

MONTANE, HEATH AND BOG HABITATS

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MONTANE, HEATH AND BOG INTRODUCTION

Around one third of the Cairngorms Partnership area is over 600-650m above sea level (above the natural woodland line, although this is variable from place to place.). This comprises the largest and highest area of montane habitat in Britain, much of which is in a relatively pristine condition. It contains the main summits and plateaux with their associated corries, rocky cliffs, crags, boulder fields, scree slopes and the higher parts of some glens and passes. The vegetation is influenced by factors such as exposure, snow cover and soil type. The main zone is considered to be one of the most spectacular mountain areas in Britain and is recognised nationally and internationally for the quality of its geology, geomorphology and topographic features, and associated soils and biodiversity. c14.5% of the Cairngorms Partnership area (75,000ha) is land above 600m asl.

Upland heathland is the most extensive habitat type in the Cairngorms Partnership area, covering c41% of the area, frequently in mosaics with blanket bog. Upland heathland or heather moorlands comprise unploughed, non-wooded ground that has dwarf shrub vegetation lying below the (variable) natural tree line. The majority of these communities result from human activities associated with woodland clearance and prevention of natural tree regeneration by burning and grazing. Similar communities extend upwards into the montane zone, but the associated plant communities vary according to altitude, exposure and soil type.

Blanket bogs and other raised bogs are widespread throughout the Cairngorms Partnership area, except for some of the lower ground in the east. It is the second most extensive habitat type after upland heath, which it is often found in association with. Blanket bog grades into wet upland heath, with the predominant vegetation type a *Calluna - Eriophorum* dominated blanket mire typical of cold wet high plateaux in northern Britain. It occurs in areas with deep peat deposits (generally 0.5-3.0m deep).

The links between montane, heath and bog habitats and other habitats is extremely important for many species. The habitat mosaics that exist in the Cairngorms result in the high populations of several species that use more than one habitat as well as being important for some species that particularly use edge habitats. Therefore, it is important to understand and consider the biological links between adjacent habitats. For example: upland/woodland mosaics favour Red deer, Golden eagle and Kentish glory; upland/wetland mosaics favour Water voles and breeding waders; upland/farmland mosaics favour Twite, Mountain hare, and Large heath butterflies; and upland/farmland/woodland mosaics favour Black grouse, Juniper, Buzzards.

It is the purpose of this chapter to:

- *Identify, where possible, the biodiversity issues and opportunities to maintain and enhance the important Cairngorms montane, heath and bog habitats and species through the actions of local people and partners.*

OPPORTUNITIES FOR ACTION IN THE CAIRNGORMS

The Cairngorms Moorland Forum is a formal group established by the Cairngorms Partnership to deliver the Partnership's strategic objectives for moorland (which are outlined fully in the Cairngorms Partnership's Management Strategy). The Cairngorms Moorland Forum involves representatives from government and non-government agencies and organisations concerned with the management of moorland and other adjacent landuses in the Cairngorms. Their strategic vision is to maintain and enhance extensive tracts of high-quality and well-managed

upland heath (heather moorland) throughout the Cairngorms and to maximise their contribution to nature conservation. Therefore, the sustainable management of the moorland habitat and species is crucial to delivering the strategic moorland objectives for the Cairngorms area.

There are no formal groups of local stakeholders to deliver the Partnership's strategic objectives for montane and bog habitats, but a number of partners are working together towards delivering the strategic objectives for the high hills through other methods. These strategic objectives make specific mention of the encouragement of nature conservation or appropriate management of the high hills in the Cairngorms and '*to return biodiversity towards natural levels*'. Therefore, the sustainable management of the high tops habitats and its species are necessary for the core delivery of strategic objectives for the upland Cairngorms area.

There are several delivery mechanisms for action on the montane, heath and bog habitats and the species in the area. The following list identifies some of the most important policy and funding opportunities:

- Targeted biodiversity management by private landowners.
- Agri-environment schemes. The ESA scheme and its successor the RSS operate on sites where livestock management is the dominant landuse.
- SSSI, SAC and SPA designations can provide advice and supporting management incentives and monitoring for particularly important areas and species (e.g. EU LIFE Environment and LEADER +).
- SNH's various conservation grants for both designated and non-designated sites and especially their Community Grant Scheme and the new '*Natural Care*' programme.
- Heritage Lottery Funding targeted at Area Partnerships and Habitat Action Plan projects.
- New Opportunities Fund – the Community Land Fund.
- HIE and LEC Community Grant Fund.
- European transitional funds – Community Economic Development fund for local community development.
- Rural Challenge Funding.
- The Cairngorms Partnership's Management Strategy identifies the strategic issues and provides a vision for the sustainable management of montane and moorland areas in the Cairngorms.
- Heritage Lottery Funding targeted at Area Partnerships and HAP projects.
- Local authority development plans provide guidance on landuse/development issues.
- Indicative Forestry Strategies (and WGS) direct and target planting to certain areas avoiding existing important montane, heath and bog habitats.
- The Deer Commission for Scotland and local Deer Management Groups and their plans.
- Targeted and expert wildlife management advice from various advisors e.g. FWAG, SAC and free-lance consultants.

There are a number of actions that would improve the biodiversity of these upland areas. Action in other adjacent 'non-montane and moorland' habitats, such as woodland management, may have profound effects on montane and moorland habitats and species. Montane scrub for example, is the rarest and most threatened habitat in the Cairngorms. It is so impoverished that many people do not even realise that the tree-line woodland habitat is missing from the high hills. There are a number of issues and opportunities associated with expanding this habitat as a transitional habitat between woodlands and the montane habitats and these are explored further in the Woodland habitat section. There are many areas where important montane and moorland habitats and species are thriving in the Cairngorms and these can be used to demonstrate good management practice. However, it is important not to be complacent as not all upland management is benign and there is always room for improvement. Opportunities taken for promoting and developing good montane and moorland practice for biodiversity will increase tourism and recreation and foster a greater understanding of the role of traditional and appropriate management in shaping the famous countryside and landscape of the area.

THE MAIN MONTANE, HEATH AND BOG BIODIVERSITY ISSUES

The following seven main issues currently affect or influence, to a greater or lesser degree, practically all the important montane, heath and bog habitats in the Cairngorms. Biodiversity Action taken to address these main issues is also likely to benefit a range of important species in the area. The specific issues related to individual habitats or species are detailed in the relevant individual accounts.

The interaction of two or more of these main factors often greatly increases the impact on plant communities, e.g. (1) Poorly managed muirburn followed by heavy grazing will result in the loss of dwarf shrubs more rapidly than either factor in isolation. (2) The interaction between nitrogen deposition and grazing may have unforeseen impacts and consequences on upland habitats such as outbreaks of herbivorous insects.

1. Lack of data/important information:

The issues:

- Despite being relatively well studied, there is a lack of up-to-date information on quality and management of some upland habitats in the Cairngorms.
- There is a lack of basic information on the ecology and current status of many important species associated with montane, heath and bog habitats in the Cairngorms. For example, the role, importance and impact of traditional heather moorland management on many of the UK Priority species e.g. upland *lepidoptera* (butterflies and moths) is largely unknown.
- Several organisations have produced reports, papers, booklets and leaflets on different aspects of montane, heath and bog habitat management. There is no up-to-date catalogue of this information to make this valuable resource readily available.
- Important areas of existing woodland and potential woodland habitat have been identified through the strategic evaluation of the woodland resource, i.e. The Cairngorms Forest and Woodland Framework. However, no similar exercise has taken place for the important moorland habitats.

The solutions, actions, targets:

- Identify the total area, and where possible quality and management, of all important montane, heath and bog habitats – *by 2005*.
- Where appropriate, commission relevant research on local issues of concern to important montane, moorland and bog habitats and species in the Cairngorms. For example, improve ecological knowledge of 50% of Priority species where ecology currently unknown, e.g. commission research into how traditional moorland management influences UK Priority *lepidoptera* species – *within 5 years*.
- Produce and make freely available a regularly updated catalogue of relevant information and advice on the ecological quality and management of montane, heath and bog habitats and species in the Cairngorms – *by 2005*.
- To allow informed decisions on existing and potential important moorland areas (including habitat corridors) commission a strategic evaluation of the Cairngorms moorland resource, i.e. a 'Cairngorms Moorland Framework' *within 5 years*.

2. Awareness raising:

The issues:

- Some of the montane, upland heath and bog habitats are of great importance for biodiversity, but often are undervalued because of their '*artificial*' nature (e.g. upland heath) or poor public image (e.g. blanket bog).
- Properly consider the requirements of all important BAP species dependent upon montane, heath and bog areas when reviewing or negotiating changes to land management support systems.

