



## HEATHER BURNING

### **What is prescribed heather burning?**

This practice has several names – rotational burning, muirburn and prescribed burning. It is the planned burning of small areas of older heather, with the aim of achieving a low intensity, quick, ‘cool burn’ in small patches, which removes the canopy but does not affect the underlying peat or soil layer.

### **Why is it done?**

As heather and grass plants become older, they become less palatable (tasty) and less nutritious (tougher and lower in nutrients). The process of burning small areas removes the older growth and allows the plants to regenerate after the burn. New heather and grass shoots follow, and these, along with the flush of plants such as

bilberry or blueberry, are key food for red grouse, deer, mountain hares and livestock. Burning patches of heather in different years in this way provides a patchwork of areas of heather of different heights. This mosaic provides areas that are suitable for feeding, breeding and cover in close proximity to each other, and is beneficial not only to grouse but also to other moorland birds<sup>18</sup>.

### **When is heather burning carried out?**

Various laws only allow burning to be carried out between October and April. Most burning occurs in the spring when the plant material has dried out, allowing it to burn while cold, damp conditions underfoot mean the fire is most easily controlled. Burns are not performed in summer when birds and animals are breeding, the daily temperatures are warm, fuel is variable in dryness, and underlying peat may have become dryer.

### **Are there heather burning guidelines or legislation that land managers must follow?**

Yes. Defra and Natural England set out and manage the rules for safe burning and can fine or prosecute those who do not burn in line with them. Where there is an increased risk to other landscape features or species, a licence must be applied for in order to burn heather.

### **Is heather only burnt on grouse moors?**

No. Although it is often associated with this land use, and presented as such in the media, heather burning is carried out for livestock grazing on moorland, as well as in other environments. A recent study of land use in Scotland looked at 26 estates and found that heather burning occurred on 23 of these, although grouse shooting was only the main land use on 10. The others stated their predominant management was for deer stalking, sheep grazing or conservation. Those estates that manage

for grouse shooting had 15% of land managed by burning per year, compared with 5% of land on other estates<sup>9</sup>.

### **So burning is good for animal food, but what effect does it have on moorland biodiversity?**

A recent independent report by Natural England, '*The effects of managed burning on upland peatland biodiversity, carbon and water*', examined all the appropriate scientific literature related to burning, which we refer to heavily in answer to the following questions<sup>19</sup>. With respect to biodiversity, most studies examined in this report indicate an overall increase in species richness or diversity when burning is considered at a whole moor level<sup>19</sup>. Burning affects the invertebrate species (including insects, spiders and earthworms), lichens, mosses and higher plants present on moorlands, removing some and supporting others in the regenerating areas.

Because burning takes place in small areas typically leaving over 85% unburned in a year and 65% unburnt for more than three years, many studies assessing the whole of a moor indicate an overall increased biodiversity. A recent moorland review by Scottish Natural Heritage (SNH) noted that much of the conservation benefit from burning depends on local site management and conditions<sup>20</sup>. Furthermore, a recent article examining moorland sites in Scotland over 44 years concludes that without burning, biodiversity decreases and states "*to maintain diversity, timely burning is recommended*"<sup>21</sup>.

### **Can burning also boost curlew numbers?**

Yes. A recent paper shows that curlew are more abundant as the percentage of recently burnt ground increases<sup>9</sup>. Golden plover also prefer to nest in areas of heather, particularly where burning has occurred in the last five years. As with any land management intervention, heather burning influences the species that live in the area. Some species will benefit and some will be disadvantaged.

**Do conservation organisations use it?**

Yes. Fire is an important and widely used management tool with a vital role to play in the maintenance and recovery of several habitat types, including heather moorland. SNH and Natural England burn heather and gorse and approve its use on many moorland SSSIs; the RSPB burns on a number of its upland reserves; the national park authorities recognise the value of muirburn and use it on Exmoor and in the New Forest to improve grazing; the National Trust has burning regimes on many of its upland holdings; and the Wildlife Trusts set fires to burn brash in coppice woodland and reed swamp.

**So species that thrive on grouse moors will be okay if other moorland users burn the heather?**

No, because along with heather burning, grouse moor management also includes predator control, while few other upland habitat managers undertake this activity sufficiently to reduce predation on ground-nesting birds. See the section on *Upland Predator Control* for more information.

**What would happen to the vegetation if the heather were not burnt?**

It depends on the environment in question. All upland moors tend to be lumped together when discussing these complex issues, whereas in fact there are several distinct ecosystems, including blanket bog/deep peat, and heather-dominated dry heathland.

