

Moorland Restoration in the Peak District National Park



Moors for the Future Research Note No 7

January 2008

“These are the most visited moorlands in the world, so this project [Moors for the Future Partnership] is an important investment in the future of the whole Peak District, where livelihoods depend on the health of the natural environment.”

Rural Affairs Minister Jim Knight, January 2006

Why Restoration?

The blanket bog areas on the high moorland plateaus contain some of the oldest peat deposits in the UK. If maintained in good condition, they have the capacity to lock up thousands of tons of carbon, assisting in combating global warming.

The moorlands are internationally recognised for their breeding birds and they provide habitat for nationally rare and significant plant communities. Almost all Peak District moorland is classified as a Special Protection Area (SPA), Special Area of Conservation (SAC) and/or as Sites of Special Scientific Interest (SSSI).

Footpath erosion has also lead to accelerated peat loss. This is caused by paths becoming very degraded and wide across the open moors.

Wildfires have been the major cause for moorland degradation. Atmospheric pollution and past overgrazing have prevented natural revegetation. On the moorland plateaus, continued surface erosion and low water tables impair proper functioning of the blanket bogs and lead ultimately to habitat, biodiversity and carbon loss.

In 2000 over 9Km² of moorlands in the Peak District National Park were mapped as bare peat and a further 22Km² as degraded moorlands.



Bruce Wilkinson/Moors for the Future

Aerial application of nurse crop grass using air drill on Holme Moss

Moors for the Future Partnership

To combat the degradation of Peak District moorlands the Moors for the Future Partnership was formed and supported by the Heritage Lottery Fund. Over the last 3 years, over 7Km² bare peat areas (wildfire sites) and 5 km of the worst eroded footpaths have been treated.

Restoration Mapping

As part of the Peak District Biodiversity Action Plan (BAP) review, the Moors for the Future team collated data and maps on all restoration activities in the Peak District. The main aspects cover bare peat revegetation, heather moorland regeneration, gully blocking, footpath restoration and stock enclosure.



bare peat on Bleaklow



Bare peat, brashed peat and re-seeded peat on Holme Moss (2 months after seeding)

Blanket Bog Restoration

Bare Peat Revegetation

The techniques of bare peat restoration have been applied on a large scale over the Dark Peak area of the National Park moors, where extensive areas have been exposed by accidental fires. The Moors for the Future technique involves the application of

- Lime and fertiliser - This application is necessary to initially improve soil condition for grasses to germinate. The peat on the plateaus is extremely nutrient poor and very acid (ph as low as 2.7 has been recorded).
- Grass and heather seed mix - As it is not possible to directly seed native blanket bog species, a mix of grasses is used as the first step to revegetation. They initially stabilise the bare ground by forming a root mat. Then other species such as cotton grass, bilberry, crowberry and cloudberry can move in, when the peat has stabilised.

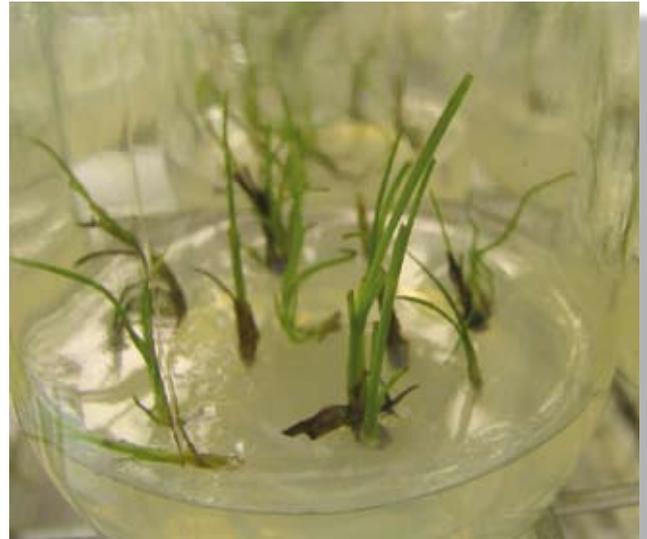
Seeds can be applied by:

