

THE MUIRBURN CODE



Changes to Legislation: The Muirburn Code has been updated to reflect legislative changes to the Hill Farming Act 1946 which came into effect on 1 August 2011.

THE MUIRBURN CODE

© Crown copyright 2011

You may re-use this information (excluding logos and images) free of charge in any format or medium, under the terms of the Open Government Licence. To view this licence, visit <http://www.nationalarchives.gov.uk/doc/open-government-licence/> or e-mail: psi@nationalarchives.gsi.gov.uk.

Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned.

ISBN: 978-1-78045-323-1 (web only)

The Scottish Government
St Andrew's House
Edinburgh
EH1 3DG

Produced for the Scottish Government by APS Group Scotland
DPPAS11899 (08/11)

Published by the Scottish Government, August 2011

THE MUIRBURN CODE

Fire - a powerful but potentially dangerous tool

Fire has been part of upland environments for many thousands of years. It occurs naturally as a result of lightning strikes and it is probably also one of the most useful, and oldest, land management tools. However, it is a powerful tool, which needs to be used with skill and understanding if it is not to do more harm than good.

The first step towards the wise use of fire is to identify the constraints that apply. This is the primary purpose of this code. The law provides statutory restrictions that *must* be followed, and these are described. In some circumstances, burning also may be unsafe, damaging, or a waste of time and resources. Following the additional recommendations of the Code will greatly reduce risks to those carrying out the burning and to the general public, and will decrease the risk of damage to agricultural, forestry, game, wildlife diversity (biodiversity), landscape, and archaeological assets.



© Forestry Commission Technical Development Branch

This Code does *not* provide all the information you need in order to carry out burning safely and effectively. If you require detailed guidance please refer to the Supplement to the Muirburn Code: A Guide to Best Practice. Training in understanding fire behaviour, modern safety requirements, and new techniques for the control of fire is strongly recommended even for those with some experience. Sources of further information, and sources of training, are listed at the end.

The Law - statutory restrictions

The Law – statutory restrictions

The principal legislation governing muirburn is the Hill Farming Act 1946 as amended by the Wildlife and Natural Environment (Scotland) Act 2011 and the Climate Change (Scotland) Act 2009. The legislation covers the burning of all vegetation on moorland, including plants such as gorse. It does not refer just to the burning of heather. Parts of the Wildlife & Countryside Act 1981, the Nature Conservation (Scotland) Act 2004, the Roads (Scotland) Act 1984, the Clean Air Act 1993, the Health & Safety at Work Act 1974 and the Fire (Scotland) Act 2005, among others, may also apply. Negligence in carrying out muirburn could result in liability to civil damages.

In Scotland, muirburn is permitted only between **1st October and 15th April inclusive**, at all altitudes. This may be extended to 30th April only on the authority of the landowner. Generally, the Scottish Government does not encourage burning after the 15th of April. A muirburn licence may be granted to allow burning outside the muirburn season for the following purposes only: conserving, restoring, enhancing or managing the natural environment; research; or public safety. Details of how to apply for a licence to burn outside the muirburn season are available from Scottish Natural Heritage (www.snh.gov.uk/protecting-scotlands-nature/species-licensing/muirburn-licensing/).

Before carrying out muirburn a person must notify the landowner, and occupiers of land within 1km of the proposed muirburn site of their intention to burn during the coming muirburn season. **Notification must be in writing (this includes email and text messaging where agreed by neighbours) and should be given after the end of the previous muirburn season but not later than 7 days before burning.** If they request further information on the dates, location and approximate extent of proposed muirburn, this information must be given no later than the end of the day before burning. Notification does not need to be given to those who have indicated in writing that they do not want to be notified of any intention to make muirburn. Where there are 10 or more occupiers of land situated within 1km of the site notification may be made by placing a notice in at least one newspaper circulating in the area.

Changes in agricultural support are increasing the importance of this Code. The cross compliance requirements of the Single Farm Payment (SFP) require moorland to be maintained in Good Agricultural and Environmental Condition (GAEC), and the Muirburn Code will be used as the standard expected of managers. The Code applies to farmers and all moorland managers and forms part of the compliance requirements for Single Farm Payments. The Code applies to all areas, regardless of altitude or type of vegetation. It should not be seen as applying only to grouse moors, as the guidance applies equally to the management of all vegetation by fire.

All of the following actions are **offences**, which could result in prosecution.

