Historic England

Peatlands and the Historic Environment

An Introduction to their Cultural and Heritage Value

Summary

This document provides an introduction to the archaeological, palaeoenvironmental and cultural significance and value of peatlands. It describes where peat deposits are found and the wealth and diversity of heritage assets associated with them – illustrated with examples from both upland and lowland peat settings. Peatlands have further public value as carbon stores and for their rich biodiversity, and so their importance straddles the natural environment and historic environment sectors.
This document outlines the main natural and human-induced threats facing peatlands, of common concern to both sectors, and summarises some of the ways in which peatlands can be afforded protection.

Front cover: The Holme Fen post, Holme Fen National Nature Reserve (NNR), Cambridgeshire. In 1850 the post was put into place with its pointed top at ground level, to show and monitor the peat loss resulting from draining nearby Whittlesey Mere (see Hutchinson 1980; Waltham 2000). This original post (together with a more-recent adjacent one) is recognised for its historic environment value, being Grade II Listed (List Entry Number 1288011). September 2020 © Zoë Hazell

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Contents

1 Introduction

Peatlands preserve unique archaeological and palaeoecological records, are living historic landscapes, and are part of our biocultural heritage. Peat deposits are important archives of past human activities and environments, often forming over thousands of years. The waterlogged conditions that characterise peatlands result in the exceptional preservation of natural and cultural organic remains, unrivalled at typical 'dryland' archaeological sites.

Peat deposits form through the gradual, upward accumulation of organic matter. This build-up of plant matter occurs because waterlogged, anoxic conditions prevent the remains from decomposing. Peat initiation and development are influenced by a site's physical and climatic setting (e.g. topography, water input) and by human activities. Evidence of anthropogenic influences on peatlands extends back to prehistoric times.

Crucially, many areas of peat deposits no longer look like the bogs or fens they once were, particularly where they have been altered by extensive drainage, peat extraction or agricultural regimes.

Definitions

The term 'historic environment' includes the concepts of: historic landscapes (as created, modified and managed by human actions), individual heritage features on the surface, archaeology (above, within and below the peat), records of past environmental changes (as preserved in/as the peat), cultural identity and living heritage.

The term 'peatland' is used here to refer to both/either upland and/or lowland deposits.

2 The resource

2.1 Peat resource

It is estimated that peatlands total an area of around 3 million hectares (12.2% of total UK land area), of which around 640,000 ha (22%) is thought to be in a near-natural condition (Evans *et al* 2017). In England, the area of mapped peat is estimated to be around 682,230 ha, however, 186,000 ha of this is mapped as wasted peat (Natural England 2010) (Figure 1).

