Fifty participants from across the UK and beyond gathered in Thurso to discuss the latest advances in peatland research when the ERI hosted the 5th “Research in the Flow Country” Conference, under the theme “Expanding Perspectives”.

The Flow Country Research Conference, which takes place every 18 months, provides a unique opportunity for researchers, land managers and stakeholders to exchange and share knowledge. It also plays an essential role in generating new ideas for future work.

The conference programme, held at the Merlin Cinema and at North Highland College, comprised scientific talks covering topics including greenhouse gas emissions estimates from peatlands; measures of water quality; studies of carbon stocks and pollen grains; and even distribution and movement of meso-predators in peatlands undergoing forest-to-bog restoration.

The keynote speaker was Professor Nigel Roulet from McGill University in Canada. He provided insightful discussions on the opportunities generated by the long-term collaborative research projects such as those being developed in the Flow Country and coordinated by Dr Roxane Andersen, ERI’s lead peatland scientist.

The conference awards for best student presentation went to Iain Detrey (UHI) for his talk on long-term peat storage in purpose built stores in Shetland, and the award for the best

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poster went to Henk Pieter Sterk (UHI) who was introducing the use of unmanned aerial vehicles (UAVs) to estimate greenhouse gas emissions from peatlands.

As part of the conference, a special workshop session was organised to share the recent development of a NERC-funded project using satellite-derived inferometric synthetic aperture radar (InSAR) to assess peatland condition, jointly developed by the University of Nottingham, the ERI and the University of Glasgow. Conference participants were able to learn how to use a map generated by an InSAR ground motion time-series to assess how areas of peatlands across the Flow Country varied in their condition from near natural to severely degraded, which generated a lot of enthusiasm.

On the last day of the programme the sun was shining as participants headed out to Plantlife’s Munsary Peatlands for demonstrations on a range of fieldwork techniques used by the ERI’s peatland team.

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Creating new fertilizer products from wastewater

Phosphorous (P) is an essential macroelement, but too much of this in aquatic ecosystems can lead to a deterioration in water quality and eutrophication. P removal and recovery from wastewater, through the sorption of P onto natural waste material, may provide a beneficial solution. Ideally, this would be a low-cost solution that would create a P-rich material (low in other adsorbed contaminants) for direct use in agriculture as a fertilizer.

ERI, as a partner in the EU Phos4You project is now working on small scale solutions for remote, rural and island areas. In partnership with Veolia, ERI will test a FiltraPHOS™ unit for use on small discharges (i.e. septic tanks) to help reduce diffuse phosphorus pollution (see figure below). FiltraPHOS™ employs enhanced gravitational filtration through a granular media with continuous self-backwashing.

Locally sourced materials will be used as the sorbents. After filtration, the sorbents containing the recovered P can hopefully be applied directly to land, as a granular-powder soil conditioner and fertilizer (rich in other beneficial components i.e. CaCO$_3$).

A chitin and calcium rich sorbent produced from crab carapace will be tested first. Crab carapace (Cancer pagurus), a waste by-product from the seafood industry, is generated in millions of tons annually in Scotland and large quantities are simply discarded (i.e. to landfill). Therefore, a feasible approach may be to add value to this solid waste – turning it into a high value-added product for use in agriculture. The crab carapace will be prepared using a low temperature activation process involving potassium hydroxide as the activating agent.

Another significant ERI contribution to this project will involve the quality assessment of the new fertilizer materials. This will assess if other (potentially undesirable) organic/inorganic contaminants are also present in any new products. If this is the case, ERI will work to assess if crops could actually take up such contaminants, i.e., are they “bioavailable”, and could this pose any risks to potential consumers?

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FiltraPHOS™ unit provided by Veolia
During May, seabird ecologist Nina O’Hanlon visited several seabird colonies to collect data on debris incorporated into seabird nests, focusing on the Northern Gannet. The first site visited was Troup Head, Banff. Nina then headed over on the Northlink ferry to the Shetland gannetries (Fair Isle, Noss, Foula and Hermaness), returning back to Thurso via Noup Head on Westray, Orkney.

In all six gannetries, nest incorporation of plastic debris was recorded. The majority of items were netting and rope, however packaging straps, plastic bags and balloons were also noted. Plastic was also observed in several Shag nests on the remote island of Foula, 20 miles west of the Shetland mainland. Fortunately, no plastic was observed in the Kittiwake nests on Shetland or Orkney.

The data collected during this fieldwork will be collated with that collected by many fantastic people across the UK who are also working on this issue. A massive thank you to everyone who has sent in / collected data so far! This will allow us to build up a picture of how nest incorporation of debris may vary between colonies.

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Blue Circular Economy

Following the success of Circular Ocean, which ended recently, ERI are delighted to be involved in a new Northern Periphery and Arctic (NPA) programme project to support the reuse and recycling of fishing gear - Blue Circular Economy. Marine debris pollution is a recognised global environmental issue, with lost fishing gear making a substantial contribution. Blue Circular Economy will help small and medium-sized enterprises within the NPA region to exploit the economic value of ‘waste’ fishing nets and ropes following a sustainable, circular approach.

This project is led by Norwegian University of Science and Technology (NTNU), with partners from England, Greenland, Iceland, Ireland, Norway and Scotland. ERI staff will lead work on the ecological impact of marine debris with a particular focus on seabirds. Over the course of the project, an interactive hotspot map will be developed to monitor and quantify the entanglement and nest incorporation of marine species across the region. This will expand on recent work monitoring the extent of nest incorporation by seabirds in the UK.

