Identifying the priority evidence gaps in the sustainable management of peatlands

Jonathan Walker, Swansea University

Cindy Froyd, Swansea University

Marian Pye, Snowdonia National Park Authority

Pete Jones, Natural Resources Wales

Chris Evans, Centre for Ecology and Hydrology

Alan Radbourne, Centre for Ecology and Hydrology

Welsh Peatlands Sustainable Management Scheme

Cindy Froyd

Swansea University

SMS Mawndiroedd Cymru
Welsh Peatlands SMS

Cynllun Rheoli Cynaliadwy - *Sustainable Management Scheme*

What?

- £1m Wales-wide partnership project funded by the Welsh Government and European Union (Dec 2017 - 2020)

Why?

- To help achieve the Ministerial ambition of bringing all of Wales' peatlands into sustainable management by 2030
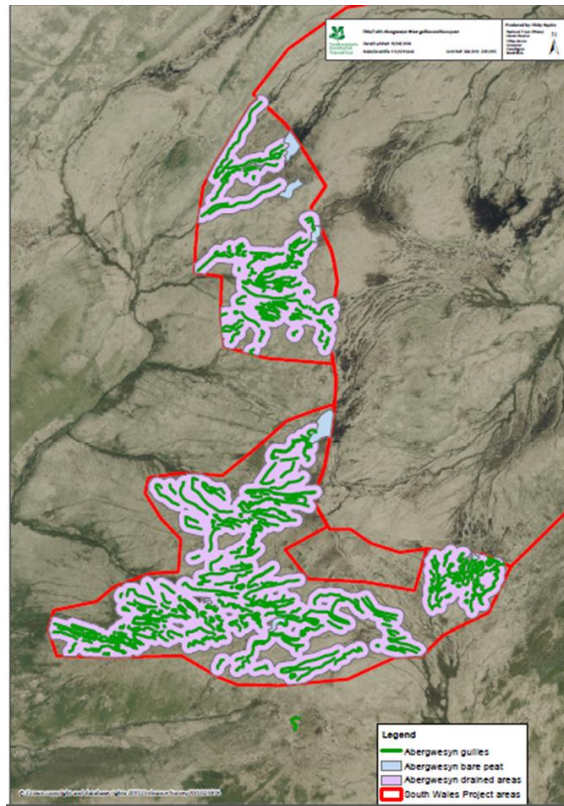
How?

- Collaborative action and developing more coordinated approaches to funding, training, education, monitoring and research

SMS Mawndiroedd Cymru
Welsh Peatlands SMS

Identifying & assessing
priority sites for action...

...developing, testing & promoting
PES mechanisms

SMS Mawndiroedd Cymru
Welsh Peatlands SMS

Enabling national scale **monitoring** &
Building **research** capacity

Engaging **local communities**

Developing **accredited training**
to ensure **best practice**

Welsh Peatlands: Building Research Capacity

1. Promote cross-institutional, interdisciplinary research programmes focusing on peatland resources and management in Wales
   - Understanding Welsh peatlands
   - Linking to national / international level research and management questions
   - Welsh sites as reference sites for some habitat types
2. Ensure that the sustainable management of Welsh peatlands is underpinned by a robust evidence base
3. Compile existing information (publications, grey literature, long-term monitoring sites) in an openly available and searchable database
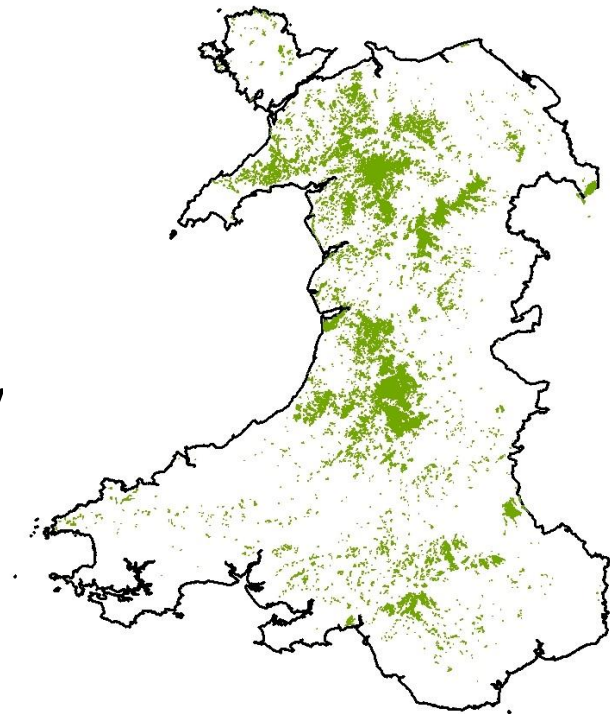
Welsh Peatlands: Building Research Capacity

4. Matching university student projects with identified management questions
5. Identify the priority evidence gaps
6. Establish a network of research and monitoring observatories across Welsh peatlands
7. **Build a research network (scientists, managers people working on / interested in Welsh peatland**
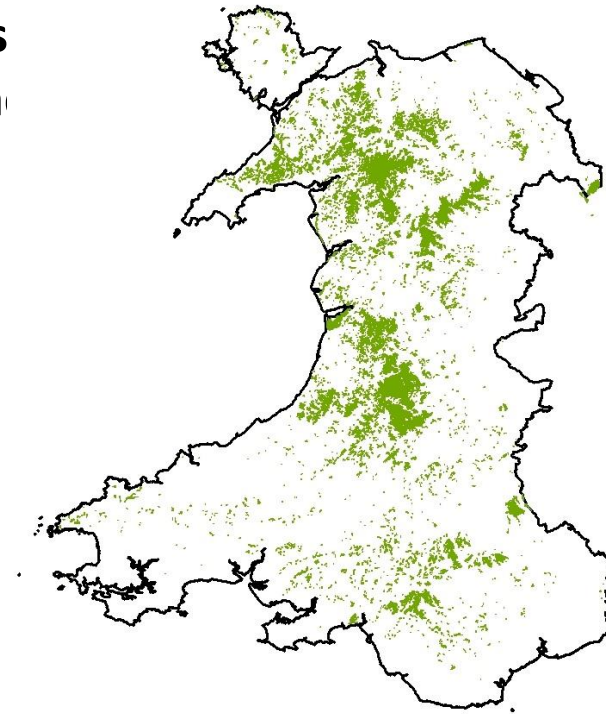
What are the peatland evidence gaps that addressing would enable the delivery of more, better planned, and more effective sustainable peatland management?

Jonathan Walker

Swansea University

Outcomes may include:

- Generating new evidence or justification for new policies, financial investment / funding mechanisms

- Removing barriers caused by concerns / ambiguity about what sustainable management is, how to do it, or its potential impacts (good and bad) for different outcomes / interests

- More efficient and effective, even new, land management techniques.

