. In our study, only half of the six coral disease types we recorded were reduced inside no-take reserves. The other diseases are more commonly associated with anomalously warm seawater temperatures, seasonal run-off of sediment or changes



in salinity from monsoonal rain. This indicates that, in these cases, environmental factors may be of greater importance in governing disease than mechanical damage.

The difficulty and significance in continuing to target drivers of coral disease

Unlike coral bleaching, which is highly visible because of the bright white colour of coral tissues, coral diseases are cryptic and hard to detect. On the Great Barrier Reef, some diseases have been known to progress at rates of up to 10 cm per day, so a single snapshot survey has a small chance of coinciding with a phase of active infection when the disease is potentially detectable. This means that we are often unable to observe what led to a coral's death. Consequently, it is likely that we are underestimating the levels of mortality that coral diseases are causing in Australia and worldwide.

Our understanding of the pathogens that cause most coral diseases is still unclear, especially compared to diseases that occur on land. The openness of the marine environment means that it is extremely difficult to pinpoint the underlying disease-causing agent or agents. This is why it is so vital to determine which activities lead to increases in disease levels, because the best way to protect corals from disease is to reduce or stop what is making them more susceptible to infection. A solid understanding of the impacts of fishing activities on coral health will be indispensable in the development of well-informed spatial management strategies in marine parks for protecting vulnerable coral reef ecosystems.

Acknowledgements: Funding for this study was provided by the Australian Government's National Environmental Research Program (NERP) Tropical Ecosystems Hub and the Australian Research Council (ARC) Centre of Excellence for Coral Reef Studies.

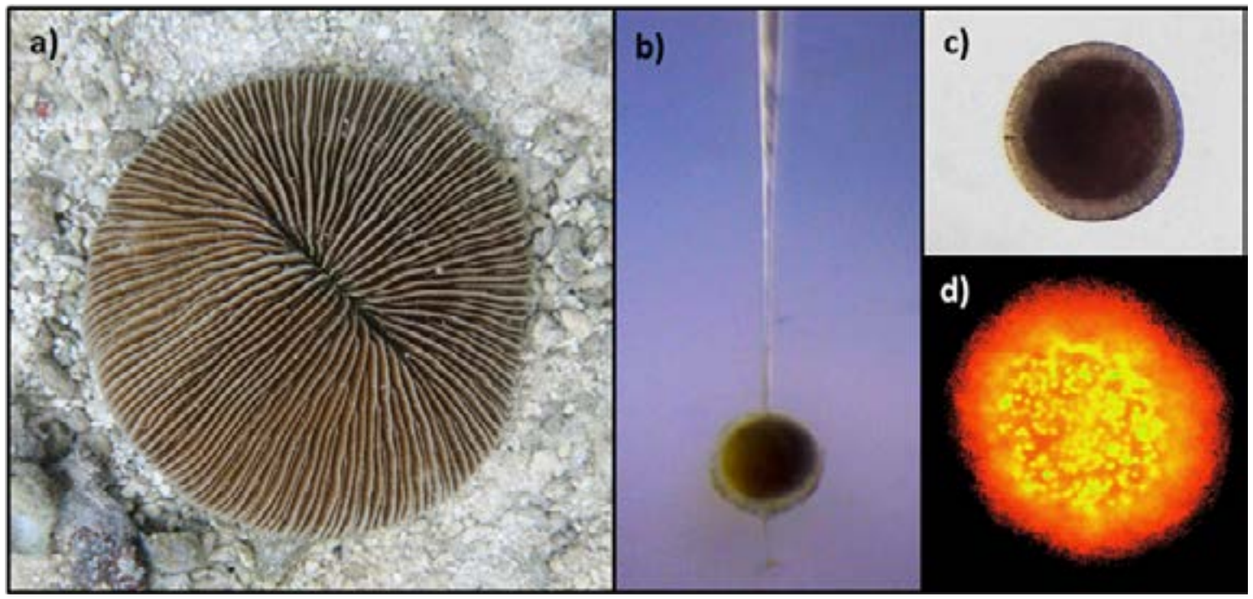
Coral explants provide microscale insights into the cnidarian-dinoflagellate world

From the paper: Gardner SG, Nielsen DA, Petrou K, Larkum AWD, Ralph PJ (2014) Characterisation of coral explants: a model organism for cnidarian–dinoflagellate studies. Coral Reefs. DOI: 10.1007/s00338-014-1240-4

Cnidarian–dinoflagellate symbioses are widespread in the marine environment. Coral cell cultures made from reef-building scleractinian corals have the potential to aid in the pursuit of understanding these symbioses. Molecular, genetic and physiological analyses of cellular processes in corals are complicated by physiological complexities associated with the coral holobiont. In particular, many analyses are hindered by the presence of a calcium carbonate skeleton or the calcification process.

In a recent paper published in Coral Reefs, we describe a method for producing cultures of host tissue containing viable symbionts (coral explants), made from the solitary free-living coral *Fungia granulosa*. The aims of this study were to determine the suitability of these coral explants as model organisms for detailed studies into coral symbioses, and validate their usefulness for studying tissue function and processes in the absence of a skeleton. We were able to maintain individual coral explants in culture for over two months, which showed that they were able to sustain cellular homeostasis. Optical sections showed coral explants to have a very similar cell-type composition with that of the *F. granulosa*: an ectoderm coated with a mucus layer, endoderm, mesogleal layer and symbionts. There were also close similarities in the physiological response of the explants and parent corals.

This publication demonstrates that coral explants are photosynthetically and morphologically similar to coral tissue at the microscale and as such, provide a good model system to study coral physiology and their host-symbiont interactions.



a) Parent coral *Fungia granulosa*, b) oxygen optode inserted through the centre of an explant c) coral explant with symbionts (dark brown) and host tissues (light brown) and d) fluorescence image of a dark-adapted explant at x200 magnification (700 µm diameter)

Improvements to Benthic Mapping – A Remote Sensing Approach

Based on the publication:
Chris Roelfsema, Mitchell Lyons, Matthew Dunbabin, Eva M. Kovacs and Stuart Phinn. (2015) Integrating Field Survey Data with Satellite Image Data to Improve Shallow Water Seagrass Maps: The Role of AUV and Snorkeller Surveys? Remote Sensing Letters. In press. DOI: 10.1080/2150704X.2015.1013643

Repeatable and accurate mapping of benthic communities is required for understanding ecological processes and to support management decisions. For shallow (< 5 m) habitats, these maps can be created by integrating high spatial resolution satellite imagery with field survey data. Benthic field survey data is often collected via snorkelling or diving using a range of georeferenced methodologies. However, this requires that personnel enter the water column for an extended period of time which is limited by environmental and safety considerations. Additionally, the acquired data needs to be georeferenced, which can be challenging since GPS signals do not penetrate the water column. Autonomous Underwater Vehicles (AUVs; Fig 1(a)) offer one alternative to manual data collection methods, enabling georeferenced surveys in unsafe or inaccessible waters. The potential advantages of AUV data collection were tested in the seagrass meadows of the Eastern Banks, Moreton Bay, Australia. An in depth analysis of the contribution of the AUV to benthic mapping was investigated using the photographs from both snorkeller and AUV collection methodologies. Field photographs were analysed manually for seagrass species composition (six species) and used as calibration and validation data to map seagrass using an established semi-automated object based mapping routine. AUV data collection was more consistent, repeatable and safer in comparison to snorkeller transects (Fig 1(b)). Additionally, the inclusion of deeper water (2.5 - 5 m) AUV data resulted in mapping of a larger extent of seagrass (~7 km2, 5 % of study area) in the deeper waters of the site (Fig 2). The overall map accuracies did not differ considerably. However, inclusion of the AUV data from deeper water transects corrected errors in seagrass mapped at depths to 5 m, but where the bottom was visible on the satellite imagery. Our results demonstrate that AUV usage should be seen as an important complimentary monitoring tool, in combination with remote sensing, for both managers and scientists working in shallow water marine habitats.

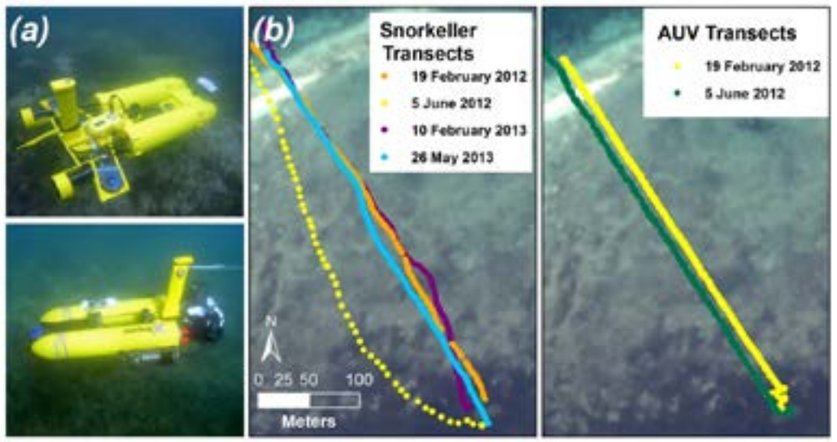


Figure 1: AUV data collection. (a) The Starbug MkIII and MkX operating over the seagrass environment. (b) Examples of snorkeller and AUV revisit transects, each mark represents

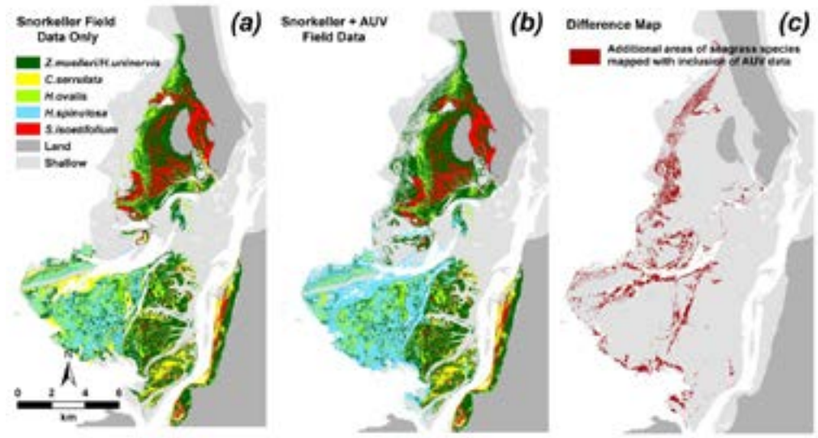


Figure 2: Seagrass species classification using 26 May 2013 field data. (a) Snorkeller data only (overall accuracy 68%), (b) snorkeller and AUV data (overall accuracy 66%), and, (c) difference map showing additional areas of seagrass mapped when AUV data from deeper water transects was included. Upper left corner is 27° 16′ 21.7″ S, 153° 18′ 5.1″ E.