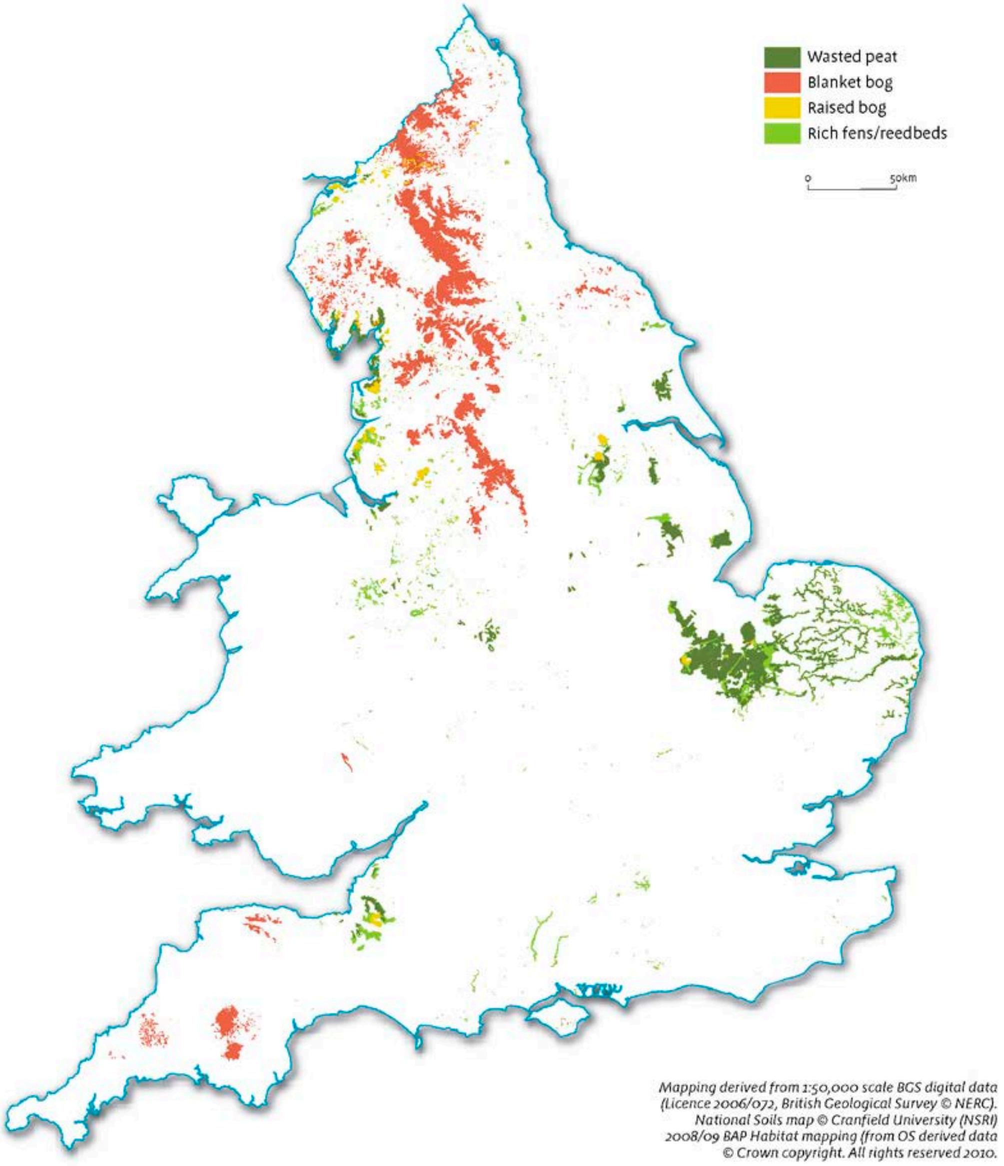

Figure 1: Map of the UK showing the distribution of different types of peatlands (after Natural England 2010: map 2, p.9).

Figure 2: The lowland raised bog at Walton Moss, Cumbria is (unlike its near neighbour Bolton Moss) a near pristine raised bog. It is widely regarded as the most intact ombrotrophic bog in England (Natural England 2015a: p.16). It is a SSSI, with areas also designated as NNR and SAC. As such, it has been the subject of multiple palaeoenvironmental studies (e.g. Hughes *et al* 2000). Image taken December 2013 © Deborah Land.

There are three main formation-types of peatland in the UK:

- blanket bog in the uplands and far north;
- rarer lowland raised bogs; and
- fen peatlands.

Peatlands can be small, a single site or feature, or large encompassing whole landscapes. Some of the oldest peatlands in England date back to the early Holocene period c. 12,000 years ago. In temperate regions peat depths of more than 10 m are not uncommon, with accumulation rates equivalent to 1 cm per 10 years (for example, Walton Moss, Cumbria (Figure 2)). Because of the way they are formed peatlands are important for capturing and storing carbon. Therefore, looking after them is important for tackling the climate crisis.

Peatland classifications, typologies and nomenclatures are complex; for the purpose of this document, the term peatland is used to refer to both/either upland and/or lowland peat deposits.