Sustainable peatland management

Sustainable management of natural resources is defined in the Environment Act (Wales) 2016 as:

"using natural resources in a way and at a rate that maintains and enhances the resilience of ecosystems and the benefits they provide. In doing so, meeting the needs of present generations of people without compromising the ability of future generations to meet their needs, and contributing to the achievement of the well-being goals in the Well-being of Future Generations Act (2015)."

"Land use and proactive management that protects the peatland resource and meets the needs of current society for priority peatland ecosystem services without compromising the ability of future generations to meet their own needs."

Reed et al. 2010 *Policy Options for Sustainable Management of UK Peatlands.* Report to IUCN UK Peatland Programme Commission of Enquiry.

Sutherland, W.J., Fleishman, E., Mascia, M.B., Pretty, J. & Rudd, M.A. (2011)
Methods for collaboratively identifying research priorities and emerging issues in science and policy.
Methods in Ecology and Evolution, 2, 238–247.

Payne, R.J. & Jessop, W. (2018)
Key research questions for UK afforested peatlands.
Mires and Peat 21, Article 22, 1–13.

Phase 1: Identification of participants	Canvas opinions and suggestions from project team	
Phase 2: collection of long-list of questions/ evidence	Q1: Short 'research questions' Questionnaire	Q2: Follow-up Questionnaire: a) policy b) practice c) research
Phase 3: Rationalization of questions		
Phase 4: Collect questions / evidence gaps long-list	Community voting on questions to establish priorities	
Phase 5: Final list of research priorities	compilation of the final list of questions and dissemination	

What are the evidence gaps in the sustainable management of Welsh peatlands?

The Welsh Government is funding a peatland sustainable management scheme that runs until August 2020. This project was developed by the Welsh Peatland Action Group - a broad partnership of statutory and NGO organisations with an interest in Welsh peatlands. As part of this project Swansea University are leading on a work package that aims to identify the priority evidence gaps that need to be filled to better deliver sustainable management of our Welsh peatland resource. We are seeking to compile and prioritise our evidence gaps on Welsh peatlands that the community of Welsh peatland policy makers, land owners and managers, and scientists need to address to deliver more and higher quality sustainable management of Welsh peatlands. These questions could be broad or very specific; in fact, can relate to anything to do with peatlands; for example: • peat soils, hydrology, soil microbes, plant communities, animals that peatland habitats support • peatland functioning and processes that enable this • funding and economic benefits of delivering sustainable peatland management • the benefits peatlands provide society (ecosystem services) - and impact of management interventions • how peatlands are used by people and wildlife • the effectiveness and efficacy of current 'best-practice' management techniques • threats to and resilience of Welsh peatlands.

The outcomes of identifying and answering your evidence gaps may include: • generating new evidence or justification for new policies, financial investment / funding mechanisms • removing barriers caused by concerns / ambiguity about what sustainable management is, how to do it, or its potential impacts (good and bad) on different outcomes / interests • informing more efficient and effective, even new, land management techniques.

There's no such thing as a stupid question (all questions and outputs from this work are anonymised). Even if your question has already been answered it will highlight information that has not been appropriately communicated.

* Required

1. **What is your peatland question / evidence gap that answering would enable you to undertake, better plan, deliver more or more effective sustainable peatland management?** *

   If you have more than one question, please add your questions in order of your priority.
   You can enter up to 10 questions on this form - if you have >10 questions please start a new form.
   The character limit in each text box is 4,000 including spaces.

   Enter your answer

What is your peatland question / evidence gap that answering would enable you to undertake, better plan, deliver more, or more effective, sustainable peatland management?

Please tell us why this question is important to you?

Welsh Peatland Observatory Network

Jonathan Walker, Swansea University

Cindy Froyd, Swansea University

Marian Pye, Snowdonia National Park Authority

Pete Jones, Natural Resources Wales

Chris Evans, Centre for Ecology and Hydrology

Alan Radbourne, Centre for Ecology and Hydrology

Overview of the Network

- Network of research and monitoring observatories across Welsh peatlands; encompasses:
- Broad monitoring network using standardised monitoring methods across Welsh peatlands in collaboration with partners
- Subset of research observatories to focus research resources to more efficiently and effectively build the peatland evidence base
- Answer 'peatland' evidence gaps on Welsh peatlands
- Act as reference sites or condition types to UK/international scale studies
  - near natural reference sites; e.g. fens
  - near natural blanket bog at 'Welsh' latitudes

Peatland Trajectory

Fit   95% Confidence Limits   - - - - - 95% Prediction Limits
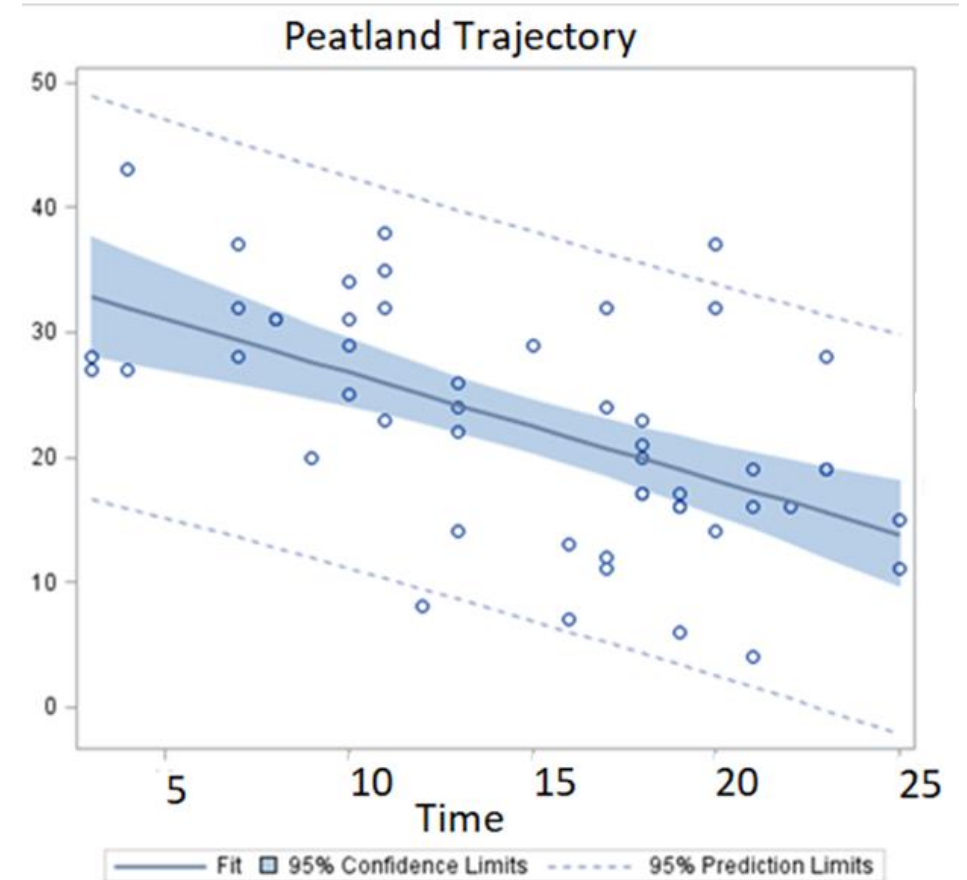
Scientific scope of the network

- Informed by evidence gap survey and prioritisation exercise

- Nothing ruled out…..