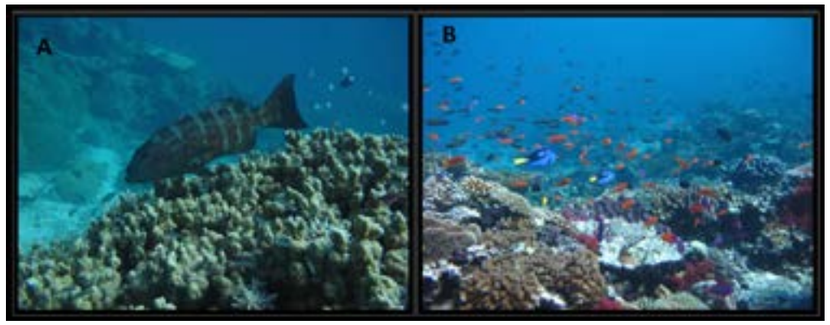
The Importance of Predators on Coral Reefs

From the publication:
Boaden AE, Kingsford MJ (2015) Predators drive community structure in coral reef fish assemblages. Ecosphere 6:art46

Predators perform crucial roles in ecological systems and the pervasive loss of apex predators is of global conservation concern. A recent paper by April Boaden and Michael Kingsford demonstrates the importance of marine reserves in conserving predatory fish populations on the Great Barrier Reef (GBR), and the flow-on effects of predator removal on coral reef fish communities.

Out on the water at One Tree Island. Photographer: Tiffany Sih

Predatory fishes can be abundant on coral reefs, however current fishing practices on the GBR target predators such as coral trout, emperors and snappers, significantly reducing their densities. Densities of prime fisheries targets such as coral trout can be up to five times greater in marine reserves compared to adjacent fished areas, so predation rates experienced by smaller fishes can potentially vary greatly according to fishing pressure.



A) Coral trout (*Plectropomus areolatus*) at the Ribbon Reefs. **B)** Diversity of prey fishes on a reef flat. Photographer: April Boaden

This study investigated the flow-on effects of predator removal to fishes at lower trophic levels, and assessed the importance of predatory fishes in driving community structure in coral reef fish assemblages.

The authors conducted detailed surveys of fishes from a variety of trophic levels, and compared the structure of fish communities amongst management zones on the GBR, to assess the effects of fishing on coral reef fish communities. Surveys were conducted at multiple locations on the GBR including the Capricorn Bunkers, Whitsundays, Palm Islands and Ribbon Reefs. The results showed that reefs open to fishing had much lower densities of piscivores, and higher densities of prey and herbivorous fishes compared to marine reserves (Fig. 1). There was strong evidence for prey release at all four locations, and the trophic composition of the fish community therefore differed amongst management zones. There was a strong negative relationship between predator and prey densities, and variations in predator density were the strongest driver for prey densities for many species.

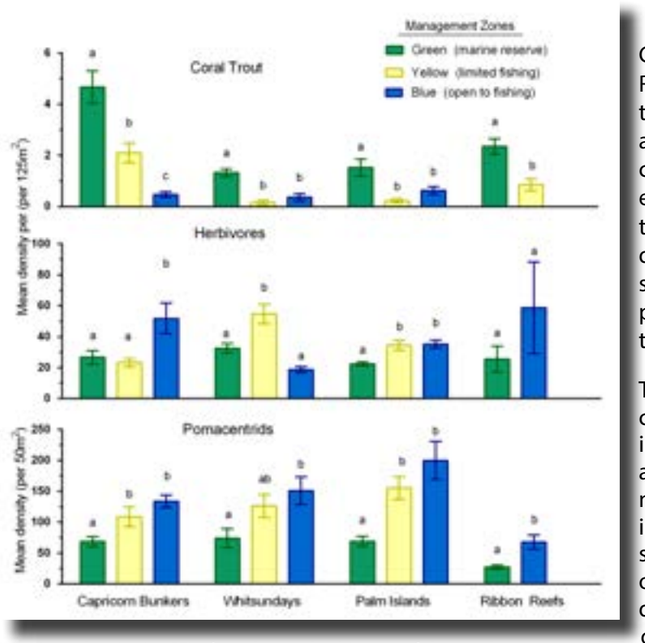
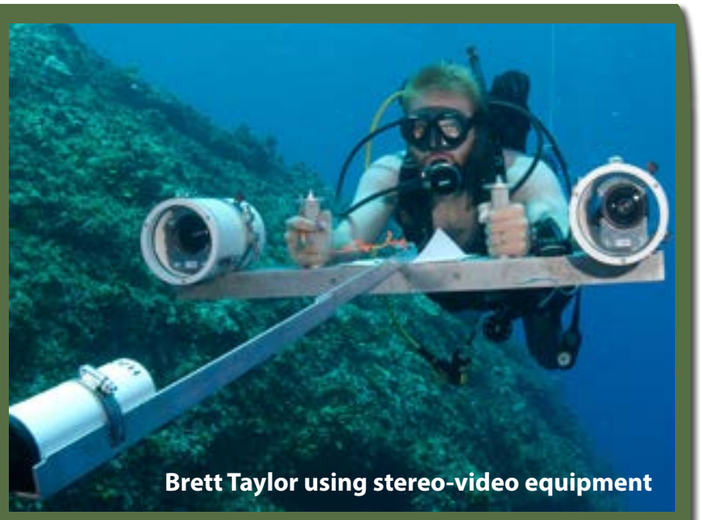


Fig: Mean density (±1SE) of coral trout, herbivorous fishes and pomacentrids amongst management zones at the four survey locations. Letters above bars indicate groupings based on post-hoc analysis: different letters indicate significant differences amongst zones. Adapted from Boaden and Kingsford, 2015.

This study provides strong evidence supporting the critical ecological role that predatory fishes can play in structuring and stabilising ecological systems, and has important outcomes for conservation and management. These data demonstrate that fishing impacts can extend beyond the targeted species, and support the use of ecosystem-based management of fisheries on the GBR. Furthermore, the study demonstrates the effectiveness of marine reserves on the GBR in preserving and maintaining healthy predator populations. The article is published in the open access journal "Ecosphere" and can be accessed **here**.

From the publication:
Taylor, B.M. 2014. Drivers of protogynous sex change differ across spatial scales. Proceedings of the Royal Society B: Biological Sciences 281, 20132423.



Brett Taylor using stereo-video equipment

Chlorurus spilurus
Bullethead Parrotfish

Unravelling life history variation in coral reef fishes: it's more complex than you think

Spatial variation in life history trait values of widespread organisms is a bit of an enigma. Most of our understanding of coral reef fishes comes from small-scale studies (for instance, effects of social demography on life histories at single patch reefs) or from large-scale trends (e.g., body size distributions across broad latitudinal gradients). However, neither of these spatial scales is very relevant to fisheries management. A recent study by Brett Taylor from James Cook University set out to address this.

Parrotfishes are perhaps the quintessential examples of sex changing species on coral reefs, with many ubiquitous species displaying vibrant colouration after sexual transition from female to male. Taylor's study used stereo-video technology to capitalise on this sexual colour dimorphism in order to investigate the ecological drivers of variation in length at sex change at multiple spatial scales. This novel technique combined high-resolution length estimates of thousands of parrotfishes, identified as initial (females with drab brownish colouration) or terminal phase (males with vibrant colouration), at multiple spatial scales across seven oceanic islands in Micronesia. The surveys spanned a range of environmental, anthropogenic and geographical factors.

In determining the hierarchy of factors influencing sex change, the spatial scale of observation became very important. For instance, many researchers have hypothesised that heavy fishing pressure and, in particular, fishery selection for larger individuals (leading to disproportionate targeting of one sex) will accelerate the timing of sex change such that individuals are transitioning at smaller sizes to compensate. This was indeed observed as a strong effect in Taylor's study, but only at the within-island scale. Across islands, however, differences in the length at sex change were overwhelmingly predicted by the unique geomorphology of each island. In other words, whether or not a particular island had an extensive lagoon or backreef, if the island was an atoll or if it was primarily surrounded by a low-complexity fringing reef had a strong predictive effect on the length at sex change, such that any effects of variable fishing pressure were completely unclear. This was true for all species examined.

Further, length at sex change within any island-type was highly related to the species' density. Interestingly, this relationship was positive where the species was not exploited or only lightly exploited, but it was negative where the species was highly targeted. This implies that different selective mortality pressures on adult individuals (i.e., natural selection versus fishing pressure) can significantly alter the social dynamics of sex change in reef fishes. Detailing the proximal mechanisms at play will require more work but this study highlights the importance of spatial scale and the complexity of life history strategies in coral reef fishes.

Viruses – The Dark Matter of Coral Reefs

Dr. Karen Weynberg
Australian Institute of Marine Science

Wherever there is life there are viruses. In just a single teaspoon of seawater there can be as many as 10 million viruses. **But don't panic!** The vast majority of these marine viruses will have no interest in humans at all. Viruses are the most abundant 'lifeform' in the world's oceans and if stretched end-to-end they would span 100 times the distance across our own Milky Way galaxy! Viruses are a huge untapped reservoir of genetic diversity that we know very little about. They are truly the 'dark matter' of the world's oceans. We do know that viruses play a central role in controlling host population size and distribution. Marine viruses cause disease in organisms ranging from algae to shrimps to whales. Viruses even influence the weather and the cycling of elements such as carbon, nitrogen and sulphur in the sea. Viruses are one of the environments best recyclers; they are responsible for enabling the flow of nutrients and energy through marine food webs. Viruses can even drive evolution by introducing new genetic material into the host cell during infection and swapping genetic material between organisms.

At the Australian Institute of Marine Science (AIMS) in Townsville, Queensland, we are exploring which viruses are performing what roles (functions) in coral reef ecosystems, particularly on the Great Barrier Reef (GBR).