The solutions, actions and targets:

- Major awareness raising and moorland interpretation project to be undertaken – *by 2005*. Additionally consider how best to raise awareness of montane and bog issues – *by 2007*.
- Encourage all partners to publicly acknowledge the importance of appropriate montane, heath and bog management for biodiversity conservation in the Cairngorms – *ongoing*.
- Ensure that the ecological requirements of all important BAP species associated with montane, heath and bog need to be properly considered in changes to land management support systems – *by 2005*.
- Produce and make freely available a regularly updated catalogue of relevant information and advice on the management of montane, heath and bog habitats and species – *by 2005*.

3. Access to appropriate policy and funding sources:

The issues:

- Many land managers wish to carry out activities beneficial to biodiversity, but are constrained by a lack of suitable funding sources. For example, two of the most extensive habitats in the Cairngorms, upland heath and blanket bog do not normally receive public money for biodiversity management activities (unlike almost all other terrestrial habitats), nor do they have formal groups of local stakeholders to take forward biodiversity objectives for these habitats.

The solution, actions and targets:

- A pilot moorland management scheme to fund appropriate activities that provide tangible biodiversity benefits should be undertaken on a *3 year trial basis*.
- Promote the uptake of some of the management activities covered by the Rural Stewardship Scheme, which should provide tangible benefits to biodiversity, e.g. appropriate muirburn and targeted livestock reduction – *ongoing*.
- The new SNH 'Natural Care' programme may be able to target appropriate montane heath and bog biodiversity action.
- The local partners should consider how best to take forward strategic objectives for the montane and bog habitats in light of the current absence of any relevant local stakeholder group – *by 2007*.

4. Direct habitat loss and fragmentation:

The issues:

- Change in landuse. The direct destruction of important montane, heath and bog habitats is an important biodiversity issue for a number of important species e.g. afforestation and natural tree regeneration may lead to the direct loss of important dwarf shrub habitats and species.
- Habitat fragmentation or isolation. Some habitat patches are now found only in small isolated and discontinuous sites. This habitat fragmentation may pose significant problems for natural ecological processes and species dispersal in particular, making the species in isolated patches particularly vulnerable to chance extinction events.
- Recently concern has been expressed regarding the current and future threat of 'inappropriate developments' such as wind farms, quarries, communication masts, fences and bulldozed access tracks to upland heath and blanket bog habitats leading to the loss of characteristic species. The issue is compounded by a lack of a moorland framework identifying important and less important areas.

The solutions, actions, targets:

- A Cairngorms Moorland Framework should be undertaken – *within 5 years*, to complement the Cairngorms Forest and Woodland Framework as a strategic planning tool to protect important moorland areas and help the appropriate siting on any new woodland areas. The Framework would identify areas of moorland and bog that are of high biodiversity importance and further the concept of a Moorland Habitat Network with partners.

- Local partners should consider funding a Moorland Habitat Network research project into the viability of moorland habitats and species, identifying optimum sizes and linkages between moorland areas – *by 2005*.
- Upon completion of a Cairngorms Moorland Framework, reinstate important moorland areas through innovative restoration programmes where justified on biodiversity grounds – *begin by 2010*.

5. Inappropriate management:

The issues:

- Changes in management regimes. The indirect loss of important habitats through neglect or over-exploitation is a significant issue for many species.
- Both undergrazing and overgrazing by deer and sheep or lack of muirburn and excessive muirburn can have profound negative biodiversity implications on habitats and their associated species, e.g. inappropriate grazing levels changing moorland into species poor grassland as well as causing localised soil erosion. Localised and incremental damage to vegetation and soils from other landuses, such as increased recreational pressure.
- Localised disturbance and resultant damage to sensitive species, for example, humans and their dogs may disturb breeding birds away from their nests and chicks making them more vulnerable to predation and inclement weather conditions.
- Encroachment by some invasive and virulent species, may lead to a loss of biodiversity.

The solutions, actions, targets:

- A Cairngorms Moorland Framework should be undertaken - *within 5 years*, to complement the Cairngorms Forest and Woodland Framework as a strategic planning tool to protect important moorland areas from incremental damage and help the appropriate siting on any new woodland areas. The Framework would identify areas of moorland that are high biodiversity importance and further the concept of a Moorland Habitat Network.
- The partners should consider funding a Moorland Habitat Network research project - *within 5 years*, into the viability of moorland habitats and species, identifying optimum sizes and linkages between moorland areas.
- The issue of reducing grazing pressure in certain 'hotspot' areas cannot be addressed by simply fencing off certain sites (due to its detrimental impact on certain species, e.g. Black grouse and Red grouse). Reducing stocking densities of both domesticated and wild animals may be necessary and justified in some moorland areas on biodiversity grounds - *ongoing*.
- Local partners should support the formation, development and work programmes of local Deer Management Groups, to reduce the impacts of high grazing levels by deer – *effective immediately*.
- Develop and promote cost-effective management regimes for important montane, heath and bog habitat and species in the Cairngorms – *ongoing*.
- Once a Cairngorms Moorland Framework is produced, develop a series of muirburn and grazing aims and targets for important moorland areas. These targets would be delivered through an appropriate funding source (such as a pilot Cairngorms moorland management scheme) which supports activities that provide tangible biodiversity benefits – *at the earliest opportunity*.
- Local partners should carry out a strategic review on recreational management to consider minimising localised disturbance on sensitive montane, heath and bog species throughout the Cairngorms – *by 2005*. This would include enforcement of current legislation such as the deliberate disturbance of Schedule 1 breeding birds under the Wildlife and Countryside Act.
- Take appropriate action to reduce the impact of virulent species on montane, heath and bog species and habitats – *ongoing*. This action will include an appraisal of the biodiversity gains and losses associated with encroachment, e.g. bracken may cause some localised problems, but it may be important for some upland birds, moths and butterflies.
- Promote the dissemination and uptake of the advice and recommendations in the updated Muirburn Code with land managers – *ongoing*. This provides a list of habitats and situations where burning should be avoided.

6. Climate change and pollution:

The issues:

- Climate change. This is likely to have profound effects on many montane species unable to colonise other areas leading to changes in vegetation composition and structure, e.g. loss of alpine plants, upland butterflies like Mountain ringlet and Large heath or expansion of common grasses to higher altitudes.
- Acidification as a result of atmospheric deposition of sulphur and nitrogen compounds. This may alter the nature nutrient levels in the soil and profoundly affect the composition and structure of vegetation communities.
- Localised contamination from human waste and litter.

The solutions, actions and targets:

- Tackling the issue of climate change is discussed in the Introduction under the theme of common threads and recurring issues across all action plans.
- Encourage everyone to follow the 'if you take it in, then you take it out again' principle adopted in other national park areas to reduce waste. Local partners should consider producing and funding an initiative whereby 'Cairngorms National Park' plastic bags for waste and sealed containers are provided for visitors, tourists and locals and suitable sites are created for the waste to be deposited *by 2007*.
- Ensure adequate distribution of the leaflet 'Where to go in the Outdoors' amongst walking groups, tourists and all those likely to be in the Cairngorms montane habitats – *ongoing*. Consider providing permanent copies of the leaflet in all bothies and shelters *by 2005*.

7. Non-native/alien animal and plant species:

The issues:

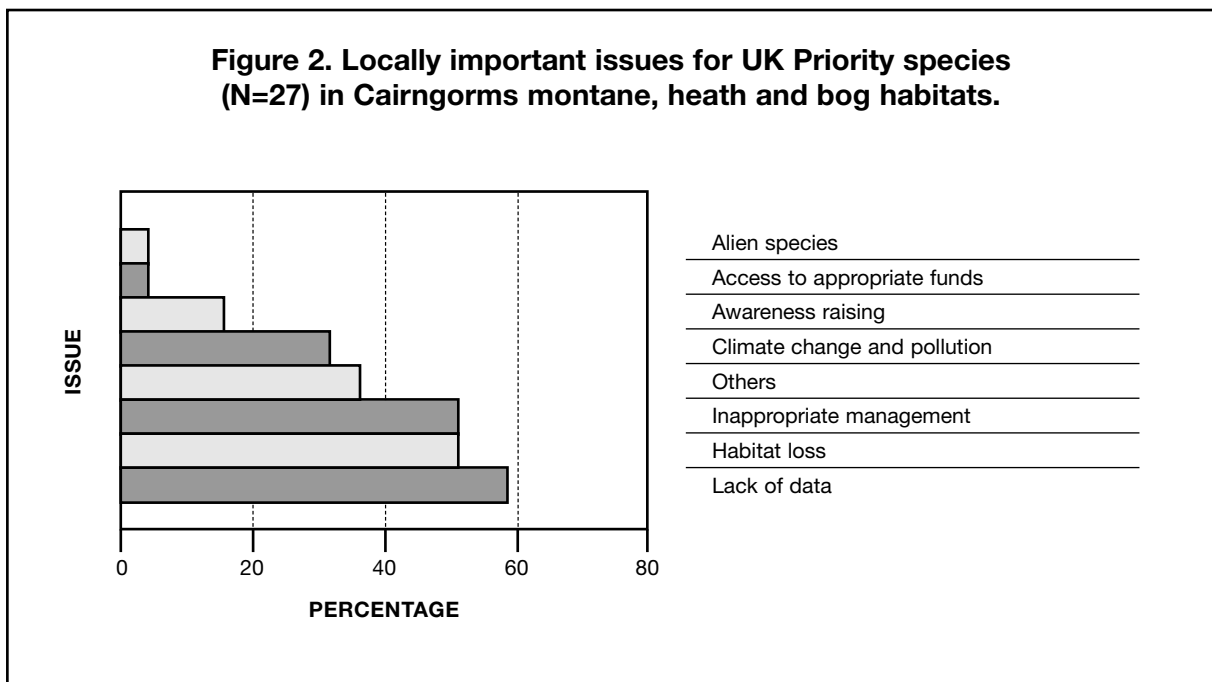
- Introduced non-native species in the wild can potentially kill, harbour diseases or compete with native species and significantly impact upon a range of biodiversity based economic activities.