- Initial focus:
  - Carbon
  - Water
  - Biodiversity

Peatland typology

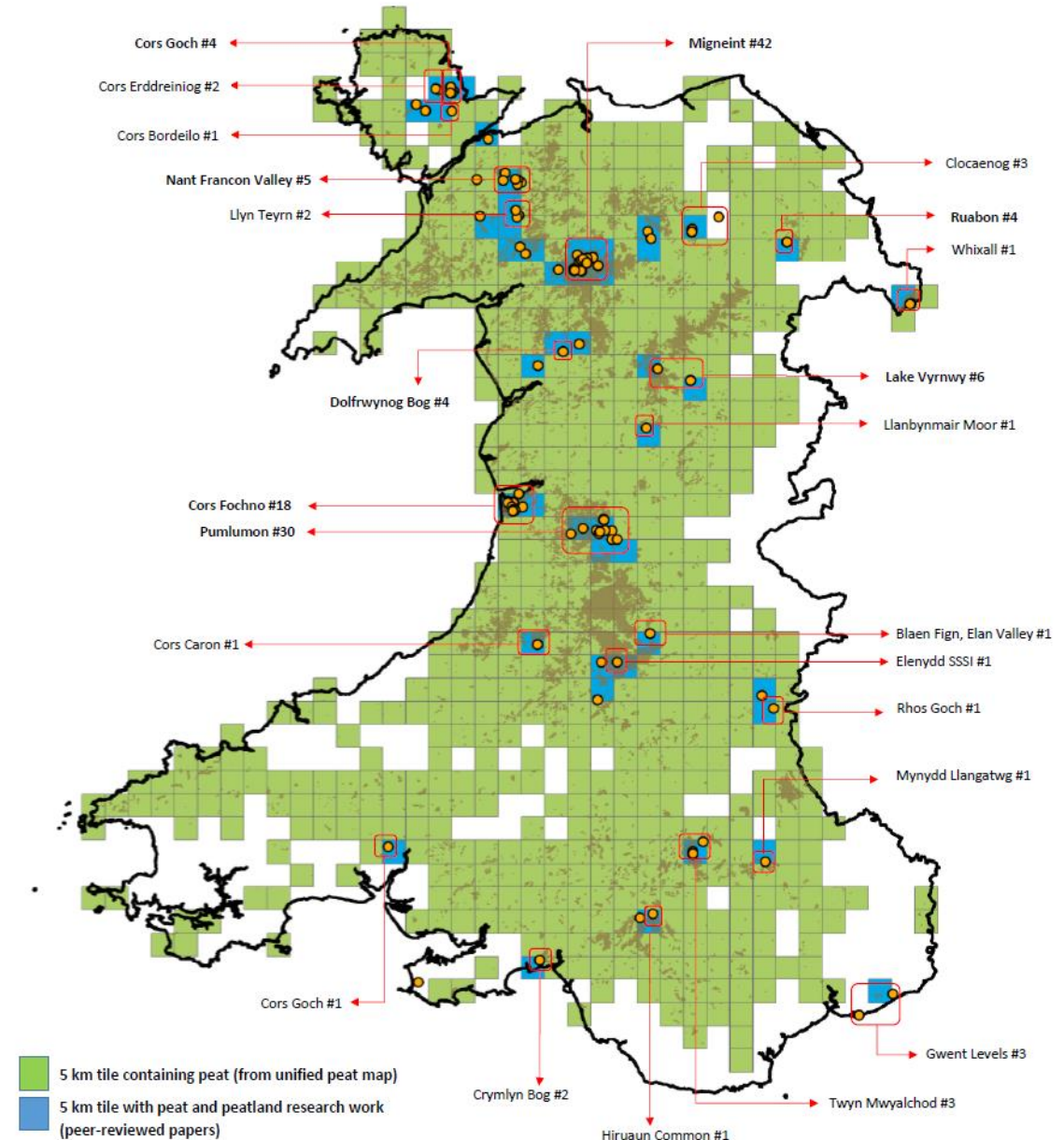Peatland typologies to include:

- Lowland raised bog -
  - Near natural
  - Agricultural grassland
- Blanket bog
  - *Near natural*
  - *Modified (semi-natural)*
  - *Molinia caerulea* dominated
  - Commercial afforestation
- Transition mires and quaking bogs
- Alkaline fens
- Calcareous fens

M. Bailey / NRW

Identifying observatories

- Review of scientific literature to identify key research sites (who, what, where)

- ?PhDs and long-term monitoring

- Existing infrastructure (e.g. ECBN)

- represent drivers of change in peatland condition and environmental clines of significance

Cors Goch #4

Cors Erddreiniog #2

Cors Bordeilo #1

Nant Francon Valley #5

Llyn Teyrn #2

Dolfrwynog Bog #4

Cors Fochno #18

Pumlumon #30

Cors Caron #1

Migneint #42

Clocaenog #3

Ruabon #4

Whixall #1

Lake Vyrnwy #6

Llanbynmair Moor #1

Blaen Fign, Elan Valley #1

Elenydd SSSI #1

Rhos Goch #1

Mynydd Llangatwg #1

Gwent Levels #3

Cors Goch #1

Crymlyn Bog #2

Hiruaun Common #1

Twyn Mwyalchod #3

5 km tile containing peat (from unified peat map)

5 km tile with peat and peatland research work (peer-reviewed papers)

Welsh Peatlands in a UK Context

Jonathan Walker

Swansea University

UK Peatland Extent

Key	
Deep peat (continuous coverage)	Red
Shallow peat soils (mosaic peatland habitat)	Green
Wasted deep peat soils	Yellow

Land cover with shallow and deep peat soil (%)	
England	10.9
Wales	20.7
Northern Ireland	24.6
Scotland	72.3
UK area cover	32.9

Evans, C., Artz, R., Moxley, J., Smyth, M-A., Taylor, E., Archer, N., Burden, A., Williamson, J., Donnelly, D., Thomson, A., Buys, G., Malcolm, H., Wilson, D., Renou-Wilson, F. (2017).
Implementation of an emission inventory for UK peatlands. Report to the Department for Business, Energy and Industrial Strategy, Centre for Ecology and Hydrology, Bangor.88pp.