As our climate undergoes rapid change, it is important to understand the influence viruses may have under conditions, such as ocean acidification and increasing sea temperatures. Viruses can be friend, as well as foe, so at AIMS we are detecting and isolating viruses that could be used to mitigate coral disease caused by bacterial pathogens. Other AIMS projects include a comparison of the viral communities across several GBR coral and sponge species, in both healthy and stressed states. Unveiling new discoveries about the viral 'dark matter' of the GBR will enable us to monitor and assess the health and resilience of this globally iconic ecosystem.

To find out more about this research, please visit the **AIMS website**.

The Great Barrier Reef Foundation's Bommies Award

Think you have what it takes? **Find out more about the Bommies Award!**

The GBRF sponsors the ACRS annual conferences and seeks to award enthusiastic researchers that have exceptional science communication skills - as the "future ambassadors for the Great Barrier Reef".

This year ACRS member **Dr. Megan Saunders** (Global Change Institute, University of Queensland) won the 3-minute video competition, with her video "The effect of rising sea levels on tropical marine environments". Second prize was awarded to ACRS Council member **Tiffany Sih** (James Cook University) for "Diving into the deep-end: fishin' impossible?" and Highly Commended was **Dr. Arielle Friedman** (University of Sydney) for his "Measuring terrain complexity with underwater cameras and robots".

Every year the public is asked to vote for their favourite video on the People's Choice Bommies Award Facebook page. The video with the most 'Like's was ACRS Council member **Dr. Renata Ferrari Legorreta** and her video "Great Barrier Reef and climate change: effect on structural complexity and community composition".

Watch the winning videos **here.**

News from our research stations

One Tree Island Research Station, USYD

Photo: Amazing view of One Tree Island, on the top right the sand apron (southern margin) and on the left the rubble flat (eastern margin). The Research Station is visible on the rubble cay. (Courtesy of D Kauffman).

2014 was a pretty good year for One Tree Island Research Station, The University of Sydney's research station in the southern Great Barrier Reef. I travelled to One Tree last December and found the station in excellent condition, we had a great campaign and everything worked beautifully. I would like to thank all the managers that have worked hard to keep the station going. We found excellent managers on Hania and Andree who stayed there most of the year; we also have to thank all the other managers that covered shorter periods Russ, Steph, Graeme and Wendy, Glen and Wendy.

It was a very busy year for the station as we had lots of Australian researchers and we also had international clients led by Prof. Ken Caldeira from the Carnegie Institute of Global Ecology and the University of Standford (USA).

We are on **Facebook!** Please make sure that you like us and that you upload the pictures from your campaigns. In 2014 there were a lot of publications featuring One Tree Island, I have tried to feature a few of them in Facebook. The idea of the Facebook page is to promote interactions between researchers so come along and publicise your research, findings and publications!

Lizard Island Research Station, Australian Museum

Photo: Trees and communications tower down and aquarium shadecloth roof shredded by Cyclone Ita. Photo by Marc McCormack, Cairns Post.

LIRS had another successful year in 2014 despite a major cyclone in April.

- LIRS supported more than 100 research projects by international and Australian researchers and educational visits by five student groups.
- The Fellowships program continues to enable excellent reef research, with six Fellows conducting research at LIRS during the year and six more fellowships awarded for 2015.
- More than 80 scientific publications appeared featuring research at LIRS.
- The Lizard Island Reef Research Foundation was awarded an Ian Potter Foundation 50th Anniversary Commemorative Grant of $500,000 which will allow LIRS to fund research aimed at improving control methods for Crown of Thorns Starfish outbreaks.
- Steady progress on the online Lizard Island Field Guide continued – 1,150 species are now included and more are added frequently.
- An additional 36kW of solar panels was added to the existing system for a total capacity of 66kW. This provides about 80% of the Station's power needs.

Cyclone Ita hit Lizard Island directly on 11 April 2014 and its impact affected activities at LIRS for the rest of the year. It was forecast to pass Lizard Island at category 5. Luckily, it hit at the low end of category 4 with central pressure 954 hPa and maximum wind speed of 158 km/h. These data are from the GBR Ocean Observing System array in the Lizard Island lagoon which recorded continuously throughout the event. The cyclone moved very slowly over the island – winds in excess of 100 km/h blew for more than 12 hours. We thank the researchers and other visitors who helped to prepare LIRS in the days preceding the storm, and the Lizard Island Resort for its assistance with the evacuation.

All LIRS buildings are rated to withstand a category 3 cyclone and they held up well. Even though there was only minor damage to infrastructure, LIRS was virtually closed for two months following the cyclone for extensive cleaning, clearing a huge number of fallen and damaged trees and minor repair work.

Cyclone damage is evident on reefs over a wide front, from Hicks Reef in the north to well south of Cod Hole. Damage is patchy, including around Lizard Island itself. The southern side and the lagoon escaped with the least damage. Eight months after the cyclone, regrowth from damaged coral colonies is already noticeable and many tiny colonies that survived are growing quickly. The December 2014 coral spawning was a good one and we are hoping for successful recruitment.

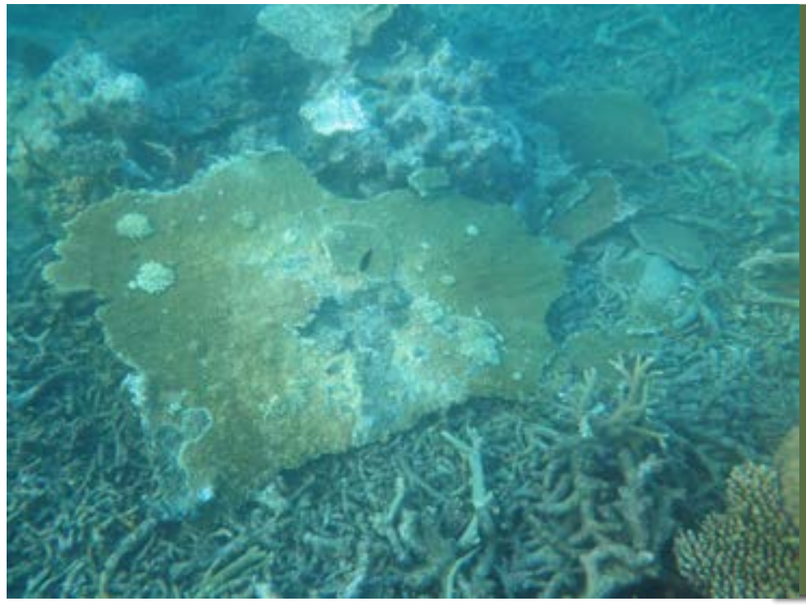
Have a look at **lirrf.org**, a new site that provides coral reef news from the Lizard Island Reef Research Foundation. Subscribe (it's free) and go into the draw to win a 3-night stay for two people at the fabulous Lizard Island Resort. Donate $20 or more and double your chances! LIRS would not be the place it is without the LIRRF's support.

Dr Anne Hoggett & Dr Lyle Vail, Directors

Lizard Island Research Station

Right: Preparing for a dive, LIRS is in the background.

Below: Cyclone Ita left plenty of small and large fragments that are regenerating.



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Web: www.australianmuseum.net.au/Lizard-Island-Research-Station

Right: COTS research is a new focus at LIRS. Photo (c) Richard Wylie, Sea Dragon Photography.

The Sydney Institute of Marine Science turns 10 in 2015!

Founded in 2005 at Chowder Bay, Sydney, SIMS is now established as one of Australia's premier marine science institutions.

SIMS' structure is intrinsically collaborative, based on a founding partnership between Macquarie University, the University of New South Wales, the University of Sydney, and the University of Technology, Sydney. The partnership is enhanced by collaborations with several state and federal government departments, the Australian Museum, the University of Wollongong and the University of Western Sydney.

The institute is uniquely positioned both in a geographical and a structural sense to significantly advance research into our marine environment. Geographically, SIMS is located on the South-East Australian seaboard, a climate change hot spot. Structurally, the collaborative research profile of the Institute harnesses the strengths of many of New South Wales' leading marine scientists.

In late 2011, SIMS completed a major infrastructure upgrade generously funded through federal and state governments, and philanthropic foundations. We now have a refurbished aquarium facility, including a protected PC2 marine aquaria, new cell and molecular, microbiological, field biology and geological laboratories, refurbished teaching laboratories and lecture theatres, and a conference and administration facility.

SIMS conducts research in most areas of marine science, and this research is done at locations across the globe. SIMS' scientists study everything from global ocean circulation patterns to fisheries management to the molecular genetics of marine microbes to seal foraging in Antarctica. While diverse, SIMS integrates these research activities into a number of high profile emergent programs including: the Sydney Harbour Research Program, the World Harbour Project, the Integrated Marine Observing System (IMOS), and the NSW Adaptation Coastal Node.

- The **Sydney Harbour Research Program** is a flagship initiative to understand what actions can be taken to protect and remediate the biodiversity and ecosystem health of Sydney.

- SIMS has launched the **World Harbour Project**. The ultimate goal of the Project is to develop a global model for "future proofing" urban waterways.

- **Integrated Marine Observing System (IMOS)**
  SIMS operates the NSW node of IMOS, deploying equipment and gathering data along the NSW coast.

- **NSW Adaptation Coastal Node**
  The NSW Office of Environment and Heritage has established the NSW Adaptation Hub to generate the key information necessary to manage the consequences of environmental change in NSW. There are three research Nodes within the Hub and SIMS is responsible for the Coastal Processes and Responses Node. The Node's focus is to understand how environmental change will affect the geomorphology of our coast and its implications for coastal development and infrastructure.

SIMS is also committed to education through both our curriculum linked school science modules, and for those already on the marine science path through our postgraduate programs:

SIMS Masters program in Marine Science and Management

This program was established in 2012 and is a unique Australian cross-institutional postgraduate marine science program. It encompasses a wide diversity of disciplines including climate change science and mitigation, marine biology, coastal management and engineering, physical oceanography, marine ecology and geoscience. The impact and use of marine science on legislation and management in the marine and coastal zones also is covered.

SIMS Doctoral Fellowships
The doctoral fellowship program was initiated in 2010. The objective is to award one or more fellowships each year with the aim of increasing the supply of highly qualified marine scientists by encouraging more people to proceed towards a PhD degree in the marine sciences.

Learn more about the Institute by visiting **www.sims.org.au**. Or drop in and see us – we'd love to show you around.

