



What's the Story with our Bogs?

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Cooperative Society Ltd

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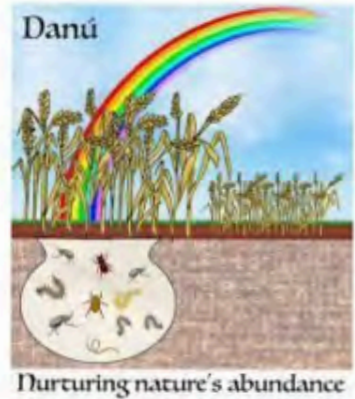
1st October 2021





NORTH PENNINES

Area of Outstanding Natural Beauty



burren**beo**trust
connecting people and place



Green Restoration Ireland coop: Background

Not for profit, not for charity but for service

- ▶ Founded in 2019 & a member of ICOS
- ▶ Support rural development through actions including preparation for offsetting which generate income through *restoration* of our natural landscape
- ▶ Members include:
 - ▶ Citizens
 - ▶ Farmers
 - ▶ Scientists
 - ▶ Activists
 - ▶ Business people
- ▶ Practical, community-oriented solutions based on scientific data



What is peat?

- ▶ Peat forms when dead plant material is so waterlogged that the usual process of rapid, oxygen-fuelled decomposition is unable to take place
- ▶ Plant fragments steadily accumulate in-situ to form a waterlogged mass of organic material or 'peat'
- ▶ Water the key ingredient for all peatlands
- ▶ Often >90% water



What's the state of our peatlands?

- ▶ Approx 1.5 M hectares of peatlands or 21% of our land area
- ▶ 80,000 hectares are Bord na Mona lands (5% of total)
- ▶ NPWS responsible for 41,000 hectares (about 3%)
- ▶ Coillte owns 230,000 hectares (about 15%)
- ▶ Assume the remaining 77% (about 1.2 M hectares) in hands of farmers and landowners
- ▶ 16% peatlands are in Natura 2000 network



What's the state of our peatlands?

- ▶ 270,000 hectares (about 17%) are natural peatlands
- ▶ Cutover bog is about 39% or 610,000 hectares
- ▶ 19% or about 300,000 hectares is afforested
- ▶ 295,000 hectares of converted peatlands (pasture) or around 19%



What's the state of our peatlands?

- ▶ In total > 1,200,000+ hectares of degraded peatlands
- ▶ >80% degraded peatlands



How much carbon is there?

- ▶ Estimated at about 1.5 billion tonnes
 - ▶ = 53% of our soil carbon
- ▶ For comparison, this is about 4-5 *times* that stored in our forests

Why so much?

- ▶ Low productivity
- ▶ Weather-dependent (climate change risk)
- ▶ Accumulating for thousands of years



How much carbon is there?

