

# THE MUIRBURN CODE

MANAGEMENT OF MOORLAND  
BY BURNING AND CUTTING



Scottish Natural Heritage  
Dualchas Nàdair na h-Alba

All of nature for all of Scotland  
Nàdar air fad airson Alba air fad



The Scottish  
Government  
Riaghaltas na h-Alba

## The Muirburn Code

The Muirburn Code provides good practice guidance for burning and cutting of vegetation. It also sets out statutory restrictions, and to highlight these the word **MUST** is used. If these restrictions are not followed, the muirburn activity will be in breach of statute.

### Supplementary Information

Supplementary Information is provided on some topics, and a list is provided in Section 9. This information is available from the Muirburn Code website<sup>1</sup>. The Supplementary Information does not form part of the Muirburn Code and the different sections will be reviewed and updated regularly.

The document *Prescribed burning on moorland - A supplement to the Muirburn Code* was published to support a previous edition of the Code. This document has not been updated as part of this review and much of the guidance it contains is still relevant, where not superseded by this version of the Muirburn Code or the Supplementary Information. It is available to view or download from the Muirburn Code website.

### Acknowledgements

A wide range of people and organisations supported the review process that produced this version of the Code. The Scottish Government acknowledges this support, which has enhanced the value of the Code and its relevance to practitioners.

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Scottish Natural Heritage  
Great Glen House  
Leachkin Road  
INVERNESS  
IV3 8NW

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<sup>1</sup> [www.muirburncode.org.uk](http://www.muirburncode.org.uk)

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## 1 BACKGROUND

Scotland's iconic moorlands and uplands provide services essential to our well-being. Most of Scotland's moorland is not burnt or cut and does not require burning, but fire and cutting equipment are useful management tools, when used with skill and understanding. The Scottish Government supports well-managed muirburn, and recognises its potential to reduce the impact of wildfire. The Review of Sustainable Moorland Management, carried out for SNH's Scientific Advisory Committee in October 2015, summarised the additional benefits that muirburn provides in scientific terms<sup>2</sup>.

The Muirburn Code sets out the issues involved in using fire or cutting machinery in uplands and moorlands, including lowland heaths.

When muirburn is done well, in accordance with this Code, it can provide benefits. When done badly, it can cause significant and lasting damage. Fires escaping from muirburn are a major cause of wildfire in Scotland. Fires can escape for many reasons including: inadequate firebreaks, staff or equipment, or because muirburn has been undertaken under the wrong conditions. Improving muirburn techniques to avoid wildfires should be a priority for everyone.

The Code is a guide for practitioners and others with an interest in muirburn. It aims to set out the statutory restrictions and good practice in a relevant and useful way.

This Code does not provide all the information needed to carry out burning or cutting safely and effectively. Links to other sources of information are provided in Section 8.1. Training can increase knowledge of fire behaviour, safety requirements and new techniques for the control of fire, even for those with some experience. There are several providers of training who can be contacted through Scotland's Moorland Forum<sup>3</sup>.



Figure 1 - Managing a fire with a beater

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<sup>2</sup> The heterogeneity of vegetation cover and structure that can be maintained by muirburn is capable of creating and maintaining high conservation value in plant, invertebrate and bird communities, although these communities lack fire-intolerant species, and the biodiversity associated with native scrub and woodland.

See: [A Review of Sustainable Moorland Management - Report to the Scientific Advisory Committee of SNH \(Oct 2015\)](#) - page 15

<sup>3</sup> Scotland's Moorland Forum contact form: <http://www.moorlandforum.org.uk/contact-us>

## 2 REGULATION OF BURNING & CUTTING

### 2.1 Introduction

This section of the Code sets out regulations that you **MUST** comply with. The principal legislation governing muirburn is the Hill Farming Act 1946, as amended and supplemented by more recent legislation, listed in Supplementary Information 2 – Offences & Legislation.

The legislation covers the burning of all moorland vegetation, including grass and gorse.

### 2.2 Muirburn Season

Muirburn is permitted only during the statutory muirburn season, which runs from 1<sup>st</sup> October to 15<sup>th</sup> April inclusive, but the season can be extended to 30<sup>th</sup> April, with the permission of the landowner. The Scottish Government does not encourage this extension, as there are increased risks to ground-nesting birds in late April.

In a small number of exceptional circumstances, a licence to carry out burning outwith the season can be applied for. See the SNH website<sup>4</sup> for guidance.