The solutions, actions and targets:

- Tackling the issue of non-native species is discussed in the Introduction under the theme of common threads and recurring issues across all action plans.

MAIN THREATS TO UK MONTANE, HEATH AND BOG PRIORITY SPECIES IN THE CAIRNGORMS

Figure 2 identifies the main locally important issues affecting the 27 montane, heath and bog Priority species in the Cairngorms. Lack of data or important information is an important issue for 59% of the upland Priority species. Both habitat loss/fragmentation and inappropriate management are considered important issues for just over half (52%) of upland Priority species in the Cairngorms. Over a third (37%) of upland Priority species require actions that are outwith the remit of the montane, upland heath and bog HAP. These 'Other' issues may be related to actions needed to be undertaken in other adjacent habitats or may refer to activities that have little to do with direct habitat management.



33% of montane, upland heath and bog Priority species are currently affected by, or sensitive to, pollution and climate change. 15% of upland Priority species are in need of direct awareness raising activities. Finally, single upland Priority species (4%) are threatened by lack of access to appropriate policy and funding resources and alien/non-native species.

Please note that some caution should be used when examining and interpreting the summary data in Figure 2. The main issues and threats that score most highly for Priority species, may not necessarily be the ones that should be addressed most urgently. For example, 'Awareness raising' of specific issues could solve many of the problems identified under the 'Habitat loss and fragmentation' heading.

UK PRIORITY SPECIES AND LOCALLY IMPORTANT SPECIES ACCOUNTS

The following Cairngorms montane, heath and bog species accounts list the known local issues affecting both the UK Priority species and Locally important species (whose populations are considered to be of high UK importance). Where possible, each locally important issue is linked (by numbers in superscript e.g. climate change⁶) to the relevant 'Main montane, heath and bog biodiversity issues' section. For some species, a single over-riding issue is of paramount importance (e.g. Mink predation of Water vole), whereas others require a suit of co-ordinated action on issues across more than one habitat (e.g. Black grouse). Action by partners targeted at these broad biodiversity issues is likely to deliver substantial benefits for a range of species. However, some other issues (referenced by #), e.g. -collection by botanists#, are not strictly related to montane, heath and bog habitat management and require additional efforts outwith the direct remit of this HAP. For further information on the local distribution of many Priority and Locally important species and the factors affecting local populations, please refer to the 'Biodiversity of the Cairngorms' publication.

Water vole:

The UK's fastest declining animal species has recently been found in small but important upland refuge areas (predominantly burns and blanket bog) across the Cairngorms. It is the subject of detailed survey work in the area.

Locally important issues:

- Predation by American mink⁷. This is considered to be the most important threat to the long-term survival of Water vole populations in the Cairngorms. American mink have wiped out most Water vole populations from the main stems of all the Cairngorms rivers, leaving small, but important populations in the headwaters of upper tributaries and on adjacent areas of blanket bog.
- The loss, disturbance and fragmentation of riparian habitats is thought to be important in other areas, but relevance in Cairngorms is believed to be minimal.

UK importance of Cairngorms population:

High and increasing as huge decline in lowland populations continues. UK Priority species and Locally important species.

Mountain hare:

Numbers of this species naturally fluctuate widely making detection of long-term trends difficult.

Locally important issues:

- Inappropriate grazing regimes can cause loss of suitable habitat⁵.
- Lack of long-term data sets to quantify any population change¹.
- Human eradication of local populations on moorlands in an attempt to reduce tick burdens in Red grouse⁵.
- Effects of predicted climate change⁶.

UK importance of Cairngorms population:

High. UK Species of Conservation Concern and Locally important species.

Golden plover:

The main issues for this species are not fully understood¹, but many birds move off the high moorlands to feed on invertebrate rich fields on the lower ground. Also the intensification of lowland farmland on the wintering grounds is thought to be important to survival and ultimately to the number of returning individuals#:

Locally important issues:

- Afforestation of moorland areas⁴.

UK importance of Cairngorms population:

Moderate-high. UK Species of Conservation Concern and Locally important species.

Dotterel:

The Cairngorms are the most important British breeding area for this migratory wader and high montane specialist. It is the subject of regular detailed survey work in the area.

Locally important issues:

- Effects of predicted climate change and severe weather⁶.
- Nest trampling by people and deer⁵. Research has shown that trampling by deer has resulted in the loss of at least a quarter of Dotterel nests in the Cairngorms.

UK importance of Cairngorms population:

Very high. UK Species of Conservation Concern and Locally important species.

Ptarmigan:

This specialist grouse is the only all year round resident bird on the highest mountains. Numbers of this species naturally fluctuate widely making detection of long-term trends difficult (none known), although recent estimates suggest between 4000-7000 Ptarmigan in the Cairngorms. The highest breeding population densities in the world have been recorded in the Cairngorms area.

Locally important issues:

- Effects of predicted climate change⁶.
- Very localised effects of increased scavengers/predators attracted by human waste[#].

UK importance of Cairngorms population:

High. Locally important species.

Red grouse:

Numbers of this economically important species naturally fluctuate widely making detection of long-term trends in the area difficult.

Locally important issues:

- Loss of appropriate traditional moorland management⁵.
- Direct loss of habitat and fragmentation to grassland or conifer woodland⁴.

UK importance of Cairngorms population:

Moderate-high. Locally important species.

Black grouse:

Black grouse are largely dependent upon suitable management of moorland, farmland, woodland and woodland edge habitats. The UK population has declined dramatically, mainly due to detrimental changes to several components of its habitat. It is currently the subject of local on-going research and conservation management across the CP area, where numbers are believed to be less than 2000.

Locally important issues:

- Habitat deterioration as a result of inappropriate grazing and agricultural improvement has removed important food plants such as blaeberry, heather, birch scrub and their associated insects for chicks^{1,2,3,4}. This may also lead to fragmentation and isolation of habitats and subsequently small and isolated Black grouse populations⁴.
- The shading out of the understorey in maturing conifer plantations with high planted tree density[#].
- Drainage and over-grazing of wetland mires destroys important plant and invertebrate food^{4,#}. Tall vegetation around boggy ground on moorlands is very important.
- The re-seeding of traditional hay meadows and losses of upland arable production have removed food sources for the autumn and winter^{1,2,3,4}.
- Poor or inappropriate muirburn⁵.

- Collisions with fences and with overhead power and telephone cables[#].
- Predation control. Foxes and crows may significantly reduce breeding success[#].
- Human disturbance during the breeding season (especially in late April-early May), particularly by birdwatchers may now be a contributory factor to poor breeding success in some areas. This threat is likely to increase as populations elsewhere decrease and more visitors come to the Cairngorms to see Black grouse[#].
- Loss of traditional cattle grazing from rough hill ground and woodlands which formerly created or maintained suitable wet flushes and/or open areas⁴.

UK importance of Cairngorms population:

High. UK Priority species and Locally important species.

Hen harrier:

Many apparently suitable moorland areas in the Cairngorms are devoid of breeding Hen harriers. It is the most threatened raptor in Britain due to the deliberate killing of birds on managed grouse moors and is the subject of regular detailed survey work in the area.

Locally important issues:

- Deliberate and illegal persecution on grouse moors⁵.

UK importance of Cairngorms population:

Moderate-high. UK Species of Conservation Concern and Locally important species.

Merlin:

Merlins occur throughout the Cairngorms on moorland and forest edge areas. It is the subject of regular detailed survey work in the area.

Locally important issues:

- Tree planting on grouse moors⁵.
- Reduction of heather height by overgrazing and associated reduction of prey species⁵.

UK importance of Cairngorms population:

Moderate-high. UK Species of Conservation Concern and Locally important species.

Golden eagle:

The Golden eagles in the Cairngorms are thought to be the most studied population in the world and are regularly monitored. Golden eagles tend to feed on open ground such as moorland and woodland edges and well as the high tops.

Locally important issues:

- Deliberate and illegal persecution on grouse moors⁵.
- Afforestation reduces value of hunting and breeding grounds and resulting in a reduction of prey species (esp. Red grouse and Mountain hares)⁵.

