Practical guide (November2021)

Managing Peatlands and Upland Habitats

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Protecting our Peatlands

Scotland's peatlands store 1.7 billion tonnes of carbon - more than 30 times the amount of carbon in our forests and other vegetation. Unfortunately, because much of our peatland is degraded, it is thought that around 1.6 million tonnes of carbon is released from peatland each year, through drying, erosion and oxidation. This is equivalent to more than 10% of Scotland's total carbon emissions. However, intact peatland removes carbon from the atmosphere as the vegetation growing on the surface does not decompose in the waterlogged conditions and instead forms new peat.

Managing our peatlands to restore previous damage and prevent new damage therefore helps to reduce carbon emissions and creates a carbon sink. Intact peatland also provides other valuable ecosystem services:

- Natural flood management - slowing rainwater and reducing peak flow levels
- Water quality – buffering watercourses from atmospheric pollution
- Wildlife habitat -supporting wading birds and a wide range of plants and invertebrates

What can I do to protect peatlands?

Land managers have a critical role to play in protecting our peatlands and peat-rich soils and there are three key ways that you can do this:

Identify your peatlands
This may seem simple, but peatlands form mosaics with other upland habitats and share many of the same plants. Surveying and mapping these habitats is an essential starting point.

Protect peatlands from damaging activities
Ensure that management doesn't cause damage to intact areas or exacerbate existing damage.

Restore degraded peatland
Take action to repair previous damage to peatland, turning a carbon source into a sink.

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Identify your peatlands and other upland habitats

There are three broad upland habitat types dominated by Ling heather (*Calluna vulgaris*): Dry Heath, Wet Heath and Blanket Bog. These differ in their importance as a carbon store and in their susceptibility to management impacts. Identifying these habitats and where they occur on your land is therefore critical to ensuring appropriate management.

Dry Heath

Dry heath occurs on freely draining mineral soils (particularly podzols) without peat and with only a very thin organic layer at the surface. This can often be easily seen at the edge of tracks.

- Abundant Bell Heather (*Erica cinerea*) is a good indicator of dry heath, along with Cowberry (*Vaccinium vitis-idaea*) and Blaeberry (*V. myrtillus*).
- It is most common on drier eastern moors, where it is the dominant vegetation on most sloping ground.

Wet Heath

Wet heath occurs where impeded drainage or high rainfall means that the ground is waterlogged for much of the year. There will often by a thin layer of peat (<50cm) between the vegetation and the mineral soil underneath.

- Cross-leaved Heath (*Erica tetralix*), Purple Moor-grass (*Molinia caerulea*) and Bog Asphodel (*Narthecium ossifragum*) are good indicators of wet heath.
- Sphagnum mosses can often be present in wet heath.
- It is abundant on wetter western moors, where it dominates gently sloping ground.

Blanket Bog

Blanket Bog occurs where peat has built up to a depth greater than 50cm (often 2-3 metres or more). The peat depth can be seen when exposed by erosion hags, or can be tested by probing the depth with a cane or pole.

- Many of the plants are similar to wet heath, but Harestail Cotton-grass (*Eriophorum vaginatum*) is a key indicator of deep peat and blanket bog.
- Sphagnum mosses are often more abundant than in wet heath.
- It is found mostly on flat or very gently sloping land at all levels in the west, but mainly above 400m in the east. Small pool systems are common.

Planning Moorland Management

Once you can identify the different upland habitats, the next step is to produce a moorland habitat map identifying the areas of blanket bog, wet heath and dry heath (and any other habitats such as grassland and woodland) within the area that you are managing.

Aerial photography provides a good starting point for habitat mapping as it is often possible, with practice, to distinguish peatland areas from these. However, this will have to be ground-truthed by assessing the vegetation on the ground and by probing peat depth. Although there are some maps of peatland soils available online, these are often not accurate enough at the individual landholding scale to help with site management. However, they do provide a general indication of where deep peat is likely to be.

The moorland habitat map then allows the moorland manager to determine where management impacts may be having the greatest impact and where remediation work is required.

