Department for Environment Food & Rural Affairs

Defra Peatland Policy and Delivery

In April 2026 Defra launched the Peatland Programme which will invest £85 million by 2030 in protecting, managing and restoring our peatlands in order to meet the Government's nature and climate targets.

New Policy Announcements

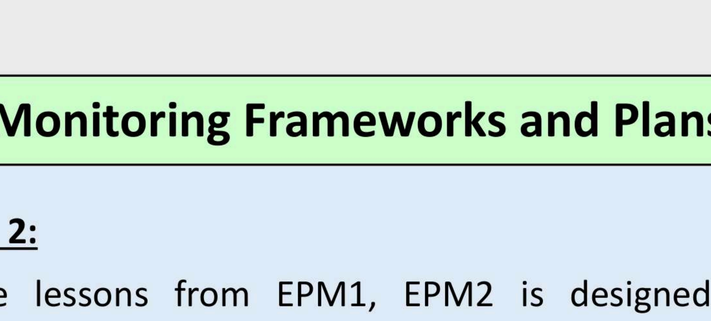
Heather and Grass Burning Regulations (September 2025):

- In September 2025, we amended the Heather and Grass etc Burning (England) Regulations 2021, expanding restrictions on unnecessary burning practices, to **enhance protection of upland deep peat** and improve the resilience of our peatlands. The regulations are supported by a refreshed Heather and Grass Management Code.
- These regulations increase the area previously protected from burning, except under license, from 246,156 hectares **to over 676,000 hectares**. Key changes include extending coverage to Less Favoured Areas, lowering peat depth threshold from 40cm to 30cm, and **prohibiting burning on blanket bogs** unless licensed under the revised grounds for applications.

Environmental Improvement Plan (December 2025):

In the EIP 2025, we committed to restoring **280,000 ha of peatlands in England by 2050**. To do this, we will:

- Invest **£85m** in restoration, water infrastructure and Paludiculture by 2030;
- Restore **40,000 ha** by 2030, through the NCPGS and ELM schemes;
- Publish the Peatland Restoration Register in 2026.



Land Use Framework (March 2026):

In the Land Use Framework, published March 2026, we made a commitment to:

- Explore opportunities to use **public land purchase** as a mechanism for increasing peatland restoration for environmental and climate delivery;
- Publish new **guidance for Internal Drainage Boards** which may clarify their climate and environmental purposes with a view to incentivising sustainable water management for peat soils.
- Look at ways to rewet lowland peat soils beneath new solar farms and **design multifunctional use** of land for solar generation and food production.

Monitoring Frameworks and Plans

England Peat Map 2:

- Building on the lessons from EPM1, EPM2 is designed to overcome the constraints that have limited the practical application of the first map. It will address these limitations by improving models of peaty soil extent and depth, with a focus on lowland agricultural peat, using hybrid mapping approaches that integrate high-quality existing data with modelled outputs.

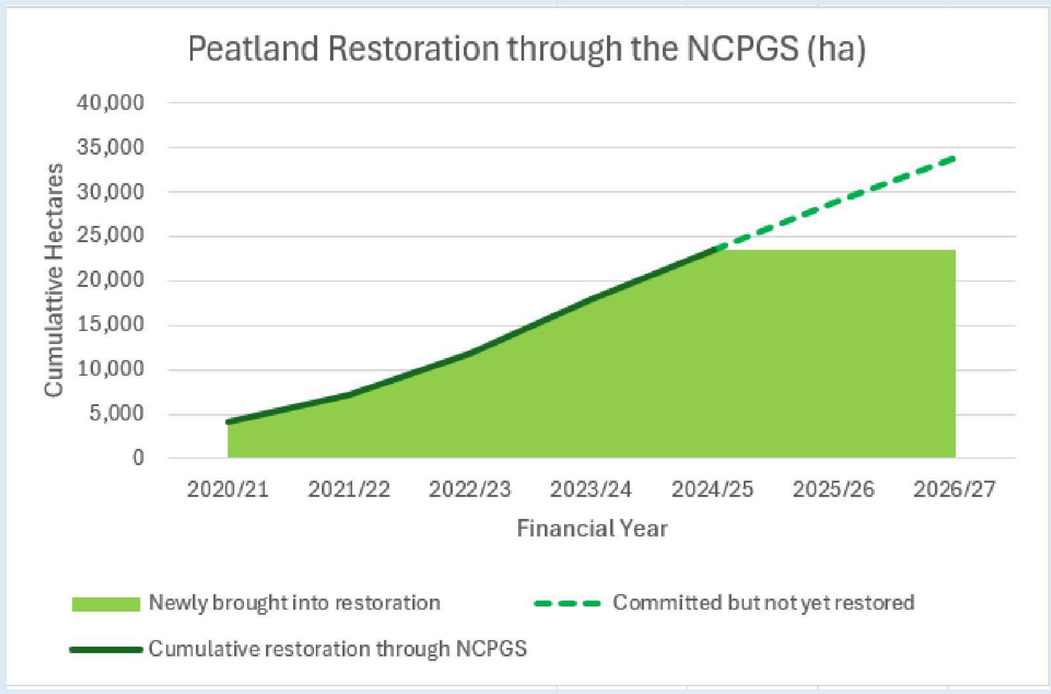
Peatland Restoration Register:

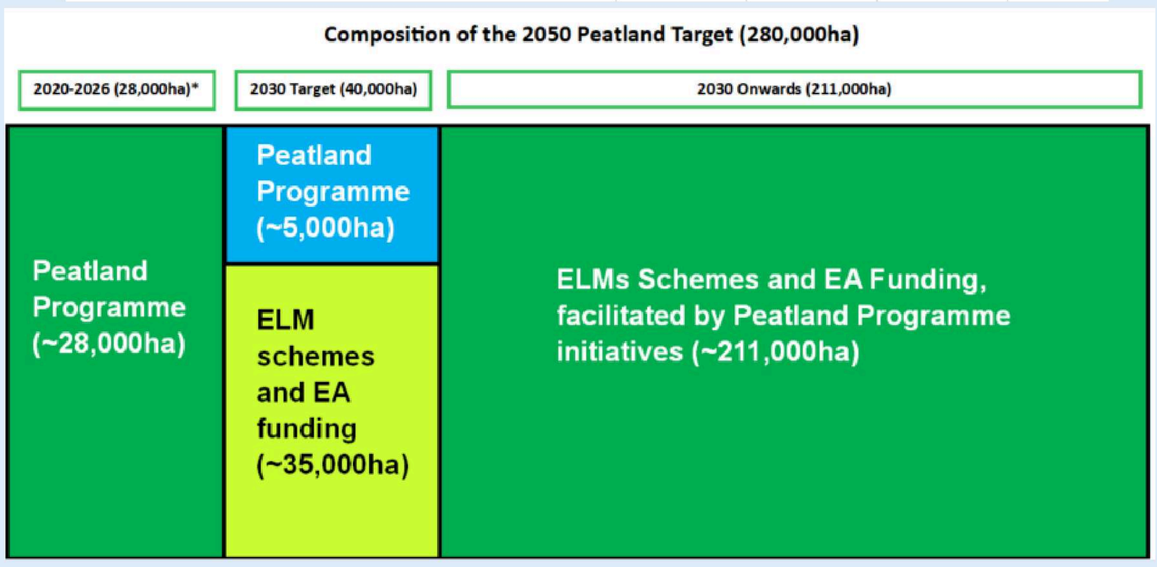
- In the EIP 2025, we committed to publishing the Peatland Restoration Register in 2026. This will be included as a spatial layer in the EPM2, starting by capturing all publicly funded restoration activity in England since 2020 (and restoration before 2020 where possible), and ensure its integration into the UK Greenhouse Gas Inventory to enable transparent tracking of emissions reductions.

Peatland Standard:

- We are developing a Peatland Restoration Standard and Technical Guidelines for England and Wales. The Standard will be an agreed set of principles for peatland restoration projects, helping advance best practice. The Technical Guidelines will provide the tools to support upscaling and innovation of restoration. Due to complete in July 2027, we are engaging with the sector throughout.

Updates on Delivery and Targets





The Year Ahead

Lowland Peat Water Implementation Grant - launching in June, this grant will fund infrastructure and telemetry to raise and manage water tables in lowland peat soils. There is approximately £36m of funding available across Round 1 (2026-2030) and Round 2 (2028-2030).

Nature for Climate Peatland Grant Scheme - we have invested £10m to extend the NCPGS until March 2027, with this extension forecasted to bring an additional 5000 hectares of peatlands into restoration.

Paludiculture and Wetter Farming Fund - launching in June, this scheme will provide approximately £10m to address evidence gaps around growing crops in wetter soils and help to create viable Paludiculture markets. It will run until the end of 2029.

Lowland Peat Water Discovery Grant - launched in April and running until 2028, this grant is providing up to £4.5m in funding to support local, collaborative approaches to more sustainable forms of water management within lowland peatland catchments.

Peatland Restoration Sector Capacity Grant Scheme - launching in June, this new £1.15m grant scheme will provide grants of up to £20,000 to implement a range of activities to increase the size of the restoration sector.

Environmental Land Management Schemes - The two pilot rounds of Landscape Recovery have supported 56 projects through their development phases, many with large scale peatland restoration ambitions. Three of these pioneering projects have now secured implementation funding and are beginning long-term delivery on the ground, with more to follow in due course.

Scottish Government

Scottish Government
Riaghaltas na h-Alba
gov.scot

New Developments Since Sept 2025

Climate Change Plan 2026-2040
- ❖ New policies to protect, manage & restore.

Five Year Partnership Plan 2025-2030
- ❖ Actions to upscale and meet ambition

Natural Environment (Scotland) Act 2026
- ❖ Targets to restore biodiversity & resilience.

Environment Strategy 2026
- ❖ Addressing the climate, nature & pollution crises.

Land Reform (Scotland) Act 2025
- ❖ Land Management Plans with communities.

Land Use Strategy 2026-2031
- ❖ Peatlands within integrated spatial land use.

Strategic Action Plan on Wildfires 2026
- ❖ Preventing, preparing & responding to wildfires.

Strategic Research Programme ENRA 2027-32
- ❖ Continued investment in peatland research.

Scottish LiDAR Programme
- ❖ High precision aerial mapping of Scotland.

Guidance and research
- ❖ Guidance: Development on peat ('1:10 guidance') (NS); pre-application guidance for windfarms (NS); management of excavated peat (SEPA)
- ❖ Research: re-use of excavated peat; peat-free horticulture; grassland on peat; *CentrePeat*.

Monitoring Frameworks and Plans

Peatland ACTION Partnership Monitoring Strategy outlines our principles for assessing the effectiveness of peatland restoration through Peatland ACTION.

'Developing Healthy Ecosystems' approach to strengthen monitoring of peatland condition in all designated sites, even where it is not a listed feature.

Check out the spatial data portal

Peatlands in SNAP3 monitoring framework, including ecosystem health indicators like habitat condition, connectivity and water status.

Coming soon..

National Peatland Monitoring Framework (early 2027) to improve consistency in how we assess the effectiveness of peatland restoration in Scotland.

Developing Official Statistics for Peatlands in Scotland (late 2026). A comprehensive, up-to-date source of basic information on peatlands in Scotland, including extent, condition and restoration.

Complete the survey by 26 June

Update on Delivery and Targets

Scotland has carried out restoration on around **105,000 hectares** of peatland since 1990, including a record 15,448 hectares in 2025-26

See our **Peatland ACTION** poster

Around 300,000 hectares of peatland are responsibly managed under the **Agri-Environment Climate Scheme (AECS).**

Our ambition is to reach over **400,000 hectares restored by 2040** and to see peatland emissions almost halved to 3.2 MtCO2e/yr.

Funding sources:

Invest **£110 million** in public funding in peatland restoration over the next four years, including £28m in 2026–27

Scotland accounts for **95% of all UK peatland (Ha) restored** through Peatland Code-registered projects (9,805 hectares)

Pilot **Carbon Contracts**, where peatland projects have the option to sell a share of future Peatland Code Units to SG at an agreed price in return for reduced grant funding.

Plans for Next Year

Our Climate Change Plan sets out how we will **protect**, **manage** and **restore** Scotland's peatlands for climate, nature and people, supported by world-class science.

Protect

- ❖ **Banning the sale of peat for horticulture.** Continue work with Defra and other devolved governments towards legislating for fair and effective restrictions on the sale of horticultural peat.
- ❖ Continue to develop tools and guidance to inform **decision making around windfarms and other development on peat**.
- ❖ Full implementation of **muirburn licence scheme** by Autumn 2026 which only permits muirburn on peatland for limited purposes such as wildfire prevention.

Manage

- ❖ **New Agriculture Support Framework**. Increased conditions on direct payments to integrate and incentivise sustainable and regenerative practice, on-farm nature restoration and actions on climate.
- ❖ **Crofting and Scottish Land Court Bill.** Removing barriers for crofters wishing to progress environmental initiatives on common grazings.
- ❖ **Deer management**. New arrangements to require or incentivise activity to control deer numbers to prevent deer damage to peatlands and other priority habitats and to support carbon storage and climate resilience.

Restore

- ❖ Implement the Peatland ACTION Five Year Partnership Plan, including developing an approach to **prioritising restoration to achieve multiple co-benefits**
- ❖ Strengthen our understanding, monitoring & evaluation, and communication of **the co-benefits of peatland restoration**
- ❖ Work with the sector to **capture contributions to peatland restoration** outside of Peatland ACTION
- ❖ **Publish Scotland's Peatland Standard** to support consistent, high-quality restoration across the sector

ENHANCED BIODIVERSITY
WILDFIRE RESILIENCE
IMPROVED WATER QUALITY
FLOOD & DROUGHT RESILIENCE
COMMUNITY & PUBLIC BENEFIT

Supporting measures, science & evidence

- ❖ **Land Use Strategy Delivery Plan**. Engaging stakeholders on establishing the place of peatlands in integrated land use at national scale.
- ❖ Development of **GHG emission savings estimates** from peatland restoration.
- ❖ Development of **Scottish Planning Biodiversity Metric**.
- ❖ Continue to explore the potential role for a **tax or other fiscal measures** in incentivising peatland restoration.
- ❖ Continue work towards **commissioning new research to support policy development** through the next Strategic Research Programme ENRA 2027-32.

Cyfoeth Naturiol Cymru
Natural Resources Wales

Adfer Mawndir Cymru
Wales Peatland Action

Llywodraeth Cymru
Welsh Government

Adfer Mawndir Cymru 2020-2025-2030 Wales Peatland Action

Gwariant ar adfer 2024/25
Restoration spend

Momentwm uwchraddio!

- Targedau 5 mlynedd wedi'u rhagori: >3,600ha.
- Targedau newydd ar gyfer y Rhaglen Weithredu Genedlaethol ar Fawndiroedd: 1800ha p.a. erbyn 2030/31.
- Cyflawni o dan bartneriaeth ehangach Adfer Mawndir Cymru.
- Cyflymder a graddfa fwy o 2025, gan fynd â'r tîm o 7 i 44.
- Daw uwchraddio ag arbenigedd ychwanegol mewn cyflawni, datblygu contractwyr, polisi a chynllunio, arolygu a monitro, data a GIS, ac ymgysylltu â phartneriaethau.
- Mae allbynnau newydd ar gyfer 2026/27 yn cynnwys y Fframwaith Monitro, Strategaeth Tystiolaeth, a Chynllun ar gyfer diweddaru Map Mawndir Cymru.

Upscale momentum!

- Exceeded 5-year targets: >3,600ha.
- New targets for the National Peatland Action Programme: 1800ha p.a. by 2030/31.
- Delivering under the wider Wales Peatland Action partnership.
- Greater pace and scale from 2025, taking the team from 7 to 44.
- Upscale brings additional expertise in delivery, contractor development, policy and planning, surveying and monitoring, data and GIS, and partnership engagement.
- New outputs for 2026/27 include the Monitoring Framework, Evidence Strategy, and Plan for updating the Peatlands of Wales Map.

Tystiolaeth, monitro ac adrodd
Evidence, monitoring and reporting

Mae gwaith tystiolaeth y Rhaglen wedi'i drefnu'n bedair thema allweddol:

NPAP's evidence work is organised into four key themes:

- **Thema 1 Mapio Mawndiroedd** / **Theme 1 Mapping Peatlands**
- **Thema 2 Deall y Pwysau** / **Theme 2 Understanding Pressures**
- **Thema 3 Targedu'r Gweithredu** / **Theme 3 Targeting Action**
- **Thema 4 Gweithio ar y Cyd** / **Theme 4 Collaborative Working**

Ariannu uniongyrchol Llywodraeth Cymru
Direct Welsh Government funding

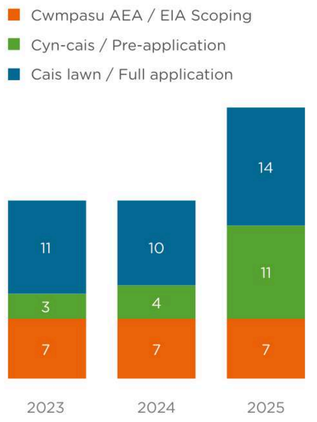
Mae ffynonellau ychwanegol o gyllid Llywodraeth Cymru yn cefnogi rheoli ac adfer mawndiroedd gan gynnwys:

- Cynllun Adnoddau Naturiol Integredig
- Cronfa Ffermio Bro
- Cynllun Ffermio Cynaliadwy
- Cronfa Tirweddau Cynaliadwy, Lleoedd Cynaliadwy

Additional sources of Welsh Government funding support peatland management and restoration including:

- Integrated Natural Resources Scheme
- Ffermio Bro
- Sustainable Farming Scheme
- Sustainable Landscapes, Sustainable Places fund

Cyngor polisi gan y Rhaglen
NPAP providing policy advice



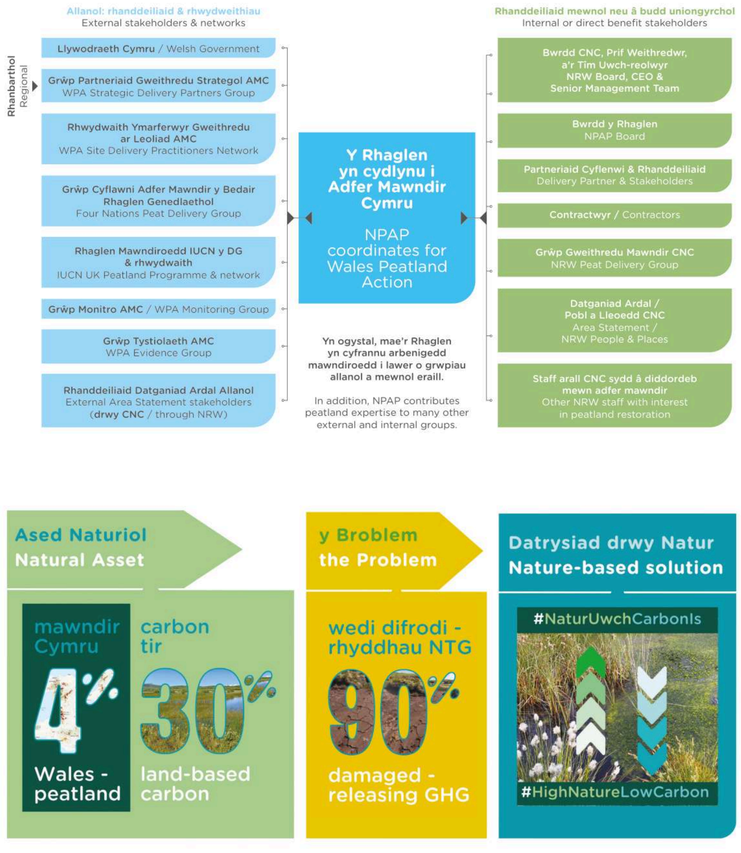
Data:
Llywodraeth Cymru / Welsh Government

Mawndir dan bwysau
Peatlands under pressure

Mae'r graff Gwaith Achosion Mawndir yn dangos bod achosion sy'n gysylltiedig â mawn wedi codi'n gyson ers 2023, gyda nifer gynyddol o gynlluniau ynni adnewyddadwy.

The Peatland Casework graph shows that peat related cases have steadily risen since 2023, with a growing number of renewable energy proposals.