UK importance of Cairngorms population:

Moderate-high. UK Species of Conservation Concern and Locally important species.

Skylark:

Skylarks use a variety of Cairngorms habitats including some montane and moorland habitats to feed upon.

Locally important issues:

- None of the known factors implicated in the species' decline are related to montane or moorland management[#].

UK importance of Cairngorms population:

Low. UK Priority species and Locally important species.

Ring ousel:

Ring ousels visit the uplands during the spring and the summer to breed. In Britain, their numbers have been declining for many decades, but some parts of the Cairngorms have bucked the national trend and continue to hold important populations of Ring ousels e.g. Glen Callater. Ring ousels prefer a mixture of heather and short-grazed grass, with some bracken on steep rocky slopes for nesting and abundant ground invertebrates during the breeding season. It is important to avoid over-grazing, burning and intensive tree plantings in these preferred areas.

Locally important issues:

- Not properly understood¹, but currently being researched locally. Possible causes include landuse changes such as afforestation, changes to moorland and grassland grazing practices, the widespread 'improvement' of upland grasslands and increases in ground predator populations – but none of these possibilities have yet been confirmed.

UK importance of Cairngorms population:

Moderate-high. UK Species of Conservation Concern and Locally important species.

Twite:

Twite use a mosaic of heather moorland, in-bye pasture and arable ground to feed and nest in. Nationally the population has declines through a combination of loss of heather, over-grazing, upland afforestation and agricultural intensification. These agricultural changes have resulted in grassland monocultures, reduced weed populations, a change from hay to silage and a loss of root fodder crops and winter stubbles.

Locally important issues:

- Not fully understood¹, but the reduction in arable production in the uplands resulting in the loss of autumn and winter feeding areas (arable stubbles and turnips) is thought to be relevant[#].

UK importance of Cairngorms population:

Moderate-high. UK Species of Conservation Concern and Locally important species.

Bullfinch:

Bullfinch is a common breeding species found at low densities throughout woodlands and gardens in the area. In the autumn, Bullfinches also feed in flocks on heather seeds at the edge of moorland. The recent national decline was associated with intensification of agriculture in lowland areas.

Locally important issues:

- Not currently well known¹, but none of the detrimental factors identified nationally are thought to be particularly relevant to the Cairngorms.

UK importance of Cairngorms population:

Moderate. UK Priority species and locally important species.

Reed bunting:

Reed buntings use a variety of habitats including some upland habitats for feeding during the autumn and early winter.

Locally important issues:

- The drainage of mires may have had a local impact on Reed bunting numbers⁴.

UK importance of Cairngorms population:

Low. UK Priority species.

Snow bunting:

The Cairngorms are the most southern site in Europe for this rare Arctic breeding species. The species inhabits the boulder fields and corries of the highest mountains. It has been the subject of very detailed research and monitoring in the area, which has shown that Scottish breeding birds are a darker race than the Arctic breeding birds.

Locally important issues:

- Effects of predicted climate change⁶.

UK importance of Cairngorms population:

Very high. UK Species of Conservation Concern and Locally important species.

Narrow-headed woodant:

Narrow-headed woodant uses native woodland and adjacent heathland at sites in Badenoch, Strathspey and Deeside.

Locally important issues:

- Historic loss of natural/semi-natural habitats in Scotland, e.g. Caledonian pine woods^{4,#}.
- Inappropriate grazing regimes (both over and undergrazing)⁵.
- Succession (shading over nests)^{5,#}.
- Development of heath sites⁴.

UK importance of Cairngorms population:

Very high. UK Priority species and Locally important species.

Netted mountain (a moth):

A moth of Bearberry *Arctostaphylos* heath on Deeside, Badenoch and Strathspey.

Locally important issues:

- Inappropriate moorland management, including neglect⁵.
- Changes to traditional muirburn⁵. Without regular muirburn *Calluna* may shade out *Arctostaphylos*.
- Over-grazing⁵.

UK importance of Cairngorms population:

High. UK Priority species.

Argent and sable (a moth):

A moth of open birch woodland, moorland and bogs of Western areas. The larvae feed on both birch and bog myrtle in moorland areas and may just reach the Cairngorms in West.

Locally important issues:

- Poorly understood¹. The factors causing the loss or decline are not properly known.

UK importance of Cairngorms population:

Unknown. UK Priority species.

Mountain ringlet (a butterfly):

This is a montane or sub-montane species that favours slightly base rich grassland habitats at 350-800m altitude, where its larvae feed on the Mat grass *Nardus stricta*.

Locally important issues:

- Inappropriate grazing regimes. Both over-grazing and under-grazing can cause problems to the habitat^{2,4}.
- Predicted climate change⁵.
- Inappropriately sited new woodlands[#].

UK importance of Cairngorms population:

Moderate-High. UK Species of Conservation Concern and Locally important species.

Large heath (*a butterfly*):

Predominantly a species of peatland habitats where its food plant Cotton grass *Eriophorum spp* is found, this species distribution and status is probably masked by chronic under-recording.

Locally important issues:

- Inappropriate grazing regimes. Both over-grazing and under-grazing can cause problems to the habitat^{2,4}.
- Site drainage for agricultural improvement or new woodlands^{4,#}.
- Direct habitat loss through peat extraction^{4,#}.

UK importance of Cairngorms population:

Moderate-High. Species of Conservation of Concern and Locally important species.

Northern dart (*a moth*):

A moth restricted to upland and montane sites containing its main larval foodplant Crowberry *Emptrum nigrum* at altitudes over 600m. The factors causing the loss or decline are not properly known, but are thought to probably include:

Locally important issues:

- Poorly understood¹.
- Localised habitat disturbance^{4,5}.
- Predicted climate change⁶.

UK importance of Cairngorms population:

High. UK Priority species.

Sword grass (*a moth*):

A species of grassland and moorland edge, extending onto lowland farmland areas. Its larvae feed on grasses before changing on to broadleaved species such as Blackthorn and Bird cherry.

Locally important issues:

- Poorly understood. The factors causing the loss or decline nationally are not even known¹.

UK importance of Cairngorms population:

High? UK Priority species.

Mountain burnet (*a moth*):

The main issues affecting this montane moth are unknown. Its larva feeds on Crowberry and other species in grassy heaths. It is highly localised and in Britain is only known from the Cairngorms.

Locally important issues:

- Lack of important basic data on this montane moth is currently the main issue¹.

UK importance of Cairngorms population:

Very high. UK Species of Conservation Concern and Locally important species.

Small dark yellow underwing and *Coleophora arctostaphyli*:

These two moths are montane *Arctostaphylos* heath species and are thought to be chiefly threatened by habitat change.

Locally important issues:

- Afforestation⁴.
- Loss of traditional muirburn management⁵.
- Possible scrub encroachment following grazing reduction⁵.

UK importance of Cairngorms population:

High. UK Species of Conservation Concern and Locally important species.

***Broad-bordered white underwing* (a moth):**

A widespread montane species with its main stronghold in the Cairngorms.

Locally important issues:

- Lack of important basic data on this montane moth is currently the main issue¹.

UK importance of Cairngorms population:

High. UK Species of Conservation Concern and Locally important species.

***Elm gyalecta* (a lichen):**

Although previously known as an epiphyte on Elms, it is now only found on calcareous rocks from widely separated sites in the Cairngorms.

Locally important issues:

- Collection by botanists is its only known threat[#].

UK importance of Cairngorms population:

High. UK Priority species.

***Alpine sulphur tresses* (a lichen):**

This lichen grows on exposed Heather/Crowberry wind-clipped heaths usually between 690 and 830m asl. In Britain it is only known from the Cairngorms.

Locally important issues:

- Likely disturbance through recreational pressure⁵. The lichen is vulnerable to trampling by walkers.
- The effects of grazing animals⁵.
- Predicted climate change⁶.
- Lack of knowledge on UK distribution (under-recorded)¹.

UK importance of Cairngorms population:

High. UK Priority species.

***Bellemeria alpina* (a lichen):**

This lichen was only known in the UK from quartzite pebbles adjacent to a snow-melt burn on Cairngorm. It has not been recorded since 1983.

Locally important issues:

- Likely disturbance caused by increased recreational pressure in the area⁵.
- Predicted climate change⁶.
- Collection by botanists[#].
- Lack of knowledge on UK distribution (under-recorded)¹.

UK importance of Cairngorms population:

Thought to be high, but not recently recorded. UK Priority species.

***Gyalideopsis scotia* (a lichen):**

A recently described lichen that grows on decomposing bryophytes on base-rich soils. It is thought to be endemic to Britain.

Locally important issues:

- Poorly understood¹. The ecological features associated with this species are not properly known.
- Habitat disturbance through recreational pressures⁵.
- Collection by botanists[#].
- Small size of the population makes it prone to detrimental or catastrophic chance events⁴.
- Predicted climate change⁶.

UK importance of Cairngorms population:

Moderate-high. UK Priority species.

