

JULY 2018

THE BRIDGE



PRIFYSGOL
BANGOR
UNIVERSITY

News from the School of Ocean Sciences
and the
School of Ocean Sciences Alumni Association

Contents

- 3 50 Years and Two Ships: The RV Prince Madog
- 4 Retirement – Prof Chris Richardson
- 6 Rajkumari Jones Bursary Recipient reports
- 8 VIMS Drapers' Company VIMS Overseas Field Course
- 10 Meet some of our students and what they are up to this summer
- 11 Research Field Trips
- 18 School of Ocean Sciences Staff
- 19 Promotions
- 20 Scholarships and Awards
- 21 Scholarships and Awards continued
- 22 Workshops, Meetings and Visits
- 27 New SOS projects
- 28 Gender Equality – Athena Swan
- 28 SOS in the media
- 30 [SOSA Welcome - Croeso](#)
- 38 Recent Grant Awards (last 6 months)
- 39 Publications (2017 – Jun 2018)

THE BRIDGE July 2018



Please send your School of Ocean Sciences news to:
sos-newsletter@bangor.ac.uk

Please send your School of Ocean Sciences Alumni Association (SOSAA) news to:
alumni@bangor.ac.uk



Teaching
Excellence

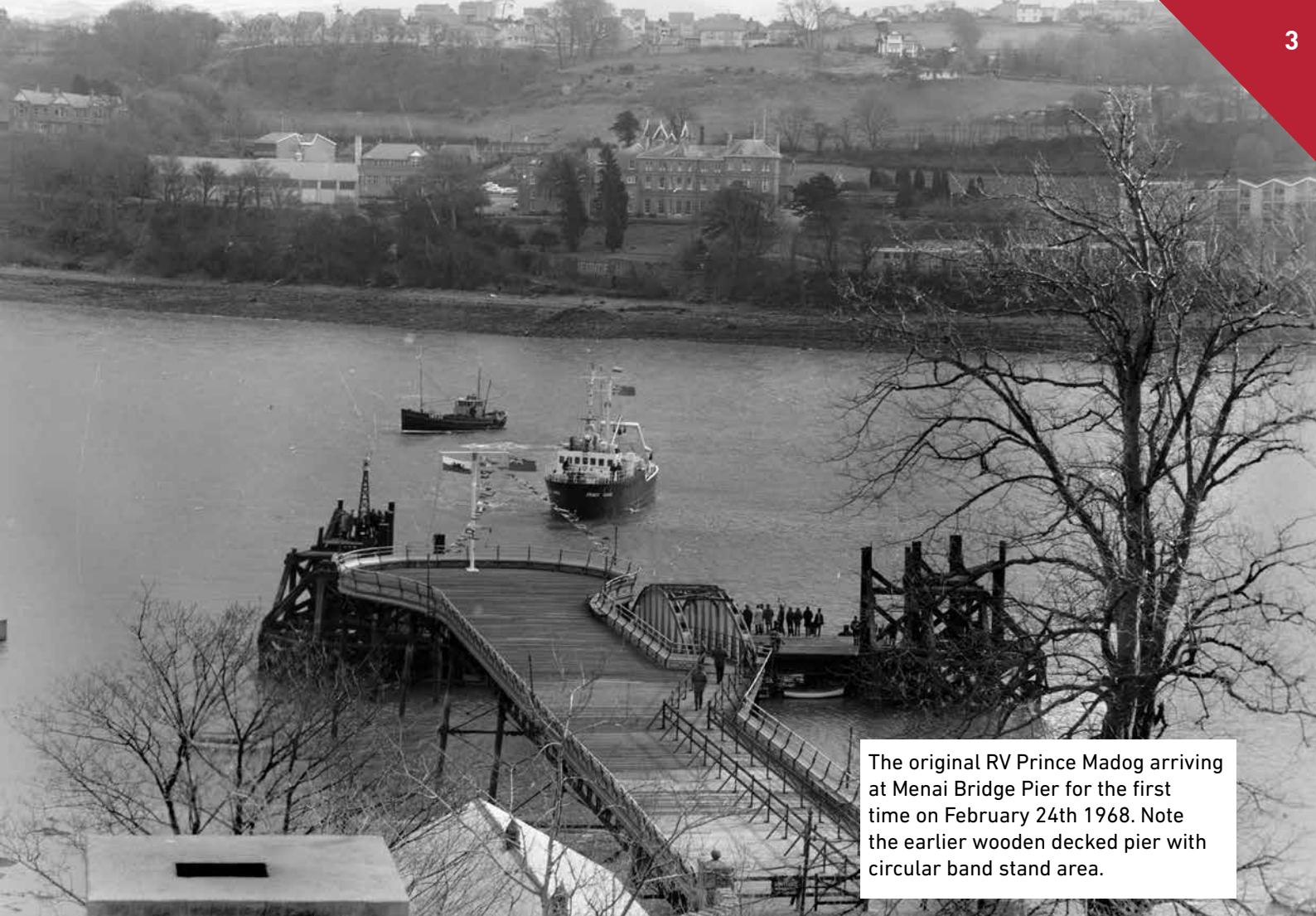
Welcome to the new version of our School of Ocean Sciences (SOS) newsletter incorporating the Alumni newsletter "The Bridge". I am excited to share with you a vast array of our achievements over the past 6 months within the School, ranging from successful student and staff fieldtrips, newly obtained grants and research projects launched within SOS, and our progress towards equality. This new newsletter "The Bridge" has joined forces with our alumni to strengthen the newsletter and to promote news sharing between students and staff, both present and past.

Gareth Williams, Editor

2018 OPEN DAYS

Saturday July 7
Sunday October 14
Sunday October 28
Saturday November 10





The original RV Prince Madog arriving at Menai Bridge Pier for the first time on February 24th 1968. Note the earlier wooden decked pier with circular band stand area.

50 Years and Two Ships: The RV Prince Madog

by Tim Whitton

This year marks the 50th anniversary of the first RV Prince Madog arriving at Menai Bridge Pier on the 24th February 1968 (as featured in the Bangor University's 'Archive of the Month' in March). The 28 m vessel was built in the Isle of Man and served the marine labs in Menai Bridge for 30 years, before being replaced with the current 35 m vessel of the same name. After the ship was sold by the university in 2001 she took the name MV Madog, and continued in service as a survey vessel in the North Sea up until this year. The RV Prince Madog, be it the original or current vessel, has played an important part in the research and teaching of marine sciences at Bangor University over the last 50 years.



Prince Madog (1968 – 2001) heading under the Telford suspension in the Menai Bridge. The funnel is painted in the University colours of the time.
Image IVOR REES



Retirement – Prof Chris Richardson

As many of you may know, a symposium was held at the end of January in the School of Ocean Sciences to mark the retirement of one of its longest standing academics, Professor Chris Richardson.

Many of Chris's old PhD students attended together with current and retired SOS staff and researchers from around the world. Chris had been at SOS for over 40 years, starting his undergraduate joint degree in Marine Biology/Zoology in 1972 and his PhD in 1975 with Professor Dennis Crisp FRS and Dr Norman Runham (Zoology), which was awarded in 1979. Following his PhD, he spent time as a post-doc at the University marine station at Millport before returning to Menai Bridge where he worked on several postdocs funded by NERC, including a special NERC fellowship and was appointed to the academic staff in

1992. He was awarded a personal chair in 2008 and upon retirement he has been granted Professor Emeritus status. Chris's work has largely focussed on age determination and growth line formation in a variety of marine animals, mainly the mollusca, as well as their ecology. A large part of this work in recent years was encompassed by the sclerochronology group, started by Chris and Professor James Scourse, producing world leading research in the field for well over two decades. In 2011 Chris was appointed as the Head of School for Ocean Sciences, a position he held until 2016.

The symposium itself was attended by over 50 of Chris's colleagues and ex (and current) students, several of whom gave talks presenting the work that they had undertaken with Chris over the years. Chris's wife Carole and daughter Sarah and son-in-law Paul were also there to listen to the talks throughout the day. Many of Chris's key collaborators, such as Professor James Scourse (Exeter University), Dr Simon Chenery (BGS), Professor Roger Mann (VIMS) and Dr Melita Perhada (IZOR) (and many more) gave talks outlining the impacts Chris has had not only on their personal careers, but on the wider field of molluscan ecology and the enthusiastic teaching of this subject over an almost 40-year academic career.

Since retirement, Chris has been spending time with family in the UK and Australia, whilst still finding time for several other holidays throughout Europe. He has often expressed a desire to 'keep a hand in' with ongoing and unfinished work and still has a PhD student underway. He will therefore hopefully be a more common sight in the coffee room once his tan has faded. We personally would like to thank Chris for all his help and guidance over the years and wish him all the best for the future, a sentiment I am sure is shared by many in the department, and hope he enjoys his time with his wife, children and grandchildren.



Rajkumari Jones Bursary Recipient reports



With thanks to Mrs Rajkumari Jones for her generous Student Bursary. Three of the top performing students starting their 4th year of study within the MSci Degree course were able to progress their career development. This document provides each student's short report on how they were able to develop themselves further with this exciting opportunity.

Marine Renewable Conference

by Bregan Brown (MSci Marine Biology/Zoology)

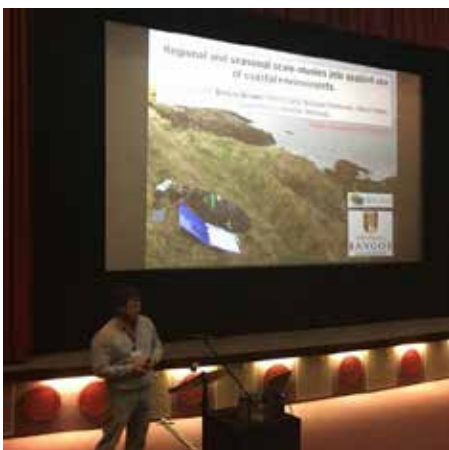
During my final year of my MSci degree at Bangor University in Marine Biology/Zoology, I was fortunate enough to be awarded a Rajkumari Jones student bursary. This was a welcomed addition to help me through my studies in my final year at Bangor.

I was lucky enough in April 2018 to have an abstract accepted for the EIMR (Environmental Interaction of Marine Renewable Energy Technologies) conference in Kirkwall, Orkney. This was focusing on the project for my fourth year and the overall project led by my supervisor, James Waggitt.

I was given an oral presentation slot and gave my talk to the marine renewables scientific community and others involved in the sector, which was well received (pictured). This was a great experience and allowed me to liaise with scientists in the marine renewables field and discuss research topics. I self-funded my trip to the conference and therefore the Rajkumari Jones student bursary really helped me to be able to do this. I am very grateful to have been awarded this bursary, which allowed me to attend and present at my first ever conference and network with others in my prospective field.

There has clearly been a positive impact of the Rajkumari Jones Student Bursary on recipients. We are delighted to see that these students have put this exciting opportunity to good use in terms of supporting their personal and professional development.

Many thanks for this wonderful opportunity on behalf of the MSci students, the course Director (Dr Coleen Suckling), the Head of School (Professor David Thomas), the School of Ocean Sciences and Bangor University.



Marine Mammal Medic Training

by Bethan Jones (MSci Marine Biology/Zoology with International Experience)

After receiving the Dr. Raj Parry Jones Student Bursary I was able to attend training programmes relevant to my field of interest that I would otherwise have not been able to. For example I completed the Joint Nature Conservation Committee Marine Mammal Observer (MMO) course. This enables me to work as a registered MMO to protect marine mammals from the negative impacts of industry and enforce mitigation measures. Also, after attending the British Divers Marine Life Rescue (BDMLR) Marine Medic Training I have joined the thousands of volunteers in the UK

which work to return stranded and injured marine animals to the sea.

Attending these courses has improved my employability greatly and allowed me to focus on marine mammals as I enter the world of work. Further to this I was able to purchase equipment such as binoculars and save the remainder to aid in relocating to Scotland later this year. Without the bursary I simply would not be in the same position as I am today and I am very grateful for the support and opportunities it has provided for me in my last year at Bangor University.



Travel, Networking & Financial Security

by Sam Smith (MSci Marine Biology/Zoology with International Experience)

This Bursary has really helped me in a number of ways, both personally and professionally and I'm very grateful for this exciting opportunity.

Firstly, it has helped to relieve pressure from general living costs, which I may have had to sustain with part time work. This has therefore allowed me to focus on my studies, something which I know is particularly important for the final year of study. This bursary has also provided me with support for travel. I have also been unfortunate to experience personal challenges in illness and the Rajkumari Jones Bursary has helped support travel between Bangor and my

home. This was incredibly important to me to ensure I was able to be with my family support network while I experienced this. On a more positive note, I was also able to travel to the Institute of Marine Science in Bergen, Norway to network with researchers. I have been offered an internship in Tromsø, Northern Norway, working for the North Atlantic Marine Mammal Commission (NAMMCO). This will be vital experience for my future career and the Bursary has made this more possible. I have been very fortunate to receive the award and thank those who put my name forward as a beneficiary and to the those providing this exciting support.

VIMS Drapers' Company VIMS Overseas Field Course

2017 Trip Report

by Sarah Zylinski



The School of Ocean Sciences' ten-day field course to the Virginia Institute of Marine Sciences (VIMS) Eastern Shore Laboratory is run each year thanks to generous funding from The Drapers' Company. This year will be the 7th year the course will be run as a 3rd year credit bearing module for students enrolled on three SOS Marine Biology degree programmes. In 2017 thirty students and five SOS staff members went to VIMS, and we hope for the same numbers this year (2018). The group travels to and stays at the VIMS Eastern Shore Laboratory facilities in Wachapreague on the Atlantic coast of Virginia, USA, allowing access to facilities, habitats and experiences markedly different from North Wales. This year was notable as Professor Chris Richardson's final year as course organiser for the trip.

The group flew from Manchester to Philadelphia, then onward by coach for the 200 mile road journey to Wachapreague, VA. Arriving jetlagged and exhausted we were grateful that postdoctoral researchers Dr Clair Szostek had travelled ahead of the main group and Dr Phillip Hollyman as a recipient of the Professor Wynn Humphries-Davies Award (see separate report), had stayed on after completing his research to help with the course. Between them they had bought in food supplies and prepared our first meal. Both Clair and Phil had taught on the course before so knew the routine. Long-term course participants Professor Chris Richardson and Dr Ian McCarthy, and myself (the only new member as recently appointed Lecturer in Marine Biology) completed the teaching team.