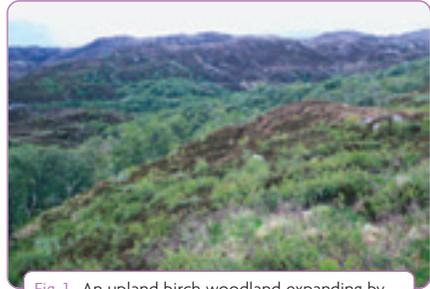
- **Burning outwith the statutory burning season** (unless under licence from Scottish Natural Heritage) [Hill Farming Act 1946, s23].
- **Burning at night, between 1 hour after sunset and 1 hour before sunrise** [Hill Farming Act 1946, s25].
- **Leaving a fire unattended** [Hill Farming Act 1946, s25].
- **Being unable to control a fire or having not made provision for its proper control** [Hill Farming Act 1946, s25].
- **Causing damage to any woodland** [Hill Farming Act 1946, s25].
- **Causing damage to neighbours' property** [Hill Farming Act 1946, s25].
- **Causing damage to a scheduled monument** [Ancient Monuments and Archaeological Areas Act 1979, s2(2)a].
- **Failing to take fire safety measures in respect of harm caused by fire. Fire (Scotland) Act 2005, Part 3, s53 & s54.**
- **Carrying out burning on a Site of Special Scientific Interest**, without consent from Scottish Natural Heritage, if burning has been notified as an 'Operation Requiring Consent' [Nature Conservation (Scotland) Act 2004, s19].
- **Intentional or reckless harassment of birds listed in Schedule A1 of the Wildlife and Countryside Act 1981.**
- **Intentional or reckless damage to the natural features of a Site of Special Scientific Interest** [Nature Conservation (Scotland) Act 2004, s19].
- **Intentionally or recklessly disturbing or destroying the nests, eggs or young of breeding birds** [Wildlife & Countryside Act 1981 (as amended), s1, Schedule 1 and Schedule A1].
- **Omitting to give the landowner, or occupiers of land within 1km of the proposed muirburn site, written notice of your intention to burn during the coming muirburn season. Notice must be given after the end of the previous season and at least 7 days before burning.** [Hill Farming Act 1946, s26].
- **Omitting to give further information, if requested, by the landowner or neighbouring occupiers (within 1km) of the dates, location and approximate extent of intended muirburn, not later than the end of the day before burning.**
- **Lighting a fire, or allowing a fire to spread, within 30 m of a road so as to damage the road or endanger traffic on it, without lawful authority or reasonable excuse** [Roads (Scotland) Act 1984, s100(c)].
- **Creating smoke that is a nuisance to inhabitants of the neighbourhood** [Clean Air Act 1993, s17, refers to an offence under the Public Health (Scotland) Act 1897].
- **Endangering anyone's health or safety, including members of the public** [Health and Safety at Work etc. Act 1974, s2 and s3, Management of Health and Safety At Work Regulations 1999 S.I. 3242].

A tenant has the right to carry out muirburn “for the purpose of conserving or improving” the land, but if the lease makes provisions controlling muirburn then the tenant must give the landlord at least 28 days written notice. If the landlord is dissatisfied with the proposed muirburn the landlord, or factor, must give notice of the grounds for dissatisfaction within 7 days and refer the matter to the Scottish Government Rural Payments & Inspections Directorate for a decision. Representations may be made to the Scottish Government by either party.

The use of cutting or swiping machinery, used as a substitute for burning, is not subject to the same statutory seasonal limits as muirburn. However, an offence would be committed under Part 1 of the Wildlife & Countryside Act 1981 if cutting or swiping intentionally resulted in the death or injury of wild birds. It should not be used after the 15th April, and throughout the summer months, when ground-nesting birds will be present. The use of cutting machinery on a Site of Special Scientific Interest may also be an offence if the use of vehicles has been identified as an ‘Operation Requiring Consent’ (Nature Conservation (Scotland) Act 2004) and a consent for their use has not been given by SNH. Other legal obligations relating to the safe use of machinery will apply.

1. Identify situations where burning should not be carried out (“fire-free” areas).

- Sites traditionally used for nesting by all bird species that are specially protected.
- Any areas within a ½ mile of nesting golden eagles, after the end of February.
- Woodland, woodland edges and scrub, except where burning is used by trained and experienced staff as part of *woodland* management, to encourage native woodland expansion, or to benefit *woodland* game or wildlife. Moorland fires should not be allowed to spread into established stands of mature trees, even when sparsely stocked, or into recently replanted or naturally regenerating areas of native trees and shrubs (Figs. 1 - 3). You should seek advice from Scottish Natural Heritage before carrying out muirburn near to any area of native oak, tree birches, aspen, Scots pine, willow or juniper.



