IUCN UK Peatland Programme Conference 2025 Water Connections: from Source to Sea

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Determining the growth rate of *Sphagnum magellanicum* Brid. in the Falkland Islands using radiocarbon dating and Bayesian age-depth modelling

Gosse Sjoerd Bootsma, Dmitri Mauquoy, Clemens von Scheffer, Daniel Coathup and Maarten Blaauw

The growth rate of *Sphagnum* L. is of great interest due to the role it plays in carbon sequestration in peatlands. A range of methods is currently used to determine the growth rate of *Sphagnum*, but each method comes with limitations. In this research, the growth rate of *Sphagnum* in peatlands was determined using radiocarbon dating and age-depth modelling, to avoid these limitations. Shoots of *Sphagnum magellanicum* Brid. were collected from East Falkland, and short sections were cut out at known positions. Each section was radiocarbon dated, and the date obtained was calibrated with a post-bomb calibration curve. A Bayesian age-depth model was constructed to model the growth rate of this plant. Median growth rates of 1.0-1.5 centimetres per year were found, with a slowdown in growth during 2015-2020. These results show that radiocarbon dating and age-depth modelling are useful tools for determining the growth rate of *Sphagnum*.

Peatland Restoration Traineeship

Ulster Wildlife, various presenters (group poster)

Ulster Wildlife through the Shared Island fund secured funding to hire two cohorts of six people from 2025 to be trained in peatland restoration. The first cohort began in April and has to date been trained in an array of skills from monitoring to restoration planning whilst simultaneously working on mini peatland research projects. These projects include the monitoring of Marsh Fritillary and large Heath butterflies, studying invertebrates' assemblages on cut over bog, monitoring small mammal presence on peatland compared to grasslands, the use of song meters to study bird assemblages on peatlands and assessing the movement and abundance of deer on peatlands. These projects not only provide valuable data about sites in active restoration, but they help trainees to build valuable skills in Peatland monitoring, project management and ecological report writing. Additionally, this traineeship benefits the growing peatland restoration sector in Northern Ireland where skilled staff are increasingly in demand.

Wetter farming: Raising the groundwater table combined with biochar application can cut greenhouse gas emissions and sustain crop yields in agricultural peat soils

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Drained peatlands are productive but degrade easily and emit high greenhouse gases (GHGs). In a mesocosm study with lettuce, we tested high (HW) vs low (LW) water tables and biochar addition. Raising WT cut CO_2 (18%) and N_2O (40%) but increased CH_4 (2.5 folds). Biochar with HW suppressed CO_2 (37%), N_2O (38%), and CH_4 (25%), giving the largest CO_2-eq reduction (4.64 t ha^{-1} yr^{-1}) and 38–56% higher yields. Biochar altered microbial communities, reducing peat decomposers and enhancing soil C. Moreover, biochar amendments produced 38%-56% greater lettuce yield compared to the unamended controls, irrespective of water table level, suggesting that biochar application could generate economic benefits in addition to reduced GHG emissions. Benefits arose from both physicochemical and microbiome changes. Combining HW and biochar reduced peat decomposition, lowered GHG emissions, and boosted yields, suggesting a potential strategy for climate-friendly peatland farming if replicated at field scale.

Keywords: Food security, Histosol, Sustainable agriculture, Biochar, Water management, Nutrient cycling

Scallop bunding for peatland restoration in the North Pennines National Landscape

North Pennines National Landscape

Scallop bunding is a relatively new technique in peatland restoration. It is used to raise the water table in order to encourage the growth of bog vegetation in dry areas and to provide standing water to increase biodiversity. This poster outlines how the North Pennines National Landscape team has developed methods to identify areas suitable for scallop bunding and how we specify the works. It also shows how the team developed a monitoring methodology to assess the restoration intervention. The North Pennines National Landscape team first installed scallop bunds on a restoration site in 2022. The site included an area of dipwells to monitor their effectiveness. Data from the monitoring study illustrated that the bunds retained water throughout the year with water levels consistently higher than the control.