**Okay, so what would happen on blanket bog/deep peat?**

Areas that experience high rainfall and low temperatures, usually at high altitude, with ground that is waterlogged for most of the year,

can produce areas of ‘blanket bog’, where a peat layer of variable depth covers the whole landscape. Heather in these areas may be naturally prevented from becoming rank by compression under deep winter snow cover, which allows side shoots to touch the ground, root and spread laterally. In such areas, the need for heather burning is lower as the heather grows more slowly.

### **What would happen on heather-dominated heaths?**

The current landscape of open heathlands dominated by heather is generally perceived as a ‘natural’ environment, whereas in fact it is the product of thousands of years of management by man. Forests were cleared, and vegetation maintained by grazing and burning to produce the heather-dominated landscapes that now exist. If management in these areas were stopped, heather would become old and degenerate and ultimately be lost, bracken would spread, scrub and tree regeneration would gradually occur, and over many decades it would progress to a vegetation community of shrubs, bushes and trees.

### **Is there an alternative to heather burning?**

Moorland habitats can be maintained in a mosaic of heights and densities by burning, grazing and more recently cutting. Grazing alone is difficult to manipulate between too little and too much, but can be an important management technique used alongside burning or cutting. Cutting requires low slope angles and smooth terrain to avoid machinery damage. Where access is possible it can be a valuable tool in areas of high fire risk or fire impact. Care needs to be taken not to cause compaction damage with machinery, or leave dense cut litter, which suppresses regrowth of the heather.

## HEATHER BURNING AND PEAT FORMATION



*In controlled muirburn only the growing plants are burnt, not the peat. © GWCT*

### **How is peat formed?**

Certain plant species tend to be thought of as peat-forming, including mosses and sedges. These grow and die back in waterlogged conditions. The low oxygen content of these conditions prevents rapid decomposition of dead material to humus (like compost). Instead, the plant remains are slowly compressed as more dead material falls each season, these layers of matter eventually turning into peat. The peat is deepest where wet conditions are maintained for thousands of years, shallowest where the climate is drier and ground conditions more free-draining.

### **Why burn peat?**

Peat is not burnt. In controlled muirburn only the growing plants are burnt. Uncontrolled fires, maliciously or carelessly set, can burn into peat causing very severe damage and loss of carbon.

### **Does heather burning affect peat formation?**

Research into the effect of burning on Sphagnum species gives mixed results. Some studies indicate that the rate of peat accumulation may be lower where managed burning is used<sup>22</sup>, however recent evidence suggests that where the interval between prescribed burning is short (10 years), the abundance of Sphagnum increased. This remains true when comparing ground under 10-year burning rotation to ground that has not been burnt for 60 years<sup>23</sup>. The paper finds “no evidence to suggest that burning is deleterious to peat-forming species; indeed, it was found to favour them”. The evidence is conflicting and further research is needed.

### **Can heather burning affect the underlying peat?**

Sometimes, and sometimes not. The answer to this question depends on many factors, including what sort of burns are performed (i.e. size, temperature), the frequency, and the type of peat that is present. The answer can range from there being no effect in the case of appropriately performed and controlled ‘cool’ heather burning, to there being a severe effect in the case of ‘hot’ burns and serious wildfire.

### **What do you mean by ‘cool’ and ‘hot’ burns?**

‘Cool’ burns pass quickly over the surface, burning the over-ground vegetation but not affecting the humus or litter layer on the surface of the peat. The temperature at ground level remains low. ‘Hot’ burns occur when the fire passes more slowly, burns more intensely and

incorporates lower layers of vegetation. This can result in ignition of the underlying peat, temperatures becoming higher still, and difficulty in controlling the fire.

### **Why is heather burning being used as a reason to ban or regulate driven grouse shooting?**

Although heather burning is carried out in other settings, it is often associated with land managed for grouse. Particularly driven grouse shooting, as higher numbers of birds are needed to operate this kind of shooting. Where heather burning is not performed appropriately, negative effects can be seen.

### **What can these negative effects be?**

Poorly performed or poorly controlled heather burning, or wildfires, can have a negative effect on the underlying peat; contribute to the release of greenhouse gases or carbon (of which peat is a major store); have a detrimental effect on water quality; and lead to wildfires.