© Angus J. MacDonald, SNH

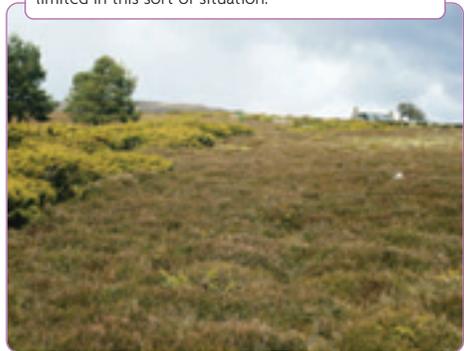
Fig. 1. An upland birch woodland expanding by natural regeneration. Moorland fires should not be allowed to spread into this sort of situation.



© Angus J. MacDonald, SNH

Fig. 2. Muirburn should not be allowed to spread into regenerating Scots pine on moorland adjacent to Caledonian pinewood.

Fig. 3. An example of moorland juniper, including regenerating juniper, accompanied here by some Scots pine trees. Moorland fires should be strictly limited in this sort of situation.



© Angus J. MacDonald, SNH

- Blanket bogs and raised bogs on deep peat (more than 0.5 m - about 20 inches - deep), unless heather constitutes more than 75% of the vegetation cover (Figs. 4 - 7).



Fig. 4. Blanket bog should be avoided. Do not burn areas with bog pools and where bog mosses are abundant. In this illustration the bog mosses are the yellow green, ochre and red patches at the edge of the pool.

© Angus J. MacDonald, SNH

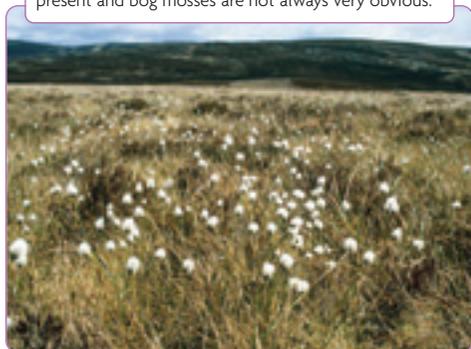


Fig. 5. Some types of blanket bog are a mixture of heather and cottongrass, particularly at higher altitudes and in the east. Bog pools are not always present and bog mosses are not always very obvious.

© Angus J. MacDonald, SNH

Fig. 6. Blanket bog often has much less heather and appears more “grassy” but cottongrass and bog mosses are usually abundant.



© Angus J. MacDonald, SNH



Fig. 7. In some parts of the north-east, blanket bogs can look very different due to the abundance of lichens, but bog mosses are still abundant.

© Angus J. MacDonald, SNH

- Peat hags and other areas with exposed peat (Fig. 8).
- Where the soil is eroding, or if there is less than 5 cm (2 inches) of soil over the underlying rock (Figs. 9 - 10).
- Summits, ridges and other areas which are very exposed to the wind, where the vegetation grows as a more or less prostrate, and sometimes sparse, mat in which the heather perpetuates itself by rooting from creeping stems (Fig. 11). Most likely to occur above 300 m (1000 feet) in the north-west to above 600 m (2000 feet) in the south-east, and in very exposed areas at lower altitudes near to the coast or where the wind is funnelled through a pass.

Fig. 8. Avoid areas of exposed peat. Erosion can be exacerbated. Also, the peat is more likely to ignite, creating a damaging and difficult to control fire.



© Angus J. MacDonald, SNH



© Angus J. MacDonald, SNH

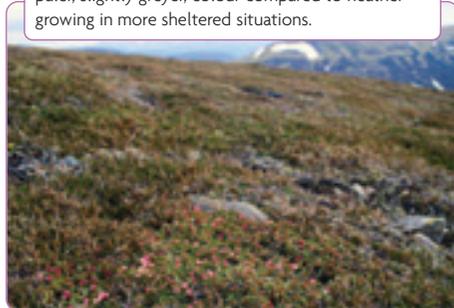
Fig. 10. Avoid burning where past erosion has produced thin soils with much exposed bedrock. Burning will exacerbate the loss of soil.



© Angus J. MacDonald, SNH

Fig. 9. Avoid burning where the soil is very thin. The soil itself may be consumed by the fire and, even if not, regeneration of the vegetation is often poor in such dry, freely draining, situations.

Fig. 11. Where the vegetation grows as a short mat, due to wind-exposure, do not burn or allow fires to spread into such areas. The heather often has a paler, slightly greyer, colour compared to heather growing in more sheltered situations.



