

# **UK Biodiversity Group**

## **Tranche 2 Action Plans**

### **Terrestrial and Freshwater Species and Habitats**



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Dear Deputy Prime Minister, Secretary of State, Minister and Assembly Secretary,

## **BIODIVERSITY ACTION PLANS**

I am writing to you in my capacity as Chairman of the United Kingdom Biodiversity Group (UKBG) about the latest group of biodiversity action plans which UKBG have completed and published in the present volume. This is the sixth and final volume in the Tranche 2 Action Plan series and its publication concludes the preparation of plans begun in 1995.

The volume has an “uplands” theme and contains 25 species and 4 habitat action plans. Also included are 53 species statements. The species cover a range of taxonomic groups. Technical introductions to these groups have already been published in Volumes III and IV. The statements cover: species where monitoring is required to confirm whether there is any significant decline in their populations; species, not recorded for over 10 years, where search is the only current action possible and for which action plans will be prepared if new populations are discovered; and species where action will be considered as part of the delivery of other relevant habitat and species action plans.

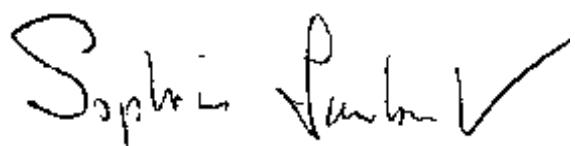
As with previous plans, these action plans have been produced through the hard work of Government departments and agencies, voluntary conservation groups, land managers and academic institutions to set challenging but achievable targets to conserve and enhance these species and habitats. As in earlier volumes, the new species action plans are accompanied by a list of lead partners (often a Non-Government Organisation) who will take the lead in their implementation, supported by a contact point (always a Government agency or department).

The new species action plans are accompanied by a table showing their indicative costings and the habitat plans include indicative costs, so that those charged with implementation are clear about the scale of the financial consequences. The volume contains a summary of the costings process for all published species action plans. The methodology for costing the habitat action plans was published in Volume II.

Publication of this final volume brings to a close the UKBG’s work in preparing plans. Our work is now focusing on implementation of the published plans and here the individual country groups

for England, Wales, Scotland and Northern Ireland have an increasing important role. Work to assess the level of implementation and the extent to which targets are being achieved is underway. The findings from this work will form part of a Millennium Biodiversity Report which the UKBG will present to the Government and the devolved administrations by the end of next year.

On behalf of UKBG, I commend to you and your ministerial colleagues the action plans set out in this volume.

A handwritten signature in black ink, appearing to read "Sophia Lambert".

SOPHIA LAMBERT

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# 1. Introduction

- 1.1 Each of the species and habitat action plans published in this and previous volumes in the series have cost estimates attached. These estimates provide Government and the partners involved in the implementation of the plans with an idea of the resource commitment entailed in their delivery. In the case of species, these costs are summarised as a table of additional average annual costs (see Annex 2). More detailed information on the cost estimates will be available in a series of reports to be published by English Nature in its Research Report series, available Enquiry Service. There will be separate reports for habitats and species, together with a summary report on habitats.

## Habitat costings

- 1.2 The methodology for the costing of the habitat action plans was described in Volume II Terrestrial and freshwater habitats. The total figure for each action plan is built up from estimates for each of the specific actions contained therein. Each of the actions was costed by using a list of generic costs derived from a range of data, and expert opinion and assumptions on how the actions would be undertaken (how much area requires restoration, how much manpower is needed, etc). The cost estimates are therefore indicative only, and actual costs will be determined by the accuracy of the assumptions made, which in turn depends on unforeseen circumstances and new information arising during the course of plan implementation.
- 1.3 The costing of the species action plans followed a similar 'bottom-up' approach of deriving costs for individual actions within the plan, and its methodology is outlined below.

## Species costings

- 1.4 Cost estimates have been produced by gathering a wide range of cost data, for example, the costs of habitat maintenance, experimental reintroductions, advising landowners, surveying populations, genetic research and publicity. The data sought focussed on the actions outlined in the SAPs. This data was then used to construct a table of standard estimates that could be used for costing particular elements of each action plan.
- 1.5 Data were obtained from specialists within a range of organisations. These included English Nature, Countryside Council for Wales, Scottish Natural Heritage, Institute of Terrestrial Ecology, RSPB, Plantlife, the Forestry Commission, university departments and various other individuals with relevant expertise. The authors and editors of the SAPs were also closely consulted throughout the process.
- 1.6 Agri-environmental grant data was obtained from the Ministry for Agriculture, Fisheries and Food (MAFF), the Welsh Office Agricultural Department (WOAD), Scottish Office Agriculture, Environment and Fisheries Department (SOAEFD) and Forestry Commission (FC) for schemes including Countryside Stewardship, Environmentally Sensitive Areas, Arable Stewardship, Woodland Grant Scheme, Tir Cymen, and the Countryside Premium Scheme.
- 1.7 The cost estimates are based on the methodology first used for action plans published in the Biodiversity: the UK Steering Group Report (1995). It used the standard estimates described above as a basis for calculations to arrive at a figure for each SAP. These calculations took into account factors such as the number of sites requiring habitat management, the number

of land managers who needed to be advised on a species, and the number of years that monitoring was required at a site.

#### Example calculation

The standard estimate for survey work was £180 per day plus 50% overheads and report writing (a total of £270 per day). It was estimated that action 5.5.1 of the river shingle beetles action plan ('Continue to undertake surveys to determine the UK status of these species') would take 10 days per year over the 10 year life of the plan. The cost estimate for this survey action was therefore £2.7K per year.

1.8 The following principles and assumptions should be noted. The cost estimates:

- ! are indicative only, based on the experience of past or current projects, and the estimations of various specialists;
- ! are for the UK as a whole;
- ! are additional to both current and projected expenditure under existing programmes (works planned in advance of the development of an action plan), which was estimated as part of the costing process;
- ! are for the public and private sector combined. No attempt has been made to apportion costs to the two sectors although the assumption has been made earlier that the non-government sector bears approximately 50% of the cost of implementing the SAPs (Biodiversity: The UK Steering Group Report, Vol 1, p65);
- ! are net of any savings or revenue associated with meeting the SAPs;
- ! avoid duplication, particularly in respect to the costs associated with habitat action plans (HAPs). Consideration has also been given to how actions for different species can be combined and the costs shared accordingly;
- ! exclude costs for activities that (a) will deliver general habitat benefits, (b) constitute statutory obligations (eg SSSI notification);
- ! exclude administrative costs. As a broad estimate, 10% needs to be added to the grand total to cover administration;
- ! exclude much of the costs of actions to be delivered through agri-environment schemes (see below).

1.9 The costs are expressed as average annual costs (in £1000s) for the first five years and the next five years of the life of the action plan. In the case of the SAPs published in 1998 (Volume I *Vertebrates and vascular plants*), the five year periods run to the years 2003/4 and 2008/9. For subsequently published SAPs, these end dates are 2004/5 and 2009/10. The apportioning of costs between these two periods was judged on an action-by-action basis. For each period of five years, the cost of one-off activities was divided by five to arrive at an average annual figure. The costs were set out in the price base of the year of publication (ie for Volume 1, 1998).

#### Agri-environmental actions

- 1.10 Some of the actions in the plans were about the use of environmental land management (agri-environment) grant schemes to create favourable management for the species concerned. The associated costs can be a significant part of the total for the plans. In some cases these relate to specific sites and areas, and were costed to the species in the normal way (eg the clearance Rhododendron from five woodlands using the Woodland Grant Scheme). The individual SAP costings therefore include these agri-environment elements.
- 1.11 Costing other such actions was often problematic, however, as the areal extent for agri-environment scheme application could not be specified with any accuracy, and it was often not clear where the benefits achieved would be shared with other priority species and habitats (ie the costs not attributable to the species alone). In some cases they duplicated action proposed in one or more habitat action plans, and so these actions were discounted from the costing process to avoid double counting. For the remaining such 'multi-species' actions, a separate analysis of the geographical spread of the species concerned, and the existing coverage of agri-environment schemes, sought to arrive at an aggregate cost estimate for such action across all the plans. This work will be reported on in the English Nature Research Report series referred to earlier.