***Halecania rhyodiza* (a lichen):**

An endemic Scottish lichen of calcareous rocks at an altitude of 610m asl. This lichen is not known to have recently declined, but is thought to be vulnerable because its only known world sites are two small isolated populations at Caenlochan in Angus and Ben Lawers in Perthshire.

Locally important issues:

- Habitat disturbance through recreational pressures⁵.
- Collection by botanists[#].
- Small size of the population makes it prone to detrimental or catastrophic chance events⁴.
- Predicted climate change⁶.

UK importance of Cairngorms population:

Very high. UK Priority species.

***Opegrapha paraxanthodes* (a lichen):**

A lichen of base-rich cliffs and rock outcrops, often in wooded valleys. It is thought to be endemic to Britain.

Locally important issues:

- Poorly understood¹. No immediate threats have been identified for this species and the factors causing the loss or decline of two populations are not known.

UK importance of Cairngorms population:

High. UK Priority species.

***Stabler's rustwort* (a liverwort):**

A liverwort of rocks and gravelly soils at 300-1160m asl. There is some confusion regarding the taxonomic status of this and other rustworts.

Locally important issues:

- Poorly understood¹.
- Building developments such as ski lifts on mountains⁴.
- Erosion of vegetation by walkers and climbers⁵.

UK importance of Cairngorms population:

High. UK Priority species.

Icy rock moss:

All known Icy rock moss populations are on granite boulders or bedrock, in burns or on loch shore margins, between 660–1200m asl. In the Cairngorms it seems to be restricted to sites which derive most of their water from areas of late snow. It is not known to have recently declined, but is thought to be vulnerable due to its localised and limited distribution in the Cairngorms.

Locally important issues:

- Predicted climate change⁶.
- Lack of knowledge on UK distribution (under-recorded)¹.

UK importance of Cairngorms population:

High. UK Priority species.

Baltic bog moss:

A species of lowland raised bog and blanket bog. It was known from only one site in the Cairngorms (Loch Muick), but it was recently discovered in Blanket bog at Abernethy. These issues have been identified nationally and it is unclear how many of the following issues are relevant in a Cairngorms context.

Locally important issues:

- Direct afforestation and planting in the vicinity of Baltic bog moss sites with associated effects on the acidity of run-off water and site hydrology^{4, #}.
- Peat cutting and associated effects on site hydrology^{4, 5}.
- Drainage of peatland sites⁵. Inappropriate collecting of *Sphagnum* for horticultural purposes[#].

UK importance of Cairngorms population:

High. UK Priority species.

Newman's lady-fern:

There is some confusion regarding the taxonomic status of this fern, but is considered to be endemic to Britain and can now only be found at four sites (two in the Cairngorms).

Locally important issues:

- Poorly understood¹. The ecological features associated with this species are not properly known.
- Collection by botanists[#].

UK importance of Cairngorms population:

Very high. UK Priority species.

Oblong woodsia:

A small rare fern found on rocks, crags and scree above 350m asl. Less than 100 plants are known to remain in the UK and it is found at two sites in the Cairngorms (Caenlochan and Glen Feshie).

Locally important issues:

- Poorly understood¹. The factors causing the loss or decline are not properly known, but are thought to probably include:
- Predicted climate change⁶.
- Collection by botanists[#].
- Small size of the population makes it prone to detrimental catastrophic chance events⁴.

UK importance of Cairngorms population:

Very high. UK Priority species.

Mountain scurvy grass:

An endemic British species showing no signs of declining. It is generally found above 600m asl on base rich grassland soils, often around wet or damp flushes in the Cairngorms.

Locally important issues:

- Poorly understood¹. The factors this species are not properly known.

UK importance of Cairngorms population:

High. UK Priority species.

Purple saxifrage:

Restricted to calcareous rock outcrops and very local in the core of the Cairngorms:

Locally important issues:

- No obvious threats.

UK importance of Cairngorms population:

Very high. UK Species of Conservation Concern and Locally important species.

Twinflower:

Outside of woodland sites, the detrimental factors affecting Twinflower on heathland are poorly known¹, but are thought to include:

Locally important issues:

- Unrestricted grazing by deer, sheep or cattle affecting the habitat⁵.
- Reproductive isolation of Twinflower populations consisting of single clones⁴.

UK importance of Cairngorms population:

High. UK Priority species.

Woolly willow:

Woolly willow is restricted to damp mountain ledges on basic rock and is found in several suitable sites across the Cairngorms.

Locally important issues:

- Grazing has removed it from accessible ground, making it restricted to small niches on very steep areas, where it is more vulnerable to chance events such as erosion, rock falls and snow avalanches^{4,5}.
- The lack of recruitment in the very small remaining populations, especially where single sex populations are isolated are threats to survival⁴.

UK importance of Cairngorms population:

High. UK Priority species.

Juniper:

This widespread species is found throughout the Cairngorms on farmland, grassland, moorland and woodland sites and is important for several BAP species including Black grouse.

Locally important issues:

- Excessive grazing which prevents establishment of young bushes⁵.
- Insufficient grazing which reduces the area suitable to juniper regeneration. This may also cause the loss of adult bushes as other tree species shade out juniper⁵.
- Direct clearance of stands⁴.
- Excessive burning which may destroy young regeneration and adult bushes⁵.
- Low economic and cultural value attached to the species².

UK importance of Cairngorms population:

Moderate. UK Priority species and Locally important species.

Grouped species:

Montane, heath and bog fungi – part I

- **A small stalked puffball** *Tulostoma niveum* UK Priority Species and Locally important species.
- **A parasitic fungus** of *Vaccinium uliginosum-Exobasidium expansum* UK Species of Conservation Concern.
- **A cup fungus** *Geopora arenosa* s.s. Locally important species.
- **An agaric fungus** *Galerina anthelia* UK Species of Conservation Concern and Locally important species.
- **An agaric fungus** *Amanita nivalis* UK Species of Conservation Concern and Locally important species.
- **An agaric fungus** *Hygrocybe lilacina* Locally important species.
- **An agaric fungus** *Lactarius psuedouvidus* UK Species of Conservation Concern and Locally important species.

- **An agaric fungus** *Mycena megaspora*
Unknown – data deficient. Locally important species.
- **An agaric fungus** *Russula laccata (norvegica)*
UK Species of Conservation Concern and Locally important species.
- **An agaric fungus** *Russula nana*
UK Species of Conservation Concern and Locally important species.
- **A cup fungus** *Sarcoleotia turficola*
Unknown – data deficient. Locally important species.

Locally important issues:

- Data deficiency¹.
- Trampling and disturbance from increased recreational use of the mountains^{2,4}.
- Predicted climate change⁶.
- Disturbance/damage to moss cushions, e.g. inappropriate burning or drainage for *Tulostoma niveum*, *Mycena megaspora* and *Sarcoleotia turficola*⁴.

UK importance of Cairngorms populations:

Data deficient, but thought to be high.

Grouped species:

Montane, heath and bog fungi – part II - Slime moulds

Snow bed species:

- *Dianema nivalis*
UK Priority Species and Locally important species.
- *Diderma lyallii*
UK Species of Conservation Concern.
- *Lamproderma atrosporum*
UK Species of Conservation Concern.
- *Lamproderma carestiae*
UK Species of Conservation Concern.
- *Lamproderma cribrarioides*
UK Species of Conservation Concern.
- *Lamproderma sauteri*
UK Species of Conservation Concern.
- *Lepidoderma carestianum*
UK Species of Conservation Concern.

Locally important issues:

- Data deficiency¹.
- Trampling and disturbance from increased recreational use of the mountains^{2,4}.
- Predicted climate change⁶.
- Inappropriate grazing leading to less tall herb stems, the preferred habitat⁵.

UK importance of Cairngorms populations:

High.

MONTANE

Habitat definition:

Montane habitats are found in areas above the natural tree level (variable, but approximately 600m asl). These alpine and sub-alpine areas represent some of the most natural and undisturbed habitats in the UK. The broad montane zone comprises many different kinds of habitat supporting a wide range of specialist plant and animal communities. The montane zone consists of mainly high plateaux, with steep sided corries, rocky cliffs, crags, boulder fields and scree slopes. The vegetation is influenced by factors such as exposure, snow cover and soil type/depth. These montane habitats include high altitude instances of common heath communities, which occur across an altitudinal gradient, moss-heaths, grasslands, dwarf-shrub heaths, late snow patches, rock ledges, scree slopes, oligotrophic lochs and montane willow scrub. This however is not followed for upland mires, bogs or flushes which regardless of altitude are classified under fens, carr, marsh, and reedbed or blanket bog.