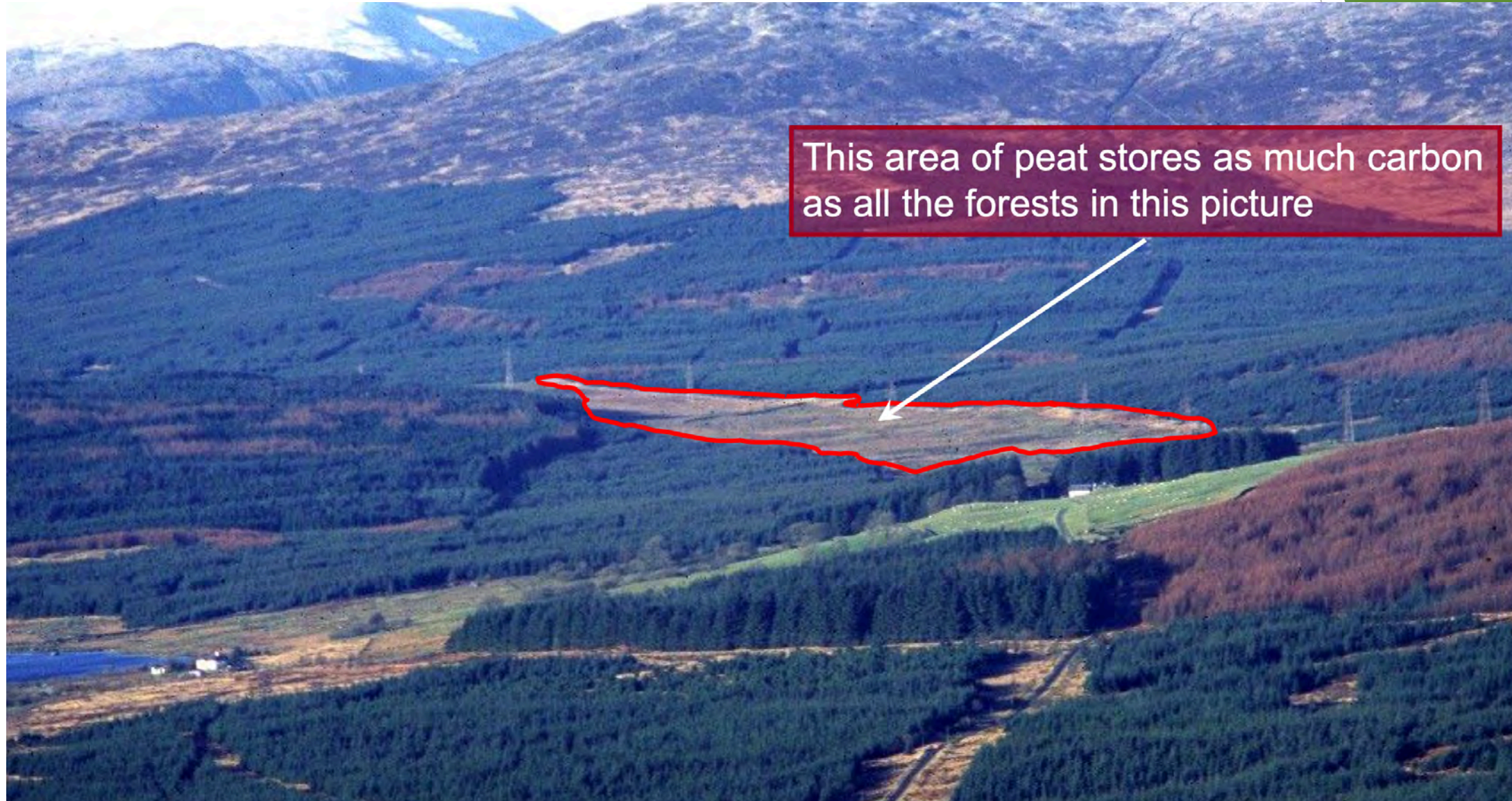
- ▶ How much in 2 metres+ of peat?



How much carbon is there?

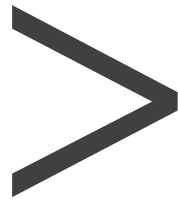
- ▶ In fact, 10-15 cm depth equivalent to amount of carbon in e.g. a Yield Class 16 conifer plantation
- ▶ So 2 metres+ can store >1000 tonnes C
 - ▶ or
- ▶ about 20 times the carbon of a similar land area of forest

How much carbon is there?



How much carbon is there?

- ▶ 4m+ peat = 2000 tonnes+ per hectare
- ▶ Equivalent to or greater than giant redwood forests of California



- ▶ *If our bogs were woodlands they would tower 100m and higher above us*



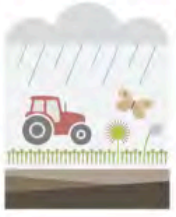
Do trees and peat go together?