2.2 Historic environment resource

Historic environment features (as defined on page 1) are present at/on the surface, within, and below the peat. Quantifying the extent and distribution of peatland archaeology is particularly challenging. This is because much of the resource is buried, and as yet unknown. Where figures *are* known, these are for areas which have experienced greatest disturbance (particularly through peat cutting) and therefore most concentrated recording. Whilst the figures also represent the most damage/loss of archaeological remains, these are still likely to be underestimates given the amounts of peat removed/lost prior to archaeological recording.

Results of regional archaeological surveys in England have been used to suggest (minimum) estimates of: 2.2 sites per km^2 in lowland peatlands (i.e. 4,200 sites) and at least 1.2 sites per km^2 in upland peatlands (i.e. 1,800 sites) (van de Noort *et al* 2002). But there are also regional differences; extrapolating data from the Brue Valley and Sedgemoor in the Somerset Levels, would put the estimated number of sites in lowland peatlands higher, at more than 3.4 sites per km^2 (i.e. 7,000).

These figures are based on the results of multiple wetland surveys funded by Historic England. As well as the Somerset Levels, areas studied extensively include: the East Anglian Fens, the Humber wetlands and North West England. Projects exploring the condition and management of England's wetlands as a whole include the *Monuments at Risk in England's Wetlands* and *Heritage Management of England's Wetlands* projects.

3 The cultural and heritage value

There are multiple facets to the cultural and heritage value of peatlands. They are important archives of archaeological and palaeoenvironmental records, preserved within – and as – the peat deposits themselves. Peatlands were part and parcel of life. They are historic landscapes and part of cultural identities, with an intangible heritage associated with their past use and exploitation. For more information see Gearey *et al* (2011) and Flint and Jennings (2020).

3.1 The deposits

Organic remains can be preserved in peatlands for thousands of years, due to the waterlogged, anoxic conditions that characterise these deposits. Peatlands are important archives of our past, documenting climate and environmental change, and providing evidence of human activities that took place in, and influenced, these alterations (see Gearey *et al* 2011; Charman 2002). These data are important for understanding contemporary processes (such as climate change) and for providing the ecological 'baseline' context of peatland restoration processes.

Archaeological and palaeoenvironmental remains are frequently discussed and considered in terms of their research 'potential'.

Archaeology

Direct evidence of human occupation and activity (archaeological remains) can be found:

- at/on the peat surface,
- within the peat, and
- below the peat.

Examples include structures (such as wooden trackways (Figure 3), platforms (Figure 4) and dwellings), domestic and personal items (Figure 5a and 5b), tools and implements, ceremonial monuments (e.g. stone rows (Figure 6a and 6b), burial chambers (Figure 7a and 7b) and cairns (Figure 8a)), rock art (Figure 8b), food (e.g. the Celtic/fava (*Vicia faba*) beans at Glastonbury Lake Village (Reid 1917)), and of the people themselves (i.e. 'bog bodies') (see Stevens and Chapman 2020).

Figure 3 (top): Excavating the Neolithic timber Lindholme trackway, Hatfield Moor, South Yorkshire, 2004–2006. Note the more-recent drainage ditch cutting across the trackway itself © Henry Chapman.

Figure 4 (bottom): The central platform (the largest of the lake edge platforms) under excavation in 2013, at the Early Mesolithic site of Star Carr, North Yorkshire © Star Carr Project, CC BY-NC 4.0 (see Milner *et al* 2018a, b).

Figure 5:
(a) Star Carr has yielded the largest assemblage of Mesolithic bone and antler artefacts in Europe, with artefact types unique to the site. Here, the *in situ* red deer frontlet (possible headdress/hunting disguise) with a smaller roe deer crania (see Milner *et al* 2018a). © Star Carr Project, CC BY-NC 4.0.
(b) A partially charred birch bark roll from Star Carr; one of a total of 161 excavated from the site over the years. Possible uses include as tapers/torches, in tar production, and/or as fishing floats (see Milner *et al* 2018b). © Paul Shields, University of York, CC BY-NC 4.0.

