TOGETHER FOR OUR PLANET

England Peat Action Plan

May 2021

Butterburn Flow. © Iain Diack

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Ministerial foreword

Humberhead Levels, Thorne Moors. © Natural England

Our peatlands are an iconic feature of England's landscape. Often referred to as 'our national rainforest', they perform many functions – they are our largest terrestrial carbon store, a haven for rare wildlife, a record of our past, and natural providers of water regulation. Yet, for too long we have taken this valuable natural resource for granted. Only 13% of England's peatlands are in a near natural state.

This Action Plan sets out our vision to reverse this decline. Our aim is to prevent further loss of peatland habitats and to restore more peatland landscapes to their natural state. Re-wetting peatland areas and returning them to their natural state could make a significant contribution to achieving our targets on reducing carbon emissions, as well as having other benefits for water quality, nature and flood mitigation.

The essence of our approach is to use new funds, like the Nature for Climate Fund and our schemes that reward farmers and land managers for producing public goods, as well as private finance to support a change in the management of these landscapes. We have invested over £8million in peatland restoration in 2020/21. We recently launched our four-year Nature for Climate Peatland Grant Scheme. We intend to invest over £50million in peatland restoration by 2025. In areas like the Pennines, we will be developing incentives under the future agriculture policy to support projects that deliver both the capital required to achieve re-wetting of land coupled with maintenance payments to preserve it for the future. We will also be exploring the role of Conservation Covenants, introduced in the new

Environment Bill, to link to these incentives; so that the habitats we rebuild are linked to long term undertakings.

Northern England's sweeping expanse of blanket bog – an internationally rare habitat – will be an early priority for restoration, to help us protect this global asset. Alongside this Action Plan, we are announcing a number of early Nature for Climate Fund investments in 2020/21, including an investment in the Great North Bog, a landscape approach to restoration across nearly 7,000 square kilometres of upland peat in the Protected Landscapes of northern England. The initiative will secure a significant carbon store, provide a bigger and better-connected habitat for rare peatland species, contribute to the Nature Recovery Network, preserve and enhance our most precious heritage peatland sites, and will reduce the impact of flooding in communities downstream from the restored peatland.

The Fenland agricultural soils in lowland areas like Cambridgeshire are our country's most productive soils. They are the breadbasket of the UK, producing some of our most important horticultural crops. However, these vital assets are also in decline. As a student in commercial horticulture in the early 1990s, I recall visiting the Cambridgeshire fens and observing how soil levels had dropped in preceding decades, as the land had oxidised and broken down through relentless cropping. We now know that in addition to degrading these soils, that process also releases a significant amount of carbon into the atmosphere. Therefore, we are establishing a task force to explore how the husbandry of these crucial agricultural soils might be improved, to reduce and mitigate the loss of these assets.

In recent decades, progress has also been made in developing alternatives to the use of peat in horticulture, with the consistency of substitutes like coir improving. Peatland soils and the habitats they support should be nurtured, not mined, and this Action Plan sets out measures to accelerate the switch to the use of alternatives, starting first with bans on the sale of peat for amateur use by the end of this parliament, and gradually moving to alternatives for other commercial sectors over time.

The government has also introduced measures placing further restrictions on the burning of heather on blanket bog. While the intrinsic carbon emissions from such activity are fairly low, such practices act as an impediment to the wider restoration of peatland habitats and their hydrology, and therefore prevent carbon abatement. We recognise that there are inaccessible areas where the use of cutting equipment is presently not practical and where some burning may be required, so we have included exemptions on steep land and the ability to seek a licence from the government in certain limited circumstances.

Finally, we want this Action Plan to be an endeavour that engages all the relevant parties and, in particular, the landowners who have been custodians of these iconic landscapes for centuries. While delivering the objectives of this Action Plan will require change, the government stands ready to put in place the right policies and incentives that ensure we can all work together to achieve our shared goals.

George Eustice, Secretary of State for Environment, Food and Rural Affairs

Executive summary

Red Moss SSSI, Greater Manchester. © Natural England / Peter Wakely

Our Goals

The 25 Year Environment Plan set out our ambition to create and deliver a new ambitious framework for peat restoration in England. Peatland restoration will enable our peatlands not only to meet their Net Zero contribution, but also contribute to wider environmental goals. Where it is not appropriate to restore lowland peat, we will develop new responsible management measures to make sure that the topsoil is retained for as long as possible and greenhouse gas emissions are reduced.

We want our peatland to meet the needs of wildlife, people and the planet. All uses of peatland should keep the peat wet and in the ground.

We will work to ensure all our peatlands, not just deep or protected peat, are responsibly managed,[1] or, in good hydrological condition or under restoration management.[2]We will

[1] Responsible management in this context is management activity that does not seek to re-establish peat habitats, but which significantly reduces the impact of using peatland for that purpose. It is for situations where full restoration is not feasible. The term needs further definition and will be land use specific. In lowland agricultural peatlands this is likely to involve changed water management and has the potential to significantly reduce greenhouse gas emissions and reduce the loss of soil, whilst offering farmers the opportunity to innovate and explore new markets.

[2] Peatland restoration should be regarded as a process and not as a one-off restoration event. Peatland sites that have been subject to restoration activity should not immediately be described as restored (or in good hydrological condition). The restoration process will have been started, but the natural system will take time to recover and achieve restored status. In the meantime, these peatlands can be described as being under restoration management as long as ongoing management practices are sympathetic to the restoration end goal and allow the site to continue on its restoration trajectory.

set a target for peatland restoration as part of the forthcoming Net Zero Strategy, recognising the important role that peat plays in the pathway to net zero emissions.

How we will achieve this

- We will develop a more up to date and detailed England peat map by 2024, establishing a clear evidence base on which to build.
- We will immediately fund at least 35,000 ha of peatland restoration by 2025, through the Nature for Climate Fund and other sources. This is just the start of our ambition for peatland restoration to 2050 and beyond. The government's new Sustainable Farming Incentive, Local Nature Recovery and Landscape Recovery Schemes will provide the main delivery mechanism for peatland restoration after 2024-25 and our new Nature for Climate grants will act as an important precursor.
- By Summer 2022, we will have recommendations for a more sustainable future for our lowland agricultural peatlands, developed by the Lowland Agricultural Peat Task Force. Where the environmental benefits are clear, the delivery of these recommendations may be supported through new schemes that reward farmers and land managers for producing public goods; the sale of peatland carbon credits; and better regulation.
- We will consult on banning the sale of peat and peat containing products in the amateur sector by the end of this parliament**.** We will publish a full consultation on phasing out the use of peat in horticulture in 2021. We recognise that the voluntary approach has not delivered.
- We will continue to protect our peat from fire by both phasing out managed burning and reducing the risk of wildfire.

What we will deliver

Implementation of the measures above will:

- Secure our peatlands' carbon store so they meet their contribution to Net Zero by 2050. This cannot be achieved by only restoring upland peat but will require significant changes to how we manage our lowland peat.
- Deliver Natural Flood Management and improve water quality, to increase drought resilience and the sustainability of our water supplies.
- Protect and restore our peatland habitats so they are healthy, well-functioning ecosystems rich in wildlife. These wildlife rich peatlands will form a key part of our Nature Recovery Network.
- Drive private investment in peatland restoration through natural capital markets that allow the accreditation and sale of the ecosystems services that healthy peatlands can provide.
- Protect the historic environment of peatlands so the important evidence of our past can be preserved for the future, and ensure that restoration projects deliver cultural heritage, education and enjoyment, alongside other public goods.

How we will measure success

Our commitment to restore 35,000 hectares of peatland by 2025 is just the start of our journey towards peatland recovery. The 25 Year Environment Plan set out a number of relevant commitments including:

- By 2030 we want all of England's soils to be managed sustainably;
- We will bring 75% of Sites of Special Scientific Interest into favourable condition by 2042; and
- We will develop a Nature Recovery Network creating or restoring 500,000 hectares of wildlife rich habitat.

The 25 Year Environment Plan provides a comprehensive set of metrics, through which progress can be measured including greenhouse gas emissions from natural resources (indicator A2); quantity, quality and connectivity of habitats (D1); and healthy soils (E7) once it is developed. By January 2023, we will review and publish a revised 25 Year Environment Plan. As part of this we will consider whether further or different steps are needed to improve the natural environment, including for peatland.

Following this Natural England will publish an Implementation Plan, which will provide a more detailed trajectory to recovery by 2050, including five year stretch targets. The baseline data of the new England Peat Map as well as the recommendations of the Lowland Agricultural Peat Task Force will feed into this.