- Prilling: As the seeds are extremely light weight (30000 seeds = 1g), they would be easily blown around when released from the helicopter. One technique to prevent this is to 'prill' them. Prilling consists of inserting the seed inside a mixture of heather and clay which adds weight to the seed but doesn't inhibit the growth.
- Hydro-seeding - Another technique is to suspend the seed in water and then spray it onto the moors using a helicopter mounted sprayer. This is commonly used for heather seed which cannot be prilled.
- Heather brush/geojute cover. A cover of heather brush and geojute helps to further physically stabilise the peat, improve microclimatic conditions, e.g. minimise damage by frost heave or drying out in summer. Heather brush and bales also contain fertile heather seeds and important mycorrhizal fungi. Geojute is applied on steeper slopes and will biodegrade in 3-4 years.

For successful restoration stock enclosure is essential. On some areas, the above techniques have to be applied repeatedly in subsequent years to ensure the establishment of vegetation.

Moorland restoration is very expensive to ensure establishment, as helicopters need to be employed due to the remoteness of the moorlands.

To treat an area of bare peat costs £11,000/ha for capital works for a 3 year restoration project plus additional associated management and monitoring costs. This doesn't include gully blocking costs which can vary enormously.



plug plant propagation

Cotton Grass Planting and Plug Plants

Planting is used to establish native moorland plant species that don't easily colonise by seed and therefore to increase plant diversity. Planting can also help to stabilise gully sides. In 2005/6 Moors for the Future involved local communities in growing 8000 cotton grass seedling and then planting these onto the moors.

In addition, over 100,000 of dwarf shrub plug plants such as bilberry and crowberry were propagated by specialist growers for Moors for the Future. These plants were all propagated from material collected on Bleaklow.



Plug planting into gully side stabilised by geo-textile



Applying heather seed into colonisation gaps on wildfire site using low ground pressure vehicle

Heather Moorland Regeneration

Over 1000ha of heather moorlands have been restored within the Peak District, mainly by Bracken and Molinia treatment. Many methods have been tried for restoring heather cover, including large scale treatments to control and remove bracken and Molinia such as:

- Bracken cutting and bruising – Bruising is less effective than cutting, but is better suited for difficult terrain which is unsuitable for cutting. It is usually carried out repeatedly on young fronds which are brittle and snap easily.
- Chemical control – Treatment with herbicides can result in quick removal of bracken and Molinia but also removes any other vegetation if herbicides such as glyphosate are used. This requires the relevant permissions from Natural England on Sites of Special Scientific Interest (SSSI). This treatment also requires immediate follow up revegetation work to prevent erosion.
- Burning - Burning of bracken litter is useful to ease cultivation and seeding success. Burning of dead bracken with no follow-up control is of little benefit and is likely to constitute an unnecessary fire risk. This in turn may lead to increased frond production. Burning is controlled by the Heather and Grass Burning Regulations.
- Heavy grazing by cattle, ponies or sheep – Winter-feeding can be used to attract livestock on to sites with bracken cover so developing fronds are snapped off by trampling. The litter is disturbed and broken up (this also encourages frost penetration to the rhizomes). In spring, as new fronds expand stock is removed, to prevent poisoning. This is not a reliable method but can help damage surviving fronds as a follow-up on sprayed areas.

These treatments are often used in combination and depend on size and location of the affected area. To restore the heather vegetation, this is followed by reseedling by using similar techniques to bare peat revegetation.

Gully Blocking

The natural creation of gullies in blanket peat causes substantial erosion, drainage of the moors and leads towards the peat drying out. This results in:

- peat and habitat loss
- low water tables
- accelerated peat decomposition and subsequent release of greenhouse gases
- discolouration of local water sources through dissolved organic carbon in the stream network

To help protect peatlands into the future, blocking erosion channels can aid the long-term recovery of degraded moorlands by restoring the hydrology and stopping surface erosion.