Moreton Bay Research Station, UQ

2014 began with one of the largest natural bush fires North Stradbroke Island has seen in decades, with over 65% of the Island burnt. The Station, which was not threatened by the fire, became home away from home to the fire brigade for 14 days. While the damage and loss of flora and fauna was devastating, it has provided new opportunities to allow us to understand how ecosystems recover from such events.

MBRS continued to be a hub for long-term research projects, such as Dr Janet Lanyon's dugong research and Prof Stuart Phinn and Dr Chris Roelfsema's satellite mapping of Moreton Bay. The Station also hosted researchers from a broad range of disciplines and institutions.

Jean Davis, a PhD candidate at Griffith University, studying trophic connectivity among tropical coastal habitats, visited the Station throughout the year. Her research aims to characterise the trophic consequences of habitat connectivity between mangroves and fringing reefs in an effort to improve the effectiveness of marine reserve design and function.

A postdoctoral research fellow from the University of Exeter, Dr Michael Salter's primary research interest is the production and fate of carbonate sediments in shallow marine environments. Dr Salter is currently exploring these issues at tropical, sub-tropical, and temperate sites along the east coast of Australia, including North Stradbroke Island.

The first publication from the Moreton Bay Array Program (MBAP) has been published in the Journal of Experimental Marine Biology and Ecology. Jointly managed by MBRS, JCU, CSIRO and AATAMS, the array network was established in May 2013 and continues to be a valuable research asset. The 30 VR2W receivers have been maintained and data collected every three months by MBRS/JCU staff and a team of dedicated volunteers. This data is available for use; if interested, please contact MBRS.

The Station has continued to upgrade and replace assets and equipment, with a focus on research and teaching support. A third vessel has been added; Xiphias is an aluminium boat with a bowsprit that will provide researchers with a safe platform to conduct work with nets, diving and other equipment that would not be possible on the inflatable vessels.

The annual MBRS Open Day occurred in November, inviting the local community to come and see a research station in action. Open Days provide an insight into the rich diversity that surrounds the Island, highlighting both traditional and scientific knowledge. There were a variety of activities for visitors to participate in including touch tanks, presentations and workshops.

For more information on news and events at the Station, you can access our newsletter **here**. We look forward to an exciting and productive year ahead, filled with even more opportunities for collaboration, research and education and hope to welcome you back on Station in the near future.

Kevin Townsend

Station Manager

Heron Island Research Station, UQ

2014 was as busy, vibrant and challenging as ever. A fire at the Resort on Christmas Day disrupted utilities across the Island but Heron Island Research Station and Faculty of Science staff were quick to respond and the Station re-opened as planned in January. Thanks must be given to our January clients who endured the complications with grace.

Equipment improvements have been steadily occurring with new king single beds and mattresses rolled out across the guest accommodation, upgrades and additions in the scientific section and further equipment purchases in boating and diving. We welcomed some new team members this last twelve months with Ben Potts joining the Boating and Diving section, Dani Annese joining Scientific, Brad Latimer returning to Maintenance and Kimberly Condon joining Housekeeping.

Once again, HIRS saw a varied group of researchers pass through the Station in 2014 showcasing the breadth of research that can be carried out from the facility. We were also honoured to host Sir David Attenborough who visited the Island to film for an upcoming BBC documentary.

The Station hosted University of Sydney Research Fellow Iain McCalman, a specialist in eighteenth and early-nineteenth century European history. His project on the Station involved researching and writing about the impact of the underwater world on art, science and culture. His most recent publication is titled: 'The Reef - A Passionate History, from Captain Cook to Climate Change'.

Dr Alastair Birtles, Senior Lecturer at JCU spent time on the Station cataloguing the GBR dwarf minke whale population and investigating its migratory pathways, ecology and areas of critical habitat. Research Scientist at AIMS and JCU, Dr Michelle Heupel visited to study the long-term movement patterns of predators including sharks, rays and fishes.

Macroalgae have been in the spotlight with Carolina Castro Sanguino, a PhD candidate from UQ, and HIRS Research Scholarship winner spending much of the year on the Station investigating Halimeda, a green alga with a key ecological role as one of the most important contributors to carbonate budgets in the Indo-Pacific. Dr Emma Kennedy's (Griffith University) research is focussed on assessing the responses of coralline algae to ocean acidification and warming and aims to determine whether it can be used to track the impacts of climate change in the GBR.

As part of National Science Week, the Station ran their first ever Open Day during August. The Station hosted a number of entertaining and educational events and displays to celebrate Science Week. Guests on Station and at the Resort enjoyed displays from Reef Check Australia, Coral Watch, GBRMPA's Eye on the Reef program and the South Australian Maritime Museum alongside researcher presentations.

For more information on news and events at the Research Station, you can access our newsletter **here**. We look forward to a year filled with opportunities for collaboration, research and education and hope to see you at Heron very soon.

Elizabeth Perkins

Station Manager

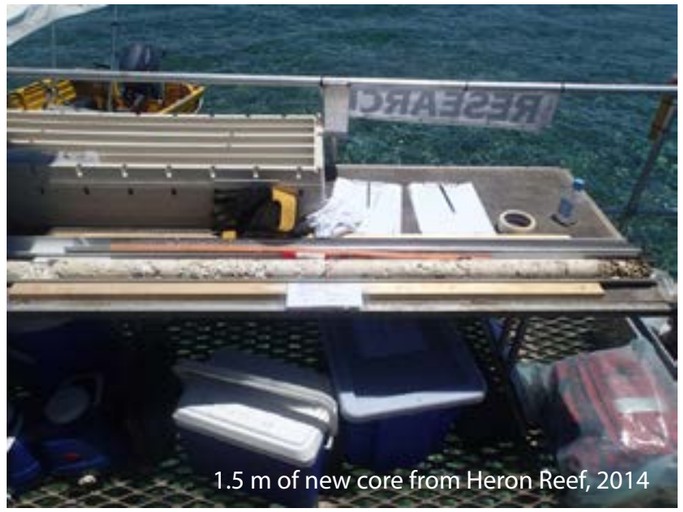
New UQ research vessel launched for reef coring

A new research vessel, the R/V D. Hill was commissioned and successfully deployed for coral reef research in late 2014 by the Integrated Palaeoenvironmental Research Group (IPRG), School of Earth Sciences at The University of Queensland. The purpose-built vessel consists of a barge and a drilling platform that allows recovery of rotary cores to a depth of 30m below the reef flat of modern coral reefs while avoiding significant damage to the reef flat. The vessel was funded by philanthropy from Geocoastal Group, one of Queensland's leading coastal environmental consulting firms, and the Dorothy Hill Chair of Palaeontology and Stratigraphy at The University of Queensland. Adjunct Prof. Trevor Graham of Geocoastal Group was behind the design of the unique vessel and coring platform and many Queensland companies helped to bring the project to fruition. The vessel is named for UQ Professor Dorothy Hill, who was one of the world's preeminent authorities on fossil corals and reefs and who, as secretary of the Great Barrier Reef Committee (1945-1955), was instrumental in founding what is now the Heron Island Research Station.

The vessel was deployed to Heron Reef in Oct-Nov 2014 and recovered new environmental cores that are part of Australian Research Council-funded research project DP120101793 : Geomorphological development of coral reefs, southern Great Barrier Reef: an integrated record of Holocene palaeoecology and palaeoclimate from cores. The project is led by Profs Gregory Webb and Jian-xin Zhao of UQ, Assoc. Prof. Jody Webster of the University of Sydney, Dr. Luke Nothdurft of the Queensland University of Technology, Prof. Juan Carlos Braga of the University of Granada, and Prof. A. 'Sandy' Tudhope of the University of Edinburgh. The aim of the project is to recover shallow cores from the southern GBR to construct a composite record of ecological and geomorphological responses to changing sea-level and environment (climate, water quality) as recorded in the geochemistry of the skeletons of reef builders such as corals. Despite the great amount and variety of research carried out in the southern GBR, especially on Heron and One Tree reefs, very little is actually known about how these reefs responded to changing Holocene sea level and climate. This project is providing new information about geomorphological and ecological responses of the reef while proving new quantitative records of seawater temperature and water quality. It is hoped that these new data will help inform future climate models while allowing better prediction of the responses of reefs and individual reef biota in the GBR to projected environmental change.

Research Vessel RV D. Hill in lagoon of Heron Reef, 2014

Coring platform in action on Heron Reef reef flat, 2014



1.5 m of new core from Heron Reef, 2014

SAVE THE DATE: 07-11 SEPTEMBER 2015

Dear colleagues,
I am pleased to announce that registration and abstract submission are now open for the European Congress of Ichthyology (ECI XV) that will be held in Porto, Portugal, from 7th-11st September 2015. The deadlines for abstract submission and early registration are 30th April 2015 and 15th June 2015, respectively. The scientific program will include sessions in four main topics: I) Phylogeny, systematic and genetics; II) Ecology, conservation and invasive species; III) Life cycles, migration and connectivity; and IV) Physiology, behaviour and toxicology. Two special symposia are also expected: v) Otoliths as a powerful tool to study fishes; and VI) Mediterranean fish biodiversity.
Check out our fantastic plenary speakers: Jeffrey Leis (Australia), Joana Robalo (Portugal), Kenneth Able (USA), Marino Vachhi (Italy), Miguel Pineda (Spain), Neil Metcalfe (UK), Rui Oliveira (Portugal) and Steven Campana (Canada). Students will have the opportunity to compete for awards for best oral and poster presentations.
Porto has been considered for the third consecutive year **"the best European destination"**, and I am sure that you will be delighted with the city, people and food (and of course Porto wine). Bookings for accommodation with special prices for HF Hotels are also now open.
Further and updated information could be find in the congress **webpage**
Please follow our latest news on **Facebook** or **Twitter**!
I hope to see you in Porto.

Prof. Alberto Teodorico Correia
Organization Committee President and Conference Coordinator

Program Leader

- **Senior leadership role with world-leading marine research organisation**
- **Develop strong science, government and industry partnerships**
- **Manage a multi-million dollar research portfolio**

Great Barrier Reef / Tropical Coastal Systems

About AIMS
The Australian Institute of Marine Science (AIMS) is Australia's tropical marine research agency with a mission to deliver world class research for the sustainable development, conservation, and management of tropical marine resources and environments.

The Institute was established to provide marine research in support of Australia's extensive marine estate. Operating on the international stage our people deliver innovative research in water quality, tropical marine biodiversity, climate change and marine microbiology. Assets include two modern research vessels, state-of-the-art laboratory facilities in Townsville Queensland, Perth Western Australia, and Darwin Northern Territory, and extensive technical support.