Next steps

This Action Plan is a blueprint for how we will take action to ensure our peatlands are functioning healthily for the needs of wildlife, people and planet. There have been various initiatives to improve the state of England's peatland over the past couple of decades. This Action Plan weaves these various initiatives together with a clear set of goals and the beginnings of institutional arrangements to coordinate our approach. It has been developed to align with the broad principles of the International Union for Conservation of Nature (IUCN) UK Peatland Programme's UK Peatland Strategy.[3]

We want stakeholders to work with us over the coming years to influence the ongoing development of our delivery approach, and to get our peatland back on the road to recovery. In particular we hope stakeholders will:

- Apply for funds to deliver peat restoration under programmes such as the Nature for Climate Fund and Investment Readiness Fund.
- Work with Natural England on the development of the Implementation Plan.
- Work with us on the development of the information tools, including a new peatland map.
- Input into the Lowland Agricultural Peat Task Force.
- Input into the consultation on measures to phase out peat use in horticulture, with a particular focus on the amateur sector.

[3] IUCN UK Peatland Programme (2018) UK Peatland Strategy 2018-2040

Chapter 1: The case to restore our peatlands

Peatland restoration before and after, Kinder Scout. Left: October 2010, and Right: September 2019. © Prof Tim Allott

We are committed to the goal of being the first generation to leave the natural environment in a better state than we found it. Our 25 Year Environment Plan marked a step-change in ambition for wildlife and the natural environment and we are already taking action at home to fulfil this ambition, including the protection and restoration of our peatlands. The peat and trees action plans, together with wider plans and strategies for nature, will set out how we will tackle the twin threats of climate change and biodiversity loss.

Peatlands are 'areas of land with a naturally accumulated layer of peat, formed from carbon rich dead and decaying plant material under waterlogged conditions'.[4] This build-up of decaying matter creates a rich organic soil that has a high carbon density, even when no longer wet.

There are approximately 1,420,000 hectares of peatland in England (Figure 1). Information on peatland is usually restricted to deep peat (more than 40 cm depth), which accounts for 677,250 ha when originally mapped, but shallow peat (between 10 cm and 40 cm) also

[4] Bain, C.G., Bonn, A., Stoneman, R., Chapman, S., Coupar, A., Evans, M., Gearey, B., Howat, M., Joosten, H., Keenleyside, C., Labadz, J., Lindsay, R., Littlewood, N., Lunt, P., Miller, C.J., Moxey, A., Orr, H., Reed, M., Smith, P., Swales, V., Thompson, D.B.A., Thompson, P.S., Van de Noort, R., Wilson, J.D. & Worrall, F. (2011) IUCN UK Commission of Inquiry on Peatlands. IUCN UK Peatland Programme, Edinburgh.

provides a suite of ecosystem services, including significant carbon stores. A recent study calculated that a 30 cm peat layer stores at least the same amount of carbon as tropical rain forest over an equivalent area.[5]

Much of our lowland peat is currently used for intensive agriculture, which can be highly profitable. It covers less than 4% of England's farmed area but produces more than 7% of England's total agricultural production and is worth £1.23 billion to the UK economy.[6] In the case of some peatlands, full restoration may not be practical or in the public interest , but at the very least, these sites must be better managed if we are to halt further degradation. Lower opportunity costs make immediate restoration more feasible in upland settings, although the economic importance of timber production, grouse moors and grazing also need to be considered. Peatlands provide a wealth of environmental benefits that we have only recently begun to value, alongside a number of economic and recreational uses. Peatlands:

- **Capture carbon** from the atmosphere and then store it as plants only partially decompose under wet conditions. Conversely, degrading peatlands release carbon into the atmosphere. It is estimated that peatlands in England emit approximately 10 million tonnes carbon dioxide equivalent per year.[7,8] Healthy peatlands have a net cooling effect on the climate, contributing to the government's target to achieve Net Zero by 2050.
- Are **rich in wildlife**. Peatland habitats contain some of our rarest species including bitterns, swallowtail butterfly, carnivorous sundews, hen harriers and short-eared owls. Nearly a third of our deep peat is protected as Sites of Special Scientific Interest. However, only 13% of our deep peat area remains in a near natural state and, as a result, our peatland habitats have become increasingly rare, threatening the plants and animals that are dependent on them.
- **Provide a sustainable supply of high-quality drinking water**. The Office for National Statistics estimates the annual value of the water supply from UK peatlands at between £208 million and £888 million.[9,10] However, over the last 30 years the quality of water has been deteriorating as degraded peatland releases dissolved organic carbon into the water, causing discolouration.[11] Removal of colour from water represents one of the major operational costs of any treatment plant and can run into millions of pounds per annum.[12]

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[5] Lindsay, R., Ifo, A., Cole, L., Montanarella, L., Nuutinen, M. (2019). Peatlands: the challenge of mapping the world's invisible stores of carbon and water. Unasylva 251, Vol. 70, 2019/1

[6] ONS (2019) UK Natural Capital: Peatlands. p17

[7] Carbon dioxide equivalent is a measure used to compare the emissions from various greenhouse gases based upon their global warming potential.

[8] BEIS (2021): 2019 UK Greenhouse Gas Emissions, Final Figures.

[9] Office of National Statistics. (2019). UK Natural Capital: Peatlands.

[10] Xu, J., Morris, P.J., Liu, J., Holden, J., (2018). Hotspots of peatland-derived potable water use identified by global analysis, 1, 246-253.

[11] Labadz, J., Allott, T., Evans, M., Butcher, D., Billett, M., Stainer, S., Yallop, A., Jones, P., Innerdale, M., Harmon, N., Maher, K., Bradbury, R., Mount, D., O Brien, H. & Hart, R. (2010). Peatland hydrology. Report to IUCN UK Peatland Programme, Edinburgh.

[12] Martin-Ortega, J., Allott, T.E.H., Glenk, K., Schaafsm, M., (2014). Valuing water quality improvement from peatland restoration: Evidence and challenges. Ecosystem Services, 9, 34-43.

- **Intercept and store greater volumes of water**, releasing it over a longer period of time and **mitigating flood risk**. Management techniques including draining, burning[13] and overgrazing have been implicated in both declining water quality and some of the larger flood events in England in recent years. For example, the floods in Fishlake, Doncaster in 2019 and the repeated flooding of the Calder Valley.

While peatland restoration can be expensive, the economic benefits exceed the costs. The Office for National Statistics recently estimated that the cost of restoring all UK peatlands to near natural condition would be between £8.4 to £21.3 billion, but restoring all of the UK's peat would deliver carbon benefits alone of £109 billion and would outweigh the costs of doing so by an estimated 5 to 10 times.[14] This classifies peatland restoration as "Very High" value for money.

There is a strong argument for acting now, as the condition of our peatlands is not static; they will continue to degrade if they are not restored. By taking action, we will avoid further loss of benefits and increased future costs of restoration.

[13] Holden, J., Palmer, S. M., Johnston, K., Wearing, C., Irvine, B., Brown, L. E. (2015). Impact of prescribed burning on blanket peat hydrology. Water Resources Research, 51, 6472-6484.
[14] Office of National Statistics. (2019). UK Natural Capital: Peatlands.

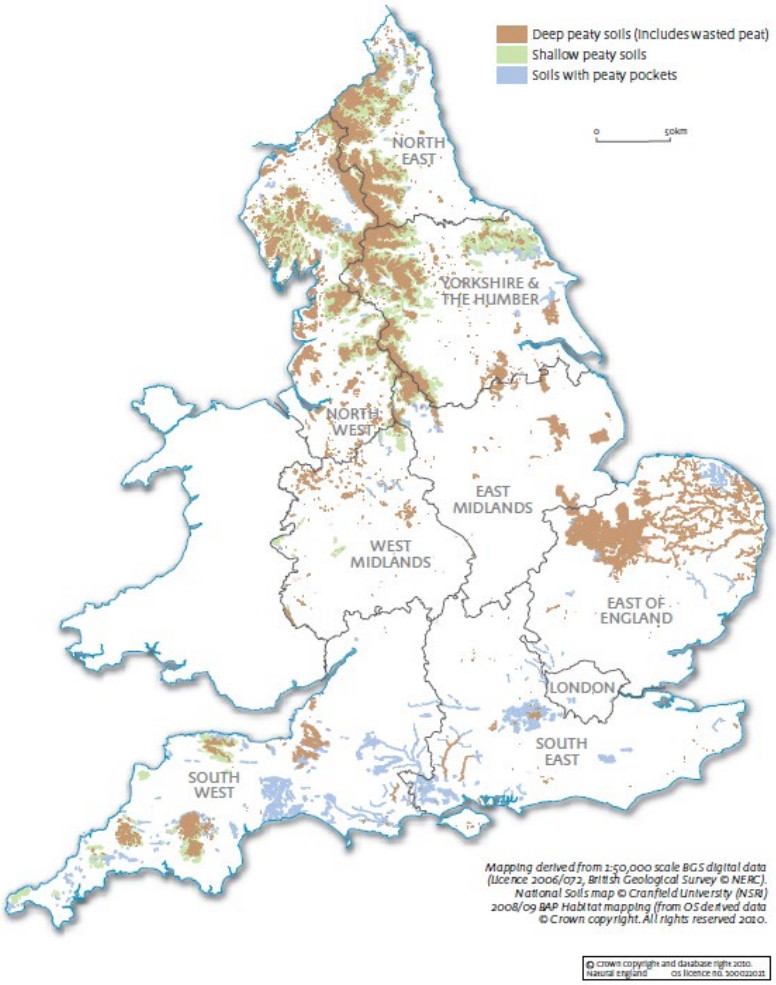

Figure 1: Peat map of England from England's peatlands: carbon storage and greenhouse gases (NE257) 2010

Chapter 2: The plan to restore our peatlands

Reprofiling and turfing a peat hag, Ramsgill. © Rosie Snowden

Full restoration of peatland habitats delivers on each of our natural capital objectives - locking up carbon, restoring biodiversity, preserving heritage sites, minimising wildfire hazards, and improving water regulation and quality.