IUCN UK Peatland Programme (2018)
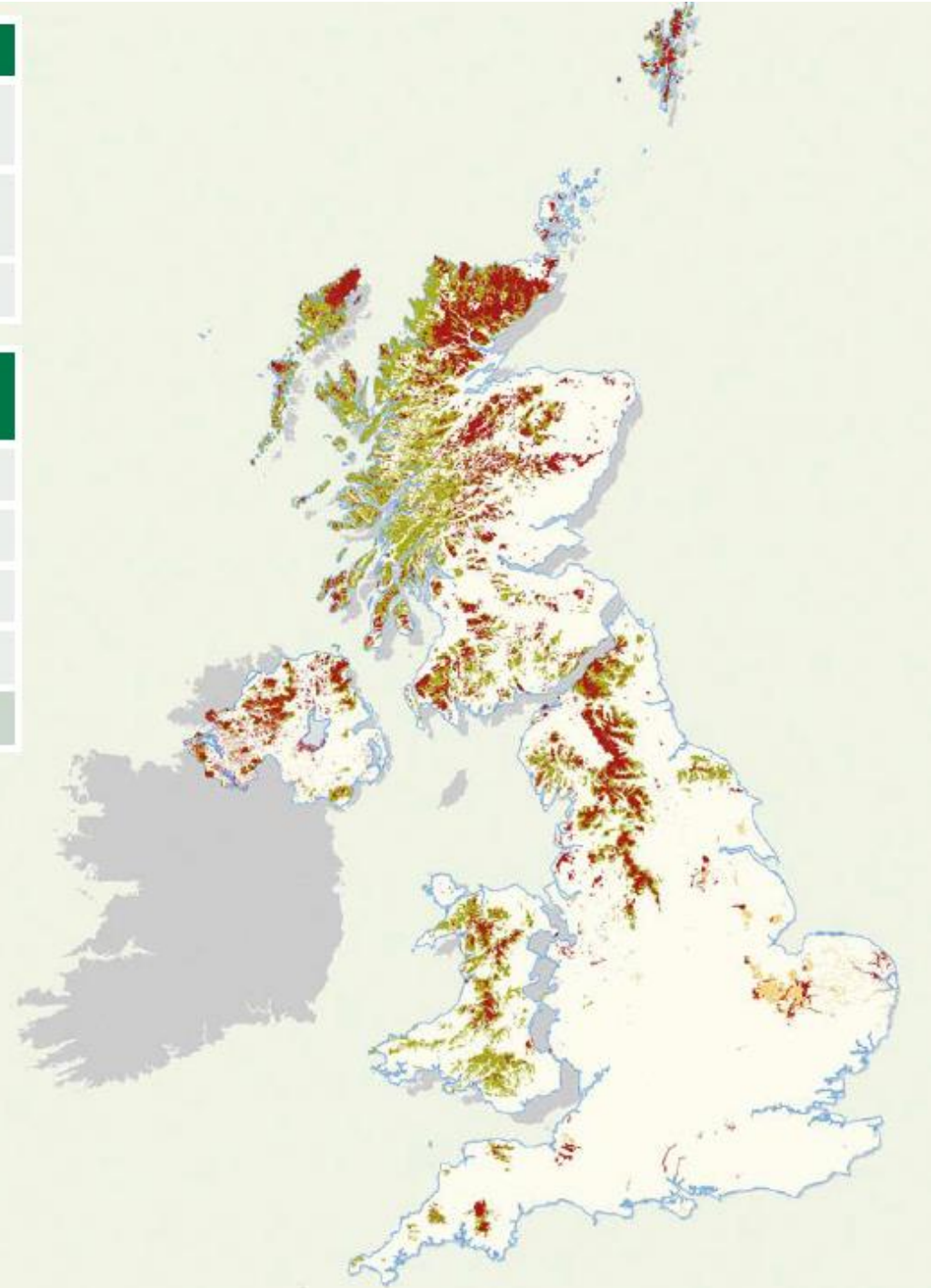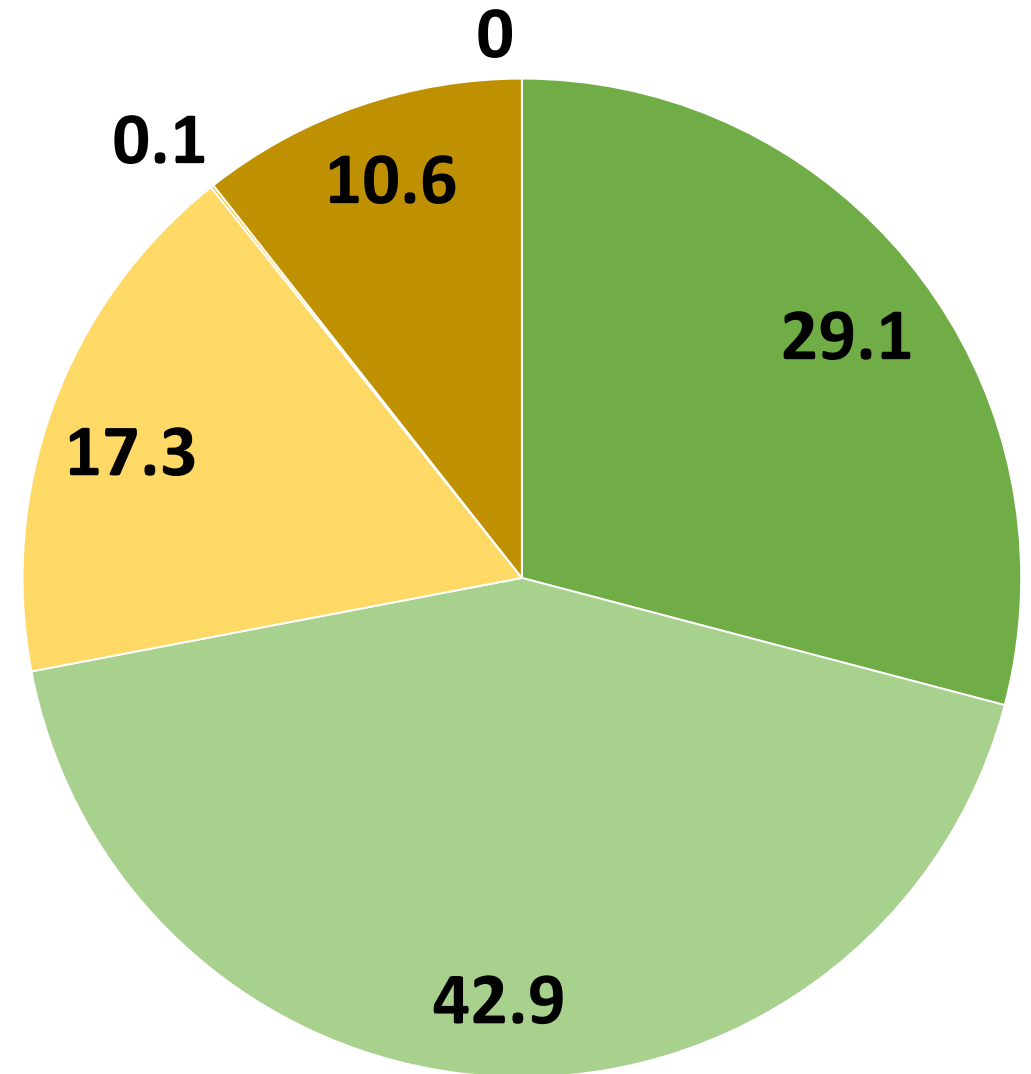
Peatlands in Wales

