



Finding better ways of protecting our oceans

Scientists from the ERI and the University of Aberdeen are beginning a new project to determine where offshore wind developments should be located in order to better protect marine life in the future. The three-year project, PREDICT (Predicting seasonal movement of marine top predators using fish migration routes and autonomous platforms) has been awarded £800K funding from Ørsted, the global leader in offshore wind. The research will address knowledge gaps in offshore wind environmental characterisation, by improving understanding of fish migration patterns and providing a vision for next-generation monitoring techniques.

Led by the ERI's Dr Benjamin Williamson and Professor Beth Scott (UoA), this project will see scientists working closely with industry across a range of multi-disciplinary research themes, spanning ecology, engineering and data analysis. It will investigate fish migration, how predictions of oceanographic changes to productive regions

in time and space may be impacted by climate change, and the knock-on effects on top predators (seabirds and marine mammals). PREDICT will support and accelerate development of strategic prediction, survey and analysis methods, so that industry can avoid using locations that have a higher likelihood of overlap with important feeding grounds for seabirds and marine mammals.

Professor Beth Scott said: "This is a very exciting project that brings a proactive approach to determining the reasons why some locations in our seas may be safer to use for wind farm developments than others. The project will dive straight into the ecological mechanisms that make fish available as prey to seabirds and mammals such that we can better predict where mobile animals will choose to forage now and into a future driven by climate change. It is highly significant to see Ørsted encouraging and supporting such strategic science for the good of the entire sector."

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Dr Benjamin Williamson added: “As well as expanding our knowledge of prey availability, and the environmental and oceanographic factors which drive variability in marine habitats, this multi-disciplinary project will also evaluate innovative technologies to collect these datasets.”

Duncan Clark, Head of UK Region for Ørsted says: “As the industry works hard to deliver the installed offshore wind capacity needed to hit Scotland’s net zero targets over the coming decades, it is essential that we do this in a way that is in balance with nature.”

“The PREDICT project will provide essential research to ensure that offshore wind projects can achieve this, minimising the impact future developments might have on seabirds and marine mammals. We are proud to contribute to

this project to be led by the University of Aberdeen and the Environmental Research Institute, which are recognised around the world for their extensive expertise in offshore renewable energy research.”

“At Ørsted we have committed to deliver net-positive biodiversity impact in all renewable energy projects the company commissions from 2030, which means we will implement initiatives that support natural ecosystems, habitats, and species in and around our new renewable energy projects.”

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Commemoration of 1928–1929 Great Barrier Reef Expedition

ERI associate, Emeritus Professor Barbara Brown has co-authored a review of the 1928–1929 Great Barrier Reef Expedition, as part of the celebration of 100 years of the formation of Australia’s Great Barrier Reef Committee in Brisbane in 1922.

Professor Brown is a pioneering coral reef expert, who has worked on eco-physiological responses of corals to global warming, including many long term monitoring studies. She is internationally recognised for her work on coral bleaching. Professor Brown helped commemorate the 1928–1929 Great Barrier Reef Expedition, which is an important milestone in the evolution of modern coral reef science, by considering its scientific achievements and longer-term legacy in the review.

The expedition involved an intensive 13 month period, spent on Low isles, on the northern Great Barrier Reef involving laboratory and field observation, microscopy, physical and chemical characterisation of water and an in depth survey of reef biota. Some of the great achievements of the expedition included estimation of adult and juvenile coral growth rates, natural bleaching events and using changes in the reef as indicators of past storms and sea levels. The expedition also provided exceptional ecological and geomorphological benchmarks against which future change can be measured. Professor Brown will be involved in other upcoming events commemorating the committee formation in 1922 and the expedition in 1928.

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Exposed coral near the anchorage, Low Islands, Queensland, ca. 1928 (C.M. Yonge). National Library of Australia from Canberra, Australia (nla.gov.au/nla.obj-145107990)



Satellite image of the Great Barrier Reef. NASA, MISR photojournal.jpl.nasa.gov/catalog/pia03401

ERI on Countryfile!

