

SUMMER  
2022

# THE BRIDGE

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



PRIFYSGOL  
**BANGOR**  
UNIVERSITY

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## THE BRIDGE Summer 2022



Please send your School of Ocean Sciences news to:

[l.haggett@bangor.ac.uk](mailto:l.haggett@bangor.ac.uk)

Please send your School of Ocean Sciences Alumni Association (SOSA) news to:

[l.haggett@bangor.ac.uk](mailto:l.haggett@bangor.ac.uk)



## Letter from the Editor

Welcome to the summer edition of "The Bridge". We are delighted to bring you the latest news from the School of Ocean Sciences and from some of our many alumni.

We are particularly proud to share some of the achievements of our students, who despite a difficult couple of years continue to excel and inspire. You can also read about some of our recent research highlights and our successes in national league tables.

As we move into the 'living with COVID' phase of the pandemic we also hope to meet a lot more of you face to face during the coming year.

Also if you have any news you would like to share please contact Laura Haggett using the e-mail address above.

Best wishes,

**Tom Rippeth, Editor**



Don't forget that you can catch up on previous editions of "The Bridge" online by visiting:

<https://www.bangor.ac.uk/oceansciences/newsletter.php.en>

## 2022 OPEN DAYS

Saturday, August 20  
Sunday, October 9  
Sunday, October 30  
Saturday, November 26



# MESSAGE FROM HEAD OF SCHOOL



Despite the immense challenge thrown at us by Covid, I can proudly say that staff in Ocean Sciences have delivered almost all of our teaching 'in person and face to face' over the last 9 months.

Staff have simultaneously livestreamed lectures, and, as we have done for a number of years, recorded our lectures and posted these online shortly after delivery. As a result, our students, whether in the lecture theatre, working remotely or even overseas, will have been able to access the majority of the teaching delivered on their programmes. This has required staff to use new digital tools alongside traditional teaching methods, and has of course required students to learn to engage with us in new and different ways, and some innovative practices will no doubt become embedded in our teaching. The technical staff have risen to the challenge of some substantially complex logistics to make practical and field classes happen, but it is now good to see the 'Perspex' screens and distancing signs coming down across the campus. Covid has been devastating and our thoughts are with those who have lost family and friends and those who have found the last two years especially difficult. We appreciate that completing a University degree through these times has not been straightforward and commend your efforts.

This July sees the unique situation of us welcoming back our Graduands from the last three years to a series of Graduations in July. We really look forward to celebrating with you, your families and friends on what will be a great occasion – especially for

those of you who have waited for three years! We will also celebrate the success of three members of staff being awarded Teaching Fellowships at the ceremonies. We are delighted to share your successes (some of which you can read about in the following pages).

Speaking of successes, and as many of you look to employment, it is significant to know that the Research Excellence Framework has reaffirmed Ocean Sciences as one of the leading Ocean Science research departments producing research and impact of world leading quality (again, you can read more in this Newsletter about this). At the same time, we are delighted that the Whatuni Awards 2022 show that our students rate us very highly, and we are seeing strong recruitment for the coming year.

We remain grateful to our Alumni for their continued support of our current students through careers advice, scholarships, and placement opportunities. These are essential components to continuing to ensure a strong Bangor community of Ocean Scientists across the World. As restrictions lift, we will be planning more Alumni events and hope that some of you will return to celebrate the *Prince Madog's* 21st Birthday in September.

**Professor John Turner, Head of School**



# MESSAGE FROM THE CHAIR OF SOSA



After two years of social, medical and business interruption, it is great to report that life, for most of us, has returned to what may be considered 'normal' again. That said, in business terms, I doubt life will ever be quite the same as it was before COVID. Online meetings and presentations are now the norm. However, whilst this may increase efficiencies and enable us to manage work-life balance better, my personal feeling is that we should never let online interaction replace face-to-face human interaction per se. Humans are social animals and communicate and work far more effectively when dealing with each other on a personal basis.

The easing of COVID restrictions early in 2022 in England enabled Oceanology International to take place as a live event in March in London. This was a very successful event and enabled those working and studying in the offshore environment to meet and interact in person for the first time in several years. Personally, I was lucky enough to be invited to present at the conference held alongside the exhibition. One talk was on careers in marine science and the other was on the impact of the Energy Transition on offshore site investigation and survey – the good and the not so good. A primary conclusion from my talk highlighted the burgeoning need for trained marine scientists in the development of offshore wind – a key part of the global energy transition strategy. The demand for such scientists currently exceeds supply at current levels of development and all forecasts show that offshore wind is due to increase exponentially in the next few years as such developments spread internationally. The need for marine scientists has never been greater in the 40+ years I have worked in the offshore sector.

Another conclusion from my presentation related to the need for further innovation in offshore site investigation. There is great scope for industry, academia and government co-operation to ensure that we develop offshore renewables as quickly and efficiently as possible and to effect a rapid energy transition to assist in the arresting of climate change through the decline in use of hydrocarbon sources of energy in favour of renewable sources of energy.

As highlighted in my previous letters, I regret to report that little has happened on the School of Ocean Sciences Alumni Association front these past few years. However, as the Pandemic begins to subside, we are hopeful that we can begin to re-activate the Association again.

Indeed, I held a very encouraging online meeting with the new (well not so new now) Director of Alumni and Development – Taryn Rock – earlier this year where we discussed a range of things the Association could do in the future including forging closer links between the School of Ocean Sciences (SOS) and industry and preparing for a long overdue Alumni reunion. The Association Committee (SOSA) has not met for several years due to COVID and some members have now retired or are unable to continue supporting the Association. Interestingly, I have had a lot of interaction with many alumni over the past year or so and intend putting together a new committee later this year. Originally, the committee comprised mainly those living in and around Bangor as meetings were always held in the SOS. However, with the advent of the use of Teams/Zoom it will be possible, in the future, to hold such meetings virtually, thereby opening-up membership of the committee to a wider range of Alumni. If you are interested in getting involved – it is not at all onerous – please contact me <mailto:mick@mickcook.com>+44 7593 233633. I look forward to a deluge of interest!

Best wishes,

Mick Cook

Chairman - School of Ocean Sciences Alumni Association ( [mick@mickcook.com](mailto:mick@mickcook.com) )

# SCHOOL NEWS

## School of Ocean Sciences leads UK Oceans Research

Every 6 to 7 years the UK Government assesses the quality of the research coming out of the UK's universities, through a peer review process called the Research Excellence Framework (REF).

The most recent results, for the period 2014-21 were published in May 2022, have shown the School of Ocean Sciences to be in the top two Ocean Science departments in the UK in terms of research quality (we finished top for research power and second for the grade point average metrics).

The REF panel judged 43% of our scientific papers to be world leading, with 95% classified as world leading or internationally excellent. It also judged the research environment within the school as being one of the best in the UK, comparable to that found at Oxford and Durham Universities. **These results highlight not only that our students are being taught by experts who are pushing back the frontiers of science, but also that they are learning within a top ranked research environment.**

The REF panel also placed the impact of environmental research at Bangor to be top of the 39 Universities who were assessed under the "Earth Systems and Environmental Sciences" unit of assessment. Impact is a measure of how our research is impacting on society, such as our work in tracking COVID spread through waste water.

*REF2021 Ranking for impact of research beyond academia for Earth Systems and Environmental Sciences.*

*In REF terms impact is defined as an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia.*

Rank		Score
1	<b>Bangor University</b>	<b>3.92</b>
2	<b>University of Lancaster</b>	<b>3.83</b>
2	<b>University of Newcastle</b>	<b>3.83</b>
2	<b>1. University of York</b>	<b>3.83</b>
5	<b>University of East Anglia</b>	<b>3.75</b>
5	<b>Manchester Met University</b>	<b>3.75</b>
5	<b>University of Manchester</b>	<b>3.75</b>
5	<b>University of Exeter</b>	<b>3.75</b>
9	<b>University of Reading</b>	<b>3.71</b>
	<b>UoA weighted mean</b>	<b>3.49</b>

Overall, Bangor University established itself as number 2 in Wales for research quality, after Cardiff University.

Welcoming the results Vice-Chancellor Iwan Davies said:

*"These results put Bangor University at the forefront of developing significant responses to the challenges of the world we live in, namely sustainability, low carbon, preventative health, promoting technology and innovation, and culture and the arts.*

*It is at the edge of disciplines where researchers achieve real innovation and Bangor's interdisciplinary globally significant research is demonstrating real-world impact.*

*Our ranking of second overall in Wales clearly demonstrates our commitment to supporting a quadruple helix of research, industry expertise, government and civic engagement benefiting the economy and society in North Wales and beyond."*



## Lira Lewis is guest speaker at Buckingham Palace

Earlier this summer 3rd year MSci Marine Biology student Lira Lewis was a guest speaker at the Gold Duke of Edinburgh (DofE) award celebration held at Buckingham Palace. We are delighted that Lira has been able to find time to tell us about the experience and how DofE helped her in her journey to study here at Bangor University.

Lira told us: *"I spoke about my own experiences as Gold award holder and ambassador, I told the new award holders to find their next advantage and aim for the stars as they were bound make difference. Standing there on the West terrace of Buckingham Palace I wondered to myself how did I get here, and I was filled with so much gratitude to have made it to this point where I could talk so many young people.*



*Remembering how before participating in the DofE awards I just wanted to hide as a 13-year-old who was bullied for their dyslexia and dyspraxia who thought that I had no prospects of ever being academic as result. I saw DofE as a chance to be something more. Through Bronze part of the award, I learnt that was not alone that we all had exceptions and we could encourage each other to be our self. Silver taught me, I could make a difference setting up a poetry club that became a safe place for self-express and raised over £100 for the Children in Syria appeal as well as the British heart foundation. And Gold that taught me three very important lessons; the first when you take a wrong turn and accidentally end up at the top of a mountain, at least you have seen a view that no one else has. Secondly, talk about your dreams, find your passions, they will become a reality with hard work and determination. Finally, encourage others to reach their dreams and passions because that is how we make a legacy not just a difference.*

*That is how with support from others I had become a Duke of Edinburgh's Award ambassador and am now about to enter my 4th year of my Marine Biology Masters degree. The rest of the day at the palace*

*was as surreal as you may expect as HRH Prince Edward, Earl of Wessex spoke about how happy he that so many young people had completed the award and thanked me for speaking. I also met Hannah Cockcroft who was truly inspirational and shared her story of becoming the Women's world record hold for 100-800 metres wheelchair racing. The Weasley twins from Harry Potter, James and Oliver Phelps were also equal parts hilarious and kind. All in all, I spent the day feeling joyous and overwhelmed, it was truly amazing to hear so many young people who had their own dreams and DofE staff that make everything possible behind the scenes. I have such amazing memories of the day and hope more young people do the award as result because it can lead to some wonderful advantages."*

## Welcome back to Iestyn



We are pleased to welcome back **Iestyn Woolway** to the school. Iestyn graduated from Bangor with a BSc in Ocean Sciences (2010) followed by the MSc in Physical Oceanography in 2011. He then moved to University College London to complete a PhD in Physical Limnology in collaboration with CEH Lancaster.

He currently holds a prestigious NERC independent research fellowship, having previously held a Marie Skłodowska-Curie fellowship at Dundalk Institute of Technology (Ireland) and the European Space Agency at the ESA Climate Office. His research combines in-situ, satellite and model simulations to answer key questions about the impacts of climate change on lakes. He joins SOS academic staff as a Reader.

In commenting on his return Iestyn said:

*"The School of Ocean Sciences at Bangor is a global leader in the field, and I was excited to join the outstanding team here in Menai Bridge. I also think there are*

*great opportunities across the college to further develop Bangor into a major centre for Earth Sciences, and I'm excited to be a part of this. Finally, North Wales is one of the best places to live in the UK, with stunning beaches, mountain ranges, and a national park. In my opinion, this is the perfect location for combining work and family life."*

## School Research Seminars see return of alumni

Weekly research seminar to which all staff and students are invited are a key part of our research environment. In the past months we have been delighted to welcome back Bangor alumni **Bill Austin** (PhD Geological Oceanography), **Maddie Shankle** (MSc, Physical Oceanography), **Julia Rulent** (MSci Physical Oceanography) and **Simon Davy** (PhD Marine Biology) back to Bangor to contribute to our weekly seminar series.



**Bill Austin** is now a Professor at St Andrew's University, and his research is directed primarily at reconstructing past climate change from marine records, with a particular focus on the last 20,000 years. In the past last decade he has been using tephrochronology to constrain North Atlantic stratigraphies.



**Maddie Shankle** is now studying for a PhD at St Andrew's University where her research focuses on the role of the Southern Ocean (the ocean around Antarctica) in atmospheric CO<sub>2</sub> change over the last ice age. She has already published her first paper, in Nature!



**Julia Rulent** is now completing her PhD at the National Oceanography Centre in Liverpool where she is studying the feedback processes and the interactions between the waves, tides and surges during storms in the UK, with the aim of understanding how the coastal water level can vary during extreme events around the UK.



**Simon Davy** is Professor of Marine Biology at the School of Biological Sciences, Te Herenga Waka Victoria University of Wellington in New Zealand, where he has been Head of School for the last 7 years. Simon's research interests focus on the cnidarian-dinoflagellate symbiosis that underlies the success of coral reefs. Simon is President of the International Symbiosis Society and will be hosting the next International Coral Reef Symposium in New Zealand.

# NEW PROJECTS



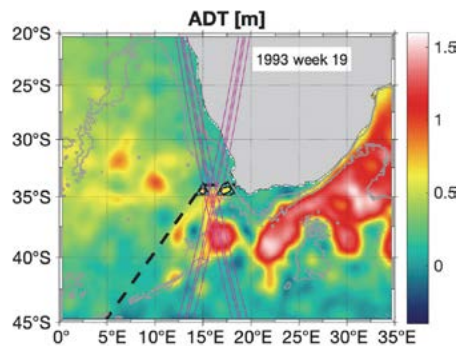
Image: Jake Davies

## Sharks inspiring Action and Research with Communities

We are delighted to be part of a new project SIARC (Sharks Inspiring Action and Research with Communities) - this exciting collaborative project will catalyse links between fishers, researchers, communities and government to safeguard elasmobranchs and support a green recovery in Wales. Key goals include:

- Management of two Special Areas of Conservation improved by addressing critical data gaps using fisher-integrated research
- Opportunities for involvement in marine conservation in Wales are diversified
- A new appreciation of the underwater environment in Wales is generated
- The next generation are inspired to connect with marine conservation

Keep an eye on social media for further updates. #ProjectSIARC is a collaborative project led by the Zoological Society of London and Natural Resource Wales with partners including the North Wales Wildlife Trust, the Shark Trust, and the Welsh Federation of Sea Anglers.



