



RANNOCH MOOR, PERTHSHIRE

U	Introduction	
U1	Montane (habitats above the treeline)	1
U2	Upland Heath	15

Go to the mountains and get good tidings.

JOHN MUIR

Tayside Biodiversity Partnership



BIODIVERSITY
THE VARIETY OF LIFE

UPLAND

Tayside is richly blessed with upland habitats straddling as it does the Highland Boundary Fault. Of the habitat types for which Action Plans have been included, the montane habitat encompasses a large area - from the entrance to the Cairngorm Plateau through the Angus Glens in the north-east, to Schiehallion in the west. Schiehallion itself is one of the finest and best known of Scottish mountains, not because of its height (1,083m), but because of its distinctive conical shape. This led to its claim to fame as it was used in the 1770s in experiments to judge the weight of the Earth. During these experiments Charles Hutton also invented contour lines as an aid to surveying the mountain.

The dwarf shrub heaths which make up Tayside's upland heathland contribute 9% to the total Scottish area of this habitat. As they are largely confined to the UK and the western seaboard of Europe, they have international conservation significance. They also encompass a large area within Tayside - from the Angus grouse moors through the Forests of Alyth and Atholl, across the Forest of Clunie and north to the Drummochter Hills.

These habitats support a range of flora and fauna, including Mountain hare, Golden eagle and Red grouse which are very familiar to us as being representative of Scotland in general and Tayside in particular. At the same time the sub-arctic conditions of the montane habitat hosts species not found anywhere else in Britain and in some cases they form very significant percentages of the world population. Alpine gentian, the evocatively-named Blue dew moss, and some lichens and other mosses are amongst those whose only UK site is in Tayside.

It is because of this mix of the exceptional and the commonplace that the Tayside upland habitats are so special and deserving of our best efforts to conserve them. Not only do they provide a local asset much enjoyed on a recreational basis by the people of Tayside, they are also a national asset and are in no small part responsible for attracting the many visitors from both home and abroad who come to enjoy this area's outstanding natural heritage.

The Plans that follow describe in more detail the upland habitats and discuss the threats that they face. A targeted programme of action will ensure their status is not diminished but enhanced so that this natural resource will continue to benefit both wildlife and people for many years to come.

Introduction

Tayside Biodiversity Partnership



BIODIVERSITY
THE VARIETY OF LIFE



LORNE GILL/SNH

BEN LAWERS, PERTSHIRE

DEFINITION

Montane habitats are found in areas above the natural tree level (approximately 600m above sea level). These alpine and sub-alpine areas represent some of the most natural and undisturbed habitats in the UK. The broad habitat supports a wide range of specialist plant and animal communities. The montane zone consists mainly of high plateaux with steep sided corries, rocky cliffs, crags, boulder fields and scree slopes. The vegetation is influenced by factors such as geology, soil type and depth, exposure and snow cover. These montane habitats include moss-heaths, dwarf-shrub heaths, grasslands, flushes, late snow patches, rock ledges and montane willow scrub.

CURRENT STATUS AND EXTENT OF HABITAT

At least 5% of Tayside is made up of montane habitat and this can be found in the north and west of the area. In Tayside 36,000 hectares were classified montane habitat in the Land Cover Scotland survey in 1988. This is likely to be an underestimate if the definition is taken to be all land over 600m. The region's montane habitat represents nearly 15% of the Scottish total; this in turn represents 90% of the British total. It is therefore seen as a key habitat in Tayside, not only because the area holds a significant proportion of the Scottish total, but also because of the number of rare species associated with the habitat.

Perthshire, in particular, has a band of calcareous shists and limestones in a broad swathe stretching from the Breadalbane mountains in the west to Beinn A' Ghlo in the East. This high incidence of calcareous rocks gives rise to a flora which is unusually rich in species for the Highlands of Scotland where mainly acidic rocks and habitats predominate.

Tayside hosts a number of internationally important upland sites such as Ben Lawers, Drummochter Hills, Beinn a' Ghlo and Caenlochan which are important for their overall species diversity, especially the range of rare plant, invertebrate and bird populations.

KEY SITES

Four SSSIs in Tayside have been notified for their important montane habitats and are candidate SACs for their international importance:

Ben Lawers	Caenlochan
Beinn A Ghlo	Drummochter Hills

Other SSSIs notified in Tayside for their montane interests include:

Beinn A' Chuallaich	Glas Tulaichean
Ben Chonzie	Meall Dail Cheallach
Ben Vrackie	Meall Ghaordie
Carn Gorm & Meall Garbh	Meall Reamhar
Cooire Bhachdaidh	Schiehallion
Forest of Clunie	

KEY SPECIES

P = UK Priority species C = UK species of conservation concern

Mammals	Mountain hare	<i>Lepus timidus</i>	C
Birds	Golden plover	<i>Pluvialis apricaria</i>	C
	Golden eagle	<i>Aquila chrysaetos</i>	C
	Dotterel	<i>Charadrius morinellus</i>	C
	Ptarmigan	<i>Lagopus mutus</i>	C
Invertebrates	Mountain ringlet	<i>Erebia epiphron</i>	C
	Northern dart	<i>Xestia alpicola alpina</i>	P
	Broad-bordered white underwing	<i>Anarta melanopa</i>	C
	a money spider	<i>Rhaebothorax paetulus</i>	C
Higher Plants	Woolly willow	<i>Salix lanata</i>	P
	Alpine sow-thistle	<i>Cicerbita alpina</i>	C
	Alpine forget-me-not	<i>Myosotis alpestris</i>	C
	Mountain scurvy-grass	<i>Cochlearia micacea</i>	P
	Alpine catchfly	<i>Lychnis alpina</i>	C
	Alpine gentian	<i>Gentiana nivalis</i>	C
	Alpine fleabane	<i>Erigeron borealis</i>	C
	Alpine pearlwort	<i>Sagina saginoides</i>	C
	Rock speedwell	<i>Veronica fruticans</i>	C
	Dwarf birch	<i>Betula nana</i>	C
	Close-headed alpine sedge	<i>Carex norvegica</i>	C
	Newman's lady-fern	<i>Athyrium flexile</i>	P
	Oblong woodsia	<i>Woodsia ilvensis</i>	P

Montane (habitats above the treeline)

U1

Lower Plants	Blue dew-moss	<i>Saelania glaucescens</i>	C
	Turgid scorpion-moss	<i>Scorpidium turgescens</i>	C
	Vaucher's plait-moss	<i>Hypnum vaucheri</i>	C
	Stabler's rustwort	<i>Marsupella stableri</i>	P
	Rusty alpine psora lichen	<i>Psora rubiformis</i>	C
	Snow caloplaca lichen	<i>Caloplaca nivalis</i>	P
	a lichen	<i>Psora globifera</i>	C
	a lichen	<i>Halecania rhypodiza</i>	P

Case Study

Dun Coillich

(‘the fort of the wood’ or ‘the cock of the wood’)



ANDREW POINTER

The 420 ha. of Dun Coillich, wonderfully described as an unremarkable hill next to a remarkable hill (Schiehallion), is Perthshire’s first attempt at a community led land buy-out.

