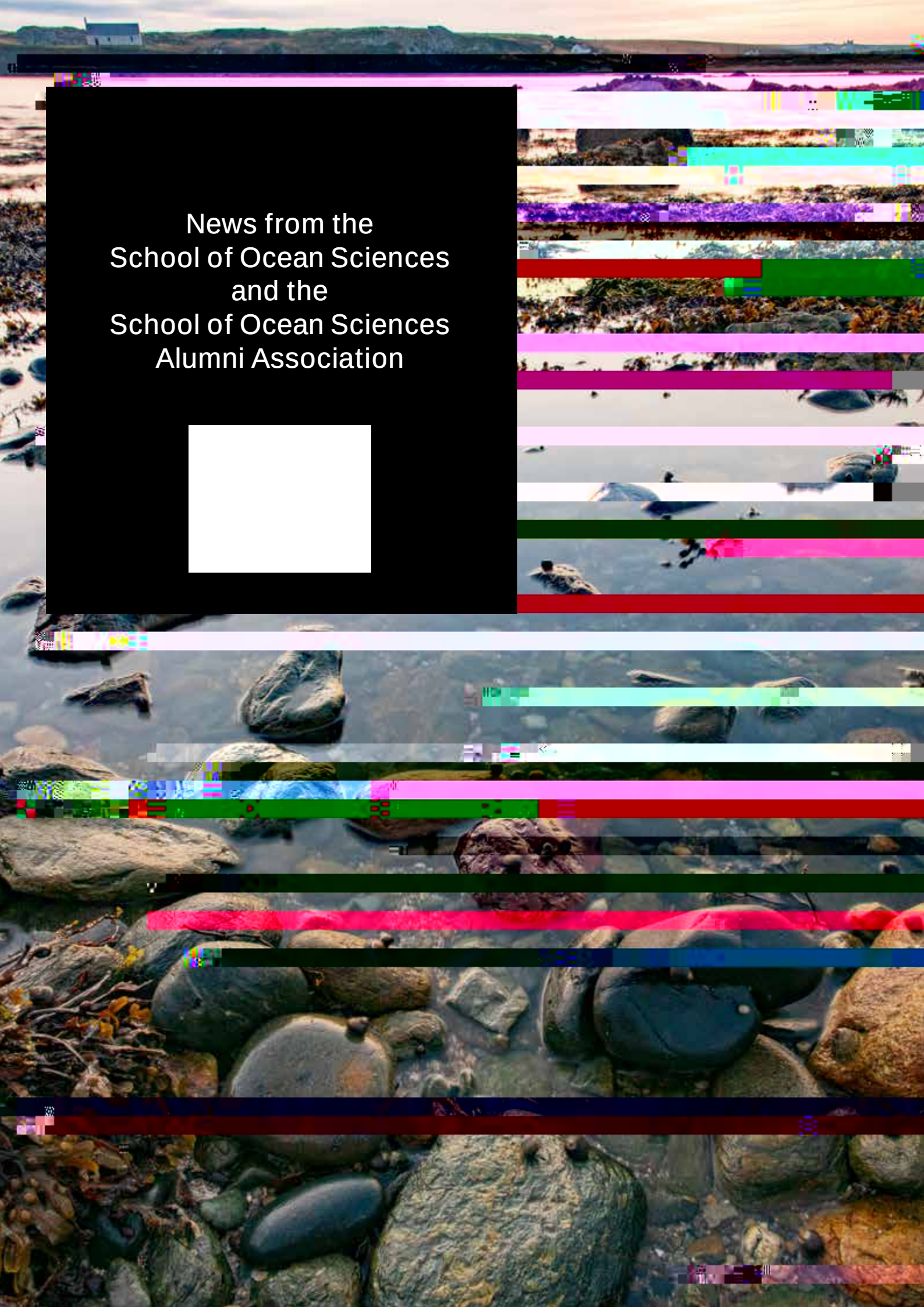


News from the
School of Ocean Sciences
and the
School of Ocean Sciences
Alumni Association

Please s 0 11B y001STgs/W PPEN Scienr PPEN (e

2021
OPEN DAYS

Virtual Open Days:
10 October, 31 October, 20 November

It at last looks as though we will able to return to Menai Bridge for September. I don't think any of us imagined in March 2020 that we would be off campus for so long, or that we would change the way we work so significantly. However, it is impressive how both students and staff have adapted to new ways of teaching and learning.

Some field visits and practicals went ahead involving much complex organisation by academic and technical staff, and this was evidently really appreciated by the students that were able to engage.

It was very challenging logistically to get everyone out on the Prince Madog this year and we are very grateful to OS Energy, our new partner in operating the vessel, for their efforts to maximise what was possible. A series of research cruises have been successful over the Spring, and we look forward to the improvements in infrastructure that OS Energy are making. Indeed, July 20th marks 20 years since the 'new' Prince Madog arrived in Menai Bridge, and you can read more about this later in the Newsletter.

Under the leadership of the Teaching and Learning team, staff have been wonderfully innovative in putting on virtual field trips and holding conferences, and in some, everyone was represented by an avatar! Indeed, the School has won a Digital Teaching and Learning grant to invest in some 360 degree cameras and virtual headsets to develop such experiences.

Lectures and meetings on Teams have worked surprisingly well, despite, even after a year of practice, the frequent calls of 'you're on mute ' and occasional wifi drop outs. It has not been easy lecturing to a large student audience that you cannot see or discussing matters with colleagues lurking behind profile photos, but we have become more proficient and efficient and improved the quality of supporting materials on Blackboard. We recognise too that while online learning has worked for many students, others have found it difficult to socialise with their class mates and to engage with online lectures, and therefore the reinvigorated Blackboard Collaborate sites have been extremely valuable.

Our students have come through a difficult time but with some excellent results, and we look forward to a grand Graduation celebration next year on an unprecedented scale, for what will be by then 3 cohorts of graduates.

Recruitment for 2021/22 looks good and we look forward to welcoming new students to Ocean Sciences. As we return to what we hope will be a more normal academic year, we will all build on our experiences, and for Semester 1 at least, continue to offer a hybrid teaching programme.

It is important that we remember that while we in the UK are benefiting from a successful vaccination programme, Co5 (orklf2ns istlo (omv20.2 (yr)-25 (y)s)15 (orieouspr)30 (

We will soon begin a period of research recovery and, in line with the University's 2030 Strategy, have ambitious plans for transformative and impactful research. This is an exciting but challenging time for marine research with various international initiatives: the UN Decade of Ocean Science for Sustainable Development 2021-2030; EU Healthy Oceans & Sustainable Blue Economies, UN Climate Change Conference COP26, Ocean Decade - Arctic Ocean Action Plan and the UK G7 Presidency, all aimed at addressing urgent global challenges such as climate change, food and water security.

You can read about some research highlights in this Newsletter and I am sure that we will see some exciting developments in the next few years.

I therefore wish to thank all of my colleagues for the work they have put in over the past year, and students for being patient and understanding. The Covid pandemic has been devastating, but we now need to focus our efforts on research that contributes to finding solutions for biodiversity loss, climate change, water quality, food security and wellbeing and in training the next generation of scientists to tackle these issues at local, regional and global levels.

Professor John Turner

PRIFYSGOL
BANGOR
UNIVERSITY

ALUMNI NEWS

So, it is some nine months since I penned my last Chairman's letter. I do not know about you, but it seems that for these past few months, life has felt a little like suspended animation whilst the global population wrestles with the uncertainty of the Pandemic. Luckily, here in the UK, the vaccination programme has proceeded with great alacrity and efficiency and, assuming no significant mutations develop, light is beginning to show at the end of the tunnel.

I regret to report that little has happened on the School of Ocean Sciences Alumni Association front. Hopefully, as the restrictions imposed by COVID 19 begin to ameliorate, we can begin to activate the Association again. In the meantime, I am pleased to report that alumni continue to contribute their news and articles to The Bridge for the consumption of the 'School' staff, students, and former students.

On a business front, I held my first face to face meeting for almost 18 months in June. So nice to meet people in person again. And I and several colleagues are involved in planning our first face to face seminar for nearly two years. This is under the auspices of the Society of Underwater Technology (SUT), Offshore Site Investigation & Geotechnics (OSIG) special interest group, and the one-day seminar is entitled Energy in Transition – its impact on offshore site investigation and geotechnics. This is to be held in Newcastle on 16th September 2021. https://www.sut.org/event/energy-in-transition-and-the-impacts-for-site-investigation-and-characterisation

Energy in transition is currently a hot topic in the marine environment and the 'Blue Economy' has never been more vibrant in my experience. As we seek to decarbonise and cut the use of oil and gas for energy and transport use, innovative technologies such as conventional offshore wind, floating offshore wind, tidal power, carbon capture and storage, blue and green hydrogen and decommissioning of marine infrastructure are all developing at an increasing rate. Never has there been a greater demand for marine geoscientists and marine environmentalists to drive and assist this blue/green revolution to ensure that future developments are efficiently and sustainably managed with due regard to the marine environment.

School of Ocean Sciences Alumni (SOSA) continue to contribute significantly to this changing marine-world, and I am pleased to report that I continue to regularly come across SOSA personnel who are helping to 'make a difference' to our planet.

Stay safe and keep well.

Mick Cook

Chairman School of Ocean Sciences Alumni Association (SOSA)

By Tim Whitton

On a sunny July 11th 2001 a 35m research vessel made its way down the Menai Strait for the first time to her new home berth at St George's Pier; it was the new Prince Madog.

Of course, this was not the first time a vessel called Prince Madog had entered the Strait, as this new vessel was replacing the previous ship of the same name which had served the University for the preceding 33 years.

Despite the original Prince Madog's (1968-2001) capable work in the training of the seg-going scientists and leading new discoveries in the science of shelf seas, a larger more capable vessel was needed to carry on its legacy after such a long and eventful career. To secure funding for a new ship the huge role that the old Prince Madog had played in the teaching and research of marine science was made clear, but also the lack of regional class research vessels in the UK fleet in the late 90's was also a major justification for funding a new vessel.

This situation largely remains the same today, with only the Prince Madog and the ageing AFBNI RV Corystes being classed as regional class vessels currently operating in the UK. The funding was secured in 1999 for the new ship along with Vopser Thornycroft's VT marine, who would be a joint partner in the vessel. The partnership was that in addition to the vessel days used by Bangor University for teaching and research, VT Marine could charter the vessel to third parties. A new facility called the Pier Pavilion was also built as part of the new vessel to house the associated equipment.

The hull was built in Romania and the ship finished in the Netherlands by Visser Ven Helder, now known as Damen.