About this Opportunity
As a member of the senior leadership team, this role will lead a large interdisciplinary research group focused on the thematic area of either the health and resilience of the Great Barrier Reef or the sustainability of industries in coastal regions of Australia. A key focus for the position will be to develop a solid connection between monitoring and process studies, modelling and synthesis that can deliver guidance on how management and policy decisions can improve marine ecosystem resilience while supporting the economic growth of sustainable marine industries.

This role will focus on building and maintaining key relationships with corporate, government and science industry stakeholders to enhance the capacity of AIMS to deliver research outcomes and will actively seek new partnerships and funding opportunities which support the continued growth and expansion of our research interests.

A highly competitive remuneration and benefits package, including a fully maintained car and 15.4% superannuation will be offered to the successful applicant. This appointment will be for an initial period of 5 years, with an option for renewal. This position is based in Townsville, Queensland and relocation assistance will be provided.

About You
You will be an innovative leader, with significant experience in leading major research and business programs in partnership with industry and government and attracting external investments. You will be internationally renowned in the field of marine science and demonstrate expertise in leading and managing high performing multi-disciplinary scientific teams.

Apply
Candidates are encouraged to submit their resume and a statement addressing how they best meet the position requirements to applications@aims.gov.au. Applications close Friday 8 May 2015.

Position enquiries can be directed to the AIMS CEO John Gunn, j.gunn@aims.gov.au.

www.aims.gov.au/employment

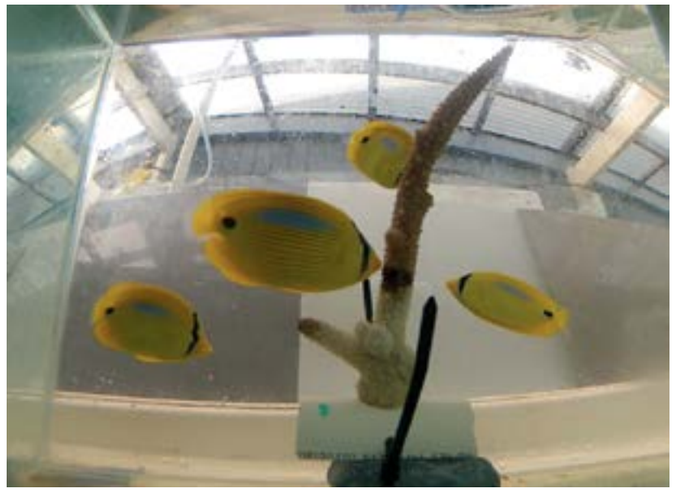
Australian Government | Australian Institute of Marine Science

Terry Walker Award 2014

Katia Nicolet

My PhD aims to assess the spatial scale over which coral disease outbreaks occur on the Great Barrier Reef, and whether reef organisms are involved in disease transmission. Many corallivorous fishes have been reported to feed selectively on coral infected tissue and some corallivorous invertebrates are known to be vectors or reservoirs of coral diseases. However, there are no quantitative estimates of the impact of selective feeding on coral disease virulence, and most invertebrate vectors have been described in other oceans. Aside of clarifying the role of corallivore on coral disease dynamics, I will also evaluate how environmental factors, including water temperature, light incidence and water quality, influence the outcome of the interaction between predation, disease virulence and disease transmission.

Why is this important? Well, infectious diseases are powerful natural forces that can cause drastic population and community losses in both terrestrial and aquatic ecosystems. In the specific case of corals, diseases have been shown to increase in both number and prevalence across all oceans, triggering greater and greater scientific interest. However, most studies focus on describing disease syndromes, identifying potential pathogens, and monitoring declines in coral cover following outbreaks, without assessing the origin and vectors of coral pathogens. Lack of understanding of disease transmission pathways is currently impeding management solutions. Identifying the roles of coral-feeding fishes and invertebrates in coral disease dynamics will advance understanding of key biological links that resource managers can influence to reduce disease outbreak severity.



Chaetodon plebeius - the Blue-dash butterflyfish in aquaria experiments on Lizard Island Research Station. Could fish be vectors for disease transmission?

In the year 2014, I received the Terry Walker Award, which greatly contributed to the completion of my data collection on Lizard Island Research Station. Understanding the links between biotic and abiotic factors and coral disease dynamics on the reef is tedious work and required me to spend 9 months on the island, conducting extensive laboratory and field experiments. The first half of my PhD is now completed and two scientific articles are ready to be submitted, providing new insights into the role of fish and invertebrates as coral disease vectors or mediators. The last chapters of my thesis will look deeper into the influence of environmental factors, such as light incidence, water temperature and water quality, on coral disease virulence. Finally, all data and knowledge acquired in previous chapters, including disease prevalence, seasonality, transmission pattern, host range and vectors, will contribute to the creation of an epidemiological model. The model will provide a valuable tool to predict disease outbreaks on the Great Barrier Reef, but also assess which factors are the major contributors of coral disease prevalence,

Results of my first chapters will soon be available in the following articles:

Nicolet KJ, Hoogenboom MO, Pratchett MS, Willis BL (In Prep) Effect of selective feeding by coral reef fishes on black band disease virulence. (Microbial Ecology).
Nicolet KJ, Willis BL, Pratchett MS, Hoogenboom MO (In Prep) Corallivorous vertebrates and invertebrates have different vector potential regarding coral disease spread. (Coral Reefs)

Healthy *Acropora* from Lizard Island
Photo: Tom Bridge, Tethys Images

Close-up of skeletal eroding band (SEB) diseased coral
Photo by Tane Sinclair-Taylor

The optics of coral bleaching

Danielle Simmons Award 2014

Daniel Wangpraseurt

INTRODUCTION

Irradiance is among the most important factors determining the photobiology and ecophysiology of corals. However, little is known about the light field that *Symbiodinium* experiences within the coral host and the basic optical properties of coral tissues. Recent work has shown that both coral tissue and skeleton have a central role in determining the light field of *Symbiodinium* in hospite. For instance, in Faviid corals light can be effectively scattered and laterally transferred through the coral tissue (Wangpraseurt et al. 2014). In other corals, such as *Porites* diffuse backscattering by the coral skeleton can strongly enhance the light field for coral symbionts (Enriquez et al. 2005). Generally, such modulation in irradiance is thought to be beneficial for the coral, stimulating photosynthesis and ensuring high photosynthetic energy efficiency. However, corals are also susceptible to excess radiation which can induce photodamage and in combination with elevated seawater temperatures lead to the loss of the symbiotic algae, i.e. coral bleaching.

It has been hypothesised that pigment loss during bleaching facilitates enhanced light penetration to the coral skeleton and thus enhanced backscattering into the overlying tissue, exerting additional light stress on the remaining symbionts (Enriquez et al. 2005). However, there is a lack of data on the in hospite light field within the coral tissue during coral bleaching. In the present study, we used a novel biophysics approach combining techniques from the field of biomedical optics with microenvironmental sensing to provide the first data on the in vivo light exposure of coral zooxanthellae during bleaching. We hypothesised that the intra-tissue light microenvironment during a stress event is a key factor in determining the susceptibility of a coral to bleaching.

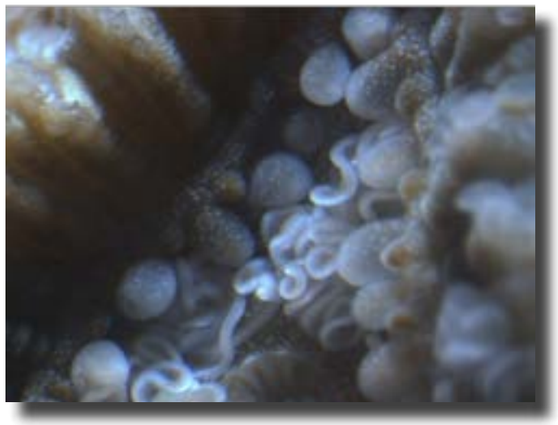


Fig 1. A light microsensor with the white diffusing tip (~60 µm in diam.) approaching the surface of a stressed *Favites* coral.

APPROACH

Technology and interdisciplinary approach: The project included electrochemical and fibre-optic microsensors (Kuhl 2005), chlorophyll a imaging (Hill et al. 2004), as well as biomedical tools such as multilayered Monte Carlo models for biological tissues (Wang and Jacques 1996).

Corals and coral bleaching: Several coral colonies of bleaching susceptible (e.g. *Pocillopora damicornis*) and bleaching resilient coral species (e.g. Favites sp.) were selected from Heron Island Research Station. Each coral colony was fragmented into smaller fragments of ~3 cm in diameter. The coral fragments were slowly bleached within 15 days. Bleaching response was induced through a slow increase in temperature levels (0.5 °C per day; Middlebrook et al. 2010).

Experimental design: To understand the role of tissue optics on symbiont light exposure and coral healthiness under stressful conditions we measured three randomly chosen coral fragments per species on each of the experimental days (i.e. day 0-day 15) for i) in hospite zooxanthellae light exposure ii) tissue optical properties (iii) photophysiology and health, and iv) pigment content.

Measurements: In hospite zooxanthellae light exposure. The light exposure of coral zooxanthellae during bleaching was measured along vertical gradients within the coral tissue using light microsensors (60 µm tip size) with high spatial resolution (Wangpraseurt et al. 2012, Fig. 1).

Coral photophysiology and health. To relate our optical measurements to coral physiology we measured photosynthetic efficiency and gross photosynthesis. Photosynthetic efficiency was measured as indicator of healthiness using the Imaging PAM (Hill et al. 2004). Gross photosynthesis was measured with oxygen microsensors using the light-dark shift technique (Revsbech 1983).