Bog Bugs and Beasties: A Preliminary Overview of the Terrestrial Arthropods of an Irish Blanket Bog.

Kieran Boyd, Queen's University Belfast

Abstract: Blanket bogs are a rare peatland that provide a range of ecosystem services including storing water, climate regulation, and supporting biodiversity; however, the vast majority are currently degraded. In Ireland, blanket bogs support a myriad of flora and fauna, including many protected species. Yet, despite their ecological significance, there is limited research on their biodiversity – particularly in relation to invertebrates. This study aims to enhance our understanding of terrestrial arthropod communities of Irish blanket bogs. Using a Before-After Control-Impact (BACI) approach, pitfall traps were installed in near-natural and degraded areas of a blanket bog site and collected monthly. The preliminary results provide a basic insight into the arthropod communities and show that (1) degraded areas display lower abundances but higher diversity, and (2) Coleoptera, Araneae, and Opiliones are the most abundant groups. These results will provide a valuable baseline for future monitoring and will inform restoration and conservation programmes.

Shared bogs, shared futures

Róisín Black, Fermanagh Omagh District Council and Cuilcagh Lakeland Geopark

This 3 year cross-border peatland project aims to build a robust evidence base for peatland management and enhance community engagement across sites within Fermanagh and Omagh District Council, Cavan County Council, and Cuilcagh Lakelands Geopark. Baseline surveys, including habitat and species assessments, peat depth and water table monitoring will inform the development of Peatland management plans. As the project progresses there will be a focus on site monitoring and the establishment of a demonstration site at Gortin Lakes. A dedicated Peatlands Officer will lead outreach workshops with landowners, schools, and volunteers to promote sustainable land management and restoration practices cross border. The project aims to address the ongoing degradation of peatlands, which threatens biodiversity, water quality and climate resilience. Through cross-border partnerships, the project will enhance knowledge transfer, ensure coordinated, long-term conservation efforts are made agreed and fill gaps in engagement, while contributing to national climate and biodiversity goals.

Raised Bog Restoration: Assessing the Impact of Subsidence on Restoration Success

Higgins, Ciaran, RPS

Active raised bog (ARB), an EU Annex 1 habitat, is monitored on Irish raised bog SACs via routine ecotope mapping to track habitat extent changes. Drainage and associated peat subsidence threaten ARB by altering hydrological regimes, making restoration crucial for conservation success. In 2021, peat damming and contour bunding were implemented on Knockacoller Bog SAC. Changes in ecotopes (2013 vs. 2025 surveys) and topography (LIDAR data from 2011 and 2025) were compared to evaluate restoration effectiveness. Results show a 45% increase (2.16 ha) in ARB extent post-restoration. However, a 30 cm elevation drop due to subsidence in the northern section reduced restoration efficacy locally. This study demonstrates that while restoration measures, such as high bog contour bunding and peat damming, can substantially enhance ARB, subsidence occurring over short timeframes risks undermining efforts if based on outdated datasets. Accurate topographic datasets are essential for effective restoration planning.

Peatland restoration and protected historic landscapes: the South West Peatland Partnership on Dartmoor

Martin Gillard, SWPP

Dartmoor is a national park, and as such, its first purpose includes ‘To conserve and enhance the cultural heritage of the area.’ Amongst its special qualities is its status as one of the most important archaeological landscapes in western Europe. A pair of case studies will examine the challenges of balancing this with the requirements of peatland restoration.

Tor Royal Bog is a very rare example of a raised mire – the only one on Dartmoor. Research in advance of peatland restoration found cartographic evidence of optimistic efforts at agricultural improvement in the early nineteenth century. As works proceeded further evidence of ultimately unsuccessful attempts to ‘reclaim’ the bog were found.