© SNH, Cairnmore of Fleet

- **Steep hillsides and gullies (Fig. 12).** Hillsides with a slope greater than 1 in 3 (18°) are best tackled only by experienced and skilled staff, while slopes steeper than 1 in 2 (26°) are best avoided.
- Areas where bracken is present, except where there is a commitment to control any bracken spread into the burnt area should it occur (Fig. 13).
- Uneven-aged heather where there is already a self-perpetuating, intimate mixture of short and tall heather bushes (Fig. 14).
- Tall vegetation at the edge of watercourses, other than where a watercourse is the only practical type of firebreak (Fig. 15).
- Any other areas identified as fire-free in management agreements, for example, with Scottish Natural Heritage, or Historic Scotland, or as part of an agri-environment scheme agreement or Rural Development Contract.



Fig. 12. Fires should not be allowed to spread onto steep slopes or into gullies.

© Angus J. MacDonald, SNH

Fig. 13. Bracken can spread into burnt patches if regeneration of other vegetation is slow or weak.



© Angus J. MacDonald, SNH



Fig. 14. Burning will provide little benefit where there is already an intimate mixture of short and tall heather.

© Angus J. MacDonald, SNH

Fig. 15. Where possible, avoid burning taller vegetation at the edge of watercourses.



© Angus J. MacDonald, SNH

2. Plan where and how to carry our burning well in advance

- Only burn outside fire-free situations and where heather or bell heather is an important or dominant component in the vegetation. Land managers may be able to claim grant aid for muirburn costs under Rural Development Contracts, administered by the Scottish Government Rural Payments & Inspections Directorate (SGRPID). You can obtain further details from your local SGRPID office
- Burn only where heather is greater than 20 cm (8 inches) tall, but avoid allowing the heather to become much taller than 30 cm (12 inches) if outside fire-free areas.
- Determine the total amount to be burnt each year according to the rate of growth of the heather.
- Ensure there are sufficient firebreaks (Figs. 16 - 19). Firebreak width should be at least 2½ times the expected flame length.



Fig. 16. An example of a hill track and a green grass strip used as firebreaks. Snow banks, wet flushes, previously burnt patches with little regrowth of vegetation, can also be used.

© Angus J. Macdonald, SNH

Fig. 17. Previously burnt strips can be used as partial or complete firebreaks, depending on the regrowth of vegetation.



© P. & A. Macdonald, SNH



Fig. 18. Cutting or swiping can be used to create firebreaks, though these should not be relied on completely. They should be cut immediately before the fire is lit so that the cut material does not have time to dry out.

© Lorne Gill, SNH

Fig. 19. A swiped firebreak used in conjunction with other methods increases the efficiency of a fire control squad.



© Angus J. MacDonald, SNH

- Consider cutting or swiping as an alternative to burning (Figs. 20 - 21), but only where the ground is not too rocky, wet or inaccessible for safe use, and where the vegetation, soil or any archaeological remains will not be damaged by the machinery. It is much less hampered by the weather and there is no fire risk to neighbours' property.
- If using swiping to create firebreaks, or as a substitute for burning, **avoid creating squares**. These do not maximise the amount of "edge" between short and tall heather, which is one of the main reasons for burning, and they can be visually offensive and detract from landscape value.
- Limit the area within your muirburn plan to suit resources of time, labour, equipment and funds.



Fig. 20. Heather which has been cut rather than burned.

© Angus J. MacDonald, SNH

Fig. 21. The same area as in Fig. 19, showing good regeneration after five years.



© Angus J. MacDonald, SNH

3. Prepare thoroughly, before any burning is undertaken

- **Join your local Rural Fire Protection Group.** These exist in many areas, and provide a formal arrangement for landowners, managers and the Fire and Rescue Service to co-ordinate their resources and provide mutual assistance if fires escape control.
- **Seek further information or training** if you cannot predict **flame length, fire intensity, rate of spread**, and other aspects of fire behaviour, or are unsure about **fire control techniques**.
- **On Sites of Special Scientific Interest, Scottish Natural Heritage should be informed.** If muirburn is listed as an 'Operation Requiring Consent' you must apply for and obtain consent from SNH in advance of burning (Nature Conservation (Scotland) Act 2004).
- **On scheduled monuments**, (archaeological sites and monuments of national importance) contact **Historic Scotland's Inspectorate about any necessary permissions** if you are planning to use wheeled vehicles, any form of ground disturbance is anticipated, or if you have other concerns that the works proposed could damage a monument.
- **Produce a written fire plan and copy this to your local Fire and Rescue Service.**
- Make sure you have an **emergency plan** and will have **back-up help** available, contactable by radio or mobile phone, on the day when burning is to be carried out.
- The Provision and Use of Work Equipment Regulations 1998 (S.I. 2306, Reg. 4 and 5) stipulates that **all equipment should be fit for purpose**. Ensure fire lighting and fire control equipment is the **safest and most effective available**.
- Make sure that there is both **sufficient variety of fire control equipment** (e.g. beaters of various types, high pressure "fogging" spays, etc.), and **spares**, to cope with changing conditions, breakage or equipment failure (**Figs. 22-26**).