A charitable trust, the Highland Perthshire Communities Land Trust, was set up to purchase the hill in May 2002 and to engage the wider community in preparing a management plan for the property. Public meetings and community consultation have taken place and there is a growing members list. Few funds remain, however, as the purchase price was raised through local contributions - so all future projects on the site must be self-funded.

Several sub-groups are taking forward specific areas of work. Finance, education, site management, membership and publicity will all be covered, and there is a survey group. One of the Trust’s first tasks is to provide a safe parking area, albeit temporary for the time being, so that people can enjoy the hill.

Equally important is the task to find out not just what is there now, but what was there in the past. So Dun Coillich’s flora and fauna, archaeology and history, as well as its stories and tales, will all be studied and recorded. The community can then plan for the future so that those who come afterwards can measure the effects of what has been done.

Dun Coillich already has a large native pinewood regeneration scheme in place, so vegetation and landscape surveys have been done. Forest Enterprise have also agreed to delay work planned under the Woodland Grant Scheme (WGS) so that the community can carry out base-line surveying to find out what is there first. Their findings will direct the site’s future management and the design of the WGS.

These are exciting times for “an unremarkable hill”. The uniqueness of involving the community in the whole process of land restoration shows that every single individual can play their part in local biodiversity conservation.

NATURE CONSERVATION IMPORTANCE

Montane areas are made up of many types of habitat and support a wide range of plant and animal communities. Less disturbed areas are characterised by a range of near-natural or semi-natural plant communities. These include internationally significant species such as oceanic and southern outliers of arctic-alpine assemblages. Other globally threatened habitats can also be found such as near-natural dwarf-shrub heaths, moss-heath and grasslands. Late-lying snow patches have characteristic bryophyte and lichen communities, while spring flushes, freshwater seepage areas, screes, rock crevices and outcrops provide a range of microhabitats which support specialised plants and animals, including arctic-alpine willows, tall herb communities and other relict arctic-alpine species. This grouping of habitats has a high diversity of plant and animal species. Of particular importance are the relict arctic-alpine species, lower plants and invertebrates, together with important concentrations of endemic species.

The montane communities in Perthshire and Angus are particularly species-rich as a result of the diversity of the underlying geology and the effects of a relatively continental climate which leads to some of the largest areas of snow-lie in Britain. They support a remarkable range of rare and scarce flowering plants, mosses, liverworts, lichens and invertebrates as well as sub-arctic and alpine breeding bird populations. Caenlochan and Ben Lawers support as large a range of nationally rare and montane vascular plants as any other British upland site. A number of European montane habitats are also particularly well represented in Tayside such as alpine calcareous grassland, montane willow scrub, tall herb communities, high altitude flushes, and plant communities of base-rich scree and rock crevices.

NATIONAL BIODIVERSITY CONTEXT

There is a UK Habitat Statement for the Montane habitat. This gives the following conservation direction to Local Biodiversity Action Plans 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, it has been suggested that the impacts of nitrogen deposition on montane communities may become very important in the future.

ECOLOGY AND MANAGEMENT

Surveys on designated sites show that the condition of some montane habitats is deteriorating as a result of grazing and trampling impacts by both deer and sheep. Vegetation communities such as tall herbs and mountain willow scrub are largely restricted to steep and rocky areas which are inaccessible to grazing animals. Some of the more palatable components of other communities such as Heather *Calluna vulgaris* are also becoming suppressed and restricted over large areas as a result of too much grazing pressure. These are being replaced by less palatable, more grazing-tolerant *Vaccinium* species such as Cowberry and Blaeberry and Mat grass *Nardus stricta*.

Tayside Biodiversity Partnership



Montane (habitats above the treeline)

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Several of the rare plant populations are known to be hanging on in dangerously low numbers. Suitable re-introduction sites have been found for some species, including Alpine sowthistle *Cicerbita alpina*. Others, including the Alpine catchfly *Lychnis alpina*, have good-sized stable populations.

Golden eagle *Aquila chrysaetos* and Dotterel *Charadrius morinellus* (both Annex I species in the EC Birds Directive) are well recorded and appear to be reasonably stable in numbers. Golden plover *Pluvialis apricaria* are less well recorded.

Golden Eagle

Britain has an international responsibility to protect its population of Golden eagles. Scotland has 420 pairs of these magnificent raptors.

They are long-lived birds, not beginning to breed until five years old and then only rearing one young per year.

Each pair has a home range of anything between 3,250 ha. and 7,300 ha. over which they hunt. Much of the eagle's food is carrion, although it will feed on mammals and birds.



LAURIE CAMPBELL

CURRENT FACTORS CAUSING LOSS OR DECLINE

Poor soils and extreme climate conditions make montane areas unsuitable for forestry or intensive agriculture. However, the shallow soils, restricted growing season and the fragmented distribution of the more vulnerable habitats and species render montane areas especially vulnerable to the following impacts:

Overgrazing by Deer and Sheep

The red deer population has almost doubled in the last forty years and it has been estimated that the Scottish population is in the region of 300,000. Parts of Tayside have some of the highest deer concentrations of anywhere in Scotland – winter densities have been recorded in the Cairngorms as high as 150 per km². This is despite concerted efforts by some estates to reduce numbers.

Sheep concentrations have also been traditionally high in hillfarm areas as a result of headage payment agricultural incentives. Although the incentive system has now changed, the legacy of high grazing levels of both deer and sheep over several decades has left montane habitats such as dwarf shrub heath, willow scrub, herb-rich vegetation and moss-heath fragmented and in a seriously degraded state. Grazing-tolerant species such as Mat grass and Blaeberry have taken over as the major components in large areas of montane habitat. This has also reduced the grazing value of the area for these animals.

Trampling damage is also becoming a serious threat to some habitats such as blanket bog, plants of high altitude water seepage areas and sub-alpine calcareous grassland (all of which are Annex I habitats in the EC Habitats Directive). This has shown a sharp increase in recent years in parts of Tayside as a result of increasingly large herds of deer becoming ever more mobile, possibly due to increased stalking pressure and restriction of deer range. Hill vehicles used for sheep and deer management, unless used carefully, can cause localised damage to wet areas and peaty areas.

Increased erosion in the form of slumping of soil and vegetation from steep slopes, as well as an increase in peat hags and bare ground are all visible in some areas. Trampling of ground-nesting bird nests and chicks by sheep and deer is also a potential problem. In some cases, trampling of Dotterel nests can reach 25% of all nests in some years at sites with high deer numbers; sheep can also destroy similar proportions of nests when they reach high density such as those observed at some sites in Tayside.