- In Wales, peaty soils defined as >10 cm and deep peat as being >40 cm.
- Deep peat is estimated to cover over 90,000 ha of Wales (4.3% of the total land area)[1]
  - 75% is in upland areas
  - 25% is in lowland areas
- Peatlands in Wales are estimated to store 196 Mt Carbon[2]
- >75% of the Welsh peatland area is impacted by one or more land-use activity
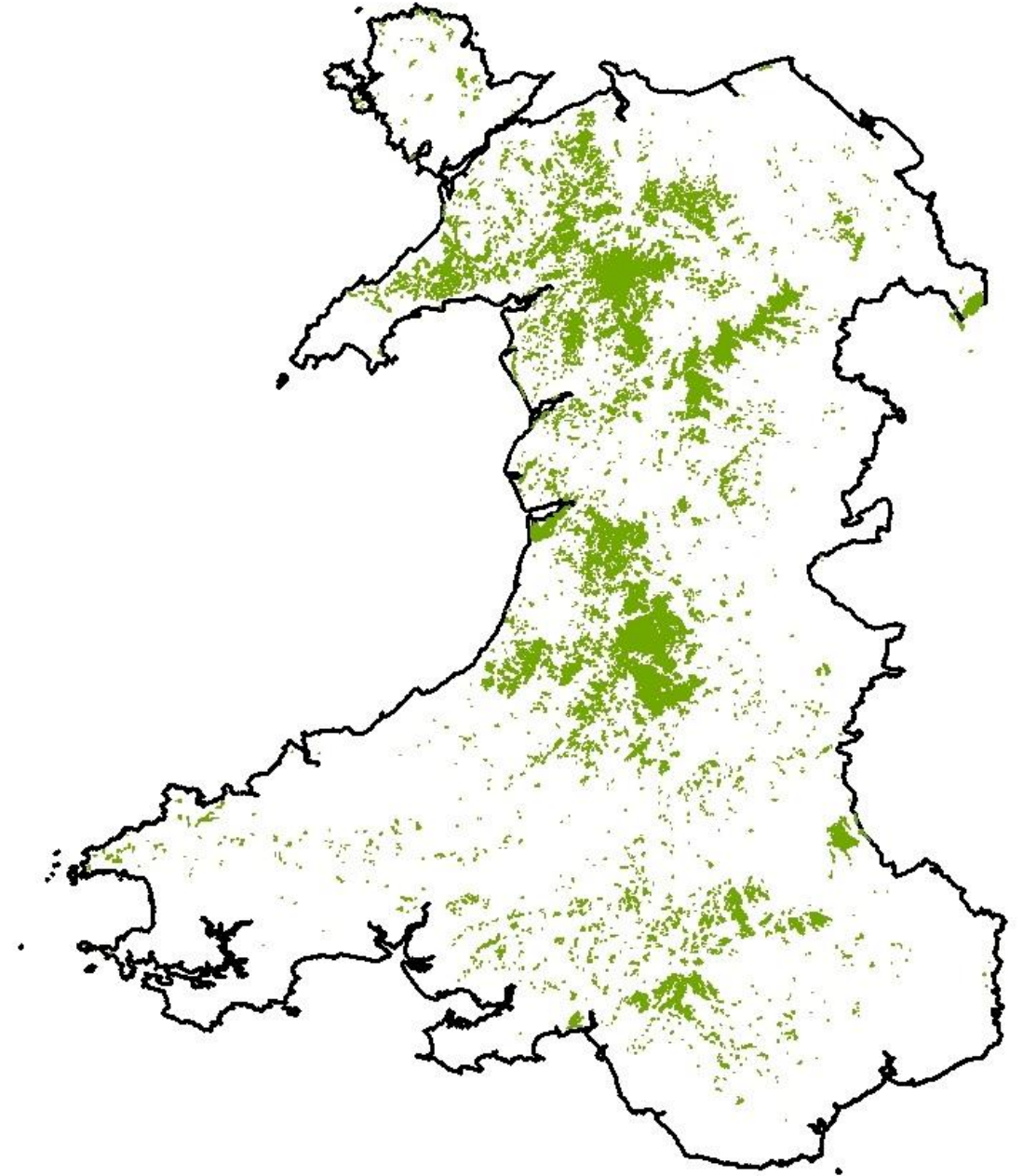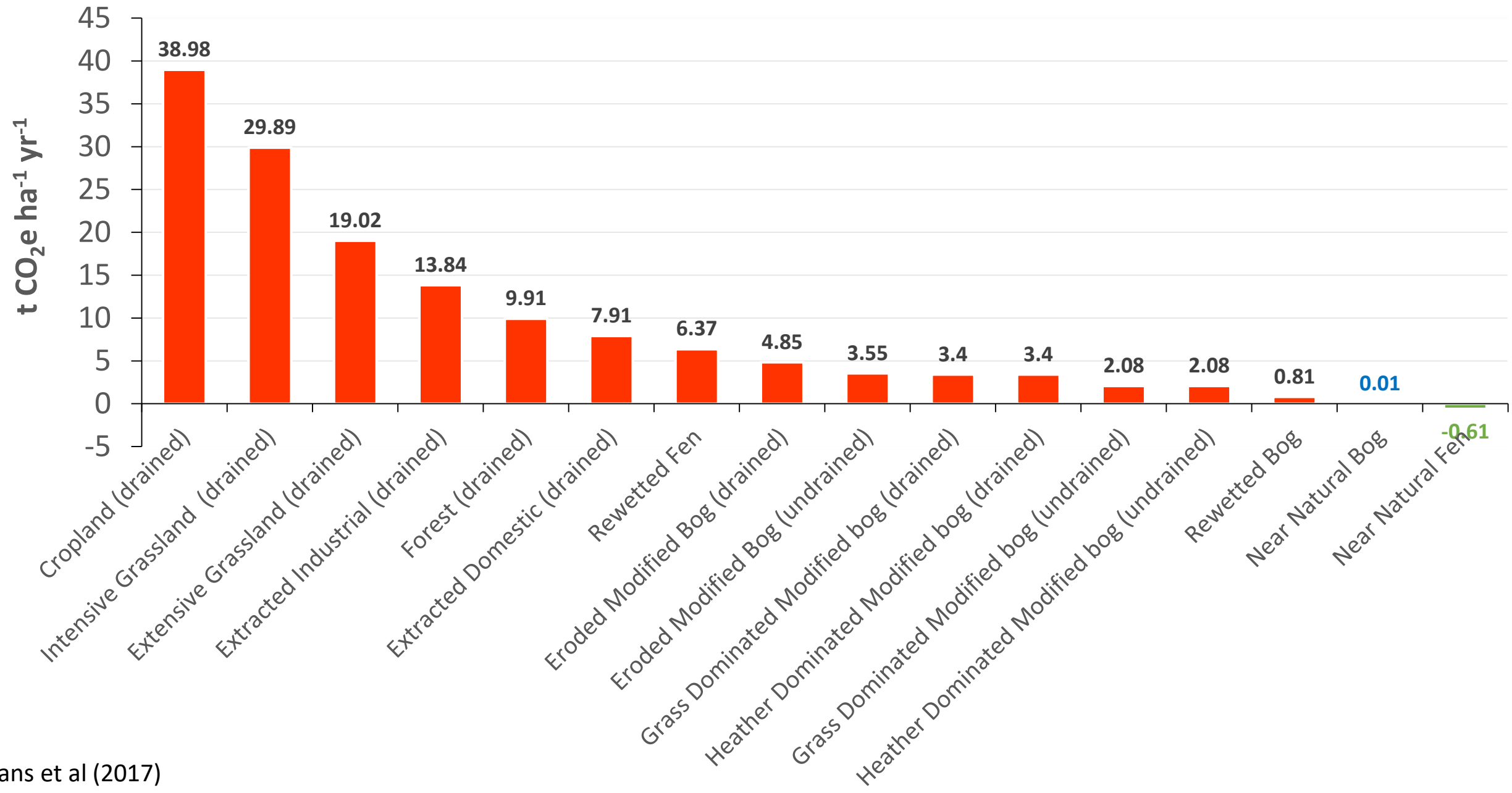