The Upper Plym valley is under English Heritage guardianship, on account of the extensive prehistoric and medieval landscapes found there. Survey in advance of peatland restoration found an additional and previously unknown industrial landscape of peat-cutting and charcoal making. Documentary evidence suggests a medieval origin, and archaeological recording and sampling seems to have confirmed this.

Making a splash: Disentangling effects of drying pool systems on peatland ecosystem processes

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Peatland ecosystems play a key role in the biogeochemical cycle of carbon, acting as significant below-ground carbon stores. Increased drying due to climate change and anthropogenic activities threatens this role, forcing peatlands to become carbon sources rather than sinks. While below-ground evidence of drying is well-documented, how drying is apparent 'above-ground' remains less understood. One way to investigate this is through changes in pool systems.

In this project, we combine below-ground palaeo-modelling techniques and above-ground remote sensing applications to assess how past changes in pool systems have affected peatland ecosystem processes. This is done through high-resolution multiproxy (and multi-core) ecohydrological reconstructions of pool margins combined with historical aerial imagery, high-resolution orthophotographs and drone imagery.

Here we present our early results from a blanket peat system within the Slieveanorra Nature Reserve (Northern Ireland), revealing unique links between the two approaches along with potential future implications for ecosystem processes.

What is the current evidence for bunding promoting rewetting and restoring peatland habitats?

Paul Titterton, Moors for the Future Partnership

This poster will focus on how bunding (a restoration technique that aims to slow the flow of water outside of grip and gully systems through interception and pooling) promotes re-wetting of peatlands, natural flood management, biodiversity and other ecosystem service benefits.

Empirical evidence (water table and vegetation data) and anecdotal evidence (reducing wildfire severity) will be presented from a trial on Close Moss and other recently restored sites showing the positive impacts of bunding. This will be linked into the wider perspective of bunding in the UK, through alluding to other bund trials and the grey literature.

The primary aim of this poster is to present the result on the Close Moss trial. The secondary aim is to promote discussion with stakeholders on bunding, in order to understand if there is any additional data available, to strengthen the evidence base going forward potentially facilitating the decision-making and consenting process.

Understanding Site Hydrology for Peatland Preservation and Restoration

Colm Casserly & Jeremy Bunn, CBEC Europe/UK

Effective peatland preservation and restoration requires an understanding of complex internal and external hydrologic paths and links. CBEC has developed an integrated sequence of desk-based review, site reconnaissance, ground-based and LIDAR topographic survey, hydrologic assessment, and 2D hydraulic modelling to map flow paths and model the effects of design interventions on peatland sites. Here we present examples of these methods as applied to 1) restoration of natural hydrology at a development site on the Isle of Lewis, 2) rerouting of an artificial-straightened channel away from an eroding peatland site in Dumfries and Galloway, and 3) the development of a restoration plan for an extensive area of blanket bog in Counties Monghan, Fermanagh, and Tyrone.

Microbes on the moors: early microbial responses to hydrological interventions on an upland blanket bog

Alice Whittle, University of Derby

The poster highlights a collaborative research project at Combs Moss, involving practitioners and academics. Peatland interventions - bunding, gully blocking, and *Sphagnum spp.* planting - are being monitored using a B-A-C-I (before-after-control-intervention) approach, to support our understanding of how they may impact the ecosystem and associated services.

The poster provides an overview of the study site and early results from the *Pavilion* mini-catchment (gully blocking and *Sphagnum spp.* planting). It outlines responses of water table, microbial community composition, and greenhouse gas fluxes (CO_2 and CH_4)**,** including observed seasonal dynamics.

The poster will explain future monitoring and analysis to be undertaken including establishing any link between environmental variables and the functional implications, such as carbon trade-offs.

The poster refers to the project's blended funding streams from Environment Agency, Nestle and Seven Trent Water, which provides a case study for exploring green finance.'