From my experience of field work in the USA and teaching on UK field courses I felt well equipped to be a useful member of the team, but was nevertheless grateful for the expertise and support of my SOS colleagues and the wonderful VIMS staff.

On the first morning we were greeted by weather more typical of a Welsh summer's day than Virginia in August—torrential rain and strong winds prevailed throughout the day. Many students were caught out by Chris' tales of intense heat and had to put on all the clothes they had brought to keep warm, and fashion ponchos out of black bin bags to try to keep dry as they dashed between buildings! Despite some unseasonably cool and windy weather throughout the course ran smoothly, and Chris' 15-odd years of running it meant he made it all seem effortless. The close working relationships he has formed with the VIMS staff over this time period are clear. I have large shoes to fill in taking over the running of the course this year.

For me one of the striking aspects of fieldwork is the close friendships that form in spite of long hours and close living conditions, and it was great to see the group of thirty students bond so well and work so efficiently together! Although I have taught on multiple field courses previously this was the first where the group had to cook, clean and shop for itself, and I was amazed at how gamely the students embraced this. It is no mean feat cooking for a group of 35 (let alone cleaning up after them), but having to undertake these domestic chores only seemed to bring the group closer together.

The marine biology of the Wachapreague area is sensational: the diversity of habitats, processes and organisms accessible to the group cannot be understated. Combine this with the knowledge and expertise of the VIMS staff and the students really do have a unique experience on the course. The clement weather conditions and shelter provided by barrier islands mean that small boats can head out virtually any day, and students could get fully involved with sampling techniques that in the UK they would be more likely to watch technicians deploy. The hard work of all the students was a credit to them, and their keenness for knowledge and to get involved in the different techniques involved was exemplary. Sein-netting in shoulder-high water for fish samples or stuck in waist-deep mud while surveying saltmarsh biota, everyone remained high-spirited and engaged throughout the ten days of the course.

On our final evening everyone, staff and students alike, was moved by the parting speeches by Chris and the VIMS staff, with whom he has grown so close over the years. Touchingly, the students presented Chris with an engraved pen they had put money together to buy him while they visited the local town of Onancock while the staff were busy marking the student's laboratory exams and field note books.

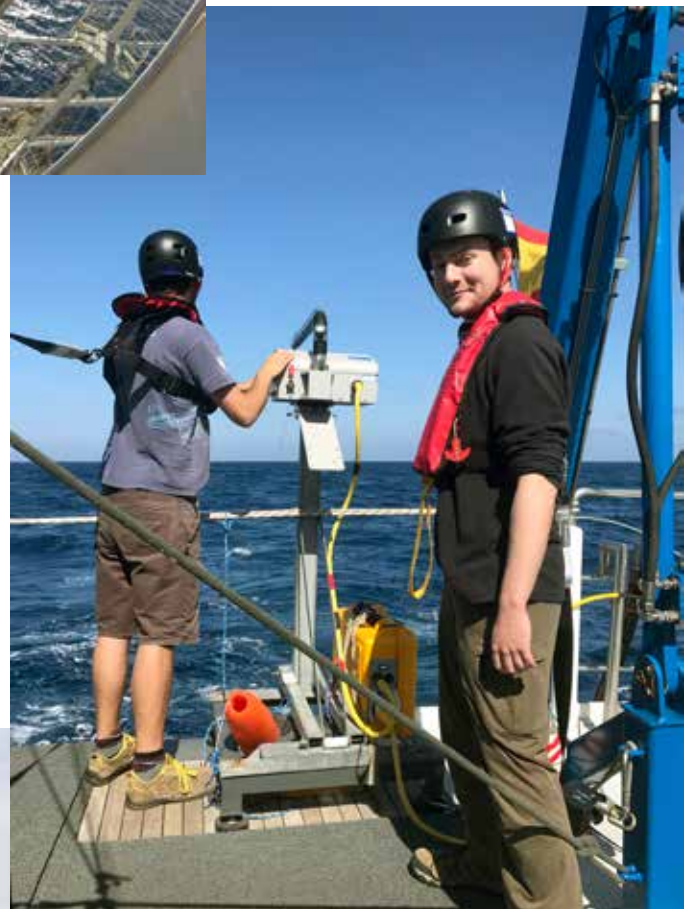


Meet some of our students and what they are up to this summer



Jess Fox (1st Year Marine Biology and Oceanography) is crossing South Atlantic on a tall ship. During the trip she is collecting water samples to analyse for plastics pollution and giving other crew members lectures on oceanography.

Ben Blackridge (3rd year Physical Oceanography) joined a research cruise with the SCRIPPS Oceanographic Institution (USA) to look at the processes responsible for mixing Mediterranean water into the Atlantic Ocean.



Second year oceanography and geography students participating in a Bergen University field course glaciology field course in Jostedal, Norway.

Research Field Trips

The Bertarelli Programme in Marine Science Coral Reef Expedition 2018

An international consortium of 16 partners including Bangor University, has been awarded US\$12 million from the Bertarelli Foundation (<https://www.fondation-bertarelli.org>) for research and management of the Chagos Archipelago in the British Indian Ocean Territory (BIOT). The reefs are uninhabited and serve as a reference site to study the impact of climate change in the absence of local human impact. The Bertarelli Programme in Marine Science is focussing on a series of projects on coral reef resilience and recovery, sentinel species such as turtles, seabirds and sharks; and using science for management, coordinated by the Zoological Society of London.

Professor John Turner, working with Dr Ronan Roche and Dr Gareth Williams from Bangor, will lead a £2.1m (£999,258 to Bangor) four year project within the Programme on Coral Reef Condition in the Chagos Archipelago, working in collaboration with the universities of Exeter, Oxford and University College London.

The Bertarelli Programme in Marine Science Coral Reef Expedition 2018 aimed to undertake a survey of reef condition and especially reef recovery across the archipelago following the 2015-2016 warming events which had caused severe bleaching and mortality. In addition, instruments were deployed across the archipelago to build a more detailed picture of changes in environmental parameters affecting the reefs over time.

The expedition worked its way from Peros Banhos, Salomon and Blenheim atolls, and then to Nelson's Island, The Three Brothers, Eagle Island and Danger island on the Great Chagos Bank, before a brief visit to Egmont atoll and Diego Garcia between March 27th and April 16th aboard the BIOT patrol vessel, Grampian Frontier (Figure 1).



Figure 1. The Grampian Frontier provided the perfect platform for the BPMS Reef 1 Expedition (Image from drone, Rob Dunbar)



Figure 2 Reef survey, Isle Anglaise, Salomon.

Over 400 hours were spent underwater, working at 29 permanent monitoring sites on seaward, leeward and lagoon patch reefs of the 6 atolls of the Archipelago across 200 km of latitude. This provided a comprehensive understanding of the state of the reefs now, compared with measurements recorded at the same sites in 2015 (pre warming), and those of the northern atolls in 2017.

The team used both visual and video techniques to record coral and other life-form cover on the reefs between 25 and 5 m depth (Fig 2). An important aspect of this work was to assess the number of coral recruits, using both visual census and fluorescence photography (Fig 3 and 4). Three dimensional reef structure was assessed on the reef terraces using photogrammetric methods to build high resolution images of 200 m² areas at each site, which will be compared with models built from data collected in 2016 and 2017. Temperature loggers were successfully downloaded and redeployed, and the Stanford team put in 35 new instruments to collect seasonal data of dissolved oxygen, salinity, irradiance, water flow and coral reef boundary layer dynamics. At three sites, the team deployed BEAMS (Benthic Ecosystem and Acidification Monitoring System) array (Fig 5) for periods ranging from 1.5 to 3 days to provide measurements of primary production rates and calcification. ARMS (Autonomous Reef Monitoring Structures) of the same modular design as those used at reef sites globally (Fig 6) were placed on 3 reefs, allowing for progressive sampling over the next 3 years to assess the early stages of biodiversity colonisation and succession of reef cryptofauna. Further, coral samples of *Acropora tenuis*, *Acropora cytherea*, and *Porites lutea* were collected for genetic analysis to assess reef connectivity, and water samples were collected from within and over reefs to assess the often neglected micro-organism community of reefs using metagenomics sequencing to identify their diversity and contribution to reef productivity.



Figure 3 and 4: Visual and Fluorescence techniques were used to assess coral recruits with cross calibration

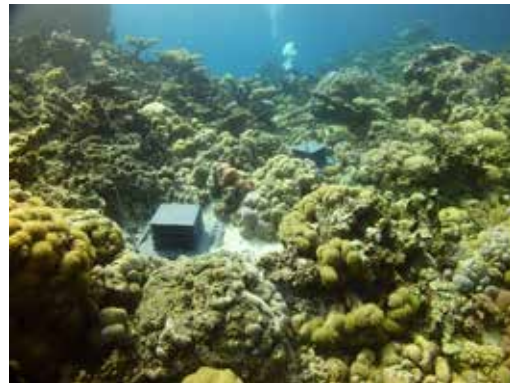


Figure 5 and 6: Deployment of BEAMS (Benthic Ecosystem and Acidification Monitoring System) and ARMS (Autonomous Reef Monitoring Structures). (Fig 5 Rob Dunbar)

The impacts of warming events on reefs are now regularly reported as are the status of those reefs after a decade or more, but what is poorly understood are the early processes that follow a warming event leading to the recovery of reef communities, especially on reefs unaffected by direct anthropogenic impacts. By revisiting those sites previously assessed on an annual basis, our projects are investigating the processes underpinning the recovery of the reefs.

A general pattern emerged, although there were exceptions at some sites. At depths below 15 m, the reefs were generally good health with most showing a high diversity of hard coral, soft coral, sponge and calcareous green and red algae (Fig 7), while others have remained characteristically dominated by a single species of coral (eg. *Pachyseris* in Horsburgh Bay, Diego Garcia (Fig 8).



Figure 7: High diversity below 15m on seaward reef of Peros Banhos and Figure 8: Monospecific stands of *Pachyseris* below 15m at Horsburgh Bay, Diego Garcia

Although not observed in 2017, The Chagos brain coral, *Ctenalla chagius* had survived the mass mortality events at mid to deep sites (Fig 9) at Isle de la Passe, Salomon and Moresby Peros Banhos, and that most of the *Porites* colonies had recovered their colour (Fig 10) and therefore their symbionts, having appeared very pale in 2017.



Figure 9: *Ctenella chagius* at Moresby, and Figure 10: Large *Porites* colony at Diamont, Peros Banhos

Shallow reefs with a terrace of tabular *Acropora* had fared least well (Fig 11), but provided an insight into regenerative reef processes that are now underway. In exposed locations such as at North west Egmont, water movement channelled coral rubble off the reef terrace and down the reef slope (Fig 12), thereby providing a clean and stable surface for calcareous coralline algae such as *Porolithon* spp. which favour coral colonisation (Fig 13). In more sheltered locations, such as within lagoons, calcareous algae and bioeroding sponges had colonised the corals, beginning to break down their structure (Fig 14).



Figure 11 Dead standing tabular *Acropora* tables on the reef terrace



Figure 12: Dead coral colonies at base of reef (Egmont North West) having been cleaned off the reef terrace by water movement.



Figures 13 and 14: New coral colonies on clean reef terrace at Egmont North West, and bioerosion weakening and collapsing coral colonies at Bernard's Shoal, in the Peros Banhos atoll lagoon. Crustose coralline algae is now growing on most collapsed structures, helping stabilise the material, and in many cases, providing a surface for coral recruitment (Fig 15).



Figure 15: A variety of coral recruits on stabilised coral and coralline algal covered substrate.

At 8 sites shallower than 15m, a fungal disease was observed causing death of the coralline algal tissues. This is the first observation of coralline fungal disease in the Indian Ocean, and a full description has been accepted for publication in the journal *Coral Reefs 'Reef Sites'* (Williams et al., in press), prompting more detailed study on reef processes such as accretion and coral recruitment next year.

Deep patch reefs at 20m in Salomon still showed little recovery from the warm saline event of 2013 (Fig 16), but patches close to passes and in areas of stronger water movement were dominated by a spectacular show of *Goniopora* (Fig 17).



Figure 16: Deep patch reef at Salomon has yet to recover from the dense warm water that caused mortality in 2013.
Figure 17: Patch reefs close to passes have well developed colonies of Goniopora

The most damaged sites were those previously impacted by the Crown of Thorns starfish, such as at Danger Island lagoon, Great Chagos Bank, which is now reduced to an urchin barren above 10 m depth with mostly coral rubble (Fig 18), and with no coral remaining at deeper depths. The urchin *Diadema* grazes coralline algae and prevents coral larval settlement.



Figure 18: An urchin barren at Danger Island lagoon side, Great Chagos Bank

Although the shallow areas of the reefs appear to have entered a period of negative accretion the team were heartened by high coral cover and diversity on deep reef slopes, and high levels of coral recruitment. Fish life remained abundant at sites of high topography such as Barton Point, Diego Garcia (Fig 19), and nursery areas on lagoon knolls (Fig 20).



Figure 19: Barton Point, Diego Garcia



Fig 20: Diamont leeward reef, Peros Banhos

Further expeditions are planned between 2019 and 2021, building on expeditions run in 2006, 2008, and 2013-2018. The team thank the British Indian Ocean Territory (BIOT) for granting access to the Chagos Archipelago and the crew of the Grampian Frontier for logistical support. Funding was provided by the Bertarelli Foundation.



Reference

Williams, GJ*, Roche, RC, Turner JR (2018). First record of coralline fungal disease (CFD) in the Indian Ocean. *Coral Reefs*. DOI: 10.1007/s00338-018-1704-z.

Promotions



Dr Katrien Van Landeghem
Senior Lecturer



Dr Martin Austin
Senior Lecturer



Dr Gareth Williams
Reader

In early March 2018, Megan Baker was awarded a Silver Medal by the Drapers Company for “an outstanding postgraduate contribution in Bangor University”

There are only two medals, a silver and a bronze. So, this is an exceptional achievement. Many congratulations Megan!



