

The blanket approach is failing

An independent review into Sphagnum Inoculation on Peak District moors



Natural England is restricting effective management of heather moorland and insisting that private landowners plant failing sphagnum moss plugs after heather cutting over SSSI sites, costing large sums to private owners and taxpayers.

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Right: 360,000 Sphagnum plugs have been planted across Woodhead & Snailsden. Jim Sutton identifies a surviving plug on an inoculation zone where hundreds were planted.



Commissioned by the Peak District Moorland Group, set up in 2015 by gamekeepers and moorland land managers to promote the contribution that good moorland management has on habitat, wildlife diversity, rural jobs, community, water quality and fire mitigation on our shooting estates in the Peak District. It works with land managers, moorland owners, environmental NGOs, Peak District National Park, police rural crime units, parliamentarians and farming bodies to coordinate knowledge and share learning about moorland management in the Peak District. Its fundamental principle is that the historic system of managing the uplands for livestock and game is valued both as a cultural heritage in itself and as the primary delivery mechanism for the protection of landscapes, wildlife assemblages and habitats valued by society.

Introduction

UK moorlands are known for being precious landscapes for many species of flora and fauna. But today, they are also being recognised as hugely important resources when it comes to climate change initiatives, capable of storing colossal amounts of carbon in peat and through sequestration by specialist vegetation.

Correctly managed moors have been scientifically proven to improve and maintain biodiversity, provide a considerable lifeline to rare and endangered species of ground-nesting waders and birds of prey, reduce the risk of catastrophic wildfire and so much more.

For decades, the most environment-friendly and efficient management method has been fast and low-impact cool burn of heather and grasses. This was the preferred option of vegetation management as carried out by experienced keepers in winter months. Some of the many benefits of this practice include vital reduction of vegetative fuel load and subsequently reducing the risk of a summer wildfire, as well as the fast regeneration of a diverse dwarf shrub sward and thus nearly immediate carbon capture and, importantly, high in nutrition food source for wild living moorland species and farmed animals. Crucially, the removal of the dense heather canopy allows important light penetration to the ground fauna species, such as the mosses and lichens and provides a mosaic of different height and stage of growth of heather preferred for ground-nesting birds. Other management methods deployed to aid benefits on moorlands landscape include sustainable rotational grazing and heather cutting.

Three years ago, *The Heather and Grass Etc. Burning (England) Regulations 2021* put a ban on burning vegetation over deep peat (deeper than 40cm) located in a Site of Special Scientific Interest (SSSI) that is also a Special Area of Conservation (SAC) and/or Special Protection Area (SPA). In specific cases where burning is necessary for the purpose of reducing wildfire risk, an application to obtain a license can be sent for approval from the Secretary of State “to prevent further damage by burning ~142,000 ha of protected blanket bog habitat.”



It is important to note that around 75% of UK peatlands – covering almost 12% of the UK – are believed to be damaged, with peat becoming bare, shrinking, drying out and eroding away, releasing carbon to the atmosphere in vast quantities. There are numerous reasons for bare peat and subsequent peatland erosion in the South Pennines. These include air pollution, the trampling of vegetation by tourists and walkers, wildfires, historic moorland drainage, and competition by non-native plants.

Much work has been carried out by private landowners, sporting tenants, Moors for the Future and other groups to reverse this decline by revegetating and ‘rewetting’ the moors, capturing and further reducing carbon emissions. Replanting the gulleys, adding peat dams and covering bare areas with grasses, heather and sphagnum are just some of the methods. The latter has been a controversial subject over the last eight years.

Despite the ban on burning of SSSI, heather management remains a crucial exercise across these landscapes. Cutting is now the primary method for control in these ‘blanket bog areas’, whereby landowners and agents must apply for permissions to carry out the work approved or denied by Natural England.