## Focusing on the import of Indian Ocean water into the South Atlantic in large eddies known as Agulhas Rings

The Indian Ocean water is an important source of heat for the Atlantic Ocean and is critical part of the global meridional overturning circulation. This new NSF-NERC funded project measures the exchange between these two ocean basins with a novel suite of moorings, autonomous and profiling instruments. Bangor scientists, led by **Dr Yueng-Djern Lenn** will be responsible for quantifying the vertical mixing of heat and salt taking place in the Cape Cauldron area off South Africa.



## Investigating Coastal Seas as Carbon sinks

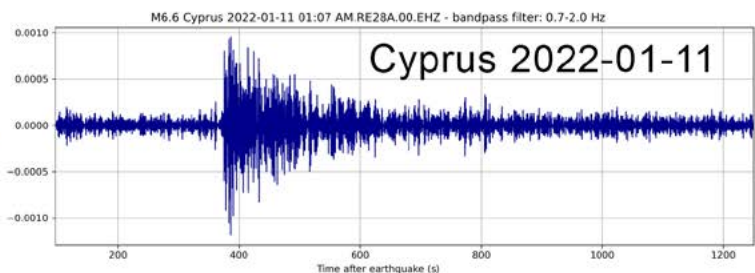
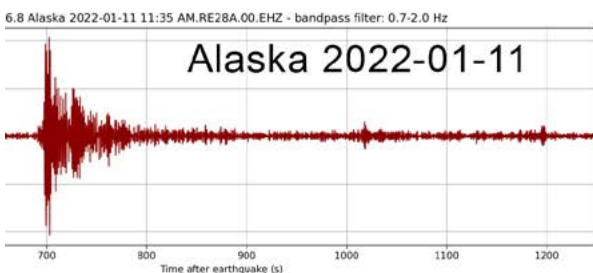
We are delighted to report that the School of Ocean Sciences is joining forces with a team of global experts in a new 5-year project to build a greater understanding of the properties and capabilities of the ocean and its continental shelves in the earth's carbon cycle.

Commenting, **Dr Sophie Ward** who leads Bangor's contribution, said:

*"We urgently need to better understand seabed carbon stores on a global scale since the oceans play such an important role in the Earth's carbon cycle. Until now, little has been known about the full capacity of coastal waters and continental shelves to store carbon. This research will be a real game-changer in understanding how the oceans can contribute to solving the climate crisis."*

## Monitoring Earthquakes

Earlier in the year we setup a new seismometer in Ocean Sciences in collaboration with Geoscientists at Manchester University. Within a few days we had detected not one, but 2 earthquakes! One in Alaska and one in Cyprus!





## Glaciers film commended at Geographical Association awards



A *Time for Geography* educational film, created thanks to a collaboration between Bangor geoscientists, Manchester Metropolitan and Keele Universities has won a highly commended award from the Geographical Association at their annual Geographical Awards.

The film 'Evidence of UK glaciation and deglaciation' features glaciologists including Bangor's **Dr Lynda Yorke** exploring evidence of the comings and goings of the last ice sheet at sites across the UK and Ireland, including Snowdonia, and is designed to be used as a tool for geography and geoscience education.

The open-access, dedicated video platform *Time for Geography*, developed through the collaboration of world-leading academics, educational and industry partner organisations serves an audience of several million school students across the UK and over 200 countries, in over 30 major languages.

Lynda, a senior lecturer in physical geography, said, "*It's wonderful to have the collaborative work between ourselves and Time for Geography recognised through this award; it was especially nice that I was able to share my knowledge from one of our key field sites here in North Wales to help explain the history of glaciation here in the UK.*"

Dr Harriett Ridley, production coordinator at *Time for Geography* said, "*The Highly Commended Award from the Geographical Association is a wonderful testament to the success of our partnership in supporting secondary education, and to the fantastic collaborative work of everyone involved in helping make these videos possible.*"

The film can be viewed at: [https://timeforgeography.co.uk/videos\\_list/glaciation/evidence-uk-glaciation-deglaciation/](https://timeforgeography.co.uk/videos_list/glaciation/evidence-uk-glaciation-deglaciation/)

## Sweet smelling soaps for #HelpUkraine Emergency Appeal



Soaps made by **Laura Haggett**, marketing and recruitment officer in the School of Ocean Sciences, are being sold in Treborth Botanic Garden's honesty shop in order to raise funds for the Association of Ukrainians in Great Britain (AUGB) #HelpUkraine appeal.

The association is working with accredited and registered Ukrainian charities to provide medicines, food and critical services to support the most vulnerable.

Laura, who makes her own soaps after finding other products on the market too harsh for her sensitive skin, wanted to do something to support Ukrainian refugees.

*"During the pandemic, I discovered that I was of Ukrainian heritage on my grandfather's side. I had been planning to visit Ukraine once travel opened up, so when the war began I just felt I had to do something. I already sell soaps at Treborth's honesty shop but have made some scented with lavender in the Ukrainian colours of yellow and blue. So far, we've raised some £600 which is fantastic. AUGB has strong established connections to Ukraine and have been using aid agencies that effectively reach out to all areas of Ukraine that need it, which is why I chose this particular fundraiser."*

Natalie Chivers, Curator at Treborth added, "*Laura's soaps are a popular product in our honesty shop and smell and feel fantastic! We regularly hold soap-making workshops at Treborth led by Laura, thanks to funding from the National Botanic Garden of Wales Growing the Future Project. It's great that we can play even this small part in the humanitarian effort.*"

For further information contact Laura on [l.haggett@bangor.ac.uk](mailto:l.haggett@bangor.ac.uk) or 01248 382 851

The shop is open when the garden is open – Monday to Friday 9am – 4pm but email a member of the garden staff or call 01248 38 88 77 to double-check before travelling.

## Undergraduate Work Experience Placements

We once again thank our alumni for their generosity in hosting our students on placement years. They provide our students with experience of the working world and help guide their future career aspirations. Here we hear from:

### **Eleanor Kirk (BSc Applied Marine Biology, 2022)** about the work experience she has gained over the past 9 months.

*"Over the past 9 months, I have spent my work placement year split between Westbury mount at Menai bridge working on dissections and histology of Antarctic echinoderms and in Plymouth at the national marine aquarium within the animal husbandry team.*



*Under supervision of **Dr Laura Grange**, I participated in the processing of the Antarctic sea star (*Odontaster validus*) and brittle star (*Ophionotus victoriae*), collected by the British Antarctic Survey. Alongside colleague and MSci student **Ellen Pentland**, I extracted the gonads and pyloric caeca, enabled calculation of the gonad index. Through the following histological process, I became practiced in techniques involved in fixation, dehydration, clearing, wax infiltration and embedding. Preparing the tissue for sectioning, staining and final measurements of the eggs, from which the reproductive investment could be inferred.*



*Within my role as an animal husbandry intern, I have become immersed in tasks such as life system and tank maintenance, as well as helping with feeding, operant conditioning, and health checks of livestock. Within the area of Plymouth sound, from march until present I have developed an interest in conservation of native marine species through an insight into activities such as the breeding of the Broad-Nose pipefish (*Syngnathus typhle*) and enrichment and stimulation for our resident common octopus (*Octopus vulgaris*).*

*I am grateful for both these unique opportunities providing an understanding of the variety of careers in the marine biology industry spanning from research to education and conservation.*



# UNIVERSITY NEWS

## Bangor University ranked fourth in the 'University of the Year' category at the *WhatUni Student Choice* awards



The University was also awarded second place in the 'International' category, and third place in the 'University Halls' and 'Postgraduate' categories. Bangor's rankings have increased in every category this year, in comparison to the results of the previous awards held in 2020.

Now in their 10th year, the awards are based solely on the views of students studying in the UK, ranking institutions according to the things that students really care about.

This year's awards were based on reviews from over 30,000 students across the UK and the winners were announced in an awards ceremony in London on Tuesday.

Welcoming the news Professor **Oliver Turnbull**, Deputy Vice-Chancellor, said

*"It's terrific that we have been ranked highly, and in so many categories. It reflects not only our focus on world-class teaching and research, but also our commitment around the student experience. Wonderful to see the hard work, across the University and the Students' Union, being acknowledged in this way."*

## Bangor University 15th in *Global Sustainability League Table*



Bangor University has been ranked 15th in the annual UI Green Metric World University Rankings, which assesses hundreds of higher education institutions worldwide for their environmental sustainability.

The Green Metric compared 956 universities in 80 countries on their efforts in six categories, including setting and infrastructure, energy and climate change, waste, water, transport and education.

Bangor University also ranked third highest for UK universities and the highest amongst Welsh universities.

Welcoming the news Professor Oliver Turnbull, Deputy Vice-Chancellor and Chair of Bangor University's Sustainability Strategy Group, said:

*"This is wonderful news, and a further endorsement, on a world leading metric, of Bangor University's commitment to embedding sustainability. This is evident in our day-to-day activity, in our teaching, and of course in our research. League tables have never been a driver for our sustainability goals, and we know that there are many more things that we can and will do to improve further. Nevertheless, it's pleasing to be recognised as amongst the best in Wales, in the UK, and in the world".*



# CONGRATULATIONS



Congratulations to 3rd year MSci Marine Biology and Zoology student **Aine Guy** for being awarded the Bangor University peer guide of the year!

Bangor University is well known for the warm welcome it extends to its students. A really important part of this are the Peer Guides who are on hand to help our new students settle in. Aine was nominated by the School for this prize:

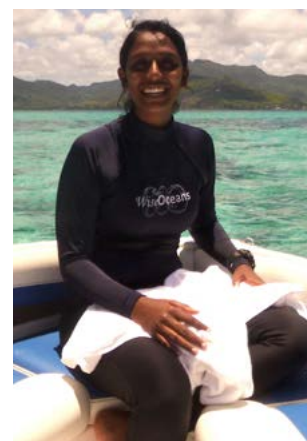
*"Aine is an exceptional Peer Guide, who leads by example. She has proven indispensable in helping organise Welcome Week, and running the Open Days.*

*She compiled the most amazing treasure hunt for pirate night, to the extent that the clues even rhymed! She always had time to assist both students and staff involved in welcome week, despite having lots of other commitments, she put peer guiding high up in her priorities and embraced the role.*

*Aine is very deserving of this award, and it would really help recognise the excellent contributions she has made to our School and to the experience of our new students and our other Peer Guides."*

**Jyodee Sannassy Pilly**, a PhD student in SOS, who has been successful in winning one of two Bertarelli Foundation funded scholarships.

The award will enable Jyodee to attend the "Our Ocean 2022" conference in Palau this year. You can read more about Jyodee's work in the [autumn 2020 edition of "The Bridge"](#).



**Bella Ormerod** (2021, BSc Physical Geography and Oceanography) who has scooped up the 2021 BSRG Undergraduate Award in Sedimentology.

This prize is awarded to the best final-year undergraduate sedimentological project in the UK and Ireland. It celebrates undergraduate skills and achievement in sedimentology and was announced at this year's AGM of the British Sedimentological Research Group (affiliated with the Geological Society) in Hull. Bella wrote an excellent dissertation entitled "*Do infragravity waves on rock shore platforms perform geomorphic work?*", supervised by **Martin Austin**.

**Professor Antonio Hogueane** (BSc Maths & Physical Oceanography, PhD Physical Oceanography) on being awarded a Mozambique Medal of Academic Merit, through the Presidential Decree, on the 3rd of February 2022, the day of Mozambican Heroes.

You can read more about Antonio's journey in the [summer 2021 edition of "The Bridge"](#).

**Dr Sarah Zylinski**, Marine Biology lecturer, on being made a Senior Fellow of the Higher Education Academy.

**Peter Evans** on being made an honorary Professor in SOS.





**Professor Ed Hill**, Ocean Sciences alumni and former lecturer, received his CBE from HRH The Duke of Cambridge at Windsor Castle.

He was awarded the CBE in the Queen's Birthday Honours 2020 'for services to ocean and environmental sciences'.

**Professor David N. Thomas**, Honorary Professor in the School of Ocean Sciences at Bangor University, has been awarded the Polar Medal by HM The Queen.

The award was announced in The London Gazette 28 January 2022.

The Polar Medal may be conferred on citizens of the United Kingdom of Great Britain and Northern Ireland who have personally made conspicuous contributions to the knowledge of Polar regions or who have rendered prolonged service of outstanding quality in support of acquisition of such knowledge.



Alumni **Dr John Grahame**, recently retired from the faculty of Biological Sciences at Leeds University, and is returning to SOS as a visiting lecturer

John is an expert in the genetic structure of intertidal molluscs, and its meaning for biodiversity. He joins the school as an honorary senior lecturer.

**Nyah Lowe**, a final year Marine Biology & Oceanography student from South Wales, for being elected President of Bangor Student Union's Sabbatical Officers



**Dr Phil Wiles**, a physical oceanography alumni, on his new position as director of the Deep South Challenge.

Phil, from New Zealand originally, began his career as an oceanographic technician at NIWA before moving to the UK to undertake a PhD in SOS. He then won a NERC Independent Research Fellowship which saw him spending time in Oregon State University. Whilst in Bangor he met his future wife **Lucy Jacob** (MEP 2006), with the couple subsequently moving to American Samoa, where Phil spent three years with the local Environmental Protection Agency. From there, the couple travelled to nearby Apia, Samoa, where Phil worked for SPREP (Secretariat of the Pacific Regional Environment Programme), an intergovernmental organisation that supports Pacific nations with science advice and support on environmental issues. Phil's focus was on the impact of climate change on oceans.