Partneriaeth ag Atebolrwydd
Partnership and Accountability



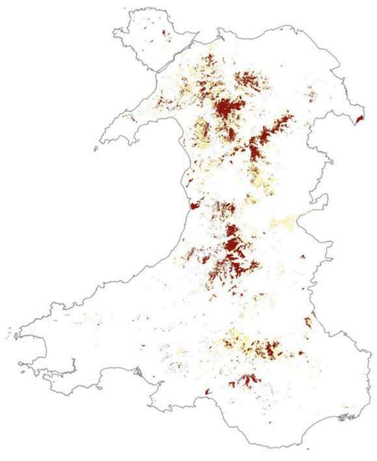
Statws Cynefinoedd Mawndiroedd
Status of Peatland Habitats

Atodiad 1 cod ac enw cynefin Annex 1 habitat code and name	Graddfa a adroddwyd yng Nghymru (ha) Reported extent in Wales (ha)
H7110 Cyforgors gweithredol H7110 Active raised bog	1,589
H7120 Cyforgors wedi'i ddifrodi sy'n dal i allu adfywio'n naturiol H7120 Degraded raised bog still capable of natural regeneration	897
H7130 Gorgors (os yn weithredol) H7130 Blanket bog (if active)	53,200
H7140 Mignen bontio a chors crynedig H7140 Transition mire & quaking bog	338
H7150 Pantiau ar swbstradau mawn y Rhynchosporion H7150 Depressions on peat substrates of the Rhynchosporion	17.5
H7210 Ffen calchaidd gyda Cladium mariscus a rhywogaethau o'r Caricion davallianae H7210 Calcareous fens with Cladium mariscus and species of the Caricion davallianae	62.8
H7230 Ffen alcalïaidd H7230 Alkaline fens	138.7
Cyfanswm **Total**	**56,243**

Gwybodaeth gryno ar gyfer y saith cynefin sydd fwyaf cysylltiedig â phriddoedd mawn. Mae'r asesiad cyffredinol o statws cadwraeth (Adran 10.5 o'r adroddiad) yn dangos eu bod i gyd yn 'anffafriol - gwael (U2)'.

Summary information for the seven habitats most closely associated with peat soils. The overall assessment of conservation status (Section 10.5 of report) show they are all 'unfavourable – bad (U2)'.

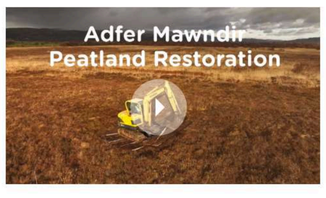
Map a Data Mawndir Cymru
Peatlands of Wales Map and Data



Mawndir yng Nghymru
Peatlands in Wales

Ardaloedd mawn posib - ar hyn o bryd heb gofnod tystiolaeth digonol i gadarnhau presenoldeb mawn
Potential peatland areas - currently with insufficient evidence recorded to confirm the presence of peat

Cymraeg English



Cymraeg English

Ymgysylltu â'r cyhoedd
Public engagement

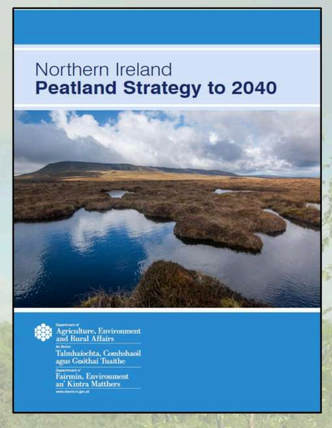
Cymraeg English

IUCN UK Peatland Programme Conference 2026 - Peatlands Under Pressure
DAERA Peatland Update

New Policy

Northern Ireland Peatland Strategy to 2040
The Northern Ireland Peatland Strategy to 2040 was published in September 2025.

Vision of the Northern Ireland Peatland Strategy
By 2040, our peatland habitats are protected, restored and managed sustainably and are recognised for the value and benefits they bring to people, nature and climate.



The Strategy provides a long-term framework for restoring degraded peatlands and safeguarding remaining near-natural sites.

Goals
- By 2040, peatland habitats in Northern Ireland are conserved, restored or appropriately managed.
- Policies are in place to underpin conservation and restoration and management activities.
- Funding and suitable mechanisms are established to deliver large-scale restoration, build capacity, conduct applied research and communicate effectively with stakeholders.

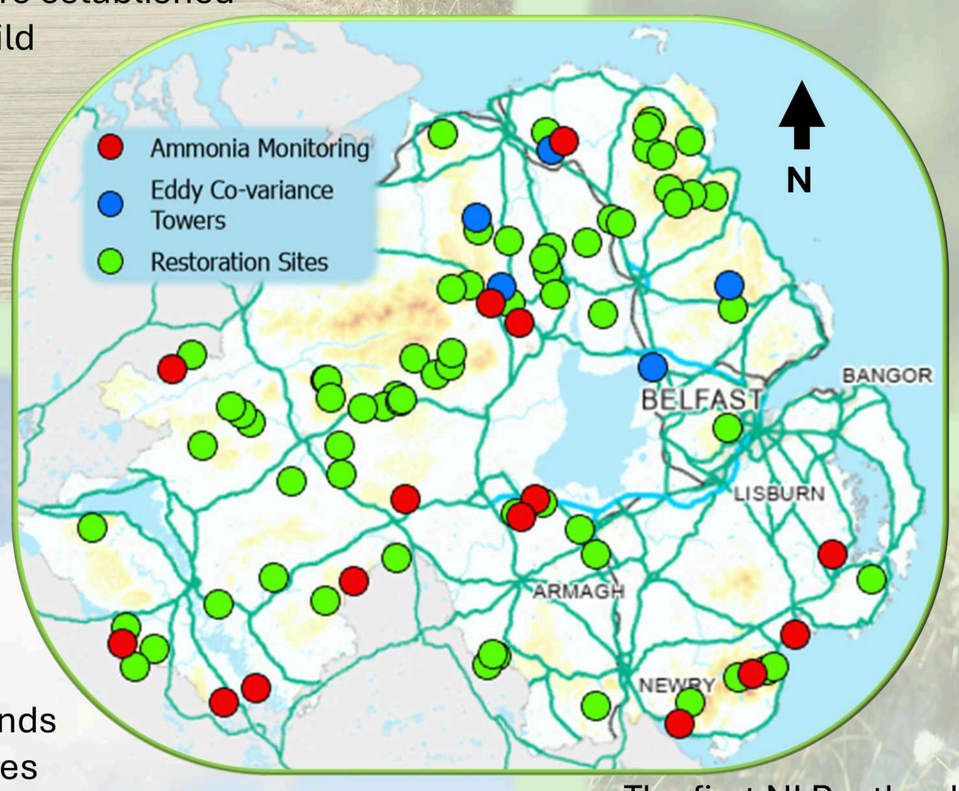
Update on Delivery of Targets

Funding Programmes

DAERA Environment Fund (2023-2028) supports peatland restoration, monitoring and capacity building across Northern Ireland
- Targets degraded peatlands, primarily within designated sites
- Restoration actions (e.g. drain blocking, reprofiling) deliver carbon reduction, improved water quality, and better habitat condition, with measurable long-term outcomes

Shared Island Initiative Peatland Programme (SIIPP, 2024-2028): partnership between NPWS, NIEA & NatureScot
- Delivering peatland restoration across Ireland, Northern Ireland and Scotland.
- Builds long-term management capacity, supports research and monitoring and contributes to climate action
- In Northern Ireland, NIEA is delivering a Peatland Challenge Fund with 5 projects
- 447 hectares of restoration being undertaken, with funding secured for a further 200 hectares.
- Restoration plans developed for over 5000 hectares of peatland
- Programme delivery continues until March 2028

PeacePlus
- Links peatland restoration with wider socio-economic goals
- Combines environmental recovery with community involvement, skills and jobs
- Delivers climate and biodiversity benefits whilst supporting rural development
- Over £20 million of Peaceplus projects



Monitoring programmes, guidance and frameworks

Ammonia monitoring network
- Site-specific ammonia monitoring on peatland sites across NI
- Data used to establish long-term trends and estimate nitrogen deposition rates

Eddy-Covariance flux tower network
- DAERA/CEH NI Peat Flux network, established in 2021/2022 across gradient of peatland condition and management conditions specific to NI peatlands.
- Provide evidence base for contribution of peatland management towards reducing emissions from the land use sector in NI and the UK by delivering near-real time data and information on GHG (CO_2, CH_4) fluxes.

Monitoring guidelines
- N.Ireland Peatland Collaborative Network Minimum Monitoring Guidelines (DAERA Environment Fund)
- Consistency in approach to monitoring allowing for more effective data collation and evaluation across Northern Ireland.
- Beneficial in demonstrating outcomes related to Hectares restored, emissions reporting, biodiversity metrics and results-based funding.

Development of a Peatland monitoring framework
Necessary to track delivery, evidence impact, support accountability, and inform future management.

Plans for next year

Northern Ireland Peatland Strategy Delivery Plan April 2026 - December 2027

The first NI Peatland Strategy Delivery Plan sets 14 short-term targets to help deliver peatland conservation, restoration and management and provides a foundation for future plans. It is intended that each subsequent Peatland Delivery Plan will cover a 5-year time period to align with the Northern Ireland Climate Action Plan cycle.

Targets identified include:
- First steps towards the collation of a Peatland Asset Register
- Peatland restoration and wildfire management
- Policy development on Horticultural Peat
- Capacity Building
- Research Projects on restoring Habitat Condition & Biodiversity
- Development of a Communications Framework
- Establishment of an internal Programme Management Board and Stakeholder Forum

DAERA NIEA will create a cross-functional team to support the delivery of the Peatland Strategy Delivery Plan and ensure N. Ireland delivers peatland recovery aligned with climate and nature commitments.

NIEA Northern Ireland Environment Agency
Gníomhaireacht Comhshaoil Thuaisceart Éireann
Norlin Airlan Environment Agency
www.daera-ni.gov.uk

An Agency within the Department of Agriculture, Environment and Rural Affairs
www.daera-ni.gov.uk
Gníomhaireacht de chuid na Roinne Talmhaíochta, Comhshaoil agus Gnóthaí Tuaithe
An Agency wi'in the Depairtment o Fairmin, Environment an' Kintra Matthers

Ecohydrological guidelines for Blanket Bog and associated habitats in England and Wales

Ros Tratt, Phil Eades[1], Bryan Wheeler[2], Emma Taylor & Mark Whiteman[3]

[1]Independent ecologists, [2]University of Sheffield (retired), [3]Environment Agency

Introduction

The ecohydrological guidelines were developed using the Wetland Framework approach.

They provide a robust habitat classification for the ombrotrophic peatlands of England and Wales enabling:

- a characterisation of the range of habitats and topographical conditions associated with different types of peatland surface;
- a holistic understanding of the habitat requirements of the vegetation of ombrotrophic peatlands;
- a basis for assessing the likely outcomes of conservation actions and restoration trajectories.

Wetland Framework Approach

Habitat = community (vegetation) AND environmental conditions

Site features:
Slope
Topographical context
Management (including restoration)
Erosion features
Geology

WETMECs represent combinations of features that can be easily observed on peatland surfaces:
- Vegetation
- Microtopography
- Erosion features
- Water flow
- Wetness
- Softness
- Peat depth
- Slope

Surface conditions:
Wetness & softness/stability
pH & EC
Pools and water flow
Microtopography (hummocks, hollows, tussocks)
Fertility

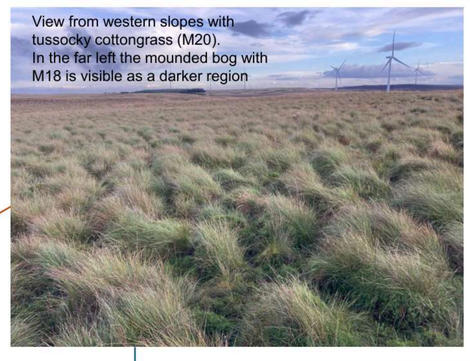
Vegetation:
Select a visually uniform 'stand' (patch)
Record the species in a sample including main bryophytes

Sub-surface:
Peat depth
Peat description – layers
Mineral material underneath (clay, sand, rock)

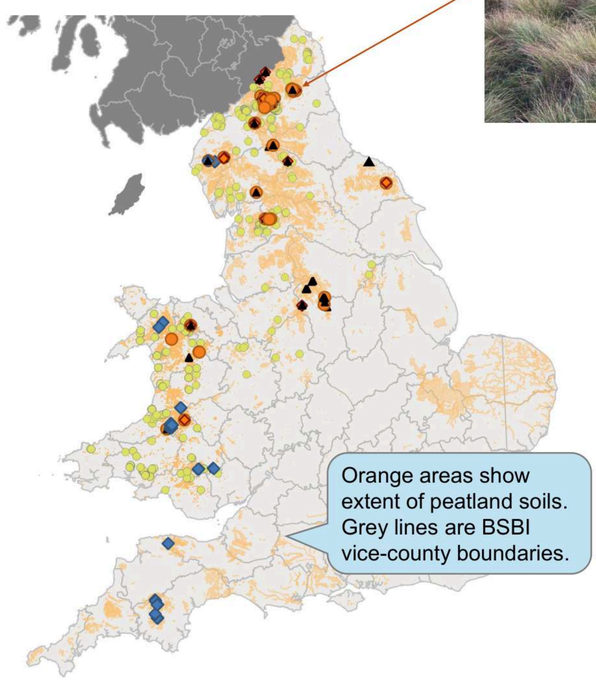
Surveys – methods add detail or context to existing approaches

c.470 samples from representative areas of intact peatland in England and Wales (**Map 1**).

Main NVC communities of ombrotrophic bog:
M17 deergrass – cottongrass
M18 cross-leaved heath *Sphagnum papillosum*
M19 heather - cottongrass
M20 cottongrass dominated (occurs with M18 and M19)



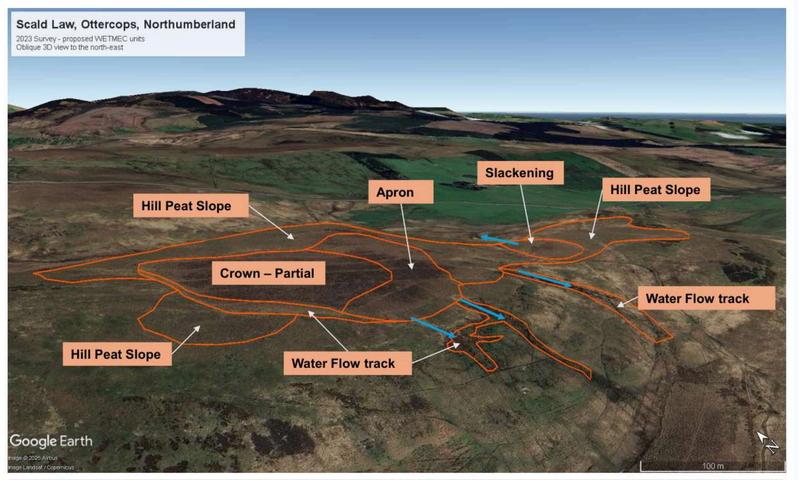
View from western slopes with tussocky cottongrass (M20). In the far left the mounded bog with M18 is visible as a darker region

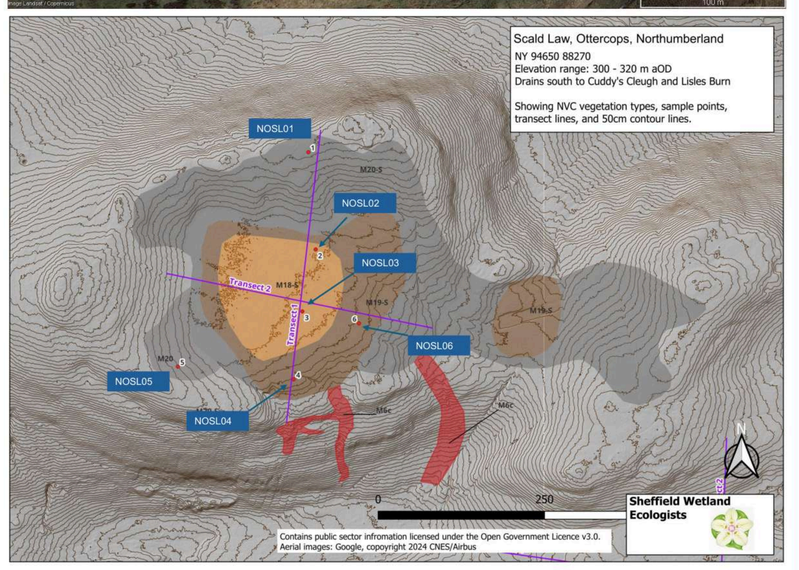


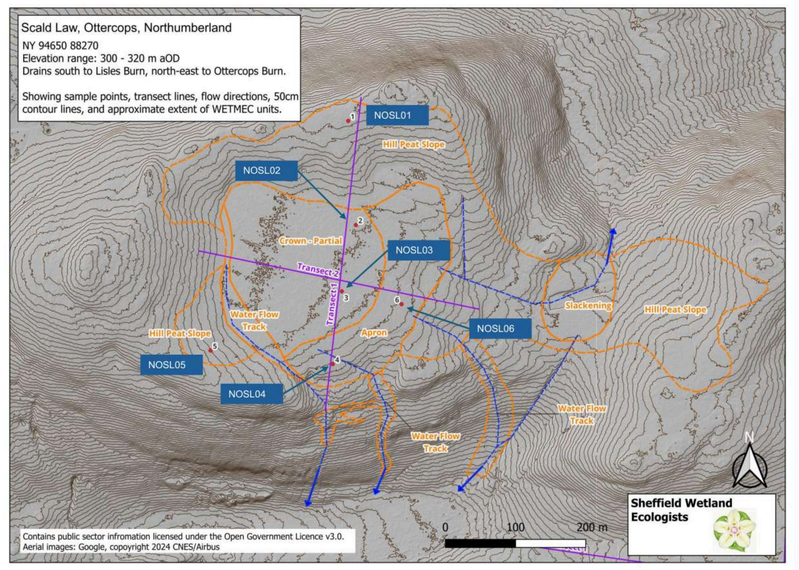
Map 1. Distribution of ombrotrophic bog vegetation in England and Wales Project dataset (surveys 2022 – 2025)
- M17
- M18
- M18/M19
- M19
- records of M18 from national inventories

All communities have distinctive sub-types with abundant Molinia (M) and Sphagnum (S)
M20 has the same distribution as M18 and M19
Pools and soakways with *Sphagnum denticulatum* (M1) and *Sphagnum cuspidatum* (M2) are often embedded.

- LiDAR and aerial imagery used to plan surveys.
- Samples recorded along transects – locations based on topography, aerial imagery and existing information.
- No specialist equipment needed.
- Rapid – each sample takes ~30minutes
- Cross sections used to present important features.
- Example of site summary from Scald Law, a non SSSI site in Northumberland.







WETMECs ombrotrophic bog habitats

BogCat – based on the configuration of the peat deposit

WETMEC – frequently encountered combinations of surface conditions

Hill Bogs
peatland surface ± follows shape of underlying mineral ground

Trough Bogs and Sump Bogs
un-mounded surface of the peatland infill of topographic troughs and sumps

Mounded Bogs
peatland surface does not follow shape of underlying ground and is automorphically mounded

Hill Peat Slope
Physical features: Slopes, gentle to steep. Water level sub-surface, in dry conditions water cannot usually be squeezed out. Surface generally firm. Peat depth moderate to deep. Microtopography usually very subdued with only scattered patches of Sphagnum, low tussocks of cottongrass and deergrass. In some areas high hummocks of heather and *Sphagnum capillifolium* are distinctive. Pools are absent, except in erosion areas.
Vegetation: M19, replaced by M17 in western areas. Sphagnum (usually *S.capillifolium*) can be abundant beneath the sward. Feather mosses are usually abundant.