Scholarships and Awards



Matt Lewis has been awarded an EPSRC fellowship.

His research will investigate the global tidal-stream energy resource, with the aim to provide the UK with a high-tech renewable energy industry. Tidal energy device technology has now been successfully demonstrated, and the vast potential is now being realised as commercial arrays around the world are planned. Yet, the true global tidal energy resource and ocean conditions are unknown, and present methods are unsuitable as the industry matures.

Matt's research will focus three key questions:

What is the size of the global tidal energy industry?

Present offshore renewable energy research methods are unsuitable and untested, making the global tidal resource and potential industry size unknown. For example, coral reef passes, biological communities (e.g. kelp beds) and ocean currents, could improve the tidal energy resource (by accelerating tidal currents) to make many potential sites commercially viable.

How do conditions vary globally and will this change in the coming century?

For sustainable device design, realistic oceanographic conditions must be characterised for the lifetime of deployments, and cascaded through device-scale models; yet oceanographic conditions, and the impact of climate change, is largely unknown. One exciting example is that previously unviable tidal energy regions may become economically viable in the future as sea-level rise increases tidal current speeds in some regions.

Are current methods of suitable as the industry develops?

As the industry evolves and sites around the world are developed, methods to simulate the dynamic interaction between devices, resource and the environment, will be required. For example, the interaction of devices with waves and tides, is needed for efficient and resilient tidal energy device design.

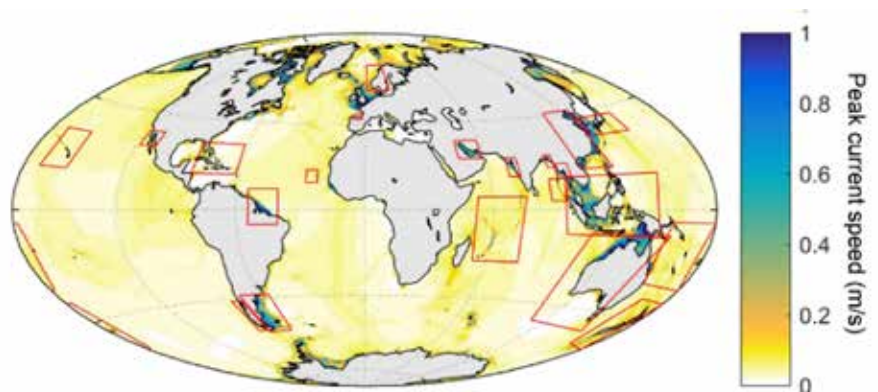


Figure 1. Tidal current speed estimated using present methods of tidal energy resource estimation, with the red boxes showing example areas of unresolved tidal energy sites.

Scholarships and Awards continued



PhD student Beth Francis won “best presentation runner up” at the Marine Biology Association Postgraduate Conference in Plymouth

Beth said: “The conference itself was brilliant, one of the best I’ve been to and had some great workshops that were tailored to PhD students.” The conference is recommended for all Marine Biology PhDs, so do think about going next year.

Mollie Duggan-Edwards won the ‘best talk’ prize at the CNS PhD conference.

Fantastic talk, very greatly deserved. There were about 15 talks by final year PhDs, and many of very high quality. It is a real feat for Mollie to win this, and truly indicative of her hard work and the very exciting research she has produced. Well done Mollie and thanks for flying the flag high for Ocean Sciences!

Saskia Mori of Ocean Sciences won the Master Award.

An annual Employability Celebration event was held in Pontio on Thursday, 26th April 2018 to congratulate and showcase Bangor University students who have taken part in the Bangor Employability Award and demonstrated exceptional commitment to developing their employability through extra-curricular activities whilst at University. Students gave presentations about their experiences of developing their employability at University, and what they have gained from participating in extra-curricular activities and work experience.

Line Cordes supervised her work. So well done Saskia and Line!

Two SOS undergraduate students were awarded “Women In Science” scholarships - Hannah Davies and Lily Stokes.

Both were undergraduate students at the University and graduated with First Class Honours in July 2017.

Workshops, Meetings and Visits

Mattias Green and Yueng-Djern Lenn were invited speakers at the prestigious Gordon Research Conference on 'Ocean Mixing'.

The conference was in Andover, New Hampshire, USA (picture below). Gordon Research Conferences are widely seen as one of the premier scientific forum globally. Attendance at the meeting is limited and the speakers are all invited because of their world leading contribution to scientific research.



Coleen Suckling was an invited speaker at the International conference: Physiomar (Sept. 2017) hosted by the University Cambridge.

Her talk was titled 'A slow growing perspective on multi-generational responses to future change' and kick started the session on 'Parental and generational determinants of resilience to environmental change'.

Tim Whitton attended the ICES Working Group on Fisheries Acoustics, Science and Technology (WGFAST) meeting in Seattle as a chair invited member.

The meeting saw the world's experts (including several SOS alumni) on fisheries acoustics, single-beam echo sounders and stock assessment of pelagic fish species. Tim presented research conducted under SEACAMS 2 to study the behaviour of water column fauna in the Holyhead Deep, using echo sounders on the RV Prince Madog and seabed deployed platforms. The meeting was preceded by the Topic Group - Quality Acoustic Data in Inclement Weather (TGQUAD), which is looking at how to identify and mitigate the problems of collecting acoustic data in adverse sea states. This is relevant to the work of SEACAMS 2 as the bubble sweep down which negatively affects acoustic data caused by rough weather, is also produced in high tidal currents, and presents a challenge for studying pelagic fauna at marine renewable energy sites in Welsh waters.



Participants of the ICES WGFAST meeting 2018 outside the School of Aquatic and Fishery Sciences at Washington University, USA.

Wales Ice and Polar Workshop comes to Bangor

Yueng-Djern Lenn, in conjunction with scientists from Swansea University and the Met Office, organised a workshop in the new Marine Centre Wales Building aimed at identifying outstanding questions in the understanding of ice-ocean interactions. The workshop brought together scientists from across the UK, as well as the EU and US, and was funded by the Ser-Cymru network.

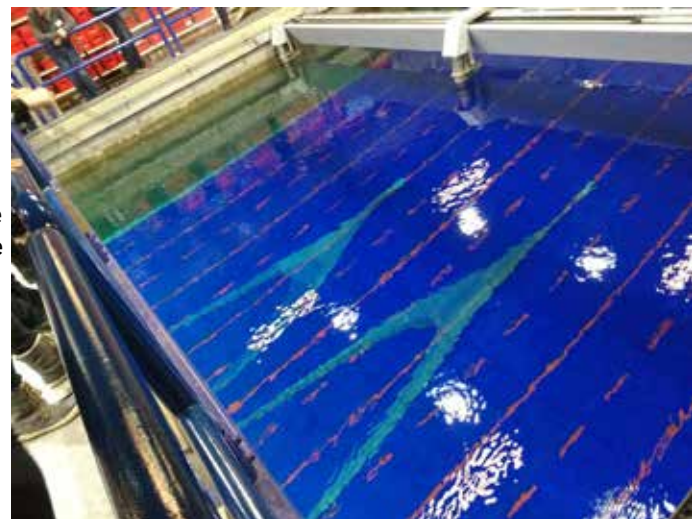
Ice forms a key component of the Earth's climate system through regulating the planet's temperature by balancing the incoming solar radiation with infrared radiation lost back to space. As the planet's climate changes it is the cryosphere (the ice world) which is seeing the big impact, with recording breaking seasonal sea ice retreats in the Arctic Ocean and thinning of earth's great Ice Sheets on Antarctica and Greenland. A current hot topic discussed at the workshop was the role of Oceanic Heat in driving the acceleration of glaciers, the melting of which is a major contributor to global sea level rise.



Unravelling the technology behind fishing nets, by Dr Claire Szostek, Fisheries and Conservation Science Group, SOS

In early February, I left North Wales in a full-scale blizzard to travel to the colder, but sunnier town of Hirtshals on the north coast of Denmark. I joined 17 other eager participants for a two-day SEAFISH 'Gear Technology and Selectivity' Course, held at the 2nd largest flume tank of its kind, owned and run by a company called SINTEF.

Mike Montgomery from SEAFISH (www.seafish.org.uk) is the best instructor you could ask for; 20 years as a commercial fisher; 20 years designing and testing fishing gear at SEAFISH and a qualified teacher, no less! Mike and his colleagues imparted a wealth of information during the course, while demonstrating numerous different types of trawl fishing gear in the large 7x21m tank. An image of a VW Beetle, propped up in front of the tank window helped us to comprehend the true scale of the nets. Some pelagic nets have a fishing circle (radius) of 3km with 260m of rope between the trawl doors and the net, and each carefully crafted net used in the tank was an exact scaled-down replica of the real thing. Trawl nets consist of a complex suite of multiple different panels, carefully designed and stitched together. So, how do the gear technologists and fishermen know exactly what warp length/angle, gear weight, mesh size/shape and towing speed will result in the best performance, even when they are unable to see what the gear in the darkest depths of the North Sea?.....Years of trial and error and plenty of experience apparently! This has culminated in Mike producing a reference table of gear component ratios and measurements that has been utilised widely across the fishing industry, with proven success.



We were shown how very small alterations in the length of the wires ('warps') towing the nets could move the net further onto, or up off the seabed, or increase or decrease the horizontal spread of the net. Nephrops (A.K.A 'Langoustine' or 'Dublin Bay Prawn') are a commercial species that are caught directly in the path of the net, therefore a wide spread is not required. However, round fish species, such as cod and haddock, need to be herded into the net, so longer sweeps (the wire between the warp and the net) are combined with a wide spread net. The net gradually funnels down so the majority of undersized fish can escape from a special square-hole 'escape panel' at the top of the net as it travels through the water, before the largest fish reach the 'cod-end', destined for the supermarket shelf or restaurant plate. Single, twin, triple and multiple rigs (up to 6 nets side-by-side) were demonstrated, each designed to catch (or release) different target species of fish or shellfish. The typical net spread of a twin-rig otter trawl is 130 m.

It was a fantastic, highly engaging and interactive course and we were able to ask questions and develop our understanding of the intricacies of gear configuration throughout the two days. We even had a spare couple of hours to look around the stunning aquarium next door before we were transported back to Aalborg airport for our flights back to the UK.



Seafish run these courses for Fishers every year, to help them better understand the gear innovations that can increase selectivity (discard reduction) of fishing and reduce seabed impact. Fishers are far more likely to invest in upgrading or changing their gear if they can see evidence of the benefits; including reduced drag (lower fuel costs), better catch efficiency (meaning shorter tows and better quality fish) and increased selectivity (reduced sorting time of catches, improved sustainability of stocks) leading to overall more efficient, intelligent fishing.

Over 70 experts from across the planet headed to the Marine Centre Wales for a workshop on “Ocean Mixing”.

The scientists from as far afield as the US, China and Russia, as well as continental Europe and the UK, converged on Menai Bridge to discuss global efforts to improve the understanding of the processes which stir up the oceans, and how these processes should be represented in weather and climate forecast models.

Commenting organiser Professor Tom Rippeth of the School of Ocean Sciences said:

“The oceans play a key role in the Earth’s climate system, they move heat around which gives places like the UK unusually temperate climate conditions when compared to other locations on the same latitude. They are one of the main nature carbon ‘sinks’, absorbing and storing carbon dioxide from the atmosphere and so helping to offset the impact of man-made CO2 emissions on global climate. Yet in many cases the processes responsible for stirring the ocean are poorly represented in the computer models of the ocean and climate which are used to make weather and climate change forecasts. In this workshop we heard about world leading research in observing the oceanic turbulence which is responsible for driving the mixing, as well as discussing efforts to incorporate these processes in the computer forecast models, with the aim of improving weather and climate forecasts”.

The Physical Oceanography team at the University’s School of Ocean Sciences are world leaders in the measurements of turbulence in the ocean. Their research was recently classes as having world leading impact, in the Research Excellence Framework 2014 Case Study: “Turbulence research improves ocean forecasting and marine energy infrastructure”.



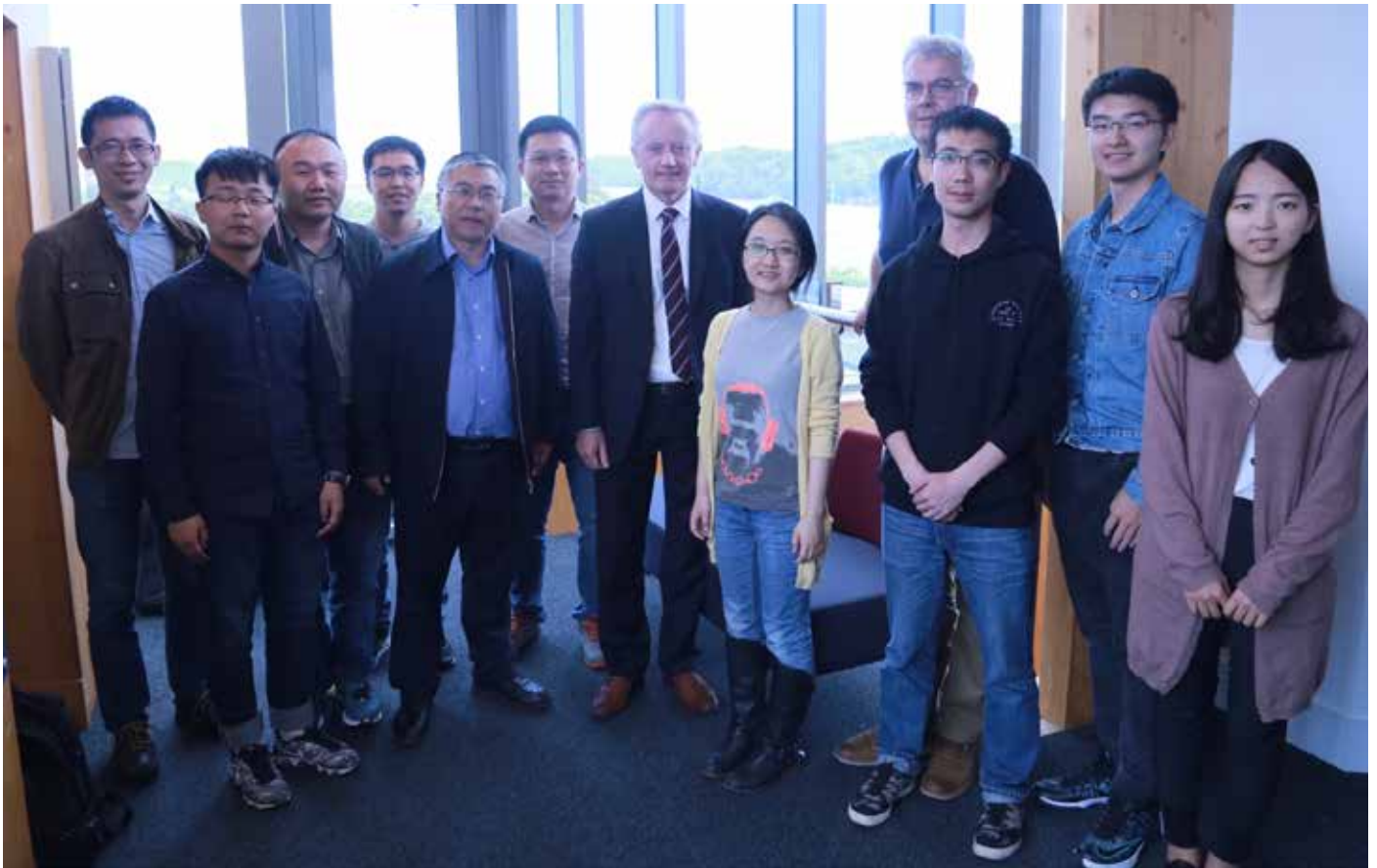
SOS strengthens links with a leading Chinese University

The Vice-Chancellor John Hughes was delighted to welcome a delegation of Physical Oceanographers from Sun Yat-sen University, Guangzhou, China, led by Professor Jiaxue Wu to Marine Centre Wales in August 2017.