Photo from the 11th February 2001 the day before the hull was launched in Romania.

The only major change to current Prince Madog's structure during the last 20 years has been the addition of a multibeam echosounder in 2012 mounted on a retractable mount near the bow (which has been upgraded with a new system last year). This year a German company called O.S. Energy (www.os-energy.de) have taken over from P&O Maritime (who took over from VT Marine in 2011) as joint venture partners with Bangor University, to lead the Prince Madog forward for many more successful years.

It is important to highlight that much of the vessel's success as a teaching and research platform has been down to the skilled crews and SOS seagoing technicians that continue to keep the ship and her scientific instruments working efficiently and safely for use by academics and students.

During the COVID restrictions imposed on the country over the last year, the Prince Madog has been able to continue operating with mitigating measures in place such as restricted use of shared cabins and staggered mealtimes. As the pandemic situation improves it is hoped the scientific berths can return to full capacity as soon as possible.

On a personal note, I have a big interest, some colleagues may argue obsession, with the Prince Madog. As an undergraduate student who wanted to become a marine biologist, going to sea on the Prince Madog was a dream come true and extremely exciting. For my MSc project, with the then Environment Agency Wales, I had the chance to lead a cruise to the Dee Estuary, and as a post-doc I have had the privilege of being able to use the vessel in my research with colleagues on the

Professor Ed Hill CBE (MSc and PhD Physical Oceanography) Chief Executive of the National Oceanography Centre (NOC):

"As we embark on the United Nations Decade of Ocean science this year, it is an especially fitting time to reflect on the 20 years of magnificent service to marine research, education and training provided by RV Prince Madog and to look forward to the important work yet to be done in the coming decade, - undertaking the science we need for the ocean we want – clean, healthy, safe, productive, predicted and inspiring".

"Mars, the Moon, and Venus are mapped in greater detail than the seafloor of our own planet. Independent assessments of the economic value of mapping the seabed around Ireland and Norway showed a return of between £4 and £6 for every pound invested. Surprisingly, only 40% of the UK's own Exclusive Economic Zone waters are well mapped with modern multi-beam echosounder methods and amongst the many and varied projects the Prince Madog has supported, the vessel has made important contributions to mapping and improving our understanding of habitats on the seafloor in the Irish Sea, especially around Wales."

Claire Medley (MSc Physical Oceanography 2019) Oceanographic Research Technician at Bermuda Institute of Ocean Sciences:

" I am incredibly grateful for the opportunities that studying at Bangor has afforded me, choosing to do a MSc in physical oceanography is one of the best decisions I've ever made! I am currently working in my dream job as an oceanographic research technician in Bermuda and that would never have been possible without the skills and experience I gained whilst at the School of Ocean Sciences. In particular, getting experience aboard the Prince Madog was certainly key in helping me get where I am today"

Dr Bee Berx (BSc Ocean Science, 2003; MSc, 2004; and PhD Physical Oceanography) Physical Oceanographer and Climate Change lead with Marine Science Scotland:

""I was lucky to be asked to join the RV Prince Madog while I was spending summer 2003 in Menai Bridge between my BSc and MSc degrees. The trip was to the Celtic Sea and despite being pretty sea-sick at the start, I must have left a good impression as I was asked for a few more trips in the next 12 months. The experiences on each survey were invaluable and gave me a passion for observations collected at sea. I also made connections with the turbulence and mixing research group where I ended up staying for my PhD (they were just like family!). During my PhD, the survey destinations were much less "far-flung" as the Madog was anchored between the Gazelle Hotel and Bangor Pier to collect measurements on the mussel beds."

Dr Charlotte Williams (MSc Physical Oceanography 2008) Research scientist at the National Oceanography Centre based in Liverpool:

"Working on the Madog was my first proper experience of being a seagoing ocean scientist (and also from suffering with sea sickness!). I now work for the National Oceanography Centre deploying their fleet of ocean robots from small (and bumpy) vessels, but working on the Madog carrying out seawater sample analysis whilst trying to pin down our equipment is one of my favourite memories of the realities of being an observational oceanographer!"

Bangor University have entered into a new joint venture to manage the Prince Madog Research Vessel as of 1st January 2021.

The Joint Venture, P. Madog Offshore Services Ltd (PRIMOS) is with O.S. Energy (www.os-energy.de). Based in Glückstadt, Germany and Newcastle, UK O.S. Energy are a family owned company who specialise in offshore wind industry and environmental survey work in the North and Baltic Seas, operating a fleet of vessels.

In addition to providing teaching opportunities to Bangor University students, the Prince Madog has a long pedigree of contributing to marine research in all disciplines. This is set to continue, with a renewed focus on the marine renewable energy industry, which the Prince Madog and scientists at the School of Ocean Sciences have been supporting through their research in recent years.

The Prince Madog is unique in the UK capable of taking students on multi-day teaching trips to the edge of the continental shelf and this will continue under the new joint venture.

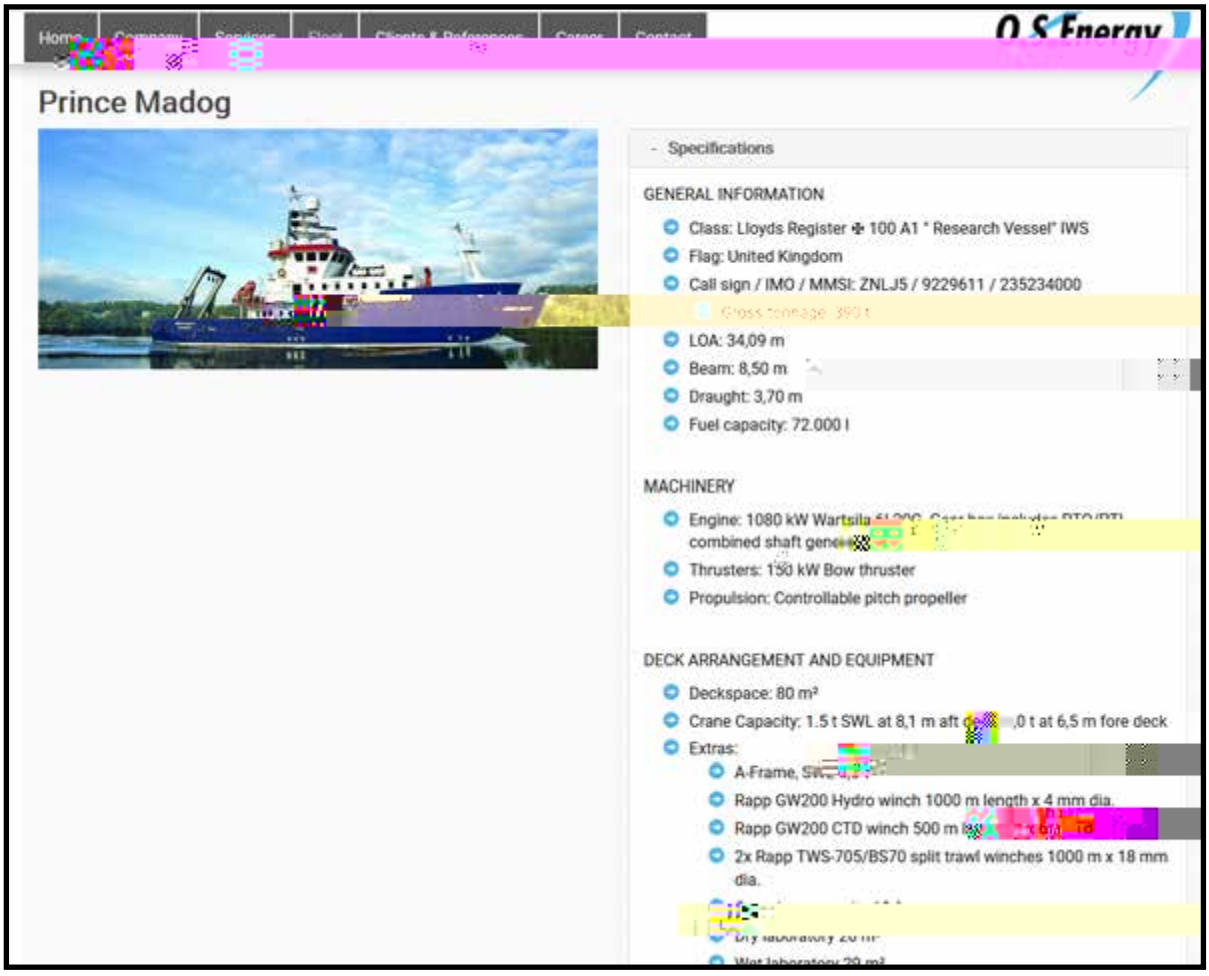
Professor John Turner, Head of the School of Ocean Sciences added:

"The ship is vital in supporting our training of the next generation of marine scientists. All of our undergraduate and postgraduate taught students (over 250 in a normal year) benefit from the unique experience of working on a research vessel at sea, using scientific equipment to assess processes, water quality and measure the abundance and distribution of marine life, and this part of the learning experience is set to continue."

Both parties also hope to extend their research in marine renewable energy, with the new joint venture leading to more technical work being carried out at the School of Ocean Sciences.

Vincent Nuernberg, Managing Director, O.S. Energy identified that:

"The Prince Madog is a perfect addition to our fleet which are operating in the European offshore wind oil and gas industries. We are proud to take over P&O Maritime Services' role as manager and join and Bangor University as new partners. Additionally, this new partnership provides easy access for the University to further specialist vessels in the fleet of O.S. Energy. We are looking forward to this long-term partnership."



I attended my undergraduate studies as a mature student. At the time I was an employee of the National Institute for Fisheries Research, in Mozambique.

I was privileged in having two scholarships, one immediately after the other, to do undergraduate and then PhD studies in the UK. When I finished my PhD studies in 1997 I returned home where I was offered a full time position at the Eduardo Mondlane University, Department of Physics, and given a task to set up an academic unit for Marine Sciences within the University. I accepted the challenge without

Did you know that the UK's first professional female marine scientist was a Bangor University graduate?

Rosa Lee (1884–1976) was born in Conwy and became the first woman to graduate in Mathematics from Bangor University, and then the first woman to be employed by the Marine Biological Association (MBA).

She was employed as a statistician initially working at the MBA's Lowestoft Laboratory but was later transferred to the Board of Agriculture and Fisheries. At that time, the board 'did not employ women scientists' however following protests by the MBA, Rosa was allowed to continue to work as a civil servant.

One of Rosa's many achievements was realising that growth rings on fish scales could be used to assess changes in fish growth rate with age. She published this discovery (to become known as the Rosa Lee Phenomenon) in Nature in 1920 and it continues to be relevant in fisheries science today.