Slackening / Crest
Physical features: Slopes very gentle. Water level below surface, but water can usually be squeezed out; Surface ranges from firm to soft, with some spots in hollows very soft. Peat depth moderate to deep. Microtopography: flats with more uniform vegetation and low hummocks of Sphagnum interspersed with irregular hollows and pools, which may be un-vegetated or have patchy bog asphodel, deergrass, *Sphagnum cuspidatum* or *Warnstorfia fluitans*. Some of the microtopographical variation may be due to natural re-vegetation of previously eroded surfaces.
Vegetation: M18/M19 with abundant dwarf shrubs and cottongrasses over patches of Sphagnum (usually *S.capillifolium* and *S.papillosum*), often with some cranberry and bog asphodel. M19_S with *Sphagnum capillifolium* hummocks is also found in these habitats.
In western areas Sphagnum rich hollows and pools, some interconnected, are embedded in M17.

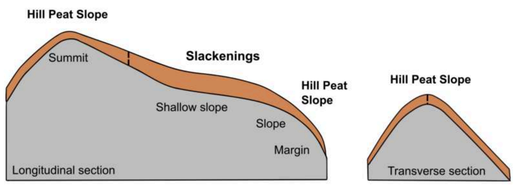
Ombrotrophic Flow
Physical features: Slopes flat to very gentle. Water level at or above surface, readily fills boot prints; surface very soft and often quaking. Peat can be very deep. Microtopography: Sphagnum lawns, mosaics of soakways and pools.
Vegetation: Mosaics of firmer patches of vegetation (often flanking networks of soakways and pools) with abundant Sphagnum forming lawns and low hummocks in a spongy layer usually *Sphagnum papillosum* often with *S. medium*; vascular plants form a sparse canopy, usually including common cottongrass, hare's tail cottongrass sometimes with bottle sedge. M17 and M18 with embedded *Sphagnum denticulatum / S.cuspidatum* pools and soakways (M1 and M2) often with white beak sedge.

Ombrotrophic Bottom
Physical features: Slopes flat to very gentle, Water level: near surface, can easily be squeezed out. Surface firm with some softer hollows. Peat usually deep. Microtopography generally quite subdued but some Sphagnum hummocks and hollows amongst vascular plants.
Vegetation: The firm peat surfaces of Bottoms support a range of vegetation types including vegetation dominated by heather and cottongrasses, often with abundant *Sphagnum capillifolium* and *S.papillosum* below the canopy (M18, M18/M19, M19). Some areas support quite tussocky vegetation with abundant Molinia.

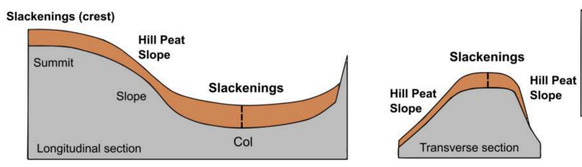
Water flow tracks
Minerotrophic - irrigated by springs and seepages or surface water which has been in contact with mineral ground. Includes lagg zones and axial soakways. Variable vegetation M1, M2, M4, M6, M21, M29.
Ombrotrophic - originating within the ombrotrophic peatland. Typically dominated by tussocky hare's tail cottongrass (M20) with *Sphagnum cuspidatum* and sometimes Molinia.

Crowns
Physical features: More or less flat. Very wet, water readily oozes from footprints or forms pools. Peat mounded, usually very deep. Surface soft to very soft, either a spongy layer of Sphagnum forming intimate hummock-hollow-pool complex or mosaic of firmer areas with softer hollows and pools, sometimes interconnected. Tussocks only scattered.
Vegetation: Sphagnum-rich forms of NVC communities M17 and M18 where the vegetation is an intimate mosaic of low hummocks and hollows with aquatic Sphagnum (*S.cuspidatum* / *S.denticulatum*). Hummock-hollow microtopography is particularly distinctive in M18 where there is a more or less continuous layer of spongy Sphagnum (usually dominated by *Sphagnum papillosum*). M17 tends to be less hummocky with 'flats' interspersed with elongated hollows. Larger pools and soakways (M1 and M2) often embedded. Drained or disturbed areas support M18/M19 and M17 typical of drier and firmer surfaces.

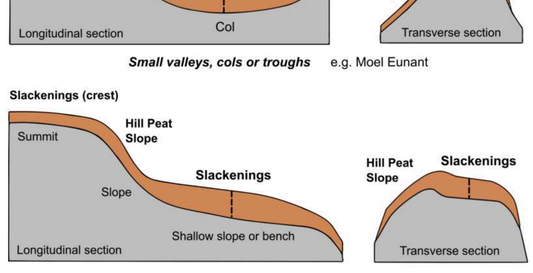
Apron
Physical features: Slopes usually very gentle but can be up to 10%. Water level: moderately wet, water can usually be squeezed out and there are occasionally wetter hollows. Surface is generally firm with some softer hollows. Peat depth variable, but usually deep. Variable microtopography, generally rather subdued but occasional low hummocks and hollows with Sphagnum.
Vegetation: In areas with M18 and M19, Aprons tend to support M18, M18/M19 and M19 often with some deergrass and Molinia; in western areas with M17 the Aprons support more uniform M17.



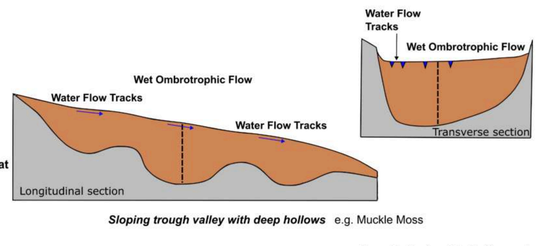
Ridge-tops e.g. Whitelee Moor



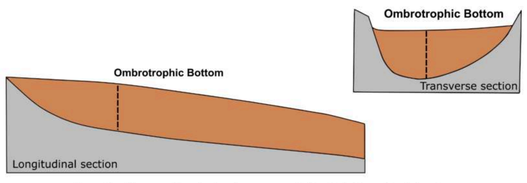
Small valleys, cols or troughs e.g. Moel Eunant



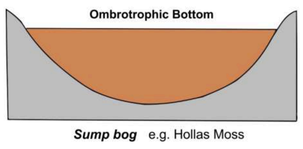
Hills, hillsides and benches e.g. Waun Wen



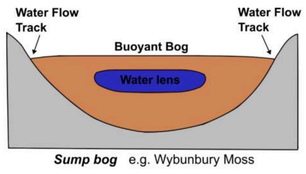
Sloping trough valley with deep hollows e.g. Muckle Moss



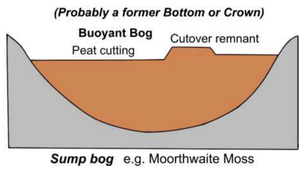
Trough with a gently sloping base e.g. White Path Moss, South Pennines



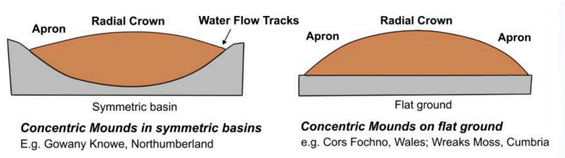
Sump bog e.g. Hollas Moss



Sump bog e.g. Wybunbury Moss

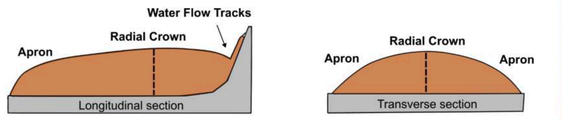


Sump bog e.g. Moorthwaite Moss

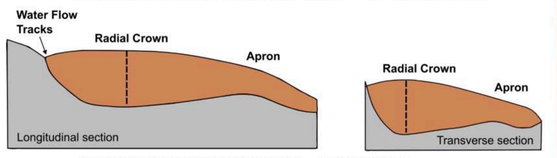


Concentric Mounds in symmetric basins E.g. Gowany Knowe, Northumberland

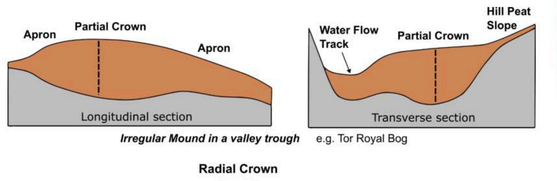
Concentric Mounds on flat ground e.g. Cors Fochno, Wales; Wreaks Moss, Cumbria



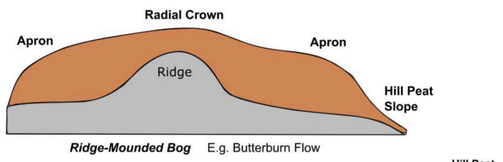
Eccentric Mounds at the edge of flat ground e.g. Cors Caron, Wales



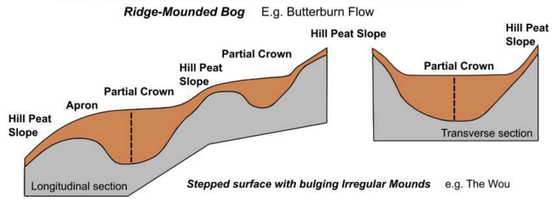
Irregular Mound over undulating ground e.g. Walton Moss



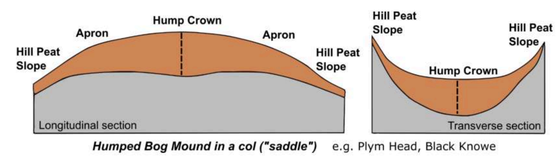
Irregular Mound in a valley trough e.g. Tor Royal Bog



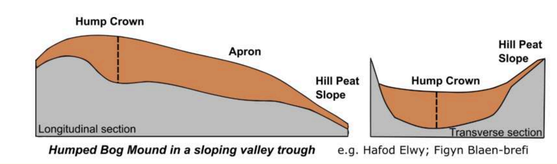
Ridge-Mounded Bog E.g. Butterburn Flow



Stepped surface with bulging Irregular Mounds e.g. The Wou

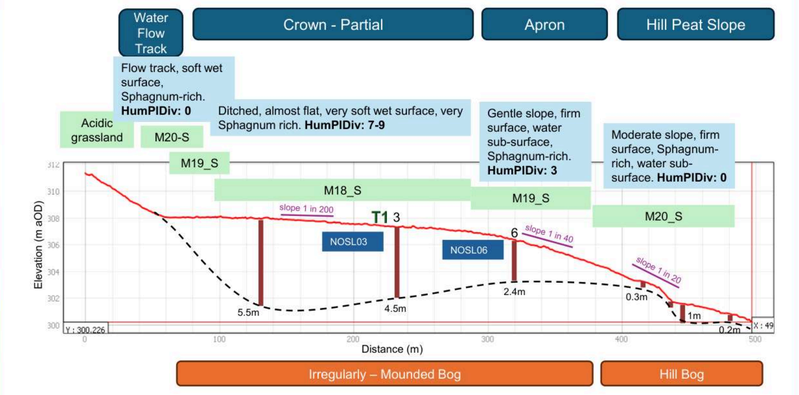


Humped Bog Mound in a col ("saddle") e.g. Plym Head, Black Knowe



Humped Bog Mound in a sloping valley trough e.g. Hafod Elwy; Figyn Blaen-brefi

Scald Law, Ottercops, Northumberland Transect 1: Q1 to Q4 (north to south)



Scald Law, Ottercops, Northumberland Transect 2: Q3 to Q6 (west to east)

Legend

Note: peat depths are a different scale to surface elevations

NOSL03 - dataset sample ID
T1 - Intersection with other transects
WETMEC type
Bog surface details
9 – sample pt
Peat surface
HumPIDiv: Hummock/Pool diversity score
BOGCAT type
Vegetation type
Peat depth (m)
Mineral ground

Erosion – affects many bog habitats

Networks of erosion channels (Type 1 erosion) result in uneven ground which is a mosaic of firm dry peat islands (haggs), with a relatively dry surface close to the eroding edges, bare and re-colonising peat on slopes, and hollows and pools on lower ground closer to the water table.

Linear erosion channels (Type 2 erosion) result in drier surfaces dissected by steep sided gullies, which can be eroded down to the mineral material beneath the peat. These have a drawdown effect on the water table within ~2m of the peat edge.

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Ian McKee
Bobby Hamill

Landowners and land managers for permission to access sites.

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Further information:
Rodwell, J. (ed.) (1991). *British Plant Communities, Volume 2. Mires & Heaths.* Cambridge University Press, Cambridge.
Wheeler B.D., Shaw S. & Tanner K. (2009). *A Wetland Framework for Impact Assessment at Statutory Sites in England and Wales*. Environment Agency, Bristol.
A wetland framework for impact assessment at statutory sites in England and Wales - GOV.UK
Working towards the development of Ecohydrological Guidelines for Blanket Bog and Associated Habitats – reports (Phase1 and 2) https://www.iucn-uk-peatlandprogramme.org/resources

Moss Side Farm, part of Risley, Holcroft and Chat Moss NNR - EU Horizon Palus Demos Demonstrator Sites

Raise water levels in cropped or arable peat soils to near the land surface

Objectives

- Investigate how a raised water table affects conventional arable crops (currently winter wheat and winter barley), focusing on:
  - Crop performance — impacts on yield and grain quality at water levels set by the Countryside Stewardship Higher Tier payment schemes CSW17 and CSW19.
  - Environmental outcomes —effects of applying conventional farming practices on land with an elevated water table

Capital works including deep trench bunding, cut-off ditches, water retention ponds and sluice gates to control in-field water levels

Willow Biomass Demonstration on wet peat

Objectives

- Establish a biomass system from dense self-sown willow on re-wetted peat
- Monitor impacts on:
  - Greenhouse gas (GHG) emissions
  - Water quality
  - Soil health

Self-sown willow restructured to create a biomass system demonstration for research

Community growing of plant species for use in peatland restoration

Objectives

- Investigate different propagation methods to grow bog plant species for restoration projects
- Work with community groups and volunteers to raise awareness of peatland restoration and provide green opportunities

Propagation and planting of bog plants at the NNR Hub with volunteers and community groups

NATURAL ENGLAND

PALUS DEMOS

Funded by the European Union

THE KING'S SERIES National Nature Reserves

Developing innovative techniques for peatland management on onshore windfarm sites: evaluating the effectiveness of re-using excavated peat

Heather Johnstone*[1,2], Kristen Liptrot[2], Roxane Andersen[1], Mike Daniels[3]

[1]Univeristy of the Highlands and Islands, Thurso

[2]RWE Renewables, Inverness

[3]University of the Highlands and Islands, Perth

Project objective

This Knowledge Transfer Partnership project is funded by UKRI through Innovate UK. The project aims to improve sustainable peatland management on renewable windfarm sites, focusing on the re-use of excavated peat. The push for renewable energy infrastructure has led to an increase in development pressure on peatlands, during which large volumes of peat are excavated.

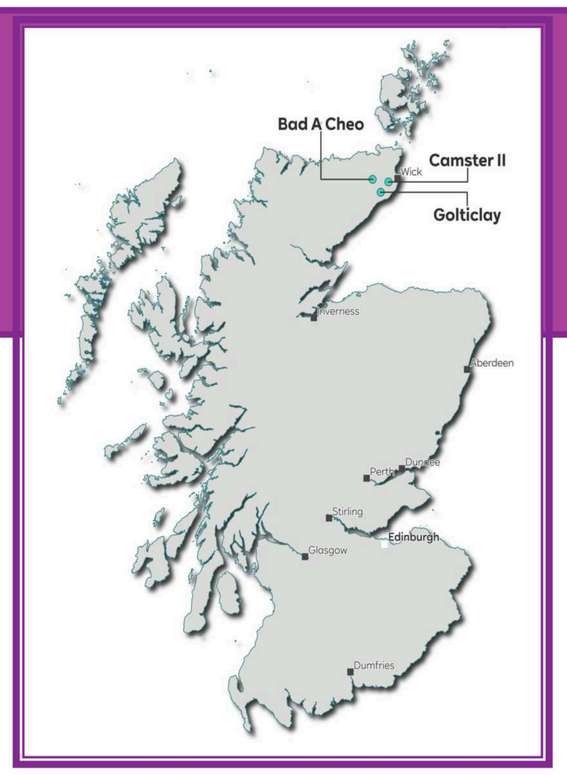


Figure 1: Map showing RWE windfarm case study sites

Project goals

- Pioneer new techniques for re-use of excavated peat on-site
- Balance renewable energy growth with peatland conservation, addressing both climate and biodiversity goals
- Develop long term monitoring for different excavated peat re-use methods to measure success
- Promote hydrological and biodiversity recovery

RWE windfarm peat re-use case study sites

Camster II (late construction phase)

Pilot-scale trial – previously non-native forestry plantation

Scenario 1: Stumps pushed down, vegetation removed from furrows and ridges, and 300mm depth peat infilling (1120m^3)

Scenario 2: Same as Scenario 1 but 150mm depth peat infilling (532m^3)

Scenario 3: Stumps were undisturbed, the vegetation was removed from furrows only and infilled to ground level (112m^3)

Control: Traditional ground smoothing restoration

- In all scenarios the vegetation removed was then spread across the reinstated area after infilling

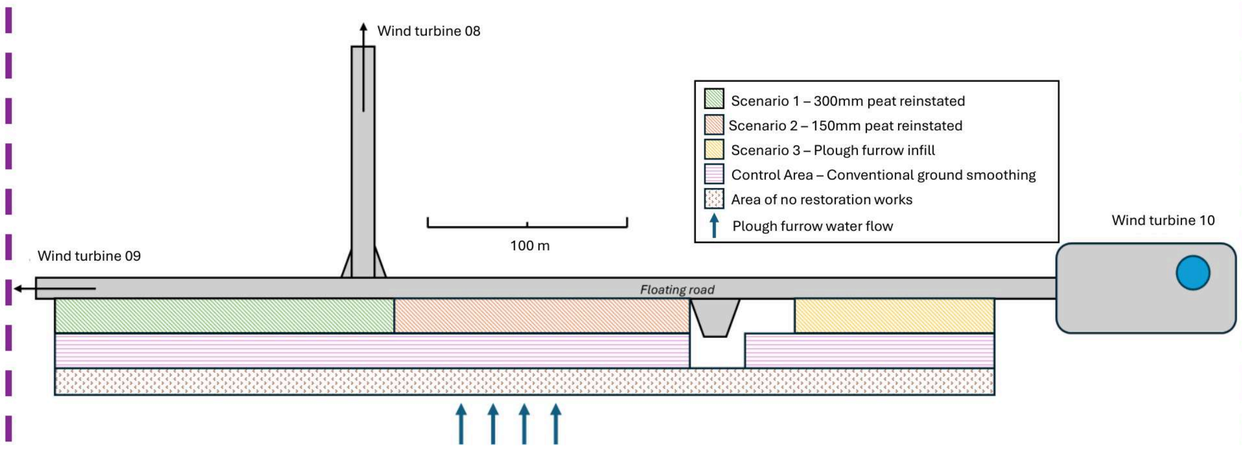


Figure 2: Diagram showing the different scenarios carried out during the Camster II pilot trial in April 2024. Peat excavated from wind turbine 10 base was used for peat infilling.

