

Positive Carbon Management of Peat Soils

*Soils store huge amounts of carbon when managed sustainably,
benefiting wildlife and people*

Peat soils are capable of supporting some of the most wildlife rich habitats on the planet, and the Broads wetland is no exception. The peaty fens, wet woodland and areas of grazing marsh in the Broads support over 600 priority species¹, including many rare invertebrates such as the Swallowtail butterfly and Norfolk hawker dragonfly.

Peatlands have recently also been recognised for the important environmental services they provide in the form of carbon and water storage. Globally peatlands store nearly double the amount of carbon locked up in the world's forests, an amazing 550 billion tonnes, with peat soils in the UK storing 580 million tonnes carbon².

In the Broads executive area, peat soils have been estimated to store 25 million tonnes of carbon³ equivalent to the annual carbon emissions from a very large coal fired powered station. This carbon remains essentially "locked up" provided the wetland soils remain un-drained and undamaged by cultivation.

This document provides soil carbon protection advice to land owners, land managers and agri-advisors, and has arisen from the Broads Authority peat survey carried out in 2009/2010.⁴ The survey looked at the type and quality of peat soils outside of conservation designated fen and wet woodland habitats, and included fen meadow, grazing marsh and arable sites. These peat soils account for over 4,500 hectares which could potentially be improved for carbon storage mainly through water management.



1. MINIMISING CARBON LOSS

Many of the surface peat layers in the Broads have been degraded and lost by erosion, shrinkage, or been extracted for fuel. The boundary of the base of this surface layer with the less decomposed hemic peat beneath is largely determined by watertable height.

1. Reducing loss of the surface 'earthy' peat

As the peat dries it is prone to shrinkage and wind or water erosion, which can lower the ground surface and induce further drainage.

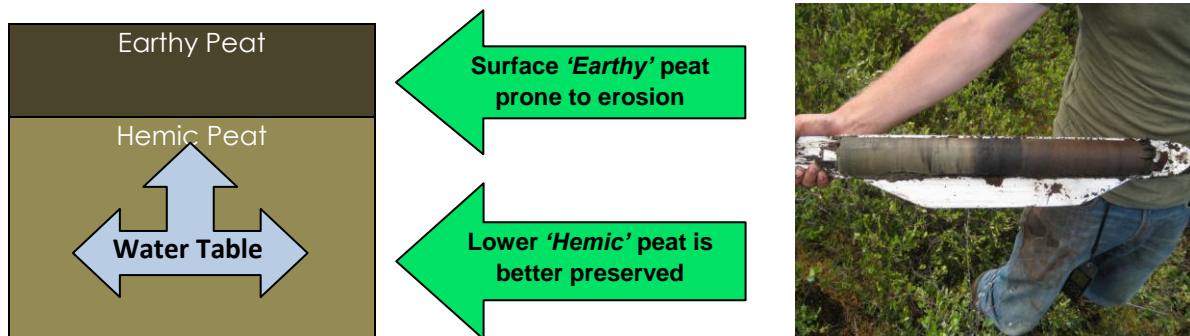
Action: To reduce peat and carbon loss the area can be established as permanent grassland.

2. Preserving the subsoil 'hemic' peat

Some peat bodies show a marked black 'gritty' layer (zone of degraded peat) where the watertable has been lowered into the upper part of the hemic peat by enhanced drainage.

Action: To preserve good quality hemic peat, the watertable should remain above the boundary of the 'hemic' and 'earthy' peat for as much of the year as possible.

Note: This option is unsuitable for arable cultivation, as the rate of oxidation of the peat, (and hence its cultivation ability) is reduced when the watertable lies within the 'earthy' peat layer.



Natural England's [Environmental Stewardship Scheme](#) provides funding to landowners to help manage the countryside to protect wildlife, landscape and natural resources. Several Environmental Stewardship Options promote healthy soils and carbon protection, and have been included in this advice sheet.