Oceanographers at Bangor University led by Tom Rippeth have signed a Memorandum of Understanding with SYSU to develop research collaborations during a workshop jointly hosted by Professor Jiaxue Wu (SYSU) and Professor Tom Rippeth (Bangor University) last September in Guangzhou.

In July this year Professor Wu and SYSU delegation made a return visit to Bangor to discuss further research collaborations and also to look at developing stronger marine science teaching links between the two Universities.

Prof Hughes was very pleased to welcome the SYSU delegation and to discuss strengthening Bangor – SYSU links. SYSU is a top rated International University, ranked no. 9 in China.



New SOS projects

Teaming up for cheaper energy from ocean tides

Physical Oceanographers at Bangor University's School of Ocean Sciences are launching a major project to study tidal turbulence at the Menai Strait in Wales. Just how can this project help reduce development costs, leading to cheaper energy from the tides?

Ocean energy represents a vast and largely untapped renewable energy resource. The global market for marine energy has been estimated to be worth around £76 billion between 2016 and 2050, according to numbers released by the Carbon Trust. To access this source of energy, oceanographers at Bangor University's School of Ocean Sciences have been awarded two major grants totalling £230k to study ocean turbulence. The aim is to help improve the design and operation of tidal energy capture devices.

Improving the assessment of risks. The new projects link the Bangor team with oceanographic instrument manufacturer Nortek and marine renewable energy survey company Partrac. This team of specialists sets out to greatly improve the assessment of risks associated with turbulence and so help reduce development costs, leading to cheaper energy from the tides.

"The shallow seas around the UK represent one of the best tidal energy resources globally, accounting for some 10% of the global total. In consequence, the tidal energy industry is an emerging and steadily growing sector of the UK economy", says Martin Austin from Bangor University's School of Ocean Sciences.

Enabling innovation in new measurement capabilities. The findings from these projects will be integrated into Nortek's innovative product development. However, this is certainly not the first tidal energy project for ADCP specialist Nortek.

"Nortek has been there to help the tidal energy industry since the start. The first installation with Norwegian renewable energy company Hammerfest Strøm was operational more than ten years ago", says Atle Lohrmann, CEO and founder of Nortek.

During the past years, the need to understand how tidal turbines could withstand very strong currents required Nortek to develop new measurement capabilities.

"We participate in all phases of tidal energy projects: This includes science of understanding the current and wave climate, resource assessment at a specific location, and also monitoring the currents during production", Lohrmann adds.

The tidal turbulence study will be executed as two related projects supported by grants from the Engineering and Physical Sciences Research Council (EPSRC) and the Knowledge Economy Skills Scholarships (KESS2).

The first project will focus on the collection of novel turbulence data in the Menai Strait, and also further offshore to the north-west of Anglesey. This effort will further develop the world-leading expertise in acoustic and optical observation techniques pioneered at Bangor. The second project will focus on advancing the measurement of turbulence in energetic tidal flows, also working in the natural laboratory of the Menai Strait.



New SOS PhD project on identifying coastal flood risk

There has been an increase in flood rate over many areas of the world in the past decades. Britain has experienced its stormiest period over the past twenty years, and damages were so consistent that coastal flood hazard was ranked as number one in the UK national risk register.

A new PhD project led by student Julia Rulent and Mattias Green and based on a collaboration between Bangor and Liverpool's National Oceanography Centre, will be dealing with the coastal flood risk from extreme waves. The aim will be to better understand how tides and storm interact with, and modulate extreme waves.

This will involve understanding how to bring oceanic, atmospheric and wave models to better exchange information with each other, i.e. which coupling set up will enable the most accurate simulations. Once the best set up is found, it will be possible to run extreme-condition simulations over specific case studies selected around Britain, in order to analyse the wave-surge-wind interaction and what conditions are most likely to increase flooding. Ideally, working at this project would improve the current understanding of flooding. If this goes well, the study could then be expanded to the whole of UK and who knows where else.

Gender Equality – Athena Swan

Athena SWAN (Scientific Women's Academic Network) is a charter to encourage and recognise commitment to address gender inequality and barriers to career progression in higher education and research. The School of Ocean Sciences started a self-reflection process in 2016 via a self-assessment team (SAT).

The SAT recently finalised a first self-reflection exercise and a linked action plan to address the key challenges we face in SOS.

An application was submitted in order to gain an Athena Swan Bronze Award on May 16th. The feedback on this application is expected in October.

The University held a student survey this year, which will be analysed at University and departmental level. This will help the SAT understand how our students perceive gender equality issues and it will act if improvements are needed.

During the summer, the SAT will commence implementing prioritised action points and it will report back on these via the Board of Studies and the Executive Board.

If you have questions on any of the above, please ask Katrien Van Landeghem.

SOS in the media

BBC Science Café Radio Interview:

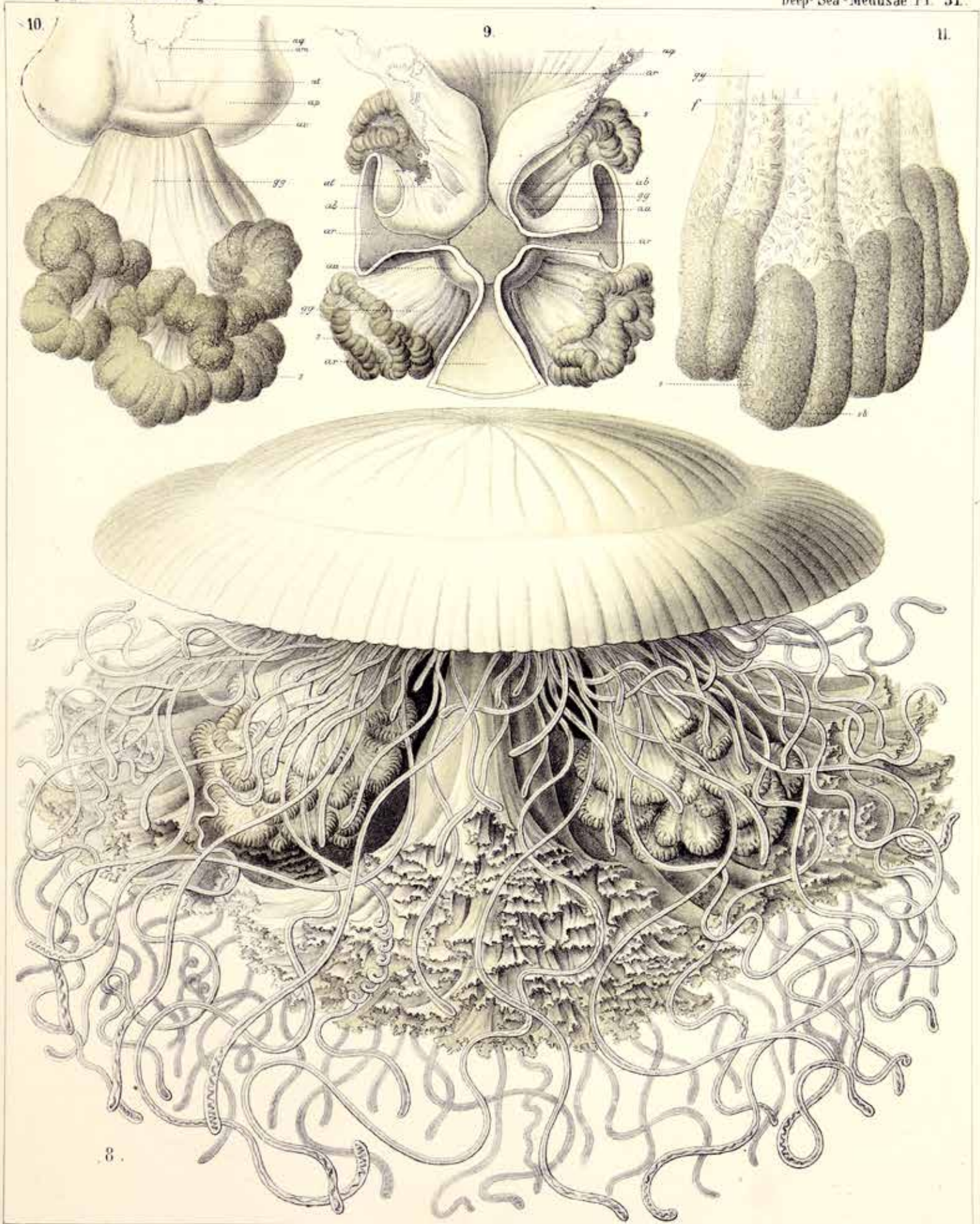
Coleen Suckling was invited by the BBC to discuss the recent standings of starfish with Radio presenter Adam Walton. Link: <https://www.bbc.co.uk/programmes/b09wry8h>

Coleen Suckling had two articles in The Conversation: 'Thousands of starfish have washed up dead after the 'Beast from the East' – here's why': <https://theconversation.com/thousands-of-starfish-have-washed-up-dead-after-the-beast-from-the-east-heres-why-92891> 'Starfish can see in the dark (among other amazing abilities)' <https://theconversation.com/starfish-can-see-in-the-dark-among-other-amazing-abilities-91965>. This second piece was also covered by Scientific American: <https://www.scientificamerican.com/author/coleen-suckling/>

Mattias Green had an article in The Conversation: 'Supercontinent formation may be linked to a cycle of supertides': <https://theconversation.com/supercontinent-formation-may-be-linked-to-a-cycle-of-supertides-94929> The work behind this has received wide media attention, including being covered by New Scientist and Science: (See: <https://www.newscientist.com/article/2168895-the-tides-are-getting-stronger-thanks-to-the-shifting-continents/> and <http://www.sciencemag.org/news/2018/02/strong-tides-may-have-pushed-ancient-fish-evolve-limbs>)

Adel Heenan had an article in The Conversation: 'How open data can help the world better manage coral reefs': <https://theconversation.com/how-open-data-can-help-the-world-better-manage-coral-reefs-88805>

Reefs that experience frequent temperature changes most likely to resist coral bleaching - The authors, from a number of American Universities and Bangor University in the UK, writing in Nature Communications utilise data collected from 118 coral reef locations globally. Science Magazine, link: <https://scienmag.com/reefs-that-experience-frequent-temperature-changes-most-likely-to-resist-coral-bleaching/>



E. Haackel and A. Giltbach del.

E. Giltbach, Jena Lithogr.

DRYMONEMA VICTORIA

ALUMNI NEWS

SOSA Welcome - Croeso

The School of Ocean Sciences Alumni Association (SOSAA) was founded in 1994 by Sinclair Buchan and George Floodgate. Its aim is to foster close links with all those who have passed through the SOS in Menai Bridge over the years.

Please send your alumni news to
Attn: Kevin Deeming
alumni@bangor.ac.uk

ALUMNI NEWS



Abdullah in the lab at the Marine Science and Fisheries Centre, Muscat, Oman

Our Man in Oman!

"I am Abdullah AL-Nahdi from Oman. I completed my MSc at Bangor University in 2012. I finished my PhD from Swansea University in November 2017. I became the Director of the Marine Science and Fisheries Centre in Muscat, Oman.

My areas of interest and expertise are on tropical fisheries; demersal, pelagic and crustacean; and project management works include stock assessment and modelling to update the management plan and implementing conservation policies in Sea of Oman and Arabian Sea fisheries.

I have worked on a number of projects, including:

- Commercial species of demersal projects
- Study of the fishery of lobster in Arabian Sea projects
- Small pelagic fishery in Oman projects
- Kingfish fishery in Oman projects
- Others projects such as investigation of shrimp fishery, abalone projects, commercial species in GCC projects."

Abdullah AL-Nahdi
MSc, Marine Biology, 2012



A beautiful olive ridley (*Lepidochelys olivacea*) hatchling!

All for Love (of Sea Turtles!)

"I finished my MSc in Marine Biology in September 2017, and since then I've undertaken an adventure to Costa Rica, as a Field Biologist for the *Leatherback Trust*, working to conserve leatherback, black and olive ridley sea turtles in the Eastern Pacific!