Fragmentation of Habitat

The resulting loss and fragmentation of some montane habitats as a result of long-term overgrazing gives rise to particular problems for some of the rarer plants. Some populations of mountain willows, for example, are now so small and dispersed, clinging to inaccessible ledges out of reach of browsing animals, that they have been reduced to one or two individuals in a number of places. If these individuals are of the same sex then the population can no longer regenerate naturally and they are often particularly susceptible to landslide or damage from rockfall. There are a number of other rare plants associated with montane habitats in a similarly precarious situation, threatened in the longer term with extinction from Scotland if resources are not made available for seed collection, propagation and re-introduction to suitable protected areas.



LORNE GILL/SNH

Mountain willow scrub is now largely restricted to steep and rocky areas which are inaccessible to grazing animals.

Muirburn

Poorly managed muirburn followed by heavy grazing will result in the loss of dwarf shrubs and can lead to a transition to grassland. It can also cause long-term damage to the soil and vegetation, allowing bracken to colonise. Erosion and sedimentation of watercourses may also occur.

Increasing Recreational Use

Numbers of hillwalkers, climbers and off-piste skiers are increasing and can cause localised damage to fragile vegetation and soils. The most likely places where this might cause a problem is where paths cross wet boggy areas or traverse just below cliffs where calcareous grassland and tall herb vegetation are growing. On the summits of hills paths may become indistinct and recreation use more dispersed, but where damage to the fragile vegetation and soils occurs it can take many years to recover. This kind of impact is generally very localised, the scale of the damage is insignificant and path management techniques can be used to ensure that erosion does not escalate.

Hillwalkers may indirectly cause a degree of damage to vegetation by unintentionally causing large herds of deer to move around the hillside more frequently. At current deer densities this can cause trampling to vegetation and soils. Occasionally recreational users may disturb deer during a stalk, but estates provide information through seasonal signage or the Hillphones Scheme to help minimise these occurrences.

Visitors and their dogs can also potentially cause disturbance to ground nesting birds adjacent to popular routes in montane areas. Dotterel, Golden plover and Dunlin *Calidris alpina* are all vulnerable to disturbance from their nests which may give predators an opportunity to take eggs or young. Dogs off lead increase the disturbance potential considerably. There is also a small risk of direct trampling of eggs or young, especially for Dotterel which nest on the open summit plateau where walkers are more likely to wander about off any defined path. Studies to date, however, have found no significant detrimental effect of hillwalkers on Dotterel, even on a very heavily visited site. Nevertheless, the birds' response to human disturbance varies from site to site and so visitors should endeavour to stay on paths wherever possible and keep their dogs under close control, preferably on a leash. Such assistance also tends to restrict any damage to the vegetation to a very limited area. Visitors should be encouraged to remove any litter and not to feed birds such as Black-headed gulls *Larus ridibundus* as the latter can also potentially take other birds' eggs.

Montane (habitats above the treeline)

U1

Dotterel

The female of this elusive wader species is unusually more intensely coloured than the male. Although their plumage is very striking, they are superbly camouflaged against the montane background. The female also takes the lead in display and rarely incubates the eggs nor looks after the young.



SEPA

Climate change and pollution

The montane areas of Scotland are particularly vulnerable to the effects of climate change. By the 2050s the mean annual temperature is expected to rise by about 1.7 degrees centigrade. This is likely to have profound effects on many montane species which will be unable to colonise other suitable areas where there is less competition. It will also lead to changes in the distribution and abundance of species, including invertebrates, some of which – the Heather Beetle for instance, which is a pest species - may over proliferate to the detriment of other species. Changes in vegetation composition and structure may also occur which may cause the loss of many of our rare alpine plants.

Acidification as a result of atmospheric deposition of sulphur and nitrogen compounds may alter the natural nutrient levels in the soil and profoundly affect the composition and structure of vegetation communities.

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Lack of Information and Knowledge

There is a lack of up to date information on the quality and management of a lot of montane areas in Tayside. There is also a lack of basic information on the ecology of many species associated with montane habitats, especially lower plants and invertebrates.

Some montane habitats are of great importance for biodiversity, but often get undervalued because there is low public awareness of the complexities of this environment and the issues affecting it.

The requirements of all key Biodiversity Action Plan (BAP) species dependent upon montane areas should be considered when reviewing or negotiating changes to land management support systems. Land managers and local advisors also need impartial advice and information on all key BAP montane habitats and species in the area to enable them to manage land for the benefit of wildlife.

MAIN THREATS TO KEY SPECIES

Mountain Hare	Conversion of heather moorland to rough grassland as a result of overgrazing Sport shooting and control by gamekeepers	
	UK Importance of Tayside population:	high
Golden Plover	Predation of eggs and young by foxes, crows and dogs Increased trampling by deer and people	
	UK Importance of Tayside population:	small

U1 Montane (habitats above the treeline)

Dotterel	Predation of eggs and young by foxes, crows and dogs Increased trampling by deer and people	
	UK Importance of Tayside population:	high
Golden Eagle	Localised persecution by gamekeepers Illegal collection of eggs	
	UK Importance of Tayside population:	moderate
Ptarmigan	Predation of eggs and young by foxes, crows and dogs Increased trampling by deer and people	
	UK Importance of Tayside population:	high
Mountain Ringlet	No obvious threats - population fluctuates widely from natural causes.	
	UK Importance of Tayside population:	high
Alpine sowthistle	Grazing pressure from deer and sheep Small populations with little genetic diversity reducing chances of natural regeneration	
	UK Importance of Tayside population:	high
Alpine forget-me-not	Grazing pressure from deer and sheep	
	UK Importance of Tayside population:	high
Alpine catchfly	No obvious threats	
	UK Importance of Tayside population:	high - the Tayside site hosts 99% of UK population
Alpine fleabane	Grazing pressure from deer and sheep	
	UK Importance of Tayside population:	high - all UK sites are within Tayside
Alpine gentian	While some grazing is essential, too much grazing and trampling by deer and sheep can be deleterious	
	UK Importance of Tayside population:	high - all UK populations are in Tayside
Alpine pearlwort	Little known about potential threats	
	UK Importance of Tayside population:	high
Blue heath	Little known about potential threats, but numbers appear to be declining	
	UK Importance of Tayside population:	high
Close-headed alpine sedge	Little known about potential threats	
	UK Importance of Tayside population:	high
Blue dew moss	Little known about potential threats but numbers appear to be declining.	
	UK Importance of Tayside population:	high - all UK sites are in Tayside
Hair silk moss	May now be extinct in UK. Further survey work required.	
	UK Importance of Tayside population:	high - both UK records are from Tayside

Montane (habitats above the treeline)

U1

Large yellow feather-moss	Little known about potential threats	
	UK Importance of Tayside population:	high - only known UK site is in Tayside
Vaucher's feather-moss	Little known about potential threats	
	UK Importance of Tayside population:	high - only UK sites are in Tayside
Rusty alpine psora	Little known about potential threats	
	UK Importance of Tayside population:	high - only known UK site is in Tayside
Psora globifera (lichen)	Little known about potential threats	
	UK Importance of Tayside population:	high - only known UK site is in Tayside

The following species all have their own UK Species Action Plan:

Woolly willow	<i>Salix lanata</i>
Mountain scurvy-grass	<i>Cochlearia micacea</i>
Oblong woodsia	<i>Woodsia ilvensis</i>
Newman's lady-fern	<i>Athyrium flexile</i>
Lichen	<i>Halecania rhypodiza</i>
Snow caloplaca	<i>Caloplaca nivalis</i>

Their Plan's main objectives are:

- To monitor known sites for impacts from land management;
- To reverse decline in populations and ensure all existing populations are successfully regenerating;
- To attempt re-introductions to former sites where suitable habitat still occurs.