Figure 6:
Examples of surface and within-peat archaeology: the Neolithic stone row at Cut Hill, Dartmoor, Devon (Fyfe and Greeves 2010); (a) showing the line of stones visible at the surface, and (b) and the submerged, horizontal stone [with the short scale bar placed on top], together with the peat profile sampled for palaeoecological analyses and radiocarbon dating. © Ralph Fyfe.

Figure 7:
The Bronze Age cist (burial chamber), Whitehorse Hill, Dartmoor, Devon (see Jones 2017). Within the cist were preserved the remains of a cremation burial. Finds included: beads, a worked flint, textiles, basketry, and wooden studs, all wrapped up within a bear pelt. *Filipendula* sp. (meadowsweet) pollen was identified from samples within the cist, suggesting that a floral tribute was included as part of the burial rite; (a) the tin, amber, shale and ceramic beads, and the wooden *Euonymus* sp. (spindle wood) (possible ear) studs, and (b) excavating the cist and sampling the adjacent peat profile. Both images © Dartmoor National Park Authority.

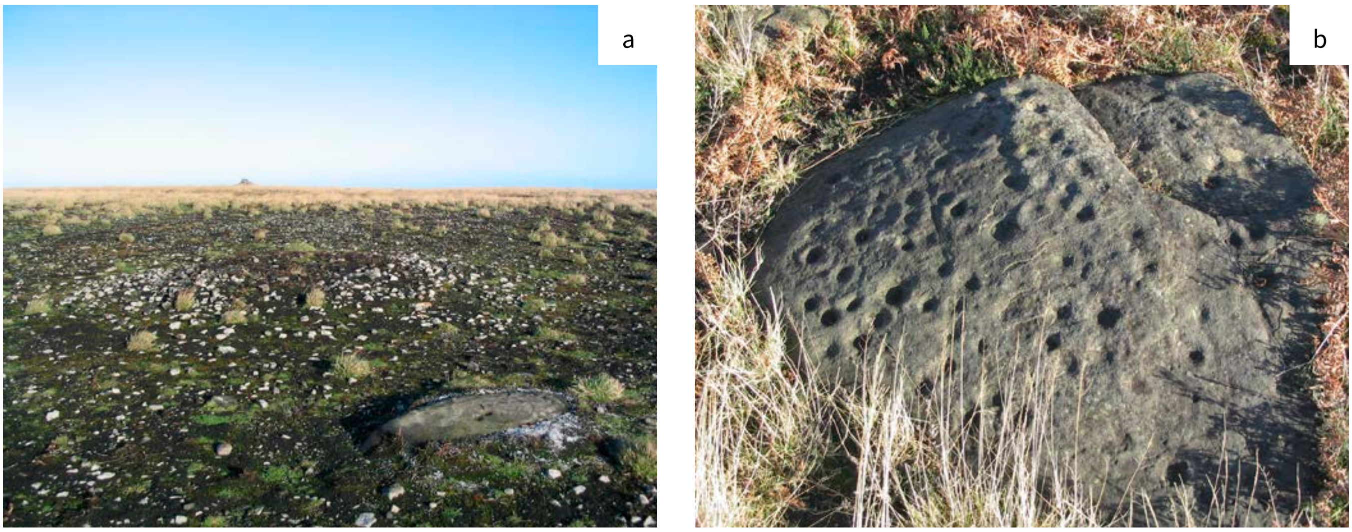

Figure 8:
Archaeological remains exposed after the 2003 fire on Fylingdales moor, North Yorkshire. Note that in January 2006, when this photograph was taken, the vegetation was recovering. (a) Three probably prehistoric features: a cup-marked stone in the foreground, a small stone cairn just behind (likely to be an Early Bronze Age burial monument), and what is probably a clearance cairn in the background; (b) an example of the prehistoric rock art (probably late Neolithic). © Jonathan Last, Historic England.