# Priority Species Action Plans and Species Statements

# Vertebrates



## Black grouse ( *Tetrao tetrix* ) Action Plan

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| <p><b>1. Current status</b></p> <p>1.1 Black grouse are largely dependent upon the suitable management of moorland/woodland edge in Scotland and Wales, and the moorland/farmland fringe in northern England. The black grouse also utilises young conifer plantations and clear-felled areas with well-developed field and shrub layers that include rushes, cotton-grass, heather and bilberry. Mature plantations with widely-spaced trees also support suitable ground vegetation and can be important for the species.</p> <p>1.2 The black grouse declined in range by 28% between 1968-72 and 1988-91, and the most recent UK population estimate (1996) is 6510 lekking males compared with an estimate of 25,000 in 1990.</p> <p>1.3 The black grouse is protected under the Game Acts (close season: 11 December-19 August), Annex II/2 of EC Habitats Directive, and Appendix III of the Berne Convention.</p> <p><b>2. Current factors causing loss or decline</b></p> <p>2.1 Over-grazing and agricultural improvement have removed key food plants such as bilberry, heather and birch scrub in many areas. These plants also support invertebrate prey items important for chicks, and provide nest sites. Sheep grazing in woodland can reduce the shrub understorey which is utilised by the species.</p> <p>2.2 The shading out of the understorey in maturing conifer plantations.</p> <p>2.3 Drainage and overgrazing of mires destroy two important black grouse food sources - the flowers of cotton grass and invertebrates. Rushes, which provide nesting cover and sources of insect food, are also affected adversely. Loss of wet flushes and riparian vegetation in afforested areas also leads to loss of food plants and invertebrates.</p> <p>2.4 The re-seeding of traditional hay meadows or enclosed rough grazings destroys plants such as sedges, rushes, sorrel, buttercups and clover, which are important food plants.</p> <p>2.5 Over-frequent moorland burning can lead to the formation of impoverished acidic grasslands.</p> <p>2.6 Fragmentation of black grouse habitat often leads to small populations which are unlikely to persist.</p> <p>2.7 Considerable numbers of black grouse are killed by collisions with deer fences. Overhead power and telephone cables may also be a problem.</p> | <p>2.8 Predation may be a limiting factor in some regions. Studies have shown the main predators to be foxes and crows.</p> <p>2.9 Disturbance of lekking birds has been identified as a severe problem at some isolated sites.</p> <p><b>3. Current action</b></p> <p>3.1 Management measures to regenerate woodland, reduce grazing and control predators, based on research by the Forestry Commission, Game Conservancy Trust (GCT) and RSPB, have been shown to increase black grouse populations.</p> <p>3.2 Guidelines for conifer forest management were published by the FC in 1993 and are incorporated into FC Forest Design Plans and Native Woodland Management Plans. Guidelines are being given a broader policy context through the UK Forestry Standard. The Forestry Authority has issued a guidance note on deer, forest regeneration and fencing.</p> <p>3.3 Research by GCT is intended to lead to the production of a management handbook detailing practical work to encourage black grouse through the improvement of its different habitats.</p> <p>3.4 A variety of grant aid mechanisms, including the Woodland Grant Scheme (WGS), ESAs, Tir Gofal, the Countryside Premium Scheme, and the Moorland Scheme, have the potential to improve much black grouse habitat through funding habitat management and fence removal. Individual 'challenge funds' under WGS/Woodland Improvement Grant Scheme target: management of existing native woodland in the Cairngorms; expansion of native woodland in Deeside and the Forest of Spey; and enhancement of upland oak woods in Wales and Argyll. A challenge fund targets new native woodland in national parks in England and Wales.</p> <p>3.5 Collaborative recovery projects for black grouse are being developed and implemented by a range of organisations in different parts of the UK, including: the North Pennines (RSPB/EN/GCT and MoD); Tayside (RSPB/SNH/GCT); Dumfries &amp; Galloway (FC/FWAG/RSPB/SNH); and Wales (RSPB/CCW).</p> <p><b>4. Action plan objectives and targets</b></p> <p>4.1 Stem or reverse the decline in numbers and range of the black grouse in the UK, in order to hold or restore the population to its 1996 size and range by 2005.</p> <p>4.2 In the long term (20 years), increase the range and abundance of the black grouse in the UK.</p> |
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4.3	Prevent further fragmentation of populations within the range of the black grouse.	5.2.2	Safeguard important black grouse habitat from inappropriate development, through the development control and planning process. (ACTION: CCW, EN, LAs, SNH)
4.4	Promote re-colonisation of formerly occupied areas between currently isolated populations by 2005.	5.2.3	Where possible, ensure favourable management of moorland and native woodland for the benefit of the black grouse. (ACTION: CCW, EN, FC, MAFF, MoD, NAW, SE, SNH)
5.	<b>Proposed action with lead agencies</b>	5.3	<b>Species management and protection</b>
	A combination of habitat improvement, including woodland regeneration and management of moorland edge and marginal agricultural land, the removal of fences, and legal predator control, are the principal means of meeting the objectives of this action plan. Further research and monitoring will also be important.	5.3.1	Promote and support the wise use of black grouse populations. (ACTION: CCW, EN, Home Office, SE, SNH)
5.1	<b>Policy and legislation</b>	5.3.2	Ensure the protection of important or isolated leks sites from human disturbance. (ACTION: CCW, EN, FE, MoD, SNH)
5.1.1	Seek EU and UK livestock support policies which will help reduce sheep over-grazing in the uplands, especially the moorland fringe. (ACTION: MAFF, NAW, SE)	5.4	<b>Advisory</b>
5.1.2	Where appropriate, include the requirements of the black grouse when preparing or revising prescriptions for agri-environment schemes. (ACTION: CCW, EN, MAFF, NAW, SE, SNH)	5.4.1	Review guidance on management for the black grouse in Great Britain, and develop the UK Forestry Standard and associated guidelines, to take into account the FC (Scotland) Advice Note Deer, natural regeneration and fences. (ACTION: FC)
5.1.3	Seek policies which ensure protection of key black grouse habitats, and identify and target positive opportunities for expanding such habitats (eg through Indicative Forestry Strategies). (ACTION: CCW, EN, FC, LAs, MAFF, National Park Authorities, NAW, SE, SNH)	5.4.2	Advise landowners and managers of the presence and importance of the black grouse, and specific management for its conservation, and update that advice in the light of new policies and research findings. (ACTION: CCW, EN, FC, MAFF, NAW, Regional Forestry Initiatives, SE, SNH)
5.1.4	Encourage and support habitat management for black grouse in woodland and open land in public and private ownership, including relevant species and habitat action plans, native woodland management plans and forest design plans (the latter to be extended to the private sector as long-term forest plans). (ACTION: FC)	5.4.3	As far as possible, ensure that all agri-environment and forestry advisers are advised of locations of this species, management requirements and potential threats. (ACTION: CCW, EN, FC, MAFF, NAW, SE, SNH)
5.1.5	Develop the Woodland Grant Scheme to encourage the favourable management of black grouse habitat in key areas, notably the North Pennines. (ACTION: FC)	5.5	<b>Future research and monitoring</b>
5.1.6	Seek to reduce over-grazing by red deer in Scotland by exercising powers under the Deer (Amendment) (Scotland) Act 1996 to conserve the natural heritage. (ACTION: Deer Commission for Scotland, FC, SE, SNH)	5.5.1	Ensure the continuation of a collaborative population monitoring programme. (ACTION: CCW, EN, SNH)
5.1.7	Encourage the use of Objective 1/5b and Leader funding, and subsequent European grants schemes, to support low-intensity mixed farming systems suitable for the black grouse. (ACTION: CCW, EN, MAFF, National Park Authorities, NAW, SE, SNH)	5.5.2	Continue to investigate black grouse demography to understand the factors limiting populations. (ACTION: CCW, EN, SNH)
5.2	<b>Site safeguard and management</b>	5.5.3	Continue research into black grouse ecology, with particular reference to diet, habitat and spatial requirements. (ACTION: CCW, EN, SNH)
5.2.1	Consider notifying areas with high densities of breeding black grouse and with important lek sites as SSSIs, and negotiate positive management agreements to secure favourable site management where necessary. (ACTION: CCW, EN, SNH)	5.5.4	Monitor the effectiveness of measures introduced to increase or restore black grouse populations, including agri-environment prescriptions and forest management by FE. (ACTION: CCW, EN, FE, MAFF, NAW, SE, SNH)
		5.5.5	Continue research to minimise or eliminate the problem of grouse colliding with forest fences and overhead lines, for example by developing new methods of marking, new

materials, and new fence designs. (ACTION: EN, FC, SNH)

5.6 Communications and publicity

5.6.1 As appropriate, use the black grouse to illustrate the issue of sustainable agricultural management in the uplands. (ACTION: CCW, EN, MAFF, NAW, SE, SNH)

5.6.2 Promote literature and other information sources detailing management measures to enhance black grouse populations, as further information from research work becomes available. (ACTION: CCW, EN, FC, SNH)

5.7 Links with other action plans

5.7.1 This action plan should be considered in conjunction with those for blanket bogs, native pine woodland, purple moor-grass and rush pastures, upland oakwoods, and upland heathland.

## Burbot (*Lota lota*) Action Plan

<b>1.</b>	<b>Current status</b>	<b>5.1</b>	<b>Policy and legislation</b>
1.1	The burbot is the only fish known to have become extinct in Great Britain in recent centuries. It was restricted to rivers in eastern England from County Durham to the Great Ouse. There has been no authenticated record of the species in the UK for over 50 years.	5.1.1	Consider the conservation justification of re-establishing the burbot as a viable component of UK biodiversity, taking account of the historic range, reasons for extirpation (see 5.5.1), the ecological impact of reintroduction, and changes to the countryside since burbot existed in the UK. The IUCN/SSC Guidelines for re-introductions should provide the foundation for such decisions. (ACTION: DETR, EA, EN, MAFF)
1.2	The burbot has a northern circumpolar distribution, occurring in clean lakes and rivers throughout much of northern Europe, Asia and North America. In Europe it is known from 19 countries, but is considered substantially threatened in several of these.	5.1.2	Take note of, and feed into, the review of fisheries legislation currently being undertaken by MAFF, and the development of policies on species and habitat translocations being developed by the country conservation agencies. (ACTION: DETR, EA, EN, MAFF)
1.3	The burbot is given special protection under Schedule 5 of the Wildlife and Countryside Act 1981. It is neither listed on Annex II of the EC Habitats Directive nor Annex III of the Bern Convention.	5.1.3	Based on the outcomes of 5.1.1/2, and the research actions detailed under 5.5, decide whether re-establishment of naturally self-sustaining populations of the burbot to parts of the former range is desirable and feasible. If considered to be so, indicate likely locations, necessary amelioration of threats and other caveats, as precursors to the preparation of a detailed reintroduction plan. (ACTION: DETR, EA, EN, MAFF)
<b>2.</b>	<b>Current factors causing loss or decline</b>	<b>5.2</b>	<b>Site safeguard and management</b>
2.1	Despite debate over the last two decades, there is no consensus on the reasons for the extinction of the burbot in England. Certainly, all the rivers from which the species was previously recorded still contain fish. One of the objectives of this action plan is to seek a consensus view on the most likely causes, using evidence from England and continental Europe.	5.2.1	None proposed.
<b>3.</b>	<b>Current action</b>	<b>5.3</b>	<b>Species management and protection</b>
3.1	None known.	5.3.1	None proposed.
<b>4.</b>	<b>Action plan objectives and targets</b>	<b>5.4</b>	<b>Advisory</b>
4.1	Decide by 2005 on whether attempts should be made to re-establish self-sustaining populations of the species within the former English range, based on consideration of the appropriateness and feasibility of such action.	5.4.1	None proposed.
4.2	If reintroduction is considered appropriate and feasible, draw up and agree upon a reintroduction plan by 2010.	5.5	<b>Future research and monitoring</b>
<b>5.</b>	<b>Proposed action with lead agencies</b>	5.5.1	Review the theories expounded for the extinction of the species in the UK, and current expert opinion, to reach a consensus on the likely causes of extinction. Evidence from both England and continental Europe should be referred to. (ACTION: EA, EN)
	The actions below deal with research and policy formulation. Re-establishment of the species in England, if agreed upon, would be detailed under a later reintroduction plan.	5.5.2	Assess the current relevance of the causes identified in 5.5.1, to determine whether they would prevent successful re-establishment of the species, or in the future present a threat to any re-established populations. (ACTION: EA, EN)
		5.5.3	Undertake reviews and further studies of the ecological requirements of the burbot, and the nature of its niches in rivers of continental Europe. Considerations should be given to the ecology, physiology and behaviour of the species, and interactions with other species. (ACTION: EA, EN)

5.5.4 Assess rivers within the historic range in England against the results of 5.5.3, to ascertain whether the ecological requirements of the species can still be met in any of them. (ACTION: EA, EN)

5.6 Communications and publicity

5.6.1 Consider how to gain a broad constituency of views on the re-establishment of the burbot as a component of the UK biodiversity, and implement an appropriate strategy to that end. (ACTION: DETR, EA, EN, MAFF)

5.7 Links with other action plans

5.7.1 None identified.

## Houting ( *Coregonus oxyrinchus* ) Species Statement

	1. Current status	5. Proposed action
1.1	The houting is an anadromous whitefish which spawns in large rivers from which the young migrate to the sea to develop and grow to maturity. They then return to their natal rivers to breed. In Great Britain this species (which some authorities regard as merely a subspecies of <i>Coregonus lavaretus</i> ) is only ever known to have occurred as a vagrant in coastal waters off the south east coast of England and in a few estuaries there (eg Colne and Medway). None has been recorded in British waters for several decades.	5.1 Monitoring only. Instigate, in Britain, a monitoring scheme for this, and other threatened species (eg sturgeon, <i>Acipenser sturio</i> , allis shad <i>Alosa alosa</i> ) via inshore commercial fishermen in the North Sea.
1.2	The original distribution of the houting was in the Baltic Sea and eastern parts of the North Sea and several larger rivers (eg Elbe, Rhine, Weser) into which adults migrated to spawn. The stocks of this species have greatly declined during the second half of the 20th century and several populations have disappeared.	
1.3	In Great Britain this species is classified as Extinct. In Europe as a whole it is Endangered. It is listed in Appendix III of the Bern Convention.	
2.	Current factors causing loss or decline	
2.1	Degradation of rivers used for spawning.	
2.2	Over-fishing during spawning migration.	
2.3	Artificial barriers (weirs, etc) in rivers used for spawning.	
2.4	Destruction of spawning grounds by engineering works.	
3.	Current action	
3.1	None in Great Britain other than the production of several published papers raising awareness of the plight of this and other threatened British and European fish.	
3.2	In Europe, there has been a very successful restoration project in Denmark, through captive breeding and the stocking of rivers in which the species originally occurred.	
4.	Objective for the species	
4.1	Seek protection in British waters, if rediscovered.	