Current status, distribution and significance of the habitat:

More than half of the Cairngorms montane zone above 600m asl is classified as three other broad habitat types, mainly upland heath (heather moorland), blanket bog and some poor acid grassland (see farmland and grassland HAP for further details). Thus, probably less than half the LCS88 area of 50,556 ha of Cairngorm montane habitat is likely to be defined as '*montane*'. This habitat includes four of the five highest mountains in the UK. Outside the main Cairngorms plateaux, there are large tracts of montane habitat in the south of the Cairngorms Partnership area, from the Drumochter hills in the west to the high Angus Glens in the east, including Beinn a' Ghlo, Lochnagar and the Mounth. The area also includes parts of the Monadh Liath in the west and the Ladder Hills in the north-east.

The differences in defining the montane habitat make it difficult to ascertain the exact proportion of UK montane habitat in the Cairngorms Partnership area. Nevertheless, the land above 600m asl in the Cairngorms represents 29% of the British total and the area is generally considered to be the most important montane area in Britain and one of the most important in a European context as well.

The national biodiversity context:

There is a UK Habitat Statement for the montane habitat. This gives the following conservation direction to LBAPs, which may adopt some or all of the relevant measures identified nationally:

"Minimise further deterioration to the resource near natural montane and high altitude moorland; restore areas of scrub, herb and moss cover and minimise damage and disturbance."

Measures identified on a UK wide basis to consider further include:

- Carry out surveys to identify remnant areas of near natural montane communities.
- Reduce grazing pressure from deer.
- Encourage lower levels of sheep grazing and burning management to maintain montane vegetation.
- Protect montane areas from inappropriate development* and discourage disturbance and damage to montane areas from inappropriate forms and levels of use, including recreational uses.
- Consider the need for studies to investigate the effects of acid deposition. (Since the production of this guidance, experts suggest that the impacts of nitrogen deposition on montane communities may become very important in the future.)

* There is a large body of opinion that believes there is no such thing as 'appropriate development' in the core montane area of the Cairngorms. This is reflected in several of the 'High hills' objectives of the Cairngorms Partnership's Management Strategy.

Targets:

The following five objectives and targets have been identified for montane habitats in the Cairngorms:

Main objectives/targets:

Target 1: Ascertain the distribution, area and ecological status of montane habitats in the Cairngorms – by 2005.

Target 2: Ensure no net loss in overall area of montane habitats in the Cairngorms – by 2006.

Target 3: Maintain and restore good ecological status/quality* of key montane sites in the Cairngorms – by 2008.

Target 4: Ensure minimal management intervention above the tree-line and target management to areas below the tree-line that allow the full range of species to interact, thereby allowing 'natural ecological processes' to occur.

Target 5: Ensure no net loss in the number and/or range of important LBAP species in the Cairngorms associated with montane habitats – by 2008.

* Measured using some sort of standardised method for ascertaining good ecological status/quality.

Current factors affecting the habitat in the Cairngorms:

Two specific montane issues, both of which relate to recreational use of the Cairngorms, were identified over and above those detailed in the section '*Main montane, heath and bog biodiversity issues*' section. Montane habitats should not be considered in isolation, it is important to consider management issues on adjacent habitats on the lower ground, such as moorland and woodland, the consequences of which can have profound effects upon the flora and fauna of Montane habitats. In particular, attention is drawn to the montane scrub section in the woodland chapter.

Habitat loss, lack of data, awareness raising and access to appropriate funding sources

The issues:

- Significant habitat damage has occurred due to the lateral spreading of some footpaths and general trampling of some sensitive habitats. The number and distribution of mountaineers/climbers and walkers using the high tops in the Cairngorms have caused this.
- There is increasing concern that mountaineers/climbers '*gardening*' and hacking turf off cliff areas may have or be causing significant damage to refuge areas for several rare plant species. The issue is particularly relevant to the creation of new routes, or off-route forays at times when the vegetation and turf is not frozen.

The solutions and actions:

- There are no quick fixes to these two problems, which should be seen as biodiversity issues as well as amenity ones. However, there are three areas where significant progress has been made to date and where future effort should be targeted: (1) Good knowledge of the locations of the problems and the sensitive habitats; (2) Advice, education and awareness raising of walkers and mountaineers, including wayfinding on paths; and (3) Development of suitable technical solutions, availability of competent contractors to carry out footpath work in remote mountain areas and availability of significant finance. Only when these three elements are fully drawn together will agreements on specific solutions be reached.

Practical action:

Rare alpine plants:

The Cairngorms Partnership and the RSPB have facilitated and co-ordinated important and fundamental research on two rare UK Priority plant species that mainly occur in the Cairngorms. Little was known about Alpine sulphur tresses (a lichen) and lcy rock moss and the commissioned research has subsequently found that both montane species, whilst still rare and local,

are more widespread than formerly thought in the core Cairngorms area. This recent work now provides conservation managers with up-to-date information on their distribution, allowing informed conservation management decisions to be made for both species.

UPLAND HEATH

Habitat definition:

Upland heath and heather moorland are terms that are regularly used to describe the same habitat – that is an upland landscape dominated with vegetation containing at least 25% dwarf-shrub heaths. It lies below the montane zone (e.g. c600-750m asl) and above the upper edge of enclosed agricultural land (e.g. 250-400m asl). Upland heath in 'favourable condition' is typically dominated by a range of dwarf-shrubs such as Ling heather *Calluna vulgaris*, Blaeberry *Vaccinium myrtillus*, Crowberry *Empetrum nigrum* and Bell heather *Erica cinerea*. It is usually found in areas with relatively high precipitation, on nutrient poor acid soils.

Current status, distribution and significance of the habitat:

Upland heath occurs regularly throughout the British uplands and is the most extensive habitat type in the Cairngorms area, covering 41% of the area (2,689 km²), frequently in mosaics with peat-land/blanket bog. It occurs to a greater or lesser extent in most 1km squares in the Cairngorms Partnership area throughout Deeside, Donside, Strathspey, Angus Glens, Atholl and Glen Shee.

The LCS88 recorded a total area of 2,689km², representing nearly 16% of the Scottish total. This habitat and its associated species are of international conservation significance, being largely confined to the UK and western seaboard of Europe.

The national biodiversity context:

There is a UK Habitat Statement for upland heath. This gives the following conservation direction to LBAPs, which may adopt some or all of the relevant measures identified nationally:

"Maintain the extent, enhance the quality and restore upland dwarf-shrub heath as part of upland mosaics and transitions of semi-natural and natural habitats appropriate to soils and climate."

Measures identified on a UK wide basis to consider further include:

- Encourage sympathetic management of upland heath for wildlife, notably for a greater structural diversity and for the rich lower plant communities.
- Promote demonstrations and advice on good muirburn practices.
- The need for studies to investigate the effects of acid deposition on upland heath communities.
- Encourage measures which reverse habitat fragmentation of upland heath vegetation.
- Reduce grazing pressure from red deer and sheep by reducing their numbers.
- Protect upland heaths from inappropriate development by identification in relevant development plans and in Indicative Forestry Strategies.

Targets:

The following four objectives and targets have been identified for upland heath habitats in the Cairngorms:

Main objectives/targets:

Target 1: Ascertain the distribution, area and ecological status of upland heath habitats in the Cairngorms – by 2005.

Target 2: Ensure no net loss in overall area of key upland heath habitats in the Cairngorms – by 2006. Promote natural tree regeneration on 'species poor' moorlands, where it does not destroy important areas for biodiversity.

Target 3: Maintain and restore good ecological status/quality* of key upland heath sites in the Cairngorms – by 2008.

Target 4: Ensure no net loss in the number and/or range of important LBAP species in the Cairngorms associated with upland heath habitats – by 2008.

* Measured using some sort of standardised method for ascertaining good ecological status/quality.

Current factors affecting the habitat in the Cairngorms:

No specific upland heath issues were identified over and above the main ones detailed in the section 'Main montane, heath and bog biodiversity issues' section. However, the management of upland heath habitats should not be considered in isolation, it is important to consider management issues on adjacent habitats on the higher and lower ground, such as montane and woodland.

Practical action:

The Cairngorms Moorland Project:

The area of traditionally managed moorland in the Cairngorms has been reduced significantly in recent years through afforestation, conversion to species poor grassland and lack of management with the resultant loss of biodiversity. The Cairngorms Moorland Project will help conserve, enhance and raise awareness of the Cairngorms impressive and important moorlands. The project will demonstrate good moorland management techniques on two representative moors in the area, enhance the biodiversity of the moors, and provide interpretative materials to raise the profile of this important habitat and its management.

Honey bees and heather:

Scotland's native Honey bees and bee keepers are threatened by an introduced parasitic mite called *Varroa destructor*. It sucks the blood from honey bees before eventually killing them and wiping out whole colonies if left untreated. Honey bees are valued not only for honey and wax they produce, but also for the pollination service that they provide to the majority of our crops and wild flowers. Bee keeping has taken place in Scotland for at least 2000 years and is a traditional economic activity in the Cairngorms.