This role was physically challenging and included conducting extensive night surveys of Playa Grande and Playa Ventanas, covering approximately nine miles on foot per night over 5-7 hours, to document nesting females. In addition, threatened nests were relocated to a hatchery, either due to threat of predation, or risk of inundation, and six-hour hatchery monitoring shifts were required to monitor for hatchling emergence. One of my favourite aspects of the field work was releasing hatchlings on the beach at night and watching them make their way to the ocean!

I absolutely adore sea turtles, and I would love to continue to pursue a career as a sea turtle conservationist and biologist, so being given this opportunity to witness and help conserve these amazing animals was a dream come true for me!"

Abigail Parker
MSc Marine Biology, 2017



Derek (centre) and a colleague – Dr Heather Sears (Right) from Coventry University receiving the award at the Houses of Parliament with Stephen Metcalfe MP (Left), a member of the Science & Technology Select Committee.

Accreditation award from the Royal Society of Biology

Since graduating, Derek Renshaw has moved to a different area of biology and is now Professor of Endocrine Physiology at Coventry University where he is Academic Director of the Centre for Sport, Exercise & Life Sciences. In April 2018 Derek received an accreditation award from the Royal Society of Biology (RSB) for the first RSB accredited Doctoral Training Centre in the UK.

Derek Renshaw
Marine Biology/ Oceanography, 1992

Professor Nigel Pontee sent us this update:

“Over the last 5 years Nigel has become more involved in nature based coastal defence projects including several oyster reef design projects in the US and an evaluation of green infrastructure solutions for protecting hydrocarbon pipelines in the US and the flood defences in the Thames Estuary, UK. He was a member on the Science for Nature and People Partnership (SNAPP) project [Integrating Natural Defenses into Coastal Disaster Risk Reduction](#) led by the Nature Conservancy, Wildlife Conservation Society and National Centre for Ecological Analysis and Synthesis. Nigel recently edited a themed edition of the Institution of Civil Engineers Maritime Engineering Journal ‘Promoting coastal resilience using green infrastructure’. He also led the coastal and estuarine chapter with the UK Environment Agency’s [Working with Natural Processes evidence directory](#), contributed to the recently completed the [World Bank guidance](#) on nature based defences and is co-leading the Wetland chapter within the [USACE guidance on nature based solutions](#). He is currently the Global Technology leader for Coastal Planning and Engineering at Jacobs and a Visiting Professor at the Natural and Environmental Science department, University of Southampton.”

Nigel Pontee
Geological Oceanography, 1991

ALUMNI NEWS



Henderson Waves Bridge



Guadiana Bridge, Spain

Bridging the Years

"I attach a picture of our closest bridge which crosses the river Guadiana, connecting southern Spain and Portugal. The bridge is close to the mouth of the river which flows south into the Gulf of Cadiz and Atlantic sea. I live with my family close by in a small town called Ayamonte on the Spanish side of the border and cross the bridge regularly for work and for frequent visits to the Algarve and Lisbon.

I joined a fantastic bunch in Menai Bridge in 1989 to do the MSc in Shellfish Biology, Fisheries and Culture. I met my wife, Paula Pereira, on the same course (although we only got married two years ago!) and we have very fond memories of our time spent there and the friends we made.....It all seems a very long time ago now!

Kind regards and keep up the good work!"

Mike Heasman
MSc Marine Biology, 1991



Making Waves in Singapore!

While enjoying a sabbatical at the Lee Kong Chian Natural History Museum located on the campus of the National University of Singapore, Simon Cragg captured this picture of the land-locked Henderson Waves Bridge which is surrounded by forest in heavily urbanized Singapore. Simon is now a Professor of Marine Zoology at the University of Portsmouth.

Simon Cragg
PhD Marine Biology, 1977

ALUMNI NEWS



Heidi Meyer and the bridge next to her office in Bergen, Norway

Frequent Flyer Status: GOLD!

“Life after leaving the MSc program for marine biology has been pretty crazy, hectic, and international (to say the least). As a citizen of the United States, I was permitted to stay in the UK for an additional 3 months to travel or work. I was offered a position by my MSc thesis supervisor to continue my work on underwater video analysis of deep-sea sponge grounds until it was time to return to the US. The work I did was fascinating and incredible, particularly since these habitats (sponge grounds) are largely unexplored, and what I was uncovering was truly just the tip of the ice berg. In addition to counting sponges and megafauna from images of the deep, my supervisor also had me help in his classes, which was both terrifying and awesome at the same time. From there on, I knew a career in deep-sea and spatial ecology was the path for me.

Two days before moving back to the USA late January, I received notice that I had been selected for a PhD interview at the University of Bergen (UiB). It was cheaper for me to fly back to the US then fly to Norway than it was for me to just move my ticket

around. And so that is exactly what I did. Almost exactly one week after landing in Oregon, I was on a plane to Bergen, Norway. Three days later, I was on my way back to Oregon. Within a month, I had received notice that I was offered the PhD position, and by the beginning of May, I was on my way to Norway (my new home for the next four years).

My time in Oregon was filled with reminiscing and visa work. The highlight of my time there was visiting with my family and friends that I hadn't seen in over a year and a half. I travelled around Oregon, Washington, and Northern California, from the Redwoods to the Coast to the Mountains to the Cities. I went skiing, camping, tide-pooling, and attended my best friend's wedding. It was a nice break from academia, but I was ready to return to the world of research after a few weeks. I was ready to begin my new life.

The first month I was in Norway was extraordinary. It was sunny and beautiful for the entire month of May. Every opportunity outside of work, I was outdoors either hiking or swimming in the lakes and cold fjord waters. Almost every day, my new colleagues and I would have lunch together or sneak away from the office for an ice cream break. The scenery by my office is absolutely stunning (see bridge). I've gone to concerts in the park, department beach clean-ups, Sunday volleyball, and Star Wars marathons. It was completely unexpected, but I couldn't imagine an easier transition.

My PhD is on investigating the biodiversity and community ecology of deep-sea sponge grounds in the North Atlantic. It is quite similar to the work I did during my masters, and it also encompasses some of the same study areas. I will be annotating videos collected from five different regions in the North Atlantic and studying in great detail the ecology and spatial trends of these sponge grounds. I will be joining a 2-week research cruise to the Arctic circle almost directly after my graduation ceremony (July-August 2018). Though the project will be primarily desktop based, I will be quite busy attending classes, training, and workshops in Svalbard, the UK, Rhode Island, Canada, and who knows where.

Since January 2018, I have lived in three different countries. Since May, I couldn't be happier with direction my life is going.”

Heidi Meyer
MSc Marine Biology 2017



Tim Elton at work

Consulting Success

"I studied BSc Marine Biology and Zoology at Bangor University, graduating in 2013. I chose a Joint Honours between Marine Biology and Zoology because whilst I had a strong general interest in both marine and terrestrial ecology, I didn't yet know where I wanted to specialise.

Having attended the Virginia Institute of Marine Science field work module (VIMS), I was invited back post-graduation for a two-month research internship. During the internship I applied all of the skills I'd learnt through my course; from leading an experiment, presenting data to the research group, to contributing to the subsequent paper 'Richard W. Brill, Peter G. Bushnell, Tim A. Elton, Jeffrey D. Shields. (2015) The ability of blue crab (*Callinectes sapidus*, Rathbun 1886) to sustain aerobic metabolism during hypoxia. *Journal of Experimental Marine Biology and Ecology*'. The internship also led me to volunteering at an all-American carnival and

taking the time out to explore New York City for a week via my journey home.

On my return home I got to applying for graduate jobs, sending out CVs and calling companies for both terrestrial zoology and marine biology jobs. Luckily, the first job I managed to get was in my home town as a seasonal ecological consultant. At the end of the field survey season, during which I spent most of my time carrying out bat, great crested newt, and reptile surveys, I was given a permanent position as an assistant ecological consultant, and two years later I moved to consultant grade with increasing office and field work responsibilities. I am now in my fourth year as an ecological consultant and have survey licences for great crested newts, dormice and barn owl, as well as working on projects for a range of other species, and botanical survey (phase 1 habitat survey). During my time as a consultant I have worked for three different organisations, including the Wildlife Trust's own consultancy.

The role of an ecological consultant is a necessary as part of the planning application process. The laws protecting habitats and species are a material consideration in granting planning permission and have to be taken into account via the ecological surveying of sites, which is then incorporated into a technical report which demonstrates how any negative impacts on protected habitats or species will be mitigated.

As a project manager I deal with local planning authority ecologists, developers, architects, planning consultants and more, often having input into site masterplans and habitat creation alongside more senior staff to ensure the continued ecological functionality of a given site. Planning consent requires an inter-disciplinary approach across multiple environmental disciplines. Having recognised the need for an inter-disciplinary approach to planning and the environment, I have recently secured a place on an Environmental Management MSc, with the help of academic references from the School of Ocean Sciences, which I am due to start in September. Following graduation, I hope to progress my career in consulting and move into a broader management role across multiple disciplines whilst working on larger projects, though my specialist knowledge in ecology will still prove to be valuable."

Tim Elton
BSc Marine Biology and Zoology, 2013



A Model Career!

John Debenham sends us an update on his career and how he applied his degree courses to a major project for *Marine Scotland*:

“My role as manager for Jacobs (formerly CH2M Hill and Halcrow prior to acquisitions) of the project to design, build, calibrate and transfer a continental shelf hydrodynamic model for our client, Marine Scotland, gave me a great opportunity to apply my experience and understanding of:

- oceanographic processes from my degree, BSc (Hons) Marine Biology and Oceanography at the School of Ocean Sciences, Bangor University;
- hydrodynamic modelling practicalities from 5 years ‘environmental hydraulics’ consultancy experience in numerical modelling of riverine and coastal environments in 1, 2 and 3-dimensions using software such as MIKE11, MIKE3, TAWDOS, HYDRA and other packages;
- specific client and stakeholder needs, relationships and experience as a project manager and manager of frameworks with Marine Scotland, Scottish Water and others; and
- project planning and management from 20 years’ experience as an environmental scientist and APM-qualified project manager for Halcrow, CH2M and Jacobs on a range of environmental and other projects in the UK and overseas.

The model is a large scale 3-dimensional (10 to 20 layers) hydrodynamic model based on a development of the University of Massachusetts’ FVCOM software code. The model covers all of Scotland’s continental shelf seas out to the 200m depth contour. It’s used by Marine Scotland to support marine planning and decision-making, particularly with respect to sustainable development for Scotland’s offshore renewable energy industry and the aquaculture sector.

As project manager I was responsible for managing: the contract, supply chain and acceptance criteria; client and stakeholder relationships and communications; the technical lead and their team’s delivery to quality, cost and time; and formal approval of all reports submitted to the customer. I co-chaired the steering group in collaboration with the customer’s project manager. Most work on the model was undertaken by a joint team of specialists from CH2M HILL and the UK’s National Oceanographic Centre - Liverpool University (‘NOC-L’). Other inputs included: bathymetry data from the UK Hydrographic Office; WAVENET wave data from CEFAS; freshwater run-off data from the UK’s Centre for Ecology and Hydrology; technical support from Stirling University on connectivity indices for sea lice; and additional current data from Heriot-Watt University. The project benefitted greatly from breadth and depth in knowledge of its steering group and technical team, too many to mention here.”

John Debenham
Marine Biology, 1987

ALUMNI NEWS



The Wishing Bridge, Gap of Dunloe, County Kerry, Ireland



Seismic survey on Larsen C Ice Shelf

An Epic Academic Journey

“After four years in Menai Bridge (2006-2010), I decided to pursue a PhD at the University of Aberdeen. Here, I applied the geophysical skills gained during the MSc course to the analysis of airborne ground-penetrating radar collected over Antarctic glaciers. In my thesis, I attempted to use the shape and size of radar reflections to map contrasts in water and sediment beneath the ice sheet, which might explain why parts of the ice sheet flow faster than others. After working briefly as a Physical Geography Teaching Fellow at Aberdeen, I returned to Wales to start a postdoc at Aberystwyth University.

In Aberystwyth, I was fortunate enough to work on project seeking to investigate how surface melting affects the dynamics and stability of Larsen C Ice Shelf, on the eastern Antarctic Peninsula. My role within the project was to use ice borehole logging to study the ice shelf stratigraphy, temperature and density structure over two field seasons camping out on the ice. Excitingly, this project meant I would finally get to visit the Antarctic after looking at the continent through a computer screen for four years!

After the project funding finished I had a short stint working in river monitoring for the Environment Agency before taking up the position of Research Associate at the University of Liverpool in March 2017. Here, I am involved in a range of projects from reconstructing glacier change in the Canadian Arctic to revisiting radar-focused themes from my PhD. Perhaps inevitably, however, my interest in oceanography has resurfaced and I am now learning about fjord oceanography in Greenland.

I’ve no doubt my time in SOS, and the support of my lecturers and professors there, set me up for pursuing my interests since leaving Menai Bridge. The bridge I’ve chosen is the “Wishing Bridge” from a student fieldtrip in the glacially-eroded Gap of Dunloe on a rare bright and calm day in County Kerry, SW Ireland.”