Picture 1: April 2024 – during reinstatement operation

Picture 2: May 2025 – 1 year after reinstatement

Golticlay (early construction phase)

Full-scale trial – previously non-native forestry plantation

Application of lessons learned from Camster II

- Detailed planning and collaboration with all parties is critical
- Concurrent peat excavation and infilling happening in parallel requires good communication between operators
  - Essential to avoid double handling and prohibitive costs

Picture 3: September 2025 – during reinstatement operation, spur roads were required to facilitate longer reinstatement reach, these were consequently buried with reinstated peat

- Peat infilling depth: 0.5m – 1.1m and up to ~50,000 m^3 of excavated peat was infilled
- Vegetation turves were pulled back and reinstated after infilling

Monitoring of pilot and full-scale trial sites

- Water-level and vegetation monitoring to be implemented across the areas
- Research and expand the same monitoring methods for other excavated peat re-use methods in Golticlay
  - Roadside excavated peat reinstatement
  - Borrow pit reinstatement
  - Repeat of full-scale trial

*heather.johnstone.extern@rwe.com

Heather Johnstone
Peatland Management Project Officer

HYDRONOV: A BESPOKE GIS APP FOR PEATLAND RESTORATION PLANS

Dr Hagen Ó Neill & Bruno Mels: Woodrow Sustainable Solutions Ltd. APEM Group

INTRODUCTION

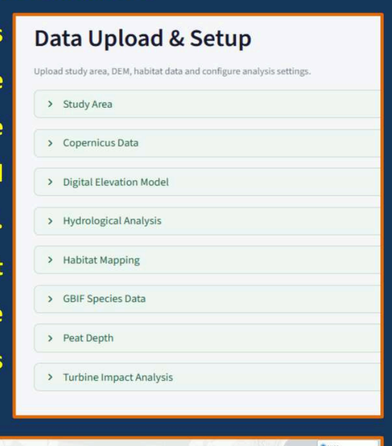
Hydronov is a bespoke Ploty-based GIS application developed to support peatland restoration planning. The name combines hydrology with a reference to Konstantin Evgenevich Ivanov, whose seminal work *Water Movement in Mirelands* (1981) has informed aspects of the application's hydrological approach. Hydronov integrates peat depth and elevation datasets within an accessible analytical framework:

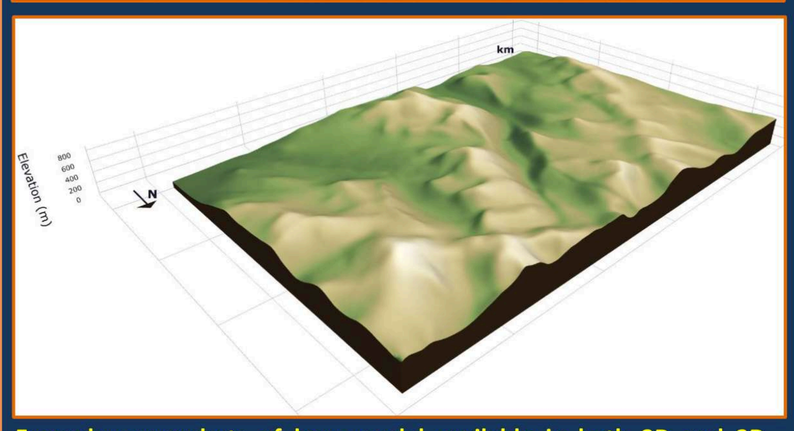
- Generates peat slide susceptibility maps and flow accumulation models for risk assessment
- Supports the design and placement of restoration interventions, including coir logs for slope stabilisation and hydrological control
- Produces interactive Plotly-based HTML outputs for portable and shareable 2D or 3D visualisation
- Enables exploration of water-shedding behaviour and hydrological connectivity across peatland landscapes
- Reduces costs and technical barriers by using open-source tools and an intuitive user interface
- Includes a transect tool for generating cross-sectional profiles combining peat depth and topographic data
- Facilitates efficient, evidence-based decision-making for peatland restoration and management

DATA SETUP

The Data Upload & Setup module is designed to minimise data requirements while supporting advanced analysis. At its core, Hydronov requires only a DEM and a peat depth dataset to generate the majority of outputs. Additional functionality is provided through integration with external data sources, including GBIF species records (incorporating National Biodiversity Data Centre and citizen science observations in Ireland) and Copernicus datasets.

This flexible approach enables users to rapidly undertake restoration planning while incorporating wider environmental datasets when required. Additionally, there is a module that provides visualisation for the impacts of potential wind turbines (noise/shadow flicker)

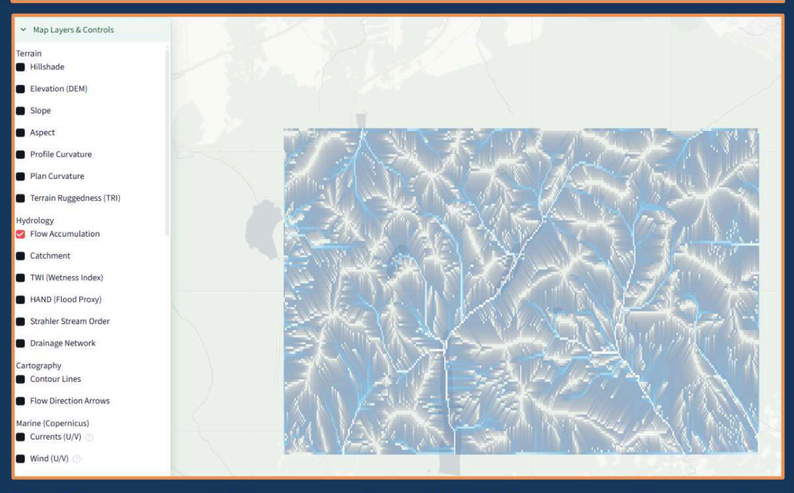




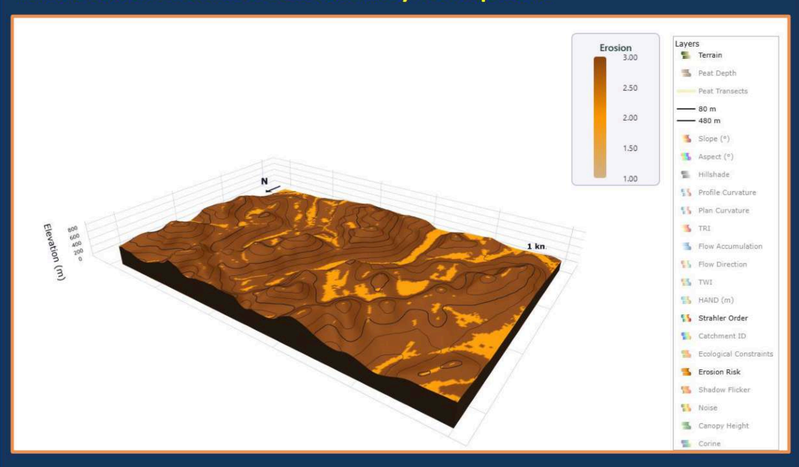
Example screenshots of base model available in both 3D and 2D visualisation. Study site is Sliabh Binneáin, Mournes, Down, NI

MAIN OUTPUTS

DEM + PEAT DEPTH = FLOW ACCUMULATION AND PEATSLIDE RISK



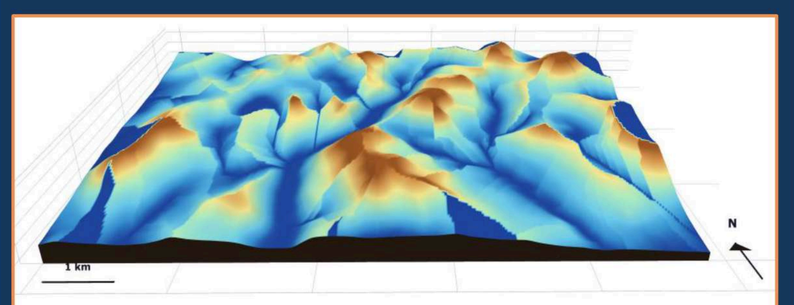
The flow accumulation map above highlights areas where surface water is predicted to concentrate across the study site. This analysis is a key component of peatland restoration planning, helping to identify potential flow pathways and areas susceptible to erosion. These locations can then be targeted for field verification to and determine where restoration interventions may be required.



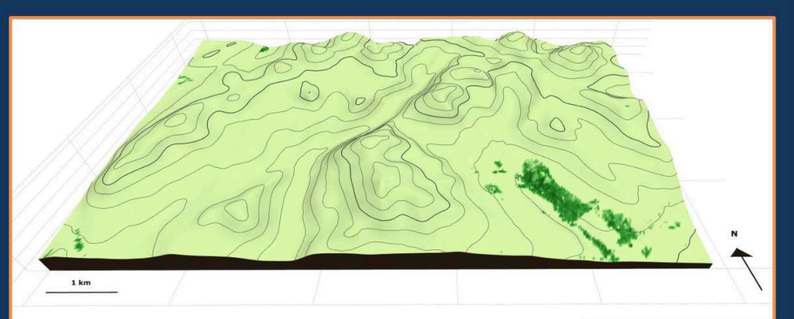
The peat slide risk model above uses peat depth and terrain slope to identify areas with an elevated susceptibility to peat instability. Based on NatureScot guidance, these outputs support risk assessment and help inform the spatial use of machinery in restoration plans.

OTHER OUTPUTS

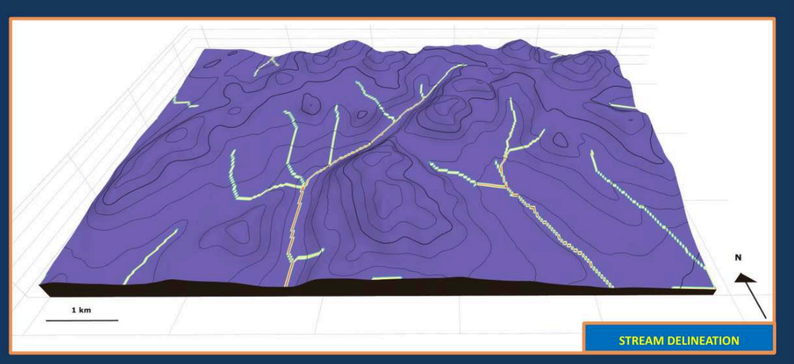
TWI (TOPOGRAPHIC WETNESS INDEX)



HAND (HEIGHT ABOVE NEAREST DRAINAGE



CANOPY HEIGHT MODEL



STREAM DELINEATION

PEAT PROFILE TOOL

Users can define transects across a peat depth raster overlaid on a digital elevation model, automatically generating cross-sectional profiles that illustrate both peat depth and ground elevation. These profiles can support site assessment and restoration planning by visualising peatland structure in a simple and interpretable format.

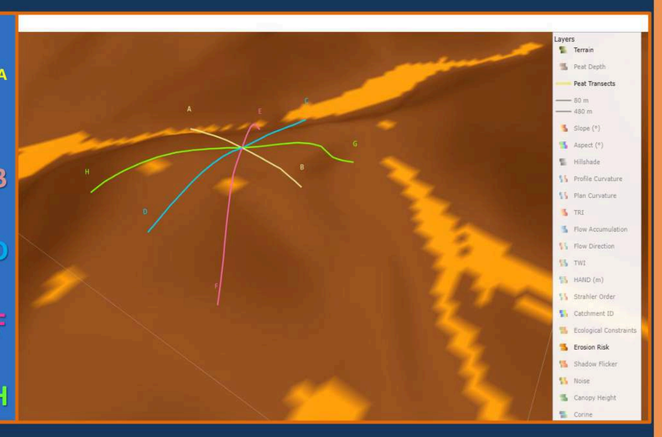
4 TRANSECTS HAVE BEEN DRAWN ACROSS A WATERSHED MESOTOPE

A → B

C → D

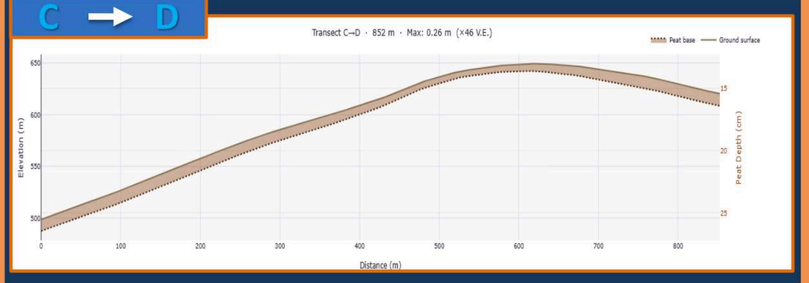
E → F

G → H



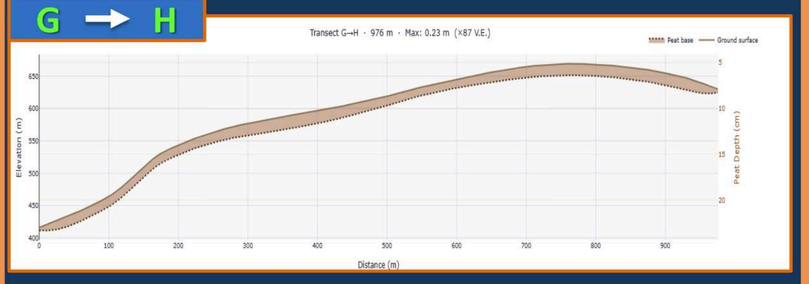
A → B

C → D



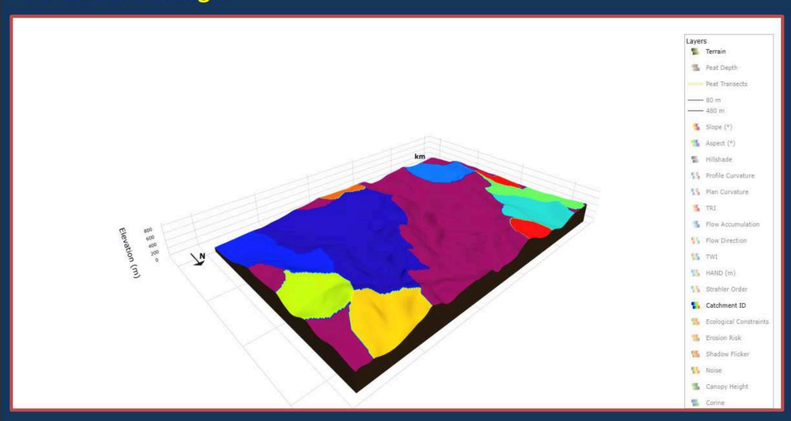
E → F

G → H



NEXT STEPS

Future development will focus on the automated delineation and classification of mire mesotopes, building on concepts described by K.E. Ivanov in *Water Movement in Mirelands* (1981). Mesotopes represent hydrologically distinct landscape units, such as watershed, spur and valley mire systems, which are commonly delineated manually during peatland restoration planning. By analysing terrain morphology and contour-derived hydrological controls, Hydronov aims to automatically identify and classify these units, providing a consistent and reproducible framework for restoration design.



Regional and topographic controls on greenhouse gas mitigation in rewetted lowland agricultural peatlands

Saghar Andaryani; Ian Holman

Cranfield Water Science Institute, Cranfield University, United Kingdom | E: saghar.andaryani@cranfield.ac.uk

Department for Environment, Food & Rural Affairs

1. BACKGROUND & AIM

Although peatlands cover only about 3% of the Earth's terrestrial surface, degraded peatlands contribute approximately 5–10% of annual anthropogenic CO_2 emissions. In the UK, drained lowland arable and grassland peat represents only about 15% of the peat area but accounts for approximately 59% of total UK peatland emissions. Raising drain water levels is a key mitigation option because water-table depth controls the balance between CO_2 emissions from aerobic peat oxidation and CH_4 emissions under wetter or ponded conditions. However, mitigation outcomes are expected to vary spatially because water tables are shaped by drainage setting, climate, groundwater influence, peat properties and field-scale topography.

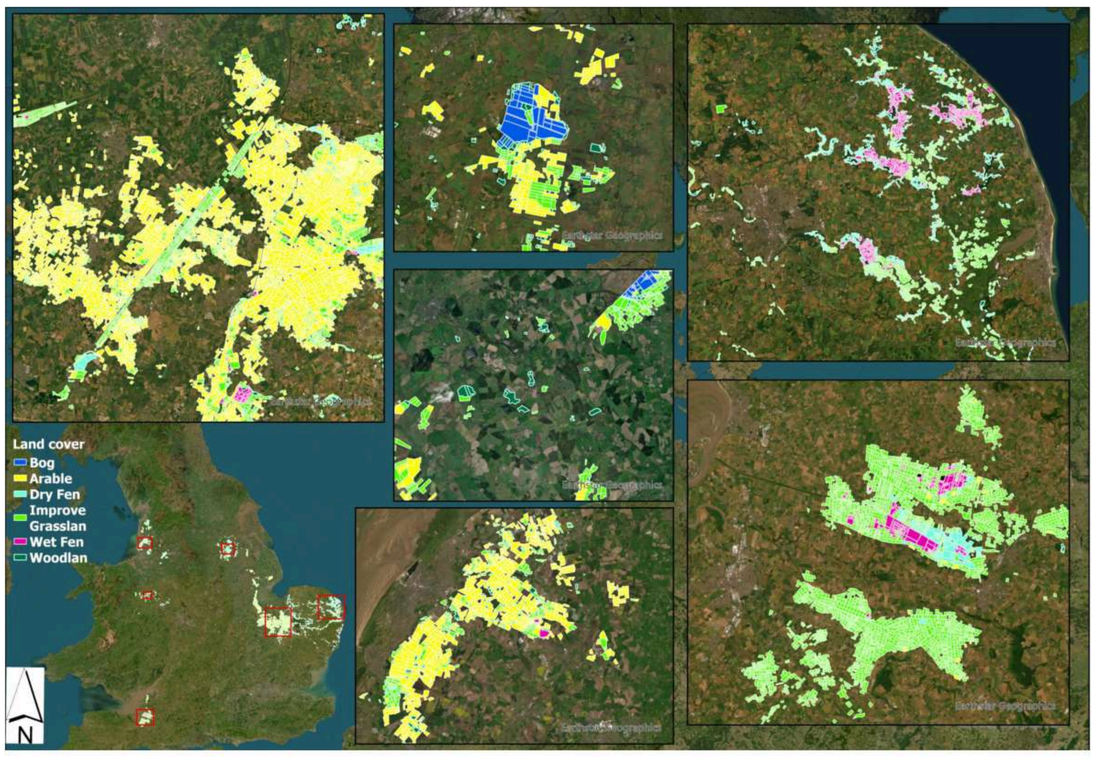
This study assessed how regional hydrological setting and within-field topographic variation influence water-table response and greenhouse gas mitigation under raised drain-water scenarios.

2. METHODS

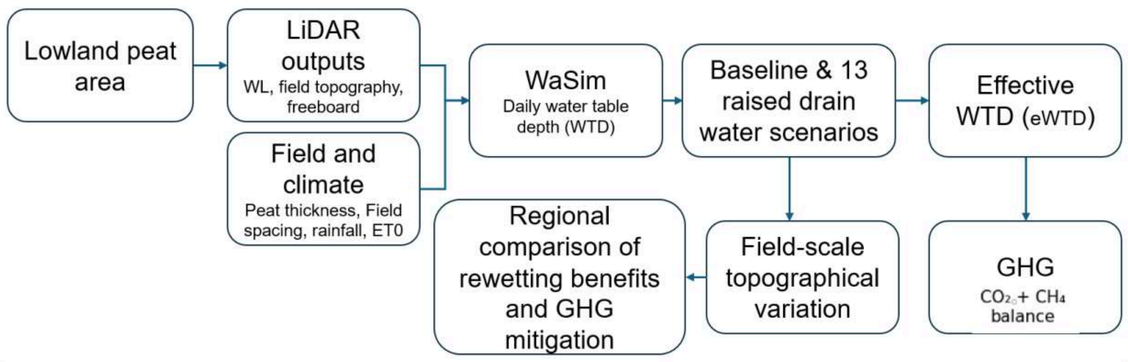
A spatial modelling framework was developed to estimate water-table depth and greenhouse gas emissions across the main lowland agricultural peat regions.

- **Study regions**

The figure illustrates the spatial distribution of major land-cover classes within mapped lowland peat areas used in the analysis.