Parts of the Highlands and most of the Cairngorms are free of *Varroa*, but many feral bee colonies have not been checked and in other parts of the UK, these are known to harbour and pass on *Varroa* to wild bees. *Varroa* poses a significant threat to the substantial production of organic heather honey in the Cairngorms. A project is proposed that would look at raising awareness amongst local bee keepers (there are approximately 6000 beekeepers in Scotland), concentrating on the movement and treatment of domestic and feral colonies. It would provide guidance of how, where and when to treat for *Varroa* and investigate other methods of promoting organic honey production in the Cairngorms.

BLANKET BOG

Definition:

Blanket bog is a globally restricted peatland habitat confined to cool, wet, typically oceanic climates. It is however, one of the most extensive semi-natural habitat types in upland Britain. Peat thickness is very variable, e.g. 0.5-3.0m being fairly typical and in excess of 5m thick not unusual. Blanket bog peat normally accumulates in response to the very slow rate at which plant material decomposes under conditions of waterlogging.

The typical blanket bog species include Heather *Calluna vulgaris*, Cross-leaved heath *Erica tetralix*, Deer grass *Scirpus cespitosus*, Cotton grass *Eriophorum* species and several species of *Sphagnum* moss. The Blanket bog bird assemblage is rather species poor, but does have very high densities of breeding species such as Dunlin and Golden plover. The relative proportions of each of these species varies across Scotland from west to east, with altitude, topography, peat thickness and rainfall. Thick peat can even develop, and blanket bog with it, in areas of low precipitation and relatively high sunshine if drainage is impeded by topography and/or the development of impervious soil layers.

Current status, distribution and significance of the habitat:

Blanket bog is very widespread in the Cairngorms Partnership area, except for lower ground areas in the east. It is the second most extensive habitat type in the area (19% of land area), after upland heath, covering 1,242km² or 9% of the Scottish total. Blanket bog grades into wet upland heath forming extensive heathland/peatland mosaics. The largest expanses of blanket bog are found in the Monadh Liath, the Atholl-Drumochter Hills, the hills of Angus, the Ladder Hills and large areas of Deeside.

Whilst blanket bog covers extensive areas of the Cairngorms, peat accumulates very slowly and is consequently colonised slowly by many species. Thus, once any damage or exploitation happens, this habitat is very difficult and slow to restore due to the timescales involved. Therefore, this sensitive habitat cannot be (re)created like other habitats in the area.

The national biodiversity context:

There is a UK Habitat Statement for the blanket bog habitat. This gives the following conservation direction to LBAPs, which adopt some or all of the relevant measures identified nationally:

“Minimise deterioration and promote appropriate management of areas of blanket bog which retain their hydrological characteristics and rehabilitate areas of damaged blanket bogs where the hydrological integrity is suitable for restoration (e.g. drain blocking).”

Measures identified on a UK wide basis to consider further include:

- Develop national inventories and agree a UK framework for identifying the extent and quality of the peatland resource, the factors affecting the habitat and the action required to conserve it, in line with international obligations.
- Protect blanket bogs from inappropriate uses by identifying them in relevant plans such as local council and forestry plans.
- Promote alternatives to peat as sources of energy and alternatives to moss for use in horticulture.
- Examine further the role of peatlands as important carbon sinks.
- Examine further the functional role of peatlands as dominant features in catchment dynamics, such as major sources of drinking water, maintenance of water quality and prevention of soil erosion.
- Encourage appropriate grazing, burning and other management of blanket bogs.

Targets:

The following four objectives and targets have been identified for blanket bogs in the Cairngorms:

Main objectives/targets:

Target 1: *Ascertain the distribution, area and ecological status of blanket bog habitats in the Cairngorms – by 2005.*

Target 2: *Ensure no net loss in overall area of key blanket bog habitats in the Cairngorms – by 2006.*

Target 3: *Maintain and restore good ecological status/quality* of key blanket bog sites in the Cairngorms – by 2008.*

Target 4: *Ensure no net loss in the number and/or range of important LBAP species in the Cairngorms associated with blanket bog habitats – by 2008.*

* Measured using some sort of standardised method for ascertaining good ecological status/quality.

Current factors affecting the habitat in the Cairngorms:

In Scotland, large areas of blanket bog have been lost to afforestation. Overgrazing, burning and moorland drainage are also significant causes of degradation. In the Cairngorms Partnership area, more than half of the area of blanket bog showed signs of peat erosion, which might be related inappropriate burning and localised trampling by Red deer. Although commercial peat extraction is a threat in other parts of the country, it not thought to be a significant issue in the Cairngorms as only a few hectares are cut annually.

RAISED BOG

Habitat definition:

Raised bog is a type of peatland that is exclusively fed by precipitation, generally found in lowland area, such as glens and flood plains. The raised bog consists of a dome of peat. The term 'moss', is often used to describe raised bogs and peat bogs in the NE of Scotland.

Current status, distribution and significance of the habitat:

Raised bogs are very rare in the Cairngorms. There are several small raised bogs in the area, but perhaps the best two remaining bogs are Balloch Moss and Egno Moss, both of which occur in Angus. The status of raised bogs is described according to the condition of the peat dome, where primary bogs domes are intact and secondary bog domes have been damaged by peat extraction or some other activity. Balloch Moss is a primary (uncut) bog of 16ha and is a SSSI. Most of the primary raised bogs in England and Scotland have been lost and undamaged sites such as Balloch Moss are now very rare.

The national biodiversity context:

There is a UK Habitat Statement for the raised bog habitat. This gives the following conservation direction to LBAPs, which may adopt some or all of the relevant measures identified nationally:

"Safeguard remaining areas of primary raised bog and with appropriate management ensure that the full functioning hydrological units supporting the habitat are maintained. Safeguard and restore important areas of secondary raised bog which, although modified, still contain sufficient representation of species typical of active raised bogs or the required environmental features that favour peat development."

Measures identified on a UK wide basis to consider further include:

- Promote alternatives to peat and moss in the horticulture and in energy generation.
- Evaluate existing measures for conserving and managing raised bogs.
- Protect raised bogs from inappropriate uses and identifying them in mineral and other plans such as local and forestry plans.
- Promote an understanding and appreciation of raised bogs.
- Encourage the restoration of degraded raised bogs.

Targets:

The following four objectives and targets have been identified for raised bogs in the Cairngorms:

Main objectives/targets:

Target 1: Ascertain the distribution, area and ecological status of raised bog habitats in the Cairngorms – by 2005. Little is known about raised bogs in the Cairngorms, other than the two important sites in Angus.

Target 2: Ensure no net loss in overall area of raised bog habitats in the Cairngorms – by 2006.

Target 3: Maintain and restore good ecological status/quality* of raised bog sites in the Cairngorms – by 2008.

Target 4: Ensure no net loss in the number and/or range of important LBAP species in the Cairngorms associated with raised bog habitats – by 2008.

* Measured using some sort of standardised method for ascertaining good ecological status/quality.

Current factors affecting the habitat in the Cairngorms:

Threats to raised bogs include domestic peat cutting, agricultural reclamation and afforestation. Balloch Moss is in sympathetic conservation management, but the situation at Egno Moss is less clear.

Table 2. 'Key' Cairngorms montane, heath and bog species

◆ = Regularly used by species. (P) = UK Priority species,
(C) = UK Species of conservation concern, (L) = Locally important species.

Species	Montane	Upland heath	Blanket bog	Raised bog
Water vole <i>Arvicola terrestris</i> (P)(L)		◆	◆	
Mountain hare <i>Lepus timidus</i> (C)(L)	◆	◆	◆	
Red deer <i>Cervus elaphus</i> (C)(L)	◆	◆	◆	
Roe deer <i>Capreolus capreolus</i> (C)(L)		◆		
Pigmy shrew <i>Sorex minutus</i> (C)	◆	◆	◆	◆
Common shrew <i>Sorex araneus</i> (C)		◆		◆
Stoat <i>Mustela erminea</i> (C)(L)		◆		◆
Weasel <i>Mustela nivalis</i> (C)(L)		◆		◆
Black grouse <i>Tetrao tetrix</i> (P)(L)		◆		
Red grouse <i>Lagopus lagopus</i> (L)	◆	◆	◆	
Ptarmigan <i>Lagopus mutus</i> (L)	◆			
Buzzard <i>Buteo buteo</i> (C)(L)	◆	◆		
Golden eagle <i>Aquila chrysaetos</i> (C)(L)	◆	◆	◆	
Hen harrier <i>Circus cyaneus</i> (C)(L)		◆	◆	
Kestrel <i>Falco tinnunculus</i> (C)(L)	◆	◆	◆	
Merlin <i>Falco columbarius</i> (C)(L)	◆	◆	◆	
Peregrine <i>Falco peregrinus</i> (C)(L)	◆	◆	◆	
Short-eared owl <i>Asio flammeus</i> (C)(L)		◆	◆	◆
Water rail <i>Rallus aquaticus</i> (C)				◆
Spotted crane <i>Porzana porzana</i> (C)				◆
Dotterel <i>Charadrius morinellus</i> (C)(L)	◆			
Golden plover <i>Pluvialis apricaria</i> (C)(L)	◆	◆	◆	
Purple sandpiper <i>Calidris maritima</i> (C)	◆			
Dunlin <i>Calidris alpina</i> (C)(L)	◆	◆	◆	
Snipe <i>Gallinago gallinago</i> (C)(L)	◆	◆	◆	◆
Woodcock <i>Scolopax rusticola</i> (C)				◆
Curlew <i>Numenius arquata</i> (C)(L)		◆		◆
Greenshank <i>Tringa nebularia</i> (C)	◆	◆		
Skylark <i>Alauda arvensis</i> (P)(L)	◆	◆		
Shore lark <i>Eremophila alpestris</i> (C)	◆			
Meadow pipit <i>Anthus pratensis</i> (C)(L)	◆	◆	◆	◆
Whinchat <i>Saxicola rubetra</i> (C)		◆		
Stonechat <i>Saxicola torquata</i> (C)		◆		
Wheatear <i>Oenanthe oenanthe</i> (C)	◆	◆		
Ring ousel <i>Turdus torquatus</i> (C)(L)	◆	◆		
Sedge warbler <i>Acrocephalus schoenobaenus</i> (C)				◆
Twite <i>Carduelis flavirostris</i> (C)(L)	◆	◆		
Bullfinch <i>Pyrrhula pyrrhula</i> (P)(L)		◆		
Reed bunting <i>Emberiza schoeniclus</i> (P)				◆
Lapland bunting <i>Calcarius lapponicus</i> (C)	◆			