OPPORTUNITIES AND CURRENT ACTION

Neighbouring Local Habitat Action Plans

About half of montane Tayside is also included within the Cairngorms Partnership area. The Cairngorms Partnership have produced a Strategy for The High Hills (included in their Work Plan 1999-2001) 'Biodiversity of the Cairngorms – An Assessment of Priority Habitats and Species' and a Montane Action Plan. The Tayside Biodiversity Partnership will work in conjunction with the Cairngorms Partnership to raise awareness of major issues affecting the montane habitat.

The following key Biodiversity Action Plan issues were identified:

- Lack of data/important information;
- Awareness raising;
- Access to appropriate policy and funding sources;
- Direct habitat loss and fragmentation;
- Inappropriate management;
- Climate change and pollution;
- Non-native/alien animal and plant species.

The four main objectives are:

- Quantify the distribution, area and ecological status/importance of montane habitats in the Cairngorms;
- Ensure no net loss in the overall area of montane habitats in the Cairngorms;
- Ensure good ecological status/quality of key montane habitats in the Cairngorms;
- Ensure no net loss in the key biodiversity associated with Cairngorms montane habitats.

There are also a number of other Tayside Habitat Action Plans with links to this one. Reference should be made in particular to the Upland Heath Action Plan which has many interests in common and the Calcareous Grassland Action Plan which includes two particularly relevant proposed actions:

- To achieve the UK HAP target of favourable condition for at least 75% of calcareous grassland by favourable management;
- To monitor the condition of calcareous grasslands within SSSIs and SACs and also sites managed under agri-environment schemes.

Designated sites

Most montane areas of high biodiversity interest in Tayside are within designated sites - SSSIs, cSACs, SPAs and NNRs. All these sites have management plans drawn up by SNH and are implemented through voluntary agreement with landowners and tenants. This offers scope for some enhancement and protection. However, as deer numbers are perhaps the key factor affecting montane biodiversity, the protective effect is very limited because deer are wild animals and their management does not normally require consent from SNH. It is also difficult to control deer numbers on individual sites without widespread co-operation with neighbouring estates. Regular survey and monitoring of important habitats and species is carried out on designated sites on a six-yearly cycle through SNH's programme of site condition monitoring.

SNH have a Cairngorms Monitoring Programme which includes montane birds, montane habitats in relation to human trampling and grazing, recreation and red deer numbers and distribution.

Deer management

The Deer Commission for Scotland have produced a vision document and 'Collaborative Deer Management - Guidelines for a Deer Management Plan'. Their rationale for deer management is 'to manage populations of all species of deer at levels and in ways which will enable the achievement of sustainable land-use objectives' (land use objectives include agriculture, forestry and natural heritage interests).

Some local Deer Management Groups, in partnership with the Deer Commission for Scotland and SNH, have commissioned Habitat Impact Assessments for their area. Many of the Deer Management sub-groups are also drafting Deer Management Plans for their area, using the DCS guidelines. These should address issues relating to biodiversity and promote action towards a more sustainable deer population.

Sheep grazing

The Rural Stewardship Scheme allows for more sympathetic management of stock in upland areas.

Current action:

SNH's Natural Heritage Zone prospectus for Cairngorms (Zone 11), Angus Glens (Zone 12) and Breadalbane (Zone 15) include priority actions for the montane area.

The Montane Scrub Action Group have organised conferences and contributed existing knowledge and experience to promote montane scrub regeneration. Highland Birchwoods, in collaboration with others, produced 'Montane Scrub', a publication achieved through the Montane Scrub Restoration Project.

The National Trust for Scotland, also in partnership with others, attracted EU LIFE funding and produced 'Grazing Management Planning for Upland Natura 2000 Sites - A Practical Manual'.

The National Trust for Scotland has also pioneered methods of regenerating montane willows and other rare plants at Ben Lawers.

SNH have an enclosure at Caenlochan NNR to help regenerate montane scrub and tall herb vegetation.

The Tayside Raptor Study Group carry out detailed monitoring of upland birds of prey across the area.

Montane (habitats above the treeline)

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OBJECTIVES

Objectives	
1	To reduce grazing and trampling pressure from red deer to a level where most montane habitats are in favourable condition.
2	To reduce levels of sheep grazing in key areas to allow improvement in habitat condition.
3	To prevent further loss and fragmentation of rarer montane habitats such as willow scrub and tall herb communities and their associated rare species, and to work towards re-establishing these areas as viable populations regenerating successfully.
4	To identify particularly sensitive areas to recreational pressures and take steps to reduce disturbance/damage by re-routing paths or raising awareness and encouraging responsible behaviour.
5	To raise awareness among all those involved in management of upland areas or using them for recreational purposes of the value of these areas in terms of biodiversity and of best practice management and use.
6	To carry out survey of extent, quality and management regimes of all key areas of montane habitat interest.

Stakeholders

- Landowners, land managers and advisors; local Deer Management Groups and Deer Commission for Scotland; local Tourist Boards and visitors; local users.

ACTION FOR BIODIVERSITY

Action - Montane		Deliverers		To take place by	Meets Objective No.
		Lead Partners	Partners	02 03 04 05 06 07 11 16	
LBAP Ref.	A	Policy and legislation			
UI	1	Ensure that all policies of all partners will result in no further deterioration in quality or area of montane habitats and species.	SNH PKC AC DCS		# # # # # # # # #
UI	2	Ensure that all designated sites within the montane zone are protected from inappropriate development that would endanger montane habitats or species through Local Plans and Structure Plans.	PKC AC	SNH	# # # # # # # # #
	B	Site safeguard and management			
UI	1	Develop and implement Deer Management Plans in all sub-areas of Deer Management Groups following DCS Guidelines.	EGDMG WGDMG West Rannoch East Glen Lyon	DCS SNH FC RSPB all other local interested individuals	# # # # # # # # #
UI	2	Help achieve UK HAP target of favourable condition for at least 75% of calcareous grassland by approving favourable management under agri-environment schemes (see Calcareous Grassland HAP).	SNH	SAC FWAG SWT SEERAD	#

U1 Montane (habitats above the treeline)