The parameters for heather which can be cut is incredibly strict, with heather needing to be over 30cm in height (far beyond optimal), where coverage is greater than 75%, and only where certain plant species are absent or in very little abundance. South Pennine landowners and sporting tenants are suffering from numerous denial of applications where experience dictates management of heather is an absolute must. Where approval is eventually granted, it is on far lesser scale than what is required. To further compound stresses, over SSSI deep peat areas Natural England has imposed a required practice of sphagnum inoculation. This process is expensive, highly labour intensive and experiencing a dire success rate. This legislation is not a nationwide practice, with moors in different regions not being required to plant the moss species. The case studies detailed below are examples of this approach failing on three different moors in the Peak District. ▶



“**Correctly managed moors have been scientifically proven to improve and maintain biodiversity**”

Sphagnum establishment

Where sphagnum can establish and thrive, creating sponge-like hummocks, it is very effective. The plant has unique characteristics including the ability to store over 20 times its own weight in liquid, and living sphagnum has considerable sequestration capabilities, trapping carbon and eventually forming part of the deep peat itself. It is also one of the many species which make up moorland biodiversity and habitat.

But herein lies the problem: the application strategy and location of sphagnum inoculation are not working – despite misleading claims by privately funded organisations that largely exaggerate their progress. Across sites in three example moors where sphagnum plugs have been planted by private means or by Moors for the Future, the success rate of a plug ranges from 30% to <1%. Furthermore, those specimens that have survived have yet to be seen at a larger growth rate than fivefold in a five- to seven-year period, considerably less than the tenfold per year claimed by organisations seeking backing for the operations through grants and donations.

Sphagnum, like all mosses, grows without roots and absorbs water through the surface of its leaf-like scales and requires wet and acidic conditions. According to the *2022 Sphagnum Practitioners' Guide*, it says: "Before planting sphagnum, it is important that the right growing conditions are created so that it can compete effectively. Therefore, removing non-native invasive species and introducing measures to control other over-dominant species, which on a bog, often means rewetting and slowing the flow of water."

The preferred planting process is to place a sphagnum 'plug' into a small, handmade hole, at around 1m between each plug. A single plug ranges in size from that of an average thumb nail to an average index finger, and costs £1 each. Sphagnum beads and gels are other application methods for establishing the moss.

The guide later goes on to state that: "Stress occurs where the environmental conditions are approaching or beyond the tolerance limit of plant species or communities – for example, they cannot meet all of their nutrient or water requirements... Stress reduces a species' ability to compete with other species better suited to the conditions." It also



notes that common stress sources in the South Pennine Moors include a low water table, and that blanket bog is naturally a waterlogged habitat.

No consideration is being made with regards to the conditions of the landscape by Natural England when prescribing sphagnum inoculation to approved cut zones over deep peat. Not one site visited on three example moors could be considered 'water-logged' or boggy, even following torrential rain in December and January. To further dampen the mood of landowners and tenants, no prior visits nor follow ups have occurred from Natural England representatives making these demands on these three sample moors, yet still insist the work is carried out.

“ No consideration is being made with regards to the conditions of the landscape by Natural England

Below: Here is a rare surviving sphagnum plant on Snailsden moor. Headkeeper of Snailsden & Woodhead Jim Sutton predicts that in only a couple of years, it will be choked out by heather growth, grasses, bilberry and cranberry that thrive in this area.





Woodhead & Snailsden

South Yorkshire/Peak District border

Headkeeper: Jim Sutton

An historical moor where it is believed that driven grouse shooting began, Woodhead and Snailsden was owned by the Spencer-Stanhope family up until the mid-1950s. Due to death duties, the moor was sold to Yorkshire Water, but the Spencer-Stanhope family retained the sporting rights, and thus management for game and wildlife, which has been sold to various owners in the intervening years. The current owner of over a decade employs Jim Sutton as headkeeper who has been in a full-time role on the estate for 15 years. He is pictured above.

Across Woodhead and Snailsden, 360,000 sphagnum plugs have been planted in areas that had been previously burnt over deep peat over the last six years, the majority between

2017-2020. This is at a minimum cost of £360,000 for the plugs alone, plus labour and other expenses. In wetter areas – where sphagnum is already present in hummocks that have been there for thousands of years – it is estimated that a maximum of 30% of planted plugs have survived after the first few years, with the percentage dropping further in years five and six. In dryer areas, the success rate is considered less than 1%, with often no plugs able to be located at all. In a survey covering over 1,500m² of inoculated sites at Snailsden, only 71 sphagnum plugs were found.