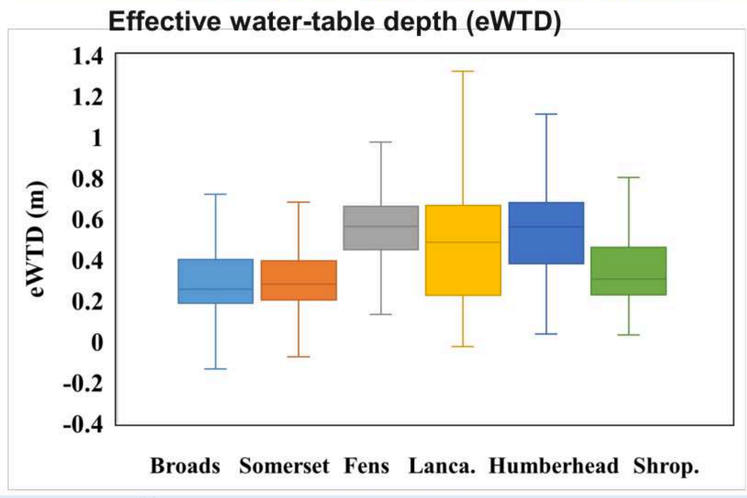


- **Data and water table model**



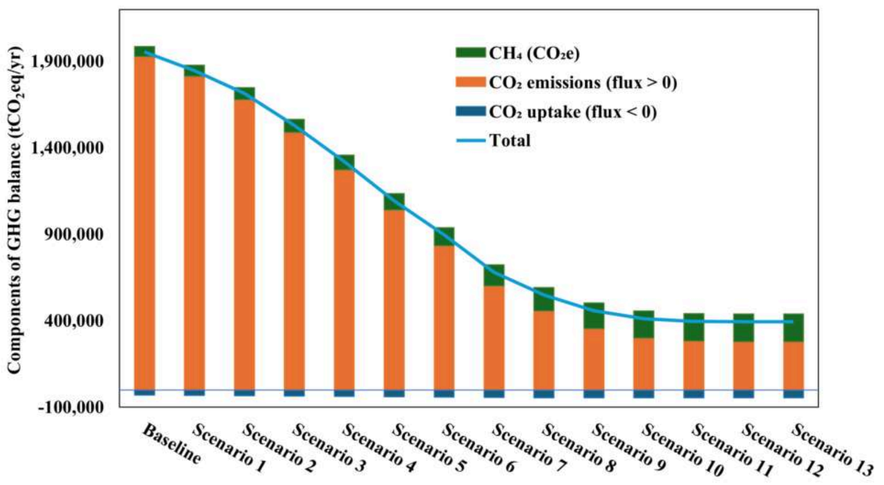
3. RESULTS

A. Regional hydrological differences



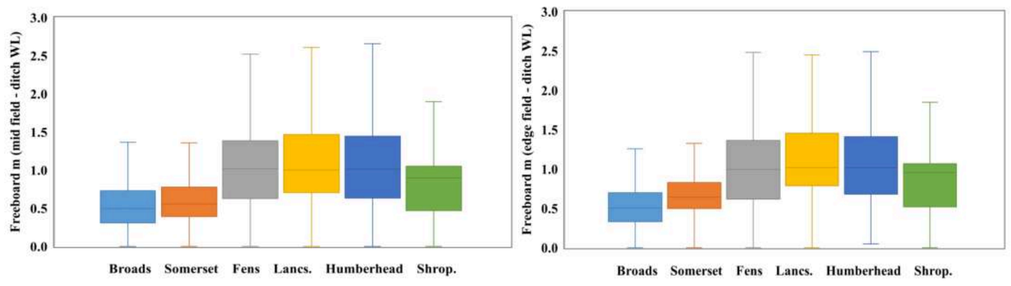
Simulated effective water table depths are greater in arable dominated LAP areas e.g., Fens

B. National GHG response

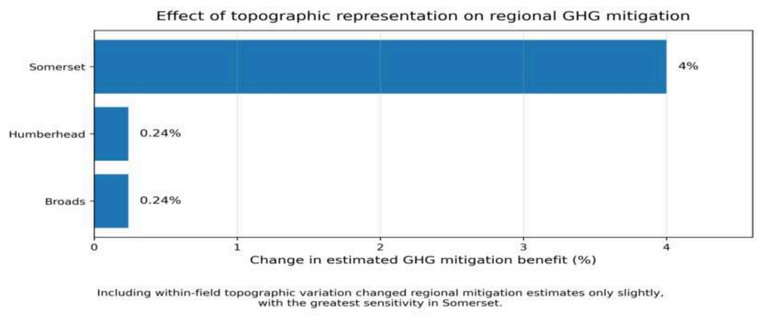


Progressively raising drain water levels reduces national net greenhouse gas balance, but with diminishing returns

C. Freeboard at drains (mid-field vs ditch water level)



D. Topography effect on GHG



Field-scale topography affected local water-table depth and ponding potential, but altered aggregate regional mitigation estimates only slightly. The greatest sensitivity occurred in Somerset (~4%), compared with Broads and Humberhead (~0.24%).

4. KEY CONCLUSIONS

- Raising drain water levels can deliver substantial GHG mitigation in lowland agricultural peatlands.
- Regional drainage setting, climate and hydrogeology exert stronger control on aggregate mitigation outcomes than field-scale topography.
- Topography matters locally by modifying water-table depth and ponding risk.
- Effective rewetting requires spatially targeted water-level management.

Acknowledgements: This work was undertaken as part of the Defra-funded Lowland Peat 3 project. We thank project partners, landowners, Internal Drainage Boards, the Environment Agency, Natural England and other organisations that provided data and support.

Building capacity for peatlands: Restoration training at Yorkshire Peat Partnership

Sam Halliday, Yorkshire Peat Partnership

Training needs in the peatland sector

The UK Peatland Strategy (IUCN UK Peatland Programme, 2018) sets a target of "two million hectares of peatland in good condition, under restoration or being sustainably managed by 2040". To meet this challenge, organisations across the UK and Ireland are scaling up delivery of peatland restoration. The availability of a skilled workforce, and the ability to quickly upskill existing staff in the latest best practices, is key to accelerating this delivery.

Yorkshire Peat Partnership (YPP) is striving to meet this need through provision of relevant, reliable training that evolves to embrace the most recent developments in our growing sector. Our training also aims to drive interest in the sector, particularly amongst young people. This poster reports on the outcomes of YPP's training programme since 2023, and will gather delegate opinions on current and future training needs of the sector.

Accredited training: Peatland Restoration Practitioner

The course: Across 6 days attendees learn how to map and survey peatlands, design restoration and oversee delivery. They complete written exercises, QGIS tasks, and practical tasks analyse the impact of restoration on two site visits to upland blanket bogs.

Outcomes:

- 101 certificates issued since 2023
- Training graduates working in peatland restoration in all 4 UK nations and RoI.
- In 2024-2025, 94% of course attendees surveyed would recommend the course.

"Extremely comprehensive" "All staff were really knowledgeable and helpful." "Useful and practical info" "Genuinely the best course I've been on."

LANTRA AWARDS APPROVED

Young people and peat: Peatland Pathways

The course: Peatland Pathways is a 2-day course YPP are able to provide free of charge thanks to support from DEFRA's Nature for Climate Fund. The course aims to inspire young people to enter the peatland restoration sector, and to promote understanding of peatlands with the next generation of land workers.

Outcomes:

- 80+ young people introduced to peatlands since October 2024.
- Grant funding attracted to expand the programme year-on-year.
- Several attendees carried on to complete further peatland training.
- Partnerships developed or deepened with Further Education colleges, peatland contractors, local charities, National Park Authority.

"I had a great time. Inspired me to work more with UK environments."

Short courses

The courses:

Blanket Bog Indicator Species

- Identification of common flora found on Britain's blanket bogs.
- Use of vegetative keys and hand lenses.
- Site-based, practical learning.

Introducing Sphagnum Mosses

- Identification of Sphagnum species in the field.
- Use of microscopes in Sphagnum identification.
- Sample library of Sphagnums from around the UK and Ireland.

Monitoring Peatlands

- Design of peatland monitoring programmes, comparison of data collection methods
- Use of UAVs for remote monitoring.
- Stakeholder engagement and citizen science.

Outcomes:

- 3 new courses developed in 2025/26
- 5 course dates delivered to 47 attendees

Sector training needs

Cairns (2026) identifies the need for training to support workers transitioning to peatland restoration from related sectors, as well as upskilling of the existing workforce to enable the adoption of new technologies.

YPP are collecting responses from conference attendees to better understand current and future training needs within the peatland restoration sector.

Scan the QR code to complete the survey.

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Photographs (clockwise from top): Ellen Shields, Sam Halliday, Ellen Shields, Lizzie Shepherd, Sam Halliday

Tree diversity of peat swamps in Southeast Asia:
planting, regeneration, agroforestry or paludiculture?

Stuart W. Smith[1], Janice S. H. Lee[2], Weng Ngai Lam[2], Mark E. Harrison[3,4,5], N. Estya B. Rahman[2]

[1]Ecological Sciences, The James Hutton Institute, Craigiebuckler, Aberdeen, UK, [2] Asian School of Environment and Earth Observatory of Singapore, Nanyang Technological University, Singapore,[3]Centre for Ecology and Conservation, Faculty of Environment, Science and Economy, University of Exeter, Penryn, UK, [4]Borneo Nature Foundation International, Penryn, Cornwall, UK, [5]School of Geography, Geology and the Environment, University of Leicester, Leicester, UK.
Email: stuart.smith@hutton.ac.uk

Introduction

Tropical peat swamp forests have experienced extensive degradation across Southeast Asia. Despite efforts to reforest peatlands, there has been limited examination of tree species diversity used across reforestation approaches and replacement land-uses.

Research questions?

- **How does the tree species diversity differ between peat swamp reforestation and land-use types?**
- **What is the frequency of species use and overlap between reforestation and land-use types?**

Methods

Desk-based review of scientific and grey literature, reviewed in English, Indonesian, Japanese, German and Thai languages.

Reforestation/land-use types were assigned based on the study aims and detailed environmental conditions:

Tree planting on drained or wetted peat on open peat or within degraded forests with aims of rehabilitation, conservation or scientific research.

Natural regeneration passive colonisation of seeds or seedlings on open peatland or forests across hydrological conditions.

Agroforestry planting of trees for the purpose of economic, social or cultural benefit, i.e., silviculture, on drained peat.*

Paludiculture planting of trees with purpose of economic, social or cultural benefit on wet peat.

Taxonomy: Tree species and palm-like trees were verified on the KEW plant databased. Based on literature searches species were grouped as:

Native to Southeast Asia and peat swamp forests

Native to Southeast Asia but from well-drained non-peat soils

Non-native to Southeast (exotic)

* Hydrological conditions were assumed to be drained if not detailed.

Acknowledgements
The work was funded by the Royal Society of Edinburgh Scottish-Asia Partnership in Higher Education Research (SAPHIRE) Fund Award number: 6152

Results

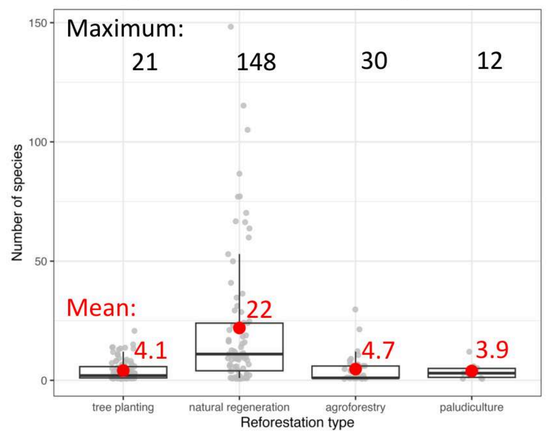
Number of studies: 219

Including tree planting (94), natural regeneration (81), agroforesty (34), paludiculture (10)

Number of tree species: 623

Including tree planting (135), natural regeneration (553), agroforestry (91), paludiculture (27)

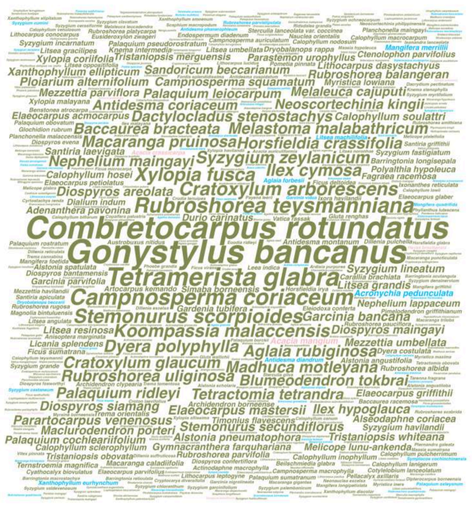
Average tree diversity



- Four native peat swamp forest species occurred in 20% of studies with a selection bias towards *Rubroshorea balangeran* and *Dyera polyphylla* in planting, agroforestry and paludiculture that was not reflected in natural regeneration.
- Agroforestry on peat is implemented due to land history and for economic livelihoods, yet it had the highest proportion of non-native species (15%, 14 species) and well-drained non-peat species (24%, 22 species) compared to other reforestation and land-uses types.
- Species similarity between reforestation types was low. Natural regeneration and paludiculture had the most divergent composition (0.08 Sørensen similarity), while planting and natural regeneration the most similar (0.31 Sørensen similarity).

Tree planting

Natural Regeneration



Agroforestry

Paludiculture

The size of species name is proportional to number of studies it which it was recorded.

Conclusion

- Current efforts to rehabilitate peat swamp forests through tree planting, agroforestry and paludiculture result in a lower tree diversity compared to promoting natural regeneration.
- Over one-third of tree species used in agroforestry are exotic and/or prefer well-drained non-peat soils and thus require drainage of peat to ensure survival and growth.

Peatlands in Flux: Flora Response to Snow Depth in Northern Scandinavia

Laurie Quincey[1], **Fabien Maussion**[1]

1 University of Bristol, Beacon House, Queens Road, Bristol, BS8 1QU, UK

Introduction

Understanding Arctic flora response to climate is critical for ecology, society, and climate research, yet the influence of snow depth fluctuations on Arctic flora productivity remains poorly understood on climate timescales. With less ubiquitous Arctic greening trends[1, 2] and weakened temperature-productivity relationships[3, 4], snow may be an important influence over productivity[5-7].

However, under-validation and a reliance on satellite data decontextualises research from site-specific ecology[8]. Data fusion approaches may remedy this, retaining site-specific context over climate timescales.

This study reconstructed 25 years (2000-2025) of sub-weekly gross primary productivity (**GPPe**) at Abisko-Stordalen, Sweden, using random forest regressors to model site-specific flux tower-derived GPP (**GPPf**) from satellite data.

Research Questions

- Can random forest regression convert optical satellite data to flux tower GGPf?
- How does snow depth affect gross primary productivity (GPP)?
- How does the study method compare to traditional satellite measures of GPP?

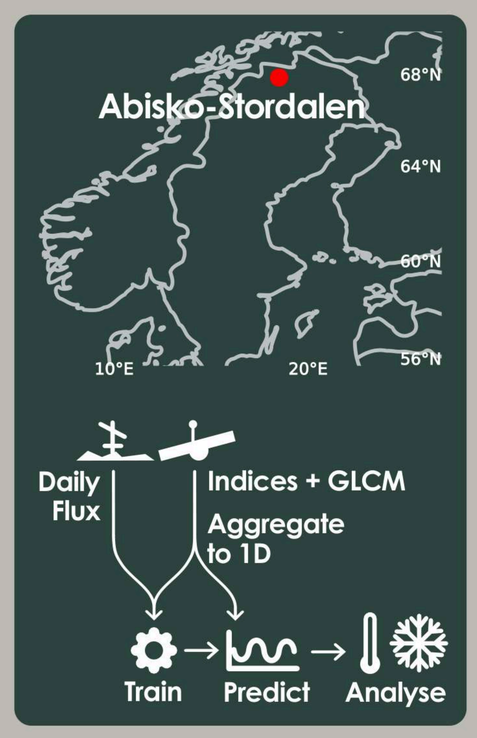
Methodology

Processing

- Calculate indices and texture on MODIS[9, 10], Landsat 4-9[11-15], and Sentinel-2[16, 17].
- Aggregate pixels within 200 m of flux towers.
- Calculate daily GPPf from ICOS Abisko-Stordalen Palsa and Grassland flux towers[18, 19].
- Train site-specific random forest models on satellite and GPPf relationship.
- Predict sub-weekly GPPe and calculate annual & seasonal GPPe.
- Prepare warmth index (WI) and snow depth from SMHI observations[20].

Analysis

- Z-score GPPe & NDVI and find inter-quartile range.
- Theil-sen slope/Mann-Kendall test on annual GPPe.
- Ordinary least squares model on seasonal GPPe & WI and GPPe WI residuals & snow depth.



Results

***GPP** = Gross Primary Production; **GPPe** = GPP Model Estimate; **GPPf** = Flux Tower GPP*

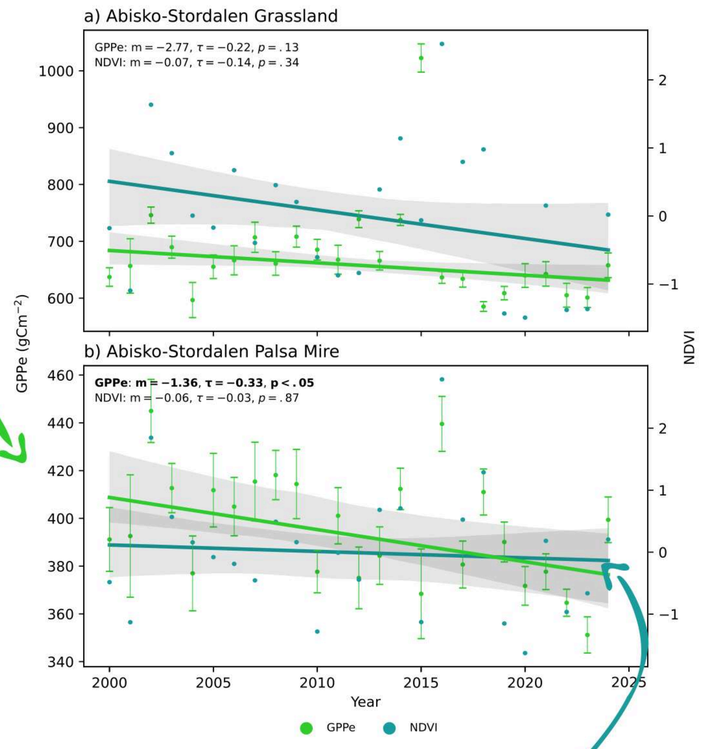
Abisko-Sto. Pasla Mire reported a significant decrease in annual **GPPe** of **~34 gCm^{-2} over 25 years** (~8-9%)

Spring snow depth had a significant positive relationship to **GPPe** at Abisko-Sto. Grassland...

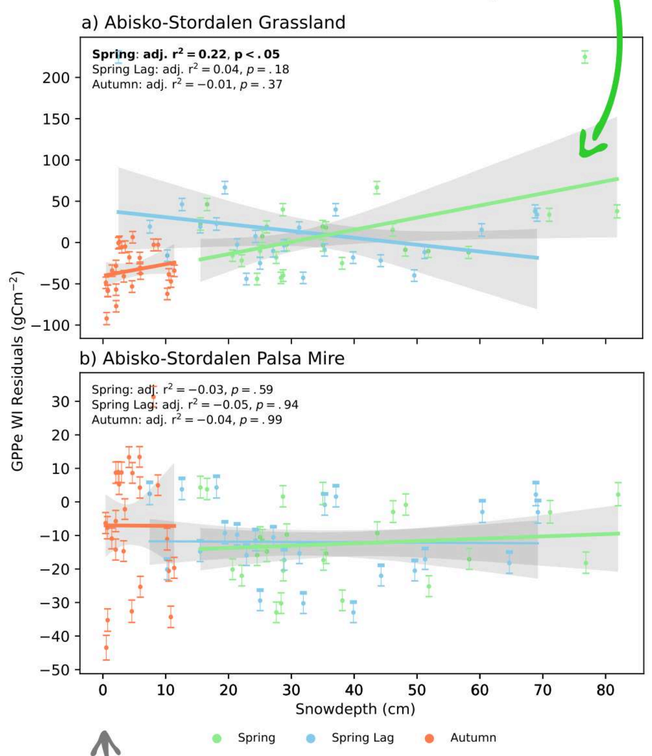
Study **GPPe** recreated **GPPf** phenology faithfully but did not capture small-scale variation

GARI & **MSAVI** indices were unique to the Palsa Mire model

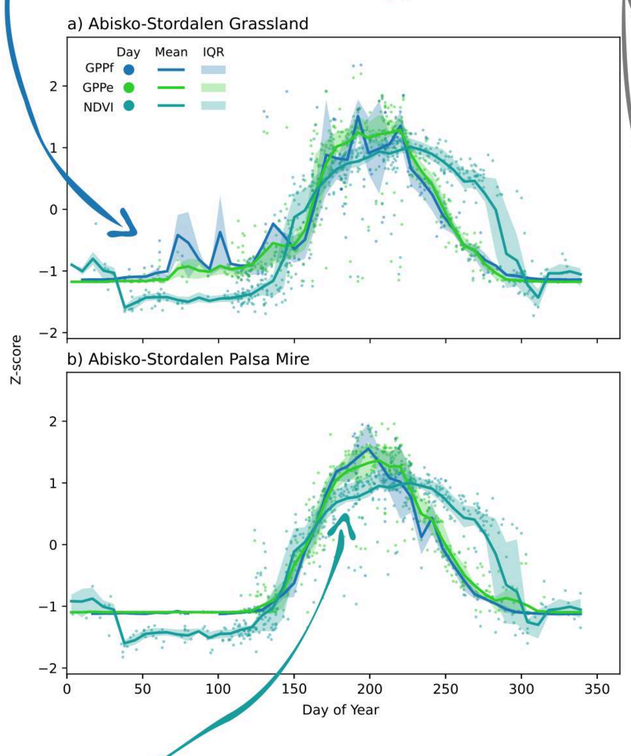
Annual GPPe



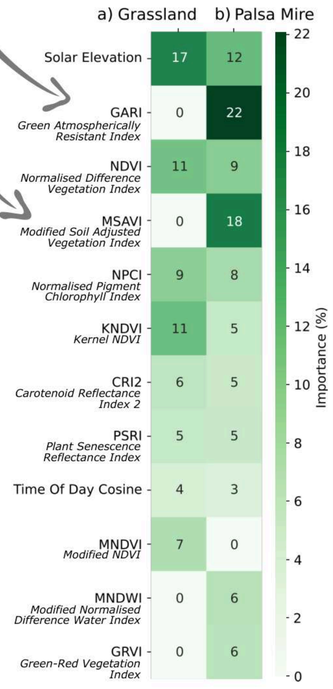
Seasonal GPPe & Snow Depth



GPP & NDVI Phenology



Feature Importances



In contrast, **NDVI** reported no significant trend at Abisko-Sto. Palsa Mire

...**but** no snow depth trend at the Palsa Mire

NDVI phenology captures spring growth **but** undershoots peak **GPPf** and overshoots autumn **GPPf**

Model Validation

a) Grassland: R^2=0.72, MAE=4.04 gCm^{-2}
b) Palsa Mire: R^2=0.80, MAE=1.63 gCm^{-2}

Discussion

At Abisko-Sto. Grassland, GPPe increased with snow depth. This was attributed to increased soil insulation causing nutrient release and extended ablation seasons. This may promote flora that benefit from snowmelt and nutrient rich conditions[21-25]. **Conversely, the Palsa Mire reported no snow depth relationship.** As raised palsas are susceptible to wind removal of snow, flora may remain temperature-limited in spring from reduced snow insulation[26].