Mapping the Drainage Status of Ireland's Agricultural Grassland Peat Soils

Muhammad Inam Bari, Munster Technological University

Intact peatlands regulate water, support biodiversity and livelihoods, and act as major carbon sinks. However, anthropogenic activities such as drainage, peat extraction, and agriculture have degraded many peatlands, turning them into sources of greenhouse gas emissions. In Ireland, despite commitments under the Paris Agreement, limited information on peatland drainage conditions hinders effective mapping and management. This research aims to improve the assessment of peatland drainage status (shallow or deep) using high-resolution drone imagery, vegetation surveys, and hydrological monitoring. Ground surveys and seasonal drone flights will support the creation of digital twins of peatland sites. A vegetation-based scorecard, weighted by species such as Sphagnum mosses, will indicate drainage conditions. Hydrological data from dip wells and soil moisture sensors, combined with updated digital drainage surveys, will enhance accuracy. Integrating field and drone data will enable machine learning–based mapping, producing a cost-effective, scalable method for monitoring and restoring Ireland’s peatlands.

Celebrating Scotland’s record breaking 14,860 hectares of peatland restoration in a year

Peatland Action

Abstract: Over the 2024-25 financial year, the Peatland ACTION Partnership – Scotland’s national programme to restore peatland, put 14,860 hectares of degraded peatlands on the road to recovery. Funded by The Scottish Government and delivered in a partnership led by NatureScot alongside Cairngorms National Park Authority, Loch Lomond & the Trossachs National Park Authority, Scottish Water, and Forestry and Land Scotland, this record achievement was a 42% increase on 2023-24. Beyond the hectare figures, the Partnership also celebrated successes across areas of training and development, site monitoring, technical advice, stakeholder engagement and in supporting the promotion of private finance opportunities. This overview of the work across the five partners highlights the delivery of peatland restoration taking place in Scotland at pace and scale together with investments in workforce development and skills, evidence building and engagement with Scotland’s landowners and communities to help achieve Scotland’s ambitious restoration targets.

Spatial modelling of the water table in agricultural peat soils with multi-sensor drone data

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Peatlands in Ireland have undergone significant degradation due to drainage. However, the current drainage status of these soils, which is characterised by water table levels, remains largely unknown. Conventional methods for measuring the water table typically involve point-based measurements, which can be impractical for covering extensive areas. Drone technologies offer a complementary solution for monitoring water table levels. In this study, we collected drone data to create various geospatial layers that were used to assess the spatial variability of the water table in selected agricultural peat soils. These layers, combined with water table measurements, were used to train and validate a random forest-based model. This model was then used to make spatial predictions of the water table in the area. The presented mapping approach can provide critical information about the actual drainage status of these soils. This supports the establishment of more targeted and effective restoration efforts.

Greenhouse gas fluxes from peatlands under grazed grassland management

Catriona Ferguson, CEH

This interdisciplinary research addresses the evidence gap concerning GHG fluxes from peatlands under grazed grassland management and associated emission factors while also interrogating the local cultural context of the crofting community where the research is taking place on the Isle of Lewis, Scotland.

I am measuring CO2 and CH4 fluxes via closed chamber measurements on 3 distinct grazed grassland areas on peat. In addition, semi-structured interviews with local and national stakeholders are being conducted to inform an interdisciplinary investigation into how data and emissions factors are used to inform decisions about peatland management, and how this impacts communities, while highlighting that the importance of local contexts is key to producing mechanisms of carbon accounting which result in just outcomes.

Development of Good Practice Guidelines for Blanket Bog Restoration in Ireland

Amber McFarland, Tetra Tech

Blanket bogs account for roughly 67% of Ireland's peatland, yet past restoration has targeted raised bogs. In recent years, funding schemes have significantly increased blanket bog restoration efforts. Recognising the need for consistent planning and implementation, the National Parks and Wildlife Service commissioned a standardised framework to guide projects aimed at restoring Annex I habitat 7130 Blanket Bogs (*if active). This study reviewed restoration practices across Ireland and the UK to offer clear, practical guidance. The resulting Good Practice Guidance presents a unified approach to project planning and implementation. It provides structured methodologies and protocols for tackling challenges, including drainage management, erosion control, and afforested peatland remediation, while detailing the conditions under which each technique is suitable, factoring slope, peat depth, hydrology, and erosion severity. To ensure consistent application, decision trees, were created. This guidance will improve restoration outcomes, enhance comparability across projects, and inform long-term Irish peatland policy.