The ERI's Dr Mark Taggart was featured in a recent episode of BBC Countryfile. Mark appeared on the program to speak with Tom Heap about lead-shot in game birds, which is an ongoing topic of research at ERI. The SHOT-SWITCH project aims to monitor the transition from lead to non-lead shotgun ammunition use in Britain. This project followed a joint statement in Feb 2020, by nine UK game shooting and countryside organisations, expressing their wish to end (on a voluntary basis), within five years, the use of lead and single-use plastics in shotgun ammunition used by hunters "in consideration of wildlife, the environment and to ensure a market for the healthiest game products". The project involves annual sampling of shop bought pheasants from across the UK to test for the presence of shotgun pellets and determine their metallic composition. In this way, the voluntary switch to non-lead shotgun ammunition can be monitored over time.



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ERI and COP26!

During the COP26 conference in Glasgow, ERI presented several contributions. Professor Roxane Andersen, delivered lectures in the Peatland Pavilion, a hub designed to highlight the global importance of peatlands. Prof Andersen spoke here about the Flow Country peatlands of Caithness and Sutherland.

Elsewhere Dr Lydia Niemi, showcased the One Health Breakthrough Partnership through an introductory video and case studies from the part-

nership under the wastewater quality theme in the Hydro Nation Virtual Water Pavilion. Additionally, Hydro Nation Scholars and PhD students Ilgaz Çakin and Manuel-Thomas Valdivia presented their research in virtual poster exhibition.

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Hydro Nation Scholars Programme



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Modelling the behaviour of legacy radioactive particles

Dounreay Site Restoration Limited (DSRL) is funding research through the University of the Highlands and Islands for a critical PhD project, to model the behaviour of legacy radioactive particles in the marine environment at Dounreay, in collaboration with ERI.

Nuclear fuel was reprocessed at Dounreay for almost 40 years. The used fuel rods were dismantled in water-filled ponds in a process that generated metallic fragments, some of which entered the site's drainage system and were discharged to the sea. An important part of the work to close down Dounreay is to address the legacy of the radioactive particles that wash up on the beaches next to the site.

Dr Iain Darby has been working with the ERI's Dr Jason McIlvenny to offer a full PhD bursary in this critical subject. He said: "Over the years we have been involved in a great deal of research into the way that the particles behave, and we are able to make predictions about the numbers of particles in the marine environment, and where we expect them to be found. However, this is an extremely important area of research for the site as we continue to manage this important issue".

Dr Jason McIlvenny added: "The PhD bursary offers an exciting opportunity to collaborate with DSRL to explore a difficult environmental problem. The project will involve working with state of the art equipment to understand historical movements of the legacy particles and understand the environmental conditions which potentially lead to the mobilisation of radioactive particles in the marine environment".

Applications for this exciting project, based at ERI are open until 22nd March 2022.

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European shag tracking project at Bluemull Sound, Shetland – are shags affected by tidal turbines?

Countries around the globe are increasingly turning to renewable energy technologies to meet their electricity production demands and greenhouse gas emissions reduction targets. However, there are concerns about the negative effects of these technologies on vulnerable species of struggling wildlife. Seabird breeding numbers in the UK, for instance, have decreased by 9% since 2000, with seabirds contending with decreases in forage fish and more frequent severe storms in addition to being at risk of collision and displacement from offshore renewable energy developments.

The UK has a large renewable energy resource in the form of wind, waves, and tides, and is already harnessing these in projects such as Nova Innovation’s tidal turbine array at Bluemull Sound, a channel between the islands of Yell and Unst, Shetland. This channel is also used by a declining and vulnerable seabird, the European shag. These birds are particularly vulnerable to negative interactions with underwater tidal turbines because they can dive up to 61 metres (and therefore within range of tidal energy devices) in search for food and do so in places with strong tidal currents.



Apart from knowing that shags use Bluemull Sound, we don’t know whether this translates to real, measurable, overlap with the turbine array. To find this out, ERI researchers Elizabeth Masden and Samuel Langlois Lopez together with local Shetland assistance, outfitted 12 shags of various age classes with biologging devices at Bluemull over the course of 2 weeks in September 2021. These loggers give very high-resolution information about shag locations (via GPS) and also about their dive depths (via in-built pressure sensors). This will help not only to answer what level of risk Nova’s turbines pose to the shags, but also to better understand how shags use areas with strong tidal currents more generally, with implications for future tidal energy developments in Shetland and elsewhere.