Rosa's achievements are all the more impressive given her employment as a civil service scientist came to an end in 1919

All Ocean Sciences degree now have a work placement option. We are extremely grateful to the many alumni who have supported our students education by providing placement opportunities. Here we hear from Marine Biology undergraduate student Simon Wills about his work placement.

Every year the scallop populations in the Irish sea surrounding the Isle of Man are assessed to provide data on abundance and age structure to feed into stock assessments. As an Applied Marine Biology student I have spent my 'placement year' assisting with ecological and fisheries work at SOS. Here is my account of 10 days on the Prince Madog.

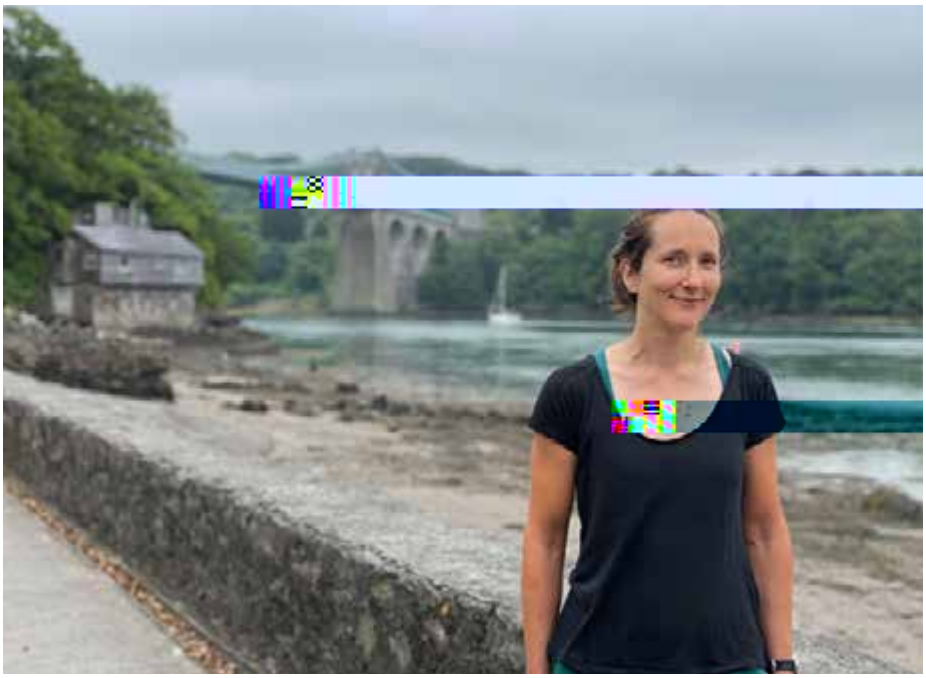
As someone petrified of getting seasick but also having a great desire to experience life at sea, the potential of participating in this survey was met with contrasting feelings. With the trip being delayed a day due to rough conditions, enough to not allow a crossing from Menai Bridge to the Isle of Man, prospects for me were fearful to say the least. Traveling over on the Wednesday (7th of April) proved manageable, with the ability to just sleep proving an effective repellent to seasickness. In an incredible turn

The whole process varied greatly in difficulty. With diff

School of Ocean Sciences holds an annual careers fair in March to highlight the huge jobs potential in one of the fastest growing sectors of the UK

Dr Sarah Zylinski

Lecturer in Marine Biology



Sarah is an outstanding member of the teaching staff whose work with students to improve their experience, and contributions to teaching development in Ocean Science, have been exceptional. Sarah receives consistent praise from both the students she teaches and those she encounters through her role as Director Student Engagement due to the extra distance she goes in her lecture presentations, supporting materials, guidance and support.

Sarah has led the School in improving module organisation (the most important predictor of student satisfaction). She developed a 'one-stop-shop' for information at a higher level than modules, and she has produced a series of generic skills guides pitched in student friendly language on topics which even include online etiquette. Her innovation is exemplified by a deep sea animal version of 'Top Trumps' which brings extreme marine habitat lectures to life by 'tentacle and jaw'.

Professor John Turner, Head of School of Ocean Sciences

Martyn Kurr (Teacher of the Year),

Jennifer Shepperson

With thanks to the Rajkumari Jones Student Bursaries, three of the top

I felt very honoured when I was informed that I had received the Rajkumari Jones Bursary earlier this year, and was very grateful to have been selected for it.

The Bursary has helped me throughout the year in many ways, the first and foremost among these being the fact that it provided me with a much greater degree of financial security and independence than I have previously experienced. This has let me

School Awards

Darbyshire Prize for the Best Final-Year Undergraduate Student in Physical Sciences: Rhian Tait (BSc Ocean and Geophysics)

Darbyshire Prize for the Best Postgraduate in Marine Physical Science: Maddy Shankle (MSc Physical Oceanography)

Jeremy Jones Memorial Prize for Best MSc Marine Biology: Jessica Harvey (MSc Marine Environmental Protection)

Gavin Borthwick Prize for Best First Year Student on a Marine Biological Degree: Stephanie Middleton (Applied Marine Biology)

Ray Delahunty Prize for Best First Year Student on Marine Biology and Oceanography: Emma Eddy

Rhain Tait: Rhian, from Northumberland, graduated with a first-class honours degree in Ocean and Geophysics.

Bella Ormerod: Bella, from Kent, is one of the first students to graduate on our new Physical Geography and Oceanography degree, and she graduated with first-class honours.

University Awards

John Robert Jones Prize for Most Meritorious Student (SOS nomination): Rhian Tait (BSc Ocean and Geophysics)*

Dan Lambley (BSc Marine Biology and Oceanography) on being nominated for the Staff Choice Award in this year's Undeb Course Rep Awards.

National Awards

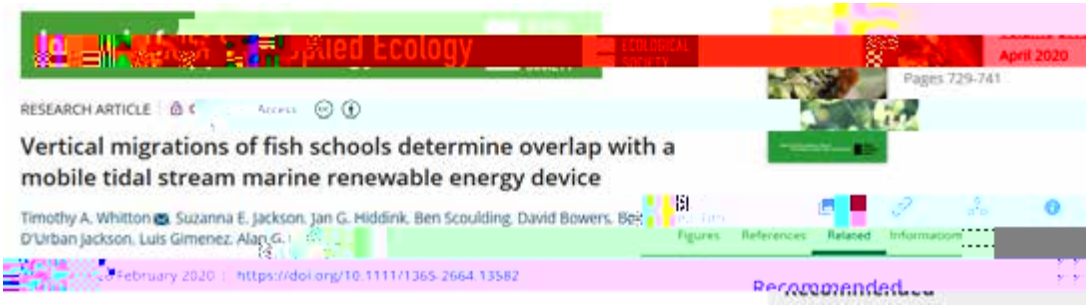
British Sedimentological Research Group: Best Undergraduate Sedimentology Project Award (SOS nomination): Bella Ormerod (BSc Physical Geography and Oceanography)*

Challenger Society for Marine Science: Best Final Year Project Student in Oceanic Research Award (SOS nomination): Lucas King (BSc Applied Marine Biology)*

British SOCIETY FOR GEOMORPHOLOGY Marjorie Sweeting Award (SOS nomination): Rhian Tait (BSc Ocean and Geophysics)*

* successful outcomes for these prizes will be reported in the next newsletter once the judging has taken place.

A link to the full paper on this work can be found below – a nice example of cross-disciplinary applied research from SEACAMS2/ CAMS/SOS team.



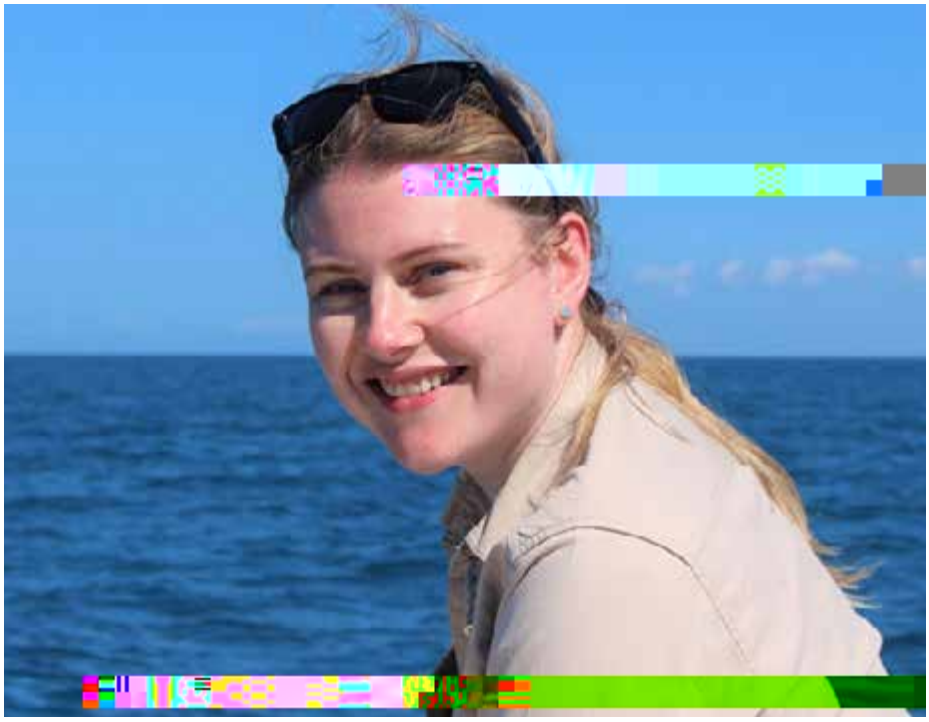
Whitton TA, Jackson SE, Hiddink JG, Scoulding B, Bowers D, Powell B, D'Urban Jackson T, Giminez L, Davies AG (2020) Vertical migrations of fish schools determine overlap with a mobile tidal stream marine renewable energy device. J Applied Ecology https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2664.13582

Karen worked as a postdoctoral researcher in SOS in the late 1980s when she worked with Des Barton and John Simpson on the fundamental studies of 'Island mixing', based around fieldwork in the Indian Ocean around the Island of Aldabra. This research which is still widely cited today and is relevant to on-going coral reef conservation work in Chagos by John Turner and Gareth Williams.

She left Bangor to take up a lecturing position at UEA in 1989, where she has stayed, becoming the first Professor of Oceanography in the UK in 2005. She specialises in autonomous underwater gliders and still maintains connections with SOS, most recently collaborating with Natasha Lucas and Tom Rippeth in the NERC OSMOSIS consortium and acting as PhD external examiner to Jess Mead Silvester.