The National Trust has pioneered this restoration approach with over 2000 gully blocks. Further gully blocking works are planned by the Moors for the Future Partnership and the United Utilities SCAMP project.

Dams of heather, bracken, wood, stone and plastic have been employed on National Trust and English Nature sites, such as Within Clough, Kinder Scout, North Grain, Bleaklow Head and Saddleworth Moor. They have been mapped and are routinely monitored. After only 12 months, there has been up to 40cm of sediment accumulation behind some dams. Combined evidence from naturally revegetated sites and analysis of the existing gully blocks has led to the recommendations laid out in the Moor for the Future report 'Understanding Gully Blocking in Deep Peat' and is summarised in research note no 2.



Mapping gully blocks (plastic piling gully block shown)



Actively eroding path surface



Stabilised and restored path surface (2 months after works)



Landscaped and revegetated path sides (2 years after works)

Bruce Wilkinson/MFF

Upland Footpath Restoration

Moors for the Future are undertaking large scale restoration of popular recreation routes covering in total 15 km, with 5 km already completed. The aim is to

- reduce the visual impact of eroded paths
- create a better environment for path users
- help prevent future damage
- reduce disturbance on ecologically sensitive sites

Trampling from walkers can lead to bare ground and boggy terrain as people tend to walk around eroded areas damaging adjacent vegetation and disturbing wildlife.

Moors for the Future's path restoration work is split into two types: trampling sites, where paths have degraded due to recreational use; wildlife disturbance sites, where disturbance to wildlife can occur on paths crossing eroding peat which may be detrimental to the local fauna, flora and landscape.

Before work commences, full consideration is taken of a site's wider issues such as remoteness, sensitivity of wildlife, archaeology, aesthetics and wider recreation management issues. Technical approaches to upland path management are:

- Stone pitching – Pitching is used on eroding sections of steep path.
- Causey Paths - Stone flaggs are laid on flat, peaty surfaces.
- Landscaping - Machinery is employed to re-profile and level the ground, improve drainage and block multiple walk lines. On more remote and less accessible sites for machinery landscaping by hand employs subsoil path building. Spoil from a new ditch is used to create a new, sustainable path surface and steps are cut out across slopes to control water flow and prevent run off.

Generally, path sides will be re-seeded with a mixture of grass and heather seed to assist with stabilisation whilst the vegetation recovers.

To aid future footpath restoration, the Moors for the Future research team is undertaking a complete upland footpath condition assessment. First all of the waylines were mapped and digitised, including ca 800 km Public Rights of Ways (PRoW) and 2000 km additional non-PRoW routes. Now footpaths are assessed on the ground by volunteer rangers to identify those footpaths that are currently eroded and may require work in the near future. This survey will also identify sensitive areas across the moorlands where people will be encouraged to follow PRoWs rather than create desire lines.

Stock Exclosure

In upland acid grassland, short bilberry dominated heath, and cottongrass bog where dwarf shrubs are present but suppressed by grazing, removal of stock will allow dwarf shrubs to regenerate naturally (particularly bilberry and heather).

Removal of stock is essential to allow successful revegetation of bare peat following events such as fire damage and bracken treatment. Many areas of uplands where overgrazing has been a problem will respond well to a change in stocking regime, including reduction in stock numbers and altered timing of grazing. Heather is particularly susceptible to grazing in autumn and spring.

Fences have been constructed so that reintroduction of stock can be phased gradually and subsequently closely controlled on areas of recent revegetation. Discrete areas have been fenced off for intensive restoration works. These fences can be removed once there is continuous cover and vegetation growth is vigorous enough to withstand some grazing.

This work is funded through agri-environment schemes for stock exclosure with the objective of regeneration of moorland. Standard area payments are based on income forgone in reducing stock numbers rather than for the cost of fencing.

Over 30 km² of Peak District moorlands are currently subject to stock exclosures in an attempt to reverse the damage caused by over-grazing and wildfire.