[1]Evans et al (2017); [2] Ecosse (2007)

Condition of Welsh Peatlands (% Total Area)

- Near-natural condition
- Semi-natural condition
- Converted to grassland
- Converted to arable
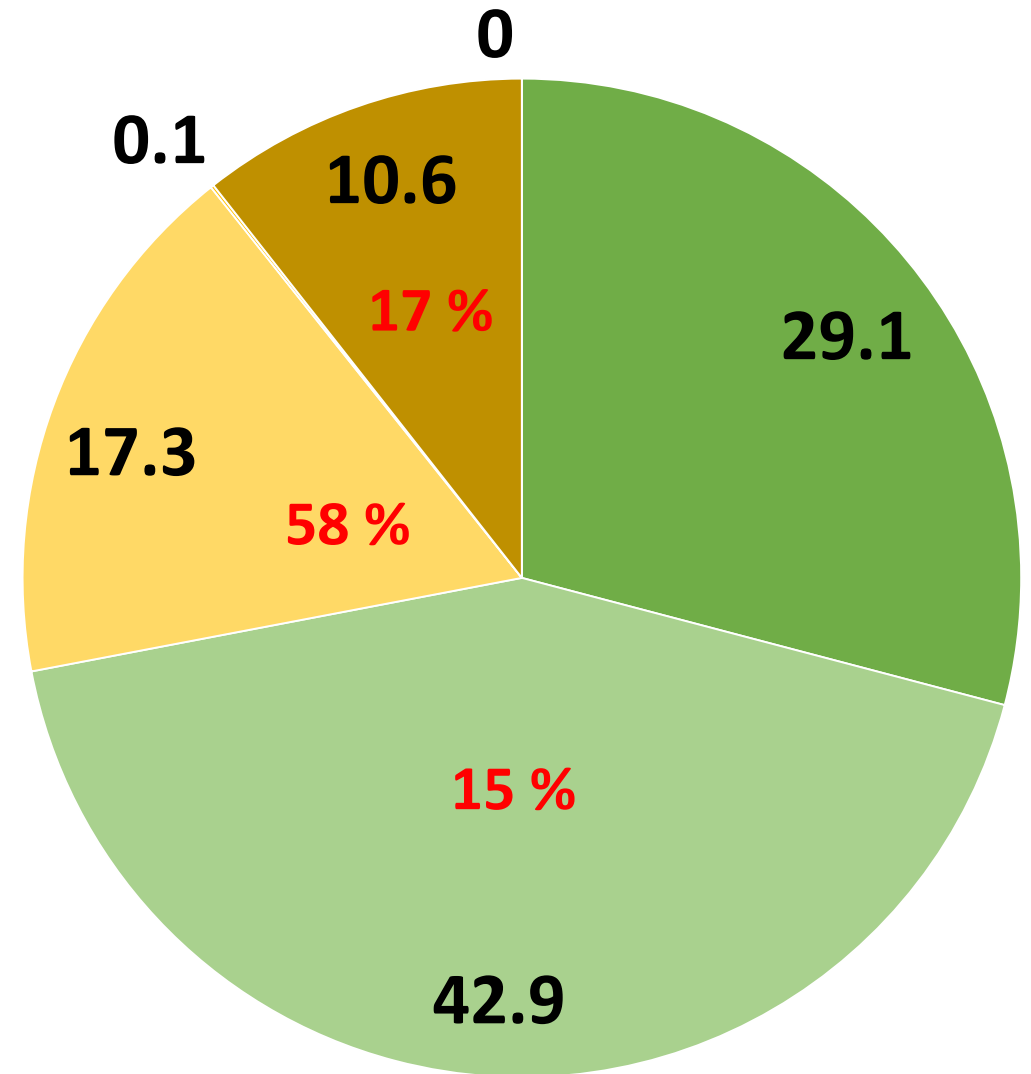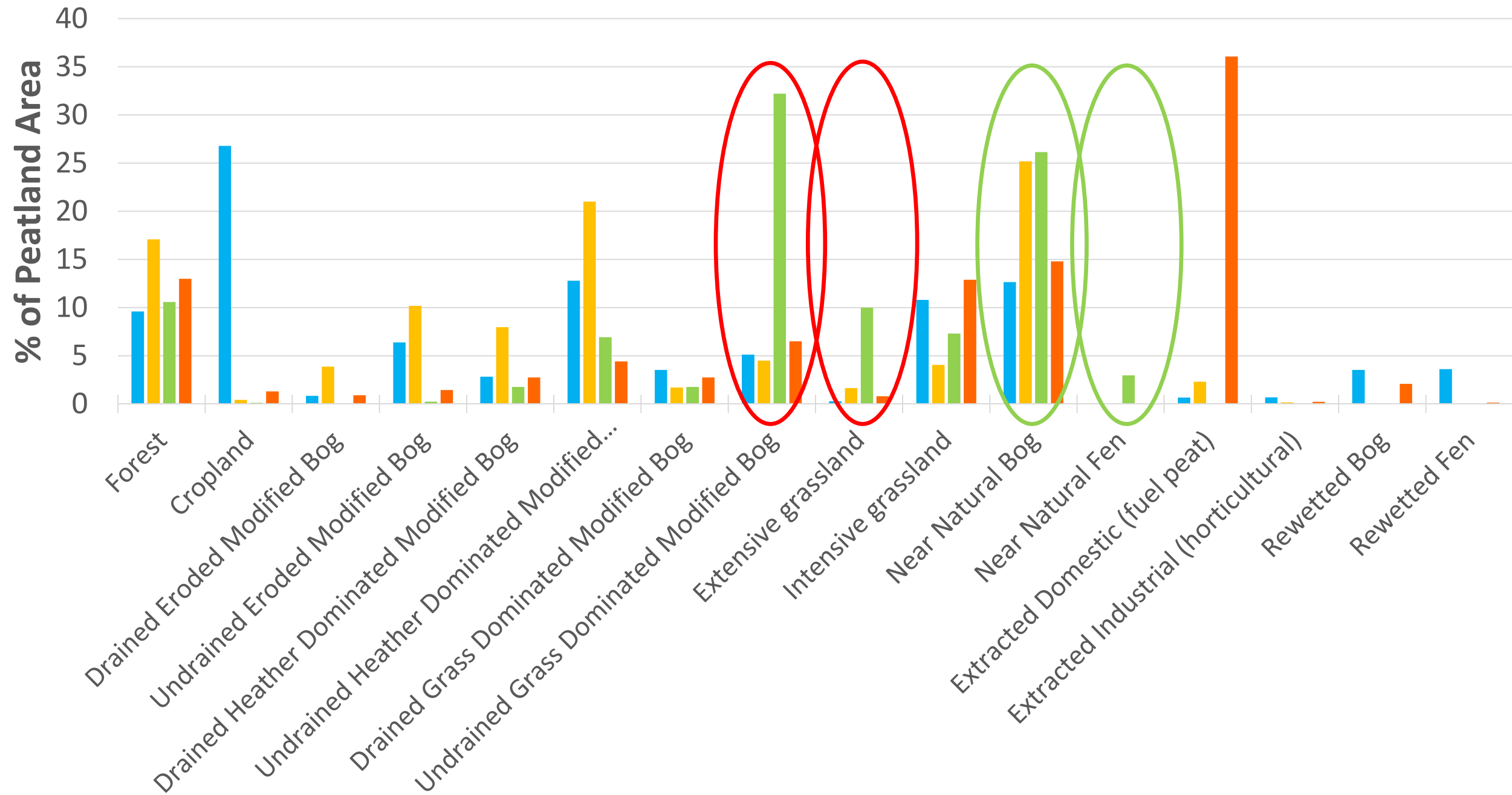- Converted to woodland
- Peat extraction