Emma works for CVB JV Tideway East on major construction projects such as London's Cross Rail.

Emily Riley being presented with the Cooling Prize Certificate by BGA Vice Chair Professor David Toll



Bangor University Alumna, Emily Cunningham has been awarded a national Rising Star Award by WeAreTheCity together with the Royal Bank of Canada.

The Rising Star awards are sponsored by the Royal Bank of Canada and were introduced to showcase female talent below management level and create 100 new role models across different industries and professions every year.

The list of winners showcases remarkable women within the UK from across 20 categories representing different industries and professions. Emily is a winner in the Charity and Not-for-Profit category and was selected for her work at the intersection of ocean recovery and social equity.

Emily studied for a 4-year undergraduate-masters degree in marine biology at the School of Ocean Sciences between 2008 and 2012. After graduation, she went on to work monitoring sea turtles for the Ascension Island Government, develop pioneering marine conservation projects for The Wildlife Trusts and lecture on an international marine ecology field course in Indonesia.

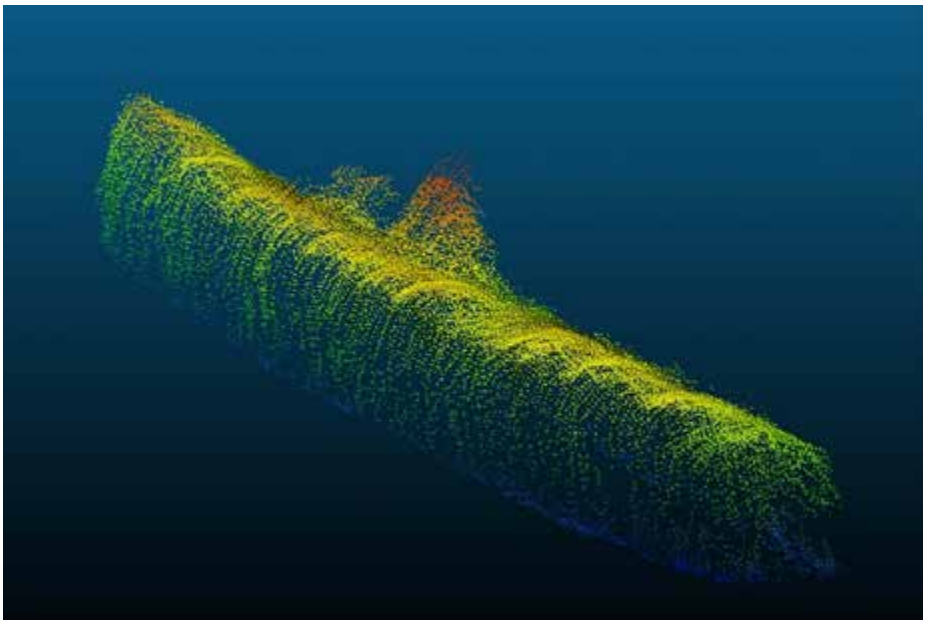
Emily believes a more inclusive and effective version of marine conservation is possible and has secured over £5m funding for projects which work with underserved communities to enable them to access, enjoy and protect their local ocean. She currently leads the work of the Local Government Association's Coastal Special Interest Group, is a Trustee of the Marine Conservation Society and is co-Secretariat to the All-Party Parliamentary Group on Coastal Communities. She is an active mentor and role model for young conservationists and in 2020 was named as a global "30 under 30" for environmental education.

Follow Emily's adventures on social media, search Marine Biology Life.

In December, the UK Antarctic Place-names Committee celebrated the 200th anniversary of the discovery of Antarctica by honouring 28 scientists and explorers who have made a significant and sustained contribution to Antarctic science.

During the pandemic we have maintained a weekly ‘virtual’ research seminar series.

Earlier in the year we had great pleasure in welcoming back two Ocean Sciences alumni,



Survey work carried out by Bangor University's School of Ocean Science's research vessel the Prince Madog, led to the discovery of submarine U87 which was damaged and sunk on Christmas Day 1917.

The discovery was part of a joint research project with the Royal Commission on Ancient & Historic Monuments in Wales's Heritage Lottery funded project: Commemorating the Forgotten U-boat War around the Welsh Coast, 1914-18.

In the documentary Dr Mike Roberts and collaborators locate the wreck of U87 in the Irish Sea, from the University's research vessel the Prince Madog, explaining how it was sunk after being attacked by an Allied warship.

The programme is part of a ten-part series, a coproduction between National Geographic Channel, More 4, Welt 24 (Germany) and Discovery Science in the US. It was originally broadcast on More 4 with further broadcasts planned for other channels all around the world.

A team of staff from the School of Ocean Sciences led by Dr Mike Roberts have been using a multibeam sonar system and the latest imaging techniques to reveal underwater wrecks from the Great War.

Dr Mike Roberts explains why the information is so valuable:

"While these wartime relics can provide valuable information to historians and archaeologists, they may also help lead to the birth of a new industry. The data we're collecting is providing unique insights into how these wrecks influence physical and biological processes in the marine environment. This information is being used to support the ambitions of the marine renewable energy sector."

"These images of wrecks reveal how the tide and currents have removed or deposited sediments and how the presence of these structures on the seabed have influenced these processes over time and what might happen when artificial structures are placed in the same or similar areas of seabed."

The editorial team of the leading international peer review journal Sedimentology have chosen their favourite papers of 2020 and they include two by SOS authors.

These include a paper written by Megan Baker as part of her PhD thesis: “Mixed sand–mud bedforms produced by transient turbulent flows in the fringe of submarine fans: Indicators of flow transformation”.

Many will remember that huge iceberg (twice the size of Luxembourg) which broke away from Antarctica and was adrift in the South Atlantic in the spring.

Physical Oceanographer Natasha Lucas recently left Ocean Sciences to take up a position as the British Antarctic Survey, and was quickly involved in using underwater gliders to track the melting of the iceberg. This work has recently been recognised as BAS awarded Natasha a “Going the Extra Mile” award with the following citation:

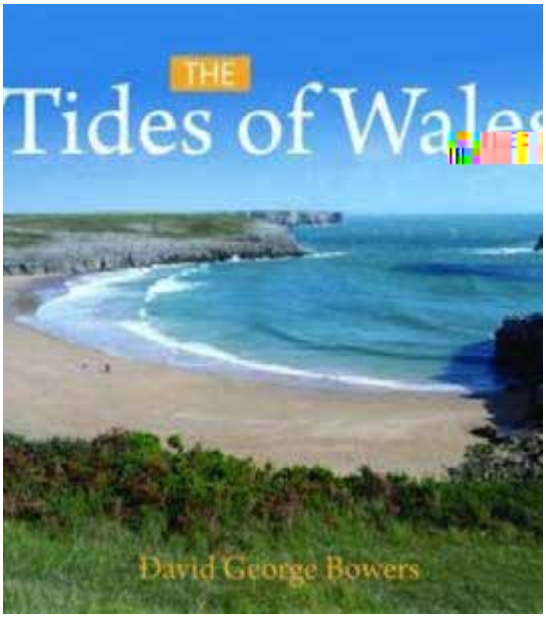
“Natasha has shown exceptional dedication to the job, going above and beyond to ensure successful delivery of data from the A68 iceberg project, strongly benefitting several members of the Polar Oceans and Ecosystems teams. In particular she very quickly gained the skills required to pilot our underwater gliders and collect high-quality scientific data; and has led the writing of

Yueng-Djern Lenn and Mattias Green have pulled together a new book in the '30-second' series, titled the "30-second Ocean: 50 key ideas about the sea's importance to life on earth".

The book includes contributions from leading ocean scientists across the global including a number from SOS staff – Martin Austin, Line Cordes, Laura Grange, Adel Heenan, Hilary Kennedy, Tom Rippeth, Martin Skov, David Thomas, Svenja Tidau, James Waggit and Sophie Ward - and SOS alumni including Meg Baker (now at Durham University), Claire Mahaffey (now at Liverpool University) and Sebastian Rosier (now at Northumbria University).

The book not only explores the ocean, from the surface to the sea-bed and the life it supports, from microscopic plankton to blue whales, at also introduces contemporary issues such as global warming, ocean acidification and plastic pollution. It also looks beyond the planet Earth with section exploring the potential for life elsewhere in the oceans of the solar system.

The book, "The 30 Second Ocean" (Eds: Yueng-Djern Lenn and Mattias Green), is published by Ivy Press (ISBN: 978-0-7112-5266-0) and is available from all good bookshops.



Meanwhile Dave Bowers has published his second book on tides, this time covering "The Tides of Wales".

You might think it's unusual to see a book about the tides of a single country, however along Wale's relatively short coastline you will find some of the greatest tidal phenomena on our planet. It has the largest rise and fall of the tide in the world, outside of Canada and you'll find several tidal bores (on the Dee and Severn Estuaries). Of course, Wales also hosts the School of Ocean Sciences, a world leader in many aspects of tidal research for over half a century!

Dave's book is called "The Tides of Wales" (ISBN: 978-1-84524-314-2) and published by Carrag Gwalch. It is available online as well as many bookshops around Wales or can be order directly from the publisher: www.carreg-gwalch.cymru

George Floodgate who died on 1 March this year, aged 96, taught marine microbiology to generations of students at Menai Bridge; towards the end of his career, he co-founded, with his good friend and colleague Sinclair Buchan, the School of Ocean Science Alumni Society and produced the first editions of the Newsletter.

George was born in Fulham in London on the last day of 1924 and grew up enjoying an active life taking camping and hiking holidays in Scotland

Karin Lochte:

“When I arrived as a German student in Menai Bridge for a MSc Course I wanted to work with zooplankton, but it was the fascinating world of microbes to which George Floodgate introduced us that finally became my field of research. He showed us that it was microbes and not whales that are the real giants in life in the ocean. George gave me much freedom in my PhD work in the “Front Study Group” and his guidance in the microbiology seminars helped us to look beyond the narrow range of our specialized field of research. I am still fond of his saying “There are no stupid questions!” and he urged us to ask ALL questions. The time in Menai Bridge was a time of intense learning, of meeting wonderful scholars and a time that shaped my scientific life. I am very grateful for this time and to George for his advice.”

Carol Turley:

“My time at Menai Bridge made some of my fondest memories and friends. What a wonderful place to study! George gave me the freedom to study, explore and make my own mistakes (and discoveries). I also learnt from George that it was good to speak up and admit you didn’t understand something wherever you are – be it at a seminar or a UN Summit - as it was quite likely that no one else did either! It set me up to keep on learning and to enjoy every minute of it. Thank you George!”

