



Assessing tidal energy sites

Researchers in the north of Scotland and Wales are trialling a new method of measuring tidal currents which could revolutionise the marine renewables industry. The project, is led by the ERI's Dr Benjamin Williamson along with colleagues from Swansea University and Bangor University in Wales. The team will test the ability of drones to film the movement of water then apply algorithms to determine its speed in the Pentland Firth in Scotland and Ramsey Sound in Wales.

Current methods for measuring tidal streams rely on using survey vessels or installing seabed sensors which can be time consuming and expensive. It is hoped the technique could provide a simple, effective way to identify locations for underwater tidal turbines which will reduce costs for renewable energy developers and generate opportunities for developing countries.

Speaking about the project, Dr Williamson explains: "Measuring the flow speed and movement of water is vital for developing offshore renewable energy. These measurements are needed to predict the performance and inform the placement of underwater tidal stream

turbines or to optimise the moorings and design of floating turbines. However, gathering these measurements is typically high-cost and high-risk".

"Our aerial technique offers a cost-effective way to support environmentally-sustainable development of marine renewable energy. It could be used in remote locations and developing countries where suitable survey vessels may not be available or to support community-based approaches to renewable energy generation. We hope to help address the climate emergency by advancing our ability to generate reliable, clean energy."

Dr Jared Wilson, Renewables and Energy Programme Manager at Marine Scotland Science, added: "The Scottish Government is pleased to be supporting this exciting project. Tidal stream renewable energy has an important role to play in the transition to low carbon energy sources and Marine Scotland Science looks forward to working with scientists from the University of the Highlands and Islands and everyone involved in the project to help develop the technology".

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“By gathering high resolution hydrodynamic data at offshore renewable energy sites, the project will improve our understanding of the potential effects of such technologies and help ensure that they continue to be delivered in an environmentally sustainable manner.”

The ‘Validating surface currents at offshore renewable energy sites’ (V-SCORES) project is being funded by the Supergen Offshore Renewable Energy Hub, a £9 million Engineering and Physical Sciences Research Council project led by the University of Plymouth.

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Swansea University
Prifysgol Abertawe

Supergen



Offshore Renewable Energy



PRIFYSGOL BANGOR UNIVERSITY



Engineering and Physical Sciences Research Council

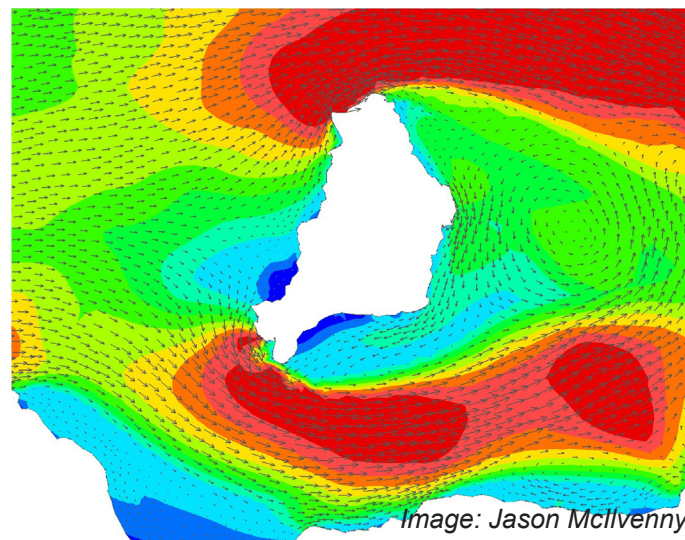
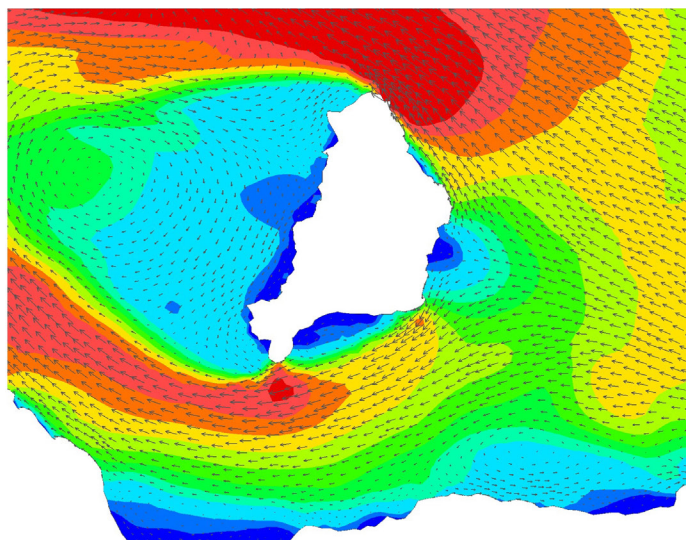