Books ‘n’ Bogs: A Toolkit for Youth Storytellers and Gatherers

Bethany Copsey, RE-PEAT

This poster introduces *Books ‘n’ Bogs*, a toolkit designed to support youth-led oral history projects in places where the role of peatland is undergoing change and other peatland conservation contexts. The toolkit itself offers both storytelling and practical guidance for conceptualising and implementing community-oriented initiatives that explore collective memory and evolving relationships with local landscapes, with the poster providing a concise, visually-appealing overview.

Developed by members of RE-PEAT, a youth-led peatland advocacy collective, the toolkit is grounded in the year-long *Books ‘n’ Bogs* project in Abbeyleix Ireland. In collaboration with Abbeyleix library, the project gathered and shared local residents’ stories of their bogs through an audio-visual exhibition, a podcast, a children’s story writing contest, and a zine.

The poster visually showcases the toolkit’s contents while highlighting how creative, youth-driven approaches can strengthen intergenerational dialogue, broaden public engagement with peatlands, and inspire new forms of cultural and ecological storytelling

Forest-to-Bog Transitions: A Spatial Decision Framework for Peatland Restoration in Northern Ireland

DAERA

Forest Service, an Agency of the Department of Agriculture, Environment and Rural Affairs (DAERA) in Northen Ireland manages approximately 26,000 ha of afforested deep peat, representing 35% of its public forest estate. In support of the DAERA Peatland Strategy and the LULUCF Sectoral Climate Action Plan, a spatially explicit decision framework has been developed to identify restorable peatland areas. This framework integrates deep peat classifications from the Agri-Food and Biosciences Institute (AFBI) soil map with digital terrain modelling to delineate flat peat zones, further refined using forest stand data (yield class, age, and open ground proportion).

Restoration prioritisation is informed by proximity to designated sites and priority habitats. Pilot projects, such as Tullychurry Forest, demonstrate the efficacy of multi-agency collaboration and DAERA and EU funded restoration. Long-term monitoring protocols are embedded to assess ecological recovery and carbon flux outcomes. This approach supports evidence-based forest-to-bog transitions, contributing to sustainable forest management and climate mitigation.

Atmospheric Nitrogen Deposition to Northern Ireland's Peatlands

NIEA

Atmospheric nitrogen pollution threatens peatland health - by damaging peat building *Sphagnum* mosses, changing species composition, and reducing bog functionality. Peatland ecosystems are naturally nutrient-poor habitats that rely on atmospheric deposition for their nutrient supply and therefore are particularly sensitive to elevated levels of airborne nitrogen deposition. Ammonia is one of the biggest sources of nitrogen pollution in the air in Northern Ireland (NI).

Recent air pollution data for protected sites across NI show that 92-97% of ASSIs, SACs and SPAs have ammonia concentrations greater than 1 µg m3 (the long term annual average Critical Level for lichens and mosses and for ecosystems in which they are important). The Northern Ireland Environment Agency, along with project partners UKCEH, National Trust, Ulster Wildlife, Fermanagh and Omagh Country Council and Monaghan County Council, has been leading a work programme to evaluate the nature and scale of impacts from atmospheric nitrogen on habitats across NI. Here, I present an overview of the results with a focus on peatlands, including the quantification of atmospheric nitrogen inputs to monitored peatlands, associated habitat and species responses and monitoring the recovery of a lowland raised bog following a reduction in high ammonia levels.