Future vision

Peatland should be restored wherever this is feasible. We will develop a range of sustainable funding and finance mechanisms to enable this, and introduce legal mechanisms to lock in these benefits.

Our three new schemes that reward farmers and land managers for producing public goods could provide the key public funding stream for those who want to undertake restoration of their peatland. This will be fully rolled out by 2024 but peatland restoration needs to happen now in order to maximise the benefits and secure our carbon store. Therefore, we have announced a comprehensive package of restoration to turbo charge this process as part of the Nature for Climate Fund. The Nature for Climate Fund provides funding for the restoration of approximately 35,000 hectares of peatland by 2025. This represents a tripling of historic average annual restoration levels (1990-2013).

We have already invested a small amount of the Nature for Climate Fund on a range of shovel-ready peat restoration projects in 2020/21 as part of a Covid-19 green recovery package. We have just launched a new competitive capital grant scheme, for peat restoration, the Nature for Climate Peatland Grant Scheme, managed by Natural England.

The Nature for Climate Fund will provide vital investment in this Parliament, but it is only the start of longer-term investment in England's peatlands. The government's new Sustainable Farming Incentive, Local Nature Recovery and Landscape Recovery Schemes will provide the main delivery mechanism for peatland restoration and management after 2024, and our Nature for Climate Fund grants will act as an important precursor. There is no need for concern about how peatland restored now will be treated in these future schemes and certainly no reason to delay peatland restoration. To meet our net zero ambitions, we need you to restore peat now.

Actions

- We will launch a new **Nature for Climate Peatland Grant Scheme** in 2021, which will include planning grants and annual bidding opportunities. We intend to invest **over £50 million** in peatland restoration by 2025;
- We will continue to invest in and support a variety of **peatland restoration initiatives** such as the **Great North Bog**;
- We will develop a new **peat map of England** to help achieve high impact, strategic restoration, and help determine the mitigation of greenhouse gas emissions, and other ecosystem services benefits;
- We will include **maintenance costs** as part of funding agreements for the Nature for Climate Fund and other schemes;
- We will expand and clarify **Countryside Stewardship options and supplements** making these available for land managers accessing funds through the new Nature for Climate Peatland Grant Scheme, when applying for a Countryside Stewardship agreement;
- We will allow land managers entering into Countryside Stewardship agreements as part of ongoing sympathetic peatland management to:

    - Break those agreements at agreed points without penalty (through annual break clauses) once they have secured a place in our new Sustainable Farming Incentive, Local Nature Recovery and Landscape Recovery Schemes; or
    - Remain on the same terms and conditions for the duration of their agreement if they want to;

- We will include support for peatland restoration and management across our new **Sustainable Farming Incentive**, **Local Nature Recovery** and **Landscape Recovery Schemes**;
- We will continue to fund peatland restoration through other funds such as the new **innovative flood and coastal resilience programme,** as we have through the **Green Recovery Challenge Fund**;
- We will work with and **support existing peatland partnerships**, as well as facilitating the establishment of new ones;
- We will **support National Parks and Areas of Outstanding Natural Beauty** teams to deliver significant amounts of peatland restoration over the next 10 years;
- We will provide additional investment over the next three years – **with more than £20 million in 2021-22 - through the Farming in Protected Landscapes Programme** to

allow farmers and land managers to work in partnership with Protected Landscapes to deliver bigger and better outcomes for the environment, for people and for the place; and
- We will work with the Department for Education and the restoration sector to develop training routes to upskill the sector, for example, through traineeships.

Unlocking Private Finance

Whilst government funding is an important part of the picture, public funding alone will not be enough to deliver peatlands that are functioning healthily for the needs of wildlife, people and planet.

The benefits provided by peatland restoration, particularly in relation to mitigating carbon release, and improving water quality and biodiversity, make it an ideal generator of revenue streams from private investment and an attractive vehicle for companies to achieve their environmental, social and corporate governance goals. Unlocking private investment will be a key means of ensuring that our peatlands are managed sustainably or under restoration management.

Actions:

- We have launched the **UK Land Carbon Registry** a joint registry of the Peatland and Woodland Carbon Codes.
- We have launched Defra's Natural Environment **Investment Readiness Fund** which will kick-start the development of the domestic market for private sector natural capital investments, and will be a useful tool for growing the market for private finance in peatlands.
- We will improve the **Peatland Code** by 2022 through implementing a package of measures including:

    - Accrediting it through the United Kingdom Accreditation Service.
    - Full technical revision, including a review of the emissions factors used to incorporate latest evidence, including those used in the UK Greenhouse Gas inventory.
    - Expanding the Code to cover more peatland types, including potentially quantifying the benefits of peatland restoration or other management interventions for lowland fens that have been converted to grassland and cropland.
    - Ensuring that the Code aligns with development of the Nature for Climate Fund and the new schemes that reward farmers and land managers for producing public goods, particularly in relation to the blending of public and private finance, to provide clarity for land managers. Our new grants will be flexible in ensuring that it is in landowners' best interests to participate in carbon and other ecosystem services markets, and that applicable additionality criteria can be met.

- We will provide **up to £20 million** to 2025 for an **Impact Fund** to leverage private finance into new natural capital markets.
- We will continue to explore expanding the **UK Emissions Trading Scheme** to the two-thirds of uncovered emissions, including the role it could play in reducing the degradation of agricultural peat. In addition, we will consider ways to support and

incentivise nature-based sequestration in the deployment of greenhouse gas removal technologies.
- We will continue to collaborate with **water companies** to encourage investment in peatland restoration as a solution to water quality issues, and to meet the industry's net zero goals.
- We will work with the **green finance sector** to determine key barriers and further opportunities for peatlands and private finance, including the development of water metrics.

Locking in the benefits

Restoration should not be regarded as a one-off event. Programmes of restoration have sometimes proceeded alongside less than optimal habitat management. Changes in burning practices and grazing regimes are often required to support ecological resilience and to safeguard the integrity of new structures and investment. Maintenance costs need to be included in peatland restoration plans to safeguard benefits.

The Environment Bill introduces a new legal tool that could be used to safeguard these investments through long term agreements: Conservation Covenants. These are private agreements entered into voluntarily which become legally binding once agreed. They are made between a landowner and responsible body, such as a conservation charity, public body or for-profit body. They conserve (protect, restore or enhance) the natural or heritage features of the land for the public good. Conservation organisations and landowners have engaged with the development of this approach and we are exploring how conservation covenants may be used for the management of peatlands and to safeguard investment.

Actions:

- We will introduce **Conservation Covenants** as part of the Environment Bill;
- We will develop **trajectories to hydrological restoration** as part of the Natural England implementation plan, in recognition that restoration is an ongoing process, not a one-off event;
- We will embed measures to phase out some of the most damaging practices such as burning on blanket bog; and
- We will promote the **benefits of peatland** as carbon sinks and carbon stores to the public.

Chapter 3: The plan to reduce degradation

Lowland agricultural peatland and a drainage ditch, Somerset. © Defra

Most restoration work to date has focussed on blanket and raised bog. However, we need to broaden our approach given that the majority of greenhouse gas emissions from our peatlands come from the lowlands.

The Great Fen Project has shown that full conversion to wetland nature management is possible under the right circumstances in the lowlands. But full restoration is not feasible in all lowland or afforested settings. Measures to stabilise and reduce the degradation of our peatland through responsible management will be necessary to meet Net Zero by 2050.

Future vision

Conventional agricultural production on drained peatland is inherently unsustainable. However, it may often not be desirable or appropriate to fully restore these lowland peatlands. Factors include: water management schemes to reduce flood risk in our towns and cities; the opportunity cost of taking this land out of production and any associated displacement of emissions, and; the maintenance of food security. Therefore, we envisage a mixed approach to the management of our lowland peatlands.

Restoration will certainly be part of this vision and we expect at least 15% by area of the Nature for Climate Fund to fund lowland projects. This proportion may rise over time, but we also need to develop a new sustainable agricultural model, where restoration to a full peatland habitat might not be possible. This model will aim to ensure that the land remains productive whilst reducing greenhouse gas emissions and retaining the peat topsoil for as long as possible.

For example, many of these peat soils only support crops for a very short period of time each year. It may be possible to raise the water table when the land is not in use, helping to slow soil loss and reduce carbon release. Wet agriculture, or paludiculture, also offers a potential way forward for these sites. A recent Defra funded review of the practical, social, economic and environmental constraints on the large-scale adoption of paludiculture in England and Wales[15] found it has the potential to make a valuable contribution to climate change mitigation and adaptation in England, whilst also maintaining the economic output and extending the lifetime of agriculturally productive lowland peat regions.