# Coleoptera



## Bidessus minutissimus (a diving beetle) Action Plan

<b>1.</b>	<b>Current status</b>	<b>4.1</b>	Maintain viable populations within each of the catchments currently occupied.
1.1	Bidessus minutissimus occurs in the lower reaches of rivers, typically in association with sand or fine gravel banks. Some of the older records are for coastal lakes; one is from a river subject to lead pollution where it was found in muddy beds of vegetation cut off from the main flow of the river. Despite the association with the lower sections of rivers, this species is not found in brackish water. The life-cycle is unknown and the immature stages have not been described. <i>B. minutissimus</i> is capable of flight, at least in the south of its range in Spain.	4.2	Ensure that viable populations are maintained in a minimum of four Welsh and two Scottish catchments by 2010.
1.2	In Great Britain this species is confined to the west. Its former range ran from the Solway area to Devon. There are no records for southern England after about 1908 but there is a record for the River Dee in Cheshire in 1981. In Wales it has been recorded from the Conwy (last record 1940), Dyfi (1941), Tywi (1950), Dee (1979), Ystwyth (1987), Wye (1992), and Rheidol (1995). In Scotland it was formerly known from the Water of Luce (1908), River Ken (1908), River Annan (1946), and River Nith (1991). The Nith site has been severely damaged by bank strengthening and increased amenity access, and the species may now be extinct in Scotland. There are also old records for the Sulby River, Isle of Man, and from Guernsey. <i>B. minutissimus</i> is predominantly an 'Atlantic' species, ranging from southern Ireland to the Canaries, Algeria, Tunisia and Morocco, but is also found in central Europe, in Switzerland and Austria, and thence to Italy, Corsica, Sardinia and the Balearics.	5.	<b>Proposed action with lead agencies</b>
1.3	In Great Britain this species is classified as Rare.		The objectives of this plan will be achieved by implementing beneficial habitat management at known sites to ensure viable populations are maintained in occupied catchments. Surveys need to be undertaken to determine the status of the species and autecological research should be carried out. Populations may need to be reintroduced to former catchments if this is necessary to achieve the objectives.
<b>2.</b>	<b>Current factors causing loss or decline</b>	<b>5.1</b>	<b>Policy and legislation</b>
2.1	Impoundment, bankstrengthening, canalisation and other forms of river regulation.	5.1.1	Where appropriate, include the requirements of the species when preparing or revising prescriptions for agri-environment schemes and for river restoration schemes. (ACTION: CCW, EA, EN, MAFF, NAW, SE, SEPA, SNH)
2.2	Point source pollution of lower parts of rivers from sewage outfalls.	5.1.2	Take account of the species' requirements in response to applications for water abstraction and discharge licences. (ACTION: EA, SWAs)
2.3	Diffuse pollution resulting in algal blooms and loss of clean gravel sites in rivers.	5.1.3	Address the requirements of this species in the LEAP process and in relevant catchment management plans and WLMPs. (ACTION: EA, IDBs, LAs, MAFF, NAW, SEPA)
2.4	Intensive use by anglers, pleasure craft and other amenity use.	<b>5.2</b>	<b>Site safeguard and management</b>
<b>3.</b>	<b>Current action</b>	5.2.1	Where possible, ensure that all occupied habitat is appropriately managed by 2010. (ACTION: CCW, EA, EN, SEPA, SNH)
3.1	The Tywi and the Wye are candidate SACs and populations of this species are present within SSSIs on the Ystwyth and the Rheidol.	5.2.2	Ensure that the habitat requirements of this species are taken into account in relevant development policies, plans and proposals, particularly in relation to river engineering. (ACTION: CCW, EA, EN, IDBs, LAs, SEPA, SNH)
<b>4.</b>	<b>Action plan objectives and targets</b>	5.2.3	Consider notifying as SSSIs sites holding key populations of the species where this is necessary to secure their long-term protection and appropriate management. (ACTION: CCW, EN, SNH)
		<b>5.3</b>	<b>Species management and protection</b>
		5.3.1	If necessary, consider reintroductions/reinforcements to establish viable populations in two catchments in Scotland and four catchments in Wales. (ACTION: CCW, SNH)

5.4 Advisory

5.4.1 Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation. (ACTION: CCW, EN, SNH)

5.5 Future research and monitoring

5.5.1 Undertake surveys to determine the status of this species. (ACTION: CCW, EN, SNH)

5.5.2 Conduct targeted autecological research to inform habitat management. (ACTION: CCW, EN, SNH)

5.5.3 Establish a regular monitoring programme for the species. (ACTION: CCW, EN, SNH)

5.5.4 If re-introductions are considered necessary, undertake genetic studies to inform such a programme. (ACTION: CCW, EN, SNH)

5.5.5 Pass information gathered during survey and monitoring of this species to a central database for incorporation in national and international databases. (ACTION: CCW, EN, SNH)

5.5.6 Encourage research on the ecology and conservation of this species on an international level and use the experience gained towards its conservation in the UK. (ACTION: CCW, EN, JNCC, SNH)

5.6 Communications and publicity

5.6.1 Promote opportunities for the appreciation of the species and the conservation issues associated with its habitat. This should be achieved via articles within appropriate journals as well as by a publicity leaflet. (ACTION: CCW, EN, SNH)

5.7 Links with other action plans

5.7.1 It is likely that implementation of this action plan will benefit other species of lowland rivers, including the water vole, the crane fly *Rhabdomastix laeta*, the stiletto flies *Cliorismia rustica* and *Spiriverpa lunulata*, the ground beetles *Bembidion testaceum*, *Lionychus quadrillum* and *Perileptus areolatus*, and the rove beetles *Meotica anglica* and *Thinobius newberyi*.

## ***Gastrallus immarginatus* (a beetle) Action Plan**

### **1. Current status**

1.1 *Gastrallus immarginatus* is associated with field maple *Acer campestre*, breeding in the bark of veteran standards or pollards in open situations. Over much of its European range it has been reported from oak and other broad-leaved trees, but it becomes increasingly confined to old, living field maple towards its northern fringes, as in Britain.

1.2 *Gastrallus immarginatus* has been recorded frequently in small numbers from Windsor Forest and Great Park, Berkshire since 1936. In the 1990s a number of populations have been discovered in woodland and parkland locations around Bredon Hill, on the Worcestershire-Gloucestershire border, and at Knole Park, Kent. Field maple is rare at Windsor and Knole Park, but around Bredon there is a large number of field maples in old parks and hedgerows and *Gastrallus* may occur there as a large dynamic population. The status and distribution of this species in Europe is unknown, although in Germany it is regarded as endangered.

1.3 In Great Britain this species is classified as Endangered.

### **2. Current factors causing loss or decline**

2.1 Loss of or damage to host trees through agricultural and other operations.

2.2 Poor age structure in field maple populations, leading to a future lack of breeding resource.

2.3 Shading of host trees through reduction in grazing or planting of new trees.

### **3. Current action**

3.1 Bredon Hill and parts of Windsor Forest and Great Park are SSSIs and part of Bredon Hill is a NNR. Both sites are pSACs.

3.2 EN have appointed a part-time liaison officer at Windsor to heighten the Crown Estate's awareness of conservation issues associated with veteran trees.

### **4. Action plan objectives and targets**

4.1 Maintain all known populations.

4.2 Enhance the population size at all known sites by 2010.

### **5. Proposed action with lead agencies**

Conservation action to ensure that viable populations of this species are maintained is dependent initially upon surveys to clarify its distribution and to assess the age structure of its host trees. The recommended actions aim to secure and enhance the availability of breeding habitat through sympathetic management of field maple in the vicinity of, and adjacent to, occupied sites. A better understanding of the ecological requirements of this species, and the threats to it, will underpin the above process.

#### **5.1 Policy and legislation**

5.1.1 Where appropriate, include the requirements of this species when preparing or revising prescriptions for agri-environment or hedgerow schemes. (ACTION: EN, MAFF)

5.1.2 Implement the 1994 review of Tree Preservation Orders to offer further protection to veteran trees. (ACTION: DETR)

#### **5.2 Site safeguard and management**

5.2.1 Where possible, ensure that all occupied habitat is appropriately managed by 2008, for example through SSSI or agri-environment scheme management agreements. (ACTION: Crown Estate, EN, LAs, MAFF)

5.2.2 Where it is in the interests of amenity, apply Tree Preservation Orders to protect host trees and woodlands. (ACTION: LAs)

5.2.3 Maintain a suitable age structure within field maple populations at occupied sites, either by planting or, preferably, through encouraging natural regeneration. (ACTION: Crown Estate, EN, FC)

5.2.4 Where possible, ensure that land use around host trees is compatible with their survival and growth, avoiding the use of fertilisers, herbicides, pesticides, ploughing, drainage, or over-stocking. (ACTION: Crown Estate, EN, MAFF)

5.2.5 Ensure that the species is included in site objective and site management statements for all relevant SSSIs. (ACTION: EN)

5.2.6 Consider notifying as SSSIs sites holding key populations of the species, where this is necessary to secure their long-term protection and appropriate management. (ACTION: EN)

#### **5.3 Species management and protection**

5.3.1 None proposed.

5.4 Advisory

5.4.1 Advise landowners and managers of the presence of the species and the importance of beneficial management for its conservation. (ACTION: EN)

5.4.2 As far as possible, ensure that all relevant agri-environment project officers and members of regional agri-environment consultation groups are advised of locations of this species, its importance and the management needed for its conservation. (ACTION: EN, MAFF)

5.5 Future research and monitoring

5.5.1 Undertake surveys to determine the status of this species. (ACTION: EN)

5.5.2 Undertake surveys of host tree population structure at occupied sites. (ACTION: EN)

5.5.3 Conduct targeted autecological research to inform habitat management. (ACTION: EN)

5.5.4 Establish a regular monitoring programme for the species. (ACTION: EN)

5.5.5 Pass information gathered during survey and monitoring of this species to a central database for incorporation in national and international databases. (ACTION: EN)

5.6 Communications and publicity

5.6.1 Promote opportunities for the appreciation of the species and the conservation issues associated with its habitat. (ACTION: EN)

5.7 Links with other action plans

5.7.1 This action plan should be considered in conjunction with those for lowland wood pastures and parkland, and ancient and/or species-rich hedgerows.

## **Gnorimus nobilis (a chafer) Action Plan**

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| <p><b>1. Current status</b></p> <p>1.1 Gnorimus nobilis occurs in old orchards, open woodlands, and pasture woodland. The larvae develop in rotting wood and wood mould from old standing trees, especially fruit trees (plum, apple, pear, damson and cherry), but also willow and oak (one record). The normal development period seems to be two years in fruit trees. Adults have been found during the daytime on flowerheads, especially of the larger umbellifers.</p> <p>1.2 Gnorimus nobilis has been rare in Britain for over a century but appears to have undergone considerable decline in range. Recent records are from the New Forest in Hampshire and from orchards near Evesham and the Wyre Forest in Worcestershire and also in Oxfordshire and Herefordshire. There are old records for Devon, Hampshire, West Sussex, Kent, Essex, Surrey, Middlesex, Oxfordshire, Buckinghamshire, Norfolk, Gloucestershire, Worcestershire and, possibly, Cumberland. It is widely distributed throughout Europe, from Spain to Greece, Yugoslavia and Hungary, and north to southern Scandinavia.</p> <p>1.3 In Great Britain this species is classified as Vulnerable.</p> <p><b>2. Current factors causing loss or decline</b></p> <p>2.1 Loss of habitat, especially through the grubbing out of old orchards and replacement of ancient decaying fruit trees, leading to gaps in the age structures so that further generations of old trees with decaying centres are no longer available.</p> <p>2.2 Loss of nectar and pollen sources through inappropriate management of orchard grassland.</p> <p>2.3 Use of chemical pesticides in orchards to control insect pests may have affected this species.</p> <p><b>3. Current action</b></p> <p>3.1 This species occurs in the New Forest, much of which is notified as a SSSI. Some orchards on the southern margin of the Wyre Forest are within the Wyre Forest SSSI.</p> <p>3.2 The restoration of old orchards is an option under the Countryside Stewardship scheme.</p> <p><b>4. Action plan objectives and targets</b></p> <p>4.1 Maintain populations at all known sites.</p> <p>4.2 Enhance the population size at all known sites by 2010.</p> | <p>4.3 If no new populations are discovered, restore populations to five suitable sites within the historic range by 2010.</p> <p><b>5. Proposed action with lead agencies</b></p> <p>A detailed review of previous and recent records should be undertaken to establish its historic range and key sites. A survey of extant colonies and historic sites should then be undertaken. This will establish its current status and provide information to allow targeting of the other measures recommended. Priorities will include appropriate management of all extant sites, based on a better understanding of the beetles' ecological requirements, and protection for each colony from damaging activities. Experimental work should also be undertaken to assess the feasibility of reintroducing viable populations to other sites.</p> <p><b>5.1 Policy and legislation</b></p> <p>5.1.1 Where appropriate, include the requirements of the species when preparing or revising prescriptions for agri-environment or woodland grants schemes, especially for orchards. (ACTION: EN, FC, MAFF)</p> <p>5.1.2 Implement the 1994 review of Tree Preservation Orders to enable better protection of fruit trees in old orchards. (ACTION: DETR)</p> <p><b>5.2 Site safeguard and management</b></p> <p>5.2.1 Where possible, ensure that all occupied habitat is appropriately managed by 2010, for example through SSSI or agri-environment scheme management agreements. (ACTION: EN, MAFF)</p> <p>5.2.2 Where it is in the interests of amenity, apply Tree Preservation Orders to protect host trees, orchards and woodlands. (ACTION: LAs)</p> <p>5.2.3 Ensure that the species is included in site management documents for all relevant SSIs. (ACTION: EN)</p> <p>5.2.4 Consider notifying as SSSIs sites holding key populations of the species where this is appropriate to secure their long-term protection and appropriate management. (ACTION: EN)</p> <p><b>5.3 Species management and protection</b></p> <p>5.3.1 If no new populations are discovered, consider reintroductions to a series of sites within the former range to establish five new viable populations. (ACTION: EN)</p> |
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5.4 Advisory