The Palsa Mire reported a long-term GPP decrease. This contrasted with warming trends[27] and increased productivity reported by NDVI-based analysis at higher latitudes[6]. This discrepancy may occur as permafrost under the Palsa Mire is melting, causing collapse and inundation[28, 29]. The resultant anoxic conditions may decrease GPP[23-25] and carbon sequestration as reported at the Palsa Mire and nearby Abisko-Storflaket Mire[30, 31].

Validation showed the study method was suitable as GPPe models faithfully reproduced GPPf phenology. Performance was better than NDVI which is a commonly used Arctic Greening metric[32, 33]. As a result, the discrepancy between long-term GPPe and NDVI trends at the Palsa Mire suggests **NDVI may perform poorly on mosaicked landscapes and peatland flora,** echoing other studies[34-36]. As indices such as GARI were important model features, wavelengths not used by NDVI[37, 38] may contain information important for estimating GPP. Therefore, this study suggests **multi-index approaches may better characterise GPP across diverse Arctic flora** compared to relying solely on NDVI.

Conclusion & Implications

- Random forest models can convert satellite data to flux tower GPP.
- Snow depth raises GPP, perhaps by soil insulation & snow melt.
- Thermokarst development may reduce Arctic carbon sequestration.
- NDVI skews phenology and can distort long-term GPP trends.
- NDVI may be unreliable for Arctic Greening and peatland monitoring.
- This study recommends multi-index approaches.

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Author Contributions: L.Q. conceived of and carried out this study, F.M. supervised and advised.

lrquincey@gmail.com github.com/lauriequincey linkedin.com/in/lauriequincey

Celebrating another record-breaking year for Scotland's Peatland ACTION Partnership restoration efforts

Aiming for success

Peatland ACTION is part of The Scottish Government's Climate Change Plan for Net Zero which aims to

- increase peatland restoration by 10% each year to 2030 and maintain levels thereafter
- support the restoration of 400,000 hectares of peatlands by 2040
- increase the proportion of the most highly degraded and emitting peat that is restored

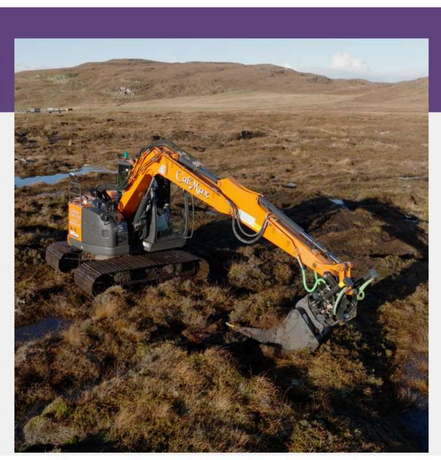
The Peatland ACTION Five Year Partnership Plan 2025 – 2030 is a roadmap to restoring more of our peatlands, with commitments to the themes of **Further**, **Fairer** and **Better.**

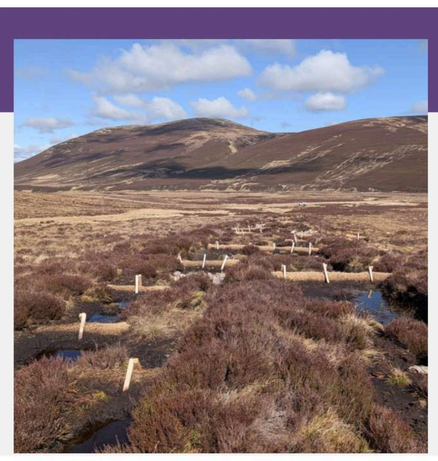
Peatland ACTION provides funding, advice and support to landowners to develop peatland restoration projects.

Across Scotland's peatland restoration efforts, over 105,000 hectares of previously damaged peatland habitat have benefited directly from restoration activities so far.

Further

- Budget of £35.5m for financial year 2025-26, delivered almost 15,500 hectares of restoration
- Delivering across a range of sites, including crofting, community-owned and heavily degraded peatlands
- Delivering diverse benefits including water quality and crofter diversification
- Utilising supportive funds via the Shared Island Initiative – funding for restoration and knowledge exchange





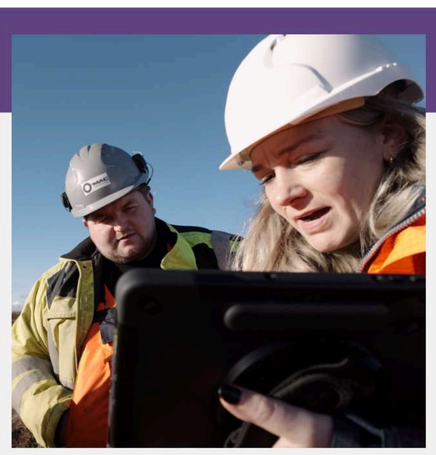
Fairer

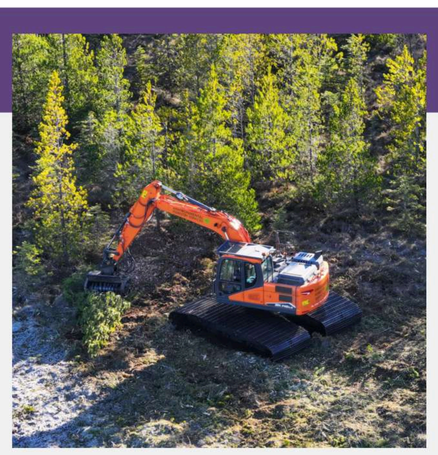
Developing the workforce – for today and tomorrow's needs

- Over 100 people developed new skills
- Piloted a dedicated internship scheme, delivering six internships
- Developing the Young Workforce project worked with 786 pupils in 17 schools
- Contractor training including two projects on croft land in the Western Isles
- £20,000 of funds supported over 100 learners via the Peatland Training Fund

Advocacy and engagement

- Promoting the broad benefits to a wide range of audiences
- Case study films showcasing business and community benefits
- Busting myths – including working with research specialists such as Moredun Research Institute
- Working with stakeholders such as NFU Scotland, Scottish Land & Estates and RICS





Better

- Project Development Support Scheme – incentivising large-scale design of pipeline for multiple-year projects
- Carbon Contracts Scheme piloted – to incentivise engagement with Peatland Code
- Scotland's Peatland Standard – engagement with stakeholders
- Developing clear monitoring workstreams to provide evidence of benefits

Looking ahead

- Aim to deliver more than 10,000 hectares and design over 12,000 hectares through financial year 2026-27
- New Skills Plan to be developed to continue supporting our peatland sector
- Scotland's Peatland Standard open consultation, delivery of the new resource and revisions and refinement of our Technical Compendium
- Carbon Contracts will return, continuing work with the Peatland Code making our applications more straightforward, to support take-up from landowners
- Support for restoration on crofts, common grazings and tenant farms
- A focus on international knowledge exchange and sharing our experience as a world leader in peatland restoration

Peatland ACTION a national programme to restore peatlands in Scotland. It is 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.

Image credits: © Liberty-Firby Fisk, © Peatland ACTION /Swift Films, © Daisy Whytock/CNPA, © Forestry and Land Scotland

The Spatial Footprint of Onshore Wind Infrastructure in Northern Ireland

Patrick Moss
PhD Student in Geography.
Contact: pmoss03@qub.ac.uk
Supervisors: Prof Jennifer McKinley; Prof Marios Soutsos; Dr Emma Delaney.

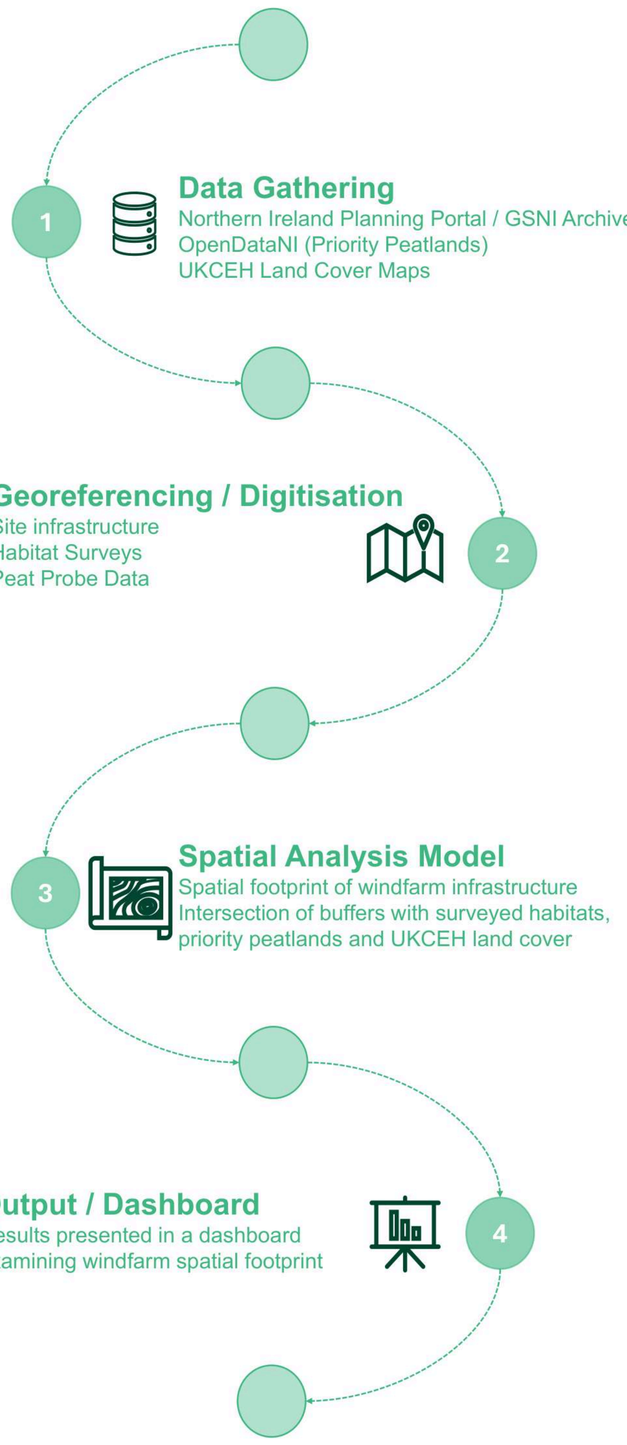
QUEEN'S UNIVERSITY BELFAST

Abstract / Background

Understanding the spatial footprint of wind energy infrastructure is essential for improving environmental impact assessment as Northern Ireland works towards meeting the Climate Change Act (2022)[1] targets. The Renewable Electricity Price Guarantee[2] scheme aims to increase installed renewable generation capacity by 40% by 2030, with majority growth expected from onshore wind. This study presents the first comprehensive, open access geospatial database of onshore windfarm infrastructure in Northern Ireland, developed through systematic digitisation of aerial imagery combined with planning portal site maps. The database integrates digitized habitat maps and external spatial datasets (the UKCEH Land Cover Map[3] and the Priority Peatlands[4] Map). A buffer-based spatial modelling approach was applied to quantify infrastructure footprints and assess interactions with surrounding habitats, with particular emphasis on peatland ecosystems. The resulting dataset provides a robust evidence base that, alongside peat depth and condition data, can support future assessments of carbon footprint and cumulative environmental effects.

Fig 1. Image credited to Getty Images.

Methodology



Results

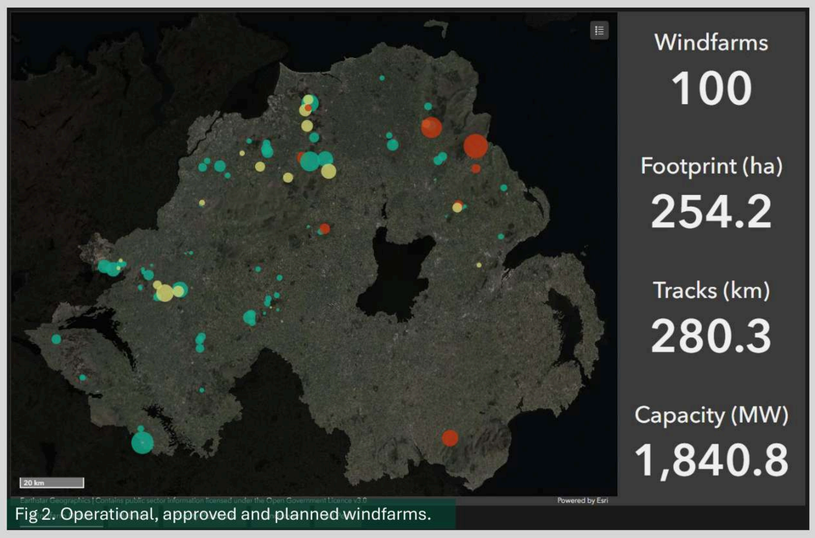


Fig 2. Operational, approved and planned windfarms.

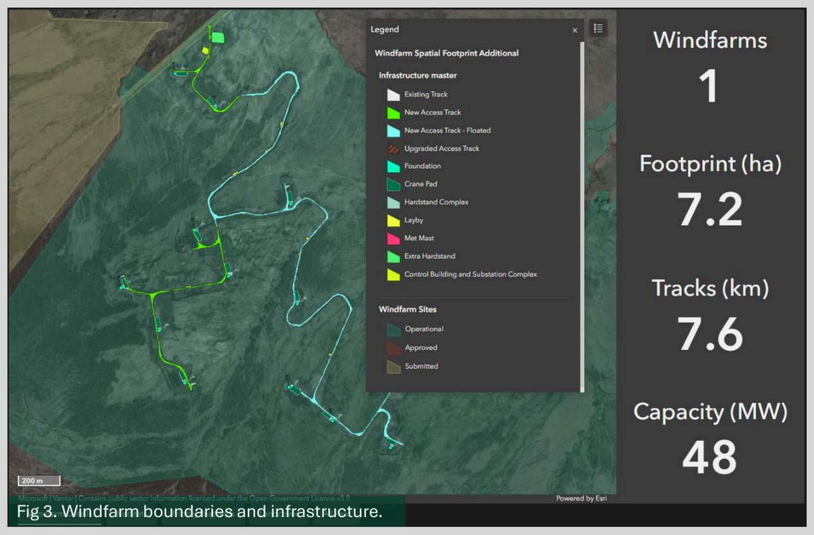


Fig 3. Windfarm boundaries and infrastructure.

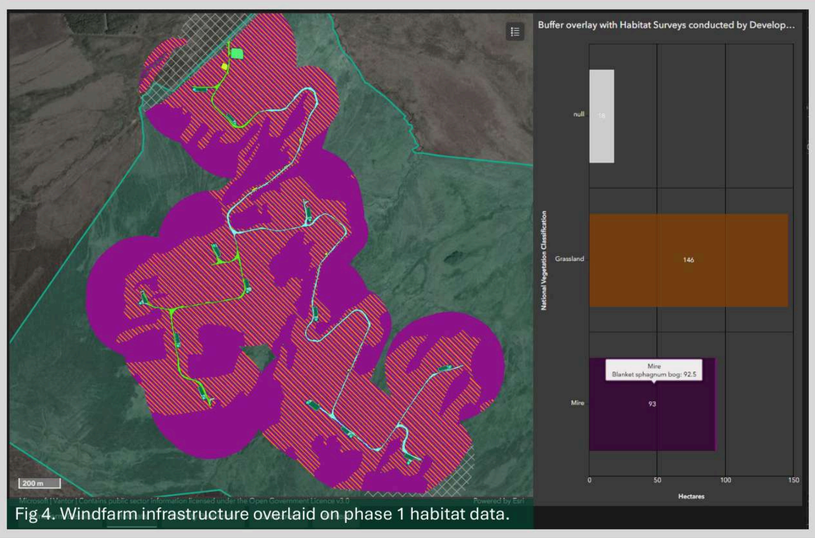


Fig 4. Windfarm infrastructure overlaid on phase 1 habitat data.

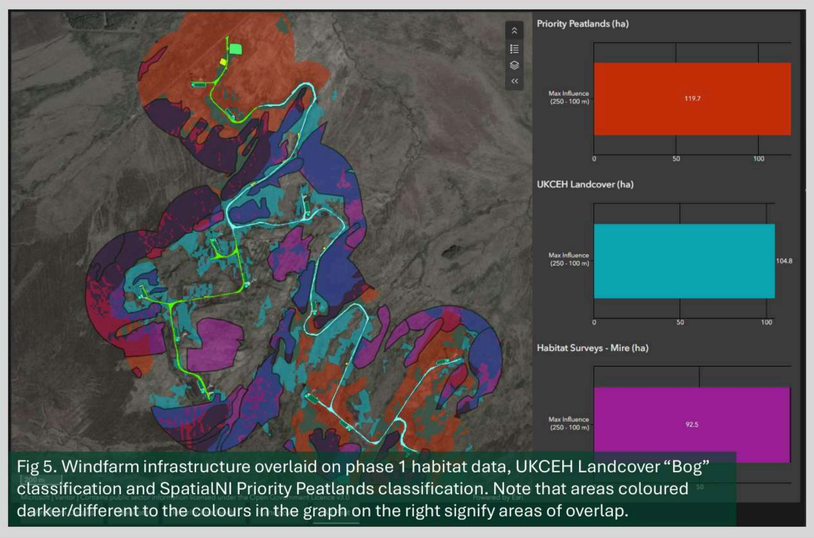


Fig 5. Windfarm infrastructure overlaid on phase 1 habitat data, UKCEH Landcover "Bog" classification and SpatialNI Priority Peatlands classification. Note that areas coloured darker/different to the colours in the graph on the right signify areas of overlap.

The spatial analysis identified 73 commercially sized windfarms, with a **combined track length of 280.3 km** and a **direct infrastructure footprint of 254.2 ha** (fig. 2). Digitised infrastructure and site boundaries can be explored at the individual site level (fig. 3). For sites with available habitat survey data (fig. 4), 50.1 km of track (out of 180.8 km) intersected mire habitats, including **23.5 km over blanket bog**. Buffer analysis (250 m around turbine bases and 100 m around tracks) indicated that **approximately 1,200 ha of blanket bog** fell within mapped zones of influence.