Palaeoecology

The peat deposits themselves are made up of remains of the plants and animals that once lived in and on the peat, and can be used to reconstruct a site's environmental history and provide an understanding of the context in which human activity occurred. The data can also be used to understand regional and global climate and environmental change.

As well as providing direct information on past vegetation (through the analysis of e.g. leaves, seeds, pollen and spores) peat also contains proxy indicators of past site conditions (e.g. testate amoebae and insects) and evidence of past burning events (e.g. micro-charcoal) (see Historic England's *Environmental Archaeology* guidance). Where such deposits remain intact, they provide continuous records of past environmental histories. The faster the accumulation rates, the higher the resolution of the environmental record.

Scientific dating

The main dating techniques used on peat deposits and organic archaeological remains are radiocarbon dating and dendrochronology. The technique that uses the lead isotope ^{210}Pb can be used to date more-recent deposits (<200 years old), and, where available, tephra layers can be used as chronological markers. In addition, archaeological artefacts found within features and associated with activities, can provide a good indication of when these events took place and their duration.

Other analyses

Analysis of other isotopes (e.g. oxygen, hydrogen, carbon and nitrogen) can provide information on past environmental conditions, particularly precipitation and wetness. Evidence of past industrial activities and pollution over a range of timescales can be determined from SCPs (Spheroidal Carbonaceous Particles) and atmospheric metal deposition records.

3.2 Historic environment features

Within these landscapes sit historic environment features (heritage assets). Whilst many are directly related to the use/exploitation of the peat itself, not all are. As well as being important in their own right, their significance and value derive from their wider, contextual (i.e. landscape) setting as outlined above.

Individual features are associated with:

- historical peat working (extraction): the peat cuttings themselves (domestic, industrial) which can vary in size and extent (Figure 9a and 9b) e.g. the landscape-scale Norfolk Broads; baulks, banks and ditches, peat stacks, steadings (Figure 10); tramways (Figure 11); hollow-way routes to and between cuttings; associated buildings e.g. for processing and storing peat (Figures 12 and 13) e.g. for petrochemicals such as naphtha;

- past water management regimes e.g. grips/ditches, and wind pumps (Figure 14);

- exploitation of other resources e.g. reed/sedge beds for thatching, and wildfowl and eels for food;

- occupation e.g. houses, field systems;

- industrial archaeology e.g. tin, coal, lead mining – tinners' buildings, extraction shafts, spoil heaps, leats, associated buildings (Figure 15);

- standing buildings, associated with other activities e.g. transport infrastructure; and

- military activities e.g. 20th century built structures, trenches, wartime aeroplane crash sites (Figure 16a and 16b).

Many aspects of peatland landscapes are still not fully understood or recorded, with upland features in particular being discovered as walkover surveys are undertaken prior to peat restoration works.

Figure 9:
(a) Peat cuttings (likely post-medieval) in the foreground, on the upland hills at Exe Plain, Exmoor, Somerset, in February 2012 (by D. Grady) © Historic England Archive (ref. 27413_002).
(b) Chapman's Broad (centre), adjacent to the larger Hickling Broad, Norfolk, in March 1938. They are part of The Norfolk Broads, created as the result of extensive Medieval peat cutting; as demonstrated by Dr Joyce Lambert in the 1950s (e.g. Lambert and Smith 1960; also see Natural England 2015b, Moss (2001): p.11). © Historic England Archive (ref. EPW056549).

Figure 10:
Remains of a steading (rick) on Bodmin Moor, Cornwall – a low platform within a shallow ditch on which cut turves were dried. This historic asset was only identified in advance of peatland restoration works, despite being in an area that has previously undergone extensive archaeological research and survey. This feature type is thought to be specific to this region. © Southwest Peatland Partnership.

Figure 11:
Remains of a tramway at Amicombe, Dartmoor surveyed as part of peat restoration works funded by Defra and South West Water. Sleepers can still be found in place within the vegetation.
© Southwest Peatland Partnership.