Phil's focus was on the impact of climate change on oceans.

According to the Challenge website, what excites Phil the most about joining the Challenge is being part of driving forward climate adaptation and connecting that research with iwi Māori, rural communities, and industry.

Commenting Phil said: "It's a huge amount of work, but if you can get in there and guide some of it, and help some really smart people do what they need to do, that's what I'm really excited about."

## Gordon Research Conference



Congratulations to **Dr Yueng-Djern Lenn**, a Reader in the School of Ocean Sciences, on her election as the co-chair (2024) and chair (2026) of the Gordon Research Conference on Ocean Mixing.

Yueng was elected by the 200+ delegates at the second Ocean Mixing GRC in Massachusetts in June 2022 and will work alongside Stanford Professor Leif Thomas in planning the agenda for next two GRCs on Ocean Mixing. Yueng's election confirms the continuing global leadership in this area, which is at the top of the physical oceanography agenda, by the Bangor Physical Oceanography team.

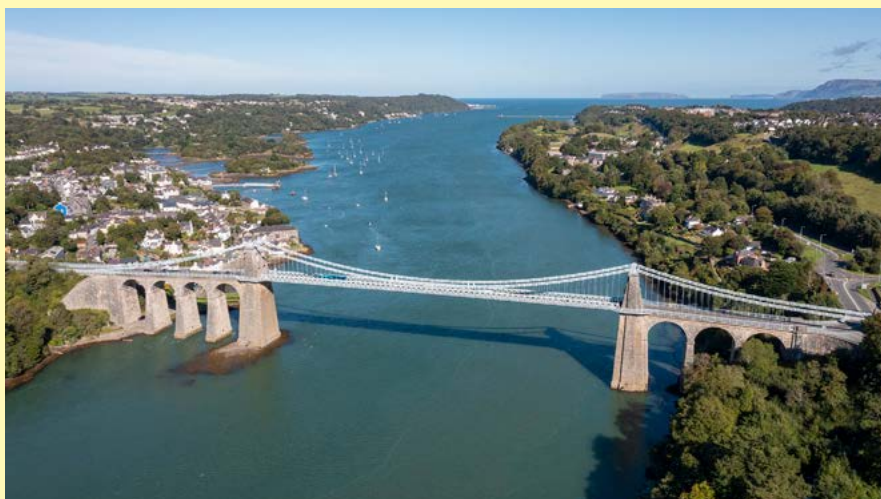
The conference speakers are experts invited to present their world leading research, with the aim of pushing back the frontiers on this critical topic in climate science.

We were very pleased to see alumni **Bethan Wynne-Cattanach** (MSc Physical Oceanography, 2017), now a PhD student at the SCRIPPS Oceanographic Institution in California, invited to speak (she was the only PhD student to do so).

Bethan's time studying at Bangor coincided with a sabbatical visit by SCRIPPS Physical Oceanography Professor Jen MacKinnon, funded through a Kirby-Laing Fellowship, which resulted in Bethan being invited to visit SCRIPPS ...



The Gordon Research Conferences are funded by a non-for-profit charity and aim to provide an international forum for the presentation and discussion of frontier research in the biological, chemical, physical and engineering sciences and their interfaces.

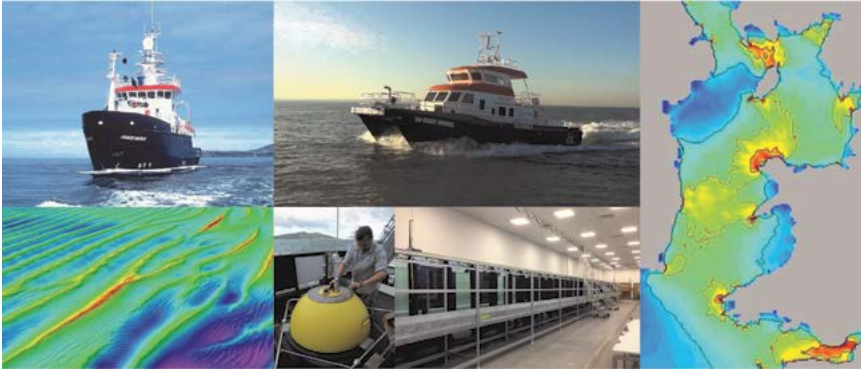


*Thomas Telford's Menai Suspension bridge (Pont Menai), was opened in 1826 and was the World's first iron suspension bridge.*

*Just a 5 minute journey over this bridge from Upper Bangor and you will reach the town of Menai Bridge in Anglesey, which has been home to the University's School of Ocean Sciences for over 50 years.*

## Marine Energy Wales

In March many SOS staff and students joined nearly 300 delegates at the Marine Energy Wales conference just down the road in Llandudno.



The conference saw two keynote speakers from the Welsh Government. First, Deputy Minister for Climate Change, Lee Waters MS, pointed to the Welsh Government success in securing a record £31 million EU grant for Morlais, a major tidal stream project off Anglesey.

He was then followed by First Minister, Mark Drakeford, who underlined the key motivations driving his government's support for marine renewable energy. He cited the experiences of Brexit, Covid, COP-26 and the horrors in Ukraine, as evidence of a 'critical' moment in history which required 'collective effort' to face the challenges ahead.

He said, "*The Welsh Government's conclusion around energy security is that it is best achieved through focusing on renewable energy. Marine Renewable Energy must play a key part for the resilient and diverse energy sources we need.*"

We are proud that the School of Ocean Sciences are at the heart of these developments and to meet so many SOS alumni and friends at the event. These included **Dr Dave Watson** of RSK (who have been involved in the renewable energy sector since the emergence of wind energy generation in the late 1990s), **Kev Black** a director of Partrac and **Antony Gaffney** a MetOcean director with the RSP Group.

We were also introduced to members of MarineSpace by MSci Physical Oceanography graduate **Jack Walker**. You can read more about the company, founded by another SOS alumni, **Stuart Lowe**, and it's employees later in this edition of the Bridge.

## Ocean Sciences Share Marine Renewable Expertise In Welsh Centre Of Excellence

In March Bangor University officially joined the Offshore Renewable Energy (ORE) Catapult's Marine Energy Engineering Centre of Excellence (MEECE) which supports innovative Welsh companies to develop new products, processes and services for the offshore renewable energy sector.

As part of this project, researchers at Bangor will be sharing their expertise in oceanography and support the growth of the Welsh offshore renewable energy sector.

MEECE is seen as a catalyst for research, technology innovation and testing and demonstration to accelerate the commercialisation of the wave, tidal and offshore wind sectors by reducing the cost of energy, improving efficiency and reliability, and supporting the growth of the Welsh supply chain.

The School of Ocean Sciences has particular strengths in physical oceanography where researchers at the school have developed advanced numerical modelling capabilities to characterise wave and tidal energy resources, as well as the impacts of extracting energy from the ocean. The school has also undertaken a plethora of survey work at potential marine energy sites around the Welsh coastline.

Commenting **Professor Simon Neill** said:

*"Our state-of-the-art ocean models, validated by data collected at sea, can inform industry on the optimum locations for siting marine renewable devices, and can forecast a whole range of variables from turbulence to the interaction of waves and tides. We are delighted to be involved in this project, which will further develop the Welsh marine energy resource on our path towards net zero."*

## MarineSpace



Amongst the many marine renewables companies we caught up with at Llandudno was MarineSpace, founded by SOS Geological Oceanography graduate **Stuart Lowe**.

We are delighted that Stuart, along with other Bangor graduates in his team, have agreed to update us on what they have been up to since graduating from SOS.

Stuart Lowe, founder of MarineSpace, shares his path from graduating Bangor with a BSc in Geological Oceanography to starting MarineSpace, a marine environmental consultancy, and reflects on the current opportunities in the marine sector:

*I graduated twice from Bangor. The first time, I graduated in 1994 with a BSc in Geological Oceanography, as the country lurched back to life following the early '90s recession. With jobs in my chosen field hard to come by, I accepted a post-grad position with **Colin Jago**, aiming to make some sense of particulate flux across the continental shelf to the deep ocean. Following some time offshore on research cruises as part of my duties, I rapidly realised that a life of libraries, research and academia were probably not for me, and I actually preferred being on deck getting wet, acquiring data.*

*So, for the next few years I found myself on fishing boats in the North Atlantic as an EU observer, and anywhere from the South China Sea to the Barents Sea as a geophysical survey technician. I saw things I couldn't quite believe, visited some great places, and went to some places that I probably wouldn't want to return to, but, overall those trips offshore were some of the most valuable experiences of my career. I learned a lot: about myself and others; the dynamism and diversity of the marine environment; how to solve problems; and the value of diplomacy. Without these experiences, nothing that followed would have worked out as it has.*

*Despite the good experiences of this early part of my career, I had a nagging feeling that if I spent too long offshore I might not fare so well. The offshore life is physical and mentally challenging, and is not ideal for everyone, and I started to look ashore for something else to do. I'd become aware of an MSc in Water Resources at Bangor and decided to take the plunge. I graduated in 1999 which, again, coincided with a recession; onshore work was hard to come by and, ironically, it was my offshore experience, especially with fisheries, that lead to my first job in consultancy with a small company in Surrey.*

*For the next 6 years I worked in consultancy, and for a building materials company, working on all manner of marine projects; seismic surveys; habitat investigations; slope stability and geohazard investigations; cable route studies; and, permitting, licensing and environmental impact assessment for dredging projects. The work was varied and challenging and provided a huge opportunity to develop my experience and my network. Then in 2006, I had the opportunity to start working for myself, and I started MarineSpace Ltd.*

*MarineSpace is a marine environmental, planning and development consultancy that works with companies to support their projects. Since 2006, the company has grown to a staff of 50, and we work across many sectors; renewable energy; subsea cables; dredging; minerals; ports and harbours; oil and gas and marine nature conservation. Our highly qualified and talented team includes technical specialists in ecology, geophysics, geotechnics, consents and permitting, project management, fisheries and GIS, with Bangor SOS graduates in every MarineSpace team. We work on projects that are supporting sustainable economic development and the energy transition, and our aim is to ensure that environmental management and responsible development is at the core of everything our clients do.*

*MarineSpace was 15 years old in 2021, and I hope that the next 15 are as exciting as the first. More than ever, we need a marine environment that is healthy, resilient and productive. The seas and oceans provide society with so much natural capital and we have a duty of care to maintain it for future generations. I hope that MarineSpace can continue to help with this ideal.*

*There has never been a better time to look at careers in marine sciences. With the huge growth in offshore wind, both within the UK and internationally, as well as continued development in other marine sectors such as minerals, subsea cables and marine nature conservation, there are more opportunities than ever for those with a foundation in marine sciences. A marine science degree from Bangor has underpinned the careers of several MarineSpace staff, some of whom have shared their journeys to joining MarineSpace below.*

*So what opportunities can MarineSpace offer to marine science graduates and those with experience working in the marine sector?*

*We are a diverse and hard-working team of professionals who seek to integrate our skills and experience to achieve practical solutions and sustainable outcomes for our clients. We currently have dedicated Ecology, Geoscience, GIS and Consenting teams and we are seeking to achieve growth through recruitment of hard working, conscientious individuals that are seeking to establish themselves in marine consultancy. Our projects cover everything from site selection studies to decommissioning support services, supporting clients through the lifetime of their projects. We work with established, major companies and innovative start-ups and we encourage our staff to work hard and take responsibility, whilst supporting them in their career development goals. If you are interested in discussing further, please get in touch. We'd be happy to hear from you.*





## Marja Aberson (BSc Marine Biology & Zoology)

*I graduated from Bangor University in 2003, with a joint degree in Marine Biology and Zoology, which is where I first discovered my love of all things benthic. After graduating, I completed an MSc in Coastal Zone Management, had a stint at the Environment Agency, and then continued on to complete my PhD in Marine Ecology from Queen Mary, University of London.*

*For the past 11 years I have been working in consultancy as a marine ecologist, where I have been lab, office and field-based, and obtained my Chartership from the Royal Society of Biology. I joined MarineSpace in 2020, where I am now a Senior Marine Consultant in the Ecology Team, working across an interesting array of sectors, from minerals through to offshore renewables.*



## Liam Porter (MSc Marine Environmental Protection)

*In 2018, I started the MSc Marine Biology course at Bangor University, after completing a terrestrial based BSc (Hons) in Environmental Conservation. After speaking with students on the MSc Marine Environmental Protection course, I made the decision to switch to this from Marine Biology, as I thought it was better aligned with my career aspirations – to work in consultancy, conducting Environmental Impact Assessments (EIAs), Habitats Regulations Assessments (HRAs), and environmental monitoring reports.*

*Five days after handing in my MSc dissertation at Bangor, I began working in the Ecology Team at MarineSpace's Norwich office. I have now been here 2½ years and have had opportunity to work in a variety of sectors, including marine aggregates, offshore renewable energy, and oil and gas, and some research and development projects. The projects I have worked on include marine aggregate and offshore wind EIAs and HRAs, GIS-based site selection and constraint mapping work, and benthic monitoring at aggregate extraction sites, as well as analysis of seabed imagery and video around the UK.*

*I am really enjoying the wide variety of projects and clients I get to work with as a Marine Consultant, and the skills and knowledge I obtained during my time at the School of Ocean Sciences have proven invaluable in my career, especially those*

*learned through the EIA and GIS modules. Although I must say, living and working in Norfolk, I do miss the mountains and beaches of Anglesey and North Wales, so I often find myself driving across the country to Wales at the weekend!*



## Carys Lloyd (BSc Marine Biology and Oceanography)

*I graduated from Bangor University in 2005 with a BSc in Marine Biology with Oceanography (joint honours). After a two-year break, teaching English in Japan, I decided to complete an MSc in Marine Science, Policy and Law at Southampton University.*

*During the following 12 years I worked for a global multidisciplinary environmental and sustainability consultancy undertaking marine Environmental Impact Assessment (EIA) and consenting projects. Working for a global consultancy gave me a huge range of experience including projects across Europe, Africa, the US and Australia, and in sectors including oil and gas, telecommunication and HVDC cables, carbon capture and storage, river/lake transport and cabotage, port/marina developments, offshore wind, aggregates, deep sea mining and solar powered desalination.*