Image: Jason McIlvenny

Tidal flow speeds in and around the Inner Sound tidal lease site where MeyGen Ltd have tidal energy devices installed

Water, soil and health – online course

ERI researchers have contributed to a new international online course “Water, Soil, and Health: Sustainable Community Interventions”, hosted by St George’s University Grenada. This free, on-demand course features industry, research, and community-led case studies and interventions focused on sustainable water use, building climate resilience, and strengthening integrated resource management in Kenya, Jamaica, Grenada, and Scotland.

ERI staff prepared the module on “One Health in Scotland” in contribution to the ‘Global Challenges Research Funded (GCRF) Health, Polluted Water, and Soils network together with project partners Clean Water Wave. It explores cross sector collaborations and knowledge exchange that is influencing policy and advancing the field of sustainable One Health outcomes in Scotland. A live panel discussion drew on expertise and perspectives from representatives of ERI, Clean Water Wave, NHS Highland, and the One Health Breakthrough Partnership.

The Health, Polluted Water, and Soils network aims to support affordable and innovative

technological and sociological solutions to improve access to clean water, healthy and productive soils, and safe, nutritious foods. It is based on a One Health interdisciplinary approach, and involves a growing membership from academic researchers, business leaders, entrepreneurs, health and environmental professionals, government officials, science policy diplomats, and community leaders.

<https://online.sgu.edu/courses/course-v1:SGU+OHOM8+2021/about>

<https://gcrfonehealth.org/>

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SHOT-SWITCH

On the 24th of February 2020, nine game shooting and countryside organisations issued a joint statement on shotgun ammunition use in the UK. The statement expressed a wish to end the use of toxic lead (Pb) shot and single-use plastics in ammunition within five years “in consideration of wildlife, the environment and to ensure a market for the healthiest game products, at home and abroad”.

To understand how effective this voluntary switch would be, a new ‘citizen science’ project was launched through the ERI with colleagues at the University of Cambridge. ‘SHOT-SWITCH’ will track the shift towards non-Pb ammunition using wild-shot pheasants offered for sale across Britain by assessing the shot type used to kill them i.e., lead, tungsten, bismuth, steel.

National monitoring will take place each year until 2025. However, the first dataset was compiled in February 2021 (covering the Oct 20 - Feb 21 pheasant season) and results published in the journal Conservation Evidence: They showed that one year into the proposed transition, 99.4% of pheasants containing detectable shot contained toxic Pb-shot (179 of 180 pheasants), indicating that we still have some way to go!

However, in March MP Rebecca Pow (Parliamentary Under Secretary of State) announced that the UK Government is now ‘considering a ban on lead ammunition to protect wildlife and nature as part of new plans under UK REACH’ (Registration, Evaluation, Authorisation and restriction of CHemicals). This adds to long-voiced calls to ban Pb ammunition to protect wildlife (i.e., waterbirds, scavengers,



raptors) and human consumers of game meat alike. For example The Wildfowl and Wetlands Trust estimates that up to 100,000 wildfowl die needlessly in the UK each year due to ingesting used Pb pellets in wetlands (often mistaken for food/gizzard grit); while up to another 400,000 suffer sub-lethal welfare or health impacts.

Furthermore, members at the recent UK’s National Game Dealers Association AGM also voted to commit to sourcing all feather and fur game as well as venison and wild boar from Pb-free supply chains from the 1st of July 2022.