Preliminary results and discussion:

Preliminary results of this study suggest that the internal coral tissue light field in relation to pigment loss behaves differently for different coral species. In the thin-tissued branching coral *Pocillopora damicornis* irradiance was strongly enhanced during coral bleaching across all cell layers within the tissue (Fig. 2). A preliminary time-dependent analysis suggests that the intra-tissue light field is enhanced in exponential fashion. In contrast, enhancement in internal irradiance was slower for the thick tissued *Favites* corals over time. Importantly, while surface irradiance increased also for *Favites* as a function of pigment loss, deeper tissue layers still revealed moderate irradiance levels optimal for photosynthesis. These differences in light behaviour suggest differences in the scattering properties of the tissue. Vertical light attenuation through the coral tissue is a function of the absorption and scattering properties of the coral. As absorption by photopigments was negligible (given that the corals were bleached), light attenuation was thus mainly a function of light scattering. There are first indications that the scattering coefficient µs (i.e. the probability of light scattering in infinitesimal distance) of *Favites* tissues is much higher than µs of *Pocillopora damicornis* (Szabo et al. 2014, Wangpraseurt et al. 2014, unpublished data). Therefore, strong scattering of incident light in upper tissue layers ensures a moderate light environment in lower tissue layers. In contrast, the low scattering *P. damicornis* tissues, allow light to be transmitted to the coral skeleton, where additional diffuse reflectance contributes to the high scalar irradiance measured within the coral tissue.

Synthesis and ongoing work:

The results suggest that differences in the optical properties of coral tissues strongly affect the light regime that *Symbiodinium* is exposed to during bleaching. As irradiance exposure during bleaching is a key factor in determining the severity of coral bleaching, coral tissue optics are thus an important factor in determining the susceptibility of different corals to bleaching and the severity of coral bleaching events. Ongoing work focusses on extracting the optical properties (i.e. scattering coefficient, absorption coefficient, anisotropy of scattering) of coral tissue and skeleton and relating such optical characteristics to photosynthetic performance and bleaching susceptibility for a range of coral species.

Fig.2 *Pocillopora damicornis* during the bleaching treatment. Bleaching begins over the coenosarc tissue areas. Internal irradiance within the coenosarc was strongly enhanced as a result of bleaching. Preliminary results suggest that light penetrates the tissue, is backscattered by the skeleton and then trapped on the return by the tissue through total internal reflection.

Acknowledgements: The results presented here are part the following manuscript: Wangpraseurt D, Holm J, Larkum AWD, Suggett D, Ralph PJ, Kuhl M. Optics of coral bleaching in prep. We thank the excellent staff at Heron Island Research station, especially Liz Hurley and Giovanni Bernal for their assistance.

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Figure 1. High abundances of Halimeda are usually found on Heron Reefs.

The impact of local nutrients on the dynamics of *Halimeda* and its implication for sediment budgets.

Carolina Castro Sanguino

The calcifying green macroalga *Halimeda* is an important producer of reef carbonate sediments worldwide[1]. Yet, empirical knowledge on the response of *Halimeda* to environmental changes are scarce[2-3]. Understanding this response is of particular importance in predicting potential impacts of climate change on the contribution of *Halimeda* to sediment budgets on shallow coral reefs. My PhD explores the productivity of *Halimeda* in different reef environments, with particular focus on the effects of coral structural complexity, herbivores and nutrients on *Halimeda* populations. My preliminary results indicate that i) branching corals play an important role as grazing refugia for *Halimeda*, and ii) *Halimeda* grow faster in reef sites with high concentrations of inorganic nutrients. At Heron Island, *Halimeda* is a key contributor to sediment production, with more than 42% of superficial carbonate sediments formed by *Halimeda* dead fragments. While nutrients appear to influence growth of *Halimeda*, it is unclear how nutrients interact with other factors, such as light, temperature and herbivory[4], which may also affect *Halimeda* populations. My research combined field and lab-based experiments to understand the response of *Halimeda* to nutrient enrichment under different ranges of (i) temperature, (ii) light and (iii) herbivory. I investigated the bottom-up (nutrients) vs. top-down (grazing) influences on *Halimeda* growth under different controlled conditions of light and temperature at the Heron Island Research Station (HIRS).

Figure 2. Superficial reef carbonate sediments at 6m depth at Heron Bommie are mainly constituted by Halimeda dead fragmented segments. Bottom right is an enlarged view of Halimeda fragmented segments.

In aquaria experiments, I assessed the individual and interactive effects of nutrients, light and herbivory on the growth of *Halimeda* heteromorpha, one of the most common species found in reef slope environments at Heron Reef. Experiments were conducted for 2 weeks in winter 2014 (mean water temperature of 21.3 ± 1.2 °C) and summer 2015 (mean water temperature of 27.7± 0.1 °C) to account for seasonal differences in *Halimeda* growth rate.

Osmocote fertilizer (50 g; ratio of 14: 3.5: 9.1 N/P/K) contained in a nylon cloth was used to simulate nutrient enrichment, while control treatments contained only nylon cloth. Light was controlled using a combination of metal halide and blue actinic lights for a 12:12-h photoperiod. Neutral light filters were used to produce 3 different levels of light as experienced by *Halimeda* on different habitats (i.e. with and without branching corals) at 4-6 m depth: 100% exposure (high level of light), 43% reduction (intermediate light) and 72% reduction (low light). Herbivory was simulated by removing tissue from segments with a hole-punch from two apical segments of each branch at the beginning of the experiment (low herbivory regime) and repeated every 3 days during the experiment (high herbivory regime), with an additional control (no damage). A total of 180 branches of *H. heteromorpha* were collected from the field, and randomly allocated to aquaria (10 branches per tank) under different treatment combinations (three replicates per each light x nutrient combination = 18 tanks). In each tank, branches were randomly assigned to one of the herbivory treatments. The growth of new segments was assessed on a daily basis, and branch weight and size of segments measured at the beginning, middle (first week) and at the end of the experiment (second week). Concentration of nutrients (N, P, C) in tissues and calcium carbonate content (as % of CaCO3 of dry weight) were determined at the end of the experiment.

Figure 3. Set-up for the three-factor crossed experiment (light, nutrients, herbivory) under controlled conditions of flow at HIRS. In the bottom right is an overview of *Halimeda* branches suspended in tanks.

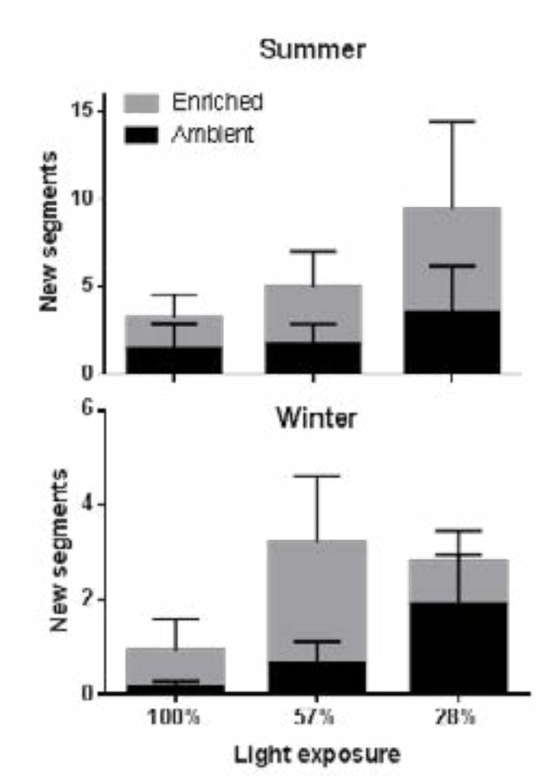

Figure 4. Production of new *Halimeda* segments (mean ± SE) observed in tanks in summer and winter under different conditions of light and nutrients.

Preliminary results and discussion: Simulated herbivory did not have a strong effect on *Halimeda* growth rates in our experiments contradicting previous hypoytheses that *Halimeda* mitigates the negative impact of tissue loss by increasing growth rates[5-6]. However, we found a significant interaction between light intensity and nutrient concentration on *Halimeda* growth rate. This effect differed among seasons, and was stronger in winter than summer (Figure 4). Nutrient analyses of *Halimeda* tissues along with changes in biomass, segment size and CaCO3 content are still in progress, but preliminary results suggest that nutrient enrichment enhances the production of new *Halimeda* segments and is light dependent. In winter, a greater production of segments occurred at intermediate light levels, whereas in summer more segments were produced at lower light levels. These results are consistent with previous studies that highlighted the importance of light attenuation and nutrient variations in explaining the growth patterns between shallow and deep water populations of a Caribbean species of *Halimeda* (*H. tuna*)[7].

Additionally, my preliminary results suggest that 1) the effect of nutrification on *Halimeda* growth differs among seasons, and is stronger in winter than summer, and 2) *Halimeda* growing under different light regimes in shallow waters may exhibit differential responses to nutrient enrichment. I hypothesize that localized increases in nutrients have a greater impact on *Halimeda* growth in habitats with high structural complexity (e.g. within branching corals) where light is attenuated by the coral canopy, whereas *Halimeda* fully exposed to sunlight (outside the coral canopy) are less likely to take advantage of episodic nutrient pulses[2]. Hence, the combined effect of nutrient enrichment and light availability is an important predictor for the productivity and spatial distribution of *Halimeda* in shallow coral reefs. Understanding the responses of *Halimeda* to changes in the environment will help us predict potential impacts on the contribution of *Halimeda* to the sediment budgets under different scenarios of environmental change such as nutrient inputs, fishing pressure, and light availability.

Acknowledgements

I want to thank the ACRS for granting me the 2014 ACRS Award which helped fund fieldwork costs at Heron Island Research Station and laboratory analyses. Special thanks to field volunteers (Henrique Bravo, Marine Briand and Daniel Jackson), HIRS staff, CRE staff Aaron Chai and Giovanni Bernal for their assistance, and Chico Birrel and MSEL for their helpful advices and support.

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Movement patterns and resource use by coral trout (*Plectropomus spp*.) in inshore and mid-shelf reefs using telemetry and dietary indicators

Jordan Matley

Introduction

The coral trout complex (*Plectropomus spp*.) consists of at least seven different species, three of which have economic significance in the recreational and commercial reef fishery on the Great Barrier Reef, Australia. However, management regulations are biased towards the more abundant and better studied *P. leopardus*, despite that some species (e.g., *P. laevis*) are listed as vulnerable on the IUCN Red List.

From an ecological perspective, as a top predator, coral trout play an important role maintaining ecosystem function on the reefs. For example, variation among predators can have top-down influences on population demography of organisms at lower trophic levels[2]. Consequently, knowledge of competition and niche segregation among co-occurring (sympatric) species is important to understand population dynamics and their ability to adapt or resist environmental disturbances. These concerns are even more serious, considering the risks that coral reefs face in Australia (e.g., ocean warming, coral bleaching, acidification, etc.).