Fig. 22. Make sure fire control equipment is ready and in good working order before commencing burning.

© Angus J. MacDonald, SNH

Fig. 23. Swiping a firebreak, and laying a temporary foam barrier, immediately before fire lighting, can assist fire control.



© SNH, Cairnsmore of Fleet



Fig. 24. Make sure there is a sufficient number and variety of beaters, scrapers and other fire control equipment to keep control of the fire even if conditions change.

© SNH, Cairnsmore of Fleet

Fig. 25. A fire being extinguished as it reaches a swiped firebreak reinforced by a foam barrier.



© SNH, Cairnsmore of Fleet



Fig. 26. A high pressure water jet can be useful for wetting down vegetation to reinforce a firebreak, and for extinguishing hot spots during fire control.

© Angus J. MacDonald, SNH

- Those carrying out the burning should be trained in the use of the equipment.
- All staff should be trained in safe procedures and should use personal safety equipment (e.g. face visors to BS2092/BSEN166, leather gloves, fire-retardant overalls - Fig. 27).
- Teams carrying out burning should have a first aid kit and at least one of the team should have first aid training.
- Ensure that additional fire suppression assistance will be available when burning vegetation where there is much purple moor-grass (“blow grass” or “flying bent” - Fig 28). Burning scraps of straw and dead leaves from this grass can be lifted in the updraught from the fire and can start new fires.

Fig. 27. Heat-resistant face visors, leather gloves, and fire-retardant, high visibility, overalls make fire control safer and more comfortable.



© Forestry Commission Technical Development Branch

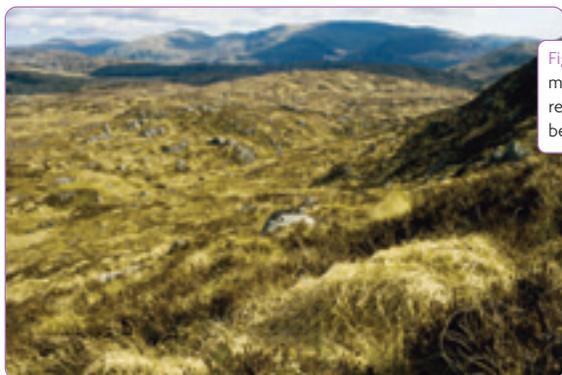


Fig. 28. Burning where there is much purple moor-grass (“blow grass” or “flying bent”) requires care, and additional assistance should be on stand-by.

© SNH, Cairnsmore of Fleet

4. Undertake burning in a safe and professional manner

- On the morning of the day of burning, or the previous evening, **inform adjoining proprietors** by telephone of your muirburn plans for the day.
- On the morning of the day of burning, **telephone your local Fire and Rescue Service** and provide details of the location (including Ordnance Survey map grid reference) and extent of intended burning. At the end of the day let them know when all fires have been extinguished.
- **Do not burn if the weather is unsuitable** for safe and controlled burning. Obtain weather forecasts as close to the time of burning as possible.
- **Do not burn when it is too dry**, that is, when the moss and plant litter on the ground surface has completely dried out.
- **Do not burn if the wind is too strong**, that is, wind speeds greater than about 15 miles per hour or 6.7 m/22 feet per second at eye level (a forecast wind speed of Force 4 or greater). When the wind is too strong, taller heather stems thrash about continuously and even the shorter, more sheltered heather stems are in continuous motion.
- **Do not burn if the flames are likely to be longer than 3 m, or about 10 feet (Fig. 29).** Whether this occurs or not will depend on the combination of fuel load and weather conditions.

Fig. 29. The flames here are about 1.5 -2 m long. Fires with flames longer than about 3 m are dangerous and difficult to control.



© D. B. A. Thompson, SNH

- Do not allow the *width* of individual fires to exceed 50 m, or about 165 feet (Figs. 30 - 31).
- Do not burn uphill on steep slopes (Figs. 31 - 33).
- Do not burn unless you know how, and where, the fire will be extinguished.
- Avoid back-fires, or only use with extreme caution, where there is peat, to reduce the risk of irreversible damage to the vegetation and underlying peat.
- Ensure that workers are supervised so that they do not suffer from heat exhaustion.