- ▶ 19% / 300,000 ha afforested
- ▶ All about water - ditched and drained
- ▶ Also trees planted on peat act as giant wicks
- ▶ Evapo-transpire tens of thousands of litres of water per year
- ▶ Dry out peat and hastens degradation and release of GHGs, DOC etc



Emission rates

- ▶ Farmed peatland emits CO₂ at about 8-20 tCO₂e/ha/year emitting > 3 million tonnes CO₂/year
- ▶ Afforested peatland about 4.5 tCO₂e/ha/year emitting > 1.3 million tonnes CO₂/year



FarmPEAT

Results based payments

Hen Harrier Project



BRIDE Project
Farming with Nature



How do RBPs work?

- ▶ Results-based payment scheme where farmers will have each habitat on their farm assessed and scored, with higher quality habitats gaining higher payments
- ▶ *Before & after* scientific measurements to quantify environmental benefits
- ▶ New technologies and analytical approaches
- ▶ Farmer-friendly technologies





Green Deal

Nationale Koolstofmarkt

PEATLAND
CODE 

Offsetting Models for Verification

VM0036

Methodology for Rewetting Drained Temperate
Peatlands



**Moor
Futures**

Ihre Investitionen in Klimaschutz.

Offsetting Principles

- ▶ *Voluntary* market not ETS
- ▶ Baseline scenario
- ▶ Additionality
- ▶ Leakage
- ▶ Permanence
- ▶ Monitoring, Reporting & Verification (MRV)
- ▶ *Transparency*

Baseline for unrestored drained peatlands?

- ▶ Peat acts like a sponge and drained peat shrinks and oxidises
- ▶ How much will it shrink by?



Baseline for unrestored drained peatlands?

- ▶ Holme Fen Post in Whittlesey Mere
- ▶ Top represents the level of the land in 1848
- ▶ 22 feet of peat oxidised to 8 feet



Baseline for unrestored drained peatlands?

- ▶ Fire and increased GHG emissions
- ▶ Accelerated degradation & no pathway to restoration