*In December 2021 I joined MarineSpace as a Principal Consultant in the Consents Team, where I am responsible for the day-to-day management of the Consents*

*Team. I also manage a range of EIA and consenting projects from early site selection through to delivery of the EIA, stakeholder engagement, Marine Licence consent applications and post consent support such as consent Marine Licence condition compliance.*

*The skills and knowledge I gained during my time in the School of Ocean Sciences provided a great foundation for my career as a Marine Environmental Consultant. I really enjoy the variety of work available as a Marine Environmental Consultant, and that no two projects are ever the same!*

## Abi Nelson (BSc Marine Environmental Studies, MSc Marine Environmental Protection)



*Having graduated from Bangor University in 2018 with an undergrad degree in Marine Environmental Studies, I couldn't quite bear to leave beautiful North Wales, so I stuck around for another year and completed my MSc in Marine Environmental Protection, with a thesis focusing on microplastic distribution throughout North Wales, graduating in 2019.*

*Since graduating I have been working in marine environmental consultancy, initially starting at Intertek Energy and Water Consultancy Services. At first, I spent my time contributing to environmental reporting such as EIAs, HRAs and marine licence applications. After 6 months, I realised that I missed the mathematical, computer-based marine science, and switched to the Water Modelling Team, where I undertook a variety of shellfish water and bathing water quality assessments. Soon after moving teams, I split my time, and took up a role within the GIS Team, honing my GIS skills developed throughout university. My responsibilities included map generation, geospatial processing of data, and quality checking of all outgoing charts.*

*After 2 and a half years, I came to the conclusion that GIS was a full-time career path, down which I wanted to venture, and made the decision it was time for a change. So here I am, just over a month into my time as a GIS Consultant at MarineSpace and very excited for the future I have ahead of myself here. My day-to-day tasks include map generation and data processing, using a range of GIS software, to include in environmental reporting, for a variety of exciting projects based all over the world, from the UK to Vietnam. All in all, I couldn't be where I am now without the education I received, from all the amazing SOS lecturers and I couldn't be more grateful to them.*



## Mick Cook

*I can honestly say that the time I spent in Menai Bridge in 1978/79, changed my life. Prior to moving to North Wales, I studied geography at Queen Mary, London and worked as a town planner at the Royal Borough of Kensington and Chelsea. Whilst I really enjoyed both, I realised my real passion was the physical environment; particularly the sea, of which there is not a lot in London. So, I changed careers completely and undertook a hybrid MSc (you could do that in those days) in marine geophysics, geotechnics and oceanography, which provided me with a passport to an incredibly fulfilling career in the commercial marine environment; working in the early years as a marine geophysicist.*

*Initially, I worked for a US-owned contractor acquiring marine geophysical and geotechnical data around the world, and subsequently processing and interpreting the data to provide engineers with the necessary information to drill wells and place infrastructure safely on the seabed. In 1984, I joined an embryonic consultancy, Hydrosearch, and over the next twenty years helped the company, as a director and partner, to grow it to one of the largest geoscience and environmental consultancies in the world, working in some 80 countries each year.*

*In 2003, we were acquired by FTSE-250 listed RPS Group – a pure-play environmental consultancy. I was appointed Managing Director – Operations for the newly-formed Energy Division with a global remit to expand the business significantly, which we did. In 2008, I decided to semi-retire. I set up my own small consultancy, MCL, and since that time I have assisted some 20+ companies to 'make more of what they have'. This has been largely done in the geo-environmental space and has led to a number of non-executive director roles. In 2011, I was visiting the Oceanology International exhibition and conference in London when I bumped into Stuart Lowe, who had worked as part of my team at Hydrosearch/RPS. When I mentioned what I was doing, Stuart responded with "we could do with some of that"! To cut a long story short, I joined Stuart's MarineSpace board of directors and have thoroughly enjoyed helping Stu and the company grow from a handful of employees in 2011 to some ~ 50 people as it stands today. I have worked with a lot of very capable and good people in my 42 years in business and those at MarineSpace are up with the best. I have thoroughly enjoyed assisting the company with its direction and growth. Being semi-retired, allows me to 'put back' into the industry that has served me so well. To this end, I was, until recently, both a Council Member and Treasurer of the Society for Underwater Technology (SUT) and have chaired several special interest groups of the SUT. Further, as many of you will know, I have had the honour of chairing the Bangor School of Ocean Sciences Alumni Association (SOSA) for the past 10 years or so, which has enabled me to keep in touch both with the SOS but also with a large number of alumni, some of whom work with MarineSpace.*

*I said earlier that Menai Bridge changed my life. This is, in part, due to providing me with an extremely rewarding career that I still enjoy in my advancing years; but also, in part, as it was in the SOS that I met my good lady wife Christine – a marine biologist – in 1978. She said she was attracted by the fact that I was the only person in the Marine Science Labs (as they were known at that time) to wear a suit jacket and jeans – which I still often do today! Most colleagues were clad in hairy jumpers and clogs – well it was the 70s – the most unfashionable era ever! Christine (nee Tiger) and I have been happily married now for 41+ years and have two great sons Christian (33) and Stefan (31). We live on the Surrey/Hampshire border, close to Farnham, and still visit Menai Bridge at least once a year for Christine to get her 'injection of Anglesey air'.*

*The skills I was taught in Menai Bridge by Messrs Taylor-Smith, Simpson, Buchan, Davis, Bowers, Jago, Jones, Darbyshire et al. many years ago, have all served me very well.*



## **Damien Kirby (MSc Marine Environmental Protection)**

*I took the Marine Environmental Protection MSc course in 2011-12 and particularly enjoyed the modules in 'Marine Ecology', 'Coastal Ecology and Habitat Survey' and 'Environmental Impact Assessment'. Experience gained in the last of these was a key to me getting a job at Cefas providing technical advice to the MMO and other UK Regulatory Bodies on reports submitted in support of Environmental Impact Assessments.*

*I subsequently went on to apply my regulatory experience elsewhere within Cefas in the delivery of ecological surveys and technical reports required for consent of UK new nuclear developments. Among other things, this involved the design and implementation of bespoke monitoring programmes for Sabellaria reefs and intertidal macroalgae habitats. In 2019 I joined MarineSpace as Principal Scientist, I now work across all of our ecological topics, but with specific focus on Habitats Regulations Assessments, Water Framework Directive compliance assessments, and cumulative impact assessments.*



## **Katie Cross (MSc Marine Environmental Protection)**

Since graduating with an MSc Marine Environmental Protection in 2002, Katie has worked in Kuwait, Tanzania and Madagascar conducting coastal and coral reef surveys, and has collected numerous sediment samples off west Africa and in the North Sea for both the oil and gas, and renewables clients. Now she is very much behind a desk working as a Principal Consultant within the Ecology Team at MarineSpace.

At MarineSpace Katie not only line manages the evergrowing ecology team, but is also involved in projects ranging from Environmental Impact Assessments for significant offshore renewables developments to research projects which underpin the conservation work of the Natural England/Defra and therefore the sustainability of the marine environment that attracted us all to the subject in the first place. Not a month goes by where Katie's work paths do not cross with Bangor alumni, particularly those that were in her MEP year, showing the importance of keeping in touch with your University mates!





## Dr David Mills (BSc Marine Biology and Oceanography, 1979) and currently Director of IMARDIS at SOS

### From Data Poor to Data Rich: Towards a Digital Ocean

I imagine not many folks reading this article will have used a brass messenger to trigger water bottles mounted on a winch wire to collect sub-surface water samples as we did on the Prince Madog in the 70's. Back in the days of dark data, written data records were the norm. In contrast, 2022 we will ingest and analyse terabytes of data per day of underwater noise in new work on the Morlais West Anglesey Tidal Demonstration Zone. The data will be stored, visualised and analysed using AI within the cloud-based SEEC (Smart Efficient Energy Centre) Cyberinfrastructure. My career spans this step change in technology driven data collection and analytics. We thought that it might be an interesting story to tell but I will let you be the judge of that!



*Niskin water bottle attached to winch wire. The brass messenger sits on the wire just above the triggering mechanism. The bottle has been deployed and the caps, top and bottom, are in closed position.*



*Prince Madog in the late 70's on the Menai Straits. Looks like Tommy in front of the wheelhouse?*

Moving on rapidly to the late 1980's I return to SOS as a research officer in the **John Simpson** lead NERC North Sea programme. With Paul Tett I developed a new capability to measure phytoplankton biomass at high frequency using a moored recording chlorophyll fluorometer. Why? Rapid growth of phytoplankton in the spring following the onset of seasonal stratification means that ship based observations are a hit and miss affair for episodic events.

Our results in 1987/88 showed in glorious detail the timing, duration and amplitude of the spring bloom of phytoplankton and the tremendous value of continuous and *in situ* observations to detect transient biological phenomena.

*A recording fluorometer on the deck of the Netherlands Institute of Ocean Sciences (NIOZ) research vessel Pelagia around 1989 with **Dave Boon** in attendance.*

*The recording fluorometer comprised a single channel battery logger and Chelsea instruments Aquatracka (cost £25k) measuring phytoplankton biomass at high frequency over periods of a month or more. Kees Veth from NIOZ on the left holds the Guinness world record for the deepest recorded Sechi disc measurement (>80m) in the Weddel Sea!*



Step forward to 1991, I join Cefas (Centre for Environment, Fisheries and Aquaculture) in Lowestoft alongside many SOS graduates including **Manuel Nicholas**, **Professor Mike Kaiser** and **Ewan Hunter** (now head of marine at DARD in Belfast). I lead the development of the Cefas Smartbuoy programme – a multi-parameter data buoy measuring physical, chemical and biological variables. Smartbuoy delivered a step-change in UK coastal seas observing capacity and significantly improved the UK evidence base for assessments of environmental status and despite funding cuts has been operational for more than 20 years.

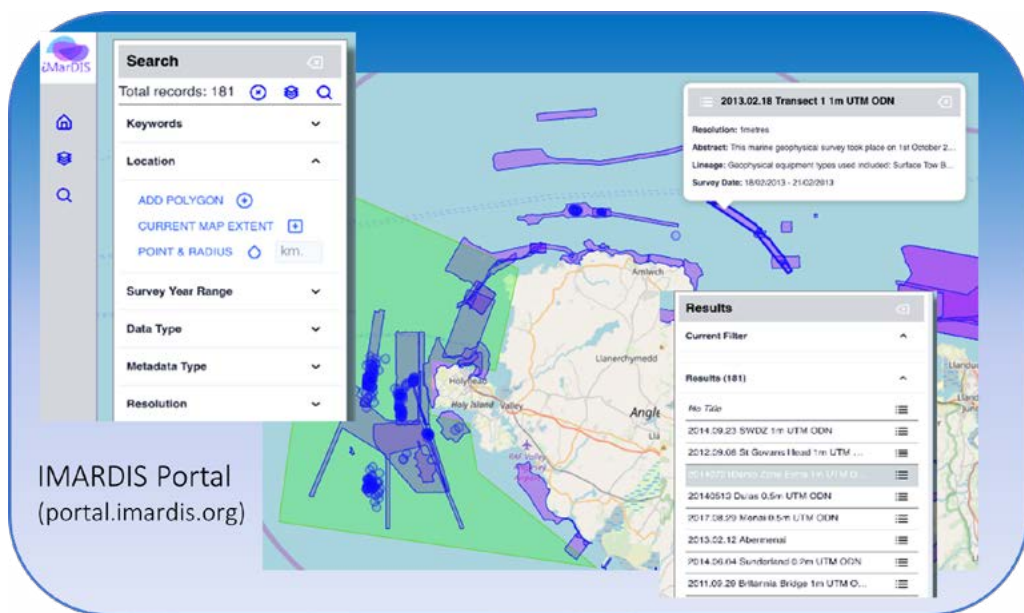


*Smartbuoy about to be deployed (Capital cost around £120 k in 2000). A multiparameter data buoy measuring near surface physical (conductivity, temperature, turbidity, PAR attenuation), chemical (nitrate, silicate concentration, suspended load) and biological (chlorophyll, phytoplankton species composition).*

*Key digital technologies underpinned Smartbuoy success; reliable multi-channel solid state data loggers; microprocessor controlled in situ analysers and samplers and a new generation low-cost environmental sensors.*

Time flies, its 2015 and I'm back again at SOS as Director of IMARDIS and part of the SEACAM2 programme designed to drive blue growth through collaborative and data intensive research with the Welsh marine renewables sector. With industry partners we co-designed the IMARDIS portal ([portal.imardis.org](http://portal.imardis.org)) and worked with researchers to streamline data ingestion including real-time data from SEACAMS2 observatories.

IMARDIS (Integrated Marine Data and Information System) is compliant with existing UK marine data archives and follows the FAIR data principles where data is findable, accessible, interoperable and reusable. The portal has upwards of a hundred users with many drawn from the Welsh marine renewables sector alongside researchers. IMARDIS now forms the basis of a cloud-based cyberinfrastructure as part of the BU SEEC programme.



*Screenshot of the IMARDIS data portal*

The new cyberinfrastructure has equipped SOS with the capacity to take full advantage of the challenge of the volume, veracity and variety of 'big data' and is already bearing fruit. We have won new work (<£500k) for the Morlais West Anglesey Tidal Demonstration Zone and will provide the data management capacity and use new data science capabilities to visualise and analyse using AI vast amounts (>> Tb/day) of data from passive acoustic monitoring of cetaceans. The cyberinfrastructure is built by a team of computer scientists that make best use of a range of digital technologies; cloud computing with nearly unlimited on-demand data storage and access to super-computing capacity, web technologies, software engineering and shared standards such as applications programming interfaces (API's).

This digital ecosystem will play an increasingly important role in ocean sciences. Physical Oceanography alumni **John Siddorn**, now head of Digital Ocean at the National Oceanography Centre, told the last edition of the *The Bridge* that we 'need to make sure the big data revolution doesn't pass ocean science by' – IMARDIS and the SEEC cyberinfrastructure is one way to make sure it doesn't!