Fig. 30. An example of good practice where burnt strips and patches do not exceed 50 m in width.



© Angus J. MacDonald, SNH



Fig. 31. An example of bad practice where burnt patches are much wider than 50 m. Also, fires have been burnt without proper planning or control, without firebreaks, uphill on steep slopes and where there are thin soils.

© Angus J. MacDonald, SNH



Fig. 32. Good practice in steeper ground is to burn across and down the slope. Note how sensitive gullies, and areas of thin soil, have been avoided.

© Angus J. MacDonald, SNH

Fig. 33. A fire burning uphill widens as it progresses. A large, and out of control, uphill fire produces a characteristic burn pattern.



© Lorne Gill, SNH

Further information and training

Formal training.

- Arboriculture and Forestry Advisory Group publishes a leaflet about forestry vocational qualifications relating to the use and control of fire which is available from the HSE website: <http://www.hse.gov.uk/pubns/afag803.pdf>. This is also relevant to moorland fires.
- Borders College (Thorniedean House, Melrose Road, Galashiels TD1 2AF, <http://www.borderscollege.ac.uk/>) which includes moorland management modules in its Gamekeeping and Rural Development residential course.
- Lantra, Scotland (Newlands, Scone, Perth PH2 6NL, Tel: 01738 553311 <http://www.lantra.co.uk>), the national training organisation for land-based sectors.
- National Interagency Prescribed Fire Training Center (3250 Capital Circle SW, Tallahassee, Florida 32310, Tel 00 1 877 223 2198 / 00 1 850 521 2080, <http://www.fws.gov/fire/pftc>). Intensive 24 day courses in prescribed fire use and control including 5 - 12 days of actual prescribed burning under variety of field conditions plus 3 - 4 days of classroom instruction.
- North Highland College (Ormlie Road, Thurso, Caithness K14 7EE, Tel 01847 889 250, <http://www.nhscotland.com/>) which runs a residential Highland Gamekeeping course.
- Scottish Qualifications Authority (Helpdesk 0141 242 2214, The Optima Building, 58 Robertson Street, GLASGOW G2 8DQ and Ironmills Road, Dalkeith, Midlothian EH22 1LE, Tel: 0845 279 1000 <http://www.sqa.org.uk>) for information on Scottish Vocational Qualifications.

Advice, and periodic demonstration days and short courses related to the use of fire.

- Farming & Wildlife Advisory Group (Scotland), Algo Business Centre, Glenearn Road, PERTH, Perthshire PH2 0NJ, Tel: 01738 450500 <http://www.fwag.org.uk/scotland/>
- The Game & Wildlife Conservation Trust, Couston, Newtyle, Perthshire PH12 8UT (Tel 01828 650543). <http://www.gct.org.uk>

- The Heather Trust, Newtonrigg, Holywood, DUMFRIES DG2 0RA (Tel: 01387 723201). <http://www.heathertrust.co.uk>
- RSPB Scotland, Dunedin House, 25 Ravelston Terrace, Edinburgh EH4 3TP (Tel 0131 311 6500). <http://www.rspb.org.uk/scotland/>
- Scottish Agricultural College, SAC Central Office, West Mains Road, Edinburgh EH9 3JG (Tel 0131 535 4000, <http://www.sac.ac.uk>).

Rural Fire Protection Groups

To promote the development of issues relating to fire management, the Scottish Wildfire Forum was established in 2004. For more information see: <http://www.scotland.gov.uk/Topics/Justice/Fire/15130/wildfireforum>

Part of the work of the Wildfire Forum is to encourage the formation of Rural Fire Protection Groups which promote best practice, provide mutual assistance between neighbours and coordination with the Fire and Rescue Service. Such groups allow an exchange of information and experience and may also provide some training opportunities. For more information about a Fire Protection Group near you, please contact your local Fire and Rescue Service. It is only through working together that potential wildfires can effectively be managed!

Publications

- *A Manual of Red Grouse and Moorland Management*. P.J. Hudson and D. Newborn (1995). Game Conservancy Trust. Available from Game and Wildlife Conservation Trust, Fordingbridge, Hampshire SP6 1EF (Tel 01425 652381).