### 2.3 Burning Do's and Don'ts

#### You **MUST**:

- Have sufficient people and equipment available to control the fire properly.
- Have consent from Scottish Natural Heritage, if a fire will be within a Site of Special Scientific Interest (SSSI) where burning is listed as an 'Operation Requiring Consent' (ORC) (See the Sitelink webpage for ORC details for all sites<sup>5</sup>).
- Inform the proprietor of the land concerned and occupiers within 1km of the proposed location where it is intended to burn, unless they have indicated in writing that they do not want to receive notification. The notification must be given after the end of the previous muirburn season, but not later than seven days before starting muirburn. It must be in writing (including text or e-mail), but if ten or more people need to be notified, a notice may be placed in a local newspaper circulating in the area instead.
- Provide, if requested, additional information about dates, location and extent of the proposed muirburn to landowners and occupiers within 1km of the proposed muirburn, no later than the end of the day before burning.

#### You **MUST NOT**:

- Burn between one hour after sunset and one hour before sunrise.
- Burn within 30m of a public road.
- Leave a fire unattended.
- Cause damage to any woodland, neighbours' property or a scheduled monument.
- Create smoke that is a nuisance.
- Endanger anyone's health and/or safety.
- Intentionally or recklessly:
  - Damage the natural features of a SSSI.
  - Harass birds listed in Schedule 1A of the Wildlife and Countryside Act 1981.
  - At any time take, damage, destroy or interfere with any nest habitually used by any wild bird included in Schedule A1 of the Wildlife and Countryside Act 1981.

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<sup>4</sup> Out of season licence: <https://www.snh.scot/professional-advice/safeguarding-protected-areas-and-species/licensing/muirburn-licensing>

<sup>5</sup> Sitelink: <http://gateway.snh.gov.uk/sitelink/index.jsp>

- Disturb or destroy the nests, eggs, or young of breeding birds, or obstruct or prevent a wild bird from using its nest.
- Kill or injure reptiles.
- Kill, injure or disturb protected mammals, such as badger, wildcat, otter, pine marten or water vole (for water vole, protection is limited to within the burrow).
- Damage or destroy the place of shelter of a protected mammal (all the above species).

## 2.4 Cutting Do's and Don'ts

The use of cutting or swiping machinery is not subject to the same statutory seasonal limits as muirburn. To avoid disturbance, injury or death of ground-nesting birds, cutting should only take place during the muirburn season.

### You **MUST**:

- Have consent from Scottish Natural Heritage, if cutting on a Site of Special Scientific Interest (SSSI), and cutting, or the use of vehicles and machinery, is listed as an 'Operation Requiring Consent' (ORC) (See the Sitelink webpage for ORC details for all sites <sup>6</sup>).

### You **MUST NOT**:

- Cause damage to a scheduled monument.
- Intentionally or recklessly:
  - Damage the natural features of a SSSI.
  - Harass birds listed in Schedule 1A of the Wildlife and Countryside Act 1981.
  - At any time take, damage, destroy or interfere with any nest habitually used by any wild bird included in Schedule 1A of the Wildlife and Countryside Act 1981.
  - Disturb or destroy the nests, eggs, or young of breeding birds.
  - Kill or injure reptiles.
  - Kill, injure or disturb protected mammals, such as badger, wildcat, otter, pine marten or water vole (for water vole, protection is limited to within the burrow).
  - Damage or destroy the place of shelter of a protected mammal (all the above species).

## 2.5 Public Funding and Payments - Conditions

Under cross compliance, recipients of direct support payments (e.g. Basic Payment Scheme) have to meet certain requirements known as Good Agricultural and Environment Conditions (GAECs), some of which relate to the Muirburn Code. Failure to meet these requirements can result in a reduction being applied to support payments. Full details can be found under GAEC 6 on the Rural Payments and Services website<sup>7</sup>.

## 2.6 Tenanted Land

Where more than one person has an interest in the land, agreement should be reached in advance of any burning taking place.

Tenants intending to carry out burning against the provisions of their lease **MUST** inform the proprietor in writing, 28 days in advance. If dissatisfied, the proprietor may, within seven days, refer the matter to the Scottish Government Rural Payments & Inspections Directorate for a decision.

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<sup>6</sup> Sitelink: <http://gateway.snh.gov.uk/sitelink/index.jsp>

<sup>7</sup> GAEC 6: <https://www.ruralpayments.org/publicsite/futures/topics/inspections/all-inspections/cross-compliance/detailed-guidance/good-agricultural-and-environmental-conditions/maintenance-of-soil-organic-matter--gaec-6/>

### 3 PROTECTED AREAS AND SPECIES, AND SENSITIVE AREAS

#### 3.1 Protected Areas

Protected areas, including Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), and Special Protection Areas (SPA), represent the very best of Scotland's habitats, plants and animals, rocks, fossils and landforms. Burning and cutting can damage some of these features, and therefore special conditions may apply.