5.4.1 Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation. (ACTION: EN)

5.4.2 As far as possible, ensure that all relevant agri-environment project officers and members of regional agri-environment consultation groups are advised of locations of this species, its importance and the management needed for its conservation. (ACTION: EN, MAFF)

5.5 Future research and monitoring

5.5.1 Undertakes surveys to determine the status of this species. (ACTION: EN)

5.5.2 Conduct targeted autecological research to inform habitat management. (ACTION: EN)

5.5.3 Establish a regular monitoring programme for the species. (ACTION: EN)

5.5.4 Pass information gathered during survey and monitoring of this species to a central database for incorporation in national and international databases. (ACTION: EN)

5.6 Communications and publicity

5.6.1 Promote opportunities for the appreciation of the species and the conservation issues associated with its habitat. This should be achieved via articles within appropriate journals as well as by a publicity leaflet. (ACTION: EN)

5.7 Links with other action plans

5.7.1 This action plan should be considered in conjunction with those for lowland wood pastures and parklands, and ancient and/or species-rich hedgerows.

## Harpalus froelichi (a ground beetle) Action Plan

<b>1.</b>	<b>Current status</b>	status, population monitoring, and autecological studies will also be undertaken.
1.1	Harpalus froelichi is found on sandy soils at the margins of agricultural fields and on coastal sand dunes. It requires dry, bare ground with partial plant cover. Its life history is unknown and it has either an annual or, possibly, biennial life cycle. Larvae, and possibly also adults, feed largely on seeds of herbaceous weeds. The adults fly readily and have been caught at light traps. It is active only at dusk and after dark and is readily caught in pitfall traps.	5.1 Policy and legislation
1.2	Although at one time found in the vicinity of the Dorset heaths and in east Suffolk and Norfolk, Harpalus froelichi has not been recorded from Dorset since the 1920s nor the East Anglian coast since the 1930s. All of the more recent records are from west Norfolk (Brettenham, Cranwich Camp) and from the Breck in west Suffolk (Foxhole Heath, Foxhole roadside, Maids cross Hill and Wangford road verge). It is often abundant where found. In Europe it has an eastern distribution within a rather narrow latitudinal range: Britain and northern France are the western limit of its distribution.	5.1.1 Where appropriate, take account of the requirements of the species when preparing or revising prescriptions for relevant agri-environment schemes. (ACTION: EN, MAFF)
1.3	In Great Britain this species is classified as Vulnerable.	5.2 Site safeguard and management
<b>2.</b>	<b>Current factors causing loss or decline</b>	5.2.1 Where possible, ensure that all occupied habitat is appropriately managed by 2008. This may be through SSSI or agri-environment scheme management agreements. (ACTION: EN, MAFF)
2.1	Loss of ruderal communities on disturbed sand, including field margins.	5.2.2 Ensure that the species is included in site management documents for all relevant SSIS. (ACTION: EN)
2.2	Modern treatment of arable weeds through herbicide and seed cleaning.	5.2.3 Consider notifying as SSIS sites holding key populations of the species where this is necessary to secure their long-term protection and appropriate management. (ACTION: EN)
<b>3.</b>	<b>Current action</b>	5.3 Species management and protection
3.1	Brettenham is a NNR. Foxhole Heath and Maids cross Hill are SSIS. Cranwich Camp is a candidate SAC. Wangford Glebe roadside and Foxholes roadside are protected road verges.	5.3.1 Consider reintroducing Harpalus froelichi to a series of sites within the former range if necessary to maintain five viable populations by 2010. (ACTION: EN)
<b>4.</b>	<b>Action plan objectives and targets</b>	5.4 Advisory
4.1	Maintain populations at all known sites.	5.4.1 Liaise with landowners and managers about the presence of the species and the importance of beneficial management for its conservation. (ACTION: EN)
4.2	Enhance populations at all known sites by 2010.	5.5 Future research and monitoring
4.3	Ensure the maintenance of five viable populations across the historic range by 2010.	5.5.1 Undertake surveys to determine the status of the species. (ACTION: EN)
<b>5.</b>	<b>Proposed action with lead agencies</b>	5.5.2 Conduct targeted autecological research to inform habitat management. (ACTION: EN)
	The processes required to deliver the above objectives involve appropriate management of known habitats for the species and, if necessary, reintroduction to potential sites within its historic range. Surveys to determine its	5.5.3 Establish a regular monitoring programme for this species. (ACTION: EN)
		5.5.4 Pass information gathered during survey and monitoring of this species to a central database for incorporation into national and international databases. (ACTION: EN)
		5.6 Communications and publicity
		5.6.1 Promote opportunities for the appreciation of this species and the conservation issues associated with sandy ruderal habitats. This should be achieved via articles

within appropriate journals as well as by a publicity leaflet. (ACTION: EN)

5.7 Links with other action plans

- 5.7.1 It is likely that implementation of this action plan will benefit other species of sandy ruderal habitats including the leafbeetle *Psylloides sophiae* and the four-spotted moth *Tyta luctuosa*.
- 5.7.2 The plan should be considered in conjunction with those for cereal field margins and coastal sand dunes.

## Synaptus filiformis (a click beetle) Action Plan

### 1. Current status

1.1 The larvae of *Synaptus filiformis* have not been found in Britain but they live in waterlogged soils and are able to survive both brackish and freshwater inundation. They are probably omnivorous. Adults appear in May and June and occur on waterside vegetation, especially reed canary-grass *Phalaris arundinacea*.

1.2 In Great Britain, all recent records have been from between Burrow Bridge and Oath on the River Parrett in Somerset. It used to be regularly found on islands in the River Thames in the Sunbury/Walton-on-Thames area. There are old records from the Severn catchment between Bristol and Tewkesbury, including Tintern, Monmouth, on the River Wye and the Newent Canal. *Synaptus filiformis* is found throughout central and southern Europe.

1.3 In Great Britain this species is classified as Endangered.

### 2. Current factors causing loss or decline

2.1 River engineering operations including channel straightening and deepening, bank grading, flood defence works and impoundment.

2.2 Inappropriate management, especially overgrazing or close mowing of river banks, or neglect leading to encroachment of scrub.

2.3 Drainage and agricultural improvement of river corridor wetlands.

2.4 Pollution/nutrient levels in the river water and sediments may be a factor.

### 3. Current action

3.1 A survey of the status of *Synaptus filiformis* along the River Parrett, funded by the National Rivers Authority, was carried out in 1992.

### 4. Action plan objectives and targets

4.1 Maintain a viable population in the catchment of the River Parrett.

4.2 Enhance the River Parrett population size by 2010.

4.3 If confirmed as absent from the Thames catchment, establish three viable populations at suitable sites in this catchment by 2010.

### 5. Proposed action with lead agencies

The priority action is to establish a beneficial habitat management regime along the River Parrett to maintain and enhance existing populations. Surveys of all historic sites for the species, to determine current distribution and status and to identify suitable habitat, combined with autecological studies, are a prerequisite of any reintroduction attempts.

#### 5.1 Policy and legislation

5.1.1 Address the requirements of the species in the LEAP process and in relevant WLMPs. (ACTION: EA, IDBs, LAs, MAFF)

5.1.2 Ensure that the habitat requirements of the species are taken into account in flood defence and channel maintenance activities in areas where the species occurs. (ACTION: EA, IDBs, MAFF)

#### 5.2 Site safeguard and management

5.2.1 Ensure that all occupied habitat is appropriately managed by 2008. (ACTION: EA, EN)

5.2.2 Ensure that the habitat requirements of *Synaptus filiformis* are taken into account in any development policies, plans and proposals likely to affect the River Parrett corridor. (ACTION: EA, EN, LAs)

5.2.3 Consider notifying as SSSIs areas along the River Parrett holding key populations of the species where this is necessary to secure their long-term protection and appropriate management. (ACTION: EN)

#### 5.3 Species management and protection

5.3.1 (Re)introduce the species to a series of sites within the historical range in the Thames catchment if necessary to establish three viable populations by 2010. (ACTION: EN)

5.3.2 Consider reintroduction of *Synaptus filiformis* to suitable sites elsewhere in its historical range (ACTION: EN)

#### 5.4 Advisory

5.4.1 Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation. (ACTION: EN)

#### 5.5 Future research and monitoring

5.5.1 Undertakes surveys to determine the status of the species. (ACTION: CCW, EA, EN)

5.5.2 Conduct targeted autecological research to inform habitat management. (ACTION: EA, EN)

5.5.3 Establish a regular monitoring programme for populations along the River Parrett. (ACTION: EA, EN)

5.5.4 Pass information gathered during survey and monitoring of this species to a central database for incorporation into national and international databases. (ACTION: CCW, EA, EN)

5.6 Communications and publicity

5.6.1 Promote opportunities for the appreciation of the species and the conservation issues associated with its habitat. This should be achieved via articles within appropriate journals as well as by a publicity leaflet. (ACTION: EA, EN)

5.7 Links with other action plans

5.7.1 This action plan should be considered in conjunction with that for coastal and floodplain grazing marsh.

## River shingle beetles Grouped Action Plan

### 1. Current status

- 1.1 This action plan covers six beetle species, three in the family Carabidae (*Perileptus areolatus*, *Bembidion testaceum* and *Lionychus quadrillum*), one in the family Hydrophilidae (*Hydrochus nitidicollis*), and two in the family Staphylinidae (*Thinobius newberyi* and *Meotica anglica*). The species share a specific and, in some instances, more or less exclusive association with exposed riverine sediments, mostly of the shingle type. As a consequence of high fidelity to their particular riparian habitats, each of the six species has a restricted, patchy and (generally) western distribution in Great Britain. Most of the six species also appear to have suffered losses of or declines in some populations during this century, with the result that their British ranges have contracted.
- 1.2 All six species covered have known ranges in Great Britain that are western or have a western bias; for most of them recorded occurrences are scattered.

*Perileptus areolatus* is a predaceous species exclusively associated with exposed riverine sediments of shingle or sand, mostly near to the water's edge. Older UK records for the species are scattered but extend from Cornwall north to southern Scotland and eastwards to the Isle of Wight in the south and Yorkshire in the north. However, there are no recent records for a number of the areas where the species was once found; most post-1970 records are for Wales and the Welsh borders. There are also recent records for southern Scotland and for south Devon. The species is widely distributed in Europe.

*Bembidion testaceum* is a predaceous riparian species associated with sand and gravel by slow-running or standing water. The species may be overlooked as it can be difficult to distinguish from some other British species of *Bembidion*. Old records may be unreliable, but the species undoubtedly once had a fairly wide, if very scattered and mainly western, distribution in England, Wales and southern Scotland. There are recent records for only 4 ten km squares, two in northern England, one in south Wales and one in the Welsh borders. The species is widely distributed in mainland Europe and is at the northern and western limit of its range in Britain.