George enjoyed cooking (which he learnt from his mother when young), watercolour painting and gardening but most of all he enjoyed his extended family. He was the loving husband of Mary, devoted father of Elizabeth, Catherine, Charles and Kirsteen, proud grandfather of Rosie and Ben and great grandfather of Caitlin and Ruben.

Dr Carol Turley, OBE, Head of International Affairs, Plymouth Marine Laboratory, UK.

Dr. Madilyn Fletcher, Distinguished Professor Emerita, former Director of the School of the Earth, Ocean, and Environment and the Baruch Institute, University of South Carolina, USA.

Prof. Dr. Dr.h.c. Karin Lochte, former Director of the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Germany.

Dr. Sinclair Buchan, former Senior Lecturer in Oceanography, School of Ocean Science, Menai Bridge, UK.

Dr. Dave Bowers, former Professor of Physical Oceanography, School of Ocean Science, Menai Bridge, UK.

ALUMNI NEWS

Alumnus supports the Covid effort

“I am Manuel and studied Marine Biology/ Zoology between 2003 and 06. While I normally work at Cefas as a Senior Marine Biologist, I have put my marine profession aside for 3 months and joined the COVID-19 response at the Government Office for Science. I joined the SAGE delivery team and provided as much support as I could during this time to ensure all the tasks were done to very tight turnaround times. It was such a privilege to work within this dedicated team to support the Covid response.”

The bridge in this image is the try bridge in KL Forest Eco Park, a tiny patch of original rainforest left in the urban city centre of Kuala Lumpur and the nearest rainforest to where I live.

“I’m happy to report that I’m still a contaminated land scientist with Shell, currently helping Shell’s Pakistan businesses protect beneficial aquifers underlying assets, where capacity in environmental services is underdeveloped.

At the same time, I will also be helping to ensure that the management of contamination risks remain robust, even as the company shifts to deploy the energy transition in an integrated way with the pace of the different countries. It will be interesting to watch new businesses emerge and out-of-the-box transition solutions come up – from the usual susp0 3 rpusgies or data science, but even more interestingly from unlikely professions like contra0 3 and client management!

P.S. I’m still blogging about sustainability & insightful travel on Teja on the Horizon.”

Plover Rovers - the 100% volunteer-run charity that is putting on marine science communication events all around the English coast

Bangor alumni Scott Xavi Gudrich (MSc Marine Environmental Protection, 2018) set up the marine science communication charity Plover Rovers (Reg.No. 1189992) a year ago when he was furloughed from his laboratory job as a benthic taxonomist. Now, he manages 50 volunteers and has more than 20 coastal science education

COVID-19, which likely will not allow for large groups to congregate this summer, is an opportunity to foster a more personal connection between local citizens and scientists, bringing them together on a level playing field, in an intimate setting, enabling person-to-person conversations with potentially transformative power for both sides.

2. Art and Emotion: We collaborate with artists to provide an additional, more emotive access to the topic, making our events interesting to an audience beyond the usual bracket of the academic white middle class. We believe that art can aid science communication by providing both an active and immersive “discovering nature” experience as well as enhanced emotional connectivity to the natural world. While there still is a need to better understand the role of emotions in decision making and behaviour, a large-scale emotional re-connection with the natural world is an obvious necessity if we want to successfully work for transformative behaviour change on a societal level.

3. Activism: We collaborate with local organisations to provide people with the possibility of local engagement. We believe knowledge should not be separated from activism and we therefore want our events to double as volunteer recruitment for locally active community groups. This direct pathway from an informative setting to active engagement will help consolidate the acquired theoretical knowledge and build a sustained connection to the natural environment.

4. Heritage and Storytelling: Our person-to-person approach will allow us to collect stories from local people to explore and understand their connection to the sea, their concerns, hopes and visions, acknowledging that we need to understand how our audiences connect with a particular topic, place or issue in order to deliver science communication which can illicit behaviour change. This active listening approach is key to achieving the UN Decade’s goal of “identifying and overcoming barriers to behaviour change required for a step change in humanity’s relationship with the ocean”.

Running a project with no budget and no paid employees creates a special kind of beauty. The absence of money frees up creativity. We invite all our volunteers to add their vision to our mission, we experiment, we value the process as much as the end result, we are learning from each other constantly and we have fun! Of course, there are challenges. I’m managing 50+ volunteers, they all have their own lives and changes in their professional circumstances can see them suddenly having to step down, leaving things to be rearranged, loose ends to be tied up, big shoes to be filled. But nothing energises me as much as meeting all these brilliant people ready to dedicate their precious time to this project, I’d take that over line managing a bunch of employees who just do their duty because they get paid for it anytime!

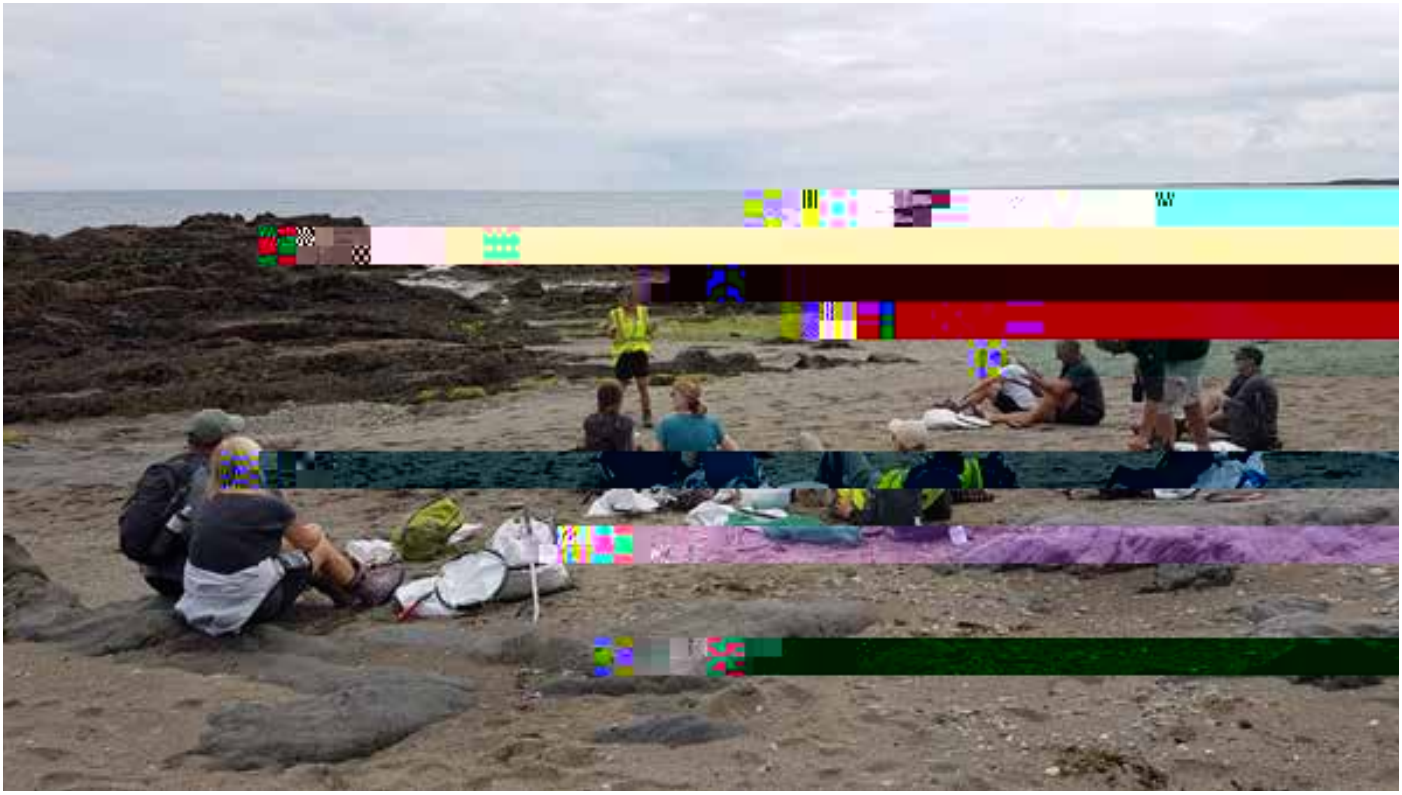
So, would I do it all again? In a heartbeat!

I’ve met so many amazing people, both among our volunteers and among our local and national partners. I’ve made connections which will no doubt be with me for years to come. And hopefully I’ve managed to create a space where young scientists can let their creativity run free, share their passion and gain valuable skills for their future, as well as an opportunity for people to connect with marine science.

Catch up with our “Talking the Coast” project at www.plover-rovers.com

If you are interested in my band The Lürxx (music for the planet): www.the-lurxx.com “

ALUMNI NEWS



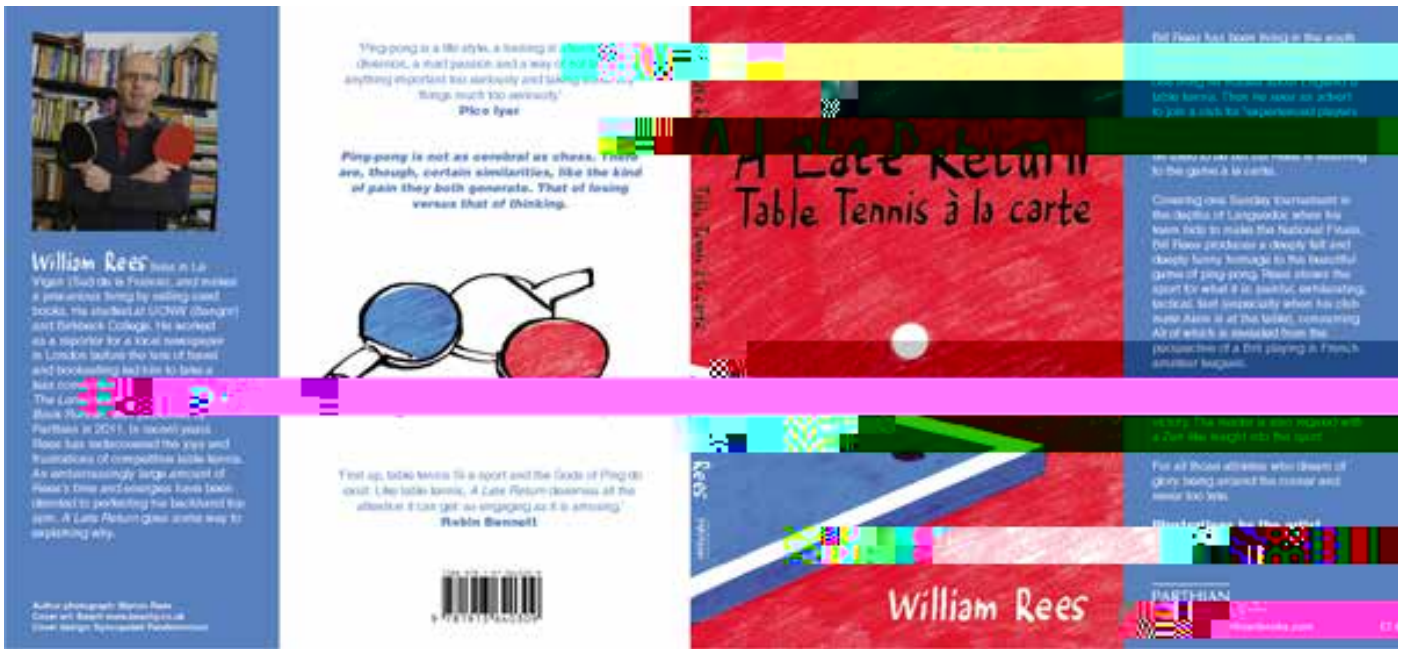
“Plover Rovers seagrass talk Looe”: Kicking off the summer with our first in-person event in Looe, talking about the importance of seagrass meadows.