It is timely to seek a new future for lowland agricultural peatlands, which promotes environmental enhancement, supports profitable food production, and contributes to a healthier society. We are also at the point where many of those farming lowland peatlands are recognising that their peat soils have a finite farming life ahead of them and that there is a need for change. We want to support land managers to make the best decisions for their farm business and for the environment, making use of incentives, education and regulation as appropriate.

Actions:

- We launched a new Lowland Agricultural Peat Task Force in January 2021.[16] The Task Force has 18 months to develop recommendations to extend the useable life of our agricultural lowland peat soils, both to preserve the carbon stored in them and to ensure that profitable agriculture can continue for decades to come. It is chaired by Robert Caudwell, a farmer and leading figure in water management. The Task Force, drawing on the advice of its subgroups, will:

    - Explore necessary changes to landscape-scale water management;
    - Explore innovative approaches such as paludiculture and new machinery; and
    - Identify economically viable farming systems that are compatible with our environmental and climate goals.

- Where the environmental benefits are clear, these systems may benefit from better regulation and the new schemes that reward farmers and land managers for producing public goods through:

    - The Sustainable Farming Incentive beginning in mid-2022 and expanding over time;
    - Local Nature Recovery from 2024; or
    - The Landscape Recovery from 2024.

[15] Mulholland, B., Abdel-Aziz, I., Lindsay, R., McNamara, N., Keith, A., Page, S., Clough, J., Freeman, B., and Evans, C. (to be published). An assessment of the potential for paludiculture in England and Wales. Report to Defra Project SP1218, pp. 97.

[16] https://www.gov.uk/government/news/new-chair-to-lead-task-force-on-sustainable-farming-of-peatlands

- We will continue to fund research into management practices to assess effects on production and environmental impacts.

Delivering for peatland and trees

Woodlands and peatlands are two of our largest natural climate regulating ecosystem types; our climate change and biodiversity obligations require us to manage them both sustainably. To meet our global climate targets under the Paris Agreement and our commitment to Net Zero, we need both peatland restoration and opportunities for woodland expansion to happen without compromising one for the other. Over the last ten years, there has been a significant increase in the amount of forest-to-bog restoration and a growing consensus on good restoration practice. We want this trend of successful restoration to continue alongside expanded forest cover in areas where it will not compromise the hydrology of peatland. Peatland restoration targets are of equal importance to those for tree planting.

This Action Plan supports further restoration of peatland by ensuring that any replanting in areas of peaty soils is guided by clearly defined information on the location and condition of peat including its hydrological integrity, its potential for successful restoration, and the dynamics of long term carbon storage. Any approach will be in step with the principles set out in the UK Forestry Standard national policy. It is also a requirement of the UK Forestry Standard that the impacts of tree planting upon the historic environment are considered and where possible, negative impacts avoided.[17]

To achieve this, we will work across the Defra group and with external stakeholders to improve evidence-based decision making around planting or replanting based on the natural capital framework set out in the 25 Year Environment Plan. This will focus on those sites that do not meet existing criteria which would already prohibit new planting;[18] and sites that do not already have a clear trajectory towards restoration. We will develop metrics within this approach that will allow decision makers to express the realistic cost of peatland restoration. This would include the long-term carbon storage and biodiversity benefits of that restoration set against the cost of alternative uses, such as replanting, and the long-term prospects for contributing to Net Zero and Nature Recovery.

The approach would sit within the framework of Local Nature Recovery Strategies and support site by site decisions made under the Open Habitats Policy and new Practice Guidance. This will provide a clear means of strategically determining restoration and recovery of habitats and species at the local level.

Through the accompanying Trees Action Plan, we will set out our plans for increasing overall levels of tree planting that is sensitive to natural capital characteristics and built around the principle of ‘the right tree in the right place’. Our aim is to achieve optimal levels of peatland restoration and woodland creation using an evidence-based approach to land use decision making, that allows peatland to be protected and restored and new woodland created in the right location. We want all parties involved in making the best decisions for each site and to move beyond simple metrics, such as peat depth, to a position where they

[17] https://historicengland.org.uk/advice/caring-for-heritage/rural-heritage/creating-new-woodland/

[18] The UKFS Forestry Standard (https://www.gov.uk/government/publications/the-uk-forestry-standard) guidelines prohibit establishing new forests on soils with peat exceeding 50cm in depth and on sites that would comprise the hydrology or adjacent bog or wetland habitats.

are working together to consider the realistic prospects for restoration of the wider hydrological unit of an area of peat. We also want to help the decision making in this framework through better carbon and other environmental metrics, and by modelling the true impact of these decisions. We will consider how our policies and incentives related to woodland creation and peatland restoration can change, to ensure that plantations on peatland that no longer meet principles for sustainable forestry are phased out as part of planned harvesting cycles, without reducing net woodland cover.

Actions:

- We will publish new **UK Forestry Standard Practice Guidance** that will help determine when afforested peat should be restored to bog, and to minimise damage to peaty soils from tree planting;
- We will **develop metrics** that allow decision-makers to assess the realistic costs of forest to bog restoration;
- We will embed **Local Nature Recovery Strategies**, a new system of spatial planning for nature**,** which will be introduced through the Environment Bill; and
- We will improve land use decision-making through the **new peatland map data**, once it is complete in 2024.

Chapter 4: The plan to protect our peatland

Peat extraction site, Bolton Fell Moss 2011. © Defra

For centuries, peatland has faced numerous damaging and unsustainable practices. Some of these threats, such as acid rain caused by industrial pollution, have now been largely addressed; although the legacy lives on through damaged peatlands today. In many cases, damaging practices are still happening and so we are putting forward a range of measures to phase these out.

Future vision: horticultural peat

In 2011, the government set out its ambition for the horticultural sector in England to be peat free by 2030, with voluntary targets for a peat free amateur sector by 2020 and the professional sector by 2030. We note that there has been some progress by particular manufacturers, retailers and growers. For example, the UK's soft fruit industry have successfully transitioned from using peat to coir. However, the voluntary approach has not succeeded overall; as shown by Figure 2 the total volume of peat sold in the UK is 25% lower in 2019 compared to 2011 but is still way off our ambition.[19] The volume of peat sold in the UK rose by 9% in 2020 due to unprecedented demand throughout the year and the impact of the global pandemic on the supply chains for alternative materials. We set out in the 25 Year Environment Plan that if we had not seen sufficient movement to peat alternatives by 2020, we will look at introducing further measures. Further action is clearly

[19] Growing Media Association (2021) UK Growing Media Monitor report

required to continue to drive the transition to peat alternatives and to support the industry to overcome barriers to this transition.

We will formally consult on a range of potential legislative measures in 2021, as well as seeking views on the support the industry will require to make a successful transition. In particular, we will seek to make swift progress in phasing out the use of peat in the amateur sector and will be exploring a range of different types of measures that will achieve this.

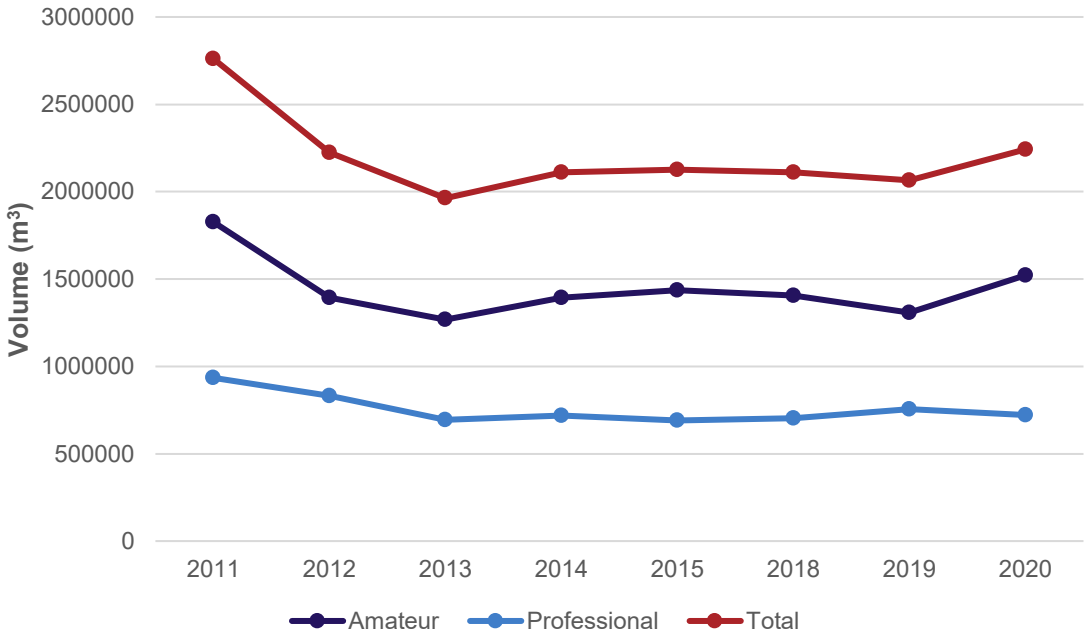

Figure 2. Volume of peat (m^3) sold in the UK between 2011 to 2019

Two thirds of the peat sold in the UK is imported from the rest of Europe. This means we are effectively exporting our carbon footprint. We shall continue to focus on reducing demand for peat in horticulture, recognising the need to protect not only England's peatland, but peatland in other countries affected by the current demand in England.