Higher Level Stewardship Option:

- HK6 - Maintenance of species-rich, semi-natural grassland
- HK15 - Maintenance of grassland for target features

2. PROMOTING A NEUTRAL CARBON BALANCE

Where watertables have been maintained near the ground surface year-round, there may only be a thin earthy layer (< 10 cm thick). The peat body is otherwise in good condition as sufficient dead plant material should be preserved each year, to allow for any breakdown of peat during the growing season, when the watertable is lower.

Action: Maintain a high watertable year-round. This is possible where fields are isolated from drains and watercourses, and where groundwater flows are still functioning.

Habitat Water Level Guide

- ✓ **Fen** retain water levels as close to the ground surface as possible
- ✓ **Fen Meadow** retain water levels within 10 cm of the ground surface
- ✓ **Grazing Marsh** ideally retain water levels at or just below marsh level. HLS water level options will be prescribed according to individual agreement objectives.



Higher Level Stewardship Option:

- HK19 - Raised water levels

3. PROMOTING A POSITIVE CARBON BALANCE

Positive carbon balance tends to be restricted to two types of situation:

Where the watertable within areas of the valley floor is within 10 cm of the ground surface all year round, but is frequently above the ground level for extended periods. Such sites are usually highly valued wildlife habitats including wet woodland, reedbed or fen. Where high groundwater levels can be maintained, the accumulation of organic matter can exceed peat breakdown, leading to peat growth.

Action: Maintain high water levels year round.

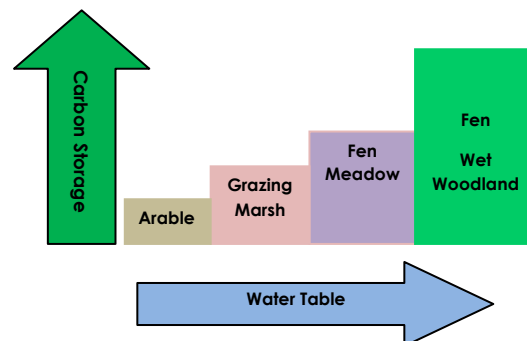


Fig 1 Broad's habitats and potential carbon storage

On the margins of the peat body, especially where peat is known to have formed in the past, positive carbon storage can be established on mineral soils **by establishing permanent grassland.**

Higher Level Stewardship Option:

- HK19 - Raised water levels
- HQ6 Maintenance of fen
- HG3 Maintenance of Reedbed
- HK6 - Maintenance of semi-natural grassland
- HK15 - Maintenance of grassland for target features

The Broads Authority can advise on ways to positively manage soils for carbon and wildlife
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Glossary

Earthy peat	Usually forms the ground surface of the peat body, earthy peat is the very dark brown to black-coloured. The material is dust-like when dry and prone to wind erosion and compaction. As the dust cannot return to the gel-like consistency when wet, it typically ponds rainwater. Water chemistry held in the peat topsoils therefore becomes increasingly different from the groundwater. This can be reflected in the vegetation that develops. E.g. Hard rush <i>Juncus inflexus</i> tends to colonise drains sides influenced by calcareous groundwater, while soft rush <i>J. effusus</i> colonises the normal ground surface, reflecting the acidic rainwater.
Hemic peat	This type of peat has partially decomposed, plant remains leave 'fossil' traces of the harder parts of plants (stems and woody matter). In the Broads grazing marshes hemic peat is initially recognised by its colour, which is dark brown to black. Secondary forms of recognition are by squeezing a sample (confirming a gel like quality) and by seeing plant fragments.

References

- ¹ Broads Biodiversity Audit (2011), Broads Authority Report, UEA
- ² Englands Peatlands Carbon Storage and Greenhouse Gases (2010), Natural England
- ³ Broads Carbon Audit (2010), Broads Authority Report, UEA
- ⁴ Broads Authority Peat Resource Contract (2010), Broads Authority Report, ELP