On SSSIs, if burning is listed as an 'Operation Requiring Consent' (ORC), consent from Scottish Natural Heritage **MUST** be obtained before carrying out any burning. (See the Sitelink webpage for ORC details for all sites<sup>8</sup>).

Scheduled monuments are archaeological sites and monuments of national importance and **MUST NOT** be damaged. If works are planned that will use wheeled vehicles, or create any form of ground disturbance, or if there are other concerns about potential damage to a scheduled monument, practitioners should contact the Heritage Management Directorate of Historic Environment Scotland (HES)<sup>9</sup> for advice about any permission that may be required.

It is important to identify the scheduled area on the ground, as it may extend beyond any visible features. Locations of scheduled monuments can be found on Pastmap<sup>10</sup>, and detailed maps of scheduled areas on the HES web site.



Figure 2 - Mixed vegetation recovering after burning

#### 3.2 Protected Species

Upland birds may be nesting on the ground, crags or trees during the muirburn season.

All bird species are protected under the Wildlife and Countryside Act 1981. Some species are specially protected, including Golden eagle, Hen harrier, Merlin, Peregrine, and Divers.

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<sup>8</sup> Sitelink: <http://gateway.snh.gov.uk/sitelink/index.jsp>

<sup>9</sup> Historic Environment Scotland: <https://www.historicenvironment.scot>

<sup>10</sup> Pastmap: <http://pastmap.org.uk/>

While cutting is not subject to the same statutory season as muirburn, to reduce the risk of death or disturbance of birds, mammals and reptiles, cutting should only take place during the muirburn season.

A walk over survey of the area, prior to burning or cutting, should be carried out to allow appropriate avoidance action to be taken, if required; this may include the establishment of buffer zones based on guidance about safe working distances. For example, areas within 1km of nesting golden eagles should be avoided, after the end of January.

The table in Supplementary Information 3 provides safe working distances and breeding season dates for key bird species that might be affected by muirburn in Scotland.

Reptiles and some mammals are protected. Burning within 30m of an otter holt (non-breeding), a badger sett or a pine marten den, within 200m of a wildcat den or otter breeding holt, or within 10m of a water vole burrow may require a licence from SNH. There is more information on the SNH website<sup>11</sup>.

### 3.3 Sensitive Areas

Sensitive areas are where the risk of damage from burning or cutting is likely to be greater than any benefits. In some of these areas, burning and/or cutting will be inappropriate; in others extra care will be needed to avoid damage.

#### *Existing Vegetation*

##### **Woodland, woodland edges and small trees/scrub**

- Fire damages or destroys trees and scrub.
- Areas with native oak, birch, aspen, Scots pine, or willow are of particular value and generally should only be burnt as part of a woodland management plan.
- Juniper bushes should not be burnt, as the bushes will not re-sprout.
- Retaining scattered trees and scrub can be important for birds such as Black Grouse.
- Burning adjacent to woodland can be used to create the seedbed conditions for native woodland regeneration.
- Burning can be used to maintain important open habitats free of trees and scrub.

##### **Bracken**

- Fire does not control bracken, and burning is likely to promote bracken expansion.
- Bracken should not be burnt.

##### **Tall and old heather**

- A mosaic, or patchwork, of old and young heather should be retained to benefit the widest range of wildlife, including insects. Some areas of old, tall heather should be left unburned.
- Areas with an intimate mix of tall and short heather should not be burnt.

##### **Special types of heath**

- Damp heaths, usually found on north and east facing slopes, can be easily damaged by fire.
- Scottish Liverwort heath is mainly found in the west of Scotland; it is a rare habitat rich in fire-sensitive liverworts and should not be burnt.
- For more detail see the Plantlife publication<sup>12</sup>.

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<sup>11</sup> Mammal licensing:

<https://www.snh.scot/professional-advice/safeguarding-protected-areas-and-species/licensing/species-licensing-z-guide>

<sup>12</sup> Liverwort information: <http://www.plantlife.org.uk/uk/our-work/publications/bryophytes-scotlands-oceanic-heath>



## *Soil*

### **Peat**

- Burning should not take place on peatland<sup>13</sup>, except as part of a habitat restoration plan, approved by SNH (also see Section 7.1, and Supplementary Information 7).
- Areas with peat hags, bare peat or erosion should not be burnt.

### **Thin soils (<5cm deep) over underlying rock.**

- These areas should not be burnt. If vegetation is removed, soil may be eroded by wind and water down to bare rock.