Volunteers June 21: Big shoutout to all our awesome volunteers!

ALUMNI NEWS

ALUMNI NEWS

“My main news is that my book, A Late Return: Table Tennis à la carte, about playing competitive ping pong in France was published in June.



It got a nice review in Wales Arts Review: https://www.walesartsreview.org/a-late-return-table-tennis-a-la-carte-by-william-rees-books

My photo of a bridge is in the commune of Mandagout, a village in the Cevennes to where I have just moved.”

Alumna edits new book - Molluscan Shellfish Aquaculture: A Practical Guide

Molluscan Shellfish Aquaculture: A Practical Guide is a readable, useable, and comprehensive source of information for all those interested in growing shellfish.

Can You Help?!

“I recently found this photo of half of the class of 1974 on the Prince Madog about to set sail on a day’s on sea research. Many didn’t look quite so perky on the return later that afternoon!

I’m on the left, Tony Richards second from right. Anne far right. Where are the others these days? I wish I also had one of the other half of the class, maybe someone does. It would show Carol Turley, Mary Armstrong and Richard Prickett.”

Please email alumni@bangor.ac.uk if you recognize any of the faces or have a copy of the other photo!

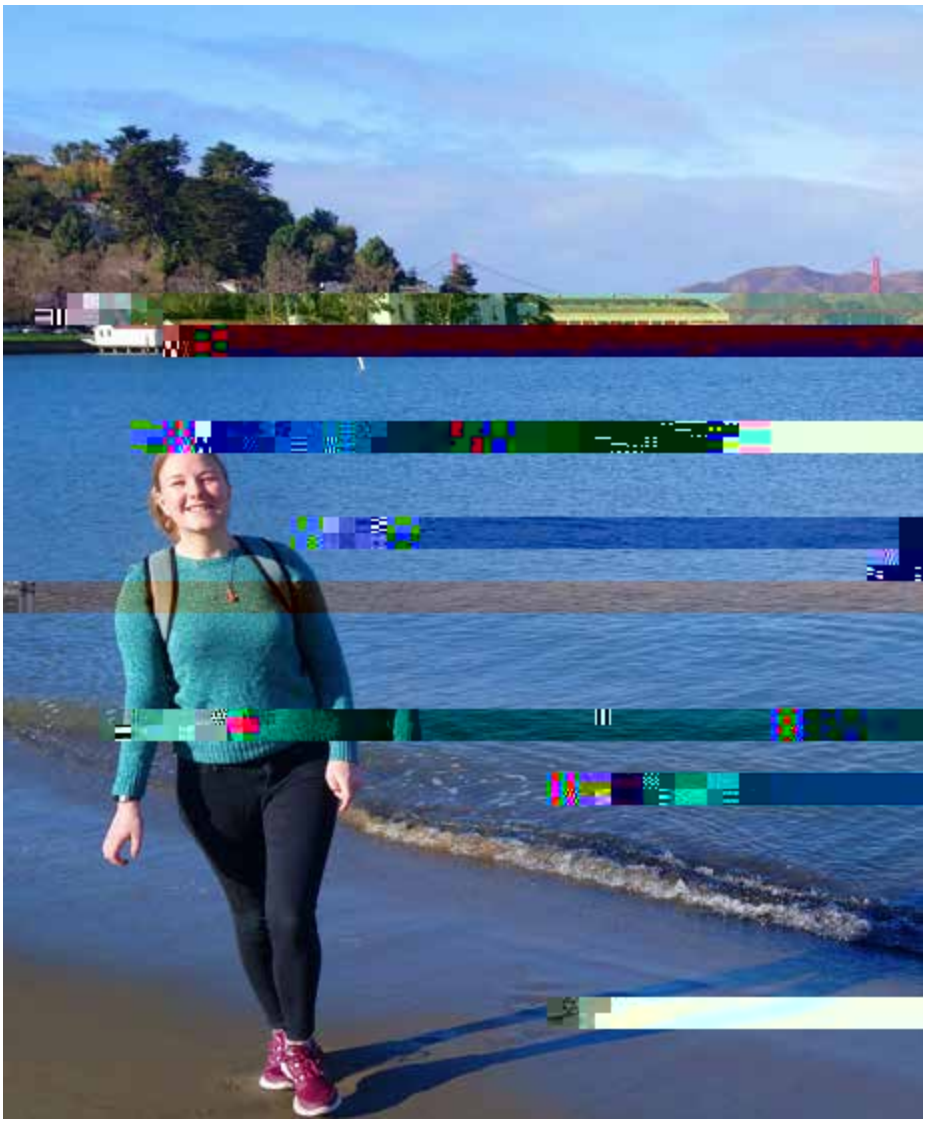
I knew during my time in at university that I wanted to work with sharks after graduating, it was one of the reasons I chose Bangor and the Marine Vertebrate Zoology program.

Since graduating in July 2019, I spent some time at Bimini Sharklab (BBFS). I was involved in assisting with their current research projects and getting involved with their outreach activities, such as public tours and Google Hangouts.

My experiences at the Sharklab have led to further work in education and outreach, as I had the opportunity to work with Jillian Morris and Sharks4Kids, providing lessons about sharks and marine conservation to schoolchildren and young people around the wor,1s1s1(es at the Sharklab ha)10.2

ALUMNI NEWS

Since graduating the MSc Physical Oceanography degree in 2017, I completed a PhD in Mathematics at the University of Exeter, titled ‘The Climate Response to Antarctic Sea Ice Loss’ successfully defending it in March 2021.



My thesis encapsulated both the atmospheric and oceanic response to sea-ice loss in the Southern Hemisphere, using state of the art Met Office ocean-atmosphere coupled and atmosphere-only climate models.

My new results have demonstrated that Antarctic sea-ice loss may trigger a greater and more spatially extensive response than previously estimated, much like that found for the Arctic. Atmospheric and ocean warming, in addition to changes in circulation and precipitation, were found both locally in the Southern Hemisphere and globally, reaching as far north as the Arctic. This work also helped to establish the important roles of the ocean in this response.

As of January 2021, I am now a postdoctoral researcher in the department of Meteorology at University of Reading. My work is assessing the climate response to the Weddell Sea Polynya, a deep convection drive area of open water in a area that would otherwise be sea ice. It has only appeared twice since the beginning of the satellite record 50 years ago.

Congratulations to Bangor graduate Rosemary Jagus, now a professor in molecular genetics at the Institute of Marine and Environmental Technology, University of Maryland Center for Environmental Science on being awarded the annual President’s Award for Excellence in Application of Science for her contributions to increasing the diversity of scientists working in the marine sciences over the past two decades.

Unprecedented observations could revise forecasts of the demise of sea ice in the Arctic Ocean.

A team led by physical oceanographers at Scripps Institution of Oceanography at the University of California San Diego, which includes SOS's show in a new study how plumes of warm water are flowing into the Arctic Ocean from the Pacific Ocean and accelerating sea ice melt from below.

The new research published in Nature Communications describes so-called underwater "heat bombs" as one of a number of mechanisms by which global warming-driven encroachment is changing the nature of the Arctic Ocean faster than nearly any other place on Earth. It adds to a growing body of evidence that suggests that Arctic sea ice, a source of global climate stability,

These pockets known as “heat bombs” are just stable enough to be able to last for months or years, swirling far north beneath

Geoscientists in SOS are playing a critical role in paving the way for one of the world’s biggest wind farms off the coast of North Wales.

Why not begin to make plans to get some vitamin-sea and watch out for one of the 30 species of whale and dolphin that visit UK waters once travel restrictions are lifted?

Researchers here at Bangor University have teamed up with wildlife charity Sea Watch Foundation and tidal energy technology developer Nova Innovation to develop Sea Watcher, a free mobile phone app that allows anyone to register a sighting of whales, dolphins and other megafauna spotted from land or a boat in UK waters.

, heading up the research project for SEACAMS 2 at Bangor University said:

"Once people can travel freely again, we hope that people will enjoy spotting for whales and dolphins around the UK, offering them fresh air, and an activity where they can learn and relax at the same time. We have developed the Sea Watcher app so that anyone can contribute to marine mammal research in the UK"

Relax and enjoy some vitamin-sea!

The best places to watch for whales and dolphins are headlands, islands and elevated clifftops where you can get a good view over a wide expanse of sea whilst calm weather conditions will help. There are many hotspots for seeing dolphins in the UK: Cardigan Bay and the Pembrokeshire islands in West Wales, Mounts Bay in Cornwall, the Northumbrian coast in NE England, the Hebrides, Northern Isles and Moray Firth in Scotland, to name just a few, but you may be lucky anywhere around the coast of Britain. If you are planning a walk along the coastal path or a relaxing watch out to sea from a clifftop, a pair of binoculars will help you, and once you have downloaded it, the Sea Watcher app will take you through the steps to log your sighting. The app has plenty of photographs and videos to help you identify the different species.

The value of local knowledge

Dr Kate Smith, Environmental Manager for marine renewable energy company Nova Innovation and SOS alumni, is also collaborating on the project and said:

"Making sure that our tidal turbines do not harm the marine environment is incredibly important for Nova. Environmental impact considerations, including potential effects on marine mammals and other marine life, are a key part of the consenting and design process for our renewable energy projects. We're delighted to be involved this research, to explore how local knowledge, which is often overlooked in consenting and design processes, can help assess and minimise the impacts of our projects on marine mammals."