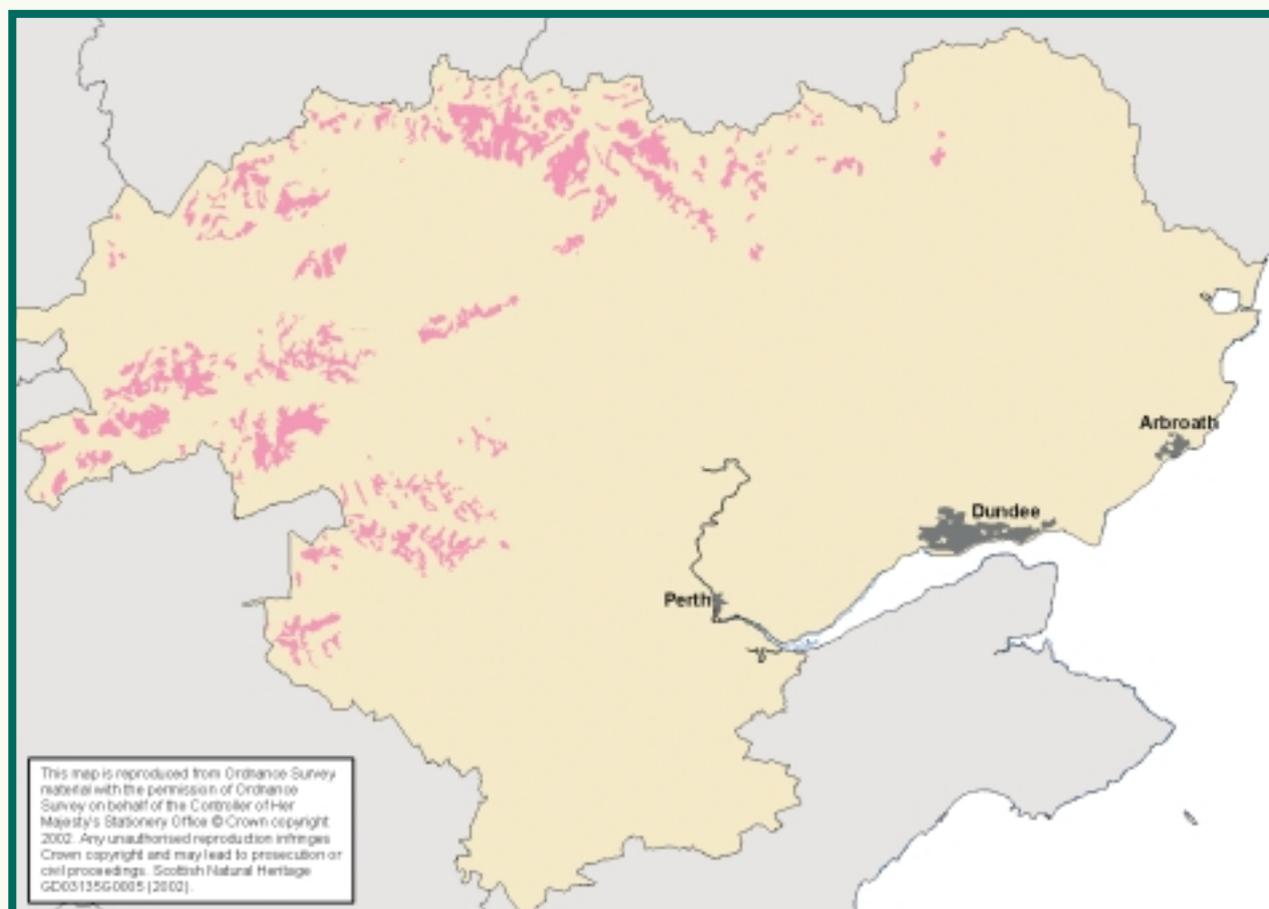
UI	3	Identify lengths of eroded path or badly routed paths or hill vehicle tracks where damage is occurring to key habitats and species and carry out path repairs/re-route to minimise damage.	SNH	PKC AC	#	
C Species management and protection						
UI	1	Implement proposed actions in Species Action Plans for priority species, and other rare or threatened species where opportunities arise, including propagation and re-introductions.	SNH	NTS	# # # # # # # #	
D Advisory						
UI	1	Encourage landowners and tenants to apply for RSS to get sheep numbers in balance with requirement of the habitat.	SAC FWAG		# # # # # # # # #	
UI	2	Encourage shepherds to prevent sheep straying onto key Natura habitats on designated sites.	SNH	FWAG SAC SEERAD	# # # # # # # # #	
UI	3	Promote the dissemination and uptake of the advice and recommendations in the updated Muirburn Code with land managers.	SAC FWAG		# # # # # # # # #	
E Research and monitoring						
UI	1	Undertake rapid habitat assessments, as developed by DCS, SNH and MLURI, to give an indication of the quality of montane habitats throughout Tayside.	DMGs	DCS SNH	# # #	
UI	2	Monitor the condition of notified montane habitats and species within SSSIs and SACs.	SNH		# # # # # # # # #	
UI	3	Continue research at Ben Lawers and Caenlochan NNRs to develop methods of regeneration and expansion of relict populations of arctic/alpine plants.	SNH NTS		# # # # # # # # #	
F Promotion and awareness-raising						
UI	1	Promote awareness in recreational users of the potential impact that they and their dogs can have on montane species – e.g. promote strict control of dogs.	Perthshire Tourist Board Angus & Dundee Tourist Board	TBP ATB AC PKC (Rangers)	# # # # # # # #	
UI	2	Encourage research into ecology and management requirements of rare and threatened species.	SNH	NTS AGRS Universities	# # # # # # # #	
UI	3	Raise awareness of the biodiversity value of upland areas and best practice management among all those involved in its management. Work in association with the Cairngorm Biodiversity Partnership where appropriate.	TBP CBP	FWAG SAC SLF DMGs SNH SEERAD	# # # # # # # #	
UI	4	Monitor and review this plan – ensure this Plan is being delivered annually and in detail after 5 years.	TBP		# # # # # # # # #	

Montane (habitats above the treeline)