The UK's amateur sector makes up ~70% of horticultural peat use. We are starting to see retailers voluntarily committing to stocking only peat-free products, and we welcome the leadership demonstrated by these retailers. Evidence suggests that consumers continue to misuse bagged peat-based products, for example using them to improve the quality of garden soil, where other products such as manure or green compost would be much more appropriate and beneficial.

We will work with the industry to identify how we can increase the resilience of the supply of alternative materials. Coir dust (from coconut husks), wood fibre and bark have shown great promise as replacements for peat and are included in many of the products on the market today. Sphagnum farming on lowland peatlands in England offers the opportunity to source more alternative materials within the UK as well as providing a more sustainable use of our agricultural peatlands. Therefore, the Lowland Agricultural Peat Task Force will work with the growing media industry to develop its roadmap to commercially viable paludiculture.

Natural England's Peat Pilots programme recently shone a light on the practice of grass turf production on peat (which harvests thin layers of peat) and its potential impact on greenhouse gas emissions. The Great Manchester pilot estimated that there is 151.20 hectares of turf production on Chat Moss, and the East Anglian Fens pilot found several turf growers and suppliers of fen topsoil operating in the area. It has proved difficult to arrive at an estimate of the area of total turf production on peat in England and we currently have no formal emission factor for the practice. We have also identified other, less widespread, uses of peat ranging from its presence in cosmetics to its use in the English whiskey industry. These wider uses of peat require further investigation and as such our consultation will also seek to broaden our understanding of these wider considerations.

Actions:

We will consult on **banning the sale of peat and peat containing products in the amateur sector by the end of this parliament.** We will publish a full consultation in 2021 to examine the feasibility of the following measures, to end the use of horticultural peat in both the amateur and professional sectors:

- Setting absolute deadlines to ban the sale of peat in both the amateur and professional sectors.
- Introducing a point-of-sale charge for the purchase of growing media containing peat. This could use the plastic bag charge as a model.
- Mandating all sellers of horticultural products containing peat, including plants, to publicly report on the volume of peat they sell each year (in bags or plant pots).
- Issuing a call for evidence on the wider uses of peat and peat products in the retail sector; for example - grass turf production, cosmetics and industries where peat forms part of the production process.

We will also:

- Continue to work with the industry to understand the implications of these proposals, identify blockages and work across government and the private sector to develop and enact solutions.
- Work with and challenge the horticultural sector to reduce the reliance on peat in growing media and associated products in order to prepare the sector for legislation.
- Continue to support the industry's Responsible Sourcing Scheme for Growing Media to ensure that the environmental footprint of peat alternatives is minimised.
- Actively promote the benefits of peat-free growing media to gardeners through public awareness and education; to help shift the demand to peat-free alternatives in advance of legislation, and to soils improvers where they are more appropriate.
- Identify opportunities to work with the devolved administrations to develop a UK wide approach to horticultural peat and related products.

Future vision: protecting peatland from fire

Rotational burning

Since the 19th Century burning strips of vegetation on rotation, termed rotational burning, has formed part of the vegetation management of upland areas such as grouse moors,

along with livestock grazing. Burning cycles have been shortening in recent years with repeated burning occurring at shorter intervals. Douglas et al. (2015) found that the annual number of burns increased from 2001 to 2011 in England.[20] The consequence of managed burning has been to convert more than 87,000 hectares of upland blanket bog from a typical peat forming habitat, to dwarf shrub dominated vegetation. [21]

While there continues to be scientific debate over aspects of the environmental impact of managed burning, there is a large and increasing body of literature that provides evidence that overall managed burning is damaging to peatland. This literature includes a systematic evidence review published by Natural England, synthesising the findings from 124 studies.[22] The impact of rotational burning is less about carbon dioxide emissions from burning peat itself, since winter burns tend to burn mainly surface vegetation, however, rotational burning does make it difficult to restore blanket bog to its natural hydrology and impossible to return it to its natural state.

Since February 2018, we have encouraged landowners and managers to voluntarily surrender their consents to carry out managed burns on these protected sites. Whilst this voluntary approach has worked in some areas, many consents have not been surrendered. We have therefore brought forward legislation to introduce new restrictions on managed burning on protected blanket bog, with a ban on burning unless covered by a license granted by the Secretary of State. Land with a gradient of over 35 degrees is exempt from the need for a licence. A new licensing regime is being created which would permit landowners, who still retain consents, to apply for a licence to burn where land is inaccessible to cutting equipment, for a conservation purpose or to prevent the risk of wildfire. Landowners will have the option to seek a multi-annual licence covering a plan for several years where appropriate.

The new requirements will protect approximately 142,000 hectares of England's upland deep peat from further damage by managed burning, which represents approximately 40% of all blanket bog in England. The government will keep under review the environmental and economic case for extending the approach to additional areas of blanket bog after assessing how the new regime works in practice.

Wildfire

Wildfires can cause significant damage to peatlands, especially when they are severe enough to burn into the peat layers. The summer of 2018 saw significant wildfires on Winter Hill and Stalybridge Moor covering 1,800 hectares. These wildfires burnt for three weeks, damaging both a Special Area of Conservation and a Site of Special Scientific Interest. Not only were greenhouse gases released, depleting the carbon that had been stored for thousands of years in the peat, but the fire also left areas of bare peat exposed

[20] Douglas, D. J.T., Buchanan, G. M., Thompson, P., Amar, A., Fielding, D. A., Redpath, S. M., and Wilson, J. D. (2015). Vegetation burning for game management in the UK uplands is increasing and overlaps spatially with soil carbon and protected areas. Biological Conservation 191, 243–250.

[21] Thacker, J.I., Yallop, A.R., Clutterbuck, B. (2015). IPENS 055 Burning in the English Uplands. Natural England Technical Report.

[22] Glaves, D.J., Morecroft, M., Fitzgibbon, C., Lepitt, P., Owen, M., Phillips, S. (2013). Natural England Review of Upland Evidence 2012 - The effects of managed burning on upland peatland biodiversity, carbon and water. Natural England Evidence Review, Number 004.

to erosion and further degradation. It is estimated the full cost of restoration of these two significant 2018 wildfires, could be £2.8 million.[23]

Given the significant impact wildfire can have on peatland, Defra undertook a review of wildfire and the management of upland peatland habitats in England. The objective was to identify what changes to current land management policy could limit the risk presented by wildfire. The implementation of this Action Plan will take forward actions from Defra's review that relate directly to peatland management. Further details of our Wildfire Review can be found in Annex B. In addition, the Uplands Management Group (UMG) were commissioned by Defra to compile advice and guidance to land manager to mitigate against the risk presented by wildfire; their recommendations can also be found in Annex B.[24]

It is clear that there is a significant gap in our knowledge of wildfire in England. Although we know that almost all UK wildfires are started by people, either on purpose or accidentally, we only have sparse data on whether wildfires are caused by discarded cigarettes, BBQs or arson. This makes it difficult to prioritise policies and identify how changes in management can mitigate wildfires. Many landowners are unhappy with the current warning system used in the UK because it doesn't predict the likelihood of a wildfire, it only predicts the severity if a wildfire were to occur, this makes it difficult for them to plan for and mitigate wildfire events. For many peatland habitats, their degraded state means that they are less resilient to the risk and impact of wildfires, but it is also the case that poorly managed land with excessive woody vegetation is at greater risk once a fire starts. That is why land management techniques and the licensing regime have an important role to play.

Actions:

- We have introduced **legislation to bring an end to managed burning** on protected blanket bog unless covered by a license issued by the Secretary of State.
- As outlined in this Action Plan, we will **take continued action on peatland restoration**. Wet and well-functioning peatland increases resilience and reduces the risk of severe damage by wildfire.
- We will produce **detailed mapping of peatland**. This will be made available to land managers and the Fire and Rescue Service for inclusion in wildfire management planning, and to help tackle emergencies.
- We will ensure land managers **implement a Wildfire Management Plan** and explore the embedding of these practices into agri-environment schemes, in particular supporting land managers with access to expertise in areas at high risk of wildfire.
- We will **support and engage with the Wildfire Forums** across the country, demonstrating leadership cross government to embed good practice.
- Work with stakeholders to develop **customised wildfire training** for land managers, spreading expertise and thereby raising practitioner understanding of the risks, and available mitigation measures.