*Lionychus quadrillum* was long considered to be not only a very localised but also a largely coastal species in Britain. Old British records are scattered around the east, south-east, south and south-west English coasts. The species has suffered losses of many of its former coastal populations during this century, mostly through loss of suitable habitat due to construction of coastal defences, seaside resorts and other developments, and agricultural intensification. There are recent records for just a few coastal English sites in the east (Suffolk and north Essex) and in the south-west. However, in recent

years the species has also been shown to be well established inland in association with shingle and sand banks at a number of sites on Welsh rivers (Rheidol, Tywi, Ystwyth, Usk). In continental Europe the species is widespread both on the coast and inland, mostly in association with riverine shingle and sand, but is known to occur also on bare, shingly ground away from water, for example in south Sweden where the species has recently been expanding its range.

*Hydrochus nitidicollis*, like other members of its genus, is essentially aquatic as both adult and larva, but may be found in wet substrates above as well as below high water levels. It favours clean and mostly running water. Adults have been collected in pitfall traps on shingle bars, but it is also known to occur in association with exposed riverine sediment substrates that are relatively fine-grained. The species has a very restricted UK distribution, confined to the south-west peninsula of England, and has never been known to occur more widely in Britain. It has been recorded from a total of 10 ten km squares in Devon and Cornwall, six of which are in the Dartmoor district. There are several post-1970 records, covering three areas: Lothwithiel in west Cornwall, Falmouth, and the Rivers Teign and Bovey in Devon. There is no clear evidence of recent decline in the UK, but at least some of the sites where the species has occurred are under threat from development. The continental distribution of the species is markedly western, with the species quite widely recorded in the Iberian peninsula and found southwards as far as Morocco.

*Thinobius newberyi* is a small and easily overlooked species that appears to be of largely subterranean habits. Like other species of *Thinobius* it probably feeds on decaying plant material or algae and is associated with shingle banks. There are old records for streamside situations in Cumberland and the Aviemore district of the Scottish Highlands, but the only recent records for the species are for the banks of the Rivers Rheidol, Tywi and Ystwyth in Wales. Although probably of very localised distribution, the species is undoubtedly under-recorded, and this is likely to account for its current status as a putatively endemic British species. Specialist collecting in suitable parts of mainland Europe may be expected to reveal its presence.

*Meotica anglica* is a tiny and probably much overlooked species of possibly predaceous habits associated with riparian gravel and sand. Like *Thinobius newberyi*, it appears to be largely subterranean and rarely seen on the surface of the substrates that it inhabits. There are old records for scattered localities from southern Scotland to southern England, mostly in the west. Recent records cover some 4 ten km squares in southern Scotland, three localities in England, the banks of the Rivers Taf, Usk and Severn in Wales, and the Mole in Surrey. Although very similar species occur in Scandinavia, these are

	apparently distinct, and so far the species has not been found outside of Britain. However, it is likely to occur in other parts of western Europe.	confluence), where two of the species considered here were found.
1.3	In Great Britain the species covered here are now classified as Rare ( <i>Lionychus quadrillum</i> and <i>Hydrochus nitidicollis</i> ), Indeterminate ( <i>Thinobius newberyi</i> ), or Nationally Scarce ( <i>Perileptus areolatus</i> , <i>Bembidion testaceum</i> , and <i>Meotica anglica</i> ). In addition, <i>Thinobius newberyi</i> and <i>Meotica anglica</i> are classified as Endemic.	3.5 A number of the sites where one or more of the six species are known to occur are designated as SSSIs, fall within ESAs, or benefit from some form of protected status. Several rivers supporting one or more of these species, including the Tywi, Usk and Wye in Wales, are candidate SACs.
2.	<b>Current factors causing loss or decline</b>  Factors likely to affect the habitats used by these species include:	<b>4. Action plan objectives and targets</b>
2.1	River engineering, eg straightening, dredging, or grading of river banks.	4.1 Maintain viable populations within each of the catchments currently occupied by these species.
2.2	Level regulation and control of flow by damming and flood alleviation schemes.	4.2 Enhance populations at selected sites by 2010.
2.3	Livestock encroachment on riverside shingle and other river-bank features.	<b>5. Proposed action with lead agencies</b>
2.4	Water abstraction.	5.1 Policy and legislation
2.5	Agricultural improvement resulting in drainage and nutrient enrichment.	5.1.1 Where appropriate, include the requirements of the species when preparing or revising prescriptions for agri-environment schemes. (ACTION: CCW, EN, MAFF, NAW, SE, SNH)
2.6	Land use changes and development (eg urban) that impinge on riparian habitats.	5.1.2 Address the requirements of these species in the LEAP process, and in relevant catchment management plans. (ACTION: CCW, EA, EN, SEPA, SNH)
2.7	Colonisation of river banks by Himalayan balsam ( <i>Impatiens glandulifera</i> ) and other invasive plant species.	5.1.3 Take account of the species' requirements in response to applications for water abstraction and discharge licenses. (ACTION: EA, SWAs)
3.	<b>Current action</b>	<b>5.2 Site safeguard and management</b>
3.1	EA, CCW and EN have recently joint-funded programmes aimed at improving knowledge of the UK distribution and characteristics of the specialist invertebrate species associated with exposed riverine sediments. Surveys have taken place in a wide range of catchments across England and Wales.	5.2.1 Where possible, ensure that all occupied sites are appropriately managed, including the maintenance or restoration of appropriate flow regimes. (ACTION: CCW, EA, EN, IDBs, MAFF, NAW, SE, SEPA, SNH)
3.2	SNH funded an extensive survey of exposed sediments in the catchments of the Carron, Spey, Nith and Tweed in 1996 and 1997. The aim was to survey the habitat resource and to characterise the sediment types favoured by the specialist invertebrate fauna.	5.2.2 Ensure that the habitat requirements of the species are taken into account in any development policies, plans and proposals, particularly in relation to river engineering. (ACTION: CCW, EA, EN, IDBs, LAs, SEPA, SNH)
3.3	Surveys of exposed riverine sediment (ERS) features in several Welsh river systems, including the Rheidol, Ystwyth and Mawddach, have been undertaken during the past decade by or in conjunction with CCW.	5.2.3 Ensure that the species are included in site management documents for all relevant SSSIs. (ACTION: CCW, EN, SNH)
3.4	In connection with a Public Enquiry in 1998, EA (Devon Area) commissioned a report on the ERS beetles of sections of the Rivers Teign and Bovey (near their	<b>5.3 Species management and protection</b>
		5.3.1 Consider notifying as SSSIs sites supporting viable populations where this is necessary to secure their long-term protection and appropriate management. (ACTION: CCW, EN, SNH)
		<b>5.4 Advisory</b>
		5.4.1 Advise landowners and managers of the presence of these species and the importance of beneficial management for

	their conservation. (ACTION: CCW, EA, EN, SEPA, SNH)	5.6	Communications and publicity
5.4.2	Ensure that all relevant agri-environment project officers, members of regional agri-environment consultation groups, relevant drainage engineers and waterways managers are advised of locations for these species, their importance, and the management needed for their conservation. (ACTION: CCW, EA, EN, IDBs, MAFF, NAW, SE, SEPA, SNH)	5.6.1	Promote opportunities for the appreciation of exposed riverine sediments species and of the conservation issues associated with their habitats. This may be achieved by articles in conservation-related wildlife, environmental, and user-group (eg anglers) journals, by posters and leaflets, and by involving the media in a publicity campaign. (ACTION: CCW, EA, EN, SEPA, SNH)
5.5	Future research and monitoring	5.7	Links with other action plans
5.5.1	Continue to undertake surveys to determine the UK status of these species. (ACTION: CCW, EA, EN, SEPA, SNH)	5.7.1	It is likely that implementation of this action plan will benefit other species of exposed riverine sediments, including the cranefly <i>Rhabdomastix laeta</i> , the stiletto flies <i>Cliorismia rustica</i> and <i>Spiriverpa lunulata</i> , the diving beetle <i>Bidessus minutissimus</i> , and the ground beetle <i>Dyschirius angustatus</i> .
5.5.2	Conduct targeted autecological research to inform habitat management. (ACTION: CCW, EN, SNH)		
5.5.3	Establish a regular monitoring programme for the species and their habitats. (ACTION: CCW, EA, EN, SEPA, SNH)		
5.5.4	Pass information gathered during survey and monitoring of these species to a central database for incorporation into national and international databases. (ACTION: CCW, EA, EN, SNH)		
5.5.5	Undertake taxonomic and other investigations to clarify the putative endemic status of <i>Thinobius newberyi</i> and <i>Meotica anglica</i> . (ACTION: CCW, EN, SNH)		
5.5.6	Encourage research on the ecology and conservation of these species on an international level and use the experience gained towards their conservation in the UK. (ACTION: CCW, EN, JNCC, SNH)		

## **Amara strenua (a ground beetle) Species Statement**

### **1. Current status**

- 1.1** *Amara strenua* occurs in saltmarshes and grasslands near the coast, where it is found under vegetation and stones. It has an annual life cycle, but whether it breeds in the spring or autumn is not clear. Adults are mainly predatory but the larvae may feed on seeds and other plant material. It is probably able to fly.
- 1.2** *Amara strenua* occurs very locally around the southern part of the English coast from east Norfolk to north Somerset. In the last century it was reported mainly from the Isle of Wight and, early this century, in the Thames estuary, but it has not been recorded from either of these areas recently. Recent records are from Norfolk, Kent and Somerset, but it is probably under-recorded. In Europe *Amara strenua* extends from England and Denmark south to Austria, where it occurs on river banks.
- 1.3** In Great Britain this species is classified as Rare.

### **2. Current factors causing loss or decline**

- 2.1** Loss of saltmarsh and coastal wet grassland habitat through reclamation.

### **3. Current action**

- 3.1** Some of the currently known sites are SSSIs.

### **4. Objective for the species**

- 4.1** Maintain the known populations and range of *Amara strenua*.

### **5. Proposed action**

- 5.1** Monitoring only. The requirements of the species should be taken into account in the delivery of the action plans for saltmarsh and coastal and floodplain grazing marsh.

## **Anisodactylus nemorivagus (a ground beetle) Species Statement**

### **1. Current status**

- 1.1 Anisodactylus nemorivagus occurs on open, sandy heathland. It has an annual life cycle, breeding in the spring with larvae in summer. The adults overwinter. Both adults and larvae are probable phytophagous, feeding mainly on seeds. The species is winged and can fly.
- 1.2 Anisodactylus nemorivagus is currently restricted to southern England, with recent records from heathlands in and around the New Forest in Hampshire, and Wiltshire and Surrey. It has also been recorded this century from Berkshire, Suffolk and Glamorgan, but formerly extended into Norfolk. It occurs throughout central and southern Europe although it is regarded as rare in some northern areas.
- 1.3 In Great Britain this species is classified as Nationally Scarce.

### **2. Current factors causing loss or decline**

- 2.1 Loss and fragmentation of heathland.
- 2.2 Inappropriate heathland management, leading to loss of open ground and scrub encroachment.

### **3. Current action**

- 3.1 Extant sites are within SSSIs or NNRs.

### **4. Objective for the species**

- 4.1 Maintain known populations of Anisodactylus nemorivagus.

### **5. Proposed action**

- 5.1 Monitoring only. The requirements of the species should be taken into account in the delivery of the action plan for lowland heathland.

## **Badister peltatus (a ground beetle) Species Statement**

### **1 Current status**

- 1.1 Badister peltatus is found on mud and in vegetation near standing fresh water in lowland marshes and fens. It has also been recorded in a flooded sand pit. It has an annual life cycle. Adults probably breed in spring and early summer and overwinter in tussocks and leaf-litter. Both adults and larvae are predatory, probably feeding mainly on small snails. The species is probably winged.
- 1.2 Badister peltatus has occurred widely but very locally in southern Britain from Caernarvonshire to Norfolk, but most recent records are from coastal marshes in Sussex and Kent. It has not been recorded since 1988. It is found across most of central and eastern Europe.
- 1.3 In Great Britain this species is classified as Nationally Scarce.

### **2. Current factors causing loss or decline**

- 2.1 Drainage of wetlands.