Swaledale ewe on a Peak District moorland

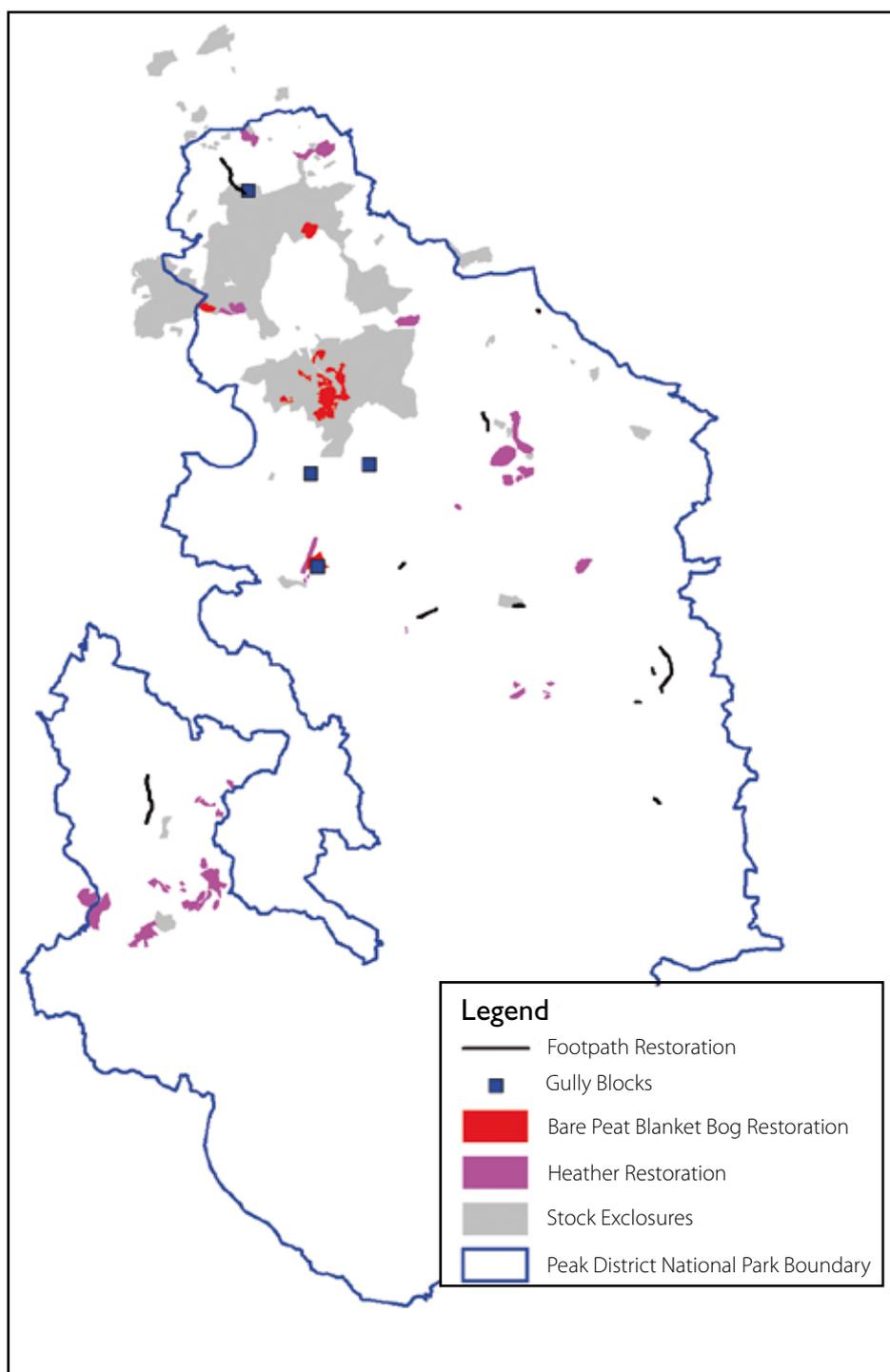
Summary

The table below highlights all the known restoration works completed to date. It does not include grip blocking, i.e. filling in of man-made drainage grips, which falls outside the remit of the moorland Biodiversity Action Plan (BAP).