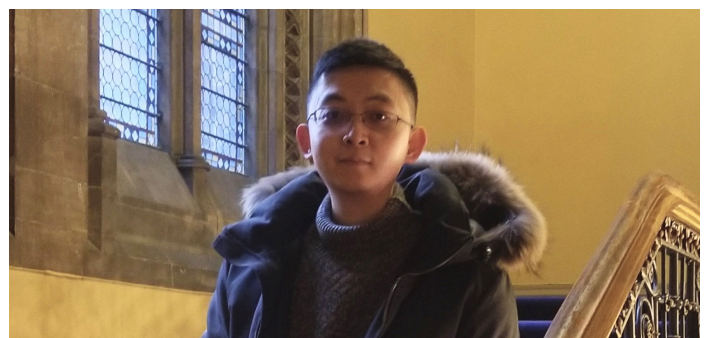
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North Highland College post-graduate student of the year

North Highland College post-graduate student of the year was awarded to ERI PhD researcher Huiyi Zhang, who is nearing completion of his PhD on the removal of emerging contaminants with marine plastic-based adsorbents. His director of Studies, ERI’s Dr Szabolcs Pap, said “Huiyi is an outstanding student and should be commended for his hard work and attitude during the last year, in what has been an unprecedented, and stressful time. Despite many challenges, he has continued to be generous with his time to support others, has published his first peer-reviews paper (with English being his second language) and is still on track with his own PhD progress”.

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New faces at @ ERI

Mascha Bischoff Molecular Plant Ecologist



Hello all, I'm Mascha and I'm joining the "Carbon, Water and Climate" theme at the ERI. I'm a chemical ecologist with a background in botany and evolutionary ecology. For the past fifteen years, my research focus has been on plant-pollinator interactions and the role of plant volatile organic compounds (VOCs) as infochemicals. I'm passionate about field work, my research has taken me to Australia, New Zealand, the US Rocky Mountain Biological Laboratory and to South

Africa. Most recently, I taught as a lecturer in plant ecology and evolution in Germany. Now I'm excited to apply my skills in a new context to explore plant-plant interactions in peatlands, learn about VOC communication in Sphagnum mosses and establish a VOC lab at the ERI. While I may have taken the long and winding road to Thurso, I'm very happy to be here now.

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Maidier Guiu Analytical Chemist



Hi everyone. My name is Maidier Guiu and I'm joining ERI as an Analytical Chemist. Although, I have been living in Aberdeen for the last 12 years, I'm originally from the Basque Country (northeast of Spain) where I graduated with a BSc in Biological Sciences and a MSc in Biodiversity, Functioning and Management of Ecosystems.

I'm really happy to come to ERI and to have the chance to explore this corner of the amazing Scottish environment in my spare time. I'm really looking forward to meeting and working with all of you!

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Lucy Mitchell Researcher



Hi everyone, I joined ERI in October as part of the ROBINSON Horizon 2020 project team. My role is focused on investigating cumulative impacts of renewable energy on birds, amongst other taxa, hopefully using some new methods.

My PhD was at the University of York and looked at the effects of habitat change on a breeding population of the European nightjar. For this I used GPS units, lots of exciting movement analysis and faecal metabarcoding to identify the main components of their diet.

I have recently moved up to Thurso with my husband and our wee dog, from Hull, where I worked on developing migration research in the UK using Motus VHF technology (you can find out about this at motus.org) and undertook the UK's first bird movement study using Motus tags (on European blackcaps – more results still to come!). I will remain as chair the UK Motus steering group and hope to use it in my work at ERI.

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Callum Thompson PhD researcher



Hi all, I'm Callum Thompson and I joined the ERI in September as a PhD researcher. I graduated from Sheffield Hallam University with a 1st class BSc in Biology, and have worked for two years as a lab technician at the University of Sheffield using *Drosophila melanogaster* as a model species to study the effects of aging and diet. I am now working under Roxane Andersen in the Carbon, Water, Climate theme, with my project having a focus on *Sphagnum*'s resilience to hydrological stress. So far I've been collaborating with the

RSPB on a baseline vegetation survey at a forest-to-bog restoration site to evaluate the colonization of *Sphagnum* on bare peat dams before the introduction of *S. capillifolium* and *cuspidatum*. I look forward to working with everyone and contributing to the growing ERI team.