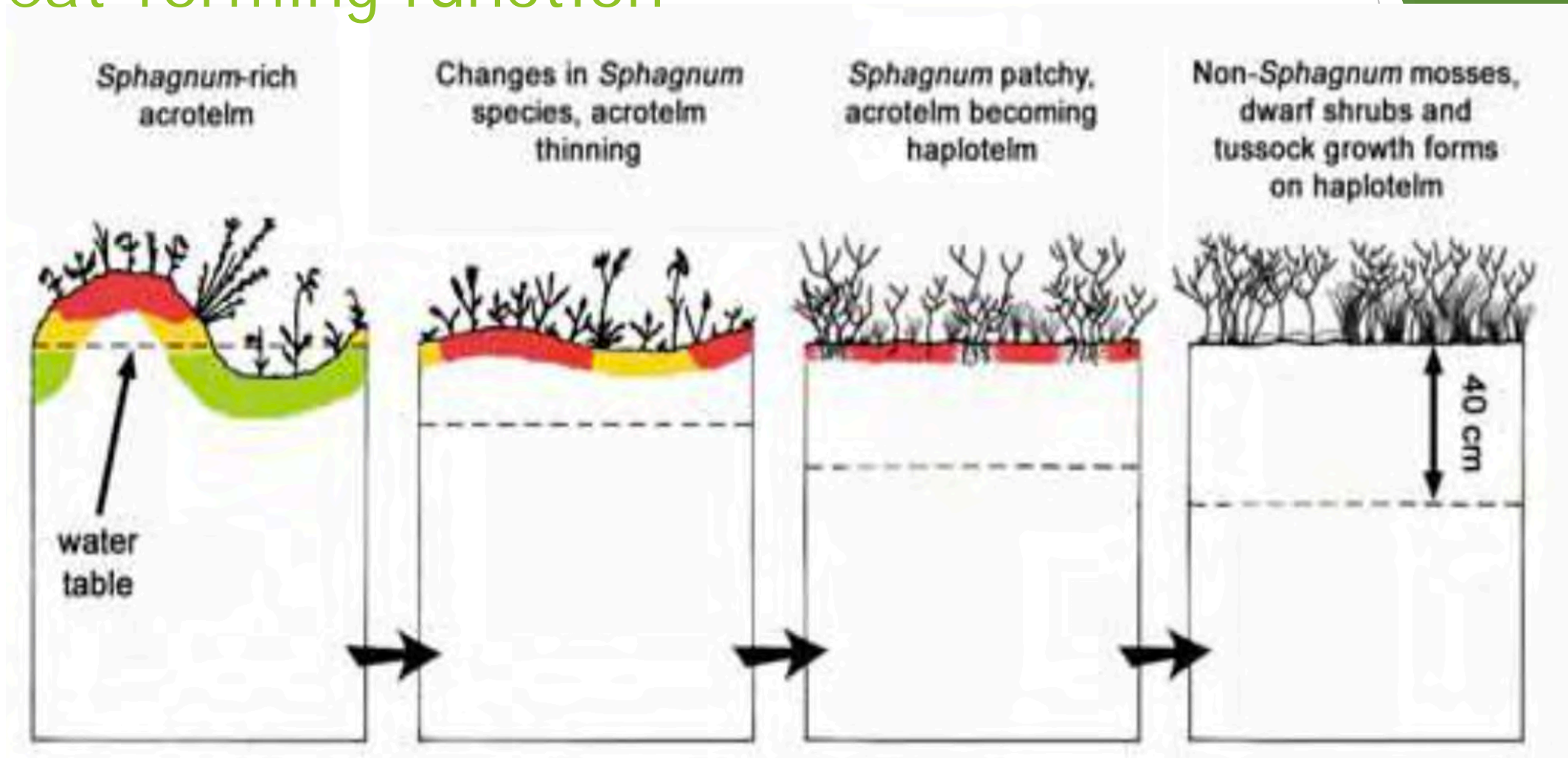
Approach

- ▶ MoorFutures basis for UK's *Peatland Code*
- ▶ Established relationships between peatland vegetation types and measured GHG fluxes
- ▶ Identify Greenhouse gas Emission Site Types (GESTs) and derive *standard* values for GHG fluxes
- ▶ Use standard values to calculate GHG *avoided emission savings* for proposed restoration projects
- ▶ Back-selling not future-selling - safer bet

Development Criteria

- ▶ Scientifically credible
- ▶ Robust (conservative includes uncertainties)
- ▶ Practical (i.e. can be performed by competent trained individuals)
- ▶ Repeatable and suitable for monitoring (clear protocol)
- ▶ Built around an understanding of ecosystem processes
- ▶ Need same process to adapt / develop an *Irish Wetland Code*

Defines Ecosystem *states* in relation to peat-forming function



1. Intact

2. Moderately degraded

3. Highly degraded

4. Severely degraded & eroding

Peatland Code Emission Factors

Peatland Ecosystem State	Plant functional types	Emission Factor (tCO ₂ e/ha/yr)
1. Intact	Peat-forming <i>Sphagnum</i> mosses	1.08
2. Moderately degraded / modified	Non-shunt species Shunt species	2.54
3. Highly degraded / Severely degraded & eroding	Dwarf shrubs / bare peat	23.84
4. Artificially drained	Presence of artificial drainage channels 15-20 m apart	4.54

Dutch Code Emission Factors

The relationship between groundwater level and CO₂ emissions alone is shown below [Fritz, C. et al. 2017].
(Note: CH₄ and N₂O emission not included, these are shown in Table 1)