U1

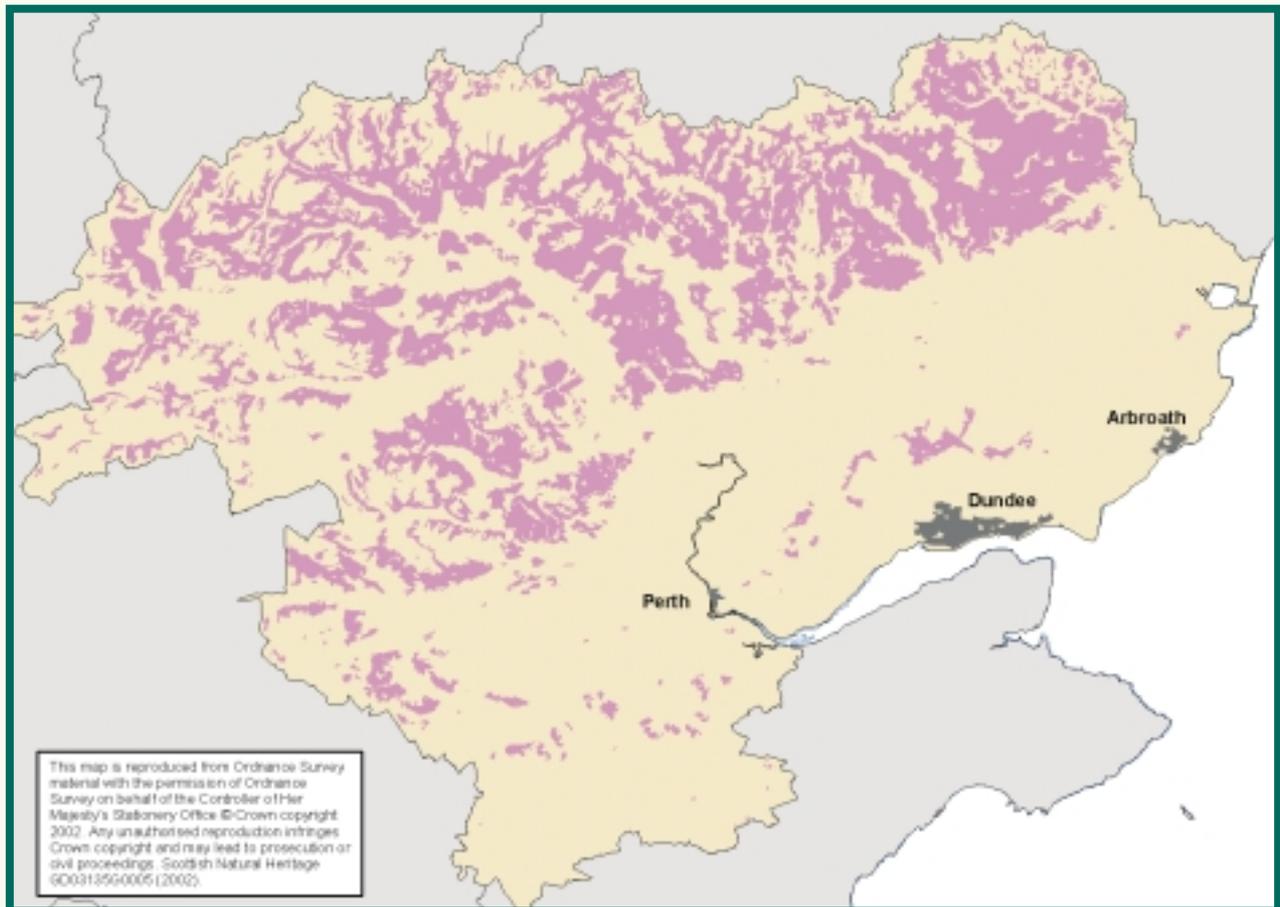
Montane

This illustrative map shows a few key examples of the habitat. Please note that many sites of interest are privately owned and owners' permission should be sought for any access.



Upland Heath

This illustrative map shows a few key examples of the habitat. Please note that many sites of interest are privately owned and owners' permission should be sought for any access.





NEAR SCHIEHALLION, PERTHSHIRE

DEFINITION

Upland heath lies below the montane zone (which begins above the potential woodland limit at c.600m) and above the upper edge of enclosed agricultural land, usually around 300 - 400 metres, but descending to near sea level in north western Scotland. Upland heather moorland is usually found in areas with over 100 cm of precipitation per annum and where nutrient poor acid soils are composed of peaty podsols or shallow peat. Variation in the vegetation communities is broadly linked to climate, but is also linked to factors such as altitude, aspect, slope, maritime influences and management practices, including grazing pressure and burning regimes. This habitat is often found in mosaics with acid and neutral grasslands.

Upland Heath is generally dominated by dwarf shrubs, for example Ling heather *Calluna vulgaris*. Mixtures of Cross-leaved heath *Erica tetralix*, Purple moor grass *Molinia caerulea*, and Sphagnum bog mosses may dominate other communities, particularly in the wetter north and west of the country. Of the 3.7 million hectares of upland dwarf shrub habitat in the UK, 1.6 million ha. are of less than 50% heather dominance. Upland heath contains mosaics of dry heath, wet heath and blanket bog.

CURRENT STATUS AND EXTENT OF HABITAT

At the last estimate heather moorland as a single feature was, at 94,500 ha., by far the most extensive single upland habitat in Tayside and represented some 12% of the whole area. A further 128,800 ha. of heather moorland also occurred in mosaics with peatland, rough grassland and montane habitats, with Heather being the primary feature over 75% of this mosaic area. This total area of 223,300 ha. represents some 9% of the total Scottish area of upland heath and some 5% of the UK figure.

In the forty years prior to 1988, however, the area of heather moorland in Tayside had actually declined by 35% and further significant losses in both area and quality will certainly have occurred since then. These losses are likely to be reflected across all upland heath types and mosaics.

KEY SITES

Forest of Clunie (SSSI SPA) and neighbouring areas.
 Drummochter Hills (SSSI SPA)
 Angus Glens Grouse Moors
 Strathbraan Glenqueich and Logiealmond Grouse Moors
 Kynachan, Strathtummel
 Forest of Atholl
 Forest of Alyth

NATURE CONSERVATION IMPORTANCE

The dwarf shrub heaths which make up upland heathland have international conservation significance and are largely confined to the British Isles and the western seaboard of Europe. In Tayside upland heath is mainly dominated by Heather but is characterised also by dwarf shrubs such as Crowberry *Empetrium nigrum* and Blaeberry *Vaccinium myrtillus*, together with grasses such as Mat grass *Nardus stricta* and Sheep's fescue *Festuca ovina*. These heaths are derived from former woodland and scrub with dwarf shrub-rich ground flora. This ground flora has survived the removal of the trees and under low intensity land use and management continues to provide a refuge for the associated species of the original woodland ground layer. Thus woodland plants such as Wood anemone *Anemone nemorosa* can still be seen over wide areas of moorland. Significant areas of upland heath have been converted to rough grassland and to woodland, both native and exotic.

In Tayside, as elsewhere, upland heath is prime habitat for an important suite of birds including Black grouse *Tetrao tetrix*, Red grouse *Lagopus lagopus*, Twite *Carduelis flavirostris*, Golden plover *Pluvialis apricaria* and Ring ouzel *Turdus torquatus* as well as the more wide-ranging species such as Hen harrier *Circus cyaneus* and Merlin *Falco columbarius*. Some areas of upland heath are very rich in bryophytes and lichen communities.

Upland watercourses can provide a valuable refuge for Water voles *Arvicola terrestris* if Mink *Lutreola vison* are not present. The Scottish population of Water vole declined an alarming 85% between 1990 and 1998.

