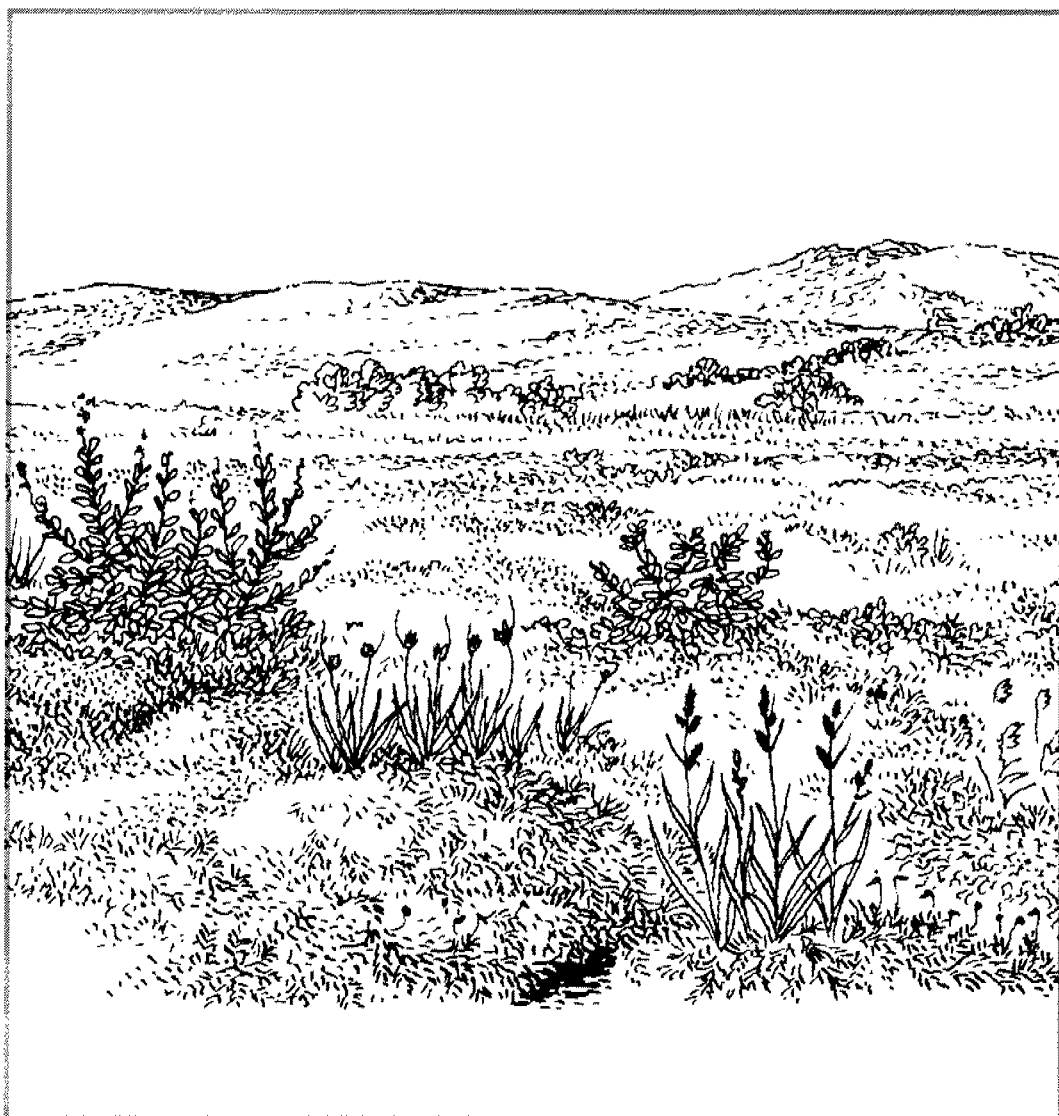




ENGLISH  
NATURE

Literature review of the historical  
effects of burning and grazing of  
blanket bog and upland wet heath

No. 172 - English Nature Research Reports



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Report (NCCE Contract No. LOW/VT5B) for  
English Nature and Countryside Council for Wales

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ISSN 0967 - 876X

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# **LITERATURE REVIEW OF THE HISTORICAL EFFECTS OF BURNING AND GRAZING OF BLANKET BOG AND UPLAND WET HEATH**

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## **Acknowledgements**

We would like to acknowledge the considerable assistance and support provided by the EN/CCW project team (see above). In addition, we are grateful to all those who responded to requests for information (see Appendix 2), and to the staff of the EN library at Northminster House for providing copies of various reports.