David Ashmore
BSc Geological Oceanography, 2009
MSc Applied Marine Geoscience, 2010

Recent Grant Awards (last 6 months)

- **ESRC Impact Acceleration Account**
Implementing methodologies for the assessment of the state of the seabed. Hiddink. £1395
- **ESRC IAA Impact Project Award**
Biodiversity Action Plans for the Chagos Archipelago, British Indian Ocean Territory. Turner, J.R. (Principal Investigator & Project Lead); Roche, R. (Co-investigator). £13,692. 1st July 2018, - 31st December 2018
- **Bangor University ECR Award**
Changing tides: implications of palaeo- and future tidal-range changes in eastern Canada. Ward SL, £1,500 May – August 2018
- **EMFF MARine MAagement: Tool for evaluating conservation Evidence: (MARMATE).** £104,618 Hiddink and Kaiser. May 2018 to March 2020.
- **EMFF Scallop fisheries in the English Channel**
£130k. Hiddink and Kaiser. January 2018 to December 2019.
- **EMFF Adaptive approach to MPA Management Project**
£74k. Hiddink and Kaiser. April 2018 to March 2020.
- **ASSEMBEPlus through H2020**
Ship time on RV Oceanograf in Gdansk Bay. In kind, ~£100k. Hiddink. Summer 2018
- **European Maritime and Fisheries Fund (EMFF)**
Sea Bass Fisheries Conservation UK. McCarthy ID. £30k April 2018-March 2020. Subcontract on a larger EMFF award to Cefas
- **Association of European Marine Biological Laboratories Expanded (ASSEMBLE Plus)**
Quantifying seabird use of tidal stream environments in the Ria De Vigo, north-western Spain. Waggitt JJ. Use of facilities at the Toralla Marine Science Station (ECIMAT), Universidade de Vigo. June 2018.
- **NERC ENVISION DTP PhD studentship: Ice-ocean interaction:**
effects of climate change on Antarctic ice-shelf dynamics. Green, JAM, Lenn, YD (Bangor), Gudmundson, HG (Northumbria), Jenkins, A (BAS); October 2018-March 2022.
- **The Nature Conservancy. Research support for ENVISION PhD:**
Landscape ecology of disturbance and recovery on Pacific coral reefs. Williams £5,250.
- **National Overseas Scholarship (India) PhD studentship**
Earth system consequences of collapsing ice-sheets. Green, JAM (Bangor). £120k; September 2018-August 2022.
- **NRN-LCEE: Returning Fellowship.**
Coupled marine ecosystem modelling, with application to the Welsh marine renewable energy sector. Ward, SL; £6k. February 2018 – December 2018.

Publications (2017 – Jun 2018)

Tidal stream resource characterisation in progressive versus standing wave systems

Ward, S., Robins, P., Lewis, M., Iglesias, G., Hashemi, M. R. & Neill, S. 15 Jun 2018 In : Applied Energy. 220, p. 274-285

Oceanographic setting and short-timescale environmental variability at an Arctic seamount sponge ground

Roberts, E., Mienis, F., Rapp, H. T., Hans, U., Meyer, H. & Davies, A. 12 Jun 2018 In : Deep Sea Research Part I: Oceanographic Research Papers.

First record of coralline fungal disease (CFD) in the Indian Ocean

Williams, G., Roche, R. & Turner, J. 4 Jun 2018 In : Coral Reefs. <https://doi.org/10.1007/s00338-018-1704-z> , 1 p.

Disturbance alters ecosystem engineering by a canopy-forming alga

Pocklington, J., Jenkins, S., Bellgrove, A., Keough, M., O'Hara, T., Masterson Algar, P. & Hawkins, S. J. Jun 2018 In : Journal of the Marine Biological Association of the United Kingdom. 98, 4, p. 687-698 12 p.

The Ornithodolite as a tool to quantify animal space use and habitat selection; a case study with birds diving in tidal waters

Cole, E-L., Waggitt, J., Hedenstrom, A., Piano, M., Holton, M., Borger, L. & Shepard, E. 31 May 2018 In : Integrative Zoology.

Population biology of grey gurnard (*Eutrigla gurnardus* L.; Triglidae) in the coastal waters of Northwest Wales

McCarthy, I., Cant, J. & Marriott, A. 28 May 2018 In : Journal of Applied Ichthyology.

Can we model the effect of observed sea level rise on tides?

Schindelegger, M., Green, M., Wilmes, S. B. & Haigh, I. D. 25 May 2018 (Accepted/In press) In : Journal of Geophysical Research: Oceans.

Local Biomass Baselines and the Recovery Potential for Hawaiian Coral Reef Fish Communities: Hawaiian Reef Fish Recovery Potential

Gorospe, K., Donahue, M., Heenan, A., Gove, J., Williams, I. & Brainard, R. 9 May 2018 In : Frontiers in Marine Science. 5, 162

Tidal range energy resource and optimization – past perspectives and future challenges

Neill, S., Angeloudis, A., Robins, P., Walkington, I., Ward, S., Masters, I., Lewis, M., Piano, M., Avdis, A., Piggott, M., Aggidis, G., Evans, P., Adcock, T., Zidonis, A., Ahmadian, R. & Falconer, R. 7 May 2018 In : Renewable Energy. 127, p. 763-778

A comparison of VMS and AIS data: the effect of data coverage and vessel position recording frequency on estimates of fishing footprints

Shepperson, J., Hintzen, N. T., Szostek, C., Bell, E., Murray, L. & Kaiser, M. 1 May 2018 In : ICES Journal of Marine Science. 75, 3, p. 988-998

Bedform migration in a mixed sand and cohesive clay intertidal environment and implications for bed material transport predictions

Lichtman, I. D., Baas, J. H., Amoudry, L. O., Thorne, P. D., Malarkey, J., Hope, J. A., Peakall, J., Paterson, D. M., Bass, S. J., Cooke, R. D., Manning, A. J., Davies, A. G., Parsons, D. R. & Ye, L. 1 May 2018 In : Geomorphology. 66 p.

Limited impact of an invasive oyster on intertidal assemblage structure and biodiversity: the importance of environmental context and functional equivalency with native species

Zwerschke, N., Hollyman, P., Wild, R., Stringer, R., Turner, J. & King, J. May 2018 In : Marine Biology. 165, 5, 88

Cumulative effects of an invasive species and nutrient enrichment on rock pool communities

Vye, S., Dick, J. T. A., Emmerson, M. C. & O'Connor, N. E. 26 Apr 2018 In : Marine Ecology Progress Series. 594, p. 39 50 p.

Tidal-stream energy resource characterisation for the Gulf of California, México

Mejia-Olivares, C., Haigh, I. D., Wells, N., Coles, D., Lewis, M. & Neill, S. 20 Apr 2018 In : Energy. 156, p. 481-491

Is there a tectonically driven super-tidal cycle?

Green, M., Molloy, J., Davies, H. & Duarte, J. 11 Apr 2018 In : Geophysical Research Letters.

Response of benthic fauna to experimental bottom fishing: a global meta-analysis

Sciberras, M., Hiddink, J., Jennings, S., Szostek, C., Hughes, K., Kneafsey, B., Clarke, L. J., Ellis, N., Rijnsdorp, A. D., McConnaughey, R. A., Hilborn, R., Collie, J., Pitcher, R., Amoroso, R. O., Parma, A., Suuronen, P. & Kaiser, M. 2 Apr 2018 In : Fish and Fisheries.

Biophysical drivers of coral trophic depth zonation

Williams, G., Sandin, S. A., Zgliczynski, B. J., Fox, M., Gove, J. M., Rogers, J. S., Furby, K., Hartmann, A., Caldwell, Z. R., Price, N. & Smith, J. E. Apr 2018 In : Marine Biology. 165, 60

Age and growth validation of the small spotted grunt *Pomadasys commersonii* (Lacepède, 1801) from the northwestern coast of the Arabian Sea of Oman.

Al-Nahdi, A., Al-Sayabi, B. & McCarthy, I. 24 Mar 2018 In : Journal of Applied Ichthyology. 10.1111/jai.13687

The complexities and challenges of conserving common whelk (*Buccinum undatum*, L.) fishery resources: Spatio-temporal study of variable population demographics within an environmental context.

Emmerson, J., Haig, J., Bloor, I. & Kaiser, M. 20 Mar 2018 In : Fisheries Research. 204, p. 125-136

Advancing the integration of spatial data to map human and natural drivers on coral reefs

Wedding, L., Lecky, J., Gove, J., Walecka, H., Donovan, M., Williams, G., Jouffray, J.-B., Crowder, L., Erickson, A., Falinski, K., Friedlander, A., Kappel, C., Kittinger, J., McCoy, K., Norstrom, A., Nystrom, M., Oleson, K., Stamoulis, K., White, C. & Selkoe, K. 1 Mar 2018 In : PLoS One. :e0189792

Regional-scale patterns in harbour porpoise occupancy of tidal stream environments

Waggitt, J., Dunn, H., Evans, P. G. H., Hiddink, J., Holmes, L. J., Keen, E., Murcott, B. D., Piano, M., Robins, P., Scott, B. E., Bond, J. & Veneruso, G. 1 Mar 2018 In : ICES Journal of Marine Science. p. 701-710

Hydroacoustics to examine fish association with shallow offshore habitats in the Arabian Gulf

Egerton, J., Al-Ansi, M., Abdallah, M., Walton, M., Hayes, J., Turner, J., Erisman, B., Al Maslamani, I., Al-Mohannadi, M. & Le Vay, L. Mar 2018 In : Fisheries Research. 199, p. 127-136 9 p.

Optimising stocking density for the commercial cultivation of sea urchin larvae

Suckling, C., Terrey, D. & Davies, A. Mar 2018 In : Aquaculture. 488, p. 96-104

Characterising the tidal stream power resource around France using a high-resolution harmonic database

Guillou, N., Neill, S. & Robins, P. 16 Feb 2018 In : Renewable Energy. 123, p. 706-718

Age, growth and maturity of tub gurnard (*Chelidonichthys lucerna* Linnaeus 1758: Triglidae) in the inshore coastal waters of Northwest Wales, UK

McCarthy, I. & Marriott, A. 1 Feb 2018 In : Journal of Applied Ichthyology.

Successional convergence in experimentally disturbed intertidal communities

Martins, G. M., Arenas, F., Tuya, F., Ramirez, R., Neto, A. I. & Jenkins, S. Feb 2018 In : Oecologia. 186, 2, p. 507-516

The role of megatides and relative sea level in controlling the deglaciation of the British-Irish and Fennoscandinavian ice sheets

Scourse, J., Ward, S., Wainwright, A., Bradley, S. L. & Uehara, K. Feb 2018 In : Journal of Quaternary Science. 33, 2, p. 139-149

Recovery linked to life history of sessile epifauna following exclusion of towed-mobile fishing gear

Kaiser, M., Hormbrey, S., Booth, J. R., Hinz, H. & Hiddink, J. 23 Jan 2018 In : Journal of Applied Ecology. JAPPL-2017-00306. R2

150,000-year palaeoclimate record from northern Ethiopia supports early, multiple dispersals of modern humans from Africa

Lamb, H., Bates, R., Bryant, C., Davies, S., Huws, D., Marshall, M. & Roberts, H. 18 Jan 2018 In : Scientific Reports. 8, 1077

Towards Developing a Mechanistic Understanding of Coral Reef Resilience to Thermal Stress Across Multiple Scales

Roche, R., Williams, G. & Turner, J. 17 Jan 2018 In : Current Climate Change Reports. D 87

Microalgal community structure and primary production in Arctic and Antarctic sea ice: A synthesis.

van Leeuwe, M., Tedesco, L., Arrigo, K. R., Assmy, P., Meiners, K. M., Rintala, J.-M., Selz, V., Thomas, D. N. & Stefels, J. 11 Jan 2018 In : Elementa: Science of the Anthropocene. 6, 4, 25 p.

Patterns in reef fish assemblages: insights from the Chagos Archipelago

Samoilys, M., Roche, R., Koldewey, H. & Turner, J. 5 Jan 2018 (Accepted/In press) In : PLoS One.

Effects of chronic bottom trawling on soft seafloor macrofauna in the Kattegat

Skold, M., Göransson, P., Jonsson, P., Bastardie, F., Blomqvist, M., Agrenius, S., Hiddink, J., Nilsson, H. C. & Bartolino, V. Jan 2018 In : Marine Ecology Progress Series. 586, p. 41-55

Hydroacoustics as a tool to examine the effects of Marine Protected Areas and habitat type on marine fish communities

Egerton, J., Johnson, A. J., Turner, J., Le Vay, L., Mascareñas-Osorio, I. & Aburto-Oropeza, O. Jan 2018 In : Scientific Reports. 8, 47

Identifying metabolic pathways for production of extracellular polymeric substances by the diatom *Fragilariopsis cylindrus* inhabiting sea ice.

Aslam, S. N., Strauss, J., Thomas, D. N., Mock, T. & Underwood, G. J. C. Jan 2018 In : The ISME Journal.

The Lifecycle of Semidiurnal Internal Tides over the Northern Mid-Atlantic Ridge

Vic, C., Naveira-Garabato, A., Green, M., Spingys, C., Forryan, A., Zhao, Z. & Sharples, J. Jan 2018 In : Journal of Physical Oceanography. 48, 1, p. 61-80

The role of bed roughness in wave transformation across sloping rock shore platforms

Poate, T. G., Masselink, G., Austin, M., Dickson, M. & McCall, R. T. Jan 2018 In : Journal of Geophysical Research: Earth Surface. 123, 1, p. 97-123

Tidal modulation of seabed light and its implications for benthic algae

Roberts, E., Bowers, D. & Davies, A. Jan 2018 In : Limnology and Oceanography. 63, 1, p. 91-106

High frequency temperature variability reduces the risk of coral bleaching

Safaie, A., Silbiger, N. J., McClanahan, T. R., Pawlak, G., Barshis, D. J., Hench, J. L., Rogers, J. S., Williams, G. & Davis, K. A. 2018 In : Nature Communications. 9, 1671

Improving estuary models by reducing uncertainties associated with river flows

Robins, P., Lewis, M., Freer, J., Cooper, D., Skinner, C. & Coulthard, T. 2018 In : Estuarine, Coastal and Shelf Science.

Tidal conversion and mixing poleward of the critical latitude (an Arctic case study)

Rippeth, T., Vlasenko, V., Stashchuk, N., Scannell, B., Green, M., Lincoln, B. & Bacon, S. 28 Dec 2017 In : Geophysical Research Letters. 44, 24, p. 12349-12357

Gastropod shell size and architecture influence the applicability of methods used to estimate internal volume

Ragagnin, M., Gorman, D., McCarthy, I., Sant'Anna, B., Campi de Castro, C. & Turra, A. 19 Dec 2017 (Accepted/In press) In : Scientific Reports.

Environmental heterogeneity at small spatial scales affects population and community dynamics on intertidal rocky shores of a threatened bay system. Ocean and Coastal Management

Dias, G., Christofoletti, R., Kitazawa, K. & Jenkins, S. 11 Dec 2017 In : Ocean and Coastal Management.