### **3. Current action**

- 3.1 The Sussex sites are within NNRs; other sites are within SSSIs.

### **4. Objective for the species**

- 4.1 Maintain any discovered populations of Badister peltatus.

### **5. Proposed action**

- 5.1 Search only. The requirements of the species should be taken into account in the delivery of the action plans for fens, eutrophic standing waters, mesotrophic lakes, and coastal and floodplain grazing marsh.

## **Bembidion humerale (a ground beetle) Species Statement**

### **1. Current status**

- 1.1 Bembidion humerale occurs on moist, partly bare peat in ombrotrophic bogs, usually at the margin of shallow water. It has an annual life cycle, breeding in the spring with summer larvae. Adults overwinter in tussocks and leaf-litter. Both adults and larvae are predatory on small invertebrates. The species is winged.
- 1.2 Bembidion humerale is known in the UK only from Crowle, Thorne and Hatfield Moors in south Yorkshire and north Lincolnshire, where it was first recorded in 1975. It is occasionally found at the margins of peaty land-drains on the periphery of these sites, but it is uncertain whether these are self-sustaining populations or stragglers from nearby peatland. It is a central European species, extending north to southern Scandinavia.
- 1.3 In Great Britain this species is classified as Endangered.

### **2. Current factors causing loss or decline**

- 2.1 Destruction of habitat resulting from drainage and commercial peat extraction.
- 2.2 Subsequent scrub and bracken encroachment.

### **3. Current action**

- 3.1 All extant sites are within SSSIs and part of Thorne Moors and NNR. A monitoring methodology has been developed for this species.

### **4. Objective for the species**

- 4.1 Maintain the known populations of Bembidion humerale.

### **5. Proposed action**

- 5.1 Monitoring only. This species will benefit from the action plan for the mire pill beetle Curimopsis nigrita. The requirements of the species should be taken into account in the delivery of the action plan for lowland raised bogs.

## **Bembidion nigropiceum (a ground beetle) Species Statement**

### **1. Current status**

- 1.1** Bembidion nigropiceum is a coastal species found in shingle and coarse sand, as well as among rubble at the base of cliffs. It has an annual life cycle, probably breeding in the spring with summer larvae. Both adults and larvae are predatory on small invertebrates and may usually be subterranean. The species is probably wingless.
- 1.2** Bembidion nigropiceum occurs around the coast of southern Britain from Kent to Pembrokeshire, although it is probably under-recorded. In Europe it occurs along the English Channel, and also on the Mediterranean coast.
- 1.3** In Great Britain this species is classified as Nationally Scarce.

### **2. Current factors causing loss or decline**

- 2.1** The species may be vulnerable to certain types of coastal development and coastal defence works designed to prevent erosion.

### **3. Current action**

- 3.1** Several known sites are within SSSIs or NNRs.

### **4. Objective for the species**

- 4.1** Maintain the known range of Bembidion nigropiceum.

### **5. Proposed action**

- 5.1** Monitoring only. The requirements of the species should be taken into account in the delivery of the action plans for coastal vegetated shingle structures and maritime cliff and slopes.

## **Ceutorhynchus insularis (a weevil) Species Statement**

### **1. Current status**

- 1.1 The weevil *Ceutorhynchus insularis* feeds on common scurvygrass *Cochlearia officinalis* in coastal areas. The larvae are probably leaf-miners, though there is no direct evidence of this. Adults are found in spring, early summer and autumn, and overwinter. The larval stages occur in mid-to-late summer.
- 1.2 *Ceutorhynchus insularis* was described as a new species as recently as 1971. It is known from only thirteen specimens and from only two localities: Dun, in the St. Kilda archipelago, and the island of Vestmannaeyjar off the south coast of Iceland. Until 1971 this weevil was thought to be a form of the common *C. contractus* and was confused with another form of that species which occurs on Lundy Island.
- 1.3 In Great Britain this species is classified as Endangered.

### **2. Current factors causing loss or decline**

- 2.1 None known.

### **3. Current action**

- 3.1 St. Kilda is a SSSI, NNR, Biosphere Reserve and World Heritage Site.

### **4. Objective for the species**

- 4.1 Maintain the population on St. Kilda.

### **5. Proposed action**

- 5.1 Monitoring and clarification of taxonomic status only. The requirements of the species should be taken into account in the delivery of the action plan for maritime cliff and slopes.

## Dune tiger beetle ( *Cicindela maritima* ) Species Statement

### 1. Current status

- 1.1 The dune tiger beetle is a coastal species, occurring on dunes and sandy beaches and in tidal refuse. It runs and flies readily in search of insect prey. It has an annual life cycle, breeding in spring and summer, with larvae in burrows in hard packed sand. The winter is spent as pupae or teneral adults in the burrows.
- 1.2 The dune tiger beetle now occurs mainly on each side of the Bristol Channel, but also in north-west Wales, Kent and Norfolk. There are earlier records this century from Lincolnshire, Hampshire and Cornwall. In Europe it is widespread and not always restricted to the coast.
- 1.3 In Great Britain this species is classified as Nationally Scarce.

### 2. Current factors causing loss or decline

- 2.1 Coastal development, especially for tourism.
- 2.2 Excessive disturbance from recreational use.
- 2.3 Erosion of dunes at Titchwell.

### 3. Current action

- 3.1 Most extant sites are within SSSIs or NNRs.
- 3.2 The dune tiger beetle occurs on the Titchwell RSPB reserve where the distribution and numbers of adults was monitored from 1996 to 1998.

### 4. Objective for the species

- 4.1 Maintain the range of the dune tiger beetle.

### 5. Proposed action

- 5.1 Monitoring only. The requirements of the species should be taken into account in the delivery of the action plan for coastal sand dunes.

## **Cryptocephalus decemmaculatus (a leaf beetle) Species Statement**

### **1. Current status**

- 1.1** *Cryptocephalus decemmaculatus* is found on dwarf sallows or eared willows (*Salix aurita*) growing in Sphagnum moss on wet hillsides or on birch in areas of quaking bog. Adults are active, dropping or flying when disturbed, and are likely to be under-recorded. The eggs are dropped to the ground and the case-bearing larvae probably develop in litter. In captivity on sallow (*Salix caprea*), larval development takes one year.
- 1.2** *Cryptocephalus decemmaculatus* is widely distributed in northern and central Europe, from the Pyrenees and Scandinavia to Siberia. In the UK, the species has a disjunct distribution, recorded from Rannoch & Braemar in the Highlands and Chartley Moss, Staffordshire, and Wybunbury Moss, Cheshire. There was a 19th century record from East Sussex. There is no evidence of recent decline.
- 1.3** In Great Britain this species is classified as Vulnerable.

### **2. Current factors causing loss or decline**

- 2.1** Inappropriate scrub management or site drainage may affect suitable habitats.
- 3. Current action**
- 3.1** Chartley Moss and Wybunbury Moss are NNRs, and some areas around Loch Rannoch are SSSIs/NNRs.
- 3.2** Research on this species' ecological requirements is part of the subject of PhD research on all BAP priority species of this genus, currently being undertaken at the University of Leeds.

### **4. Objective for the species**

- 4.1** Maintain the range of *Cryptocephalus decemmaculatus*.

### **5. Proposed action**

- 5.1** Monitoring only. The requirements of the species should be taken into account in the delivery of the action plan for lowland raised bogs.

## **Dromius quadrisignatus (a ground beetle) Species Statement**

### **1. Current status**

- 1.1 Dromius quadrisignatus is found very locally in broad-leaved woodland and pasture woodland. It occurs either on trees under bark or amongst dead twigs, branches and litter on slightly damp ground. Both adults and larvae are predatory under bark. It is probably spring-breeding and is fully winged.
- 1.2 Dromius quadrisignatus has been found from west Cornwall to Fife, but the most recent records are only from Bushey Park, Middlesex, and Sherwood Forest, Nottinghamshire. It was last recorded in 1986. In Europe it is widespread, but found mainly in southern and central regions.
- 1.3 In Great Britain this species is classified as Endangered.

### **2. Current factors causing loss or decline**

- 2.1 None known.

### **3. Current action**

- 3.1 Sherwood Forest is a SSSI and candidate SAC.

### **4. Objective for the species**

- 4.1 Maintain any discovered populations of Dromius quadrisignatus.

### **5. Proposed action**

- 5.1 Search only. The requirements of the species should be taken into account in the delivery of the action plan for lowland wood pasture and parkland.

## **Dromius sigma (a ground beetle) Species Statement**

### **1. Current status**

- 1.1 Dromius sigma is found on muddy or peaty soils near standing water infens, lowland marshes, flooded quarries and gravel pits. It has an annual life cycle and probably breeds in the early summer, overwintering as immature adults, often in tussocks of tufted hair-grass *Deschampsia cespitosa*. Both adults and larvae are predatory on small invertebrates. In Britain the species is probably always wingless.
- 1.2 Dromius sigma now occurs in central and eastern England, with recent records from beside the River Idle in Nottinghamshire, Inkle and Thorne Moors in South Yorkshire, Elland Gravel Pits in West Yorkshire, Askham Bog in North Yorkshire and Scolt Head in Norfolk. Its earlier distribution extended from Cumberland to south Hampshire. It is widespread in Europe.
- 1.3 In Great Britain this species is classified as Nationally Scarce.

### **2. Current factors causing loss or decline**

- 2.1 Drainage of wetlands.
- 2.2 Peat extraction.

### **3. Current action**

- 3.1 Most extant sites are within SSSIs or NNRs.

### **4. Objective for the species**

- 4.1 Maintain the range of Dromius sigma.

### **5. Proposed action**

- 5.1 Monitoring only. The requirements of the species should be taken into account in the delivery of the action plans for fens and lowland raised bogs.

## Harpalus cordatus and Harpalus parallelus (ground beetles) Joint Species Statement

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| <p>1. Current status</p> <p>1.1 Harpalus cordatus and H. parallelus are found on coastal dune grassland and inland chalk grasslands and quarries in exposed, sunny locations. They both have annual life cycles. H. cordatus breeds in summer through to autumn, with winter larvae and pupae in the spring. H. parallelus breeds in the spring and early summer, with summer larvae, and overwinters as pupae or adults, probably in burrows in the soil. Both species are mainly seed-feeding in the larval and adult stages. They are also both fully winged, and flight is probable. Species of the genus <i>Harpalus</i> (subgenus <i>Ophonus</i>) can be very difficult to identify; <i>Harpalus cordatus</i> and <i>H. parallelus</i> are most likely to be confused with <i>H. melleti</i>, <i>H. puncticeps</i>, <i>H. puncticollis</i> and <i>H. rupicola</i>.</p> <p>1.2 Harpalus cordatus has occurred along the coast of southern England from Dorset to Kent, as well as possibly in Yorkshire, but since 1970 it has been found only in the Deal-Sandwich sandhills (Kent), Wilmington and Beachy Head (Sussex), Portsdown (Hants) and Red Cliff (Isle of Wight). It is at the northern limit of its range in Britain; in Europe it extends across central and southern Europe to Asia.</p> <p>H parallelus was formerly rare throughout south-east England, but since 1970 has been found only at Folkestone (Kent), Beachy Head and Rye Harbour (Sussex), Ventnor (Isle of Wight) and Great Morton (Northants). Its range probably extends south to Italy in Europe, although taxonomic confusion makes continental records of this species rather uncertain.</p> <p>1.3 In Great Britain both species are currently classified as Rare.</p> | <p>4. Objective for the species</p> <p>4.1 Maintain populations at all known sites.</p> <p>5. Proposed action</p> <p>5.1 Monitoring only. The requirements of the species should be considered in the delivery of the action plans for the click beetle <i>Melanotus punctolineatus</i>, the spider-hunting wasp <i>Evagetes pectinipes</i>, the fiery clearwing <i>Bembecia chrysidiiformis</i>, coastal sand dunes and lowland calcareous grassland.</p> |
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## **Harpalus dimidiatus (a ground beetle) Species Statement**

### **1. Current status**

1.1 Harpalus dimidiatus occurs predominantly in open, dry sites, either on inland or coastal calcareous grassland or on sandy coastal cliffs. Its distribution and habitat appear to be limited to sites where the soil warms rapidly in spring. Occasional records from other habitats include a river floodplain, saltmarshes and dunes. The adults are probably nocturnal and are mainly herbivorous, feeding on seeds, etc. The larval biology is unknown, but the larvae are probably herbivorous. Most records for the species are in spring and early summer, with a few as late as August and September. The species breeds in spring, and teneral adults have been collected in September.