[23] Based on restoration costs per hectare associated with Defra's current Capital Grant restoration scheme.
[24] Uplands Management Group Moorland Wildfire Risk Assessment and Management Planning Recommendations https://www.uplandsmanagement.co.uk/

Future vision: planning & development

We want to ensure that the value of peatlands is taken into account when development is considered, including through biodiversity net gain. Some areas of peatland are potentially susceptible to development pressure and it is vital that planning policies reflect the importance of managing peatlands and avoid detrimental climate, water and biodiversity impacts from development.

Biodiversity net gain is already promoted within the National Planning Policy Framework and will, when it becomes mandatory through the Environment Bill, require development to deliver at least a 10% improvement in “biodiversity value”. The biodiversity metric used for biodiversity net gain recognises the ecological value of peat, giving it very high or high distinctiveness; this means that there is a strong incentive for development to retain peatland habitats and to avoid damage to them in the first place (in line with the mitigation hierarchy). Any unavoidable losses or damage to non-irreplaceable habitat would need to be compensated for, ideally on site or locally.

We want to help ensure that further steps are taken through policy and guidance to protect peatlands, including those which are damaged but recoverable, from potentially damaging development that would hinder restoration and recovery of the habitats and species.

Action:

- We will consider how we can strengthen the protection afforded to peatlands in national planning policy, guided by the development of new tools such as the new England peat map and the Natural Capital Ecosystem Assessment Pilot.

Chapter 5: Driving progress

We will develop a strategic, coordinated approach to peatland recovery in England, to achieve the best outcomes for wildlife, people and the planet. Whilst significant progress has been made with deep peat protected sites over the past decade, there is much more to do. We will introduce support for peatland recovery that will drive the delivery of this Action Plan to achieve the best outcomes for wildlife, people, and the planet.

Natural England will play a lead role working in partnership to deliver this Action Plan with the support and expertise of other Defra delivery bodies. Once we have initial outcomes from the Nature for Climate Fund and early data from the peatland map, an Implementation Plan setting out Natural England's approach will be developed and published by end of 2023. It will include a trajectory of restoration and responsible management over the next 20 years. This plan, along with new information tools described in the section below, will provide certainty about expectations through: better evidence, information, and defined terminology.

In June 2019, Natural England began road testing the delivery approach through the England Peatland Pilot programme. The pilots highlighted the importance of working in partnership with local stakeholders and finding mutually beneficial solutions that respect local traditions. The pilots also concluded that, although the government performs a key role in setting long term targets, providing support and unlocking funding ultimately, solutions need to be found locally.

The pilots revealed several key gaps in support for peatland recovery including better information, empowerment of stakeholders on the ground, support for planning and implementation, unlocking of a range of non-financial barriers, and ongoing monitoring. More details can be found in Annex C.

Actions:

- We will develop an improved **baseline map of England's peatlands**. Our prioritisation of action and investment on peat is being hampered by the age of the data (>30 years) that is currently available to aid in decision making.
- We will **develop other tools** to help close our information gap including an improved classification scheme; a peatland restoration register; and improved recovery and management trajectories.

- We will continue to **develop the evidence base** on peatland restoration for carbon abatement, water quality and biodiversity among other ecosystem services.
- Natural England will publish an **Implementation Plan** that will include a trajectory for recovery
- The Nature for Climate Fund will provide **grant funding for development work** on sites suitable for restoration, as well as provide planning grants for new partnerships.
- We will publish **joint Natural England / Historic England guidance** on peatland restoration in relation to the historic environment
- We will continue to **build the knowledge and evidence base** for peatland recovery
- We will **ensure accountability** by reporting into the **outcome indicator framework** for the 25 Year Environment Plan.
- We will also **develop clear metrics** and **practical guidance** for land managers and hold twice-yearly stakeholder strategy meetings.
- We will implement the **Greening Government Commitments** to reduce the government's impact on the environment:

    - For the period 2021-2025, we aim to strengthen the commitments to require government departments and their partner organisations to, where relevant, protect and enhance total peatland owned and leased (ideally expressed through increased hectarage or percentage of land holdings). Full details will be available in the forthcoming 2021-25 Greening Government Commitments framework.
    - In line with the government Buying Standards for horticulture and park services, departments are to continue buying peat-free growing media.

Annex A: Unlocking private finance

Private finance will be vital if we are to meet our restoration ambitions. Whilst government has a clear role as a key investor, it is also important that peatland projects are able to make the most of new revenue streams that provide rewards for the environmental benefits that they deliver. In July 2019, the government published its first Green Finance Strategy, which sets out measures for a financial system fit to help deliver the 25 Year Environment Plan, Clean Growth Strategy and Net Zero. We are addressing a range of current barriers to unlock the various potential revenue streams.

Water companies are already working with regulators to deliver improved water quality by investing in natural solutions, as well as grey infrastructure. Reverse auctions, for example, pay farmers and landowners to change the way they manage their land to reduce the pollutant burden. This can be more cost-effective than equivalent investment in conventional water treatment. Government and regulators are now working to identify barriers to the further development of this model and its adoption in other areas. The work may include consideration of the water industry's involvement in peatland restoration schemes. In addition to water provision, Natural Flood Management as a co-benefit of peatland restoration is also seen as a significant cost saving opportunity for multiple stakeholders, and may attract private finance from industries such as insurance to design schemes which work alongside hard infrastructure solutions.

Mandating biodiversity net gain through the Environment Bill is expected to stimulate the development of markets in habitat creation or 'habitat banking'. Using the biodiversity metric 2.0, degraded peatland with no designation could be restored to generate biodiversity units as part of this market in England. Suitable peatland sites could also be restored through monies invested via the biodiversity net gain statutory credits mechanism.

Carbon finance also offers a significant revenue stream for investors, by giving value to the greenhouse gas emissions that are reduced or removed by a project. Both the Clean Growth Strategy and the 25 Year Environment Plan commit to strengthening carbon offset markets as a means of reaching our statutory decarbonisation targets or potentially generating units that could be sold on the carbon market.

Currently the key mechanism for leveraging carbon finance into peat restoration is the Peatland Code. The Peatland Code is a voluntary standard which provides a consistent approach for UK peatland restoration projects wishing to attract carbon finance; providing validation and verification and ensuring businesses are given the assurance that a

restoration project will deliver the benefits they claim. Currently the Peatland Code provides assurance for carbon benefits only.

We are working with the International Union for Conservation of Nature, the provider of the Peatland Code, to invest in its evolution and ensure it meets investors and landowner needs as outlined in the Action Plan.

In the 2018 Budget, the Chancellor announced a package of funding for forestry, including a Woodland Carbon Guarantee, which will underwrite £50 million of the carbon credits registered under the Woodland Carbon Code. This provides long term certainty for participants and gives landowners a guaranteed price for the carbon credits, set at the level required to make the investment worthwhile. Once the reforms to the Peatland Code outlined above are implemented, we would like to explore whether the guarantee mechanism could be expanded or replicated to include peatland restoration. This could significantly open up carbon investment in peatlands. The carbon price is currently too low, meaning that peatland restoration projects aimed at long-term carbon abatement are often unviable.

As these various revenue streams are unlocked, we shall look to develop mechanisms for layering or ‘blending’ investment, to monetise all of the potential ecosystem services provided by peatland restoration in all settings (Figure 3). It is important that the value of the possible benefits is understood from project inception, so that investors can join from the beginning, and the benefits can be stacked. The valuation of natural capital assets and ecosystem services is developing at pace, both in the public and private sector, including through the government’s recently announced £5 million pilot on establishing a new Natural Capital and Ecosystem Assessment.