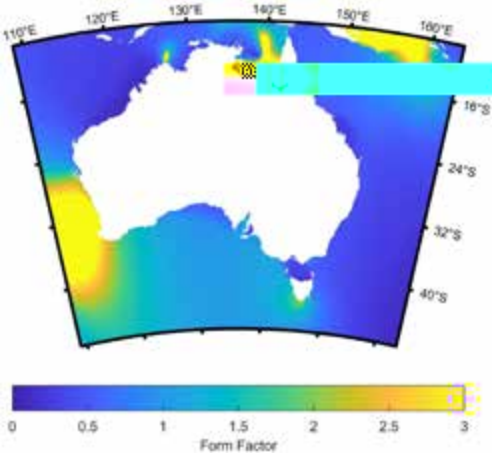
It is well known that being by the sea can positively contribute to our wellbeing, so next time you are near the sea, make sure you have downloaded the Sea Watcher app, grab your binoculars, and enjoy some vitamin-sea!

www.seawatchfoundation.org.uk/sea-watcher-app

The IPCC predicts increases in global mean surface temperatures of 3.7 to 4.8 °C by 2100, and while an overall loss of global biodiversity has been widely predicted, climate change is expected to have a more insidious effect

We found that nest temperatures in the nests we shaded and split in half were 1.1 °C and 0.5 °C lower than control nests on average respectively. This was enough to reduce the sex ratio (the percentage of female hatchlings produced) by 24% for split clutches and by 68% for shaded clutches. Splitting the clutches in half also reduced the metabolic heat produced by the incubating clutch itself in the later stages of incubation. Importantly, we found no difference in hatching success between our treatments, and hatchlings were the same size and mass, and could run and right themselves as quickly between treatments. These metrics are important for avoiding predators and survival after hatching.

Our results show that these simple tools can effectively change the thermal properties of incubating turtle nests at very little cost and investment of personnel, and could be useful in the future to mitigate the effects of climate change without compromising hatch success or the fitness of hatchlings. It's important to have a better understanding of sea turtle population dynamics before we intervene though, as sex ratio is such a fundamental life-history parameter, but as the effects of climate change accelerate, these tools may offer managers effective and easily implementable ways to support conservation of these endangered species."



Research undertaken by SOS students research projects have helped to characterise the potential for the generation of renewable tidal energy around Australia and has now been published in the Journal Renewable Energy.

The work, undertaken by Alana Griffiths (2020, BSc Ocean and Geophysics) and Aaron Furness (2020, MSc Marine Renewable Science), used computer models to predict the tides around Australia and to use the results to demonstrate the feasibility for the extraction of renewable energy from the potential energy associated with the tide (called the tidal range resource) from different locations around Australia.

The new research has shown that Australia has the potential to generate 2004 TWh/yr, which accounts for 22% of the global resource. This actually exceeds Australia's total energy consumption for 2018/2019 (1721 TWh/yr), implying that tidal range energy has the potential to make a substantial contribution to Australia's future electricity generation. However, the new work shows that much of the resource is concentrated away from the major centres of population, in the sparsely populated Kimberley region of Western Australia. However, the tidal range resource in this region presents a renewable energy export opportunity, connecting to markets in southeast Asia.

Neill, S., Hemer, M., Robins, P., Griffiths, A. & Furnish, A. (2021). Tidal Range Resource of Australia. Renewable Energy, 170, p. 683-692.

A mysterious tale of disappearing marine sponges in a unique lough in county Cork could yet have a happy ending.

A team led by Bangor University alumni and Te Herenga Waka–Victoria University of Wellington Professor of Marine Biology, James Bell and including from the School of Ocean Sciences has been studying the loss of possibly

Bangor ocean scientists have contributed to an assessment of climate change impacts on the seas and coasts of the UK Overseas Territories.

Launched at an online event in July by the Marine Climate Change Impacts Partnership, Professor and Dr of the School of Ocean Sciences were co-authors of the Indian Ocean Region Assessment which highlighted 4 priorities:

1. Changes in coral species;
2. Changes to coral reef habitats;
3. Changes to reef islands and sandy beaches and
4. Impacts on the provision of natural coastal protection and island resilience to sea-level rise.

Over 60 scientists and managers working with all 14 UK Overseas Territories undertook similar regional reviews, which include the Polar Territories (South Georgia and the South Sandwich Islands (and the British Antarctic Territory); Territories in the South Atlantic (Ascension Island, Falkland Islands, Tristan da Cunha and St Helena Island); Caribbean & Mid Atlantic (Anguilla, Bermuda, the British Virgin Islands, the Cayman Islands, Montserrat, and the Turks and Caicos); Mediterranean (Gibraltar and Akrotiri and Dhekelia in Cyprus) and the Pitcairn Islands in the Pacific.
https://www.mccip.org.uk

Although most territory islands are small, the UK has the fifth largest total area of ocean, and the territories contain 94% of the UK's biodiversity. The UK Government has committed to establishing a 'Blue Belt' of over 4 million square kilometres of marine protected areas.

Lord Goldsmith, Minister for the International Environment and Climate, announced:

"The impacts of climate change pose a serious threat to the vital marine ecosystems of the UK Overseas Territories and the coastal communities that depend directly on them. By undertaking research, such as the reports published today, we can close gaps in our understanding and gain valuable insights that will help us to meet the global challenge of protecting and restoring the health of our ocean."

Professor John Turner stated:

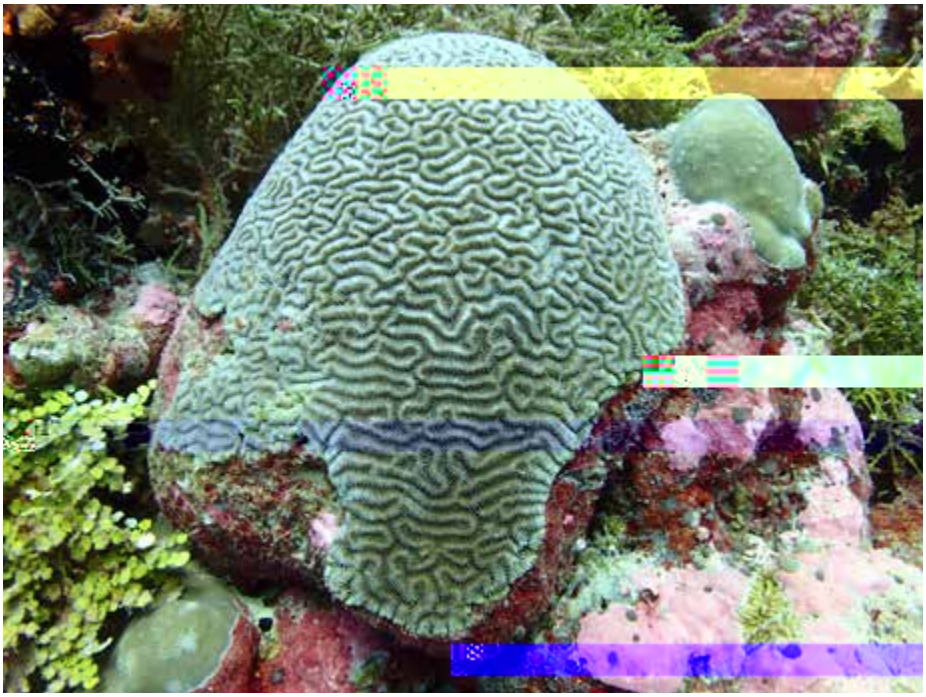
'As a fully protected Marine Protected Area in a remote location, the Chagos Archipelago in the Indian Ocean provides a globally important reference site for climate change impacts that can give insights into vulnerability and resilience in the absence of other anthropogenic stressors''.

Reef structural complexity provides habitat for other species such as fish and invertebrates on healthy reefs (Image: J.Turner)

Internationally collaborative research funded by the Bertarelli Foundation has shown that corals are being affected by climate change, with an increase in bleaching, caused by heat stress, as well as physical damage from storms. Several coral species are already becoming rare or significantly reduced in abundance. A reduction in reef habitat quality and structural complexity because of rising temperature, physical damage and ocean acidification, all cause impacts on other organisms, such as fish. Changes in sea level, storms and waves and large-scale ocean processes could affect reef islands and beaches, especially on eroding coasts exposed to the prevailing winds. These changes may affect the provision of critical terrestrial habitat, natural coastal protection, and island maintenance.

In this crucial year of global climate action (which includes the UN Climate Change conference COP26 in November), these assessments highlight climate challenges in the UK Overseas Territories and showcase working with nature to build resilience to climate change.

Citation: Koldewey, H., Atchison-Balmond, N., Graham, N., Jones, R., Perry, C., Sheppard, C., Spalding, M., Turner, J. ,and Williams, G. (2021) Key climate change effects on the coastal and marine environment around the Indian Ocean UK Overseas Territories. MCCIP Science Review 2021, 31pp.doi: 10.14465/2021.orc06.ind Submitted: 062021 Published online: 21stJuly 2021.



Ctenella chagius – an endemic coral to the Chagos Archipelago which is very vulnerable coral to heat stress caused by climate change. (Image: J.Turner)

Koldewey, H., Atchison-Balmond, N., Graham, N., Jones, R., Perry, C., Sheppard, C., Spalding, M., Turner, J. ,and Williams, G. (2021) MCCIP Science Review 2021, 31pp.doi: 10.14465/2021.orc06.ind Published online: 21stJuly 2021.

Fairchild, T. P., Bennett, W. G., Day, B., Skov, M., Moller, I., Beaumont, N., Karunarathna, H. & Griffin, J. N., 7 Jul 2021, In : Environmental Research Letters. 16, 7, 074034.

O'Donoghue, T., Davies, A. G., Bhawanin, M. & Van Der A, D. A., 6 Jul 2021, In : Coastal Engineering. 169, 103954, 19 p., 103954.

Hold, N., Robins, P., Szostek, C., Lambert, G., Lincoln, H., Le Vay, L., Bell, E. & Kaiser, M., 2 Jul 2021, In : Fisheries Oceanography. 17 p.