1.2 Harpalus dimidiatus was formerly considered local but not uncommon in the south, with records prior to 1970 for southern England from south Devon, north Somerset, Dorset, Isle of Wight, south Hampshire, East Sussex, Kent, south Essex, Surrey, Berkshire and Oxfordshire. Post-1970 records covering just 9 ten km squares are known from scattered localities in north Somerset, Dorset, Surrey, Worcestershire, East Sussex, and Kent. The most recent published record was for an unrecorded number of specimens found at Spyway Farm, Dorset, in 1995. Early records suggest that the species could be abundant at known sites, with ten or more specimens collected in a day, but that it was very patchy within its overall area of distribution in southern England. Records from 1970 onward suggest that the species occurs only sporadically and in very small numbers, sometimes only as singletons. However, there is little evidence that previous sites have been resurveyed to determine whether or not the species has persisted. Harpalus dimidiatus is more or less at the northern limit of its world distribution in southern England. Within Europe, the species is generally distributed throughout southern and central Europe at least as far east as Turkey and the Black Sea. It is doubtfully recorded from Poland and is absent from Scandinavia, Denmark and the Baltic countries.

1.3 In Great Britain this species is classified as Nationally Scarce.

### **2. Current factors causing loss or decline**

2.1 Loss of calcareous grassland through agricultural improvement, road building or spread of urban and other land development.

2.2 Inappropriate grassland management, failing to maintain existing open calcareous grasslands, thus allowing successional changes to affect the habitat.

2.3 Stabilisation of coastal sand cliffs and coastal land development.

### **3. Current action**

3.1 The species has been recorded from Mount Caburn NNR and from a number of SSSIs and sites that belong to the National Trust.

### **4. Objective for the species**

4.1 Maintain populations at all known sites.

### **5. Proposed action**

5.1 Monitoring only. The requirements of the species should be considered in the delivery of the action plans for lowland calcareous grassland and maritime cliffs and slopes.

## **Harpalus obscurus (a ground beetle) Species Statement**

### **1. Current status**

- 1.1 Harpalus obscurus is found under stones in exposed, sunny locations in old chalk and limestone quarries. It has an annual life cycle and probably breeds in summer through to autumn, with winter larvae and pupae in the spring. Both adults and larvae are seed-feeders on ruderal plants, the larvae probably in burrows in the soil. H. obscurus is probably fully winged, and flight is possible. Species of the genus Harpalus (subgenus Ophonus) can be very difficult to identify; H. obscurus is most likely to be confused with H. ardosiacus and H. sabulicola.
- 1.2 Harpalus obscurus has occurred rarely throughout inland southern and eastern England, but since 1970 has been found only at Geeston Quarry (Leics/Rutland), Old Sulehay Forest Quarry (Northants) and, possibly, Bishops Itchington Quarry (Warwickshire). In Europe, it has a localised and discontinuous, mostly southern, montane distribution from Spain to the Crimea.
- 1.3 In Great Britain this species is classified as Endangered.

### **2. Current factors causing loss or decline**

- 2.1 Loss of former quarries to agriculture or urban development.
- 2.2 In-filling and scrub/tree growth in old chalk and limestone quarries

### **3. Current action**

- 3.1 None known.

### **4. Objective for the species**

- 4.1 Maintain populations at all known sites.

### **5. Proposed action**

- 5.1 Monitoring only. The requirements of the species should be considered in the delivery of the action plan for lowland calcareous grasslands.

## **Harpalus punctatulus (a ground beetle) Species Statement**

### **1. Current status**

- 1.1 Harpalus punctatulus is found in grassland and amongst open scrub on chalk or sandy soils, often under stones. It is an annual species that breeds mostly in the spring. The adults and the larvae are mainly seed-feeding. The beetle is winged and able to fly.
- 1.2 Harpalus punctatulus has recently been found only in east Suffolk and at Roydon Common in west Norfolk, but its earlier range includes most of southern England as far north as Nottinghamshire as well as the south Wales coast. It is found throughout most of Europe except the north.
- 1.3 In Great Britain this species is classified as Nationally Scarce.

### **2. Current factors causing loss or decline**

- 2.1 Not known.

### **3. Current action**

- 3.1 Roydon Common is a SSSI.

### **4. Objective for the species**

- 4.1 Maintain the range of Harpalus punctatulus.

### **5. Proposed action**

- 5.1 Monitoring only. The requirements of the species should be taken into account in the delivery of the action plan for lowland calcareous grassland.

## **Ochthebius poweri (a water beetle) Species Statement**

### **1. Current status**

- 1.1** Ochthebius poweri lives in seepages on sea cliffs. It appears to be essential for these seepages to be within the spray zone. An association with New Red Sandstone exposures around Exmouth is partly climatic and partly dictated by the structure of the rock lending itself to the production of small aquifers. Thus the species also occurs on limestone and clay cliffs in Wales. The life cycle has not been described.
- 1.2** Ochthebius poweri has been recorded from a total of 11 ten km squares in England and Wales, seven of which are post-1980. Its range is from Pembrokeshire to Dorset. *O. poweri* has a strikingly disjunct distribution, in southern England and Wales and thence from southern Portugal and Spain to Algeria, Italy and Greece.
- 1.3** In Great Britain this species is classified as Rare.

### **2. Current factors causing loss or decline**

- 2.1** Loss of habitat by coastal development, particularly contamination of cliff seepage by sewage effluent and rubbish infill.
- 2.2** Natural erosion and loss of seepage-fed cliff faces.

### **3. Current action**

- 3.1** Several of the sites for this species are notified as SSSIs.

### **4. Objective for the species**

- 4.1** Maintain the range of Ochthebius poweri.

### **5. Proposed action**

- 5.1** Monitoring only. The requirements of the species should be taken into account in the delivery of the action plan for maritime cliff and slopes.

## **Protagon ryei (a weevil) Species Statement**

### **1. Current status**

- 1.1 Protagon ryei is associated with red clover *Trifolium pratense* and possibly other clovers. Larvae feed in the flowerheads of the host in summer; the adults occur in spring and autumn and overwinter. The species is found in grasslands, waste places and machairs.
- 1.2 This weevil is known only from Shetland, Orkney and the Hebrides. It is rather common throughout its limited range. The taxonomic status of Protagon ryei is in doubt. It may be conspecific with *P. assimile*, which is a common species in the UK, and be part of a cline. The type specimens are currently unavailable for study.
- 1.3 In Great Britain this species is classified as Nationally Scarce and Endemic.

### **2. Current factors causing loss or decline**

- 2.1 None known.

### **3. Current action**

- 3.1 Several of the occupied sites are SSSIs or NNRs, or have other forms of protection.

### **4. Objective for the species**

- 4.1 Maintain the range of this species.

### **5. Proposed action**

- 5.1 Monitoring and clarification of taxonomic status only. The requirements of the species should be taken into account in the delivery of the action plan for machair.

## Lundy cabbage flea beetle ( *Psylliodes luridipennis* ) Species Statement

### 1. Current status

- 1.1 The larvae of this flea beetle mine the petioles and stems of Lundy cabbage *Coincyawrightii* and the adults feed on the leaves. Lundy cabbage is restricted to the island of Lundy, where it occupies a 2500 m length of the eastern cliffs, extending up to 600 m inland. Host plant numbers fluctuate from year to year, from just a few hundreds in the 1970s to over 10,000 flowering individuals in 1998.
- 1.2 The Lundy cabbage flea beetle is endemic to the island of Lundy in the Bristol Channel. The beetle is present throughout the host plant's range, which therefore determines the range of the beetle and probably its abundance.
- 1.3 In Great Britain this species is classified as Vulnerable and Endemic.

### 2. Current factors causing loss or decline

- 2.1 Encroachment by the invasive alien shrub *Rhododendron ponticum*.
- 2.2 Grazing of the foodplant by domestic sheep and feral goats.

### 3. Current action

- 3.1 Most of the range of its host plant is within a SSSI.
- 3.2 Monitoring of host plant range and abundance is being undertaken.
- 3.3 Rhododendron is being cleared on the cliff tops under a Countryside Stewardship agreement and on the sea cliffs under English Nature's Species Recovery Programme.

### 4. Objective for the species

- 4.1 Maintain the range of Lundy cabbage flea beetle.

### 5. Proposed action

- 5.1 Monitoring only. This species will benefit from the action plan for Lundy cabbage *Coincyawrightii*.

## **Tachys micros (a ground beetle) Species Statement**

### **1. Current status**

- 1.1 Tachys micros is a coastal species that occurs on and within areas of damp sand at the base of south-facing cliffslippages, as well as under stones on damp sand and near freshwater seepages oversand. It is an annual spring breeder, with both adults and larvae feeding on micro-invertebrates within the sand substrate. It is winged in Britain.
- 1.2 Tachys micros occurs locally around the south and west coasts of Britain from Kent to Caernarvonshire, but is probably under-recorded within its range. In Europe it occurs mainly in the south, as well as in north Africa.
- 1.3 In Great Britain this species is classified as Nationally Scarce.

### **2. Current factors causing loss or decline**

- 2.1 Cliff stabilisation schemes.

### **3. Current action**

- 3.1 Many extant sites are within SSSIs.

### **4. Objective for the species**

- 4.1 Maintain the range of Tachys micros.

### **5. Proposed action**

- 5.1 Monitoring only. The requirements of the species should be taken into account in the delivery of the action plan for maritime cliff and slopes.

## Saproxylic beetles Grouped Species Statement

### 1. Current status

- 1.1 All ten species in this group are associated with dead wood habitats on veteran trees in old deciduous woodlands and parklands. Some are restricted to single sites and/or host species, while others are more widespread and are found on a range of trees. Five species occur at Windsor Forest and Great Park only:

*Gnorimus variabilis* (Scarabaeidae). A chafer developing mainly in veteran oaks, but occasionally in beech and elm, with extensive red-rot in trunks, stumps and main branches where the larvae develop for two or three years before emerging as adults in the summer. There are 19th and early 20th century records for the London area but this species is now confined to Windsor.

*Lacon querceus* (Elateridae). A click beetle that develops in dry red-rotten oak wood in veteran trunks and fallen boughs.

*Ampedus nigerrimus* (Elateridae). A click beetle that develops in veteran oaks with extensive red rot and will occur in fallen or standing timber.

*Ampedus ruficeps* (Elateridae). A click beetle that develops in red-rotted cavities in branches and trunks of veteran oaks.

*Dryophthorus corticalis* (Dryophthoridae). A wood-boring weevil living in the red-rot of standing and fallen oak trees, possibly in association with the brown wood ant, *Lasius brunneus*.

A further four species occur at Windsor Forest and Great Park and a small number of other nationally or internationally important sites for the invertebrate fauna associated with veteran trees:

*Megapenthes lugens* (Elateridae). A click beetle living in decaying wood, mainly of elm, with a possible record for beech. It is restricted to Windsor, Epping Forest and the New Forest, although there are 19th century records for Surrey, Norfolk and Middlesex.

*Ampedus rufipennis* (Elateridae). A click beetle that lives in decaying wood and under bark of veteran individuals of a range of trees, including oak, elm, birch, ash and sycamore. It occurs at Windsor and several other important sites, including Moccas Park and Bredon Hill, as well as other sites in Surrey and Kent.

*Elater ferrugineus* (Elateridae). A click beetle living in hollows in veteran oak, beech, grey poplar, willow, walnut, ash and elm, particularly where there have been animal nests and/or where there is lesser stag beetle *Dorcus parallelipedus* activity. It occurs now only at

Windsor, Richmond Park in Surrey and the Icklingham Plain in Suffolk, although it formerly occurred in Cambridgeshire, Kent, Middlesex, Surrey, Berkshire, possibly Gloucestershire, and Glamorgan.