Ring Ouzel *Turdus torquatus*

The Ring Ouzel is the only thrush that is a summer visitor to Britain. Its upland breeding habit has earned it the alternative name of 'mountain blackbird'; its behaviour is certainly similar to its lowland cousin. Its loud piping song is audible over very long distances.



Upland Heath

U2

KEY SPECIES

P = UK Priority species C = UK species of conservation concern

Mammals	Mountain hare	<i>Lepus timidus</i>	C
	Wild cat	<i>Felis silvestris</i>	C
Birds	Black grouse	<i>Tetrao tetrix</i>	P
	Red grouse	<i>Lagopus lagopus</i>	C
	Hen harrier	<i>Circus cyaneus</i>	C
	Merlin	<i>Falco columbarius</i>	C
	Ring ouzel	<i>Turdus torquatus</i>	C
	Twite	<i>Carduelis flavirostris</i>	C
	Golden plover	<i>Pluvialis apricaria</i>	C
	Golden eagle	<i>Aquila chrysaetos</i>	C
	Curlew	<i>Numenius arquata</i>	C
	Short-eared owl	<i>Asio flammeus</i>	C
	Peregrine falcon	<i>Falco peregrinus</i>	C
	Stonechat	<i>Saxicola torquata</i>	C
Amphibians and Reptiles	Adder	<i>vipera berus</i>	C
Invertebrates	a mason bee	<i>Osmia inermis</i>	P
	Northern brown argus	<i>Aricia artaxerxes</i>	P
	Mountain ringlet	<i>Erebia epiphron</i>	C
	Pearl-bordered fritillary	<i>Boloria euphrosyne</i>	P
	Grey scalloped bar	<i>Dyscia fagaria</i>	C
	Northern arches	<i>Apamea zeta</i>	C
	Rannoch brindled beauty	<i>Lycia lapponaria</i>	C
	Slender striped rufous	<i>Coenocalpe lapidata</i>	C
	Broom-tip moth	<i>Chesias rufata</i>	C
	Small dark yellow underwing	<i>Anarta cordigera</i>	C
	Large heath	<i>Coenonympha tullia</i>	P
	Narrow-headed wood ant	<i>Formica exsecta</i>	
Plants	Juniper	<i>Juniperus communis</i>	P
	Heath cudweed	<i>Gnaphalium sylvaticum</i>	C
	Marsh clubmoss	<i>Lycopodiella inundata</i>	P
	Issleri's clubmoss	<i>Diphasiastrum issleri</i>	C

NATIONAL BIODIVERSITY CONTEXT

There is a UK Broad Habitat Statement for upland heathland. This gives the following conservation direction:

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.

Tayside Biodiversity Partnership



BIODIVERSITY
THE VARIETY OF LIFE

Measures, identified on a UK basis to be considered further include:

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

CURRENT FACTORS CAUSING LOSS OR DECLINE

Four main activities impact on upland heath in Tayside. All are closely linked and play essential and complementary roles in determining and maintaining the area, quality and diversity of upland heath. The key factor is their balance and integration.

Agriculture

Stock grazing, largely by sheep, is necessary to prevent woodland regeneration and thereby to maintain upland heath. Excessive grazing, especially in winter, when accompanied by excessive burning leads to conversion of dwarf shrub heath to rough grassland. In some areas grazing and burning pressures have increased owing to higher overall stocking rates encouraged by production incentives. Most heavy grazing in Tayside has resulted from long term shifts away from hefted blackface flocks which distributed grazing pressure across an entire holding to more intensive systems using less hardy crosses in which flocks are concentrated onto more accessible areas. This has focused grazing trampling and burning onto lower moorland where large areas have been converted to rough grassland or where Heather has been badly suppressed. Remoter areas within holdings with correspondingly lower agricultural use are left unmanaged and may suffer increased deer pressure or conversion to woodland.

Grouse Shooting and Muirburn

Traditional management for Red grouse involves burning Heather on a rotation of 8 - 10 years in small strip fires distributed evenly across an entire holding. This regime, when balanced with well-distributed grazing produces an intimate mix of different age classes of Heather which, together with other features such as wet flushes, is necessary for commercial grouse production. Coupled with poorly managed and poorly distributed muirburn practices and frequent large scale fires on the moorland edge, such a rotation is too short to create optimum conditions for many key plant and bird species of upland heath.

The biodiversity value of intensive grouse moors, can in some cases, also be compromised by the persecution of key predator species such as the Hen harrier. Much upland heath supports less intensive or non-commercial grouse shooting with a good range of key species. The two approaches are complementary in biodiversity terms.

Grouse shooting is currently the main economic and cultural incentive for the conservation and management of upland heath in Tayside. Because of the investment required in habitat management and legal predator control, however, its commercial importance has declined over wide areas in relation to intensive sheep farming and forestry with the resulting long-term decline in habitat area and quality.

Forestry and Woodlands

Since the 1970s large areas of upland heath in Tayside have been converted to either exotic or new native woodlands in response to attractive incentives and a decline in grouse shooting. The scale and location of some of these woodlands have fragmented quite large areas of upland heath, compromising the management of the surviving fragments both for commercial grouse and for key species. Many woods also have sharply-defined edges and are surrounded by deer fencing. This adversely affects key species such as Black grouse which need a gradual transition from woodland to heath. These woodlands represent not only a loss of heathland area, but also a wider and more serious loss of heathland quality.

Recent new woodlands have been much better integrated with adjacent habitats through greater attention to site, scale, species and design. Many of these new woodlands have also integrated commercial objectives by balancing exotic conifers with native species, whilst many older commercial woodlands are being restructured under the Woodland Grant Scheme for greater integration. Collisions with deer fences cause considerable mortality amongst such species as Black grouse so any new deer fencing must now be justified in applications for the Woodland Grant Scheme. Where fences are considered necessary to protect young woodland from deer, but are also in sensitive areas for Black grouse, they must be clearly marked in an acceptable manner to reduce collision rates.

Black Grouse

At dawn, throughout much of the year, male Black Grouse gather at favoured sites (leks) to display. They engage in mock fights, raising their lyre-shaped tails and inflating their blue necks. Invariably, but not always, they are watched by the grey/brown females.



RSPB

Red Deer

A long-term increase in Red deer numbers in Tayside has led to some localised heavy grazing within the traditional Red deer range. The extent of this is unclear. There has also been a long-term expansion of the Red deer range which has impacted on important areas of upland heath on the lower fringes of the Grampians, particularly in winter. The expansion appears to have been driven by deer population pressure, expansion of forestry onto traditional wintering areas and the vacuum left in many areas by the removal of hefted sheep flocks.