Snow bunting <i>Plectrophenax nivalis</i> (C)(L)	◆			
Common toad <i>Bufo bufo</i> (C)(L)		◆		◆
Common frog <i>Rana temporaria</i> (C)(L)		◆	◆	◆
Palmate newt <i>Triturus helveticus</i> (C)(L)				◆
Slow worm <i>Anguis fragilis</i> (C)(L)		◆		
Adder <i>Vipera berus</i> (C)(L)		◆		
Narrow-headed woodant <i>Formica exsecta</i> (P)(L)		◆		
Netted mountain <i>Semiothisa carbonaria</i> (P)	◆	◆		
Northern dart <i>Xestia alpicola</i> (P)	◆	◆	◆	
Sword grass <i>Xylena exsoleta</i> (P)		◆		
Argent and Sable <i>Rheumaptera hastata</i> (P)	◆	◆	◆	
Large heath <i>Coenonympha tullia</i> (C)(L)	◆	◆	◆	◆
Mountain ringlet <i>Erebia epiphron</i> (C)(L)	◆	◆		
Grey scalloped bar <i>Dyscia fagaria</i> (C)	◆	◆	◆	◆
Mountain/Scotch burnet <i>Zygaena exulans</i> (C)(L)	◆			
Small pearl-bordered fritillary <i>Boloria selene</i> (C)(L)		◆	◆	◆
Small dark yellow underwing <i>Anarta cordigera</i> (C)(L)		◆		
Broad-bordered white underwing <i>Anarta melanopa</i> (C)(L)		◆		
Northern arches <i>Apamea zeta</i> (C)		◆		
A moth <i>Coleophora arctostaphyli</i> (L)		◆		
Northern blue damselfly <i>Coenagrion hastulatum</i> (C)(L)			◆	
White-faced dragonfly <i>Leucorrhinia dubia</i> (C)(L)			◆	
Honey bee <i>Apis mellifera</i> (L)		◆		
'Bumble bee' <i>Bombus terrestris</i> (L)		◆	◆	
A spider <i>Lepthyphantes antroniensis</i> (C)	◆			
A wolf spider <i>Tricca alpigena</i> (C)	◆	◆	◆	
Elm gyalecta <i>Gyalecta ulmi</i> (P)	◆			
Alpine sulphur tresses <i>Alectoria ochroleuca</i> (P)	◆			
A lichen <i>Bellemeria alpina</i> (P)	◆			
A lichen <i>Gyalideopsis scotica</i> (P)	◆			
A lichen <i>Halecania rhypodiza</i> (P)	◆			
A lichen <i>Opegrapha paraxanthodes</i> (P)	◆			
A lichen <i>Cladonia fragilissima</i> (C)	◆			
Upright mountain cladonia <i>Cladonia stricta</i> (C)	◆			
A lichen <i>Pseudephebe minuscula</i> (C)	◆			
Stabler's rustwort <i>Marsupella stableri</i> (P)	◆			
Pointed frostwort <i>Gynomitrium apiculatum</i> (C)	◆			
Hooker's liverwort <i>Haplomitrium hookeri</i> (C)	◆			
A liverwort <i>Herbertus stramineus</i> (C)	◆			
A liverwort <i>Lejeunea lamacerina/Lepidozia pearsonii</i> (C)	◆			
A liverwort <i>Plagiochila carringtonii</i> (C)	◆			
A liverwort <i>Scapania nimbosa</i> (C)	◆			
Newman's lady-fern <i>Athyrium flexile</i> (P)	◆			
Oblong woodsia <i>Woodsia ilvensis</i> (P)	◆			
Icy rock moss <i>Andreaea frigida</i> (P)	◆			
A moss <i>Anoetangium warburgii</i> (C)	◆			
A moss <i>Brachydontium trichodes</i> (C)	◆			
A moss <i>Bryum dixonii</i> (C)	◆			

Alpine copper moss <i>Mielichhoferia mielichhoferia</i> (C)	◆			
A moss <i>Pohlia muyldermansii</i> (C)	◆			
A moss <i>Rhynchostegium alopecuroides/lusitanicum</i> (C)	◆			
Issleri's clubmoss <i>Diphasiastrum issleri</i> (C)		◆		
Blue dew moss <i>Saelania glaucesens</i> (C)	◆			
Hay-scented buckler-fern <i>Dryopteris aemula</i> (C)	◆			
Bog hair grass <i>Deschampia setacea</i> (C)			◆	
Baltic bog moss <i>Sphagnum balticum</i> (P)			◆	
Bog orchid <i>Hammarbya paludosa</i> (C)(L)			◆	◆
Wilson's filmy-fern <i>Hymenophyllum wilsonii</i> (C)	◆			
Alpine woodsia <i>Woodsia alpina</i> (C)	◆			
Alpine sow-thistle <i>Cicerbita alpina</i> (C)	◆			
Alpine fleabane <i>Erigeron borealis</i> (C)	◆			
Alpine gentian <i>Gentiana nivalis</i> (C)	◆			
Purple colt's-foot <i>Homogyne alpina</i> (C)	◆			
Sticky catchfly <i>Lychnis viscaria</i> (C)	◆			
Alpine catchfly <i>Lychnis alpina</i> (C)	◆			
Alpine pearlwort <i>Sagina saginoides</i> (C)	◆			
Tufted saxifrage <i>Saxifraga cespitosa</i> (C)	◆			
Purple saxifrage <i>Saxifraga oppositifolia</i> (C)(L)	◆			
Purple oxytropis <i>Oxytropis halleri</i> (C)	◆			
Blue heath <i>Phyllodoce careulea</i> (C)	◆	◆		
Heath cudweed <i>Gnaphalium sylvaticum</i> (L)		◆		
Whorled caraway <i>Carum verticillatum</i> (C)			◆	
Mountain scurvy-grass <i>Cochlearia micacea</i> (P)	◆			
Twinflower <i>Linnaea borealis</i> (P)(L)	◆	◆		
Juniper <i>Juniperus communis</i> (P)(L)	◆	◆		
Woolly willow <i>Salix lanata</i> (P)	◆			
An agaric fungus <i>Amanita nivalis</i> (C)(L)	◆			
An agaric fungus <i>Galerina anthelia</i> (C)(L)	◆			
An agaric fungus <i>Mycena megaspora</i> (L)			◆	
A cup fungus <i>Sarcoleotia turficola</i> (L)			◆	
A cup fungus <i>Geopora arenosa</i> s.s. (L)	◆			
An agaric fungus <i>Hygrocybe lilacina</i> (L)	◆			
An agaric fungus <i>Lactarius pseudouvidus</i> (C)(L)	◆			
An agaric fungus <i>Russula laccata</i> (norvegica) (C)(L)	◆			
An agaric fungus <i>Russula nana</i> (C)(L)	◆			
A small stalked puffball <i>Tulostoma niveum</i> (P)(L)	◆			
A snowbed slime mould <i>Dianema nivalis</i> (P)(L)	◆			
A snowbed slime mould <i>Diderma lyallii</i> (C)	◆			
A snowbed slime mould <i>Lamproderma atosporum</i> (C)	◆			
A snowbed slime mould <i>Lamproderma carestiae</i> (C)	◆			
A snowbed slime mould <i>Lamproderma cribrarioides</i> (C)	◆			
A snowbed slime mould <i>Lamproderma sauteri</i> (C)	◆			
A snowbed slime mould <i>Lepidoderma carestianum</i> (C)	◆			
A parasitic fungus <i>Exobasidium expansum</i> (C)		◆		