Evans et al (2017)

GHG emissions for peat condition types (CO_2, N_2O, NH_4)

t CO_2e ha^{-1} yr^{-1}

Condition type	Value
Cropland (drained)	38.98
Intensive Grassland (drained)	29.89
Extensive Grassland (drained)	19.02
Extracted Industrial (drained)	13.84
Forest (drained)	9.91
Extracted Domestic (drained)	7.91
Rewetted Fen	6.37
Eroded Modified Bog (drained)	4.85
Eroded Modified Bog (undrained)	3.55
Grass Dominated Modified bog (drained)	3.4
Heather Dominated Modified bog (drained)	3.4
Grass Dominated Modified bog (undrained)	2.08
Heather Dominated Modified bog (undrained)	2.08
Rewetted Bog	0.81
Near Natural Bog	0.01
Near Natural Fen	-0.61

Evans et al (2017)

Condition of Welsh Peatlands (% Total Area)

- Near-natural condition
- Semi-natural condition
- Converted to grassland
- Converted to arable
- Converted to woodland
- Peat extraction

0
0.1
10.6
17 %
29.1
17.3
58 %
15 %
42.9

**Welsh Peatlands emit 549 Kt CO2e ha-1 yr-1**

Evans et al (2017)

Inter-country variations in the main sources GHG emissions.

- **Scotland** with the largest total peat area, the largest sources are modified blanket bog and forests
- **England** the smaller (and partly wasted) peat area makes a larger overall contribution to total UK emissions, as a result of intensive arable and grassland cultivation, predominantly in lowland areas
- **Northern Ireland** intensive grassland in the lowlands and domestic peat extraction in the uplands are major sources
- **Wales** intensive and extensive grasslands and modified bogs

[1]Evans et al (2017)

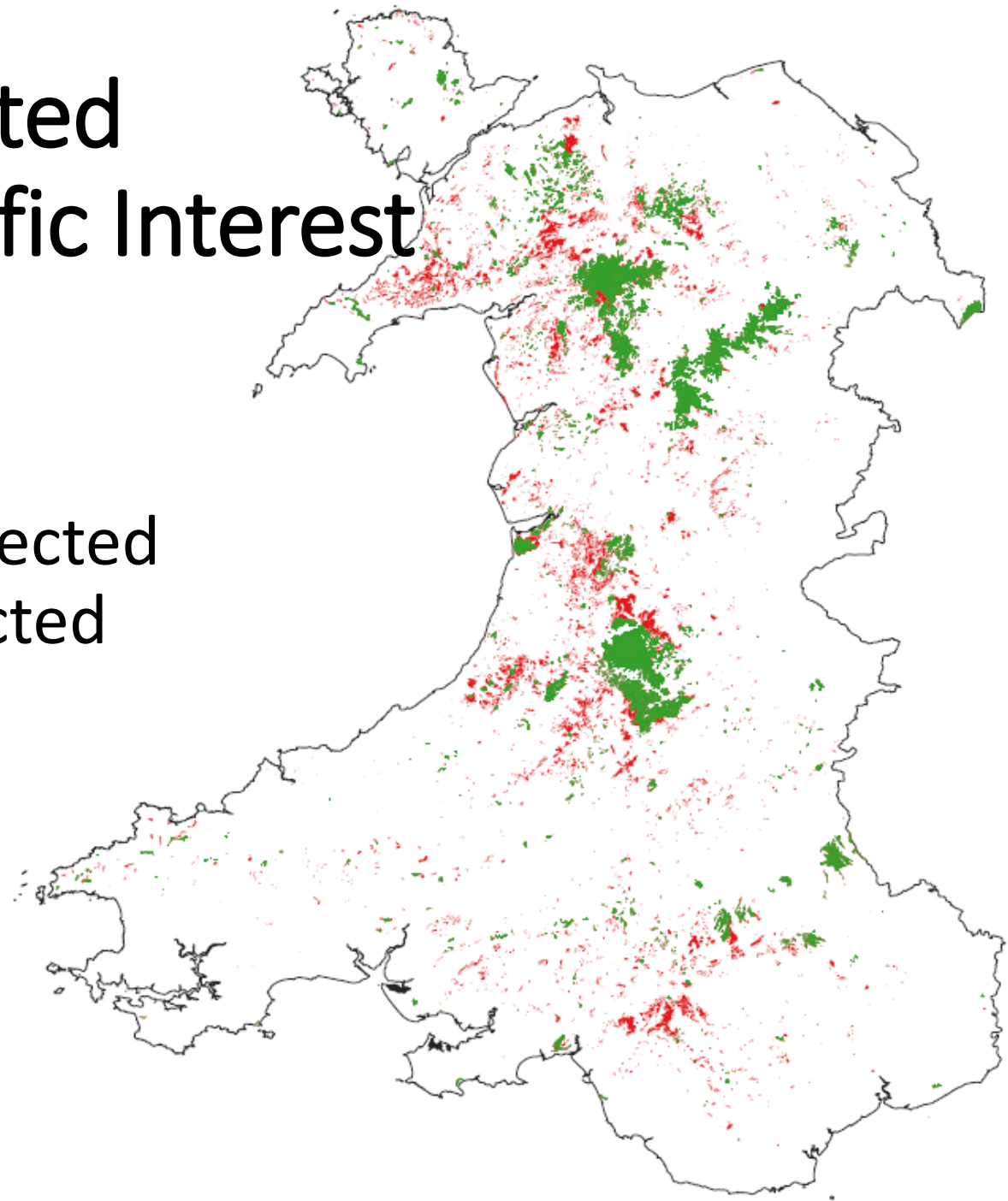# Welsh Peatlands designated as Special Areas of Conservation