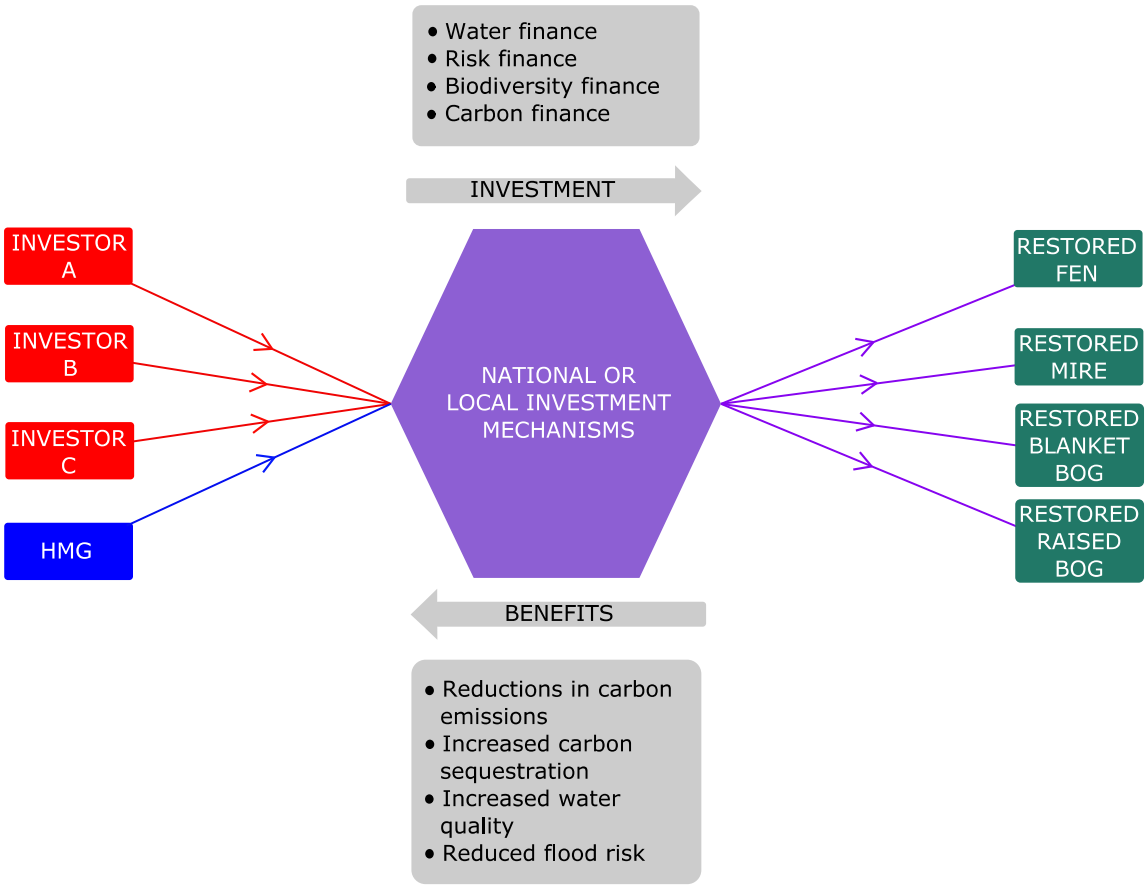

Figure 3: Schematic representation of blended finance for peatland restoration

Blending funding streams would enable large-scale, strategic investments that deliver more than the sum of individual ones. For example, Defra is working with the private sector to develop the Landscape Enterprise Networks model, which blends different private revenue streams to unlock strategic landscape scale investments. Defra is committed to ensuring that new schemes that reward farmers and land managers for producing public goods. An Environmental Land Management Trial is currently taking place in Cumbria that will develop options for adding Environmental Land Management finance into the Landscape Enterprise Networks model. We will also ensure that the Nature for Climate Fund does not crowd out private sector funding but instead pump primes potential new funding streams, acting as a catalyst, incentivising private sector investors funding ecosystem services. We will develop effective project delivery models that can be replicated with confidence by others.

As set out in the Green Finance Strategy, government has a role to play in paying for public goods that the market alone cannot provide, but also has a role in market development. The establishment of Defra's Natural Environment Investment Readiness Fund will kick-start the development of the domestic market for private sector natural capital investments. The Natural Environment Investment Readiness Fund will provide capacity and capability building support to organisations to develop a pipeline of commercially attractive, revenue-generative projects that support 25 Year Environment Plan goals, such as peatland restoration. Activities eligible for support could include, but are not limited to: project management, technical guidance (for example in evaluating ecosystem services), investment structuring and capital raising, and assessment of

investment risks. Peatland delivery partnerships will be well-placed to bid for funding and assistance as they are in an ideal position to unlock private funding opportunities.

The activities outlined above will not only help to develop a market for peatland restoration, but also for sustainable management. Feedback from landowners and land managers indicates that until they understand the range of financial opportunities available to them and what their peatland asset is worth, making decisions on management practices can present a challenge, and they are less willing to invest in new technologies or make changes to their business models.

Annex B: Protecting peat

The Wildfire Review

The peat archive shows that wildfire has been a feature of peatlands for a considerable length of time[25] but with a changing climate we expect that the frequency and severity of wildfires may increase. The summer of 2018 saw significant wildfires on Winter Hill and Stalybridge Moor covering 1,800 hectares. These wildfires burnt for three weeks, damaging both a Special Area of Conservation and a Site of Special Scientific Interest. Not only were greenhouse gases released, depleting the carbon that had been stored for thousands of years in the peat, but the fire also left areas of bare peat exposed to erosion and further degradation. It is estimated the full cost of restoration of these two significant 2018 wildfires could be £2.8 million.[26]

Since 2018 wildfires have continued to occur. The risks associated with increased public access during the Coronavirus emergency has highlighted the need for continued improvements in how wildfire risk is planned for and responded to. Larger numbers of people accessing local areas of countryside at higher than normal levels resulted in wildfires and increased pressure on emergency services.

Natural England recently published an Evidence Review[27] looking into the occurrence, causes, prevention and management of wildfires on heathlands and peatlands in England. This work has highlighted a need for more evidence, but where robust conclusions can be drawn, the review shows that:

- The incidence of wildfire in the UK tends to be episodic, coinciding with dry-spells and hot periods, with much variation between years.
- People are the main cause of wildfire ignition.
- On peatland, restoration reduces the risk of wildfire ignition and severity, and increases resilience.
- Raising awareness and public information campaigns can reduce wildfire occurrences.
- Rapid and reliable responses to wildfire, such as fire watching and good vehicle access, are effective at reducing incidences and spread.
- However, there is a need for greater evidence in the UK to support the effectiveness of firebreaks in reducing occurrence and spread of wildfire. Similarly, there is little UK research into the effectiveness of managing fuel load.

Defra also undertook a review of wildfire and the management of upland peatland habitats in England, to identify what changes to land management policy could further minimise the

[25] https://www.iucn-uk-peatlandprogramme.org/sites/www.iucn-uk-peatlandprogramme.org/files/8%20Burning%20%20final%20-%205th%20November%202014.pdf
[26] Based on restoration costs per hectare associated with Defra's current Capital Grant restoration scheme.
[27] http://publications.naturalengland.org.uk/publication/4741162353295360?category=5968803

risk of wildfire. The implementation of this will take forward actions that relate directly to peatland management. These were:

- Continued action on peatland restoration.
- Detailed mapping of peatland, including peat depth, made available to land managers for inclusion in wildfire management planning, and to the Fire and Rescue Service to help tackle wildfire in emergencies.
- Consideration of how managed burns to reduce wildfire risk can, in exceptional circumstances, remain a part of the wider 'toolkit' available to manage wildfire risk.

The Review found that burning on peat habitats has the potential to increase long-term fire risk. Burning on deep peat is likely to set back habitat recovery and encourage the dominance of heather. Heather has a high, woody fuel-load when mature, and burns hotter than other moorland vegetation. This may present more of a wildfire risk in the long term especially when compared with restoration of peatland habitat, including rewetting.[28] Whilst cutting is the preferred management technique for heather on deep peat, the use of burning should remain an option under specific circumstances.

Several other actions that could reduce future wildfire risk in upland peat habitats were highlighted in the review, namely:

- Reviewing how public access is managed,
- Working with Natural England to improve public awareness and understanding of wildfire risks,
- Improving local resilience,
- Considering how we improve existing mechanisms (such as the Fire Severity Index) designed to raise awareness of wildfire risk and trigger actions to reduce the impact of wildfire and increase awareness of imminent risk. We will look at how these mechanisms are applied to better inform closures of public land, improve public awareness of those risks, and reflect changes within climatic conditions.
- Developing a standardised approach to information capture following wildfire incidences.

Continued and close working across central government will remain key to ensuring that policy and practice improvements are taken forward, support more effective and strategic responses to wildfire, and improve our understanding of wildfire risk and how to address it. This includes considering the need for longer-term research into the impacts of wildfire and ensuring that the recommendations of the Uplands Management Group, highlighted below, are widely supported.

[28] Granath, G., Moore, P. A., Lukenbach, M. C., Waddington, J. M. (2016). Mitigating wildfire carbon loss in managed northern peatlands through restoration. Scientific Reports, 6. DOI: 10.1038/srep28498

Uplands Management Group and Forestry Commission Recommendations

The Uplands Management Group were commissioned by Defra to compile advice and guidance to land manager to mitigate against wildfire.[29] Their advice is based on the Forestry Commission Practice Guidance,[30] and recommends a risk assessment approach to planning and preparing for wildfire, which should include:

- A **Wildfire Management Plan**, to reduce the risk of wildfire, and the damage caused if one should occur and mitigate any risks identified in the risk assessment.
- A **Wildfire Risk Assessment,** carried out by land managers, to understand the likelihood of a wildfire event, and the potential severity if it does occur. This includes as a first step, the use of the UMG Wildfire Risk Scoresheet to evaluate the factors that may affect the likelihood of a fire starting and to determine if a full Wildfire Risk Assessment is required.
- **Wildfire management zones**, to protect life, property and infrastructure as well as provide a proportionate approach in land management planning.
- **Wildfire prevention measures –** implementation of planning using operations that will increase wildfire resilience on site and in the landscape. This could include a wide range of management practices including; controlled burning, grazing, tree thinning, cutting (manual or mechanical)**.**
- A **Wildfire Response Plan**, to describe the response required in the event of a wildfire. It should include relevant information such as location of infrastructure, access routes, water sources, specialist equipment, contact details and site maps.

In order to best protect people, businesses, property, habitats and ecosystem services from wildfire, the UMG provide templates for the three documents. It also provides a Wildfire Risk Scoresheet to use in the initial site assessment.