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Jake Witherington PhD researcher



Hi everyone, I'm Jake and I have recently started my PhD at the ERI working with Prof. Roxane Andersen as my lead supervisor. I will be using the peatland growth models, DigiBog and HPM, to investigate the ecohydrological feedbacks and resilience of blanket bogs. Specifically, I will be focussing on how these processes with the added pressure of a changing climate may affect bog growth and if this imposes any limits on restoration action.

Before moving to Thurso, I graduated from the University of Reading with a BSc in Environmental Physics and I have a keen passion for climbing, talking about climbing, building climbing walls, recovering from climbing, and converting a van to go climbing in.

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Samuel Webber PhD researcher



Hello everybody! I'm Sam and have recently joined the ERI as a PhD Researcher after a 4-year Chemistry degree at the University of Edinburgh. I have the interesting task of determining the different mechanical, ecological and hydrological properties of peatland margins with respect to peatland resilience. I am already having a great time in the field and theorising conceptual models and am very excited for the next 3 years in Thurso.

a wide range of things such as surfing and cooking. I'm already looking forward to making some winter stews (but not so much the cold sea water when catching waves!). I'm already a massive fan of Caithness and I'm sure I will spend a fair amount of time exploring the area as well! So, I hope to see you all around!

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Other than academia, I enjoy

Anna McWilliam PhD researcher



"Innovative brush management to enhance water quality following peatland restoration and forestry operations". This is within the Environmental Contamination and Ecological Health theme, led by Dr. Mark Taggart, with Dr. Paul Gaffney as my Director of Studies.

projects, including the Langholm Moor Demonstration Project and the Scottish Grey Partridge Recovery Project. More recently, I've ventured into forestry, working for Forestry and Land Scotland as an Environment Ranger and Harvesting Forester. I hope my research can contribute to improving sustainability in the forestry industry.

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Hello, my name is Anna McWilliam. I've lived near Helmsdale for five years, so am delighted to have ERI on my doorstep. In October, I started my PhD on

I graduated from the National University of Ireland, Galway in 2008 with a BSc (Hons) and from the University of Reading in 2009 with a MSc in Wildlife Management and Conservation.

Since then, I've worked as a research ecologist on a variety of

Tom Thompson MRes student



Hello everyone, I am Tom Thompson and I have joined ERI as an MRes student. Previously, I was a technician and teaching assistant at a secondary school in Cambridge but wanted to progress my career. Having completed my BSc (Hons) in Applied Science with UHI Perth College last year, I am now looking forward to developing my practical and scientific skills. I will be researching water quality in and around Wick John O'Groats

Airport, looking into current practice, including de-icer use, wastewater management, and wastewater monitoring methods. Having lived in Scotland for over 4 years now, I have deepened my interests in hiking, cycling, traveling, beer, and a little whisky!

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PhD success!

ERI PhD researchers Henk-Pieter Sterk, Iain Detrey and Clare MacDowall, each recently defended their thesis, marking another three successful PhD completions!

Iain's thesis was entitled "Is long term peat storage for future restoration viable? Assessing the impact of long-term peat storage for future reinstatement at a Shetland energy development". Iain now works as a Programme Officer for the IUCN UK Peatland Programme.

Henk-Pieter's thesis was entitled "Assessing the condition of the Flow Country peatlands to support their future protection – monitoring blanket bog during drought and mapping post-wildfire recovery". Henk-Pieter joined Nature Scotland working for Peatland Action as GIS & Data analyst.

Clare's thesis was entitled "Hydrodynamic Characterisation and Wave Current Interaction around Dunnet Head in the Pentland Firth with Implications for Marine Energy Generation". Clare works for Inverness College UHI as a maths lecturer.

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Iain Detrey



Henk-Pieter Sterk

ERI Publications winter 2021/22

Galligan, T. H., Green, R. E., Wolter, K., **Taggart, M. A.**, Duncan, N., Mallord, J. W., Alderson, D., Li, Y., & Naidoo, V. (2022). The non-steroidal anti-inflammatory drug nimesulide kills Gyps vultures at concentrations found in the muscle of treated cattle. *Science of the Total Environment*, 807(2), 150788. <https://doi.org/10.1016/j.scitotenv.2021.150788>

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ERI Publications winter 2021/22 continued

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