## **HEATHER BURNING AND WATER QUALITY**

### **Are studies on the impact of burning on water quality conclusive?**

No. The effect of heather burning on water quality is still being studied, with different pieces of evidence suggesting different outcomes. There is some evidence that burning may be associated with increased water colour, and some sources equate this to an increase in dissolved organic carbon (DOC) in the water. However, one study clearly showed that the colour of water is not always a good indicator of DOC, and that DOC did not rise in response to burning<sup>24</sup>. One recent paper showed that lake water DOC fell following a wildfire. The picture is not yet clear.



### **Why is the impact of burning on water not yet fully understood?**

Results differ depending on the length of time since burning, and the scale at which the studies are performed. The possible effect of burning on water quality and amount of run-off is also complicated by interactions with other upland management, such as woodland expansion and grazing. These interactions have been little studied.

### **How do I understand the true situation when the evidence is not clear cut?**

This is a difficulty that is often encountered in the early stages of research into a complex subject. The evidence base is building up but has not yet revealed a definitive answer. There are many reasons for this, including the interplay of many factors and the complexity of the wide variety of ecosystems under consideration. Furthermore, management practices such as 'burning' in fact consist of a range of techniques with many variables. A simple answer to such questions is rarely available, and a balanced review of the facts often reveals a more complex picture.

Those that attempt to present a simplistic view do not represent all the evidence. This view was expressed in a recent peer-reviewed paper by 13 authors who are concerned about the simplistic and provocative position taken towards burning by many bodies. They state *"We, therefore, suspect that much of the contextualisation in recent fire-related studies stems less from evidence of the environmental effects of managed burning and more from attitudes towards the forms of land-ownership and other management practices associated with burning in the UK"*<sup>25</sup>. Until integrated evidence is available, all scientists should be concerned when potentially interesting and informative research is used as a forum to propagate what amounts to hearsay or to promote political agendas<sup>25</sup>.

### **Without heather burning, would water from moorland be clear?**

No. Water from peatlands has always been what the water industry calls 'discoloured', as a result of draining through the peat. It is likely that water draining through upland forestry would be similarly discoloured. Evidence suggests that heather burning can be associated with increased water colouration<sup>19</sup>, but this is not conclusive. The EU has set standards for water quality that go beyond its purity and safety and include its colour. Water companies must therefore treat water from peatlands to meet these standards. Many water companies have land holdings in upland areas and rent their land for grouse shooting. This would be unlikely to happen if it was damaging water supply.

### **Is anything being done to address some of the possible effects of upland burning on water?**

The moorland management community do not want to unintentionally cause water quality issues, or burn unnecessarily. Natural England has been working with moors on a transition process to enhance blanket bog and also sustain grouse shooting for the last four years. This 'outcomes approach' is site specific; for example, on some moors by re-wetting, on others by focussing burning away from blanket bog where the benefits to grouse of burning appear lowest, and the risk to Sphagnum greatest.

## **MOORLAND WILDFIRES**

### **What causes wildfires?**

The evidence base examining the causes of vegetation fires is very limited. The Fire Service Incident Recording System does not include cause or source of ignition, unless an investigation is conducted which

is very rare for vegetation fires. Therefore, the relationship between the use of prescribed fire and the frequency and extent of wildfires on moorland remains unclear. This is an area which needs more research.

### **Does prescribed heather burning lead to wildfires?**

There is evidence that sometimes prescribed burns are not adequately controlled and can lead to wildfires<sup>20</sup>. However, evidence also suggests that the benefits for wildlife, wildfire reduction and promoting habitat growth outweigh the risks. For example, in the Peak District, grouse moor management is associated with a lower frequency of wildfire<sup>26</sup>. There is evidence across the world for the benefits of prescribed burning in reducing wildfire risk<sup>27</sup>, but there are not enough studies specifically referring to the UK moorlands, and experts call for more research<sup>25,28</sup>.

### **How can rotational burning reduce wildfire risk?**

Fuel load and structure are critical factors in how fire behaves. Prescribed burning reduces the accumulation of old, woody heather, which can build up to a large stock of potential fuel, so heather burning reduces the likelihood (and intensity) of fire<sup>19</sup>. Prescribed burning may also create fire breaks, which can hinder the spread of wildfire.

### **Are wildfires always bad?**

Wildfires are uncontrolled and may burn hot and deep, in the worst cases igniting the underlying peat and burning for months. This can then also lead to a cost to the public purse with extensive and prolonged use of the fire and emergency rescue services in difficult to reach areas. These factors are very rare occurrences in prescribed burns. However, there is also evidence that wildfire can have little or no lasting impact on habitat or wildlife<sup>20</sup>.