- *Good Practice for Grouse Moor Management*. The Moorland Working Group. Copies available from Scottish Natural Heritage Publications, Battleby, Redgorton, Perth PE1 3EW (Tel 01738 627921).
- *The Lowland Heath Management Handbook*, C.H. Gimingham (1992). English Nature. Out of print. Replaced by RSPB Publication:
A practical guide to the restoration and management of lowland heathland. Symes N C and Day J. 2003. The publication is available to purchase only; price £19.99 + £2 postage and packaging. Details of how to order are on the following website: www.rspb.org.uk/publications (download an order form).
- *The Upland Management Handbook*. Backshall J., Manley J. and Rebane M (eds) 2001. English Nature, Peterborough is found at:
<http://naturalengland.communisis.com/NaturalEnglandShop/product.aspx?ProductID=8cc609ba-1d87-4b0b-8ca9-b1158c8a3ceb>
- *Introduction to Wildland Fire*. S.J. Pyne, P.L. Andrews and R.D. Laven (1996). 2nd edition. John Wiley & Sons Inc., New York. Very comprehensively describes fire behaviour, the use of prescribed fire, fire planning, and fire control techniques in North America.
- *A Guide for Prescribed Fire in Southern Forests*. D.D. Wade and J.D. Lunsford (1989). Technical Publication R8-TP11, Forest Service Southern Region, United States Department of Agriculture. USDA Forest Service, Southern Region, 1720 Peachtree Road, NW Atlanta, Georgia 30367-9102. Although dealing with prescribed burning of the understorey vegetation in the pine forests of the south-east USA, this provides a very relevant and concise account of fire behaviour, and the practicalities of prescribed burning, in a short booklet well illustrated with colour photographs.
- *Australasian Fire Authorities Council Learning Manuals*. These excellent manuals cover a wide range of fire-related issues in a concise and clear way, well illustrated with colour diagrams. There are manuals on *Wildfire Behaviour* (manuals 1.12A, 2.28, 3.23), *Wildfire Suppression* (manuals 1.12B, 2.29, 3.18) and *Prescribed Fire* (manuals 3.17, 4.25). Tasmania TAFE, Learning Media Services, P.O. Box 949, Rosny Park, Tasmania 7018 (Tel 0061 3 62 33 7397). Details about these other manuals can be found at
<http://ausfire.com/index.htm>.
- *Prescribed Burning Guidelines in the Northern Great Plains*. K.F. Higgins, A.D. Kruse and J.L. Piehl (1989). U.S. Fish and Wildlife Service, Cooperative

Extension Service, South Dakota State University, U.S. Department of Agriculture EC760, Jamestown, North Dakota, USA. This document can be found and downloaded free at

<http://www.npwrc.usgs.gov/resource/habitat/burning/index.htm>

- *Principles of Moorland Management*. Scotland's Moorland Forum (2003). Copies available from Scottish Natural Heritage Publications, Battleby, Redgorton, Perth PE1 3EW (Tel 01738 627921) and as a download from: <http://www.moorlandforum.org.uk/>
- *Forest and moorland fire suppression*. ISBN 0-85538-571-5. I R Murgatroyd; Forestry Commission, Edinburgh. Technical Note published September 2002, FCTN003. Obtainable from Forestry Commission Publications, P O Box 25, Wetherby, West Yorkshire, LS23 7EW. Tel 08701 214 180.

Access via Forestry Commission publications:

[http://www.forestry.gov.uk/website/publications.nsf/searchpub/?SearchView&Query=\(FCTN003\)&SearchOrder=4&SearchMax=0&SearchWV=TRUE&SearchThesaurus=TRUE](http://www.forestry.gov.uk/website/publications.nsf/searchpub/?SearchView&Query=(FCTN003)&SearchOrder=4&SearchMax=0&SearchWV=TRUE&SearchThesaurus=TRUE)

- The following *SNH Information and Advisory Notes* are relevant to aspects of muirburn and are available, free of charge, from Scottish Natural Heritage Publications, Battleby, Redgorton, Perth PE1 3EW (Tel 01738 627921)
- *Heather layering and its management implications*. No. 35. A.J. MacDonald. <http://www.snh.org.uk/pubs/results.asp?o=title&c=-1&id=706>
- *Cutting of heather as an alternative to muirburn*. No. 58. A.J. MacDonald. <http://www.snh.org.uk/pubs/detail.asp?id=727>
- *Grazing behaviour of large herbivores in the uplands*. No. 47. H. Armstrong. <http://www.snh.org.uk/pubs/results.asp?o=title&c=-1&id=716>
- *Heather moorland management for Lepidoptera*. No. 78. A.J. MacDonald and K. Haysom. <http://www.snh.org.uk/pubs/results.asp?o=title&c=-1&id=746>
- The FireBeaters website <http://firebeaters.org.uk/> provides information about fire ecology in the UK. It has links to other relevant websites, providing access to a large amount of useful information on prescribed burning, wildfire control, techniques and tools, from other parts of the world.