In total 2000 ha of moorland within the Peak District receives restoration treatment. This does to some extent overlap with the 3200 ha of land that is subject to stock exclosure.

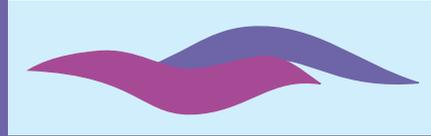
The targets for the Peak District BAP are set to end in 2010. However these may be reassessed in the interim period, with targets for operations such as gully blocking being set.

Moors for the Future is conducting a Peak District moorland landscape audit. This will identify in detail areas of bare peat and bracken to allow efficient targeting for future habitat restoration. The audit will allow the continued monitoring of habitat change such as intensity of burning or invasive species encroachment onto the moorland fringe areas.



Areas of moorland restoration

Habitat type	restoration activity	completed / planned for 2007/08	MFF target (phase 1)	MFF target achieved to date	Peak District BAP target for 2010	BAP target achieved to date
Blanket bog	Bare peat	835ha	300ha	278%	3000ha	24.1%
Blanket bog	Gully Blocking	180ha (2078 blocks)				
Blanket bog	Stock exclosure	3241ha			3600ha	91%
Blanket bog	footpath restoration	5.1km/15.4km	15.5km	32%	19km	26%
Heather Moorland	Heather/Dwarf Shrub regeneration	1136ha/279ha			3500ha	32%



Acknowledgements / Data availability

- Thanks to everyone who provided information and commented on this document.
- Further information on moorland restoration can be found in the Moors for the Future library and on our website www.moorsforthefuture.org.uk and www.peatlands.org.uk
- Views expressed in this research note do not necessarily reflect those of all Moors for the Future Partners.

References / Links

- Anderson, P., J. Walker & M. Buckler (2008) Moorland restoration – potential and progress. In: Bonn, A., T. Allott, K. Hubacek & J. Stewart (eds.) Drivers of environmental change in uplands. pp.448 - 474. Routledge, Abingdon.
- Buckler, M., J. Walker & A. Bonn (2008) Bare Peat Restoration on Peak District Moorlands: Nurse Crop Establishment and Plant Succession. Moors for the Future Report No. 14, Edale.
- Evans, M., T. Allott, J. Holden, C. Flitcroft & A. Bonn (eds) (2005) Understanding gully blocking in deep peat. Moors for the Future Report No. 4, Edale.
- Moors for the Future and Natural England (in press) Moorland Restoration Manual for England. Moors for the Future/Natural England.
- Walker, J., J. Holden, M. G., Evans, F. Worrall, S. Davison & A. Bonn (2008) A compendium of UK peat restoration and management projects. Final report to Defra, project code SP0556

Moors for the Future Research notes

- No 1 Breeding Bird Survey of the Peak District Moorlands
- No 2 Gully Blocking in Deep Peat
- No 3 Peak District Moorland Stream Survey
- No 4 Heavy Metal Pollution in Eroding Peak District Moorlands
- No 5 Visitors on Peak District Moorlands
- No 6 Rapid Assessment Protocol for Monitoring Burning
- No 7 Moorland Restoration in the Peak District
- No 8 Breeding Bird Distribution and Change Analysis 1990-2004
- No 9 Air Pollution in the Peak District
- No 10 Peak District Moorland Vegetation RELU Landscape Audit
- No 11 Wildfire Risk on Peak District Moorlands
- No 12 Carbon Flux from Peak District Moorlands

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Natural England, National Trust, Peak District National Park Authority, United Utilities, Severn Trent Water, Yorkshire Water, Sheffield City Council, Moorland Association, Environment Agency, Defra, Country Land and Business Association, National Farmers Union



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