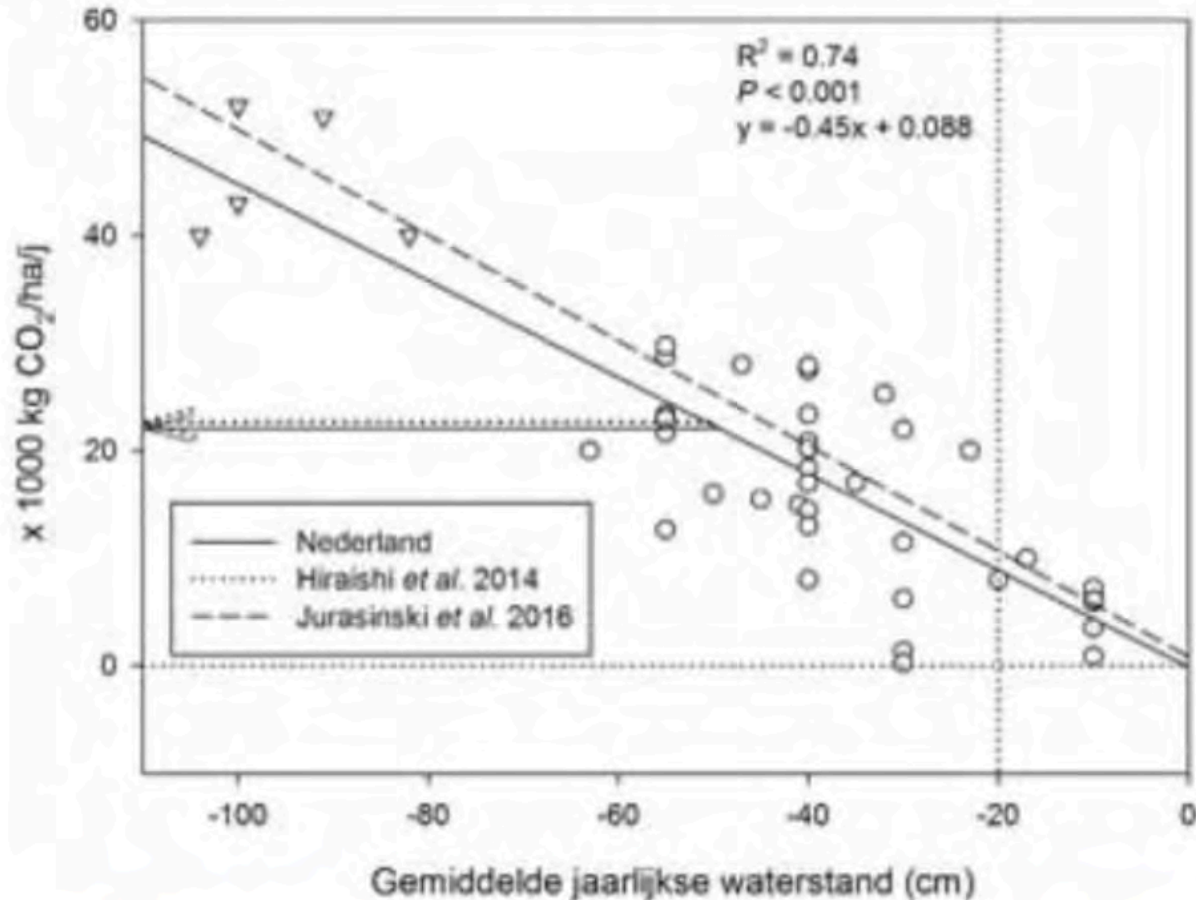
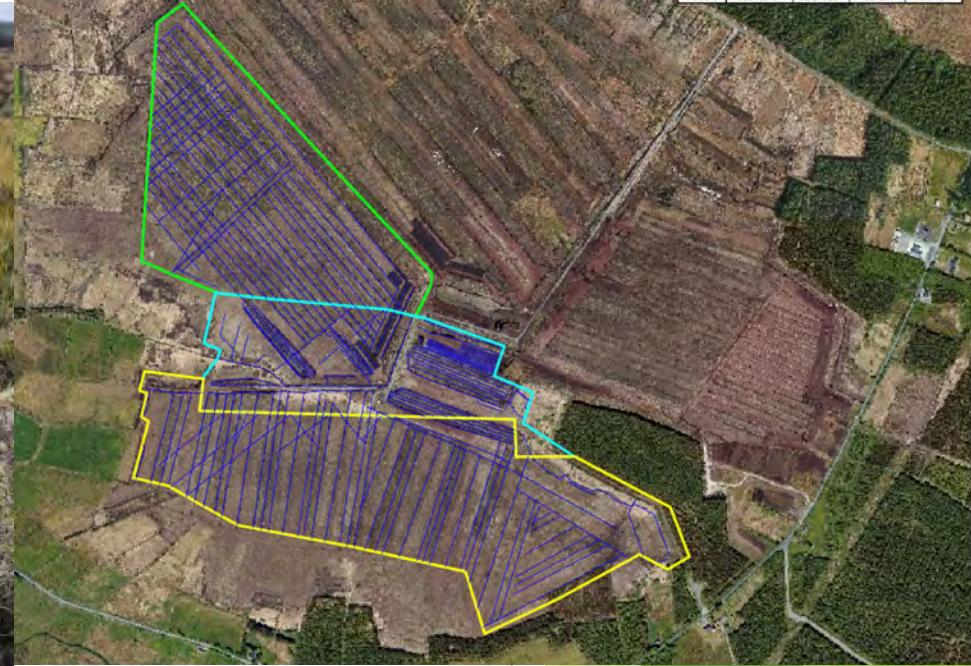