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The first meeting of Blue Circular Economy took place in Alesund, Norway - Nina O’Hanlon, ERI is standing fourth from left.
Researchers from ERI joined colleagues from across the NPA programme area in Rovaniemi, Finland for the REGINA project’s final conference which saw the launch of a new learning platform with development tools for local planners and policymakers. The platform aims to empower small communities with resource-based economies to optimise benefits from big socioeconomic changes.

This project started in 2015, involved six Nordic Arctic municipalities and six knowledge partners including ERI. Highland and Islands Enterprise were involved as an associated partner.

REGINA has helped partners create Local Smart Specialisation Strategies in their respective communities. These were adapted from the mainstream practice of European Regional Smart Specialisation to the needs of smaller communities in sparsely populated areas.

Partners developed a series of tools and overall analytic framework to help reduce vulnerability and increase the preparedness of small communities in remote areas of the Nordic Arctic and Scotland that are facing the development (or closing-down) of large-scale, resource-based industries.

ERI led the development of the Local Benefit Analysis Toolbox (LBAT), one of three planning tools. The LBAT guides the development of strategies for adapting the labour force to new challenges, supporting new business development and local entrepreneurship in the industrial supply chain.

Magnus Davidson introduced the toolbox to delegates and explored how it worked in practice in the Norwegian municipality of Brønnøy. Magnus also explained the role of ERI in the development and application of the Demographic Foresight Model in modelling population change in the far north of Scotland from the decommissioning of the Dounreay Fast Reactor Research Site.

The conference in Rovaniemi was attended by nearly 100 key stakeholders, representing all the participating countries and partners.

The project handbook and project outputs can be found at: www.reginaproject.eu

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Chinese and Japanese Academics converge in Thurso

Scientists from Japan and China recently visited Thurso to collaborate with environmental researchers and engineering professionals as part of academic exchange projects.

The ERI welcomed the scientists from the Wild Bird Society of Japan, the University of Hokkaido and the Nature Conservation Society of Japan. Research fellow, Dr Elizabeth Masden, spearheaded the exchange and shared ERI’s leading research on the impacts of wind farms and marine plastic litter on birds.

Dr Elizabeth Masden said, “It was a great opportunity to discuss environmental issues which are relevant both to Scotland and Japan and I’m positive about future collaboration opportunities. Wind energy is rapidly expanding in Japan and our visitors were keen to learn about the situation in Scotland and the UK in terms of assessing potential cumulative impacts of increasing numbers of developments.”

On the same day, the North Highland College’s Engineering, Technology and Energy Centre (ETEC) welcomed eleven engineers from the Hunan Institute of Engineering in China. Organised by Perth College UHI, the visitors were in Scotland as part of a Research Collaboration and Academic Exchange Programme for Advanced Renewable Engineering. They also spent time at Lews Castle College and in Perth.

While in the highlands, they visited various renewable engineering projects such as MeyGen, Nigg Energy Park and observed offshore construction activities for Beatrice Offshore Wind.

Assistant Director for Learning and Teaching and Department Head for Engineering and Technology and the Built Environment, Alan Ogg said, “This was a fantastic staff development opportunity for the Hunan Institute of Engineering Creative Centre for Offshore Wind Power, to witness first-hand, the construction activities involved in the Beatrice Off-Shore Wind farm.”

Alan continued, “It was also an exciting opportunity for North Highland College UHI Engineering teaching staff to engage with their counterparts from China and to demonstrate the innovative teaching methods using various technologies, software and equipment. We now have a member of staff teaching the Hunan students in China and we hope to build on this partnership.”

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James Slingsby  
PhD Student

Hi, I am James, a new PhD student in ERI. In 2017, I finished my undergraduate master’s degree at Bangor University, North Wales. My master’s project focussed on investigating fine scale harbour porpoise (*Phocoena phocoena*) behaviour, within a tidal-stream habitat, using acoustic data. This followed on from my third year dissertation, which also used acoustic data to examine porpoise foraging in high-energy areas.

As part of ERI, I will undertake a Bryden Centre PhD project, funded by INTERREG, which will investigate top predator distribution and behaviour within tidal-stream habitats. My project will explore the viability of unmanned aerial vehicles (UAVs) to achieve this, with the potential to create algorithms that would allow for the automated detection of both animals and hydrodynamic features.

I have recently moved into Halkirk, with my girlfriend, having migrated from the foothills of Snowdonia in North Wales. I enjoy an eclectic mix of pastimes that range from tabletop/video gaming, to surfing and hiking.

I am very excited to explore Thurso, and the surrounding areas, in addition to becoming a part of such a knowledgeable and diverse research team.

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Natalie Isaksson  
PhD Student

After undertaking undergraduate education at Boston College (USA) to become a lab rat, I realised I wanted to spend more time outdoors and so pursued a masters degree in animal ecology and conservation biology at Lund University, Sweden. While there I grew to appreciate seabirds and went on to work for BirdLife Sweden and their conservation projects focused on Baltic Sea Caspian terns and lesser black-backed gulls.

I joined ERI in October as a PhD student working on the project: Use of tidal flow areas by seabirds and the potential interactions with tidal stream renewable energy. In collaboration with Queens University Belfast, the RSPB, and Marine Scotland, the project will make use of existing tracking data on diving seabirds and newly collected local data on black guillemot movement ecology to assess how seabirds are and may become impacted by tidal-stream turbines. I very much look forward to contributing to applied research, hanging with seabirds at remote island locations, and not least sampling Scottish nature and beverages.

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Publications


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