Figure 12:
A ruined and part-demolished peat charring oven at Rattlebrook Head Peat Works, Dartmoor, installed in the late 1870s. © Phil Newman.

Figure 13:
Grade II listed remains of the late 18th to early 19th century Old Gang Peat Store, North Yorkshire (List Entry Number 1131503). The peat was used as fuel to smelt the locally-mined lead. © Historic England Archive (ref. 28813_046) taken September 2015 (D. MacLeod)

Figure 14:
View across Sedge Fen (Wicken Fen, Cambridgeshire) showing the historic, Grade II listed (List Entry Number 1161096) (re-located) wind-pump, and the visitor centre. The wind-pump dates from the early 20th century and was originally used to drain water for peat cutting on Adventurer's Fen, but was moved in 1956. February 2014 © Zoë Hazell.

Figure 15:
Evidence of coal mining and associated processing on Fountains Fell, North Yorkshire, part of which is a Scheduled Monument (ref. 1017715).
© Historic England Archive (ref. 34119_001) taken September 2019 (E. Trevarthen)

Figure 16:
Remains of the WWII Spitfire X4593 from Holme Fen, Cambridgeshire which crashed on 22 November 1940 during a training flight. The body of Pilot Officer Harold Penketh was recovered at the time, and the remains of the aeroplane were excavated in 2015 by Oxford Archaeology East. The photographs show the propeller *in situ* (a), and excavated (b). All photos © Oxford Archaeology.

3.3 Historic landscapes

On a holistic, landscape scale, peatland landscapes (‘peatscapes’) provide composite evidence of being shaped, modified and/or created by past human activities. These extend from the influence of prehistoric human activities on early peatland development, to more-recent effects of large-scale historic drainage/extraction schemes.

3.4 Wider cultural heritage

Peatlands also have links to intangible heritage and cultural identity, for example:

- the history and heritage of peat cutting, for example the tools used and livelihoods supported (as presented for example at Nidderdale Museum, North Yorkshire (https://www.nidderdalemuseum.com), and the Kirbuster Museum, Orkney (https://www.orkney.com/listings/kirbuster-museum);
- the traditional language associated with peat deposits (e.g. Finlay MacLeod's "Some Lewis Moorland Terms: A Peat Glossary", in Macfarlane 2016); and oral histories (e.g. the "Moorlands: People, Places, Stories" project in Upper Nidderdale, North Yorkshire (see Nidderdale AONB 2018));
- associative value – for example, Wicken Fen, Cambridgeshire was where ecologists and botanists Sir Harry Godwin, Sir Arthur Tansley and Dr Max Walters, as well as Charles Darwin, undertook their pioneering research (see Hazell 2014);
- as a resource-base for past uses, that might not have left lasting evidence in the landscape, for example harvesting *Sphagnum* for medical dressings;
- the landscapes as represented in art (e.g. Thomas Wade's *Turf Cutters* (1869); John William Inchbold's *Peat Burning* (c 1864–6); Joseph Beuys; Fred Ingrams) and in literature (e.g. Seamus Heaney; Edna O'Brien); and
- as a continued resource today e.g. in whisky manufacture (see Godsman and Van De Greindt 2008).

Key points

Peatlands preserve unique, evocative and fragile archaeological sites and artefacts that are generally not found on drylands, and provide an amazing record of environmental and landscape change. They make it possible to place people's activities within their environmental setting. Their extensive cultural and heritage connections provide exceptional opportunities for public enjoyment and engagement.

4 Managing peatlands

Good management of peatlands is vital in order to protect and maintain their multiple public benefits. Increasingly, this is being driven by the urgent need to stem growth in atmospheric carbon dioxide concentrations to avoid catastrophic climate change. Peatlands are a crucial store of carbon – reducing peat loss, and maintaining and restoring healthy peatlands, are essential for global carbon reduction and can also help reduce the impacts of an already changing climate. Overall, concerns for the loss of peatlands are shared by the natural environment and historic environment sectors. Therefore, managing peatland sites requires close collaboration and joint working.