Special issue: Wave and tidal resource characterization

Neill, S., Yang, Z. & Hashemi, M. R. 1 Dec 2017 In : Renewable Energy. 114, p. 1-2

Biological and climate controls on North Atlantic marine carbon dynamics over the last millennium: Insights from an absolutely-dated shell based record from the North Icelandic Shelf

Richardson, C., Reynolds, D., Scourse, J., Butler, P., Wanamaker, A. & Hall, I. R. Dec 2017 In : Global Biogeochemical Cycles. 31, 12, p. 1718-1735

Characteristics of the velocity profile at tidal-stream energy sites

Lewis, M., Neill, S., Robins, P., Hashemi, M. R. & Ward, S. Dec 2017 In : Renewable Energy. 114, Part A, p. 258-272

Comparison of ADCP observations and 3D model simulations of turbulence at a tidal energy site

Togneri, M., Lewis, M., Neill, S. & Masters, I. Dec 2017 In : Renewable Energy. 114, Part A, p. 273-282

Large-area imaging reveals biologically driven non-random spatial patterns of corals at a remote reef

Edwards, C., Eynaud, Y., Williams, G., Pedersen, N., Zgliczynski, B., Gleason, A., Smith, J. & Sandin, S. Dec 2017 In : Coral Reefs. 36, 4, p. 1291-1305

The wave and tidal resource of Scotland

Neill, S., Vogler, A., Goward-Brown, A. J., Baston, S., Lewis, M., Gillibrand, P. A., Waldman, S. & Woolf, D. K. Dec 2017 In : Renewable Energy. 114, Part A, p. 3-17

Tidal energy extraction in three-dimensional ocean models

Goward Brown, A., Neill, S. & Lewis, M. Dec 2017 In : Renewable Energy. 114, A, p. 244/257

Tidal stream resource assessment uncertainty due to flow asymmetry and turbine yaw misalignment

Piano, M., Neill, S., Lewis, M., Robins, P., Hashemi, R., Davies, A., Ward, S. & Roberts, M. Dec 2017 In : Renewable Energy. p. 1363-1375

Application of a model of internal hydraulic jumps

Thorpe, S., Malarkey, J., Voet, G., Alford, M., Girton, J. & Carter, G. 17 Nov 2017 In : Journal of Fluid Mechanics. 834, p. 125-148

Why artificial light at night should be a focus for global change research in the 21st century

Davies, T. 10 Nov 2017 In : Global Change Biology.

Coral bleaching and mortality in the Chagos Archipelago to 2017

Sheppard, C., Sheppard, A., Mogg, A., Bayley, D., Dempsey, A. C., Roche, R., Turner, J. & Purkis, S. 2 Nov 2017 In : Atoll Research Bulletin . 613, 613, p. 1 25 p.

Contrasting effects of ocean warming on different components of plant-herbivore interactions

Pages Fauria, J., Smith, T. M., Tomas, F., Sanmartí, N., Boada, J., De Bari, H., Pérez, M., Romero, J., Arthur, R. & Alcoverro, T. 1 Nov 2017 In : Marine Pollution Bulletin.

Feeding ecology of sea trout in the Irish Sea

Roche, W., Milner, N., Davies, C., Shepherd, S., King, J., Coyne, J., Gargan, P. & Hughes, R. 1 Nov 2017 Sea Trout: Science and Management: Proceedings of the 2nd International Sea Trout Symposium. Harris, G. (ed.). Kibworth Beauchamp: Matador, p. 371-395 25 p. Chapter 20

The effect of light on bacterial activity in a seaweed holobiont

Coelho-Souza, S., Jenkins, S., Casarin, A., Baeta-Neves, M., Salgado, L., Guimaraes, J. & Coutinho, R. Nov 2017 In : Microbial Ecology. 74, 4, p. 868-876

Trawl Exposure and Protection of Seabed Fauna at Large Spatial Scales

Mazor, T., Pitcher, C. R., Ellis, N., Rochester, W., Jennings, S., Hiddink, J., McConnaughey, R., Kaiser, M., Parma, A., Suuronen, P., Kangas, M. & Hilborn, R. Nov 2017 In : Diversity and Distributions. 23, 11, p. 1280-1291

Variation in sea trout (*Salmo trutta*) abundance and life histories in the Irish Sea

Milner, N., Potter, E., Roche, W., Tysklind, N., Davidson, I., King, J., Coyne, J. & Davies, C. Nov 2017 Sea Trout: Science and Management: Proceedings of the 2nd International Sea Trout Symposium. Harris, G. (ed.). Kibworth Beauchamp: Matador, p. 96-128 32 p. 5

Residual flow, bedforms and sediment transport in a tidal channel modelled with variable bed roughness

Davies, A. & Robins, P. 15 Oct 2017 In : Geomorphology. 295, p. 855-872 10.1016/j.geomorph.2017.08.029

Microbiome and infectivity studies reveal complex polyspecies tree disease in Acute Oak Decline

Denman, S., Doonan, J., Ransom-Jones, E., Broberg, M., Plummer, S., Kirk, S. A., Scarlett, K., Griffiths, A., Kaczmarek, M., Foster, J., Peace, A., Golyshin, P., Hassard, F., Brown, N., Kenny, J. G. & McDonald, J. 13 Oct 2017 In : The ISME Journal.

Meta-Mass Shift Chemical (MeMSChem) profiling of metabolomes from coral reefs

Hartmann, A., Petras, D., Quinn, R., Protsyuk, I., Archer, F., Ransome, E., Williams, G., Bailey, B., Vermeij, M., Alexandrov, T., Dorrestein, P. & Rohwer, F. 12 Oct 2017 In : Proceedings of the National Academy of Sciences of the United States of America.

Relative sea-level variability during the late Middle Pleistocene: New evidence from eastern England

Barlow, N. L. M., Long, A. J., Gehrels, W. R., Saher, M., Scaife, R. G., Davies, H., Penkman, K., Bridgland, D. R., Sparkes, A., Smart, C. & Taylor, S. 1 Oct 2017 In : Quaternary Science Reviews. 173, p. 20-39 20 p.

Livestock grazing alters multiple ecosystem properties and services in salt marshes: a meta-analysis

Davidson, K. E., Fowler, M. S., Skov, M., Doerr, S. H., Beaumont, N. & Griffin, J. N. Oct 2017 In : Journal of Applied Ecology. 54, 5, p. 1395-1405

Physicochemical Factors Influence the Abundance and Culturability of Human Enteric Pathogens and Fecal Indicator Organisms in Estuarine Water and Sediment

Hassard, F., Andrews, A., Jones, D. L., Parsons, L., Jones, V., Cox, B. A., Daldorph, P., Brett, H., McDonald, J. & Malham, S. Oct 2017 In : *Frontiers in Microbiology*. 8, 1996

Micro-scale geochemical and crystallographic analysis of *Buccinum undatum* statoliths supports an annual periodicity of growth ring deposition

Hollyman, P., Chenery, S., Ignatyev, C., Laptikhovsky, V. & Richardson, C. 30 Sep 2017 In : *Chemical Geology*. p. 1-30 30 p.

Global tidal impacts of large-scale ice-sheet collapses

Wilmes, S-B., Green, M., Gomez, M., Lau, H. & Rippeth, T. 28 Sep 2017 (Accepted/In press) In : *Journal of Geophysical Research-Oceans*.

The stoichiometric dissociation constants of carbonic acid in seawater brines from 298 to 267 K

Papadimitriou, E., Loucaides, S., Rerolle, V., Kennedy, D., Achtberberg, E. P., Dickson, A. G., Mowlem, M. & Kennedy, H. 28 Sep 2017 In : *Geochimica et Cosmochimica Acta*.

Measuring the role of seagrasses in regulating sediment surface elevation

Kennedy, H., Huxham, M., Diele, K., Potouroglou, M., Githaiga, M., Bull, J., Krauss, K., Fusi, M., Daffonchio, D. & Mangora, M. 20 Sep 2017 In : *Scientific Reports*. 11917

An approach for the identification of exemplar sites for scaling up targeted field observations of benthic biogeochemistry in heterogeneous environments

Thompson, C., Silburn, B., Williams, M., Hull, T., Sivyer, D., Amoudry, L., Widdicombe, S., Ingels, J., Carnovale, G., McNeill, C., Hale, R., Marchais, C. L., Hicks, N., Smith, H., Klar, J., Hiddink, J., Kowalik, J., Kitidis, V., Reynolds, S., Woodward, M., Tait, K., Homoky, W., Kroger, S., Bolam, S., Godbold, J., Aldridge, J., Mayor, D., Benoist, N., Bett, B., Morris, K., Parker, R., Ruhl, H., Statham, P. & Solan, M. Sep 2017 In : *Biogeochemistry*. 135, 1-2, p. 1-34

Evaluation of Two Triplex One-Step qRT-PCR Assays for the Quantification of Human Enteric Viruses in Environmental Samples

Farkas, K., Peters, D. E., McDonald, J., de Rougemont, A., Malham, S. & Jones, D. Sep 2017 In : *Food and Environmental Virology*. 9, 3, p. 342-349

Gypsum and hydrohalite dynamics in sea ice brines

Butler, B., Papadimitriou, S., Day, S. J. & Kennedy, H. Sep 2017 In : *Geochimica et Cosmochimica Acta*. p. 17-34

Size-selective fishing of *Palaemon serratus* (Decapoda, Palaemonidae) in Wales, UK: implications of sexual dimorphism and reproductive biology for fisheries management and conservation

Emmerson, J., Haig, J., Robson, G., Hinz, H., Le Vay, L. & Kaiser, M. Sep 2017 In : *Journal of the Marine Biological Association of the United Kingdom*. 97, 6, p. 1223-1232

Mediation of nitrogen by post-disturbance shelf communities experiencing organic matter enrichment

Sciberras, M., Tait, K., Brochain, G., Hiddink, J., Hale, R., Godbold, J. & Solan, M. 29 Aug 2017 In : *Biogeochemistry*.

Time-since-invasion increases native mesoherbivore feeding rates on the invasive alga, *Sargassum muticum* (Yendo) Fensholt

Kurr, M. & Davies, A. 22 Aug 2017 In : *Journal of the Marine Biological Association of the United Kingdom*.

Correcting surface wave bias in structure function estimates of turbulent kinetic energy dissipation rate

Scannell, B., Rippeth, T., Simpson, J., Polton, J. & Hopkins, J. 17 Aug 2017 (Accepted/In press) In : *Journal of Atmospheric and Oceanic Technology*.

Climate and land-use change impact on faecal indicator bacteria in a temperate maritime catchment (the River Conwy, Wales)

Bussi, G., Whitehead, P., Thomas, A., Masante, D., Jones, L., Cosby, J., Emmett, B., Malham, S., Prudhomme, C. & Havard, P. 10 Aug 2017 In : *Journal of Hydrology*.

Seasonal variability in the source and composition of particulate matter in the depositional zone of Baltimore Canyon, U.S. Mid-Atlantic Bight

Prouty, N. G., Mienis, F., Campbell, P., Roark, E. B., Davies, A., Robertson, C., Duineveld, G. C. A., Ross, S. W., Rhode, M. & Demopoulos, A. W. J. 3 Aug 2017 (Accepted/In press) In : *Deep Sea Research I: Oceanographic Research Papers*. 127, p. 77-89

Use of multi-element stable isotope ratios to investigate ontogenetic movements of *Micropogonias furnieri* in a tropical Brazilian estuary

Pizzochero, A. C., Michel, L. N., Chenery, S., McCarthy, I., Vianna, M., Malm, O., Lepoint, G., Das, K. & Dorneles, P. R. 3 Aug 2017 In : Canadian Journal of Fisheries and Aquatic Sciences.

Energy input and dissipation in a temperate lake during the spring transition

Woolway, R. & Simpson, J. Aug 2017 In : Ocean Dynamics. 67, 8, p. 959-971

Nest trampling and ground nesting birds: quantifying temporal and spatial overlap between cattle activity and breeding redshank

Sharps, E., Smart, J., Mason, L. R., Jones, K., Skov, M., Garbutt, A. & Hiddink, J. Aug 2017 In : Ecology and Evolution. 7, 16, p. 6622-6633

Tuning, Interference and False Shallow Gas Signatures in Geohazard Interpretations: Beyond the 'λ/4' Rule

Barret, B., Huws, D., Booth, A., Wergeland, O. & Green, M. Aug 2017 In : Near-surface Geophysics . 15, 4, p. 359-366

Towards spatial management of fisheries in the Gulf: benthic diversity, habitat and fish distributions from Qatari waters

Walton, M., Hayes, J., Al-Ansi, M., Abdallah, M., Al Maslamani, I., Al-Mohannadi, M., Al-Shaikh, I., D'Urban Jackson, T., Szostek, C., Egerton, J., Kaiser, M. & Le Vay, L. 27 Jul 2017 In : ICES Journal of Marine Science. 12 p.

Stable isotopes reveal the effect of trawl fisheries on the diet of demersal target species

Hinz, H., Moranta, J., Balestrini, S., Sciberras, M., Pantin, J. R., Monnington, J., Zalewski, A., Kaiser, M., Skold, M., Jonsson, P., Bastardies, F. & Hiddink, J. 24 Jul 2017 In : Scientific Reports. 7, 6334

The double high tide at Port Ellen: Doodson's criterion revisited

Byrne, H., Green, M. & Bowers, D. 20 Jul 2017 In : Ocean Science. 13, p. 599-607

Sex-specific reproductive trade-offs in the gregarious furoid macroalga *Ascophyllum nodosum*

Kurr, M. & Davies, A. 19 Jul 2017 In : European Journal of Phycology.

Global analysis of depletion and recovery of seabed biota following bottom trawling disturbance

Hiddink, J., Jennings, S., Sciberras, M., Szostek, C., Hughes, K., Ellis, N., Rijnsdorp, A. D., McConnaughey, R. A., Mazor, T., Hilborn, R., Collie, J. S., Pitcher, R., Amoroso, R. O., Parma, A. M., Suuronen, P. & Kaiser, M. 17 Jul 2017 In : Proceedings of the National Academy of Sciences of the United States of America. 114, 31, p. 8301-8306

Evidence maps and evidence gaps: evidence review mapping as a method for collating and appraising evidence reviews to inform research and policy

O'Leary, B., Woodcock, P., Kaiser, M. & Pullin, A. 11 Jul 2017 (Accepted/In press) In : Environmental Evidence.