Comparison with national-scale datasets highlights important discrepancies: in fig. 5, the UKCEH land cover map captures 63.4% of surveyed mire extent but misses 36.6%, while 44.0% of mapped bog does not correspond to field-surveyed habitats. The Priority Peatland layer shows lower agreement, capturing 42.8% of mire habitats, missing 57.2%, and overestimating extent, with 66.9% not aligning with survey data.

Implications

- Windfarm infrastructure shows substantial spatial interaction with mire and blanket bog habitats, extending beyond direct footprint through buffered zones of influence.
- Comparison with national datasets indicates moderate to low agreement with surveyed habitats at sites examined, with both UKCEH and Priority Peatland layers missing significant areas of mire and overestimating peat extent compared to surveyed Phase 1 habitats in the example provided.

Next Steps

- Integrate peat depth, condition, and land cover data to develop peatland-specific carbon footprint models for windfarm infrastructure.
- Use InSAR time-series analysis to investigate long-term ground movement and potential deformation associated with infrastructure on peatland.

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UKRI Engineering and Physical Sciences Research Council

LinkedIn

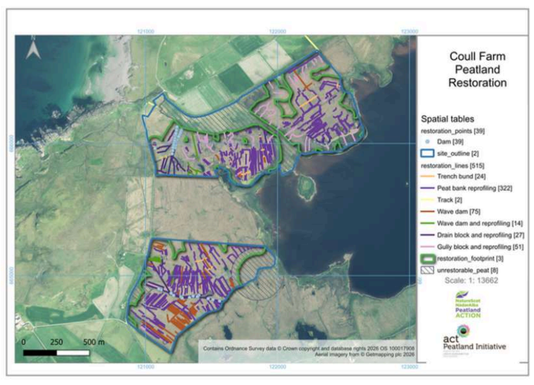
ACT PEATLAND: Case Studies of Peatland Restoration in Argyll

ACT Peatland was established in 2022, funded by NatureScot Peatland ACTION and Esmee Fairbairn Foundation. These combined funding sources have enabled us to make peatland restoration accessible to everyone regardless of the size of their landholding, whilst building the connection local people have with peatlands and improving our understanding of the species that call this landscape home.

ACT Peatland host two Peatland ACTION Officers covering Islay, Jura, Colonsay, Kintyre, Knapdale and West Cowal. Over the past year we worked with landowners, site managers and agents to bring over 600ha of peatland back onto the road to recovery. This was made possible by the strong working relationships developed between our Project Officers and Stakeholders. Strong communication skills, real-time spatial data updates and a hands-on approach to project management ensured a smooth delivery across both projects.

Coull Farm, Islay

Coull Farm is a landholding owned by IO Warren Farming Partnership on the West Coast of the Isle of Islay. ACT Peatland have been involved with the site for a number of years and have recently helped develop and deliver a Peatland ACTION restoration project. The project aimed to bring 116ha of degraded peatland back onto the road to recovery.



KEY FACTS & FIGURES

- **Owner**: I O Warren Farming Partnership
- **Location**: Coull Farm, West Islay
- **Area restored**: 116ha
- **Peat depth**: Average 2.5-3m with a maximum of 5.5m
- **Timing of work:** Winter 2025/26
- **Contractor**: Ian MacPherson and Son

SITE HISTORY & MANAGEMENT

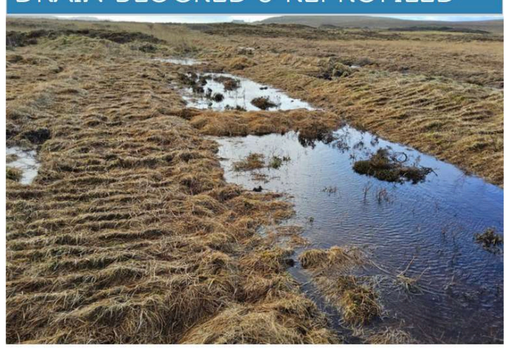
The restoration site at Coull Farm is located between Loch Gorm and the public road B8018. Coull Farm is a mixed sheep and cattle farm, the surrounding areas are grazed but the peatland restoration areas do not form part of the livestock grazing regime.

Historically, the site has been extensively cut for peat. Although, there has been no cutting for the past 30 years, banks remained across the site, varying in hight from approximately 30 cm to 2 m. This is characteristic of the restoration sites we see on Islay.

Esmee Fairbairn funded pre-intervention monitoring across the site for breeding birds with additional surveys for roosting birds in the run up to the start of works.

PEAT BANK REPROFILING

DRAIN BLOCKED & REPROFILED



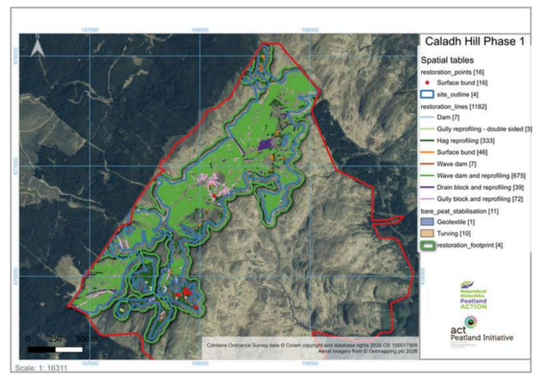
RESTORATION TECHNIQUES

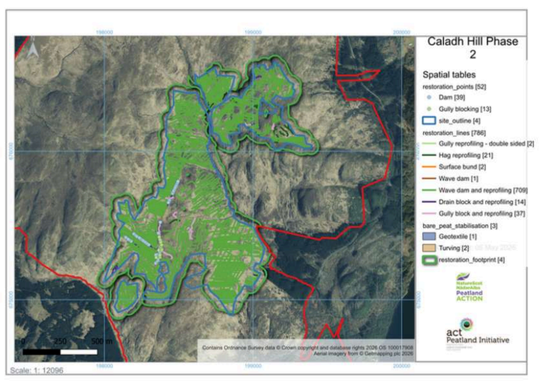
The total area restored was 116 ha and the following techniques were used:

- **Drain blocking and reprofiling**: 3,336m primarily using peat dams but 39 leaky timber dams were also used in the larger drains
- **Gully block and reprofiling**: 3,157m
- **Peat bank reprofiling**: 22,649m
- **Wave dam**: 901m
- **Wave dam and reprofile (zipping)**: 812m
- **Bunding**: 494m

Caladh Hill, West Cowal

Caladh is a landholding situated on the Cowal Peninsula in Argyll. ACT Peatland have been working with the landowners to restore the areas of blanket bog within the site. The project was designed as a two year project but we successfully restored a total of 325ha, ahead of schedule, over one winter.





KEY FACTS & FIGURES

- **Owner:** Dalhanna Farming Company
  Location: Caladh Hill, West Cowal
- **Area restored:** 325ha
- **Peat depth:** Phase 1 averaged at 0.5-1m and phase 2 at 1-1.5m
- **Site altitude:** 240-450m
- **Timing of work:** October 2025 to February 2026
- **Contractor:** Net Zero North Limited

SITE HISTORY & MANAGEMENT

Historically the site was heavily drained and grazed with sheep, though this had not occurred for a number of years. In 2021, a wildfire spread across a large area of peatland near Tighnabruaich, including the majority of Phase 2. The primary land use is now deer management.

The project sits within a wider landscape-scale nature regeneration programme across the Caladh landholding. Native broadleaf woodland has recently been planted on the hillside below the peatland, with the aim of increasing connectivity within this key temperate rainforest area. Regenerative grazing practices are also being investigated for the wider landholding.

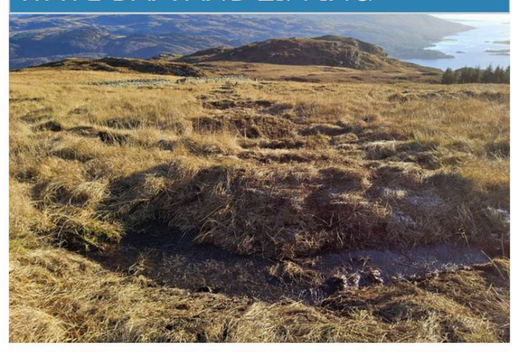
RESTORATION TECHNIQUES

The total restoration carried out across both phases of the project:

- **Drain blocking**: wave dams or peat dams 360m
- **Drain blocking and reprofiling**: wave dam and zipping, blocking with peat or timber dams and reprofiling 130,066.5m
- **Gully blocking:** coir dams (13), peat dams, timber dams (39) 4580m
- **Bare peat stabilisation:** 574m2
- **Peat bunding:** (approx. 50cm deep) – 265m
- **Coir bunding:** 16 bunds
- **Removal or scattered rhododendron and Sitka spruce regeneration:** 80.31ha

GULLY BLOCKING: TIMBER DAM

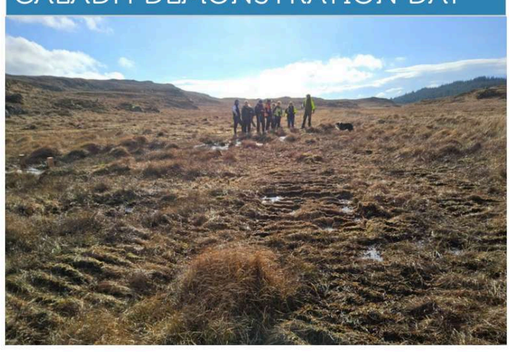
WAVE DAM AND ZIPPING



CONSIDERATIONS WHEN PLANNING RESTORATION PROJECTS

- **Protected species**: surveys, mitigation, licensing and buffer zones where required
- **Bird and habitat monitoring:** at peatland regeneration sites, before and after works
- **Herbivore impact:** assessing deer or livestock pressure and its effect on regeneration
- **Designated or protected sites (e.g. SSSI or Drinking Water Protected Areas):** consultation with relevant body, consents, HIAs and mitigation
- **Archaeology:** screening for features, local authority consultation, following ALGAO guidance
- **Experienced contractors and appropriate resources:** including low-ground-pressure machinery
- **Community engagement:** through agricultural shows, careers fairs, and school sessions
- **Capacity building:** within the local and regional contractor sector – open days and tender writing workshops

CALADH DEMONSTRATION DAY



CHALLENGES AND SUCCESSES

- **Proactive management** and consistent communication with contractors and stakeholders aids smooth delivery
- **Sharing resources**, such as common mapping software, simplifies project management across sites
- Future projects need **more time built in for planning**, prior notification and prior approval consultations
- **Logistics and access** are ongoing challenges when working on islands and remote locations in winter
- **Design flexibility is essential** — ground conditions are never fully known in advance; changes must be documented and offer variations submitted promptly

act Peatland Initiative
argyll & the isles coast & countryside trust
SCIO SC044733

Esmée Fairbairn FOUNDATION

NatureScot NàdarAlba Peatland ACTION

Bog 'Bugs' and Beasties

Beetle and Spider Assemblages of Irish Blanket Bogs: Near-natural Vs. Degraded

Kieran M. Boyd, Dr Guaduneth Chico, Dr Neil Reid and Prof. Jaimie T.A. Dick

1 Background

- **Blanket bogs** are rare, important habitats; however, most are degraded[1].
- Arthropods are the most common animals on bogs[2], yet they are often overlooked and **understudied**[3-5].
- Beetles and Spiders could be used as reliable **indicators** of peatland habitat condition[6-8].
- Lack of research on what '**bugs**' there are and how to utilise them[6,7,9].

Why Beetles and Spiders?

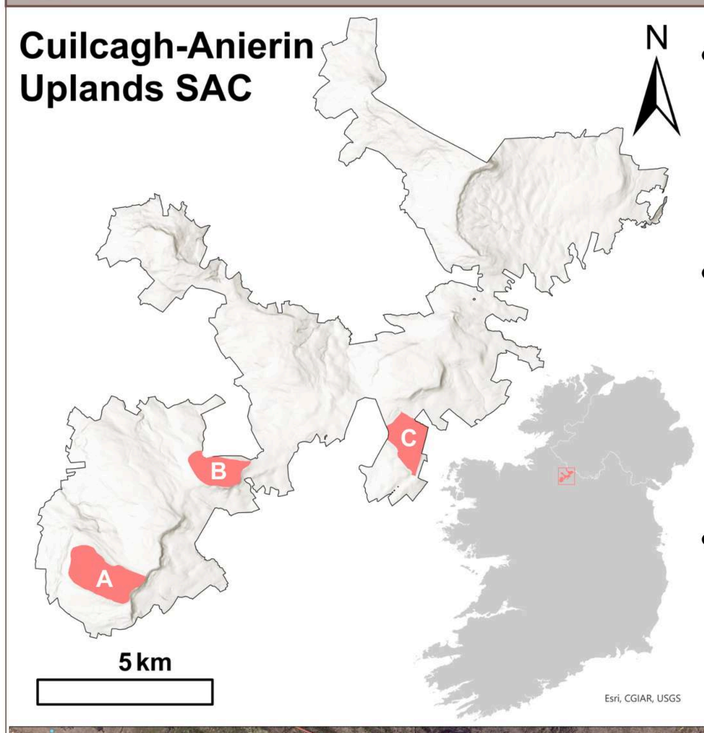
- Very abundant;
- Key predators;
- Prey species;
- **Bioindicators!**

2 Aims

Characterise Beetle and Spider assemblages of Irish blanket bogs.

Compare assemblages between near-natural and degraded areas and identify indicators.

3 Methods



- This study was conducted across three **blanket bogs** within the Cuilcagh-Anierin Uplands SAC (**Fig. 1**).
- Representative **near-natural** and **degraded** areas (**Fig. 1**) were selected for sampling based on vegetation clustering (**Fig. 2**; $p < 0.05$).
- **Pitfall traps** (n = 47; **Fig. 3**) were installed across the sites and collected monthly from May to September 2024.

Figure 1. Maps of the study areas. The top map displays the Cuilcagh-Anierin Uplands Special Area of Conservation (SAC) and the three site locations within. The bottom maps provide a closer look at these sites: (**A**) Slieve Anierin, the primary degraded site; (**B**) Bencroy, the comparison degraded site; and (**C**) Bartonny Lough, the near-natural reference site.

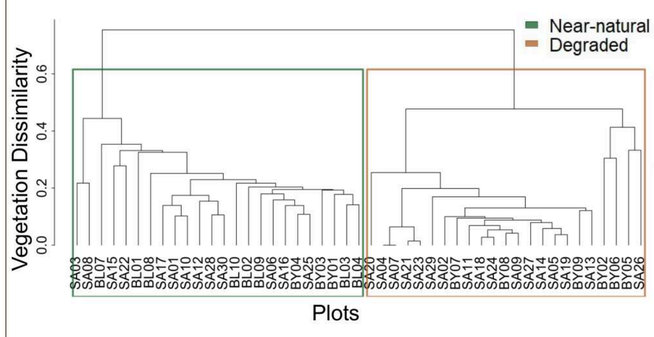


Figure 2. Vegetation cluster dendrogram.

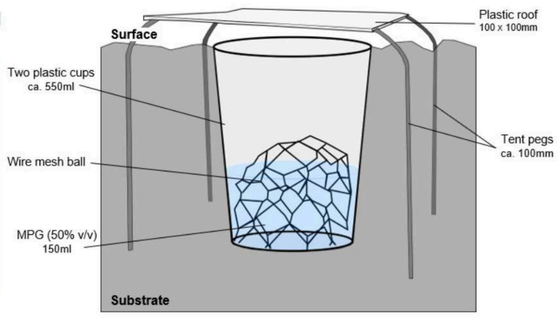


Figure 3. Pitfall trap design used in this study.

- **Spiders** and **Beetles** were then identified to species, where possible.
- Analyses were conducted in RStudio[10] using non-metric multidimensional scaling (NMDS) ordinations with PERMANOVA, PROcrustean Randomization TEST (PROTEST), variation partitioning, and Indicator Species Analysis (IndVal).

4 Results and Discussion

- **3,520 Beetles** (from 103 species) and **1,580 Spiders** (from 80 species) have been identified, comprising four key **families**: Carabidae, Staphylinidae, Linyphiidae, and Lycosidae.

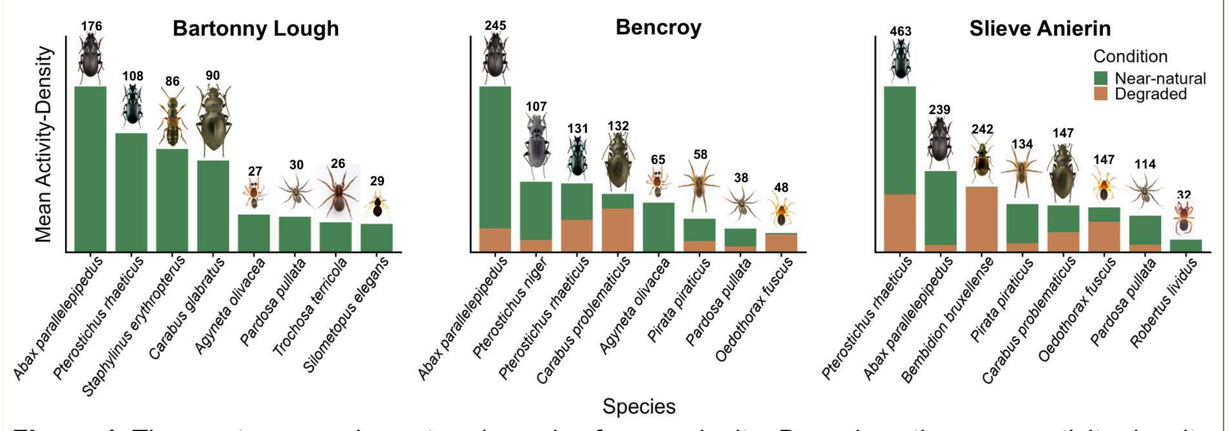


Figure 4. The most commonly captured species from each site. Bars show the mean activity-density per trap. Stacked colours represent peatland condition. Images of the species are provided with the total number of individuals captured overall (for context only).

- Arthropod assemblages differed significantly between near-natural and degraded areas of bog (**Fig. 5**; $p < 0.001$).
- **Vegetation composition** and **habitat structure** explained most of the variation (Spiders = 32%, Beetles = 41%; $p < 0.001$). **Next steps**: assess the relationship between arthropods and water table levels, soil moisture, and weather.

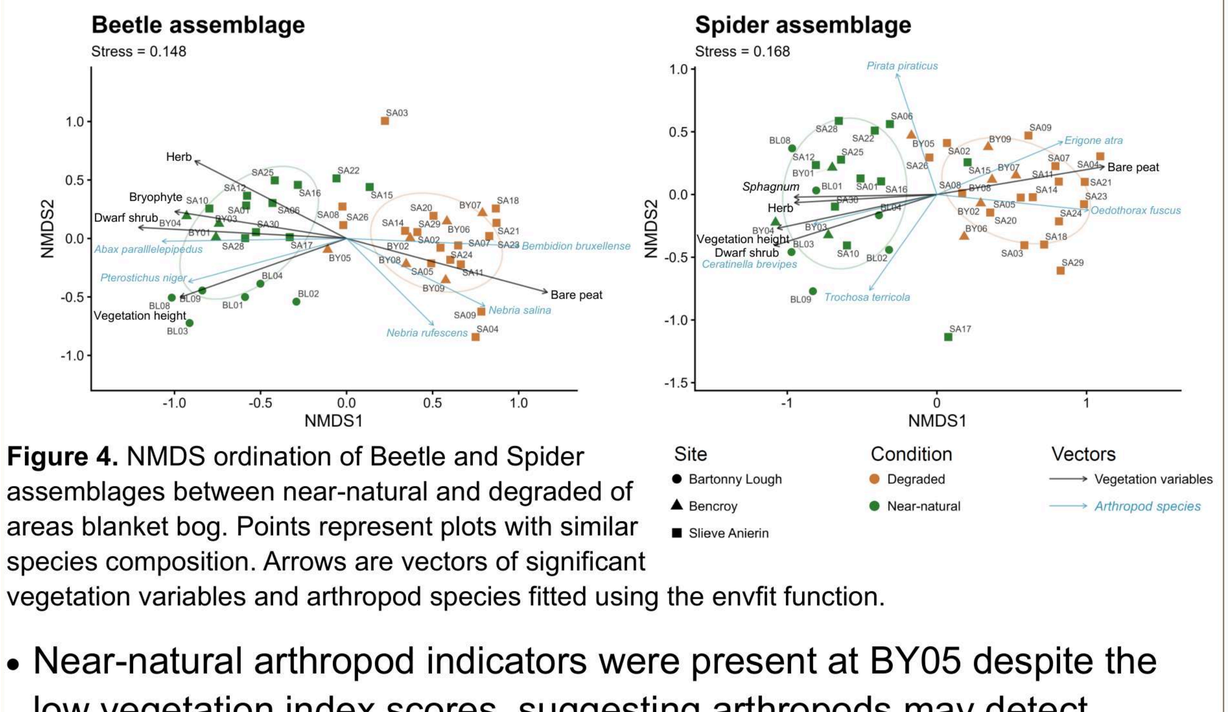


Figure 4. NMDS ordination of Beetle and Spider assemblages between near-natural and degraded of areas blanket bog. Points represent plots with similar species composition. Arrows are vectors of significant vegetation variables and arthropod species fitted using the envfit function.