# MORE ALUMNI NEWS



## Ellie Harland (BSc Geological Oceanography, 2021):

*Presently I am working on a project based in Northern Ireland completing Public Safety Risk Assessments (PSRAs) and Initial Needs Assessments (INAs) for Flood Defences - mostly inlets, outlets, fluvial and sea defences. This means I get a good balance of site and desk work as I am on site in Belfast every other week. I am hoping to progress further into flood and coastal risk management but I only joined JBA Consulting in January though so far they have been a delight to work for.*



## Jess Fox (MSc Physical Oceanography, 2021; Marine Biology and Oceanography, 2020):

*I've just got home after 3 weeks on Bark Europa in Antarctica! We sailed from Ushuaia via Drake Passage to Antarctica (both the continent and islands to the west of the peninsula up to 65°S) and then back. The weather conditions ranged from totally becalmed to storm force 10 which resulted in some often overly-exciting but also brilliant experiences.*

*I particularly wanted to write to you because this trip marked the finale of my 4 years studying the oceans at Bangor as well as the pinnacle of my time on tall ships. With the knowledge from my degrees at SOS I was able to appreciate Antarctica so much more – and not only that, but it also gave me the power to pass on this deeper appreciation to so many others on board which the crew told me had greatly enhanced their Antarctic experiences. Furthermore, having this understanding of the science behind oceanic environments and ecosystems enriches my life every day and I just wanted to say again THANK YOU for making this all possible.*

*In other news, I have been offered a job as Senior Water Quality Process Scientist with Southern Water in the Medway region of Kent which started in March. I'm looking forward to getting stuck into something totally new and believe this will be a great place to start my career.*

*Following completion of her degree, Jess headed south, on a tall ship to Antarctica!*





## Zhiyu Liu (Visiting PhD Student, Physical Oceanography, 2007-2009)

Zhiyu now works as a Professor of Physical Oceanography at Xiamen University (XMU), the cradle of China's marine studies and one of leading institutions in China for ocean science education and research. Zhiyu currently serves as an associate dean of XMU's College of Ocean and Earth Sciences, and an associate director of the State Key Laboratory of Marine Environmental Science. He reflects on how his time at Bangor helped him achieve this career:

*"My two-year visiting study at Bangor is crucial to my career development. As a visiting PhD student, I was working mainly with Prof. Stephen Thorpe FRS, who is a renowned scientist in the field of ocean turbulence and mixing, which my studies were (and remain) concentrated on. I had also intense interactions with Prof. **John Simpson**, Dr **Tom Rippeth** and others in the physical oceanography group, with many of them having ever since become friends and collaborators. I think Bangor is a fantastic place to study ocean sciences, with stunning facilities situated on the amazing Menai Strait, which I miss much. And most importantly, the research programs are run by prominent scientists, and students and postdocs are guided to do novel research at the very frontier of the field.*

*For myself, the research training I obtained at Bangor well prepared me a stimulating career in dynamical oceanography, which I enjoy very much. I always take Bangor as my academic hometown. And indeed, my daughter Yuxi (with nickname 'Menai') was born in Bangor; hence lots of sweet family memories in addition to the science and friendships I enjoyed. I always look forward to revisiting Bangor!"*



## Phil Coates (BSc Marine Biology / Zoology, 1981)

### Notable Achievements in a Career in Maritime Management in Wales

Phil has just retired from working in Welsh Government having been there for 12 years in fisheries and marine (policy, evidence and planning).

Post-graduation Phil did an MSc in Environmental Technology at Imperial College, specialising in water management. Then, to gain experience, he taught sailing in Scotland and did botanical survey work in Cornwall.

He moved east in Cornwall to work on migratory fisheries on Roadford Reservoir with South West Water, moving for a short while to become the first marine biologist in National Rivers Authority (NRA) south west. In 1989 he moved to Swansea where he has remained. He married Jackie (Occupational Therapist in NHS) and raised 2 boys (now graduate geneticists).

From 1989 Phil was deputy then Director of South Wales Sea Fisheries Committee (SWSFC) managing and enforcing inshore fisheries with a team of 14 and a relatively small budget. Despite this, a great deal was achieved including a World first in the MSC accreditation of the Burry Inlet cockle fishery, and a first in the UK to introduce statutory protection of (berried) V-notched lobsters and stock enhancement using EU grant aid. Another memorable moment was dealing with the fishery after-effects of the Sea Empress Oil spill in 1996 and being a member of the Sea Empress Economic Evaluation Committee. Phil has given various other evidence to Commons and Assembly Committees and Inquiries on a range of topics and presented several papers to the Shellfish Association (GB) and the European Elasmobranch Association. He also developed expertise in Habitats Regulation Assessments.

It was whilst working with SWSFC that Phil became reacquainted with Dr Ivor Rees who was a committee member of the neighbouring North Western & N Wales SFC (NWNWSFC), and was his undergraduate tutor.

In 2010 Welsh politics took a turn and both the SWSFC and NWNWSFC were amalgamated into a new all Wales Fisheries management structure under the Welsh Government. Phil initially worked in fisheries then marine evidence; moving on to marine planning helping to implement the first marine plan for Wales in November 2019. He also led on marine aggregates policy and latterly was heavily involved in the development of offshore wind and marine renewables. His last task being the publication of a guide to marine planning Sector Governance in Wales.

An accomplished sea angler in his college days (and representing Wales), Phil later took up sailing, windsurfing and surf skiing.

On his impending retirement Phil said "after devoting so much time to marine management in Wales and covering such diverse areas and in meeting so many dedicated people, unless he could be persuaded otherwise, he was looking forward to having more time to relax and travel!"



## Emily Cunningham (MMBiol Marine Biology, 2012)

### SOS alumna, Emily Cunningham is making waves with national Motion for the Ocean campaign

SOS alumna Emily Cunningham is one of a trio of ocean experts behind a national campaign to get local councils to step up and play their part in ocean recovery. As a result of this campaign, eight councils from England and Wales have so far made Ocean Recovery Declarations, with more to follow over the coming months.

Plymouth City, Falmouth Town, South Tyneside, North Norfolk District, North Devon, Monmouthshire County, Seaton with Slingley Parish and Seaham Town Councils have all made Ocean

Recovery Declarations at their Council meetings over the past few months, with Councillors from all political parties showing their support for ocean action.

Over the next year, these eight councils will be taking action to help our oceans including exploring ocean-based climate solutions such as seagrass and saltmarsh restoration, ensuring the local blue economy benefits the marine environment as well as local people, and ensuring all pupils in their areas get the opportunity to experience the ocean firsthand before leaving primary school.

These eight Ocean Recovery Declarations were based on the model - or template - Motion for the Ocean developed by ocean experts Emily Cunningham, Dr Pamela Buchan and Nicola Bridge. The marine trio are now calling on all local councils across the UK and beyond to step up and take action for the ocean.

Anyone can help by asking their local Councillor to table a Motion for the Ocean at their next council meeting. You can find out who your local Councillor is at [writetothem.com](http://writetothem.com) and find the model Motion for the Ocean [HERE](#).

### What is the Motion for the Ocean?

The model 'Motion for the Ocean' proposes that local councils will:

- Consider the ocean when making decisions, particularly around budgets, planning, skills and regeneration.
- Ensure that industries linked to the sea, such as fishing, marine technology, renewable energy and aquaculture, continue to develop in a sustainable and equitable way.
- Invest in the ocean as part of their climate action plans
- Ensure that all pupils have a first-hand experience of the ocean before leaving primary school.
- Support and promote sustainable and equitable access to the ocean through physical and digital experiences.
- Call upon central government to do everything within their power to put the ocean into net recovery by 2030.

Motion for the Ocean Co-Authors:

1. Emily Cunningham specialises in working with coastal communities to increase access to, and stewardship of, the ocean. She was named a 30 under 30 global environmental leader in 2020 and sits on the Board of the UK's leading marine conservation charity. [www.emilycunningham.co.uk](http://www.emilycunningham.co.uk) / [www.twitter.com/EG\\_Cunningham](https://twitter.com/EG_Cunningham)
2. Dr Pamela Buchan is a marine social scientist who recently completed research into marine citizenship at Exeter University (report and full thesis). She was a Plymouth City Councillor 2018-2022. <https://twitter.com/Asterinidae> / [www.pamelabuchan.co.uk](http://www.pamelabuchan.co.uk)
3. Nicola Bridge, is the Head of Ocean Advocacy and Engagement at the Ocean Conservation Trust, Chair of the Conservation Education Committee of the British and Irish Association of Zoos and Aquariums (BIAZA), and President of EMSEA (European Marine Science Educators) [https://twitter.com/Ocean\\_Nic\\_B](https://twitter.com/Ocean_Nic_B)

## Motion for the Ocean Co-Authors

#Motion4theOcean



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[pamelabuchan.co.uk](http://pamelabuchan.co.uk)



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**Nicola Bridge**  
@Ocean\_Nic\_B  
[oceanconservationtrust.org](http://oceanconservationtrust.org)





## Selena Stead (MSc Fisheries Biology and Management, 1992)

*I graduated in 1991 with a BSc in Marine Biology and Oceanography and 1992 with a MSc in Fisheries biology and Management.*

*I became the Executive Dean for the Faculty of Environment at the University of Leeds in January 2022.*

## Lynn Sorrentino (MSc Marine Environmental Protection, 2018)

### Important Shark and Ray Areas project

*I graduated with an MSc in Marine Environmental Protection in 2018. I am now working for the International Union for Conservation of Nature (IUCN) since 2020 on the Ocean Team, and started a project called Important Shark and Ray Areas (ISRAs).*

*This project is working on the criteria to identify areas that are key to protection sharks, rays, and chimaeras, and I work with a team of shark scientists on this. The main partner is the IUCN Species Survival Commission Shark Specialist Group Chair, Dr Rima Jabado, and the co-chair of the IUCN Marine Mammal Protected Areas team Dr Giuseppe Notarbartolo di Sciara. The team working together includes consultants from Australia (Ciaran Hyde), the UK (Sarah Fowler), and New Zealand (Brit Finucci). The project was funded by the Save Our Seas Foundation.*

*This team with consultations of over 160 experts globally - held 4 workshops in 2022 and has developed the foundations for an innovative approach to ensure that discrete portions of habitats, critical to shark species, are delineated and used in various place-based conservation and management initiatives across the world's ocean. The group was supported by the IUCN Ocean Team and the IUCN Task Force on Marine Mammal Protected Areas.*

*ISRAs are "discrete, three-dimensional portions of habitat, critical for one or more shark species, that are delineated and have the potential to be managed for conservation". The identification of ISRAs is an evidence-driven, purely biocentric process based on the application of scientific criteria which is supported by the best available science. This makes ISRAs completely independent from any political pressures. Important to note is that ISRAs are not marine protected areas (MPAs). They have no legal or regulatory mandate associated with them. ISRAs are therefore completely removed from the regulation or mitigation of any human-based activities that may be occurring. However, one of ISRA's main goals is to attract the attention of policy- and decision-makers who develop these MPAs so that the need of maintaining the favourable conservation status of sharks in those specific areas is highlighted through the design implementation of the most appropriate management measures.*

*Criteria have therefore been designed to capture important aspects of shark biology, ecology, and population structure and to encompass multiple aspects of species vulnerability, distribution, abundance, and key life cycle activities, as well as areas of high diversity and endemism. The team is presenting the ISRA topic at a knowledge session at IMPAC5 (International Marine Protected Area Conference) in Canada in February 2023.*

Here are 3 links for more info:

<https://saveourseas.com/project/important-shark-and-ray-areas/>

<https://www.iucn.org/news/marine-and-polar/202205/important-shark-and-ray-areas-news>

<https://sharkrayareas.org/resources/job-careers> (there are also 4 jobs open now, please take a look!)



*Here's a photo of a bridge for you too - this is Luzern, Switzerland. (I live an hour from here and this is one of the oldest wooden bridges in the world).*



## Harriet Baldwin (MSc Marine Environmental Protection, 2021)

### Alumna's role with The Crown Estate and The Marine Data Exchange

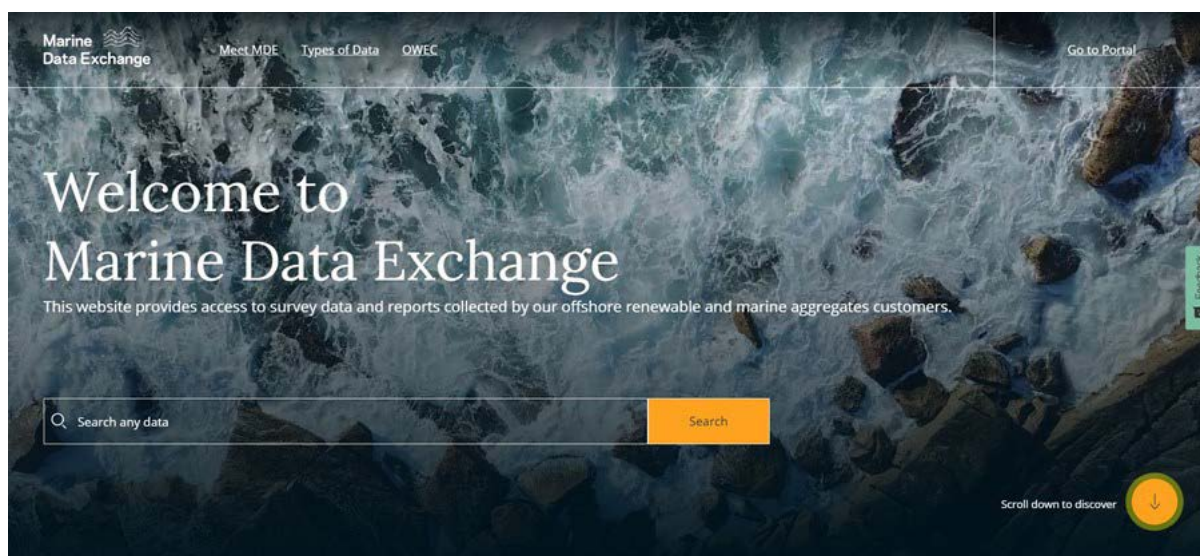
Since graduating from Bangor University Harriet has presented her Master's dissertation work on the functional diversity of cold-water corals at the 16th Deep Sea Biology Symposium in Brittany, has worked as a researcher at the Ocean Discovery League, and now works as a Marine Evidence Advisor at The Crown Estate.