It is important to note the size of the surviving plugs. They have seen very limited growth, going from the size of a thumbnail to the inner ring of a saucer, a fraction more

“If you were to combine all the surface area of remaining living sphagnum across the whole moor into one pile, I would say there is not enough to cover the area of my kitchen floor

in very few scenarios. Far from the five to tenfold increase per year claimed on funding websites.

Headkeeper Jim Sutton is well versed in historic management practices on the moors, with records dating back to the mid 1900s. He has noticed considerable changes since his time on the estate, in particular that of the last six years since the Statutory Cessation Order to license burning over deep peat was signed in 2018. He says: “We have lost significant biodiversity;

that all-important mosaic of habitat. Most notably, our rare abundance in species of cotton grasses has all but disappeared. After burning ceased in 2018, we had a visit from Natural England. I identified some areas that I suggested could be cut as the heather was becoming very long and the NE advisor declined that approach as cotton grass was present.

“Fast forward six years and the cotton grasses have been choked out by degenerative heather. In a good cotton grass year this moor used to have vast swathes of white flowers and now we have only a few sparse areas remaining. Indeed, these species are included in what will be replanted into the restored gulleys to try and cover the peat and help prevent erosion.

“The reason it thrived, along with the vibrant moss carpet, is because we burned regularly. We didn't wait until heather grew too high and choked out everything underneath it. Now we have masses of heather now over knee-height, which is otherwise barren and devoid of damp mosses underneath the canopy. ▶



"Cotton grasses are fire respondent and are usually the first species to recolonise after a cool burn. But these are further implicated by us being denied cutting applications regularly, or having reductions in them. For example, this year, Moors for the Future was given permission to cut approximately 23 hectares of heather on Snailsden over deep peat to produce brash for regeneration work, yet on Woodhead moor – which has suffered numerous wildfires over the years (two already in spring 2024) – we applied for just 10 hectares knowing we couldn't get approval for more. As the cutting season came to an end we still didn't have any consents and another year has gone by.

"The heather is growing beyond the rate we can control and we must be allowed to cut more. It is only a matter of time before we suffer a landscape-scale wildfire at Woodhead and the £4 million-worth of restoration work will go down the drain along with the peat they're trying to protect. We urgently need consent, too, without the requirement to plant sphagnum that only works in very specific conditions. The Peak District moors are naturally free draining due to their steep hill sides and underlying porous gritstone, unlike many areas of the North Pennines where true blanket bog is

in abundance. It appears that Natural England will only give cutting consent in the Peak District under the condition that sphagnum plug planting will be followed up and this can amount to a huge sum of money which the land managers are expected to pay and there is currently very little scientific data to suggest any long-term benefits."

Jim continues: "Moors for the Future's views on the previously planted sphagnum, is that sphagnum inoculation is a success because it has 'established' – but if you were to combine all the surface area of remaining living sphagnum across the whole moor in one pile, as an educated estimate I would say there is not enough to cover the area of my kitchen floor (approx 10m2).

"Of additional concern is where we have seen restoration works carried out on Woodhead, rosebay willowherb is rife – an invasive weed that will grow anywhere. It is hard to tell if this has been imported via the heather brash that has been used previously or if it is in the grass seed mixes used to revegetate bare peat. On other SSSI moors with lots of restoration work being carried out – Marsden for example – a lot of this weed can now be found."



Above: Where heather has been denied cutting and burning applications, the moss layer has all but disappeared due to heather growth way beyond optimal height. **Right:** A naturally formed sphagnum hummock that is over hundreds of years old, which survived despite Jim and previous keepers cool burning the heather over the top of it for decades. This quashes claims that burning damages the peat and vegetation layer below.