[29] Uplands Management Group Moorland Wildfire Risk Assessment and Management Planning Recommendations https://www.uplandsmanagement.co.uk/

[30] Forestry Commission (2014) Building Wildfire Resilience into Forest Management Planning

Annex C: Delivery Approach

Better information

We currently have a number of information gaps in relation to our peatland - where it is, what condition it is in, and what actions have been taken to recover it. These gaps should not be a barrier to action; addressing them will allow us to make better decisions, including targeting investment in areas that provide the greatest value for money. Over the next two years we intend to develop a number of tools to help close these information gaps.

This will include **an improved baseline map of England's peatland**. Our prioritisation of action and investment on peat is being hampered by the age of the data (>30 years) that is currently available. The map will allow us to:

- Make more robust estimates of greenhouse gas emissions from peatlands;
- Prioritise investment in peatland restoration in areas that would deliver greatest cost-benefit;
- Understand where successful peatland restoration action is possible and where it is not possible to restore peatland;
- Aid in the response to wildfires, as it will enable accurate risk assessment and mitigation;
- Assist in spatial planning, by for example, allowing the National Soil Map to be updated.

This map will integrate with the Living England habitat map and Natural Capital and Ecosystem Assessment pilot programme to show restoration outcomes for habitats and biodiversity in the future. The map will make full use of recent innovations such as satellite data. The intention is that all of our peatland will be mapped by 2024.

Other tools will include:

- **An improved classification scheme** for peatland condition (based on available data). Current classification schemes do not meet the needs of peatlands: most assess condition purely for biodiversity. The new scheme will be used to assess the condition of all peat for multiple objectives, including carbon storage, natural flood management and biodiversity.
- **A peatland restoration register** for projects in England. This will be a one-stop-shop for cataloguing key data, including end goals for the site, current restoration status, greenhouse gas emissions abatement, restoration/management plans, issues and actors. It will play an important role in tracking our progress against the five year stretch targets for peat restoration and it will be a requirement of government funding for peat restoration that projects complete a register entry.
- **Recovery and management trajectories** for different types of peatland. Once a restoration plan has been agreed and funding secured, restoration and management

will transition through stages to reach the end goal and to deliver the agreed environmental outcomes. Figure 4 illustrates an example trajectory with milestones and a likely timeframe for restoration. Using evidence from the pilot programme, and over the course of initial roll-out of the Action Plan, different trajectories will be developed and tested for different peatland types, aiding understanding of the stages necessary to move each site from its starting position to the desired end goal.

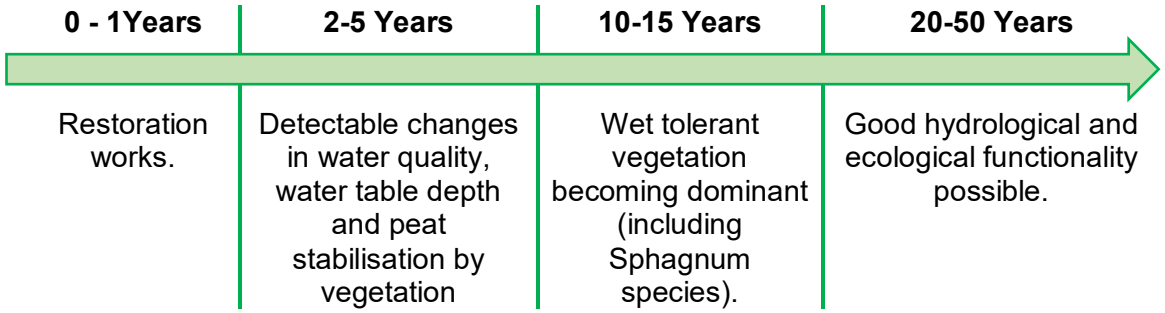

Figure 4: Plotting a recovery trajectory for blanket bog (adapted from RSPB).

Empower: support and facilitation on the ground

As the custodians of our peatlands, landowners and managers are instrumental to their recovery. At a local level the last two decades have seen the emergence of significant peatland partnerships such as the Yorkshire Peat Partnership, Moors for the Future and the South West Peatland Partnership. These are usually led by National Parks or Areas of Outstanding National Beauty, water companies or environmental Non-Governmental Organisations such as Wildlife Trusts, and have proven to be vital in building trusted relationships with, and coordination between, landowners and managers, helping achieve shared values to protect and preserve the environment. Their work has been instrumental in driving peatland restoration as well as advancing our knowledge of restoration processes and its timescales for success. Social research commissioned as part of the Peatland Pilots emphasised the importance of respecting valuable local knowledge, and helping landowners and managers find solutions that work for their land, without being overly prescriptive.[31] The role of trusted intermediaries is vital as part of this process.

In terms of building the infrastructure to deliver benefits for peat, we don't want to replace what established partnerships are already doing effectively. We want to support and grow their approach. We also want to encourage the growth of new or developing peat partnerships in areas with limited current coverage. The original focus of peat restoration occurring in areas of greatest value for biodiversity means that there are still large parts of the country that don't have a strong grass-roots partnership providing expertise and pressing for change.

[31] Reed MS, Kenter JO, Hansda R, Martin J, Curtis T, Saxby H, Mills L, Post J, Garrod G, Proctor A, Collins O, Guy JA, Stewart G, Whittingham M (2020) Social barriers and opportunities to the implementation of the England Peat Strategy. Final Report to Natural England and Defra, Newcastle University

Given Natural England's role in providing national coordination and expertise they are developing a broader offer of support that will:

- seed the creation of peatland partnerships in areas of the country where they don't currently exist;
- ensure existing partnerships have support and continuity of resource to create a pipeline of ongoing restoration, for example, through the funding of planning grants as well as grants for restoration projects in the Nature for Climate Fund.

Plan: developing the pipeline of restoration

We are aware that capital funds to carry out restoration works are not the only funding required by organisations. We know there is a large amount of untapped potential to restore peat, however most sites do not have restoration plans. Developing these plans involves significant work – coordination between multiple landowners and managers, archaeological assessments, surveying work, logistical planning to secure contractors – can take months, sometimes years. Funding and capacity for this work is vital.

The Nature for Climate Fund will provide support and funding for development work on sites that have been identified as suitable for restoration. In addition, pre-market engagement will facilitate the formation of new peatland partnerships, and planning grants will be available for the new partnerships through the grant scheme. This will help to significantly increase restoration efforts nationally, in order to meet our targets.

Building the knowledge & evidence base:

Better knowledge sharing between researchers and practitioners on how to do effective peatland restoration is needed. We will look to develop an evidence and knowledge-exchange programme. We will partner with and influence the direction of other institutions. We want to encourage all research funders to help us to address these gaps.

Our top evidence and knowledge gaps for sites on a pathway to healthy functioning peat-forming wetland habitat are:

- How can restoration success be quantified and monitored? Can we move from intervention-based (e.g. number of ditch blocks) to outcome-based (e.g. demonstrable improvements in peat hydrology, habitat composition) assessment, e.g. using remote sensing?
- How might future changes in climate and land use/management affect degradation processes (including hydrological, microbiological, greenhouse gas flux and nutrient cycling) in different types of English peatland (upland and lowland), and how can these risks be effectively mitigated or avoided?
- How resilient is current peatland restoration activity in England to climate change? Are there particular types of restoration that may provide better returns than others in terms of peatland ecosystem services, including cultural services, or resilience to climate change? Are there areas of the country where anticipated warming risks successful outcomes for any restoration approach?
- How do the changes that peatland systems have undergone due to different types of management affect the outcomes of restoration? Does reversing the causes of

degradation return the peatland to delivering its original ecosystem services or has the peatland system been so changed that it now operates in a different way?
- What factors influence the costs of restoration in different contexts across England, and how does this influence the cost-effectiveness of restoration investments? How can these values be converted into ecosystem service benefit values for use in accounting and monitoring in private investment schemes?
- What are the greenhouse gas implications of restoring forest to peatland compared with retaining productive forest under an improved management regime?

Improving guidance on peatland restoration

Peatland restoration projects and heritage stakeholders have a common objective to halt and prevent further damage to peatland. Degrading peatland can rapidly loose its ability to safeguard historic information. Considering the impact that peatland restoration proposals will have on the historic environment at the earliest stages of project planning, and including appropriate mitigation measures, helps to minimise the possibility of costly delays at later stages of projects.

The preservation and enhancement of the historic environment requires careful consideration from the very earliest stages of project planning for peatland restoration. Collaborative working relationships and embedding historic environment advice into projects from the outset are key to allowing historic and natural environment stakeholders to maximise the opportunities to deliver public goods by peatland restoration.

Natural England and Historic England will be developing joint guidance around peatland restoration and the historic environment. The guidance will demonstrate the need to consider the scale of losses not only of historic information, but also of the other public goods and services inherent within degrading peatland habitats. By adhering to the new guidance, stakeholders will have assurance that historic environment issues have been duly considered, and peatland restoration projects can progress with less risk.