This project examines the movement, habitat, and foraging behaviour of three coral trout species (*P. leopardus, P. maculatus, P. laevis*) over two years using passive acoustic telemetry and indicators of diet (stomach contents and stable isotope analysis). By utilizing two distinct, yet complimentary methodological approaches, we will identify temporal and spatial resource use trends, at a species level. The extent of this examination is rare among marine species especially those found on coral reefs, and will advance knowledge on biological and behavioural characteristics that are needed for management decisions.

The main goal was to compare the diet and movement of sympatric coral trout (*P. leopardus* vs. *P. laevis*; *P. leopardus* vs. *P. maculatus*) on the central Great Barrier Reef.

Methods

The project was designed using two main methodological approaches: Passive acoustic telemetry and dietary indicators.

Passive acoustic telemetry utilizes sound underwater to detect animals and determine movement patterns. It consists of a receiver (stationary moored device that detects coded signals at specific frequencies) and a transmitter (implanted into animal that emits coded signals at a specific frequency) to identify space use patterns, including home range estimates, depth profiles, and key habitats[3]. A total of 58 VR2W receivers were deployed at three reefs where 156 coral trout were tagged with V13P transmitters.

Figure 1: Coral trout in captive stable isotope feeding trial

Diet provides information on habitat and resource use as one of the main biological determinants of behaviour. Both stomach contents and stable isotopes (δ13C and δ15N) were analysed from ~180 individuals collected over for two years at reefs both open and closed to fishing. Stable isotopes are increasingly used in ecology to study temporal feeding habits and food web structure as they reflect tissue assimilation from prey[4]. To better understand and interpret stable isotopes of coral trout, an experimental feeding trial with captive *P. leopardus* (n=50) was conducted to measure discrimination factors and turnover rates of several tissues (Fig. 1).

Preliminary findings

We are currently in the initial stages of data analysis. Nevertheless some interesting findings have already been revealed. Movement data indicated that *P. laevis* use a horizontal area >4 times the size of *P. leopardus* and spend more time foraging in deeper waters away from the reef crest (Fig. 2). Stable isotope data matched these behaviours well, as demonstrated by muscle δ13C values which were higher in *P. laevis*, indicating feeding habitat closer to the bottom. At inshore reefs, differences between *P. leopardus* and *P. maculatus* were less pronounced, as evidenced by similar muscle δ13C and δ15N values between species. However, preliminary analysis of movement data suggests that *P. maculatus* remain deeper and occupy a smaller home range than *P. leopardus*. This apparent niche segregation among the three species has significant implications relating to the efficacy and design of marine protected areas in the GBR and highlights the need for species-specific regulatory initiatives. As analysis continues, we hope to explore species-specific movement and feeding patterns relating to habitat, management zones, and daily/seasonal influences.

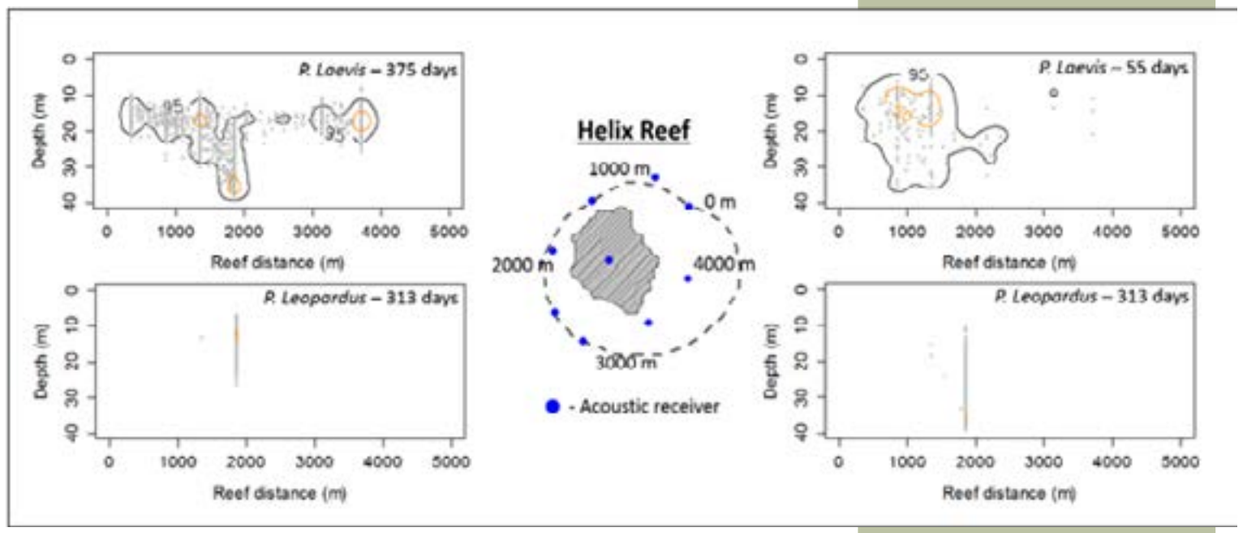

Figure 2: Space use comparison between *Plectropomus leopardus* and *P. laevis*

Acknowledgements

I would like to thank the Australian Coral Reef Society for the ACRS Award which covered costs processing tissue samples for stable isotope analysis. My gratitude also to my supervisors M. Heupel, C. Simpfendorfer, and A. Tobin, as well as several colleagues: E. Ledee, L. Currey, M. Espinoza, P. Yates, N. Hill, M. Adkins, F. De Faria, S. Moore, and L. Houston.

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88th Annual Conference

The 2014 ACRS Conference was held 27-29 August in Brisbane at the Mercure.

***Gobiodon histrio* from Lizard Island**

Photo by Pedro Pereia

Poster award

Brock Bergseth

PhD Student, James Cook University

The 2014 ACRS conference was second to none. Conference organizers struck a great balance of professional and casual events, featuring swanky venues, leading researchers in coral reef biology, and a few healthy doses of complimentary drinks, among others. The research topics, presentations, and posters left no doubt in my mind as to why Australia

is one of the leading countries in coral reef research. In all, the 88th ACRS conference was a great opportunity to present my research, meet some of the brightest experts of the region, and make the ever-important social networking connections. Thanks to everyone who contributed to such a successful and pleasant event.

Vicki Harriott Award

Lisa Boström-Einarsson

PhD Student,

James Cook University

To be honest, I never really 'got' the practical need for conferences. Sure, it's fun to go to great locations, have drinks with colleagues and hear about interesting new research. To me it always seemed like that was the true order of priority, albeit with only the reverse spoken out loud. That elusive 'networking' component never materialised either. Perhaps it was because I'd attended some enormous conferences with thousands of delegates, perhaps it was because I was a newbie PhD student with few interesting things to say about my research? Either way, at my first ACRS in Brisbane 2014 I finally 'got it'. I had a great experience, saw many inspiring research seminars and my networking forged new contacts that will be invaluable to my PhD and beyond. The conference dinner and many other social events provided ample opportunity to meet up with fellow Australian reef scientists, while the diverse seminar sessions and poster talks highlighted the excellent research conducted on our shores. I can't wait for Daydream Island 2015!

Bench fee award winners

Susannah Leahy
PhD student,
James Cook University

The 2014 ACRS conference in Brisbane definitely exceeded my expectations, especially in terms of the socialising, schmoozing, and genuine friend-making opportunities it presented. One of the last conferences I had attended was the International Coral Reef Symposium in 2012, which was a dauntingly big event, but the ACRS 2014 conference was much different to that. The small, informal setting made it much easier to approach people, to talk to big-wigs and small-wigs alike about the exciting research they were presenting. I recommend attending the student-day workshops, which I found particularly helpful at the start of the last year of my PhD candidature. It's unusual – and very enlightening – to get to hear from and talk to accomplished academic and non-academic scientists about how they got to be where they are, and I really appreciated their candour. I found the ACRS conference as a whole to be a fun and intellectually exciting experience, and would like to thank the ACRS council for making it happen.

Chiara Pisapia

PhD student, James Cook University

The ACRS 2014 conference in Brisbane was great and I really enjoyed every aspect of it! The friendly atmosphere and the high quality talks and posters really made this conference worthwhile for me. I was very happy to have the opportunity to be updated with the fabulous ongoing research around Australia and also to reconnect with and meet great scientists and friends based in Brisbane and Sydney. The social events associated with the conference allowed me to receive advice and input from other students and outstanding Australian coral reef scientists.

It was great to present my latest research and I look forward to attending next year's conference.

I'd like to thank the ACRS and the One Tree Island Research Station for awarding me one of the student talk prizes.

© Christopher E Mirbach

Watch out for these sharks! Student competition was fierce...

The Australian Coral Reef Society Conference 2014 in Brisbane was my first ACRS conference and I thoroughly enjoyed it! The conference provided a great opportunity for me to present my PhD work on viruses and coral diseases. Unfortunately I was the only presenter discussing coral diseases at the conference, however, it was good to raise awareness regarding the importance of viruses in the marine environment - the estimated 4 x 10 ^ 30 viruses in the ocean are a magnitude higher than bacteria ;).

It was nice to see familiar faces from the ICRS 2012 and to get to know more Australian coral reef scientists, especially all the people who joined from Australian institutes that I am not affiliated with.

I am looking forward to the next ACRS conference!!

Patrick Buerger

PhD student,

James Cook University

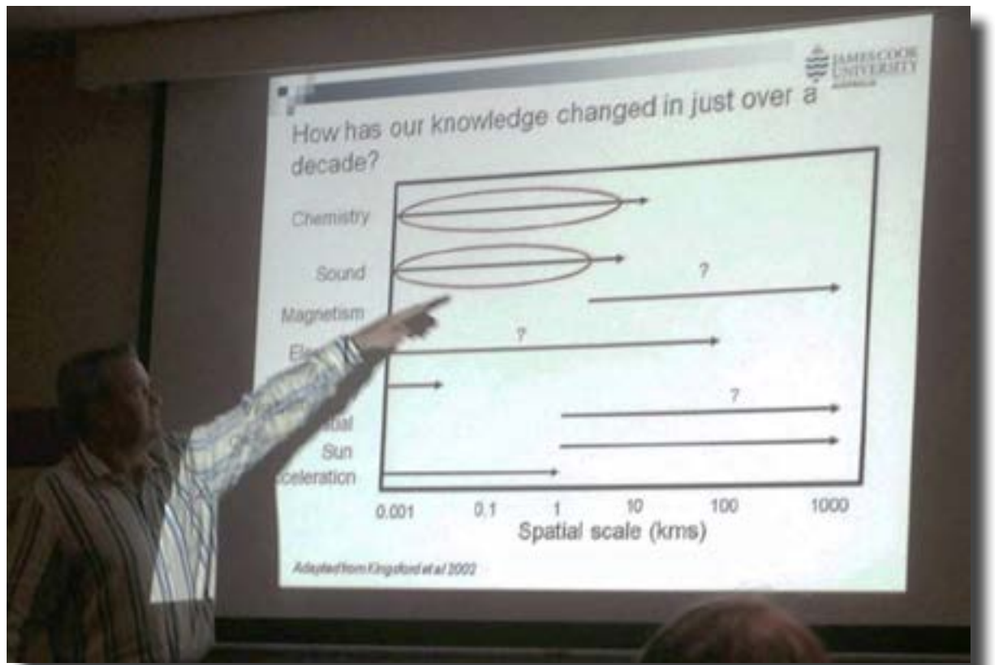
Bench fee award winners (cont'd.)