“ We urgently need consent, too, without the requirement to plant sphagnum

Example moor 2:

Mossy Lea

Shelf Moor & Cold Arbour Moor,
Glossop, Derbyshire
Headkeeper: Joshua Bailey

Mossy Lea is a relatively modest sized moor made up of Shelf Moor and Cold Arbour Moor, comprising of steep hill sides and gulleys. It has been a grouse moor throughout the last century, but until the late 1990s was largely overgrazed. A huge amount of restoration work has been undertaken to restore the moors back to heathland, along with peat restoration, largely supported by Moors for the Future.

Burning of the heather didn't take place until the early 2000s, and after this time records of grouse counts crept up to a record year in 2014. Josh Bailey took on the Headkeeper role in 2020, and has maintained a firm approach to heather through legal cutting and burning, and general moorland management using best practices in this time to ensure that biodiversity extends the depth and breadth of the moor.

"We have indeed carried out work that is optimal for grouse, subsequently benefitting all manner of moorland birds and mammals too. Natural England were keen to see unfavourable ground – i.e. that which was dominated by poorly performing grass back into heathland which we have done to a huge extent and with great success. Now they only want sphagnum," Josh explains. "As part of our five-year management plan which ends in November this year, we have been required to plant sphagnum plugs on all of our cuts over deep peat on Cold Arbour Moor."

Josh, along with a team of three contract labourers, inoculated 10 permitted cuts on their SSSI restricted zone with 1,000 plugs, 10 in each location, hand-planted 1 metre apart as per guidelines. The cost of this exercise alone was over £1,500, and there has been a 100% failure rate. ▶

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“Where we are required to plant sphagnum, though, it simply doesn't work – it's rock-hard, and naturally draining

Right: Josh uses GPS to record where he has planted the sphagnum plugs. However, on each of the inoculated cut zones, not one sphagnum plug survives.



“Across other areas of the moor, we have been privately funding heathland restoration on other areas overgrazed with great success. We have conducted around 15,000 digger scrapes and hand scrapes and planted 5,000 heather plugs across Shelf Moor and have been seeing great return in the last few years. Where we are required to plant sphagnum, though, it simply doesn't work – it's rock-hard, and naturally draining,” Josh says. “One would never consider growing it there”.

To further complicate matters, Josh is restricted by the amount of acreage of heather that can be cut and burnt per year by Natural England, which is 1% of the whole moor. “This totals 9 acres, on a 12-year rotation too, which is simply not enough though,” explains Josh. “10% would be more reasonable. The moor is pretty much where I would like it to be now, and we have different lengths of heather which provide different services for wildlife. But the heather is growing at such a rate, that it is out of control and is going to become a significant fire risk, and the curlew, lapwing, dunlin, short-eared owl, merlin, mountain hares etc. that rely on the food and habitat we provide are going to be lost as a result”.

In addition to Josh's moorland habitat work, Moors for the Future Partnership has carried out extensive work to cover any bare peat areas at Mossy Lea. It has also installed numerous gully blocking interventions in a bid to retain water on the top of the moor. This work has seen an increase in Dunlin numbers, classified in the UK as red listed under the IUCN Birds of Conservation Concern.



Example moor 3:

Howden Moor

From conservation success story to catastrophe

Former tenant: Geoff Eyre

Geff Eyre is a 76-year-old semi-retired agronomist, award-winning ecologist and conservationist. His work in Moorland Restoration is recognised by many, and no-one

has produced more results from harvesting heather to revegetating vast expanses of bare peat than he, making him one of the most knowledgeable individuals when it comes to any moorland landscape.

Indeed, it is calculated that over 30 square miles of bare peat, Nardus and bracken have been restored to favourable conditions containing a diverse range of vegetation species and the subsequent mosaic of habitats needed by birds and mammals by Geoff alone. In addition, he has re-seeded 500 square kilometres of heather moorland across the North of England and Scotland – a size that roughly equates to the Isle of Man. But perhaps most important is his work on Howden Moor which is considered legendary, receiving the James Purdey & Sons highly acclaimed Gold Award for Game & Conservation in 2005.