Harriet's role at The Crown Estate now focuses on marine data and evidence projects that aim to inform decision making in support of the sustainable management of the seabed around England, Wales and Northern Ireland. Her area of research and investigation includes fisheries spatial data and evidence, understanding the use of industry data for marine assessment and reporting (with a focus on natural capital) and gaining environmental insight from the data made available via the Marine Data Exchange - The Crown Estate's open data portal.

### The Marine Data Exchange

The Marine Data Exchange (MDE) is the world's largest database of offshore renewables survey data, research and evidence and holds a vast library of information regarding the UK's marine environment. Since the development of the first operational offshore wind farms in the UK just over 20 years ago, The Crown Estate's offshore wind customers have agreed to share data collated throughout the lifecycle of their projects, in a bid to support the future sustainable growth of the offshore renewables industry. The portal holds data collated from feasibility through to decommissioning studies across the offshore wind, marine aggregates and wave and tidal sectors (including environmental impact assessments, wildlife surveys and post-construction monitoring surveys etc.). It also hosts outputs from the Offshore Wind Evidence and Change programme, evidence projects commissioned by The Crown Estate, and outputs from The Crown Estate's spatial analysis and plan-level Habitats Regulations Assessments.

Biological (marine mammal, bird, fish and benthic), physical (geotechnical, metocean, onshore, sedimentology, meteorological etc.) and human (marine archaeology) data, can all be found via the MDE. We want to ensure as many people are using our data as possible, as we believe that the wealth of data available via the MDE could help to inform academic studies, creating a greater evidence base for decision-making, and consequently supporting healthier, more biodiverse seas. The MDE wants to hear from you! We want to feature projects that use MDE data on our site, giving your work exposure and celebrating the benefits of open, freely accessible data! User stories are extremely important to us, as they demonstrate the value of the data we hold, as well as helping us drive the development of the website, so that it is easier, and more informative for all of our users, like you. If you want to contribute to the development of the MDE and have your work featured, please let us know here: <https://forms.gle/mH9GkvNmKNkhmf9> (If you want to tell us about what you're doing, but don't want it featured, please fill in the form and reply 'No' to question 5). Please feel free to get in contact with us if you have any queries about the MDE or projects you would like to have featured: [harriet.baldwin@thecrownestate.co.uk](mailto:harriet.baldwin@thecrownestate.co.uk)



The Marine Data Exchange: <https://www.marinedataexchange.co.uk>

## John Theodorou (MSc Marine Biology, 1991)

Associate professor at the University of Patras working with marine bivalve shellfish species in Mediterranean. His research calls for the legalisation of pearl oyster fishing in Greece so that they can be fished sustainably and sold for higher added value. "It's very important because it offers an alternative for the fishermen to improve their income as the pressure on the natural stocks of other shellfish increases due to overfishing and climate change."

<http://www.pearlseafood.upatras.gr>

## Genevra Harker (MSc & PhD Physical Oceanography, 1992, 1996)



*Learning really is a life-long journey. I did my first degree at the University of Sheffield – a BSc in Physical Geography. I wanted to do more with the sea so then moved to Bangor University to do an MSc and then PhD in Physical Oceanography, from 1992 to 1996. At the same time as I studied for my first degree I also passed a diploma in singing, and during my PhD I did another diploma in French, with the Open University – it's always good to diversify and have multiple interests.*

*After my PhD, I gained some experience working for Southern Science on a water quality contract for a few months, and then joined Fugro GEOS. This is an offshore survey company where I led many different projects working on different ships and rigs, designing, collecting and analysing oceanographic data for different uses from oil and gas exploration, to port development, to model validation. Working offshore was excellent experience to really understand the practicalities of data collection and understand the data themselves. I spent a lot of time offshore, and this job took me to many places in the North Atlantic (off Scotland and Ireland, Norway and the Faroe Islands), to the Gulf of Mexico and the Caribbean, and Nigeria.*

*After 5 years I decided I wanted to spend more time onshore, and moved to an environmental consultancy. This was when offshore wind was starting to gain attention, and I was involved with several of the Round 1 offshore wind farms, bringing offshore and oceanographic expertise to the projects.*

*Two years later, I decided to become an independent consultant, continuing to support offshore wind, and branching out into onshore wind, solar parks, and wave and tidal energy. I set up my own consulting company and worked on site identification, assessment, and consents for 11 years.*

*It was then time to make another change, and I looked to research to see where I could make a difference with new technologies. In 2015, the Pacific Northwest National Laboratory offered me the role of leading an initiative to develop environmental monitoring technologies associated with marine energy. I therefore moved to Seattle in Washington State and led the Triton Initiative. Having set up the program, I then looked for new challenges, and became the Division Director for Coastal Sciences at PNNL at the beginning of 2019, leading the Marine Sciences Laboratory based in Sequim. This took me away from the day to day research, but gave me the opportunity to help and develop others across a broad range of marine disciplines, and build long lasting partnerships and programmes. To keep me learning, I also did a Master of Laws in Energy Law and Policy during this time, distance learning with the University of Dundee. I was awarded that in 2020, and enjoy having the legal and policy perspectives to add to my scientific background, particularly at this time when science backing policy and legal frameworks for climate change mitigation is so important.*

*In early 2022, I changed my role again, and have become an advisor to the US Department of Energy, working to achieve the goal of 30 GW of offshore wind by 2030. Currently the US has 42 MW of offshore wind deployed, so there's a lot to do!*

## Simon Davy (BSc Zoology with Marine Zoology, 1990; PhD, 1995)



Simon Davy is Professor of Marine Biology at the School of Biological Sciences, Te Herenga Waka Victoria University of Wellington in New Zealand, where he has been Head of School for the last 7 years.

Simon's research interests focus on the cnidarian-dinoflagellate symbiosis that underlies the success of coral reefs. Simon completed a BSc in Zoology with Marine Zoology at Bangor in 1990, and then a PhD funded by the EPSRC on The Specificity of Temperate Anthozoan Dinoflagellate Symbioses supervised by **John Turner**. Simon has been extremely productive, undertaking post docs at Harbour Branch Oceanographic Institute in Florida, a Royal Society Fellowship at Sydney, and as a lecturer at Plymouth (working with another Bangor graduate **Willie Wilson** on coral disease) and then at the Marine Biological Association. Several Bangor masters students have worked with Simon in New Zealand (**Gareth Williams, Katie Hillyer, Laura Wicks**) and Simon supervised **Gareth Williams** PhD at Palmyra Atoll.

Simon is President of the International Symbiosis Society and will be hosting the next International Coral Reef Symposium in New Zealand.

## Carlos Andrade (PhD Physical Oceanography, 2000)



*Diving on the shipwrecks off Cartagena - 2021*

**Twenty-two years developing oceanography in Colombian Caribbean and Pacific Ocean waters, from tracking eddies, to climate change and on protection of old shipwrecks.**

Menai Bridge alumnus Carlos Alberto Andrade has spent all these years developing a varied series of projects, as a developing country normally needs, as well as passing on his knowledge to the next generation.

Carlos was on active duty in the Colombian Navy while he was our student here at SOS and received the rank of Captain the same year he graduated. Upon his return to Cartagena, he was entrusted with the Directorate of the Center for Oceanographic and Hydrographic Research (CIOH) of the Colombian Navy. In that capacity, he managed several oceanographic research projects in coastal areas, the Oceanographic Vessel Service and the Hydrographic Service of the Navy, for two years. Later, he established his family in Cartagena de Indias and registered the company (Exploraciones Oceánicas de Colombia, EXOCOL SAS) of which he is currently the CEO.

From this time, he also carried out research for 15 years in collaboration with the Physical Geography Laboratory of the University of Paris 1 (La Sorbonne) related to underwater geomorphology and changes in the coastal zone. He was part of the National Committee for Climate Change Communication and wrote the Chapter on sea level rise for the IPCC Third communication (Gutierrez et al., 2017). Since then, he has worked permanently on the subject as part of the group of experts in ocean processes.

All this time, Carlos has remained an External Professor at the Colombian Naval School, where he has taught the subject of dynamic oceanography in the master's courses, has served on the doctoral committees of five students and remains active in the research groups of the Colombian Navy.

Carlos was called to be a Member of the Colombian Academy of Exact, Physical and Natural Sciences where he has held Chair 67 since 2016. He is the author of more than a hundred scientific publications, most of them in peer-reviewed journals, mainly on dynamic oceanography, climate change, coastal processes, sea level rise and marine archaeology.



*Studying the origin of the Antarctic Intermediate Water – The Falklands 2010*

Some titles for your interest could be:

Quintana-Saavedra, D.M., C.A. Andrade, et al (2022).

Characterization of four shipwrecks from 1741 in Cartagena Bay.

*International Hydrography Review* (A5) 59-78

Lonin, S., C.A. Andrade and J. Monroy (2022).

Wave climate and the effect of induced currents over the barrier reef at Cays of Albuquerque Island, Colombia, *Sustainability* 14, 6069, <http://doi.org/3390/su14106969>

Andrade, C.A., Y.F. Thomas, A. Nicolae-Lerma, P. Durand y B. Anselme (2013).

Coastal Flooding Hazard Related to Storm Surge Events in Cartagena de Indias, Colombia, *Journal of Coastal Research*, 29, 5, 1126-1136. DOI: 10.2112/JCOASTRES-D-12-00028.1

Thomas, Y., L. Menanteau, S. Kunesch, M. Cesaraccio, C.A. Andrade, S. Lonin, & C. Parra,

Le delta du canal du Dique (baie de Carthagène des Indes, Colombie). Modélisation géomorphologique et sédimentologique.

*Interactions Nature-Société, analyse et modèles*. UMR6554 LETG, La Baule (2006).

Andrade, C.A., E.D. Barton & C.N.K. Mooers (2003).

Evidence for an Eastward Flow along the Central and South American Caribbean Coast,

*Journal of Geophysical Research*, Vol. 108, C6-3185. EID: 2-s2.0-0141501411

Andrade, C.A. & E.D. Barton, (2000).

Eddy development and motion in the Caribbean Sea,

*Journal of Geophysical Research*, Vol. 105, (C11.), 26,191-26,201. EID: 2-s2.0-0034483786

In recent years he has dedicated himself to researching the enormous archaeological potential remaining in Colombia. He has documented several galleons sunk in 1741 (see Quintana et al., 2022). Recently, the Colombian government has appointed him as a Member of the National Commission for Shipwrecked Antiquities, from where he advises on conducting campaigns at sea that have found important shipwrecks such as the galleon San José, one of the most valuable sunken treasures in the world.

(<https://www.bbc.com/news/world-latin-america-35014600>)

or (<https://www.bbc.co.uk/news/world-latin-america-61722200>)

*"I am extremely grateful to all the people who shared my days at Menai Bridge. I found Friendship in the most unexpected people who accompanied me and helped me overcome the difficult situations that arise when arriving from a tropical country that contrasts in almost everything, except in the affection of the good people I had the fortune to meet.*

*I treasure each one of you and keep you in mind even if we are not frequent in communication. From the Caribbean Sea, I extend a warm embrace with my best wishes."*

# RESEARCH AND IMPACT HIGHLIGHTS

## Is sustainable seabed trawling possible? A look at the evidence

This article by **Jan Geert Hiddink**, Professor in Marine Biology at the School of Ocean Sciences, is republished from The Conversation under a Creative Commons license. [Read the original article.](#)

### Bottom-trawl fishing provides about a quarter of global seafood but is controversial.

The heavy nets and dredges that are used to catch species like cod, plaice and scampi also disturb the seabed and kill some of the invertebrates that live there. For instance, a single pass with the widely used "otter trawl" kills about 6% of seabed animals, while a scallop dredge [kills closer to 14%](#).

EU proposals to curb bottom trawling have [triggered a row](#) between conservationists and industry groups. Environmental NGOs have been calling for a ban because they consider it incompatible with sustainable management of the seas, while fishing industry groups have been arguing that the practice is compatible with good environmental stewardship.