## *Landform*

### **Summits, ridges and other areas very exposed to the wind.**

- These areas should not be burnt, as vegetation is kept short by high winds (wind-clipped); burning has no benefit and risks removing vegetation cover, leading to erosion.
- These conditions are most likely to occur:
  - Above 300 m in the north-west,
  - Above 600 m in the south-east, and
  - In exposed areas at lower altitudes, near the coast or where wind is funnelled.



Figure 3 - A mosaic of fires

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<sup>13</sup> Peat is an organic soil, which contains more than 60 per cent of organic matter and exceeds 50 centimetres in thickness. Soil survey of Scotland – page 17 - <http://www.gov.scot/Resource/Doc/917/0120458.pdf>

### *Steep hillsides and gullies.*

- Fires burning uphill on steep slopes are more difficult to control.
  - Burning on a slope greater than 1 in 3 (18°) should only be carried out by experienced practitioners using appropriate techniques and equipment.
  - Slopes steeper than 1 in 2 (27°) should be avoided altogether.
- Burning in gullies should be avoided; they can act like chimneys, drawing air upwards and increasing fire intensity. Gullies are also important for biodiversity.
- Avoid burning into scree slopes to avoid damaging lichen and destabilising the scree.

### *Waterbodies (rivers, burns, lochs and lochans)*

#### **Edge of waterbodies**

- Vegetation at the edge of waterbodies protects banks from erosion and reduces water and sediment run-off.
- Fire-free buffer zones should be established:
  - 2m wide for watercourses less than 2m wide.
  - 5m wide for watercourses more than 2m wide, lochs and lochans.
  - Watercourses should not be used as primary firebreaks. In an emergency they can be considered as a back-up to cover the failure of a primary firebreak.
- Wetter vegetation or dips in the ground beside watercourses may be suitable as firebreaks. Cutting may also be used to create firebreaks. Techniques to ensure low fire intensity can increase the effectiveness of firebreaks.

#### **Water Catchments.**

- Additional precautions or restrictions may be required in some circumstances in catchments that are acid-sensitive, are used for drinking water, or where there is a high flood risk. If this is the case, SEPA or Scottish Water will contact the relevant owners and managers.



Figure 4 - Burning buffer zones should be established beside waterbodies

### *Existing management*

Areas subject to heavy grazing are unlikely to be suitable for burning. A combination of heavy grazing and muirburn is likely to lead to grasses becoming dominant, resulting in the loss of heather and species diversity.

#### 3.4 Fire-Free Areas

These are places where the risk of damage from burning is such that burning should not take place. This applies to some Sensitive areas identified in section 3.3.

Some areas are identified as fire-free in SSSI consents, in Natura Muirburn Plans, or as part of publicly funded schemes and agreements, such as Agri-environment schemes, Rural Development Contracts, or Management Agreements with Scottish Natural Heritage or Historic Environment Scotland. These areas **MUST NOT** be burnt.

It is good practice to identify a network of patches that are not burnt or cut. Some of these will be particular features, as identified in the sections above (for example: waterbody buffers, steep slopes, peat hags, historical features) but there should also be fire-free areas in all parts of the landscape.



Figure 5 - Mixed vegetation may not benefit from burning

#### 4 PLANNING FOR MUIRBURN – General Considerations

1	<b>Read</b> and understand this Code.	In particular, sections: <ul style="list-style-type: none"> <li>• 2 - Regulation of Burning &amp; Cutting</li> <li>• 3 - Protected Areas &amp; Species and Sensitive Areas.</li> </ul>
2	<b>Define</b> the land that is being considered.	Use maps or aerial photographs
3	<b>Identify</b> the management purpose and desired outcome, and decide whether burning and/or cutting might meet the objective.	Indicate areas where burning or cutting might achieve the objectives. Consider the interaction of other planned management activity, especially grazing. Consider alternatives to burning. Decide whether burning, cutting, or other management is desirable.
4	<b>Identify</b> and note all the features, and assets at risk from burning or cutting on a map or aerial photo.	Include: <ul style="list-style-type: none"> <li>• Property – e.g. fences, gates, buildings, power lines, pipelines, roads and tracks.</li> <li>• Biodiversity assets – e.g. special habitats, wildlife, peatland bogs, scrub, woodland.</li> </ul>
4	<b>Identify</b> all protected areas, protected species, sensitive areas and fire-free areas.	Show these areas on a map. Consider whether external advice is required.
5	<b>Check</b> if any consents are required for the proposed work.	Contact Scottish Natural Heritage or Historic Environment Scotland if required.
6	<b>Review</b> the management options.	For the factors to consider, see Supplementary Information No. 1: “To Burn, to Cut or to do Neither”.
7	<b>Prepare</b> a more detailed plan if you decide to burn or cut.	See Sections 5 or 6.