Clarke, L., Elliot, R. L., Abella-Perez, E., Jenkins, S., Marco, A. & Hawkes, L. A., 1 Jul 2021, In : Journal of Applied Ecology. 58, 7, p. 1466-1476

Scourse, J. D., Chiverrell, R. C., Smedley, R., Small, D., Burke, M. J., Saher, M., Van Landeghem, K., Duller, G. A. T., O'Cofaigh, C., Bateman, M., Benetti, S., Bradley, S. L., Callard, S. L., Evans, D., Fabel, D., Jenkins, G. T-H., McCarron, S., Medialdea, A., Moreton, S., Ou, X., Praeg, D., Roberts, D. H., Roberts, H. M. & Clark, C., Jul 2021, In : Journal of Quaternary Science. 36, 5, p. 780-804 25 p.

Bloor, I., Duncan, P. F., Dignan, S., Emmerson, J., Beard, D., Gell, F. R., McHarg, K. & Kaiser, M. J., 30 Jun 2021, In : Marine Policy. 132, 104649.

Woodworth, P. L., Green, M., Ray, R. D. & Huthnance, J., 18 Jun 2021, In : Ocean Science. 17, 3, p. 809-818

Saha, K. & Van Landeghem, K., 17 Jun 2021, ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences. Copernicus GmbH, Vol. 3-2021. p. 29-35

Baas, J., Tracey, N. D. & Peakall, J., 9 Jun 2021, (Accepted/In press) In : Journal of Sedimentary Research.

Vaughan, E. J., Wynn, P. M., Wilson, S. K., Williams, G. J., Barker, P. A. & Graham, N. A. J., 4 Jun 2021, (Accepted/In press) In : Marine Pollution Bulletin.

3.

Lewis, M., O'Hara Murray, R., Fredriksson, S., Maskell, J., de Fockert, A., Neill, S. & Robins, P., 1 Jun 2021, In : Renewable Energy. 170, p. 1308-1323

Neill, S., Hemer, M., Robins, P., Griffiths, A. & Furnish, A., 1 Jun 2021, In : Renewable Energy. 170, p. 683-692

Nash, J. Z., Teahan, W., Bond, J., McCarthy, I., Pierce, I., Case, M. & Mowat, R., 1 Jun 2021, In : Ocean Engineering. 229, 108650.

Torres, G., Chamantier, G., Wilcockson, D., Harzsch, S. & Gimenez Noya, L., Jun 2021, In : Ecologyr

Jackson-Bué, T., Williams, G., Walker-Springett, G., Rowlands, S. & Davies, A., 15 May 2021, In : Remote Sensing in Ecology and Conservation.

Micaroni, V., McAllen, R., Turner, J., Strano, F., Morrow, C., Picton, B., Harman, L. & Bell, J. J., 14 May 2021, In : Science of the Total Environment. 789, 147708.

Giglio, C., Benetti, S., Sacchetti, F., Lockhart, E. A., Clarke, J. H., Plets, R., Van Landeghem, K., Ó Cofaigh, C., Scourse, J. & Dunlop, P., 12 May 2021, (Accepted/In press) In : Boreas.

Tidau, S., Smyth, T., McKee, D., Wiedenmann, J., D'Angelo, C., Wilcockson, D., Ellison, A., Grimmer, A., Jenkins, S., Widdicombe, S., de Moura Queiros, A., Talbot, E., Wright, A. & Davies, T., 1 May 2021, (Accepted/In press) In : Methods in Ecology and Evolution.

Baas, J. H., Best, J. & Peakall, J., 1 May 2021, In : Geology. 49, 5, p. 493-497

Cooper, H. M., Bennett, E., Blake, J., Blyth, E., Boorman, D., Cooper, E., Evans, J., Fry, M., Jenkins, A., Morrison, R., Rylett, D., Stanley, S., Szczykulska, M., Trill, E., Antoniou, V., Askquith-Ellis, A., Ball, L., Brooks, M., Clarke, M. A., Cowan, N., Cumming, A., Farrand, P., Hitt, OookdAmc, Br.,7C., ScS, A, Oookos, J., Wott, A.WinPictos, J28 Apr (y 2021, InEckhar)-25h(S, A)-10 (ysR)25 n : Scienc.,

Muñoz-Ramirez, C., Beltrán-Concha, M., Pérez-Araneda, K., Sands, C., Barnes, D., Roman-Gonzalez, A., De Lecea, A., Retallick, K., Van Landeghem, K., Sheen, K., Gonnelli, K., Scourse, J. D., Bascur, M. & Brante, A., 24 Mar 2021, (Accepted/In press) In : Revista de Biología Marina y Oceanografía.

Benetti, S., Chiverrell, R. C., Ó Cofaigh, C., Burke, M., Medialdea, A., Small, D., Ballantyne, C., Bateman, M., Callard, S. L., Wilson, P., Fabel, D., Clark, C., Arosio, R., Bradley, S. L., Dunlop, P., Ely, J. C., Gales, J., Livingstone, S. J., Moreton, S., Purcell, C., Saher, M., Schiele, K., Van Landeghem, K. & Weilbach, K., 18 Mar 2021, (Accepted/In press) In : Journal of Quaternary Science.

Leal, I., Bohn, K., Hawkins, S. J., Jenkins, S., Flores, A. A. V. & Tremblay, R., 4 Mar 2021, In : Marine Ecology Progress Series. 661, p. 147–161

Reed, A. J., Godbold, J., Grange, L. & Solan, M., Mar 2021, In : Global Ecology and Biogeography. 30, 3, p. 578-589

Reed, A. J., Godbold, J., Solan, M. & Grange, L., 25 Feb 2021, In : Frontiers in Marine Science. 8, 576746.

Farkas, K., Hillary, L., Thorpe, J., Walker, D., Lowther, J. A., McDonald, J., Malham, S. & Jones, D. L., 23 Feb 2021, In : Methods and Protocols. 4, 1, 10 p., 17.

Alexander, J., Malham, S., Smyth, D., Webb, J., Fidler, D., Bayford, P., McDonald, J. & Le Vay, L., 15 Feb 2021, In : Aquaculture. 532, 736003.

O'Cofaigh, C., Callard, S. L., Roberts, D., Chiverrell, R., Evans, D., (n)15 (arof i. : Glofm subtr)25.1 (opical and t)10 (emp)10 (eonuBa)10 , D., Burk

Ford, H., Gove, J. M., Davies, A., Graham, N. A. J., Healey, J., Conklin, E. & Williams, G. J., 1 Feb 2021, In : Ecography. 44, 2, p. 188-198 11 p.

King, N., Wilmes, S-B., Smyth, D., Tinker, J., Robins, P., Thorpe, J., Jones, L. & Malham, S., Feb 2021, In : ICES Journal of Marine Science. 78, 1, p. 70-81 70-81.

Schulz, K., Janout, M. A., Lenn, Y-D., Castillo, E. R., Polyakov, I., Mohrholz, V., Tippenhauer, S., Reeve, K., Holemann, J., Rabe, B. & Vredenborg, M., Feb 2021, In : Journal of Geophysical Research: Oceans. 126, 2, e2020JC016375.

Smyth, D., Hayden-Hughes, M., Alexander, J., Bayford, P. & Kregting, L., 31 Jan 2021, In : Regional Studies in Marine Science. 41, p. 101585 1 p.

Lawrence, A., Heenan, A., Levine, A., Haddaway, N., Powell, F., Wedding, L., Roche, R., Lawrence, P., Szostek, C., Ford, H., Southworth, L., Sannassy Pilly, J., Richardson, L. & Williams, G. J., 25 Jan 2021, In : Environmental Evidence. 10, 3.

Austin, M. & Walker-Springett, G., 13 Jan 2021, In : Journal of Coastal Conservation. 25, 1, 10.

Mazor, T., Pitcher, C. R., Rochester, W., Kaiser, M., Hiddink, J. G., Jennings, S., Amoroso, R., McConnaughey, R. A., Rijnsdorp, A., Parma, A., Suuronen, P., Collie, J., Sciberras, M., Atkinson, L., Durholtz, D., Ellis, J., Bolam, S. G., Schratzberger, M., Couce, E., Eggleton, J., Garcia, C., Kainge, P., Paulus, S., Kathena, J. N., Gogina, M., van Denderen, P. D., Keller, A., Horness, B. & Hilborn, R., Jan 2021, In : Fish and Fisheries. 22, 1, p. 72-86

Jones, D. L., Baluja, M. Q., Graham, D. W., Corbishley, A., McDonald, J. E., Malham, S. K., Hillary, L. S., Connor, T. R., Gaze, W. H., Moura, I. B., Wilcox, M. H. & Farkas, K., 20 Dec 2020, In : Science of the Total Environment. 749, 141364.

Green, M., Davies, H., Duarte, J., Creveling, J. & Scotese, C., 4 Dec 2020, In : Nature Communications. 11, 1, 6227.

Atkinson, J., King, N. G., Wilmes, S. B. & Moore, P. J., Dec 2020, In : European Journal of Phycology. 56, 6, p. 1591-1600

Ward, S., Scourse, J., Yokoyama, Y. & Neill, S., Dec 2020, In : Continental Shelf Research. 205, 104165.

Rippeth, T. & Green, M., 16 Nov 2020, Oceanography and Marine Biology: An Annual Review. Hawkins, S. J., Allcock, A. L., Bates, A. E., Evans, A. J., Firth, L. B., McQuaid, C. D., Russell, B. D., Smith, I. P., Swearer, S. E. & Todd, P. A. (eds.). Taylor & Francis, Vol. 58. p. 319-350

Galley, T., Beaumont, A., Le Vay, L. & King, J., 15 Nov 2020, In : Aquaculture. 528, 735504.

Green, M. & Pugh, D., 9 Nov 2020, In : Ocean Science. 16, 6, p. 1337–1345

Barnett, R., Charman, D. J., Johns, C., Ward, S., Bevan, A., Bradley, S. L., Cambridge, K., Fyfe, R. M., Gehrels, W. R., Hatton, J., Khan, N. S., Marshall, P., Maezumi, S. Y., Mills, S., Mulville, J., Perez, M., Roberts, H. M., Scourse, J. D., Shepherd, F. & Stevens, T., 4 Nov 2020, In : Science Advances. 6, 45, eabb6376.

Monkman, G. G., Hyder, K., Kaiser, M. J. & Vidal, F. P., 1 Nov 2020, In : ICES Journal of Marine Science. 77, 6, p. 2245-2254 10 p.

Greenfield, L. M., Hill, P. W., Seaton, F. M., Paterson, E., Baggs, E. M. & Jones, D. L., 1 Nov 2020, In : Soil Biology and Biochemistry. 150, 108007.

Tiktak, G., Butcher, D., Lawrence, P., Norrey, J., Bradley, L., Shaw9.e-8007.1 (.1 ((e)25 & Megat)15 (er)5 (cher)75 . L)-10 (., 1 No)20 ES Jour5 (,a