4.1 Threats to peatlands

Peatlands as a whole are at risk of loss from a range of direct and indirect threats. Peat loss occurs on a range of scales, from incremental losses to drastic events, and their impact is cumulative, putting heritage above, within and below the peat at risk (see Cover image). The main factors driving peat loss include: climate change, agriculture, tree planting, root damage, fires (including managed burning), peat cutting, dewatering, desiccation, erosion, and land drainage (see Gearey *et al* 2011 for more detail). Many of these are interlinked, and will increase in frequency and/or severity as a result of climate change, for example, the incidence of fires. Some threats are more relevant for certain peatland types; for example, arable agriculture is a particular threat to lowland peats. Holman (2009: pp. 9 and 14) used various sources to estimate that deep peats within the East Anglian Fens were wasting at rates of up to 2.1 cm/year (for land described as 'intensive arable').

Whilst peat loss is unwanted and needs to be reversed and/or reduced, the destructive processes involved can lead to important archaeological discoveries (Figures 4, 7a, 7b, 8a and 8b) and provide opportunities for engagement (Figure 17).

Figure 17:
Peatlands offer incredible opportunities for communities to explore and engage with the archaeological and palaeoecological resource. The lowland peatland of Hatfield Moors has been the focus of concerted public engagement via The Heritage Lottery Council; funding The Isle of Axholme and Hatfield Chase Landscape Partnership (IOAHC) (https://ioahc.net/). Events have been held on the themes of: (a) experimental archaeology – the project Trackway Through Time built a reconstruction trackway, including making the stone tools and felling the tree, and (b) palaeoecology – Project Wildscape's 'Palaeofest' event included coring to retrieve samples, followed by a pollen citizen science workshop.
© Benjamin Gearey.

As well as the threats to peatlands (as outlined above), further specific threats to the historic environment include:

- changes to site hydrogeology; for example, fluctuating water tables, and water-table draw-down resulting from drainage (which has been shown to negatively affect pollen preservation, Davies *et al* 2015); and
- actions that can change and/or obscure surface features, and alter their wider setting – including works undertaken to restore peat areas.

4.2 Peat restoration works

In order to stabilise and protect peat deposits at risk of loss (e.g. through erosion) peat restoration works are undertaken. However, restoration works themselves can result in changes to, and loss of, historic environment features, archaeological remains and peat deposits if not carefully planned. Methods used in restoration schemes include: re-profiling, grip blocking (using dams of peat, wood, plastic sheeting, or heather/coir plant bales to block up old drainage ditches) and vegetation planting/seeding (e.g. of *Sphagnum* moss). The method(s) used need to be tailored depending on the character of each site, and will need to consider: loss of, or disturbance to, the sediments, as well as peat compression.

4.3 'Doing nothing'

In some settings 'doing nothing' is a direct threat to the preservation of peatlands' historic environment features and deposits, resulting in loss of the historic environment resource. Remedial actions (i.e. restoration works) are therefore necessary, and enable an initial limited, managed and recorded loss; in preference to the alternative which would be a continued, uncontrolled and unrecorded loss.

Key points

Peatlands are at risk of loss from a range of direct and indirect threats, and increasingly, pro-active management approaches are required to protect them. Together, these can be viewed as opportunities to discover and record historic environment features as they are revealed.

5 Designations and protections

Sites and features are recognised and protected through historic environment designations (e.g. scheduling and listing) and/or natural environment designations (e.g. SSSI, NNR, LNR and SAC). Yet designations do not necessarily protect sites from loss, especially those in settings that are drying out. Some specific site types will have additional statutory protections e.g. aircraft crash sites. Sites that sit within protected landscapes (e.g. National Park and AONB areas) are afforded protection as part of the overarching management responsibilities of the governing authority. Other land management schemes (e.g. environmental stewardship) also help ensure that land-owners manage their natural and cultural assets appropriately.