Comparative studies reveal variability in the use of tidal stream environments by seabirds

Waggitt, J. J., Robbins, A. M. C., Wade, H. M., Masden, E. A., Furness, R. W., Jackson, A. C. & Scott, B. E. Jul 2017 In : Marine Policy. 81, p. 143-152

Indirect Effects of Bottom Fishing on the Productivity of Marine Fish

Collie, J., Hiddink, J., van Kooten, T., Rijnsdorp, A. D., Kaiser, M., Jennings, S. & Hilborn, R. Jul 2017 In : Fish and Fisheries. 18, 4, p. 619-637

Your evidence or mine? Systematic evaluation of reviews of marine protected area effectiveness

Woodcock, P., O'Leary, B., Kaiser, M. & Pullin, A. Jul 2017 In : Fish and Fisheries. 18, 4, p. 668-681

Filling the gap: Using fishers' knowledge to map the extent and intensity of fishing activity

Szostek, C., Kaiser, M., Murray, L. & Bell, E. 20 Jun 2017 In : Marine Environmental Research.

Grain size selection in seagrass beds

Conley, D., Austin, M., Davidson, I., Buscombe, D. & Masselink, G. 17 Jun 2017

Mediation of macronutrients and carbon by post-disturbance shelf sea sediment communities

Hale, R., Godbold, J., Sciberras, M., Dwight, J., Wood, C., Hiddink, J. & Solan, M. 12 Jun 2017 In : Biogeochemistry.

Characterizing the Great Lakes hydrokinetic renewable energy resource: Lake Erie wave, surge and seiche characteristics

Farhadzadeh, A., Hashemi, M. R. & Neill, S. 1 Jun 2017 In : Energy. 128, p. 661-675

Critical Review on the Public Health Impact of Norovirus Contamination in Shellfish and the Environment: A UK Perspective

Hassard, F., Sharp, J., Taft, H., Le Vay, L., Harris, J., McDonald, J., Tuson, K., Wilson, J., Jones, D. & Malham, S. Jun 2017 In : Food and Environmental Virology. 9, 2, p. 123-141

Hydroacoustics for the discovery and quantification of Nassau grouper (*Epinephelus striatus*) spawning aggregations

Egerton, J., Johnson, A. F., Le Vay, L., McCoy, C. M., Semmens, B. X., Heppell, S. A. & Turner, J. Jun 2017 In : Coral Reefs. 36, 2, p. 589-600 12 p.

Modelling incident-band and infra gravity wave dynamics on rocky shore platforms

McCall, R. T., Masselink, G., Austin, M., Poate, T. & Jager, T. Jun 2017 p. 1658-1669

Shading impacts by coastal infrastructure on biological communities from subtropical rocky shores

Pardal-Souza, A., Dias, G., Jenkins, S., Ciotti, A. & Christofolletti, R. Jun 2017 In : Journal of Applied Ecology. 54, 3, p. 826-835

Characterization of meta-Cresol Purple for spectrophotometric pH measurements in saline and hypersaline media at sub-zero temperatures.

Loucaides, S., Rerolle, V., Papadimitriou, E., Kennedy, H., Mowlem, M., Dickson, A. G., Gledhill, M. & Achtberg, E. P. 30 May 2017 In : Scientific Reports. 7, 2481

Large-scale and non-linear responses of benthic communities to scallop dredging in dynamic and unconsolidated sediments

Kaiser, M., Lambert, G., Hiddink, J., Cambie, G., Hold, N., Murray, L., Hinz, H. & Lincoln, H. 18 May 2017 (Accepted/In press) In : Scientific Reports.

Influence of exogenous chemicals on larval development and survival of the king scallop *Pecten maximus* (L.)

Galley, T., Beaumont, A., Le Vay, L. & King, J. 1 May 2017 In : Aquaculture. 474, p. 48-56 9 p.

A robust operational model for predicting where tropical cyclone waves damage coral reefs

Puotinen, M., Maynard, J. A., Beeden, R., Radford, B. & Williams, G. May 2017 In : Scientific Reports. 6, 26009

Differences in biological traits composition of benthic assemblages between unimpacted habitats

Bolam, S., Garcia, C., Eggleton, J., Kenny, A. J., Buhl-Mortensen, L., Gonzalez-Mirelis, G., van Kooten, T., Dinesen, G., Hansen, J., Hiddink, J., Sciberras, M., Smith, C., Papadopoulou, N., Gumus, A., Van Hoey, G., Eigaard, O. R., Bastardie, F. & Rijnsdorp, A. May 2017 In : Marine Environmental Research. 126, May 2017, p. 1-13 13 p.

Statoliths of the whelk *Buccinum undatum*: a novel age determination tool

Hollyman, P., Leng, M., Chenery, S., Laptikhovskiy, V. & Richardson, C. 24 Apr 2017 In : Marine Ecology Progress Series.

Life associated with Baltic Sea ice

Thomas, D. N., Kaartokallio, H., Tedesco, L., Majaneva, M., Piiparinen, J., Eronen-Rasimus, E., Rintala, J.-M., Kuosa, H., Blomster, J., Vainio, J. & Granskog, M. A. 5 Apr 2017 Biological Oceanography of the Baltic Sea. Snoeijs-Leijonmalm, P., Schubert, H. & Radziejewska, T. (eds.). 1 ed. Dordrecht: Springer Science, p. 333-357

The area-to-mass ratio and fractal dimension of marine flocs

Bowers, D., McKee, D., Jago, C. & Nimmo-Smith, W. A. M. 5 Apr 2017 In : Estuarine, Coastal and Shelf Science. 189, p. 224-234

Dynamics of estuarine drift macroalgae: growth cycles and contributions to sediments in 2 shallow areas

Lanari, M., Kennedy, H., Copertino, M. S., Wallner-Kersanach, M. & Coelho Claudino, M. Apr 2017 In : Marine Ecology Progress Series. 570, p. 41-55

Estimating the sustainability of towed fishing-gear impacts on seabed habitats: a simple quantitative risk assessment method applicable to data-limited fisheries.

Pitcher, R., Ellis, N., Jennings, S., Hiddink, J., Kaiser, M., Kangas, M., McConnaughey, R., Parma, A., Rijnsdorp, A., Suuronen, P., Collie, J., Amoroso, R., Hughes, K. & Hilborn, R. Apr 2017 In : Methods in Ecology and Evolution. 8, 4, p. 472-780

Post-settlement dispersal ability determines structure of marine benthic metacommunities

Martins, G. M., Matias, M., Moniz, I., Ruis, C., Sanderson, J., Neto, A. I. & Jenkins, S. Apr 2017 In : Marine Ecology Progress Series. 569, p. 15-23

Scale-dependent natural variation in larval nutritional reserves in a marine invertebrate: implications for recruitment and cross-ecosystem coupling

Jimenez Noya, J., Torres, G., Pettersen, A., Burrows, M. T., Estevez, A. & Jenkins, S. Apr 2017 In : Marine Ecology Progress Series. 570, p. 141-155

Immanent conditions determine imminent collapses: nutrient regimes define the resilience of macroalgal communities

Boada, J., Arthur, R., Alonso, D., Pages, J. F., Pessarrodona, A., Oliva, S., Ceccherelli, G., Piazzini, L., Romero, J. & Alcoverro, T. 29 Mar 2017 In : Proceedings of the Royal Society B: Biological Sciences. 284, 1851

Macro-nutrient concentrations in Antarctic pack ice: Overall patterns and overlooked processes

Fripiat, F., Meiners, K. M., Vancoppenolle, M., Papadimitriou, S., Thomas, D. N., Ackley, S. F., Arrigo, K. R., Carnet, G., Cozzi, S., Delille, B., Dieckmann, G. S., Dunbar, R. B., Fransson, A., Kattner, G., Kennedy, H., Lannuzel, D., Munro, D. R., Nomura, D., Rintala, J.-M., Schoemann, V., Stefels, J., Steiner, N. & Tison, J.-L. 29 Mar 2017 In : Elementa: Science of the Anthropocene. 5

Sea Ice, Ice Drift, and Oceanic Circulation

Thomas, D. N., Cottier, F. R. & Brandon, M. A. 6 Mar 2017 The International Encyclopedia of Geography: : People, the Earth, Environment and Technology. Richardson, D., Castree, N., Goodchild, M. F., Kobayashi, A., Liu, W. & Marston, R. A. (eds.). 1 ed. John Wiley & Sons, p. 6075-6084 10 p.

Explicitly modelled deep-time tidal dissipation and its implication for Lunar history

Green, M., Huber, M., Waltham, D., Buzan, J. & Wells, M. 1 Mar 2017 In : Earth and Planetary Science Letters. 461, p. 46-53

Distributions and habitat associations of deep-water corals in Norfolk and Baltimore Canyons, Mid-Atlantic Bight, USA

Brooke, S. D., Watts, M. W., Heil, A. D., Rhode, M., Mienis, F., Duineveld, G. C. A., Davies, A. & Ross, S. W. Mar 2017 In : Deep Sea Research Part II: Topical Studies in Oceanography. 137, p. 131-147

Influence of storm surge on tidal range energy

Lewis, M., Angeloudis, A., Robins, P., Evans, P. S. & Neill, S. Mar 2017 In : Energy. 122, p. 25-36

Surreptitious sympatry: Exploring the ecological and genetic separation of two sibling species

Cordes, L. S., O'Corry-Crowe, G. & Small, R. J. Mar 2017 In : Ecology and Evolution. 7, 6, p. 1725-1736

A sclerochronological archive for Antarctic coastal waters based on the marine bivalve *Yoldia eightsi* (Jay, 1839) from the South Orkney Islands

Román González, A., Scourse, J., Richardson, C., Peck, L. S., Bentley, M. J. & Butler, P. 1 Feb 2017 In : Holocene. 27, 2, p. 271-281

Regional variation in bycatches associated with king scallop (*Pecten maximus* L.) dredge fisheries

Szostek, C., Kaiser, M., Bell, E., Murray, L. & Lambert, G. Feb 2017 In : Marine Environmental Research. 123, p. 1-13 13 p.

Evaluation of Molecular Methods for the Detection and Quantification of Pathogen-Derived Nucleic Acids in Sediment

Farkas, K., Hassard, F., McDonald, J., Malham, S. & Jones, D. 24 Jan 2017 In : Frontiers in Microbiology. 6, p. 1-12 53

Multisensor Acoustic Tracking of Fish and Seabird Behavior Around Tidal Turbine Structures in Scotland

Williamson, B. J., Fraser, S., Blondel, P., Bell, P. S., Waggitt, J. J. & Scott, B. E. 17 Jan 2017 In : IEEE JOURNAL OF OCEANIC ENGINEERING. 42, 4, p. 948-965

Analysis of ontogenetic growth trends in two marine Antarctic bivalves *Yoldia eightsi* and *Laternula elliptica*: Implications for sclerochronology

Román González, A., Scourse, J., Butler, P., Reynolds, D. J., Richardson, C., Peck, L. S., Brey, T. & Hall, I. R. 1 Jan 2017 In : Palaeogeography, Palaeoclimatology, Palaeoecology. 465, Part B, p. 300-306

Reconstructing North Atlantic marine climate variability using an absolutely-dated sclerochronological network

Reynolds, D. J., Richardson, C., Scourse, J., Butler, P., Hollyman, P., Román González, A. & Hall, I. R. 1 Jan 2017 In : Palaeogeography Palaeoclimatology Palaeoecology. 465, Part B, p. 333-346

Sea Ice

Thomas, D. N. (ed.) 1 Jan 2017 3 ed. Wiley Blackwell. 728 p.

Cumulative effects of multiple stressors: An invasive oyster and nutrient enrichment reduce subsequent invasive barnacle recruitment

Vye, S. R., Emmerson, M. C., Dick, J. T. A. & O'Connor, N. E. Jan 2017 In : Journal of Experimental Marine Biology and Ecology. 486, p. 322-327

Metagenomic covariation along densely sampled environmental gradients in the Red Sea

Thompson, L. R., Williams, G., Haroon, M. F., Shibl, A., Larsen, P., Shorenstein, J., Knight, R. & Stingl, U. Jan 2017 In : ISME Journal. 11, p. 138-151

Defining thresholds of sustainable impact on benthic communities in relation to fishing disturbance

Lambert, G., Murray, L., Hiddink, J., Hinz, H., Lincoln, H., Hold, N., Cambie, G. & Kaiser, M. 2017 In : Scientific Reports. 7, 5440

Diversity of fishing métier use can affect incomes and costs in small-scale fisheries

Cambie, G., Pantin, J., Lincoln, H., Hiddink, J., Lambert, G. & Kaiser, M. 2017 In : Canadian Journal of Fisheries and Aquatic Sciences. 74, 12, p. 2144-2152

Impacts of a reduction of seawater pH mimicking ocean acidification impacts on assemblage, structure and diversity of marine fungal communities

Reich, M., Wichels, A., Panzer, K., Krause, E., Gimenez Noya, J. & Gerdtts, G. 2017 In : Aquatic Microbial Ecology. 79, 3, p. 221-233

Polar Microalgae: Functional genomics, physiology and the environment

Hopes, A., Thomas, D. & Mock, T. 2017 Psychrophiles: From Biodiversity to Biotechnology. 2 ed. Springer Verlag, p. 305-344

Predicting the dispersal of wild Pacific oysters *Crassostrea gigas* (Thunberg, 1793) from an existing frontier population—a numerical study

Robins, P., King, J., Jenkins, S. & Tita, A. 2017 In : Aquatic Invasions. 12, 2, p. 117-131

Relative growth and size at onset of sexual maturity of the brown crab, *Cancer pagurus* in the Isle of Man, Irish Sea

Öndes, F., Kaiser, M. & Murray, L. 2017 In : Marine Biology Research. 13, 2, p. 237-245

The Effect of Clay Type on the Properties of Cohesive Sediment Gravity Flows and their Deposits

Baker, M., Baas, J., Malarkey, J., Silva Jacinto, R., Craig, M., Kane, I. & Barker, S. 2017 In : Journal of Sedimentary Research. 87, 11, p. 1176-1195 59 p.