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# SUMMARY

## *Scope*

1. A literature review of the effects of burning and grazing of blanket bog and upland wet heath has been carried out, based on information derived from searches of computerised bibliographic databases, personal contacts and recent reports.
2. There is an extensive published literature concerning 'moorland' and/or 'upland'. Although these terms are sometimes qualified (e.g. 'heather moorland'), the habitats are often referred to in very vague terms, without clear vegetational definition, making it difficult to carry out searches for literature of specific relevance to this project. 'Heather moorland' usually encompasses the more productive, drier types where heather is dominant (and which support more grouse), rather than the wetter types comprising blanket bog and wet heath, which contain only a smaller proportion of heather.
3. There is a moderate amount of literature concerning the vegetation and management of blanket bogs, but very little specific information was found regarding upland wet heath. Literature of direct relevance to the impacts of burning and grazing on the native fauna of blanket bogs and wet heaths is also rather scarce.

## *Burning*

4. Much of the work relating to burning as a management tool has been carried out with respect to the management of grouse moors or lowland heaths, and hence relates more to the drier types of heath and moorland than those considered in the present review.
5. Burning can have both physical and biological effects. The effects of fire depend, *inter alia*, upon the vegetation composition, intensity and frequency of the fire, time of burning and wetness of the substratum. Summer fires are likely to be most damaging.
6. Many animals are able to avoid the direct effects of burning by moving away, but fire may destroy less mobile animals and those at a vulnerable stage in their life history, such as overwintering insects or breeding birds. There are also indirect effects through changes in physical habitat characteristics and plant species composition, the latter affecting both food sources and vegetation structure (and hence microclimate).
7. The results of our literature review suggest that burning is not usually recommended for management of blanket bog, although there may be a case for its infrequent use in some circumstances.

## *Grazing*

8. The intensity and extent of damage through grazing varies according to stocking rates, wetness and condition of the site, type of grazing animal, time of year and length of time on the site.
9. The effects of grazing on the vegetation can vary depending on the other habitats and food supplies available to the herbivores. There are therefore interactions between management history and grazing impact which can be difficult to separate.
10. Changes in vegetation composition and damage can also be effected through trampling, and, if severe, may result in creation of bare ground. Effects may be localised, for



example, around supplementary feeding points, fences, walls etc. Enrichment from dung and urine is also greatest in these areas.

11. There are few studies on the impacts of grazing on invertebrates, but these are likely to be mediated through changes in plant species composition and habitat conditions.
12. The impacts of grazing on birds has not been considered here as this is the subject of a separate study.

### ***Conclusion***

13. The main conclusion from the review is that where carried out without regard for wildlife, regular burning regimes and heavy grazing are likely to be damaging to the wildlife interest of blanket bog and wet heath and can lead to the loss of these habitats. However, if carried out sensitively, burning and grazing can be advantageous to some, but not necessarily all, species of these habitats.
14. At the moment, most of the management recommendations provided are based mainly on work carried out in Scotland and northern England. Optimal management for any one area will depend heavily on local factors, including past management regimes, and precise management objectives, and there may be a conflict of interests in some cases – it is impossible to define one optimal management regime to cover all areas of blanket bog and upland wet heath throughout Britain.

# 1. Introduction

In December 1995, the Environmental Consultancy, University of Sheffield were contracted by English Nature and the Countryside Council for Wales to carry out a literature review of the effects of burning and grazing of blanket bog and upland wet heath. This report is the result of this work, and is based on information derived from searches of computerised bibliographic databases, personal contacts and recent reports.

There is an extensive literature pertaining to the management of upland heather moorland, mostly relating to 'dry' examples. Much of this was reviewed by Mowforth & Sydes (1989). In addition the reviews by Coulson, Fielding & Goodyer (1992) (*The Management of Moorland Areas to Enhance their Nature Conservation Interest*) and RSPB (1995) (*Conservation Management of Blanket Bog: A Review*) provide useful additional information and guidance, the former in particular concerning the invertebrates and birds of moorlands, and the latter practical details of the current management practices on upland peatlands. Much of this information has been summarised here, where directly relevant, and supplemented with additional sources. The annotated bibliography by Siaron Hooper (1987) provides a useful source of information on various aspects of heather, grouse and land use management, including agricultural aspects. The extensive literature concerning lowland heaths has not been examined in detail as this was outside the scope of the current project. However, it should be noted that this literature does include some relevant information, for example the response of certain species to burning or grazing regimes.

Where information is available, the focus has been on the effects of management on the target plant species and communities, as these largely form the 'habitat' for the dependent animal species, although the effects on animals are also discussed. There is clearly much more practical knowledge held by land managers and conservation practitioners than has been reported in the literature, and it will be important to collate this knowledge for the proposed EN 'Upland Management Handbook'.