Management Impacts - Drainage

Many areas of blanket bog and, to a lesser extent, wet heath have been artificially drained in the past to provide easier access for livestock or to improve the growth of heather, which grows more vigorously on drier ground. Parallel lines of drainage channels or 'grips' are often clearly visible on aerial photographs of such areas.

By drying the peat surface, drainage channels hinder carbon sequestration that would otherwise occur through the formation of new peat and can lead to erosion and peat loss.

Drained bogs are also vulnerable to invasion by trees and shrubs (which do not normally grow well in waterlogged peat) and the trees then exacerbate the drying by drawing water up through their roots.

Blocking such drains with peat dams or similar structures is an important measure to re-wet the bog surface and restore the ecosystem services it provides.

Moor grip (drain) in deep peat (above)

Birch regeneration on a drained (raised) bog (left)

Management Impacts - Grazing / Trampling

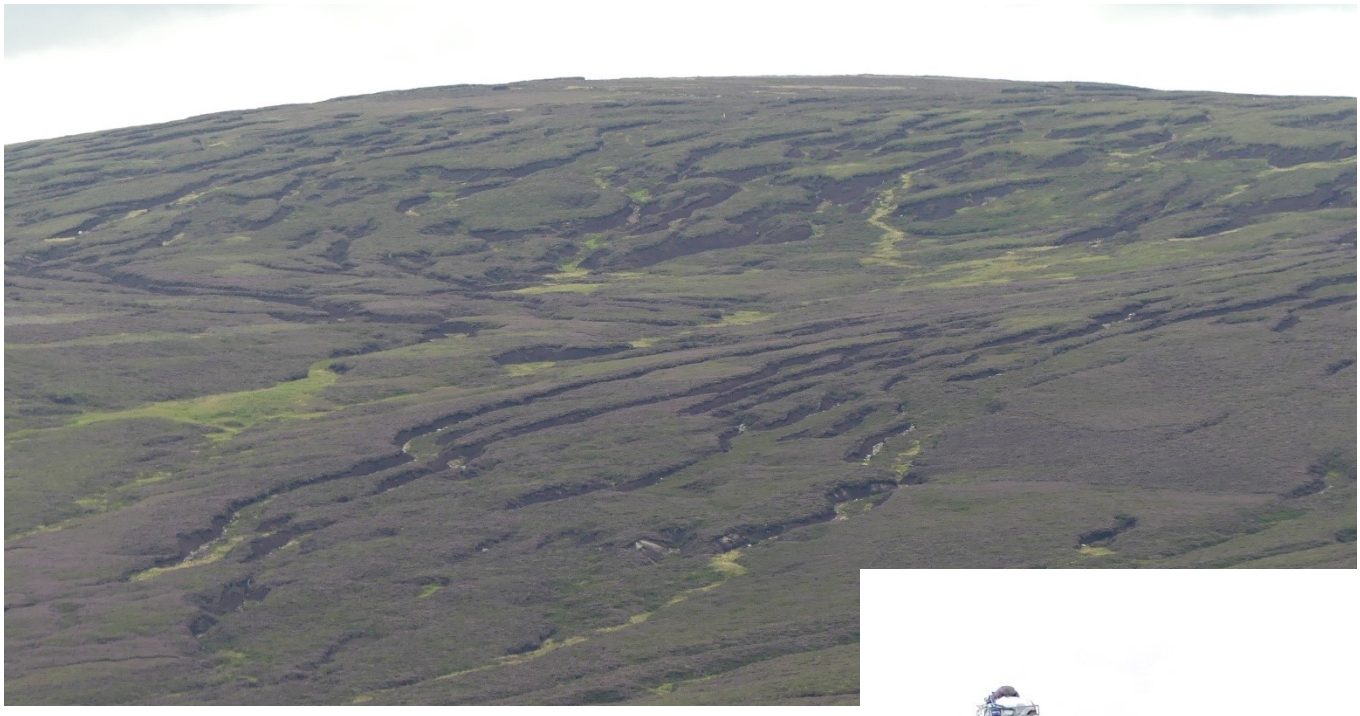
Blanket bog generally supports lower levels of livestock grazing than wet heath and dry heath. High levels of stocking by cattle, sheep and, more commonly, red deer can damage the fragile surface of blanket bogs and wet heaths, exposing bare peat. This results in much higher levels of peat erosion than would occur naturally and is likely to be responsible for many of the areas of bare peat haggs that we see in the uplands today. In some cases, this is a legacy of historical over-stocking, but the damage will not repair itself and requires restoration work.