Also see the checklists in Tables 5.1 and 5.2, in Section 5 - Burning.

## 5 BURNING

### 5.1 Management by Fire

Fire has occurred in the uplands for thousands of years, but regular management by fire is only carried out on a small proportion of moorland in Scotland. Some plant species are fire-adapted, while others are adversely affected.

Fire is a powerful tool and muirburn requires skill and understanding, if it is not to do more harm than good. A fire should not be lit unless it can be put out. Fire that is in the wrong place, or out of control, however ignited, can damage property, people, livelihoods and vital services.

### 5.2 Fire and its impacts

See Supplementary Information 4

The behaviour of fires changes with wind, slope, fuels and aspect and whether it is a head, flank or backing fire or indeed a ground fire. The effects of individual fires vary according to fire behaviour and the type and condition of the vegetation that is burnt. The fire regime<sup>14</sup> affects vegetation and habitats in ways that are different from the effects of individual fires.

Practitioners should be aware of the potentially damaging impacts of different types of fire and of the overall fire regime. Appropriate fire prescriptions, fire regimes and subsequent land management should be used to avoid damage and maximise opportunities for recovery.

### 5.3 Burning Plan

A robust burning plan allows some control over the threats that can be created by burning. As well as the information within this Code, details of some of the issues that need to be considered to produce a burning plan are provided in Supplementary Information 5.

The plan should include:

- Objectives of burning.
- Choosing where to burn.
- Choosing when to burn.
- Choosing how to burn.
- Where and when not to burn.
- How to reduce risks.
- Equipment.
- Where and how to record what has been burnt.

**Table 5.1** provides a checklist for the preparation phase.

**Table 5.2** provides a checklist for the actions required on the day that burning is to take place.

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<sup>14</sup> A fire regime is the pattern, frequency, and intensity of the muirburn fires and wildfires that prevail in an area over long periods of time. It is an integral part of fire ecology, and renewal for certain types of ecosystems.

**Table 5.1 - Preparations for Burning**

1	Consult your burning plan	This should identify where, when and how to burn, and the constraints on burning.	<input type="checkbox"/>
2	Obtain consents	If required from government agencies, to ensure that the proposed muirburn will comply with all relevant legislation.	<input type="checkbox"/>
3	Inform the proprietor of the land concerned and occupiers within 1km of the proposed location where it is intended to burn.	Notification must be given in writing after the end of the previous muirburn season, but not later than seven days before starting muirburn. For full details of the requirement, see the Burning Do's & Don'ts (Section 2.3).	<input type="checkbox"/>
4	Prepare Equipment	Preparations should be completed prior to the start of each burning season, so that burning can take place as soon as conditions are suitable.	<input type="checkbox"/>
5	Staff preparations	Identify the people (minimum 3) to form burning teams, provide additional training, if necessary, and brief them on what will be required from them on a burning day. Consider first aid training, with a view to having a trained first aider in each burning team.	<input type="checkbox"/>
6	Warning Notices	If burning is planned close to popular areas for public access, consider preparing warning / interpretation signs.	<input type="checkbox"/>
7	Liaison with the Scottish Fire & Rescue Service	Send a written fire plan to the appropriate SFRS Control Centre.	<input type="checkbox"/>
8	Emergency Plan	Prepare an emergency plan and identify back-up help that can be mobilised by VHF radio (where a network exists) or by mobile phone (check the mobile phone coverage in the area).	<input type="checkbox"/>
9	Insurance	Check that there is adequate third party and employer's liability insurance cover in place for burning operations.	<input type="checkbox"/>
10	Risk Assessment	Prepare a Health & Safety Risk Assessment	<input type="checkbox"/>