- Protected = 45.0%
  Unprotected = 55.0%

- Lowland peatlands: 27.0% protected
  Upland peatlands: 51.0% protected
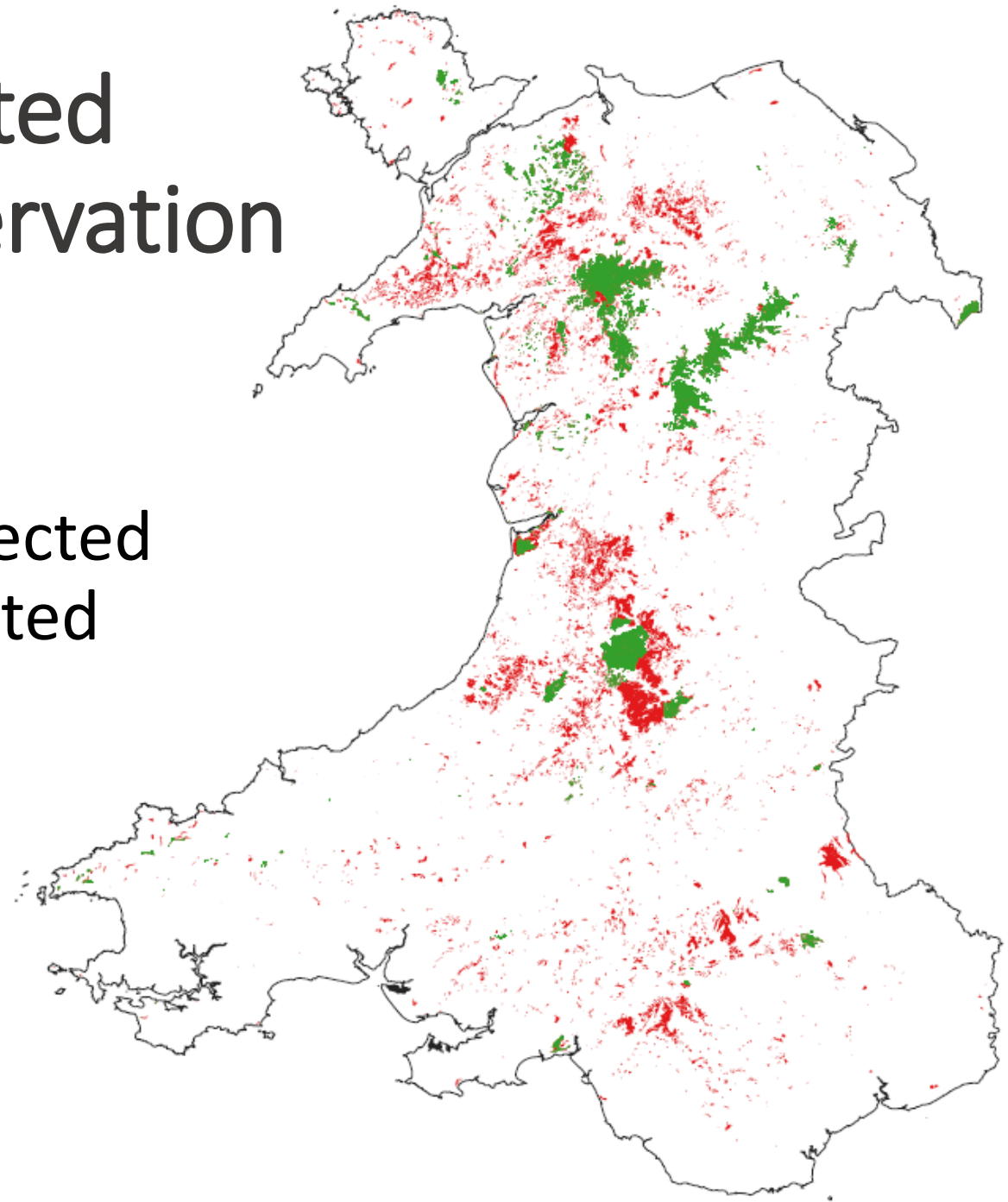
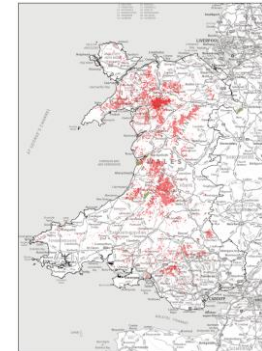# Welsh Peatlands designated as Sites of Special Scientific Interest
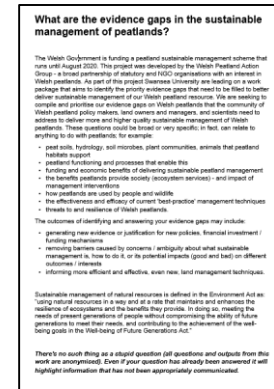
- Protected = 67.6%
  Unprotected = 32.4%

- Lowland peatlands: 40.9% protected
  Upland peatlands: 76.4% protected

We'd like your help:

1. Feedback on how we propose to collect and collate an evidence gap database (10 min)

2. Contribute your peatland evidence gaps [that could be addressed in Wales, or focus on, Welsh peatlands] (10 min)

3. Feedback on our proposal to establish a Welsh Peatland Observatory Network (10 min)