Approximate guideline stocking rates in Livestock Units per hectare are given below. For red deer, densities above 8 deer/km^2 are likely to be damaging to peatland habitats, although this will vary from site to site.

Dry Heath	**0.10 - 0.20 LU/ha**
Wet Heath	**0.05 - 0.10 LU/ha**
Blanket Bog	**0.00 - 0.05 LU/ha**

Ensuring that grazing pressure is at a sustainable level is important to protect peatland from further damage and it is particularly important after habitat restoration work has been carried out, to prevent damage occurring again in future.

Restoration work for damaged areas may involve reprofiling of eroding haggs, damming of gullies or even reintroduction of sphagnum and cotton-grass.



Severe peat erosion (above)

Peat hagg re-profiling (right)

Burning

Burning has long been used as a management tool in the uplands, both to provide fresh vegetation growth for livestock and deer and to provide habitat for red grouse shooting. On dry heaths in eastern Scotland, heather and other moorland plants can recover very quickly from burning and rotational burning can ensure that grazing pressure is spread more evenly over the hill. However, burning on bogs and wet heaths can expose the underlying peat to erosion and there is a risk of the peat catching fire in dry coniditions. It can also lead to loss of heather and over-dominance by Cotton-grass on blanket bogs and *Molinia* on wet heaths. The resulting vegetation has limited grazing value and by removing the heather which can provide nutrition during the winter months, the resilience of the habitat for grazing animals may be reduced.

Burning of upland habitats is subject to the Muirburn Code, which is a cross-compliance requirement of agricultural subsidy schemes. Under the latest version of the code:

- Vegetation on deep peat (>50cm) must not be burnt unless it is part of an habitat restoration scheme approved by NatureScot. An example of this might be to remove a canopy of rank heather from a dried-out peatland, but this would have to be accompanied by measures to re-wet the bog to prevent the heather from becoming over-dominant again.
- On dry and wet heaths, sensitive areas and steep slopes must not be burnt and individual fires should not extend over large areas.
- Although burning on wet heath is not prohibited, it may not be advisable due to the risk to any underlying peat and due to the very slow recovery of heather on such sites, compared to dry heathland.

Muirburn on peatland can lead to dominance by Cotton-grass and loss of heather

Forestry and woodland creation

At lower altitudes, most dry heath is a man-made habitat that would once have been wooded. Therefore, although dry heath is a valued habitat in its own right, it is also an ideal place for woodland creation, being particularly well-suited for the creation of new native woodlands of Scots Pine, Oak or Birch.

By contrast, intact blanket bog is naturally treeless or supports only scattered, stunted trees due to the waterlogged conditions and lack of nutrients. Despite this, many areas of blanket bog were planted with conifer plantations in the past, with ploughing of the peat required to enable the trees to grow.

- Under the UK Forestry Standard, no tree planting or woodland creation should now take place on peat soils deeper than 50cm. (ie. all blanket bogs)
- Where plantations on deep peat are being felled, there may be an opportunity to restore blanket bog. A Practice Guide is available from Scottish Forestry to help determine if this is appropriate ('Deciding Future Management Options for Afforested Deep Peatland')
- Although wet heath can support woodland and forestry, the carbon balance needs to be carefully considered and the forestry grant scheme now prohibits ploughing on peat deeper than 10cm, which will include most wet heaths.

Lodgepole Pine plantation on deep peat, Caithness

Further Information

For further information visit the following sites, and search for 'Peatland'

SRDP Farm Advisory Service
www.fas.scot

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba
www.nature.scot

Scottish Forestry
Coilltearachd na h-Alba
www.forestry.gov.scot

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