**Table 5.2 - Burning Day Check List**

1	'Preparations for Burning' checklist	Confirm that all checks in Table 5.1 have been completed.	<input type="checkbox"/>
2	Fire & Rescue Service	Notify the appropriate Fire & Rescue Service Control Centre before burning each day.	<input type="checkbox"/>
3	Warning Signs	Erect warning signs, if burning close to popular areas for public access.	<input type="checkbox"/>
4	Weather conditions	<ul style="list-style-type: none"> <li>• Obtain a weather forecast</li> <li>• Is the weather suitable for burning now and how is it expected change during the day? The wind speed should not be above Force 3, 13-19 km/hr (8-12 mph).</li> <li>• Is the condition of the vegetation suitable for burning safely?</li> <li>• Decide where to burn in the expected weather conditions. If conditions change, re-assess.</li> </ul>	<input type="checkbox"/>
5	Briefing	Carefully brief sufficient people to carry out the planned burning programme safely. At least one person should know the area well.	<input type="checkbox"/>
6	Risk Assessment	Review the Risk Assessment and confirm it is acceptable to proceed.	<input type="checkbox"/>
7	Equipment	Make sure that all equipment required for safe burning is available and fully serviceable.	<input type="checkbox"/>
8	Burning Team	Check that the burning teams are properly dressed and equipped.	<input type="checkbox"/>
9	Back-up team	Confirm that extra people are on call to assist, if necessary.	<input type="checkbox"/>
10	Firebreaks	Prepare firebreaks before lighting fires – the firebreaks to be used or created will depend on the conditions on the day.	<input type="checkbox"/>
11	Test Fire	Choose a safe place for a test fire to check fire behaviour and control methods. Alter methods and review the risk assessment. Only burn if the risks are acceptable.	<input type="checkbox"/>
12	Welfare	First aid kits should be carried and drinks should be available.	<input type="checkbox"/>
13	Fire & Rescue Service	Notify the appropriate Fire & Rescue Service Control Centre on completion, each day.	<input type="checkbox"/>

#### 5.4 Liaison with the Scottish Fire & Rescue Service (SFRS)

If a fire is reported and it is not possible to verify that it is muirburn under control, SFRS will attend. To reduce unnecessary call-outs, on the day of muirburn, the person in charge of burning (the Responsible Person) should telephone the appropriate SFRS Control Centre (see the coverage map<sup>15</sup>):

- North: 01382 835804
- East: 0131 228 1367
- West: 01505 331661 or 0141 887 1188

The following information should be provided:

- The name of the Responsible Person.
- The position of the centre of the area where burning is planned to take place:
  - Direction & distance from the nearest village or town.
  - Six figure grid reference.
  - Example: 7 miles north of Blair Atholl, NN 853778
- Start time and expected finish time of burning.
- Contact mobile telephone number for the Responsible Person, and in case the primary telephone number is unavailable, a back-up telephone number, which will be monitored throughout the time that the muirburn is taking place (for example: the estate / farm office / home number).
- Number of people taking part.

The Responsible Person should contact the Control Centre again, when burning operations have been completed and all fires are out.



Figure 6 - Back-pack sprayer to apply water

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<sup>15</sup> SFRS Coverage map: <http://www.firescotland.gov.uk/your-area.aspx>



## 5.5 Fire Control Equipment

A team using a range of different equipment controls fire most efficiently. Each member of the muirburn team should have a fire beater appropriate to the vegetation type – note that different types of beater are best suited to different vegetation. Water can be applied by knapsack sprayers, water tank and pump combinations, and fire fogging units. It is important to ensure adequate supplies of water are available. Cutting equipment (tractor-mounted flail or brushcutter) and commercial leaf blowers can also be useful. There is more detail in Supplementary Information 5.

## 5.6 Personal Protective Equipment (PPE)

All members of the burning team **MUST** wear appropriate protective clothing and equipment. Details of appropriate PPE can be found on the Forestry Industry Safety Accord (FISA) website<sup>16</sup>



Figure 7 - Vehicle-mounted fire fogging equipment



Figure 8 - Leaf blower

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<sup>16</sup> FISA for PPE: <https://www.ukfisa.com/assets/files/safetyLibrary/FISA%20803%20Firefighting.pdf>

## 6 CUTTING

See Supplementary Information 6

### 6.1 Management by Cutting

Cutting, on its own or in combination with burning, is an important vegetation management technique. Increasingly, cutting is used in support of burning, and significant benefits from the combined approach can be achieved. Cutting can create firebreaks before burning starts, or even ahead of a fire that is out of control. Cutting can be a substitute for burning in appropriate circumstances. Some practitioners manage their heather using specialist cutting equipment alone, and this can be very effective.

Cutting is much less hampered by the weather, requires fewer people, and carries a very low wildfire risk.

### 6.2 Where cutting can be used

Cutting is restricted to areas where there is access to the land for machinery and where the ground conditions allow the cutting machinery to work safely and without causing damage.

### 6.3 Cutting equipment

A wide and versatile range of cutting equipment is available.

Cutting equipment can be heavy and very powerful. If handled badly, it can cause injury to operators and damage to vegetation, above ground archaeology and the equipment itself.