Geoff first started working on large-scale moorland management over half a century ago; on Howden Moor in particular for his father-in-law. Then, in 1990, Geoff took on the sporting lease himself. This coincided with the time

the Joint Nature Conservancy Council supported a new Environmentally Sensitive Areas scheme, with a goal of halting the loss of heather from the area. ▶

“ here is heather over 3ft deep and more, and there is not an effective firebreak to be seen across most of the area



Geoff experimented and pioneered management practices across many more landscapes too and essentially created the 'cool burning' method – proven to be carbon negative – which is favored nationwide for heather management across moors where not legally restricted even today. Geoff's Molinia, bracken, Nardus and rush transformation to mixed heath areas were seen as the most advanced in the UK, with sites documenting 100-fold wildlife increase. There was an abundance of white hares, grouse, ground-nesting waders such as the curlew, and birds of prey. It even

Below: Where are the fire breaks?

“Those seeking funds for the work and benefit from labour, resources, etc. do not want to know

attracted hen harriers back to the Peak District for the first time in 140 years which nested on restored areas. “Once, we even had a Bearded Vulture identified on the moor – a sure sign that we were doing something right?” asks Geoff. It was all this, and his unprecedented habitat creation and drive, that secured his Purdey Award win.

Now, however, after 10 years of heavy restrictions on management practices imposed by the moor's owner, the National Trust, records of wildlife numbers across the 6,900-acre Howden are in a shocking and dramatic decline. The Trust has made a U-turn from wanting to regenerate heather in favour of the rewilding and rewetting approach to Howden.

“To make the investment of funds and time required as a sporting tenant worthwhile, one needs to have a healthy stock of grouse. Over the last few years the stocks have dwindled due to no control of predators and being able to provide appropriate habitat – two key elements in the 'three-legged stool' approach. With a heavy heart, my 10-year lease has now come to an end and will not renew, and as such the haven that this great moor was is now lost forever.

“As we moorland owners are experiencing, sphagnum and rewetting have become ecology buzzwords. Howden is the first of many 10-year rewilding and rewetting examples. I am afraid it has gone past the point of no return and needs to be a model for positive action against this movement. I have watched intently over this decade and assessed the work carried out at a huge financial sum through fundraising and tax payers' money, and it is incredibly disappointing to witness the poor success rates and rapid decline of wildlife, but above all I am deeply concerned about the potential for wildfires,” Geoff admits. “The tinder-dry grasses [even in the depth of winter] have grown thick, birch trees are up to 15ft high, fir trees over 10ft, there is heather over 3ft deep and more, and there is not an effective firebreak to be seen across most of the area.

“In complete contrast, my other moor Abney, which I own and is in a similar state to how I had Howden only 10 years ago, is in perfect balance. My wildfire hazard is classified as low, needing only fire beaters to stop the spread. In the autumn of 2023, Howden was graded as a huge wildfire risk by specialists, needing at least two helicopters and possibly a plane to put a fire out if ever there is one. The fuel load is so high now that in the event of a wildfire it will cause colossal damage and put any carbon capture into negative equity for many, many years. Let alone the damage to the peat and loss of wildlife and habitat.”

Sphagnum establishment

“Contrary to what some might believe, I am very open minded when it comes to potential management practices and methods to improve our landscapes. Over the years I have proved to many that things can be done which were thought impossible, or find practical, workable solutions to initiatives,” explains Geoff. “To this day, on Abney, I can still be found experimenting and putting these ideas to the test. I do not simply belittle them without first practical, hands-on knowledge.

“I am, however, irked when I see blanket legislation and practices come to the fore that aren't tested, practically possible, and appear less favourable for environments than existing, and use far from optimal, time consuming and expensive methods; such as this sphagnum inoculation and the recent hand-planting of cotton grass plants at a ▶

Right: Waist deep heather is cause for serious concern.



colossal cost. The latter I have demonstrated can be sewn by seed over correctly prepared ground at a miniscule fraction of the cost to taxpayers' money with improved success rates, coverage and time. But those seeking funds for the work and benefit from labour, resources, etc. do not want to know."