Two projects are currently on-going which will be highly relevant to the current work:

1. A review is currently being funded by SNH/Scottish Office (SOAFD) entitled: *A review of the impact of vertebrate herbivores on the natural heritage of the Scottish uplands*. [see Section 11.2 for details]
2. A review of information and literature concerning the implications of overgrazing for upland birds is currently being undertaken by Rob Fuller, of the BTO. The proposed contents list of this report is given as Appendix 1. The report will cover aspects of the ecology of upland birds, and their relationships to management, and grazing in particular. It was agreed that this would overlap to a large extent with the work here, and therefore the impacts of grazing on birds are not discussed in the current document.

## 2. Methodology

### 2.1 Published Literature

A comprehensive search of published literature on the effects of burning and grazing blanket bog and wet heath has been carried out using the following bibliographic databases:

#### *Biological Abstracts on CD 1985 to September 1995*

This database is the CD-ROM version of Biological Abstracts which is updated every 6 months. It contains abstracts from all major biologically-orientated periodicals.

#### *Bath Information and Data Service (BIDS)*

Science Citation Index: 1981–. This is an on-line database which is able to search over 2000 periodicals of a scientific nature.

The Index of Scientific and Technical Proceedings is of similar nature to SCI but searches symposia and other scientific papers not published in periodicals.

#### *British Library Catalogue*

This is an on-line database which allows access to published books held in the British Library.

#### *University of Sheffield STAR Catalogue*

The STAR catalogue contains books, theses, periodicals and symposia which are held in the University of Sheffield Library.

#### *New Scientist on CD ROM, General Science Abstracts and UK Official Publications*

These were also searched briefly but did not contain much relevant material not already picked up elsewhere.

A similar list of key words were used to search each of these databases. In cases where the return from the search was too large (usually above 100 titles) then the search criteria were narrowed by combining other keywords: e.g. moor and burning. In most cases this method seemed to give satisfactory results.

A list of the keywords most commonly used (in various combinations) is shown below:

agriculture	birds	blanket	bog	burn
burning	Calluna	Carabidae	cattle	deer
Erica	Eriophorum	erosion	farming	fire
grazing	heath	heather	invertebrate	mire
Molinia	moor	moorland	moss	muir
muirburn	peat	sheep	Sphagnum	upland
wet heath	wetland			

In some cases, site and author names were used in more specific searches, for example, where there is a history of research on blanket bog (*e.g.* Moor House NNR, Cumbria).

### **Current Research in Britain (CRIB)**

The 'CRIB' on-line database was searched in order to find out details of ongoing research which may be relevant to the current project. This information was helpful in compiling a list of contacts.

### **WILDSCAPE**

Searches of this computerised bibliographical database held by the country agencies and JNCC yielded approximately 900 references.

### **Other sources**

The reference lists provided by the various reports and papers gathered were perused to identify any relevant papers. Recent sources were accessed through personal knowledge and references suggested by our contacts.

### **Sources of information not covered**

It was not possible within the time-scale of the current project to follow up all possible sources of information. The main gaps are:

Unpublished studies or reports on specific sites held by individual English Nature/Countryside Council for Wales offices, Wildlife Trusts etc.

Ecophysiological literature on individual plant species.

Ecological studies on individual bird species, and broader upland bird surveys.

In addition, the literature on management and species of lowland wet heaths is known to contain information which would be of some relevance.

## **2.2 Contacts**

A total of 43 individuals and organisations were contacted regarding information relevant to the project (see Appendix 2). Those responding were very helpful in providing information and suggesting further contacts or references.

## **2.3 Results**

There is an extensive published literature concerning 'moorland' or 'upland'. Although these terms are sometimes qualified (e.g. 'heather moorland'), the habitats are often referred to in very vague terms, without clear vegetational definition, making it difficult to carry out searches for literature of specific relevance to this project. 'Heather moorland' usually encompasses the more productive, drier types where heather is dominant (which support more grouse), rather than the wetter, 'boggy' types, which contain only a smaller proportion of heather, although clearly some of the information is of broad relevance, and has been included here. There is a moderate amount of literature concerning blanket bog, in particular stemming from the projects which have been carried out at Moor House NNR (Cumbria), and investigations by the Hill Farming Research Institute (now incorporated within the Macaulay Land Use Research Institute, Aberdeen). Very little specific information was found regarding upland wet heath. Literature of direct relevance to the impacts of burning and grazing on the native fauna of blanket bogs and wet heaths is also rather scarce.

There is much reported which is general in approach or written from an 'agricultural' rather than a specifically conservation management view-point, for example, studies on loss in areas of heather moorland or changes in land-use in the uplands. This information has not been considered in detail here, as the focus is on the more detailed impacts on the flora and fauna.