Figure 9 - Tractor-mounted flail mower



Figure 10 - Quad bike and self-powered flail mower

## 7 GOOD PRACTICE MANAGEMENT

### 7.1 Muirburn and Peatland

See Supplementary Information 7

#### Key Issues:

- Peatland plays a valuable role in supporting a range of land uses and providing natural services. It needs to be managed carefully in order to continue that role.
- When in good condition, peatland will have a high water table, a high cover of *Sphagnum* bog-mosses, and slow heather growth, which rarely becomes rank.
- Techniques are available to improve the condition of some degraded peatland resulting in the restoration or improvement of the multiple services that peatland provides.

#### Burning

- Burning should not take place on peatland unless it is part of a habitat restoration plan approved by SNH.
- Such a restoration plan will almost always include drain blocking, or other actions to raise the water table. Although cutting will normally be preferred, burning may have a role in:
  - reducing dense vegetation, which may shade out mosses and thus hinder recovery, and
  - exposing drains and facilitating dam installation.
- More information about a habitat restoration plan is in Supplementary Information 7.
- If burning is to take place, a low severity fire should be used, normally burning with the wind, when the litter under the canopy is moist.
- Peatland areas should never be burnt in very dry conditions, as this can cause significant damage and lead to serious peat fires.

#### Cutting

- As part of habitat restoration, where ground conditions permit, cutting can be used to open up the canopy and allow a range of bog species to recover and re-establish.
- On wet peatland, lightweight cutting equipment, mounted on low ground pressure vehicles, should be used to minimise the amount of compaction.
- Care needs to be taken to avoid scalping hummocks.

#### Risks:

- Peatland can be damaged easily by incorrect management.
- Fires that ignite peat can be very damaging and difficult to extinguish.
- Many peatland areas form part of drinking water catchments. Inappropriate management can lead to impurities in the drinking water, which are expensive to remove.
- Bad burning practices can produce bare peat, which is easily eroded by wind and water, allowing it to enter watercourses.
- Badly managed cutting can damage the surface of the peat.

#### Benefits:

- Reducing a heavy vegetation fuel load on peatland may reduce the risk of lasting damage should a wildfire occur.
- In some circumstances, burning and cutting can break up dominant heather and grass cover, which may increase the diversity of the vegetation and create space for peat-forming *Sphagnum* mosses to re-establish or expand their cover.

## 7.2 Muirburn for Grazing Management

See Supplementary Information 8

### Key Issues:

#### *Application*

- Anyone who uses muirburn to manage vegetation for grazing of domestic livestock or deer.

#### *Objectives*

- In grassland, to remove old or dead grasses, encourage new growth, and create a varied structure. Burning can be used to provide an “early bite”.
- In heather moorland, to encourage regeneration of young heather, and to create a mix of patches of different age and structure to provide a balance between feeding and shelter.
- Burning or cutting may also provide improved access for stock amongst taller vegetation to areas that can be grazed.
- Burning should not be used in an attempt to eliminate heather and replace it with grassland, either where heather is dominant or where there is a grass-heather mixture. This usually produces grasslands of low forage and biodiversity value.

#### *Frequency*

- Carrying out muirburn too frequently damages heather and blaeberry, which provide winter feed. It results in poor quality grassland (for example Purple moor-grass *Molinia caerulea*), and a loss of winter grazing and biodiversity.
- The minimum recommended muirburn frequency in grassland ranges from four to ten years, depending on growing conditions and the type of grassland. In heather-dominated vegetation, muirburn frequency should be determined by the rate of growth of the heather, and should not take place until the heather is 20-30cm tall. In the most productive situations, this will take at least 8 years and it may take much longer in other areas.

#### *Size of fire*

- Fires should not be bigger than can be controlled by the available people and equipment.
- Large fires burn indiscriminately, including areas that are suitable for burning and those that are not.
- Large fires carried out without due care are a significant cause of wildfire.
- Large fires are less likely to create the mosaic of habitats and vegetation ages that provide forage through the year and increase the biodiversity value.
- Fires in excess of 50m wide can be difficult to control.

### Risks:

- Grass fires have a fast rate of spread and react quickly to changes in wind direction or wind speed.
- Grass fires can breach firebreaks through direct heat transfer, flying embers (spotting) or by creeping across short vegetation.
- Dead grass is a fine fuel that can dry out quickly, often in less than one hour, and this can lead to significant increases in the rate of spread and fire intensity.
- Insufficient preparation of firebreaks, staff or equipment creates a significant risk of wildfires. Fires of this type can destroy large areas.
- Burning in a small area, in a single year, may result in a ‘honeypot effect’, causing local overgrazing and poaching.

**Benefits:**

- Greater short-term grazing capacity for domestic stock and deer.
- Fires can be used to distribute grazing more widely, to encourage movement through areas avoided by livestock, or to attract deer to specific areas.