International designations are also relevant, for example, World Heritage Site status (administrated by UNESCO), and the Ramsar Convention that designates wetlands of international importance.

It is essential to recognise that natural and historic environment designations have different management priorities and approaches. These do not always directly align, and highlight the importance of close cross-sector working and engagement.

6 Further reading

The Historic England-funded wetland surveys are all published; The Somerset Levels Project, the Fenland Project, the Humber Wetlands Project, and the North West Wetlands Survey.

Guidance on specific aspects of archaeology and heritage are available through the Historic England website, in particular:

Environmental Archaeology
https://historicengland.org.uk/advice/technical-advice/archaeological-science/environmental-archaeology/

More on peatlands, their form and function can be found in Natural England publications. For example, see *England's peatlands: Carbon storage and greenhouse gases* NE257, available at:
http://publications.naturalengland.org.uk/publication/30021

The International Union for Conservation of Nature (IUCN) UK Peatland Programme website also hosts a range of peat resources, including the comprehensive historic environment review by Gearey *et al* (2011); see:
https://www.iucn-uk-peatlandprogramme.org/

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8 Glossary

Anoxic
oxygen-depleted

AONB
Area of Outstanding Natural Beauty

Blanket bog
an expanse of peat covering extensive areas of upland hills, whose water input is primarily from rainfall ('ombrotrophic'). It is an overarching term used to describe a complex of feature sub-types.

Dendrochronology
tree ring dating. This is based on the annual growth patterns of most tree species in temperate regions

Fen
a peatland which receives water input from groundwater and/or runoff ('minerotrophic') (Charman 2002: p. 6)

Holocene
the current warm period following the end of the last glacial c 12,000 years ago (Walker *et al* 2009)

Isotopes
are atoms of an atomic element that have a different number of neutrons (but the same number of protons and electrons) e.g. $^{13}C/^{12}C$, $^{18}O/^{16}O$.

LNR
Local Nature Reserve

Micro-charcoal
microscopic charcoal fragments produced during burning events. They are used as evidence of past fires

Naphtha
a flammable liquid produced from the distillation of peat

NNR
National Nature Reserve

^{210}Pb dating
a radiometric dating technique that uses this radioactive isotope of lead

Proxy indicators
something that is counted/measured in place of a variable of interest, because it responds to that variable in a known way; and that variable can no longer be measured because it happened in the past. A proxy provides an indirect measure of past climates or environments (e.g. moisture levels, temperature, water quality, air pollution etc)

Radiocarbon dating
a radiometric dating technique that uses the radioactive isotope of carbon (^{14}C)

Raised bog
a dome-shaped peatland which receives its water input solely from rainfall (‘ombrotrophic’)

SAC
Special Area of Conservation

SCPs
Spheroidal Carbonaceous Particles; spherical microscopic fly-ash particles, produced from fossil fuel burning

SSSI
Site of Special Scientific Interest

Tephra
sherds of volcanic ash emitted during volcanic eruptions. The chemical composition, together with physical characteristics, of tephra layers can be matched to specific eruptions

Testate amoebae
single-celled organisms that indicate moisture levels. They can be used as a proxy to reconstruct past wetness.

UNESCO
United Nations Educational, Scientific and Cultural Organization

Wasted peat
“a technical term for deep peat that has been substantially degraded following years of drainage and cultivation so that the peat is now more dominated by underlying mineral material” (Natural England 2010: p. 7)

9

Where to get advice

Local authority curator/archaeologist
https://www.algao.org.uk/localgov/hersmr

Local Historic Environment Record (HER) officer
https://www.heritagegateway.org.uk/gateway/chr/default.aspx

Historic England's science advisors
http://historicengland.org.uk/scienceadvice

Natural England's historic environment advisors
https://www.gov.uk/government/publications/natural-england-office-locations

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< < Contents