Contacts

Historic Scotland

email: hs.inspectorate@scotland.gsi.gov.uk. Tel: 0131 668 8770

Figure captions

Fig. 1. An upland birch woodland expanding by natural regeneration. Moorland fires should not be allowed to spread into this sort of situation.

Fig. 2. Muirburn should not be allowed to spread into regenerating Scots pine on moorland adjacent to Caledonian pinewood.

Fig. 3. An example of moorland juniper, including regenerating juniper, accompanied here by some Scots pine trees. Moorland fires should be strictly limited in this sort of situation.

Fig. 4. Blanket bog should be avoided. Do not burn areas with bog pools and where bog mosses are abundant. In this illustration the bog mosses are the yellow green, ochre and red patches at the edge of the pool.

Fig. 5. Some types of blanket bog are a mixture of heather and cottongrass, particularly at higher altitudes and in the east. Bog pools are not always present and bog mosses are not always very obvious.

Fig. 6. Blanket bog often has much less heather and appears more “grassy” but cottongrass and bog mosses are usually abundant.

Fig. 7. In some parts of the north-east, blanket bogs can look very different due to the abundance of lichens, but bog mosses are still abundant.

Fig. 8. Avoid areas of exposed peat. Erosion can be exacerbated. Also, the peat is more likely to ignite, creating a damaging and difficult to control fire.

Fig. 9. Avoid burning where the soil is very thin. The soil itself may be consumed by the fire and, even if not, regeneration of the vegetation is often poor in such dry, freely draining, situations.

Fig. 10. Avoid burning where past erosion has produced thin soils with much exposed bedrock. Burning will exacerbate the loss of soil.

Fig. 11. Where the vegetation grows as a short mat, due to wind-exposure, do not burn or allow fires to spread into such areas. The heather often has a paler, slightly greyer, colour compared to heather growing in more sheltered situations.

Fig. 12. Fires should not be allowed to spread onto steep slopes or into gullies.

Fig. 13. Bracken can spread into burnt patches if regeneration of other vegetation is slow or weak.

Fig. 14. Burning will provide little benefit where there is already an intimate mixture of short and tall heather.

Fig. 15. Where possible, avoid burning taller vegetation at the edge of watercourses.

Fig. 16. An example of a hill track and a green grass strip used as firebreaks. Snow banks, wet flushes, previously burnt patches with little regrowth of vegetation, can also be used.

Fig. 17. Previously burnt strips can be used as partial or complete firebreaks, depending on the regrowth of vegetation.

Fig. 18. Cutting or swiping can be used to create firebreaks, though these should not be relied on completely. They should be cut immediately before the fire is lit so that the cut material does not have time to dry out.

Fig. 19. A swiped firebreak used in conjunction with other methods increases the efficiency of a fire control squad.

Fig. 20. Heather which has been cut rather than burned.

Fig. 21. The same area as in Fig. 19, showing good regeneration after five years.

Fig. 22. Make sure fire control equipment is ready and in good working order before commencing burning.

Fig. 23. Swiping a firebreak, and laying a temporary foam barrier, immediately before fire lighting, can assist fire control.

Fig. 24. Make sure there is a sufficient number and variety of beaters, scrapers and other fire control equipment to keep control of the fire even if conditions change.

Fig. 25. A fire being extinguished as it reaches a swiped firebreak reinforced by a foam barrier.

Fig. 26. A high pressure water jet can be useful for wetting down vegetation to reinforce a firebreak, and for extinguishing hot spots during fire control.

Fig. 27. Heat-resistant face visors, leather gloves, and fire-retardant, high visibility, overalls make fire control safer and more comfortable.

Fig. 28. Burning where there is much purple moor-grass (“blow grass” or “flying bent”) requires care, and additional assistance should be on stand-by.

Fig. 29. The flames here are about 1.5 - 2 m long. Fires with flames longer than about 3 m are dangerous and difficult to control.

Fig. 30. An example of good practice where burnt strips and patches do not exceed 50 m in width.

Fig. 31. An example of bad practice where burnt patches are much wider than 50 m. Also, fires have been burnt without proper planning or control, without firebreaks, uphill on steep slopes and where there are thin soils.

Fig. 32. Good practice in steeper ground is to burn across and down the slope. Note how sensitive gullies, and areas of thin soil, have been avoided.

Fig. 33. A fire burning uphill widens as it progresses. A large, and out of control, uphill fire produces a characteristic burn pattern.



The Scottish
Government

© Crown copyright 2011

ISBN: 978-1-78045-323-1 (web only)

APS Group Scotland
DPPAS11899 (08/11)

w w w . s c o t l a n d . g o v . u k