For further information on SHOT-SWITCH, and to see how this story evolves in coming years, you can follow the project at the ERI website: <https://eri.ac.uk/research/major-projects/shot-switch/>

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Image: Left and right, Rhys Green; centre, Mark Taggart; above Andy Hay/ RSPB images.

Building fire resilience in peatlands

In September 2019, a team led by the ERI received funding from the UK's Natural Environment Research Council (NERC) to assess: 'How does land management influence fire resilience and carbon fate in blanket bogs; FireBlanket'. Over the following 18 months the project team compared the fire resilience of blanket bogs under different management regimes using measures of vegetation, moisture, peat properties, satellite-derived "bog breathing" and water quality.

The project was rounded off in March 2021 with a workshop bringing together researchers with 13 stakeholders organisations including land managers and the Scottish Fire and Rescue Service (SFRS). The workshop aimed to co-develop future-proof strategies for near-natural, drained, afforested and restored blanket bogs in the Flow Country.

Lessons learned from the response to the 2019 Strathy fire were presented by representatives of the SFRS and the Royal Society for the Protection of Birds (RSPB) with the creation of a Local Wildfire Operations Group being recommended. This group would include representatives from SFRS, Police Scotland, local land managers, RSPB, Highland Council, SAS, SSE, Dounreay, etc. and could organise training events, maintain an asset register, support education programmes and be involved (as appropriate) in response to wildfire incidents. Participants also identified

several future opportunities to reduce risks including education of local communities and visitors, alongside more specific training for land managers.

The workshop also addressed opportunities and barriers around two possible future land management scenarios: reducing fire spread e.g. with fire breaks or reducing fire severity e.g. through re-wetting and fuel management. The majority (82%) of the participants identified that a combination of actions from these two scenarios, together with improved future response, would be the most effective strategy to reduce fire risk. There was also a consensus (> 80% agreement) that further research is needed to identify the most cost-effective management strategies in terms of reducing fire risk, and to determine how climate change and land management interact with wildfire risk.

While the FireBlanket project is now officially finished, the team will continue to work on analysing the data and writing up the key findings from the project, and will seek future opportunities to develop the research.

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Image: Henk-PieterSterk



Image: Chris Marshall

Transporting Samples across Reindalen, Svalbard 2019

Peatlands: the ice cores of the warm past

New research (Large et al., 2021; see publications) has shown that under the right landscape and climate conditions, peatlands can almost continuously accumulate peat over one million years, far longer than previously estimated. The results emerge from a collaboration between ERI, University of Nottingham and UNIS (Svalbard) through the Leverhulme-funded 'Peatland Resilience' project.

This is important as peat stored as coal can record detailed information about the climate, hydrology, atmosphere, landscape, flora and fauna present during periods much warmer than today. The longevity of peatlands in the geological past shows the natural resilience of peatland and its carbon store to change over substantial periods of time and provides a means to understand how peatland adapts to rapid climatic warming.

By examining ancient peatlands, we can also examine the processes by which peatland initiates, expands and terminates. This helps determine the natural mechanisms that control whether peatlands are accumulating or losing carbon. One of the ways this might be useful in modern peatland is to determine the maximum depth of peat a particular landscape setting may be able to naturally hold without becoming unstable. This would allow the maximum

peatland carbon store to be determined for a specific setting, and also allow restoration to be targeted in areas with the greatest likelihood of success. Another area where this may be useful, is in predicting under which landscape settings peatland is stable, allowing the future extent of peatland under different climate scenarios to be more accurately estimated.

This research allows us to examine how landscape and climate interact with land management over the short to medium term to control the resilience of the Flow Country blanket peatland. This includes identifying how peatland reacts to extreme weather events, how condition relates to land management using satellite radar, how peatland species such as sphagnum adapt to the varied conditions in the Flow Country and how the system will respond to future warming.

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LEVERHULME
TRUST



Professor Roxane Andersen



Roxane Andersen, a senior research fellow at North Highland College UHI's Environmental Research Institute, has been awarded a professorship from the University of the Highlands and Islands, in recognition of her outstanding research activity, her leadership skills and her contribution to education.