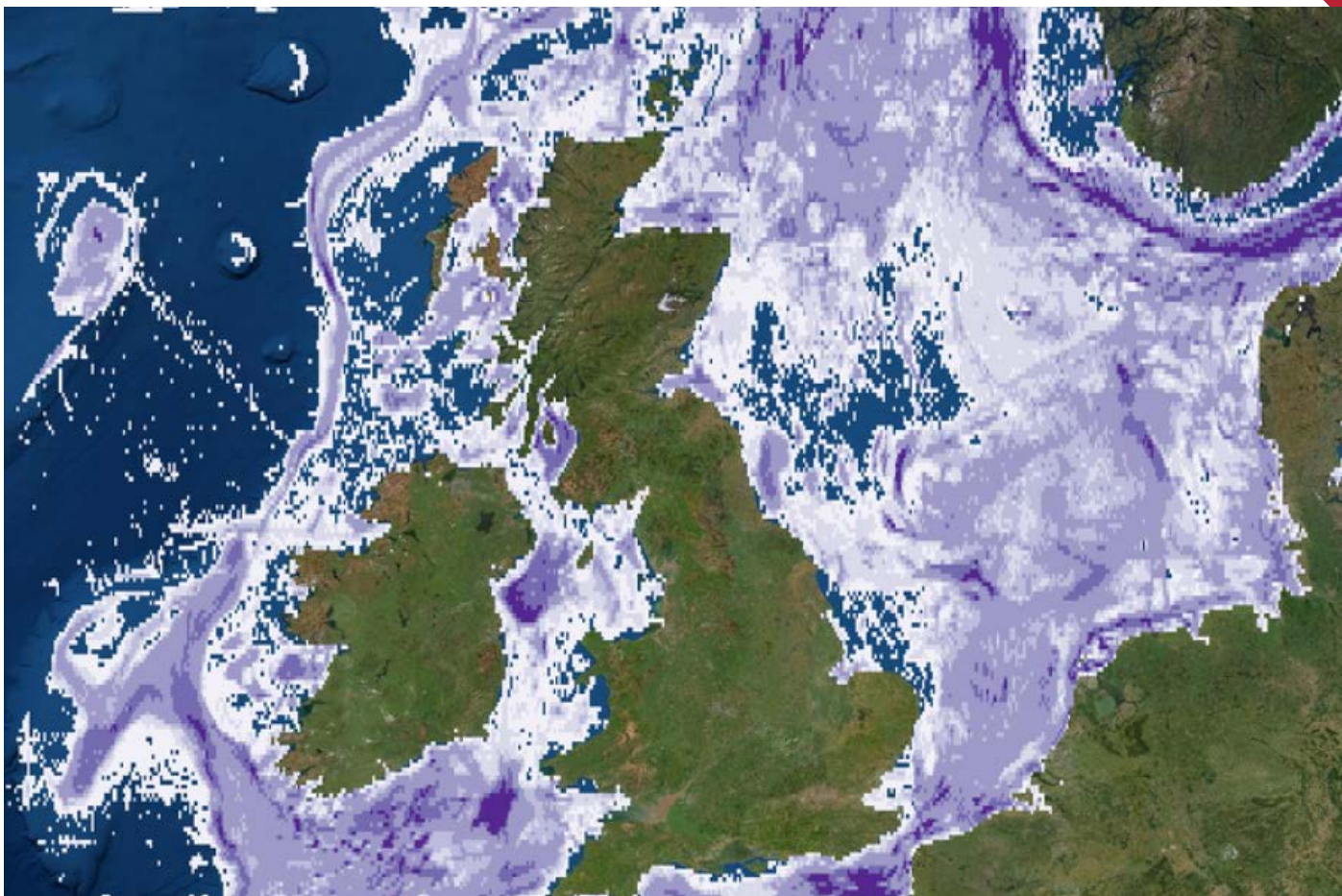


As ever, the reality is more complex, and the impacts of bottom trawling depend strongly on the type of habitat that is being fished. Although bottom fishing is extensive and intense across Europe, even in the most heavily exploited seas at least 20% of the seabed is unfished. A few years ago, I was part of a team that evaluated the impact of bottom trawling on the world's continental shelves. In [18 out of the 24 regions we evaluated](#), we found more than two-thirds of the seabed area remained untrawled.

Most bottom trawling occurs on muddy, sandy and gravelly bottoms, with animals including clams, worms and starfish. Colleagues and I recently gathered all the existing evidence on the [impact of bottom trawling on seabed habitats around the world](#), and rated each seabed between 1 (completely untrawled) and 0 (fully trawl-depleted). We found the status differed greatly among regions, from 0.25 to 0.999, though the regions in the worst state were all in Europe.

The total bottom trawled area in UK seas was about 319,000 km<sup>2</sup>, which is larger than the whole of the country's land area. Just 11% of the North Sea and 18% of the Irish Sea was unimpacted, while 10% and 3% were identified as having a fully depleted status of 0.





Bottom trawling impact on the seabed. Dark blue is unfished; white is fished less than once every ten years; darker purple indicates more intense fishing with the most intense areas fished more than 10 times a year.

Credit: International Council for the Exploration of the Sea (ICES), CC BY-SA

The status of the seabed is closely related to the sustainability of the fishery. Regions with depleted seabeds were places where fish stocks typically are over-exploited and have ineffective management regimes, while seabeds are in good health where trawl fisheries are sustainably managed.

Some bottom trawling also occurs on more sensitive habitats, such as oyster reefs in shallow waters and deep-sea sponge gardens. These [vulnerable marine ecosystems](#) haven't yet been well mapped over larger scales, and we don't yet know what impact bottom trawling has on them because few studies have been carried out (for the understandable reason that it is hard to justify trawling over such sensitive habitats for a scientific experiment). We do know, however, that even the most resilient of these ecosystems cannot resist trawling more than [once every three years](#).

Compared to something like agriculture, above ground, it is clear that bottom trawling has a large footprint, but that its impact in much of this footprint is nevertheless limited.

## Protected areas don't always stop bottom trawling

Of course, this does not solve the debate over what amount of seabed trawling is acceptable, or how to best reduce its impact. Marine protected areas (MPAs) are a widely-used tool for biodiversity conservation, but in the EU and UK most MPAs are not designed to protect the seabed and [still allow bottom trawling](#). Both the UK and the EU are increasing the protection from bottom trawling using MPAs, but conservationists do not consider the plans ambitious enough, while the fishing industry is feeling under pressure and is preparing to fight back.

If seabed trawling is banned, recovery can be surprisingly quick – [just six years](#) on average for sandy, muddy and gravelly habitats. More vulnerable ecosystems, such as oyster reefs or coral gardens, take much longer to recover, however, and the most sensitive deep-sea reefs will likely not recover in our lifetimes.

If the aim of marine management is to find a balance between conservation and seafood production, then management of bottom trawl fisheries should prioritise reducing fishing of overexploited stocks. This will benefit seabed habitats as well as maximise food production. We should also avoid fishing on the most vulnerable ecosystems. A total ban on bottom trawling would reduce the availability of seafood as alternative methods to harvest these fish, such as pots, traps and diving, operate on much smaller scales and mainly in coastal areas.

# Are marine protected areas helping marine mammals and birds? Maybe, but more can be done



This article by **Dr Peter Evans**, Honorary Professor, School of Ocean Sciences, is republished from The Conversation under a Creative Commons license. [Read the original article.](#)

**Our oceans are under pressure like never before, with over 60% struggling from the increasing impact of fishing, coastal activities and climate change.**

The harsh truth is that as we move towards 2022 only 3% of oceans are totally free from the pressure of human activity. The greatest impact appears to be on large-bodied animals such as marine mammals and birds, which cannot reproduce as quickly as smaller species.

Through my 40 years of extensive work on marine animals - and my current involvement in a European Commission project to help assess the effectiveness of marine protection areas (MPAs) - I have come to understand some of the issues which we need to consider to ensure that MPAs protect marine biodiversity.

Over one-third of marine mammals are threatened with extinction – and in Europe over 30% of marine birds are declining. Some species, including the Balearic shearwater and Atlantic puffin, are already endangered.

MPAs have been established to limit or exclude human activities that could potentially harm species and habitats. And, after a slow start, the last ten years have seen encouraging progress. MPAs now cover the 2020 global target of 10% of oceans, while some seas with high levels of human activity (the North Sea for example) have reached as much as 27% MPA coverage.

At a recent meeting, the international community agreed to protect 30% of oceans through MPAs and other conservation measures by 2030.

So, can we be optimistic that MPAs can turn the tide of declining marine biodiversity? Well, maybe, but in those ten years between 2010 and 2020 many species have continued to struggle despite the marked increase in MPAs. I would argue that more can be done to help marine mammals and birds specifically. Here's some of my reasoning.

## Size could be an issue

For one thing, I consider that the protected areas are probably too small to be fully effective – 50% of MPAs in EU waters measure less than 30km<sup>2</sup> and most are below 5km<sup>2</sup>. This is a particular problem for marine mammals and birds, which are among the most mobile of all animals. I am not just talking about the annual 80,000km global migration of the Arctic tern between the Arctic



and Southern Ocean, or the 22,000km migratory movements of the gray whale in the Pacific – many other marine species are extremely mobile too.

Even diminutive harbour porpoises can move great distances, and have been tracked by satellite travelling more than 2,000km from Greenland's west coast out into the North Atlantic west of Ireland.

Some seabirds, such as gannets, can often show a strong preference for particular locations and return to these year after year. There are also populations within a species, coastal bottlenose dolphins for example, which are much more sedentary and tied to a particular location. So, MPAs can be helpful in those cases. But the long distance migratory habits of many marine species shows the importance of providing protections throughout their life cycle and not only when they are in an MPA.

*Atlantic puffins are experiencing significant population declines across northern Europe. Photo: Peter Evans*

Within the European Union (EU) special protection areas for seabirds tend to be concentrated around the breeding colony, with little of the rest of the marine area protected. Yet, seabird species may regularly forage tens, sometimes hundreds, of kilometres away to find food for their young. I feel that the pressure of commercial fishing activity – due to depletion of fish stocks offshore – is rarely incorporated adequately in management plans.

Currently, marine mammal biodiversity does not seem to be well addressed by the EU habitats directive, because only six of the 30 species which regularly inhabit or pass through its waters are placed in a special annex requiring protected sites. Many more need area-based protection, including minke whale, killer whale and several dolphin species.

## What next?

The creation of an MPA, particularly a coastal one, can bring its own challenges. Marine mammals and birds are iconic, and attract a lot of public interest.

The pressure of human disturbance may actually increase once the site has become designated and publicised. It flags that there are interesting species to be found, and suddenly the animals become the focus of attention. This is an increasing problem in the UK, fuelled by the rise in tourist trips to view the resident mammals and birds.

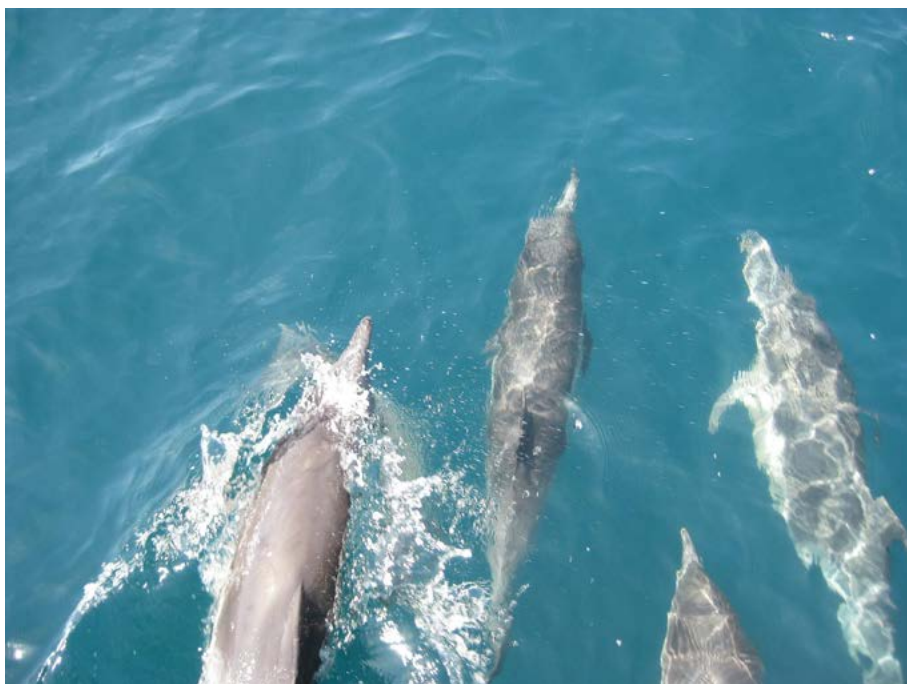
Many marine protected areas lack management plans, but in my opinion even those that have them rarely implement management in a fully effective way. Regulations may curtail human activities within the MPA but they rarely stop them entirely. And in many cases the activity, be it a wind farm construction or disturbance to the seabed from fishing, can often take precedence for socio-economic reasons.

Management plans, where they exist, often simply describe the problematic human activities. I think that there is limited consideration given to the impact of those pressures on different species, and robust monitoring of their populations is mostly inadequate.

How can anyone tell whether management measures are effective if neither the species nor the human activity is fully monitored, and the links between activity and its impact on each species has not been established? It seems to me that the bar for effective management of MPAs needs to be raised substantially from where it is at present.

European or other regional conservation agreements to help highly mobile cetaceans can help to improve the situation. That's not to say that joining them automatically protects marine mammals – it does not. But it is a move in the right direction, and focuses governments to work together to protect these much-cherished species by better understanding and addressing specific threats.

So, spare a thought for the Atlantic puffin in its nesting burrow and the bottlenose dolphin mother and calf in their shallow bay. Would they recognise in a positive way that they are living and breeding in a marine protected area?





# Study shows six-fold increase in severe lake heatwaves since 1995

## Severe lake heatwaves will be 25 times more likely in a 3.5° warmer world

Lake ecosystems, and the organisms that live within them, are vulnerable to temperature change, including the increased occurrence of extreme heat and cold. However, very little is known about lake heatwaves—periods of extreme warm lake surface water temperature—and how they may change under global warming.

According to a new study by Bangor University and the European Space Agency, published in *Geophysical Research Letters*, human-induced climate change is responsible for an increase in heatwaves within freshwater lakes.

Lakes are a vital source of freshwater and provide valuable services such as drinking water, irrigation, and food, as well as being a key part of the natural environment. Very little is known about the affect climate change has had, but this pioneering research is the first step towards seeking to redress the negative effects of heatwaves.

The analysis focuses on the frequency of heatwaves from a sample of the world's largest lakes over a 20-year period and models how often they will occur under climate change.

It was found that lakes have experienced a six-fold increased number of heatwaves since 1995. The 'hot' years of 2010, 2012 and 2016, showed a particular increase, with the greatest number of heatwaves (157) being recorded in the monitored lakes in 2016.

Further examination shows that 94% of the observed heatwaves categorised as 'severe', can at least in part, be attributed to climate change.

Whilst the satellite data and modelling for the 78 large lakes studied suggested that these lakes were two and five-times more likely to experience severe heatwaves in a 1.5°C and 3.5°C warmer world, the news for smaller lakes is far worse.

Looking at a global scale, and including smaller lakes, the model suggests that severe heatwaves will be 25 times more likely in a 3.5 warmer world.