MAIN THREATS TO KEY SPECIES

Water Vole	Loss and fragmentation of habitats Disturbance of riparian habitats Pollution of watercourses and poisoning by rodenticides	
	UK Importance of Tayside population:	moderate
Black Grouse	Inappropriate grazing removes key food plants such as blaeberry, heath and birch scrub Poor muirburn practices Habitat fragmentation leads to isolated populations Collisions with deer fences Loss of under-storey food plants in mature conifer plantations	
	UK Importance of Tayside population:	high

Red Grouse	Loss of habitat and fragmentation to grassland or conifer woodland	
	UK Importance of Tayside population:	moderate
Merlin	Afforestation on grouse moors	
	UK Importance of Tayside population:	moderate
Hen Harrier	Deliberate and illegal persecution on grouse moors	
	UK Importance of Tayside population:	moderate
Ring Ouzel	Threats not properly understood	
	UK Importance of Tayside population:	high
Mason Bee	Loss of herb-rich upland grasslands or moorland with short swards Inappropriate grazing regimes, including cessation of grazing or grouse-moor management Direct loss of habitat owing to afforestation Climate change	
	UK Importance of Tayside population:	high – restricted to one site in Tayside (only other site known in the UK)
Netted Mountain (a moth)	Inappropriate moorland management, including neglect Poor muirburn practices Over-grazing	
	UK Importance of Tayside population:	high
Mountain ringlet (a butterfly)	Inappropriate grazing regimes (both over-grazing and under-grazing can cause problems to habitat) Climate change Inappropriately sited new woodlands	
	UK Importance of Tayside population:	moderate
Large Heath (a butterfly)	Inappropriate grazing regimes (both over-grazing and under-grazing can cause problems to habitat) Site drainage for agricultural improvement or new woodlands Direct habitat loss through peat extraction	
	UK Importance of Tayside population:	moderate
Marsh Clubmoss	Habitat loss, including drainage or improvements to unmade trackways Cessation of traditional management practices, including grazing Climate change and atmospheric pollution Inappropriately sited new woodlands	
	UK Importance of Tayside population:	moderate
Juniper	Excessive grazing (which prevents establishment of young bushes) Insufficient grazing which reduces area suitable to juniper regeneration or allows other tree species to out-shade new growth Direct clearance of stands Excessive burning which may destroy both mature bushes and regeneration	
	UK Importance of Tayside population:	moderate

OPPORTUNITIES AND CURRENT ACTION

Upland heath is unique among major terrestrial habitats in having no obvious dedicated public funding mechanism. Outwith designated sites positive management is almost entirely dependent on funding by private sporting owners whose activities make public support problematic.

- Rural Stewardship Scheme - incentives for sympathetic management of stock. Overall budget too low to outweigh effects of mainstream supports.
- SSSI and SPA designations of key heathland areas like the Forest of Clunie with supporting management incentives and monitoring.
- Cairngorms Partnership Board lottery bid for moorland demonstration sites.
- Woodland Grant Scheme - incentives and constraints which integrate woodland with upland heath.
- SNH conservation grants for both designated and non-designated sites, especially the Community Grant Scheme and the new Natural Care programme.
- Development of demonstration moors on SSSIs and within Cairngorm Partnership Area with European and other support.
- Moorland Working Group - national partnership of statutory agencies, conservation, landowning and sporting bodies to promote effective and legal management of grouse moors.
- Tayside Indicative Forestry Strategy - provides for planned woodland expansion based on criteria which includes conservation of upland heath (to be revised).
- Independent Study Groups, including the Raptor Study Group and the Black Grouse Study Group monitor key species and indicator species across the area.

Opportunities taken for promoting and developing good montane and moorland practice for biodiversity may increase appropriate tourism and recreation and foster a greater understanding of the role of traditional and appropriate management in shaping the surrounding landscape.

OBJECTIVES AND TARGETS

Objectives		Targets
1	Ensure the quality of important upland heathland habitat in Tayside is retained and improved.	No net loss in area of good quality upland heath habitat by 2010 Restoration or improvement of 20,000 ha. of upland heath by 2010
2	Determine the condition of key upland heath habitats in Tayside by 2006	Complete survey of condition of key upland heath habitats by 2006
3	Set up programme to raise awareness of contribution of upland heath to biodiversity, particularly regarding provision of dedicated management incentives.	Set up awareness programme by 2003.

Stakeholders

- Landowners, land managers and advisors, statutory bodies and local authorities, Deer Commission for Scotland, tourists and local users, members of the public.

ACTION FOR BIODIVERSITY

		Action - Upland Heath	Deliverers		To take place by								Meets Objective No.
			Lead Partners	Partners	02	03	04	05	06	07	11	16	
LBAP Ref.	A	Policy and legislation											
U2	1	Ensure that the policies of all Partners do not result in deterioration of the quality of upland heath.	SNH	TBP	#	#	#	#	#	#	#	#	
U2	2	Ensure that local authorities are fully aware of the biodiversity importance of upland heath and of identifiable habitat trends.	PKC AC SNH	TBP	#	#	#	#	#	#	#	#	
U2	3	Ensure that these habitat trends are fully considered in Structure, Local and Subject Plans, particularly any revision to the Indicative Forestry Strategy.	PKC AC SNH	TBP	#	#	#	#	#	#	#	#	
	B	Site safeguard and management											
U2	1	Ensure no net loss of area of upland heath on designated sites of national or international importance by 2010.	SNH	FC RSPB								#	
U2	2	Improve quality of upland heath on designated sites by implementing and developing Natural Care incentives by 2010.	SNH		#	#	#	#	#	#	#	#	
U2	3	Promote upland heath as a priority habitat under the Rural Stewardship Scheme where appropriate.	FWAG SAC RSPB		#	#	#	#	#	#	#	#	
U2	4	Promote restructuring of woodlands under Woodland Grant Scheme to integrate with the upland heath.	FC	SNH RSPB	#	#	#	#	#	#	#	#	
U2	5	Prioritise management actions on sites following survey/audit.	SNH	RSPB FC	#	#	#	#	#	#	#	#	
U2	6	Develop and implement Deer Management Plans in all sub areas of Deer Management Groups, following DCS Guidelines and ensuring that they fully consider targets and actions for upland heath.	Deer Commission for Scotland		#	#	#	#	#	#	#	#	
	C	Advisory											
U2	1	Use Forest of Clunie and sites within Cairngorms National Park as exemplars of good practice.	SNH	RSPB, SEERAD FC, FWAG SAC, CPB								#	
	D	Research and monitoring											
U2	1	Survey all upland heath within the statutory site network to NVC standard.	SNH									#	
U2	2	Ensure that upland heath within the statutory site network meets site condition monitoring targets for favourable conditions.	SNH									#	
	E	Promotion and awareness-raising											
U2	1	Seek common ground between landowners/managers and conservation and other interests over management issues relating to upland heath.	SNH SLF	RSPB FWAG SAC	#	#	#	#	#	#	#	#	
U2	2	Set up awareness programme by 2003 to increase public awareness of upland heath through publications, media and environmental education.	SNH	TBP, RSPB FWAG, SAC, SLF, DCS	#								
U2	3	Monitor and review this plan – ensure this Plan is being delivered annually and review in detail after 5 years.	TBP		#	#	#	#	#	#	#	#	