- Near-natural arthropod indicators were present at BY05 despite the low vegetation index scores, suggesting arthropods may detect ecological change earlier than vegetation indicators (**Fig. 5**; $p < 0.001$).

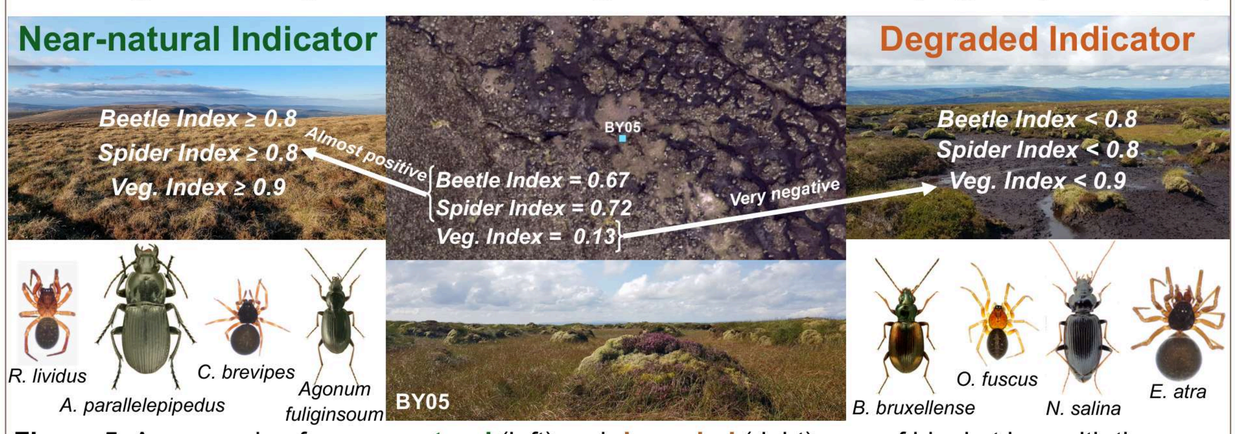


Figure 5. An example of a **near-natural** (left) and **degraded** (right) area of blanket bog with the indicator index scores for Beetles, Spiders, and vegetation and some associated indicator species pictured below ($p < 0.05$). The middle images show an aerial and ground shot of plot BY05.

- In **conclusion**, Beetle and Spider assemblages differ between degraded and near-natural areas and show promise as bioindicators.

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Improving our understanding of peatland restoration:

Mind(ing) the gap between academics, practitioners and stakeholders

Pia Benaud, Dylan Young, Gaby Lopez Gonzalez and Richard Grayson

Blocks to knowledge sharing

Peatlands are globally important ecosystems; their water-logged conditions support unique flora and fauna and deliver valuable ecosystem services. However, in the UK 80% of peatlands are degraded – with highly connected flow pathways, lowered water tables and shifts in vegetation communities – contributing to higher flood risk, increased carbon emissions, impeded drought mitigation and reduced biodiversity value. Peatland restoration seeks to restore ecohydrological function with interventions that disconnect flow pathways, raise water tables and re-establish peat-forming vegetation and ecological niches.

Many peatland partnerships have long-standing, imbedded working relationships between stakeholders, practitioners and academics, providing a unique opportunity for direct knowledge exchange and fostering a culture of best practice. Despite this, barriers to wider knowledge sharing have impacted how peatlands are understood and how restoration is valued. These include:

- Siloed working and knowledge exchange
- Decisions based on narrow evidence bases
- Inaccessible academic research (paywalls + language + statistics)
- Uncertainty around evidence strengths and/or gaps

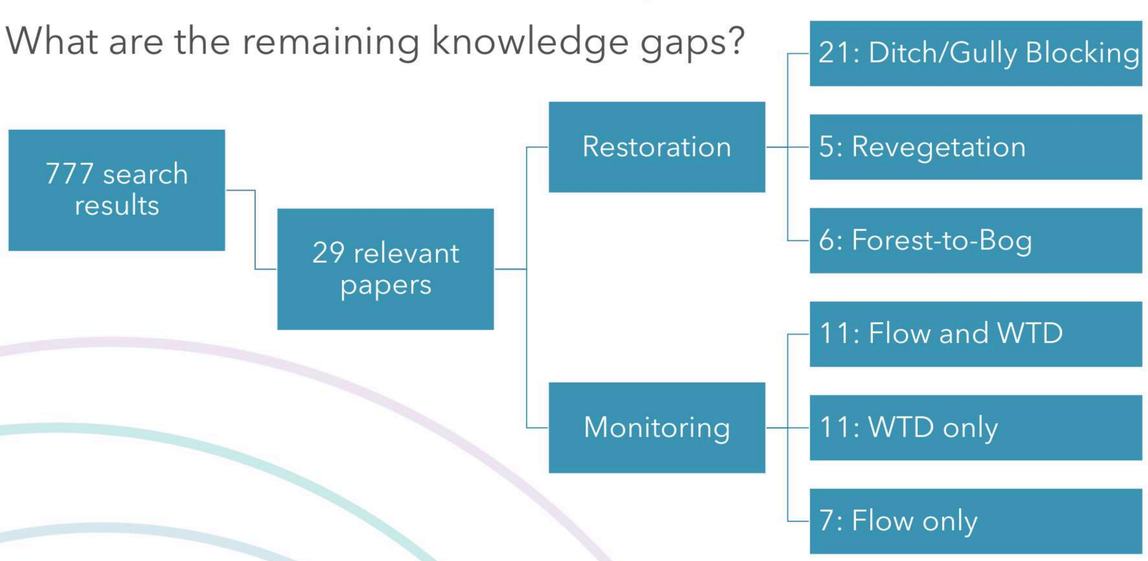
Clarifying academic research:

Nature of evidence and/or gaps

Robust evidence is needed to build confidence in the outcomes of peatland restoration and to drive investment and combat scepticism. Peer-reviewed, published research, based on strong experimental designs, is rightly or wrongly, often vital to this. However, reading academic papers can be challenging due to dense formal language, an abundance of technical jargon, and unwieldy statistical tests and graphs. This creates a barrier to knowledge sharing where important details get lost in translation, while also creating uncertainty around the strengths and/or gaps within the evidence base.

To address this, we are reviewing published literature to produce an open-access resource to support transparency around the nature of the evidence base, focussing on the impacts of peatland restoration on water table depths and rainfall/runoff relationships on blanket bogs in the UK. This seeks to identify:

- Where, what and how has evidence been gathered?
- How consistent is the restoration response?
- What are the remaining knowledge gaps?



Widening the evidence base:

Analysing (lots of) monitoring data

While academic research is often centred in policy decision making, practitioners collect lots of incredible monitoring data to inform their restoration processes and communicate success. To help broaden the evidence base and build support for peatland restoration, we're collating and analysing existing monitoring data from Blanket Bog sites in England.

Our research focuses on understanding how restoration influences water table depth and rainfall/runoff relationships, as early indicators of restoration success and regulators of valuable ecosystem services such as carbon emissions, flood risk and drought regulation. The main questions we will address are:

- How does the hydrological response vary with starting peatland condition, intervention type, distance, topographic position?
- Does restoration improve resilience to climatic conditions such as drought and high rainfall?
- Is there sufficient evidence to build confidence in the outcomes?

Partnerships and academics have contributed lots of data, including over 6 million water table measurements to-date, from over 50 restoration sites. Thanks!

Challenges

- Slow access to data – time needed for partners to collate
- Standardisation – everyone collects and stores data differently
- Short-term datasets and limited continuous monitoring data

Outputs

- Academic publication and plain language summaries shared with the peatland restoration community
- Tool to allow practitioners to extract consistent information from water table depth data
- All data analysis workflows shared open-access for use with open-source software

Improving data shareability:

Peatland (meta)data standards

Collecting and aggregating peatland data from multiple sources is a challenge across the sector. Most scientists and practitioners recognise the value of exchangeable peatland data, but long-established workflows make change difficult.

Our community of practice is working on two things that could be used to address this, available now (open-source, CC BY 4.0) :

- A draft peatland (meta)data standard aligned with existing data ontologies
- Draft Peatland Exchange Tags (PXT), a hashtag-based tagging system inspired by the humanitarian sector's Humanitarian Exchange Language (HXL). Tag your data so it can be exchanged and aggregated, without touching your original datasets or rebuilding your systems

Beyond the proof of concept, our main aim is to engage with the wider peatland community to develop shared approaches to data exchange in peatland science. Please get in touch.

FIND OUT MOOR

Existing data review:
Pia Benaud (P.E.Benaud@leeds.ac.uk)
Data standards:
Dylan Young (D.M.Young@leeds.ac.uk)

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Restoring Oxfordshire's lost fens

Contributors: Ellie MacDonald, David Morris, Adam Bows

Freshwater Habitats Trust

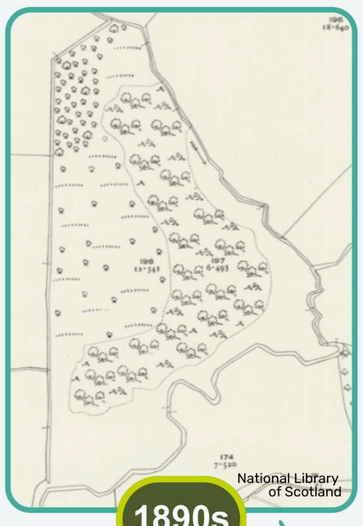
Alkaline fens are fragmented, overlooked, and suffering from lack of management.

Restoration is necessary to reverse succession and bring back biodiversity.

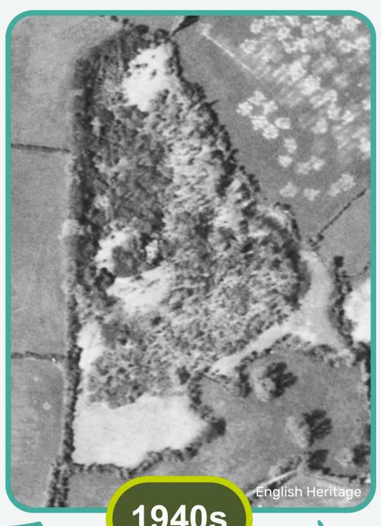
Alkaline fen restoration in action

Identifying fens in the landscape

Using historic maps and aerial photos we can locate and identify degraded fen habitats.



1890s → Historic maps



1940s → Historic aerial photos

Present Day → Satellite imagery

Bringing species back

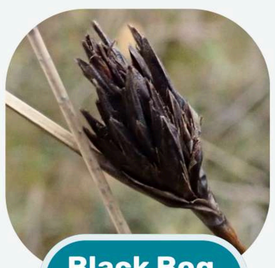
Alkaline fens support some of the richest plant and animal assemblages in the country, including many rare and threatened species.

Brown Mosses

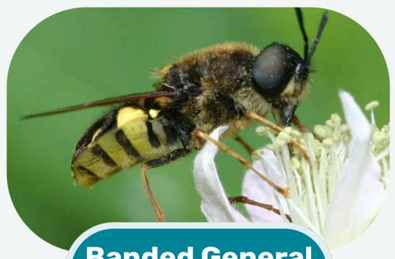
Long-stalked Yellow Sedge

Southern Damselfly

Grass-of-Parnassus



Black Bog Rush



Banded General Soldierfly

Bog Pimpernell

Marsh Helleborine

Our work in Oxfordshire is helping to restore alkaline fen habitat and bring these species back.

How we are restoring Oxfordshire's alkaline fens

Reversing succesion

Remove trees and rank vegetation.

Spread Marsh Lousewort - a hemiparasite and ecosystem engineer.

Tree felling

Rebuilding vegetation

Establish characteristic and specialist plants with limited recolonisation potential.

Scything reed

Marsh Lousewort

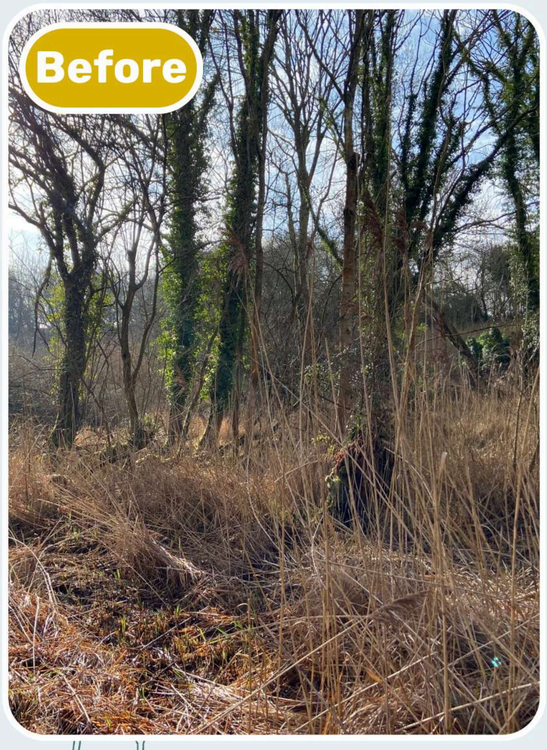
Brown Moss translocation

Hay from a donor fen

Sustainable management

Introduce grazing or continue cut and collect.

Livestock grazing



Before

After

Restoration success

8.9ha of alkaline fen habitat is being actively restored in Oxfordshire.

After eight years of restoration at Hinksey Heights Fen, there has been a **nine-fold** increase in plant diversity.

Find out more: freshwaterhabitats.org.uk

Contact us: info@freshwaterhabitats.org.uk

Agricultural peatland restoration for Green Transition:
A Danish case-study

SEGES INNOVATION

F.P. Eller[1], A.E. Hertz[1], E.S. Læsøe[1], F. Bondgaard[1], R.R. Graversen[1], T.S. Jensen[1], M.M. Nielsen, D.H. Zak[2]

[1]SEGES Innovation P/S, Crops & Environment, Aarhus, Denmark; [2] Aarhus University, Department of Ecoscience, Catchment Science and Environmental Management

STØTTET AF
Promilleafgiftsfonden for landbrug

Background

In 2024, the Danish government and key agricultural and nature stakeholders reached a historic **Agreement on a Green Denmark** to enhance nature, improve water quality, and support a sustainable agricultural transition. A core element is a CO_2e tax on emissions from drained peat soils, combined with funding to retire these areas from production. Denmark aims to restore 140,000 ha of drained peatlands and surrounding areas by 2030 (Fig. 1).

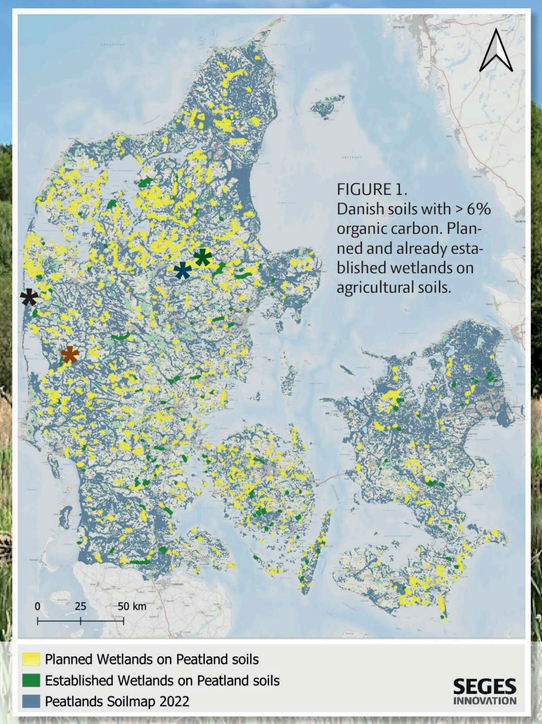


FIGURE 1.
Danish soils with > 6% organic carbon. Planned and already established wetlands on agricultural soils.

Aim

This project aims to identify the optimal process for peatland restoration in Denmark—from planning through post-rewetting. Using case studies and scientific literature, we develop a model for land use and management that **maximizes biodiversity**, **nutrient removal**, and **greenhouse-gas reduction** after restoration.

Literature review

Preliminary findings show the effects of different measures (e.g. top soil removal, encroachment, etc.) on biodiversity increase, nutrient reduction, and greenhouse gas emission reduction.

	Nutrient removal		Reduction of greenhouse gas emissions			Biodiversity				
	N	P	CO_2	CH_4	N_2O	Vascular plants	Bryophytes	Arthropods etc.	Birds	Fungi
On former agricultural land, continued nutrient input after rewetting										
Top soil removal										
Biomass harvest										
Encroachment										
Seasonal grazing										
Year-round grazing										
On former agricultural land, little or no nutrient input after rewetting										
Top soil removal										
Biomass harvest										
Encroachment										
Seasonal grazing										
Year-round grazing										

Large positive/desired effect
Minor positive/desired effect
No effect
Negative effect
Not established

Barriers to efficient restoration

- Nutrient pollution difficult to handle
- No well developed market for harvested biomass
- Governance and management after restoration are unclear and not sustainably financed
- Water tabel level is not controlled
- Biodiversity is not actively enforced
- Legislation can be a hindrance.

Workshops with landowners

Often after restoration, multiple landowners manage the area. How can they best collaborate to achieve optimal ecological and economic benefits?

Landowner interests:

- Financial compensation
- Use of area for hunting
- Low risk and responsibility

Discussion of peatland project areas with farmers

Extensive year-round grazing as post-restoration management example:

Conventional governance model

Alternative government model– Landowners' association:

Conventional governance model

Case studies in recently rewetted areas

In these areas, top soil removal or annual biomass harvest are measures to reduce the soil nutrient content (Fig. 1, 2).

✱ Vosborg Enge (VB) ✱ Vejrumbro (VRB) ✱ Strande Enge (SE) ✱ Kvorning Enge (KE)

Topsoil removal before rewetting is a promising restoration measure to enhance plant biodiversity and remove nutrients. Biomass harvesting is efficiently removing nutrients and problematic species. Both methods are effective, but topsoil removal is represented with few replicates (Fig. 2, 3).

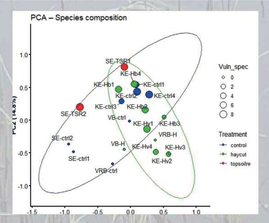


FIGURE 2. PCA of vegetation data in rewetted plots with annual biomass harvest (haycut), topsoil removal, or no treatment (control).

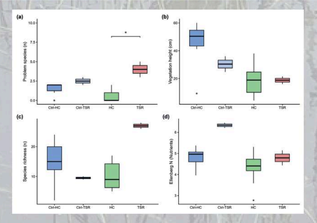


FIGURE 3. Number of problematic species (a), vegetation height (b), species richness (c) and Ellenberg N (d) in rewetted plots with annual biomass harvest (haycut, HC), topsoil removal (TSR), or no treatment (Ctrl). Kruskal-Wallis and Dunn post-hoc test (Bonferroni corrected).

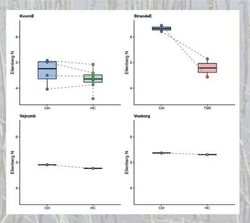


FIGURE. 4. Ellenberg N in rewetted plots with annual biomass harvest (haycut, HC), topsoil removal (TSR), or no treatment (Ctrl).