Figure 2. Relationship between groundwater level (x-axis) and CO₂-emissions (y-axis)

First Rewet at
Lackaduff Bog
29/9/21
(T. McGovern owner)



The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. These shapes are primarily located on the right side of the slide, creating a modern, layered effect. The text is centered on the left side of the slide.

Other Issues & Ecosystem Services

Into the waters

- ▶ Decomposing peat is also lost as Dissolved & Particulate Organic Carbon
- ▶ Between 0.17 and 0.26 tonnes DOC / hectare / year
- ▶ Also nutrients (ammonia, nitrates) in the peat
- ▶ Peat solids if bare peat exposed to elements

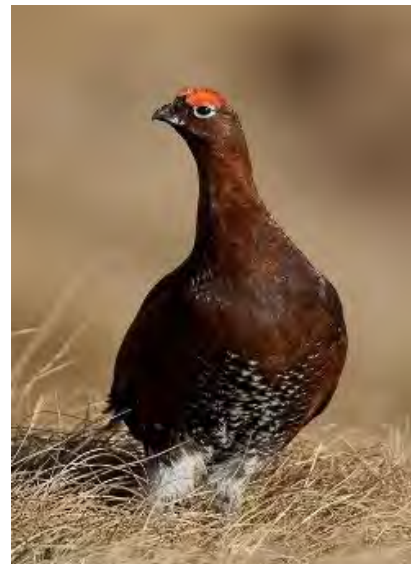


Flood control

- ▶ Intact peatlands act as sponges
- ▶ Reduced water storage capacity where drained
- ▶ Increases severity of floodwater events

Biodiversity

- ▶ Ireland has 50% of remaining raised bog in western Europe
- ▶ Fens most threatened habitat in Ireland only about 20,000 hectares
- ▶ Some of our most threatened /rapidly declining wildlife makes a home on bog, fen and callow / wet grassland e.g. corncrake, curlew, lapwing, marsh fritillary etc.



Possible solutions to control GHG emissions

- ▶ Some form of rehydration involved:
 - ▶ Full rewetting and restoration to bog, fen or wet grassland
 - ▶ Partial rewetting

Possible solutions to control GHG emissions

- ▶ Some form of rehydration involved:
 - ▶ Paludiculture = 'wet agriculture' - productive land use of wet peatlands that stops subsidence and minimises emissions by cultivating crops that are adapted to high water levels, e.g. reed, cattail, common alder, peat mosses and fodder grasses (see DPPP)



Adjacent lands issue

- ▶ Rye-grass monoculture has poor water infiltration capacity
- ▶ Multi-species swards
- ▶ Mob grazing



THANKYOU FOR YOUR ATTENTION!



For more information email us at
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(Information will soon be available at www.farmcarbon.ie
and www.greenrestorationireland.coop)