Lauren Nadler
PhD student, James Cook University

As a second year PhD student, 2014 was my first real conference season. After attending three large international conferences with broader themes, it was lovely to be a part of the more intimate atmosphere at the ACRS conference in Brisbane that featured so many amazing talks on a range of topics affecting coral reefs. The conference presented great opportunities to see familiar faces from my home university (James Cook University) and meet other coral reef researchers from around Australia. The day before the conference began, I attended the student workshop hosted by the ARC Centre of Excellence for Coral Reef Studies. I learned a ton from the day's speakers including Terry Hughes, Peter Mumby, Daniela Ceccarelli and Vimoksalehi Lukoschek, who spoke on a range of topics including publishing, findings jobs and achieving balance in our professional and personal lives. On the first day of the conference, I gave my talk entitled "Fish with friends: Effect of familiarity on schooling behaviour in coral reef fish". My talk generated lots of great feedback and advice from other delegates during the following coffee break, which is definitely one of the biggest bonuses of attending a conference with other coral reef scientists. One of the other highlights for me was the diverse topics discussed during the two days of talks. We heard fantastic talks by keynote Michael Kingsford and Mary Bonin on recent advances in our understanding of connectivity between marine populations while speakers like keynote Janice Lough and Jennifer Donelson explained our improved understanding of climate change effects on coral reefs. The conference ended with a dinner at the Rydges Hotel Southbank, which gave us spectacular views across Brisbane and during which I was thrilled to be awarded an ACRS presentation award. Thank you very much to ACRS for the honour of a student talk award and for putting on such a fabulous conference!

Tyson Martin
PhD student, Griffith

ACRS 2014 was an ideal mix of fun and science. As I am very new to conferences and networking, I really appreciated the student workshop, and in particular how it was run the day prior to the conference. The workshop gave me an opportunity to get to know fellow like-minded students and when the hierarchy arrived the next day, the experience allowed us to mingle and introduce each other in a less intimidating setting. This was my first presentation at a conference and I found the size of the audiences big enough to get the nerves going but not become completely overwhelmed. Overall, I would highly recommend this conference to anyone in our field, but especially PhD students looking to network and present their research in a high quality, friendly and overall supportive conference setting.



Professor Mike Kingsford in the opening keynote speaker at the 88th ACRS Annual Conference in Brisbane, 2014

ECMR thoughts on the conference

As an Early Career Researcher, I had overall good experiences with the ACRS conference in Brisbane 2014. I presented a summary of my PhD within the Climate change adaptation - Session and received nice feedback from the audience. The venue was very well organized and comfortable. One of the highlights for me was probably the field excursion to North Stradbroke Island after the conference where we had the chance to make friends with other Early Career Researchers and PhD students from Australia and got to know the marine and coastal life of South Queensland. We stayed at the Moreton Bay Research Station of the University of Queensland and had a wonderful time.

Elisa Bayraktarov
e.bayraktarov@uq.edu.au
Post doc, Global Change Institute
University of Queensland

I was only able to attend one day of the ACRS conference, but found it to be an enlightening experience. Janice Lough's keynote talk on "Changing Environments for coral reefs" kicked the day off with an impressive geographical range of climate reconstruction studies that struck just the right balance between robust analysis and concerned scientist. The diversity of the talks was encouraging, both in terms of disciplinary areas and the different organisations that were represented. As ever, the vibrant feel of the assembled group made the lunch and tea breaks a pleasure, as well as provided reassurance that Australian Coral Reefs are in the hands of some committed, passionate and enthusiastic researchers. The photo competition showcased some excellent talent as fieldwork stories were swapped over quality food and wine. Just as a good conference should be!

Sarah Hamylton
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Lecturer, School of Earth and Environmental Sciences
University of Wollongong

Photography competition winners 2014

Best Overall
Winner: Maria Palacios

Category: Feathers, Flippers and Fins
Winner: Chico Birrell

Category: Your story
Winner: Christine Schoenberg

Category: Closer
Winner: Maria Palacios

Recollections of the 88th Conference

The ACRS conference has grown steadily in size and stature over the years, and this time three concurrent sessions were needed to accommodate the 79 contributed papers. Fortunately the close proximity of the presentation rooms meant it was fairly easy to change sessions to listen to speakers in different sessions. There was a wide variety of interesting session themes, including fish communities, fish trophic interactions, and the ecological role of fishes; visual ecology; algal dynamics; coral reef disturbances; ocean acidification and climate change adaptation; reef recruitment and connectivity; coral physiology; remote sensing; effective management of reefs; sediment effects on reefs; and past reefs. The ACRS conference is a great opportunity for postgraduate students to present their research, and there were 36 oral presentations from students. In addition, there were10 posters, personally "hosted" by the lead authors during the dedicated poster session, 4 of these posters being contributed by students.

There were three excellent plenary presentations. Mike Kingsford of JCU spoke about research over the last few decades into the connectivity of marine populations. The "never ending story" continues to unfold, particularly given enhanced techniques available for genetic studies of larvae and increased knowledge of the ability of larvae to sense the whereabouts of reefs. Mike reminded us that while it's now known that a high percentage of larvae (e.g. reef fish larvae) do return to their natal reefs, we shouldn't forget that some larvae do travel long distances and the founder effect could potentially play a strong role in adding to population networks.

Janice Lough's (AIMS) plenary talk provided an excellent overview of changing environments for coral reefs, discussing increases in atmospheric carbon dioxide concentrations since the 1950s, and rises in average land and sea temperatures globally. She explained that average sea surface temperatures may disguise spatial and seasonal variations and local SST patterns at Australian coral reefs. These changes in reef environment were also considered in the context of climate reconstructions developed from long coral cores, which pre-date human interference in the climate system.

Adriana Verges (University of NSW) gave us a global perspective on climate-driven shifts in herbivory and the "tropicalization" of temperate marine ecosystems. She described a novel type of phase shift caused by tropical herbivores extending their distribution, and overgrazing on canopy-forming algae which typically dominate shallow temperate reefs. Adriana also considered the range shifts of tropical herbivorous fish and impacts on temperate seagrass and macro-algal forests at various ocean warming hotspots. This was brought closer to home in the context of eastern Australia, where ocean warming has been linked to increased abundance of tropical species in temperate environments and loss of kelp forests at the warmer edge of their distribution. (For me, if Janice's talk wasn't a "chilling" enough indication of what may lie ahead for coral reefs, Adriana's talk was scary stuff indeed!)

The conference social events were most enjoyable, starting with the welcome function at the Mercure where we were entertained by the fiery magician Mike Tyler. The social calendar concluded with the conference dinner and award presentations at the top of Rydges Hotel in Southbank – this was a real treat, with fantastic food and stunning views of the Brisbane River and city at night.

Whether this was actually the 88th annual conference of the society since the 1928-29 Low Isles expedition, or just one of many exciting Australian coral reef conferences since the expedition, matters not. My thanks to Selina Ward, Ross Hill, K-le Gomez, and all of those involved in making this conference such a success. I'm looking forward to the next ACRS conference at Daydream Island, and a return to the island setting.

Dr Zena Dinesen is a Senior Fellow (Adjunct) in the School of Biological Sciences at UQ

Dr Janice Lough (Australian Institute of Marine Science) presenting at the 88th Annual ACRS Conference

The Awards were announced at the Conference Dinner at Rydges Southbank

Important information about the NEXT ACRS conference:

Daydream Island
28-31 July 2015

We have four great keynote speakers confirmed to lead the program:

Mr John Gunn, CEO, AIMS
Dr Liz Madin, WWF-ARC DECRA Research Fellow, Macquarie University
Dr Charlie Veron, former Chief Scientist, AIMS
Dr Mark Erdmann, Senior Advisor, Conservation International, Indonesia

Abstract submission **NOW OPEN** until
15 May 2015

Registration Information - Early Registration prices before 28 May 2015
List of Themes and Abstract Submission Instructions

Australian Research Council Centre of Excellence for Coral Reef Studies is sponsoring the **National Student Mentoring Day** 28 July 2015

Places for 40 postgraduate students available!

Student Travel Award deadline: 11 May 2015

Photo Competition entries due 14 July 2015

1. Science in Action
2. Best Turtle Photo!
3. Diversity
4. Macro

$50 prize to the best photo in each category and $100 prize for best overall photo

#ACRS15

Photo by Ed Roberts
www.tethys-images.com

Photo by Chris Mirbach

Leaving a lasting impression:

Glenn Almany

It is with a heavy heart that we report the news of the recent passing of former ARC Future Fellow Glenn Almany. Glenn was an outstanding researcher and was committed to applying his research to make a difference in remote communities that are dependent on coral reef resources. His open nature and larger than life personally meant that he was quickly accepted and respected by the many local villages in which he worked, to the extent that coral reefs and children have been named in his honour. These qualities, along with his honesty, integrity and general 'Joie de vivre' made Glenn a loving father and husband, valued supervisor, and trusted friend. It is no exaggeration to say that he was regarded by most people he met as a legend. Glenn was adamant that research should make a difference, and whilst he was cut off in his prime, we can safely say that Glenn did make a difference through his exceptional science, conservation and outreach efforts. Glenn serves as an inspiration to us all and will live long in the memories of those of us that were lucky enough to know him. Long may his legacy continue.

- Mark "Sparky" Priest & Tane Sinclair-Taylor

We invite you to keep in touch

www.australiancoralreefsociety.org

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Cardinalfish by Pedro Pereira