**What really stood out was the magnitude of human contribution. Most of the severe lake heatwaves we looked at had a significant anthropogenic imprint. And looking at how these heat waves will change in the future, the magnitude of change we expect to see in the coming decades was quite striking.**

*Dr Iestyn Woolway, NERC Independent Research Fellow at the School of Ocean Sciences and lead author of the paper.*

**94% of severe heatwaves observed at lakes in recent decades can be attributed in part to climate change**

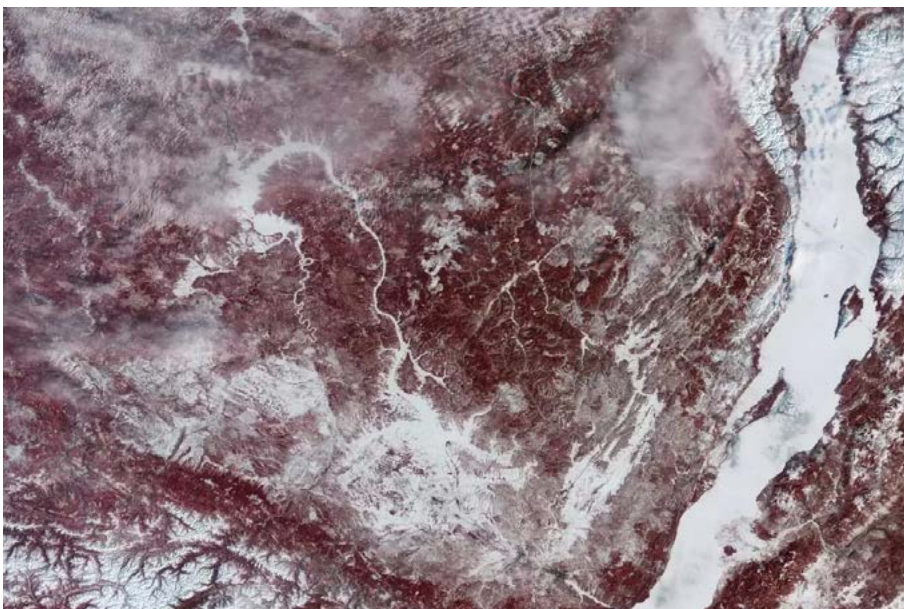


*An ESA satellite image of North America's Great Lakes*

*All five of North America's Great Lakes are pictured in this spectacular image captured by the Copernicus Sentinel-3 mission: Lake Superior, Michigan, Huron, Erie, and Ontario.*

*The Great Lakes are a chain of deep freshwater lakes. With a combined area of around 244 000 sq km, the lakes represent the largest surface of freshwater in the world – covering an area exceeding that of the United Kingdom.*

*Credit:European Space Agency*



The ice covered Lake Baikal is seen to the right of a satellite image.

The deep Lake Baikal in Siberia is covered by ice here. The entire lake is typically covered between January and May and in some places the ice can be more than 2 m thick.

Holding around 23 000 cubic km of water, Lake Baikal is the largest freshwater lake by volume in the world.

Credit:European Space Agency



A satellite image with Lake Ontario coloured orange representing greater surface temperature.

According to an a paper by Iestyn Woolway and colleagues, published in Nature Geoscience, the influence of human-induced climate change is evident in the fact that lake-water temperatures are rising in the fact that lake ice-cover forms later and melts sooner.

Credit:European Space Agency

## Effects could be worse in smaller lakes

Lakes are highly complex ecosystems, and vary in their ecology, depending on their location.

Some common effects of greater heat will include increased algal blooms, which remove oxygen from the water and pose a serious threat to animals and humans that depend on lakes as a freshwater source. Warmer waters also mean more evaporation and less mixing, as the lake's water becomes stratified with hot water on top and cooler water trapped below. Both issues can mean less oxygen, which can stress lake dwellers like fish who need to breathe.

At threat in the great lakes are organisms which are living at the extreme end of their temperature range.

Iestyn added: "Unlike humans, who can get into air conditioning or construct emergency shade, there's no escape for aquatic organisms when they are exposed to these extreme temperatures."

"We can expect that if these large bodies of water such as the Great Lakes are experiencing these heatwaves, then the effects must also be happening, and could even be worse in smaller shallower bodies of water," he added.

The next step for the research team is to link the physics with the ecology to better understand the implication for freshwater lakes.

# Testing sewage has helped track COVID – soon it could reveal much more about the UK's health

This article by **Davey Jones**, Professor of Soil and Environmental Sciences and Andrew Singer, Chemical Ecologist at the UK Centre for Ecology and Hydrology is republished from The Conversation under a Creative Commons license. The work reported here is carried out in collaboration with Drs **Shelagh Malham** and **Kata Farkas** of the School of Ocean Sciences. [Read the original article.](#)

## Testing sewage has helped track COVID – soon it could reveal much more about the UK's health

It may not feel like it when you're swabbing your throat, but improving how we test for diseases is one of the big positives of COVID. Applying methods developed for COVID to other diseases could revolutionise how we detect the causes of disease over the next decade.

When thinking of COVID testing, lateral flow and PCR tests spring to mind. However, there's one other, lesser-known advance that's remained quite literally underground – testing human sewage to monitor the spread and prevalence of COVID across the UK.

When we become infected with COVID, we all shed the virus in respiratory droplets. However, at least half of people are expected to shed the virus in their faeces too. Although not infectious, the coronavirus's genetic material can be detected in sewage, allowing many countries to supplement their testing programmes with wastewater monitoring.

This was established early on in the pandemic. As soon as COVID had taken hold in spring 2020, a team at Bangor University started testing wastewater at key cities in the UK, including Cardiff, Manchester and Liverpool. By adapting methods used previously to track norovirus in wastewater, the team soon confirmed that levels of the coronavirus in wastewater map closely to local cases.

British scientists specialising in wastewater analysis then came together to refine the methods for detecting the virus. Their work also permitted the viral genetic material found in wastewater to be genomically sequenced, meaning different viral variants could be spotted.

Soon afterwards, a national wastewater monitoring programme was set up. In England, it works by gathering samples of untreated sewage four times a week from roughly 270 sewage treatment works across the country, assessing collectively the sewage of around 40 million people.



The programme can show where the prevalence of the virus is increasing and decreasing, and through sequencing, can also detect the emergence and spread of variants. Importantly, wastewater testing is cheap, non-intrusive, captures everyone connected to a sewage treatment plant (so doesn't require people to choose to participate) and can be used in most urban settings.

With the emergence of the less symptomatic omicron variant, and as COVID testing is downscaled in the future, conventional testing methods will be much less able to keep track of the virus. So governments are now evaluating whether wastewater can lead the way in COVID surveillance.

In parallel, researchers are also trying to reveal what other secrets wastewater may hold, and how these can be used to improve people's health and wellbeing and guide future healthcare policy.

## Not letting waste go to waste

Given the evidence linking human gut bacteria to a range of common diseases, together with the success of using wastewater monitoring to track COVID, there's now interest in using urban wastewater more broadly as an indicator of community health.

For example, many other respiratory viruses are also shed in faeces, including influenza viruses and respiratory syncytial virus. The sampling approach and analysis methods to test for these are almost identical to those already used for monitoring COVID.

Unsurprisingly, wastewater monitoring can also be used to assess the levels of gastrointestinal viruses that are circulating. Noroviruses, enteroviruses and others that are spread by the faecal-oral route are present at super-high levels in diarrhoea, making them easy to track.



*Testing isn't limited to viruses – chemicals and other microbes can be looked for too.*

The possibilities also extend beyond viruses and faecal material. In some ways, the urine component of sewage contains more valuable information about our health. We are all familiar with using urine tests to see if athletes have taken banned substances or to screen for common health conditions such as diabetes. To date, however, we haven't applied the same principles to wastewater to look at community health and how this changes over time or between regions.

For example, it's notoriously difficult to measure the mental wellbeing of a population and how this is affected by changes in government policy, season or world events. But by measuring certain chemicals in wastewater – such as cortisol, the body's primary stress hormone – we may be able to develop a way of routinely assessing the country's collective feelings.

## Coming to a town near you

The measurement of chemicals and genetic material in human waste does, however, raise some potential ethical concerns. At present, no attempts are made to trace observations back to individual households as this undermines the unbiased and anonymous foundations that underpin wastewater-based community surveillance. But in future, we'll need to set out clear guidelines on the accessibility, governance and use of wastewater data.

Alongside taking measurements at large wastewater treatment plants, there's also potential to look at "near-source" locations – sites where there's a high risk of infection due to high-density housing (for example, university halls of residence or prisons) or where an infection spreading is of particular concern (such as hospitals and care homes). There's growing evidence, through ongoing research, that wastewater sampling at these locations can detect disease outbreaks when routine testing has failed, allowing preventative measures to be implemented quicker.



*Localised wastewater testing could give early indications of disease outbreaks in hospitals.*

Another potential application gaining traction is monitoring wastewater at international borders. It's likely that new coronavirus variants enter the UK every day via foreign travel. Most of these variants aren't as infectious as omicron and don't catch on, and the frequency with which these import events occur remains unknown. But initial evidence from ongoing research indicates that targeted sampling of wastewater from boats and aircraft may allow the arrival of new coronavirus variants to be reliably estimated.

So flush and forget is no longer an option. Wastewater tells no lies about societal behaviour, and analysing it should reap rich rewards. We need to harness the rich wealth of information in our sewage and use it for public good.

# Wind turbines can breathe new life into our warming seas

This article by **Ben Lincoln**, Research Fellow in Applied Observational Oceanography, Bangor University; Robert Dorrell, University Research Fellow, Energy and Environment Institute, University of Hull and **Tom Rippeth**, Professor of Physical Oceanography, Bangor University. is republished from [The Conversation](#) under a Creative Commons license.

## Offshore wind is set to move further and further from shore, as demand for renewable energy grows and new floating turbine technology makes deep-water expansion possible.

However, for the first time, large areas of the UK continental shelf now open for development are “seasonally stratified”. David Attenborough has described these seasonal seas as some of the most biologically productive on the planet. While they only cover 7% of the ocean, they are estimated to account for somewhere between 10% and 30% of the life at the bottom of the food web.

According to our new research, one byproduct of deep-sea wind farming is that the foundations of these floating turbines could help reverse the damaging effects of climate change on such seas.

In seasonally stratified seas, the water is completely mixed during winter, but separates into layers in the spring with warm sunlit water forming over the top of colder water below. The formation of this “stratification” during spring triggers a massive explosion of marine life as phytoplankton (microscopic algae) blooms in the warm surface waters, forming the base of a food chain which ultimately supports fish, seabirds and whales.

However, the nutrients in the sunlit surface layer rapidly become exhausted by the plankton bloom. After this point, growth depends on nutrients stirred up from the deep water by turbulence associated with tides, winds and waves.

This turbulence not only stirs nutrients up, but also stirs oxygen down into the dark, deeper layers where dead plants and animals sink and rot. Since oxygen is needed for things to decay, this mixing helps this “marine snow” to rot, transforming it back into useful nutrients.

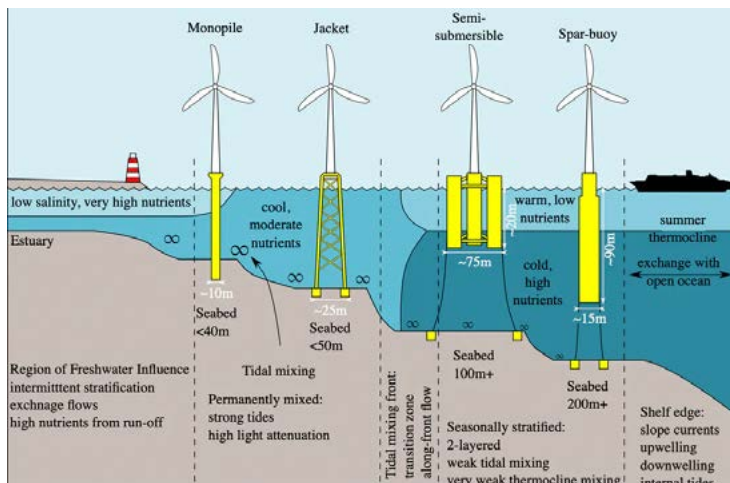
## Climate change could starve our shelf seas

Our changing climate means stratification is starting earlier in the year and plankton is blooming earlier in spring, out of sync with the life cycles of larger animals. During summer, the stratification is predicted to increase, a change already well documented in the open ocean.

Increasing stratification will reduce the ability of natural turbulence to stir up vital nutrients from the deep into the warm water surface layer and so diminish their ability to sustain marine ecosystems.

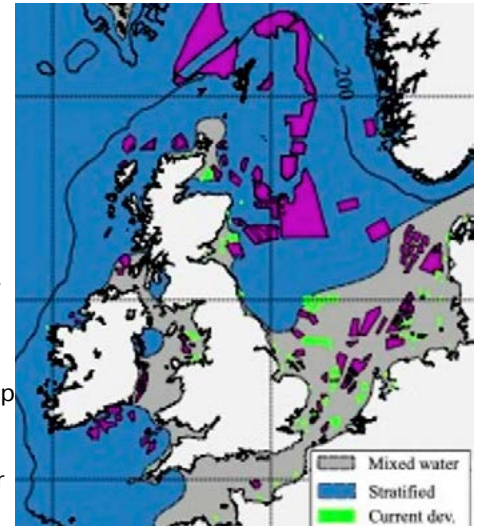
As the ocean warms, it is also less able to hold oxygen, potentially leading to poor water quality.

So where do wind farms come in? The introduction of wind turbines into deeper water, where the ocean is stratified, will provide a new, artificial, source of turbulence. Water flowing past the floating turbine foundations will generate wakes, causing the warm and cold layers to mix together. In fact, we recently published research showing the wake from foundations at least doubles the natural turbulent mixing within the region of an offshore wind farm.



Even ‘floating’ wind turbines still have large underwater foundations to keep things stable.

Credit: Dorrell et al (2022), Author provided



So far, offshore wind farms around the UK have been in well mixed waters (grey). But there are proposals to move into deeper seasonally stratifying seas (blue).

Dorrell et al (2022), Author provided

This increased turbulence could potentially offset the impacts of climate change on stratification and increase the supply of nutrients to the surface layer and oxygen to the deep water. Something similar already occurs around underwater banks, which is why very productive fisheries are often found in places like Dogger Bank in the North Sea or the Grand Banks of Newfoundland – shallow points where different layers of the ocean have been mixed together.

It seems that offshore wind could help seasonally stratified seas become more productive, more biodiverse and support more fish. Careful turbine design and wind farm planning could therefore provide an important tool in the battle to save these important ecosystems from the worst impacts of climate change.

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