Indeed, Geoff experimented with the use of moss spores to sow and capsule the prepared ground to improve the germination rate of heathland species with considerable results over 30 years ago. "Sphagnum would do well on wetter areas, and I'd use ferric moss on the drier zones. The ESA Scheme began to like moss growing and I treated many areas creating fantastic initial growth over well-prepared ground – which had to have been burnt first, otherwise spores never set and grew," explains Geoff. "The key requirement for sphagnum is that the ground must be wet and prepared correctly. Where these conditions were met, it can do well for up to five years. But after 10 years, most of it will be smothered out by other plants growing out of it, like heather, bilberry and cranberry."



Having grown more sphagnum than most, Geoff believes that it is a useful resource with many positives when in the appropriate setting. He also agrees that on other moors it could be a benefit to the landscape where conditions are met. But on naturally draining moors like Howden, Mossy Lea and Snailsden, it isn't.

Howden Sphagnum inoculation success rate

In February 2024, a total 2,400m² of moorland was surveyed across various inoculation sites to judge the success of the work carried out by Moors for the Future in 2017. A total of four sphagnum accumulations were found, two of which were deemed naturally occurring due to size. The subsequent report by Matthew Goodall, Head of Education and Advisor for Wales and NW England, states: "We are aware that several different inoculation methods including plug planting, pellets and gel were used in 2017 on recently flailed compartments, however we do not have access to the quantities of each method or the

inoculation density. Regardless of expected densities, one accumulation [of sphagnum] per 600m² suggests unsuccessful inoculation."

"In addition," says Geoff, "Despite claims, sphagnum is not as good at storing carbon compared to most moorland plants, which is one of the many highlight points those seeking funding are using. Indeed, to support my statements, I have conducted many tests and have proved that heather takes some beating as a carbon sequestering plant. I grew some sphagnum to eight years old and weighed a square metre's worth. After fully drying it out, it amounted to only 250g of dry matter," Geoff explains. "I then weighed a square metre of adjacent eight-year-old heather I had grown, which weighed in at 3 kilos. I then burnt the leaves off the heather and reweighed it, losing only 500g and so still leaving 2.5 kilos of carbonated stalks. The carbon in the burnt stick being trapped there forever.

"I would surmise that the rush to grow sphagnum from plants with some areas costing £100K per hectare is to achieve quicker 'visible' results, in a more emotive manner with the usage of volunteers, which can then be promoted in glossy brochures and on websites to gain more funds using the 'carbon' catch-word.

"My biggest upset is that this costs so much money and time, which within 10 years there will be nothing left to show for it. My thoughts are made even worse when considering the loss of rare heather moorland habitat through re-wilding and re-wetting, that will be beyond recovery just like large parts of the 6,900-acre Howden has become."

“ Howden is the first of many 10-year rewilding and rewetting examples, and I am afraid it has gone past the point of no return and needs to be a model for positive action against this movement



Summary

The requirement to inoculate sphagnum over cut sites is clearly not working, and where it may be 'successful', it is very localised. Across the three sites visited in this report – and many more outside of it – the restrictions imposed on private moorland owners and their staff need far more proactive consideration and support from those assessing applications, guided by scientifically proven management practices that benefit myriad species of flora and fauna, and carbon goals too.

The initiative of sphagnum inoculation needs more scientific and precise subscription versus the current one-size-fits-all approach that is costing a huge sum of money for minimal to no reward. In addition, further research is needed to identify zones across our moorlands where there is a guaranteed chance of sphagnum achieving far greater rates of survival and growth than that recorded at present. Once obtained, the same detail is required for application methods to establish sphagnum that are judged against three key factors: cost; efficiency; and effectiveness.

Landowners and staff working on the moors are crying out for more leeway and collaboration from governing bodies, with a recognition of the emerging science which takes into account the longterm results as opposed to the previous studies which often concentrated on short term results. They need to be able to be proactive, not only in effectively managing specialist moorland bird populations as well as grouse stocks, but also in working to reduce wildfire risk and encourage new growth of heathland species, which has benefits for water quality and improving biodiversity.

Through collaboration, these precious landscapes will be able to thrive. They can become dominant in carbon capture initiatives, offer a haven for endangered species, and help the economy.

Right: Abney, Geoff Eyre's other moor, is a pristine example of how heather moorland should be.





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