### 7.3 Muirburn for Grouse Moor Management

See Supplementary information 9

**Key Issues:***Objectives*

- To provide a mosaic of different ages of heather and other vegetation to provide food, nesting areas and shelter for grouse. This can also benefit a range of other moorland species.

*Style of Burning*

- Low severity (“cool”) fires burnt over moist soils with a range of fire intensities depending on fuels, slope and wind.
- Narrow headfires creating strips with widths of 30-50m. Backing, flanking and other ignition patterns can also be used to control fire intensity and reduce the risk of escapes.
- Strip fires can run for several hundred metres.

*Frequency*

- The period between management will be determined by the rate of growth of the heather. Burning should not take place until the heather is 20-30cm tall. In the most productive situations this will take at least 8 years, but it may take much longer in other areas.
- The rate of growth will be influenced by factors such as altitude, fertility of the soil and the amount of grazing, and burning frequency should be adjusted accordingly.

**Risks:**

- Heather fires can have high fire intensity with a fast rate of spread, and they react quickly to changes in wind direction or wind speed.
- Fire intensities can be generated that are beyond the capacity of on-site fire control equipment.
- Heather fires can breach firebreaks through heat transfer or creeping through short vegetation.
- Low levels of fuel moisture can lead to significant increases in the rate of spread and fire intensity.
  - Heather is a fine fuel with dead litter and elevated dead leaves, which can dry out quickly in the sun or with low levels of humidity.
  - The live fuel moisture can also drop rapidly following frosts.
- Burning with inadequate firebreaks, staff or equipment or under the wrong conditions creates a significant risk of fires escaping to become wildfires.
- Burning too frequently can lead to dominance of grasses.
- Burning small fires may result in a “honeypot effect” causing local overgrazing and poaching.

**Benefits:**

- The burning or cutting of vegetation to increase structural diversity for grouse can provide benefits for other plant, bird and animal species on the moor.

## 8 INFORMATION SOURCES

### Scottish Government

- GAECs: <https://www.ruralpayments.org/publicsite/futures/topics/inspections/all-inspections/cross-compliance/detailed-guidance/>

### Scottish Fire & Rescue Service

- Contact details for the appropriate Control Centres
  - North: 01382 835804
  - East: 0131 228 1367
  - West: 01505 331661 or 0141 887 1188
- Website: <http://www.firescotland.gov.uk/>

### Scottish Natural Heritage

- You can view the Code on our website: <https://www.snh.scot/muirburncode>
- For out of season licensing see: <https://www.snh.scot/muirburn-licensing>
- For contact details for SNH SNH offices see: <https://www.snh.scot/about-snh/contact-us/area-offices>

### Scottish Environment Protection Agency

- Website: <http://www.sepa.org.uk/contact>
- Telephone: 0300 099 6699

### Historic Environment Scotland

- Website: <https://www.historicenvironment.scot>
- Telephone: 0131 668 8770

### The Muirburn Group of Scotland's Moorland Forum

- Muirburn Code: <http://www.muirburncode.org.uk>
- Website: <http://www.moorlandforum.org.uk>
- Telephone: 01387 723201

### Lantra Scotland

- Details of competency standards, and Lantra Awards register of instructors
- Website: <https://www.lantra.co.uk/scotland>
- Telephone: 01738 310164

### Scottish Qualifications Authority

- Information on vocational qualifications and academic courses e.g. HNC Gamekeeping
- Website: [www.sqa.org.uk](http://www.sqa.org.uk)
- Telephone: 0345 279 1000

## 9 SUPPLEMENTARY INFORMATION

1	To Burn, to Cut or to do Neither
2	Offences & Legislation
3	Safe working distances and breeding season dates for key bird species that might be affected by muirburn in Scotland.
4	Fire Behaviour and Effects, Wildfire and Contingency Planning.
5	Planning for Burning.
6	Planning for Cutting
7	Muirburn and Peatland
8	Muirburn for Grazing Management
9	Muirburn for Grouse Moor Management



Figure 11 – All Terrain Vehicle, with fire-fogger and fire beaters



Figure 12 - Muirburn in progress

### Photo Credits

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Figure 1	Langholm Moor Demonstration Project
Figures 2, 3, 4, 5 & 6	Heather Trust
Figures 7 & 8	Scottish Land & Estates
Figure 9	Scottish Natural Heritage
Figure 10	Logic Engineering Ltd.
Figure 11	Game & Wildlife Conservation Trust
Figure 12	Patrick Laurie

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Scottish Natural Heritage  
Great Glen House  
Leachkin Road  
INVERNESS  
IV3 8NW