Professor Andersen joined the ERI as a research fellow in 2012. Since then, she has helped to secure over £4 million of grant income from a range of funders to develop a comprehensive and collaborative programme of research on peatlands and ecological restoration. She has published over 50 peer-reviewed articles in academic journals, organised and contributed to numerous international conferences and supervised 13 PhD students. Professor Andersen has also contributed to national and international policy and governance, supporting a bid for Caithness and Sutherland's Flow Country to become a UNESCO World Heritage Site and was appointed as chair of Scotland's National Peatland Monitoring and Research Group in 2018.

Speaking about her new title, Professor Andersen said: "I am truly honoured and I feel incredibly grateful to everyone who has supported me on this journey so far, not least to the whole team at the Environmental Research Institute. I feel privileged to have met many strong, intelligent and amazing women throughout my career who I could look up to. I really hope that, like them, I too can inspire others to follow their passion."

Professor Todd Walker, Principal and Vice-Chancellor of the University of the Highlands and Islands, said: "The title of professor is the highest level of academic achievement which can be awarded. It is reserved for individuals who are recognised as leaders in their field and who have demonstrated excellence in their work. Professor Andersen is a worthy recipient. She has made an invaluable contribution to peatland science and developed an international reputation for her work. She is a credit to our university and I look forward to seeing how her career continues to grow."

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Professor Stuart Gibb is Director of the ERI and is also Chair of the Peatlands Partnership. He said: "In recent years we have seen a shift in scientific understanding of peatlands. Their importance in terms of biodiversity, carbon capture and climate change and in the provision of ecosystem services has been re-evaluated and Roxane's work, particularly in the Flow Country, has been at the heart of this. However, the impact of her work goes beyond science and has helped promote societal appreciation of the global significance of the peatlands we have on our doorstep. This is an excellent example of 'place-based' research and its power to connect local communities with international agendas and I am delighted that Roxane has been recognised for this contribution."

Following the announcement of her new title, Professor Andersen gave a public seminar on Wednesday 2nd June - World Peatlands Day. The online talk explored the science of peatlands, touching on subjects including climate change, biodiversity and restoration.

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Environment artist in residence

An arts centre in Caithness has launched an ambitious new artist residency in collaboration with ERI. Lyth Arts Centre have announced musician and composer Morag Currie as their Environment Artist in Residence.

Morag, from Thurso, will use traditional music techniques to explore the intersection between society, economy and ecology and interrogate what a 'just transition' to renewables could look like. The residency will also involve collaboration with the Marine Alliance for Science and Technology for Scotland (MASTS) and their People Ocean Planet initiative, and NatureScot, Scotland's Nature Agency.

Connecting with the themes of the critical COP26 climate negotiations, due to take place in Glasgow later in 2021, the residency will engage with people who live in and visit coastal environments where offshore and marine renewable energy developments may affect them. Morag's project will have a particular focus on the Pentland Firth and Moray Firth, highlighting its maritime heritage alongside its contemporary role as a hot spot for tidal energy. The project aims to improve understanding and engagement with ocean issues and opportunities in local communities. Supported by the partners of the project, Morag will work with groups in Caithness and nationally, exploring themes such as renewable energy

developments and nature co-existing together, the role of science in our lives and societies relationship to the ocean and coast.

The project will culminate in a performance at the Northern Lights Festival, Lyth Arts Centre Year of Coasts and Waters Celebration around Wick Harbour rescheduled to September 2021, as well as new music and film and presentations at academic conferences.

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LYTH ARTS CENTRE

New Faces @ ERI

Dr. Stephanie Strother
ERI Associate (external)



Hi everyone, my name is Stephanie Strother and I've joined ERI as an Associate focusing on climate change, energy and STEM outreach initiatives. I'm currently working with Dr Benjamin Williamson and Dr Annie Linley on the Energy Knowledge Exchange team focusing on research capability mapping, skills and curriculum development surrounding offshore wind, green hydrogen and other various energy themes.

I am originally from the US, but moved to the UK to pursue a PhD in vegetation and paleoclimate modelling at Northumbria University and after completing my Research Fellow position in Newcastle moved up to Thurso. I'm excited to start working on more knowledge exchange initiatives and exploring more of the north of Scotland once restrictions ease!

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Publications

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