*Eucnemis capucina* (Eucnemidae). A false click beetle developing in decaying wood and under bark of veteran beech, ash and field maple and restricted to Windsor, the New Forest, and Bredon Hill, Worcestershire and its immediate environs.

The final species, the 'Moccas Beetle' *Hypebaeus flavipes* (Melyridae), occurs only at Moccas Park, Herefordshire. It is a malachite, or false soldier beetle, associated with very ancient oak trees, the adults occurring on the foliage. The ecology of the early stages is unknown but they are likely to be predatory in decaying wood.

### 1.2

All of the species covered by this statement are classified as Endangered in Great Britain, except *Ampedus rufipennis* which is classified as Vulnerable. *Hypebaeus flavipes* is the only species to be given special protection under Schedule 5 of the Wildlife and Countryside Act 1981. All species are internationally scarce or declining in all or parts of Europe.

### 2. Current factors causing loss or decline

#### 2.1

Loss or degradation of old woodlands and parklands, through changes of land-use such as conversion to arable farmland or urban development.

#### 2.2

Destruction and inappropriate management of veteran trees and loss of dead wood.

#### 2.3

Loss of continuity of mature timber habitats due to poor age structure of the host trees.

### 3. Current action

#### 3.1

Moccas Park and part of Bredon Hill are NNRs. The New Forest, Bredon Hill, Epping Forest and part of Windsor Forest and Great Park are candidate SACs. All of the other sites referred to are designated as SSSIs.

#### 3.2

There are cooperative statements of intent between EN and the Crown Estates at Windsor, and between EN and Forest Enterprise in the New Forest.

#### 3.3

EN have appointed a part-time liaison officer at Windsor to heighten the Crown Estate's awareness of conservation issues associated with ancient trees.

#### 3.4

Subject to the constraints of public safety and, to some extent, landscape, management of dead wood at Windsor Forest and Great Park now includes retention of large quantities of standing dead timber and fallen branches and trees. There are non-intervention areas in Windsor

Forest and some areas of restoration to wood pasture are planned.

- 3.5 Research undertaken in the construction of artificial habitats for rare saproxylic click beetles is under way at Windsor and Bredon Hill.

4. Objective for the species

- 4.1 Maintain the range of each species.

5. Proposed action

- 5.1 Monitoring and search only. It is likely that the species will benefit from the action plans for other species of parks and wood-pastures, including the stag beetle *Lucanus cervus*, the bark beetle *Gastrallus immarginatus* and the violet click beetle *Limoniscus violaceus*. The requirements of the species should be taken into account in the delivery of the action plan for lowland wood pasture and parkland.

# Hymenoptera



## Dark guest ant ( *Anergates atratulus* )

### Action Plan

#### 1. Current status

- 1.1 The dark guest ant is an obligate social parasite (inquiline) in the colonies of another ant, *Tetramorium caespitum*. As such, its status is closely linked to that of its host species, which is itself locally distributed in Great Britain. Due to its parasitic nature, the dark guest ant is necessarily rarer than its host and it appears to survive only where population densities of *T. caespitum* are high. The biology of this parasite is poorly understood but newly mated queens appear either to secure adoption in a queenless colony of *T. caespitum* or else to lead to the host queen being killed or starved by her own workers. The dark guest ant does not have workers of its own and so the total resources of the host colony are then diverted to the development of large numbers of new dark guest ant queens and wingless males.
- As no further host workers are produced, the dark guest ant queen must produce new generations before the colony dies out in about two to five years, and therefore she soon becomes massively swollen with eggs. Such queens are themselves rarely found in nests; more commonly the yellowish larvae (contrasting with the white *Tetramorium* larvae), the winged queens or the pale pupoidal males are found. Mating occurs within the nest and the queens then fly out from May to August to find new host colonies. Many records are due to catches of these winged queens rather than from locating parasitised nests.
- 1.2 In Great Britain the host ant, *T. caespitum*, nests in areas of dry lowland sandy heath, coastal zones and some rocky inland areas with short dry acid turf. Although *T. caespitum* has been recorded from coastal sites as far north as Scotland, it is predominantly a southern species requiring habitats with sparse vegetation cover (greater than 40% bare ground) and attracting high levels of insolation at the ground surface. The greatest population densities of this host species occur mainly along the south coast of Britain and on the lowland heaths of Dorset, Hampshire and Surrey. The dark guest ant has consequently been recorded from the cliffs at Bolt Head and Bolberry Down in south Devon, the shingle beds at Dungeness, the heathlands of Purbeck and around Wareham and Hurn in Dorset, near Burley and Beaulieu Road Station in the New Forest, and the heaths at Longmoor in Hampshire and Pirbright Common in Surrey. It has also been recorded from Jersey. However, it is easily overlooked and is probably under-recorded. The dark guest ant is found across the Palearctic and, along with its host, it has become well established in the eastern United States.
- 1.3 In Great Britain this species is now classified as Insufficiently known. It is classified by the IUCN (1996) as globally Vulnerable.

#### 2. Current factors causing loss or decline

Due to the sparsity of records and insufficient knowledge of the species, it is not possible to state whether the dark guest ant is actually in decline. However, since the status of the species is so closely linked to that of its host, and populations of *T. caespitum* do appear to be in decline (particularly on some lowland heaths), the main factors adversely affecting its host species will be relevant. These include the following:

- 2.1 Loss of suitable heathland habitat through urban or industrial development, agricultural improvement and afforestation.
- 2.2 Inappropriate heathland management.
- 2.3 Inappropriate coastal development or cliff stabilisation.
- 2.4 Changes in grazing practice where the host species occurs on short dry acid grassland and cliff-top turf.

#### 3. Current action

- 3.1 Many of the sites where the dark guest ant has been recorded are afforded some protection as SSSIs, NNRs, or other nature reserves.

#### 4. Action plan objectives and targets

- 4.1 Maintain host populations at known sites for the dark guest ant.
- 4.2 Encourage the expansion of host populations at up to five sites supporting the dark guest ant by 2010.

#### 5. Proposed action with lead agencies

Survey of known and potentially suitable sites for the dark guest ant are necessary in order to confirm its status and that of its host. If necessary, further research into the ecological requirements of *T. caespitum* should be undertaken. Any sites where the dark guest ant and its host appear to be in serious decline should be identified. If these sites are not currently protected, then means of safeguarding them should be investigated. Appropriate management should be implemented to increase host population densities at these sites by 2010. Concurrent monitoring of host and parasite populations will be required.

5.1	Policy and legislation	5.6	Communications and publicity
5.1.1	Give due consideration to the protection of the dark guest ant and its host when dealing with policy and planning issues affecting lowland heaths and coastal zones. (ACTION: EN, LAs)	5.6.1	Promote opportunities for the appreciation of the dark guest ant and the conservation issues associated with its habitat. This should be achieved via articles in appropriate journals and other forms of media. (ACTION: EN)
5.1.2	Where appropriate, include the requirements of the dark guest ant and its host when preparing or revising prescriptions for agri-environment schemes. (ACTION: EN, MAFF)	5.7	Links with other action plans
5.2	Site safeguard and management	5.7.1	It is likely that implementation of this action plan will benefit other species of lowland heaths and coastal cliffs, including the ground beetles <i>Cicindela sylvatica</i> , <i>Pterostichus kugelanni</i> and <i>Amarafamelica</i> , woodlark <i>Lullula arborea</i> and sand lizard <i>Lacerta agilis</i> .
5.2.1	Where possible, ensure that known sites for the dark guest ant are appropriately managed, for example through SSSIs or agri-environment scheme management agreements. (ACTION: EN, FC, MAFF)	5.7.2	This plan should be considered in conjunction with that for lowland heathland and maritime cliff and slopes.
5.2.2	Ensure that the dark guest ant is included in site management documents for all relevant SSSIs. (ACTION: EN)		
5.3	Species management and protection		
5.3.1	None proposed.		
5.4	Advisory		
5.4.1	Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation. (ACTION: EN)		
5.4.2	As far as possible, ensure that all relevant agri-environment project officers and members of regional agri-environment consultation groups are advised of locations of this species, its importance and the management needed for its conservation. (ACTION: EN, MAFF)		
5.5	Future research and monitoring		
5.5.1	Undertake surveys to determine the status of this species. (ACTION: EN)		
5.5.2	Conduct targeted autecological research to inform habitat management. (ACTION: EN)		
5.5.3	Establish a regular monitoring programme for the dark guest ant and its host. (ACTION: EN)		
5.5.4	Monitor the impact on host and parasite populations of any management operations undertaken. (ACTION: EN)		
5.5.5	Pass information gathered during survey and monitoring of this species to a central database for incorporation in national and international databases. (ACTION: EN)		
5.5.6	Encourage research on the ecology and conservation of this species on an international level and use the experience gained towards its conservation in the UK. (ACTION: EN, JNCC)		

## Hairy wood ant ( *Formica lugubris* ) Species Statement

	<b>Proposed action</b>
1. Current status	
1.1	The hairy wood ant is a major scavenger and predator of other invertebrates in woodlands in northern Britain. It builds prominent nest mounds, in spots exposed to the sun, along woodland rides and in clearings. Suitable habitat can sustain numerous colonies which may be linked by trails to form supercolonies.
1.2	The UK distribution of the hairy wood ant extends from the Highlands of Scotland through upland areas of northern England as far south as mid Wales. It can be locally common in these areas and the UK populations of this ant appear to be stable, even increasing at some sites. The hairy wood ant is found across the northern Palaearctic and in cooler mountainous regions of central and southern Europe and Asia. In much of its range it is reported as threatened by disturbance, development and changes in woodland management. In several European countries wood ants are protected by law and in others they are included in national Red Data Books.
1.3	In Great Britain this species is classified as Local. It is classified by the IUCN (1996) as globally Near Threatened.
2. Current factors causing loss or decline	
2.1	Loss of suitable woodland habitat through agricultural clearance, urban or industrial development and unsympathetic afforestation.
2.2	Inappropriate woodland management, for example through changes in traditional practices, intensive afforestation with conifers or destructive felling operations. Loss of sunny woodland rides and clearings due to overgrowth and scrub invasion.
3. Current action	
3.1	Some populations are on SSSIs and/or NNRs.
3.2	Some woodlands are managed locally to help conserve the species, or are under sympathetic management by FC, RSPB, NT, local Wildlife Trusts or private ownership.
4. Objective for the species	
4.1	Maintain the range of the hairy wood ant.
5. Proposed action	
5.1	Monitoring only. It is likely that this ant will benefit from the action plans for other species of Scottish pinewoods, including the Scottish wood ant <i>Formica aquilonia</i> and twinflower <i>Linnaea borealis</i> . The requirements of these species should be taken into account in the delivery of the action plans for native pine woods and upland oakwoods.

## Shining guest ant ( *Formicoxenus nitidulus* ) Species Statement

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| <p>1. Current status</p> <p>1.1 The shining guest ant is a commensal species which lives in the nests of wood ants. In Britain the species has been recorded with <i>Formica rufa</i>, <i>F. lugubris</i> and <i>F. aquilonia</i>. The small nests of the shining guest ant, containing up to 100 individuals, are often found in a piece of wood or bracken frond buried within the mound. Although the shining guest ant is less common than its host species, the majority of wood ant nests in a particular locality may be found to harbour this species. There can also be more than one shining guest ant colony per mound. The small dark shiny workers of the shining guest ant are rarely seen but occasionally wander over the surface of the nest mound, particularly on warm, overcast days. They are ignored by the much larger host workers and move freely amongst them. The wingless worker-like males may be seen from July to September running over the mound in search of a mate. The winged gynes are able to disperse to new wood ant mounds to start colonies but may also re-enter their original mound. Little is known about the biology or ecology of the shining guest ant, opinions even differ on what it feeds upon. The fortunes of the shining guest ant are tied to that of its hosts, although it does not appear to favour any one wood ant species over another. Where one wood ant species appears to be encroaching on another, it may have the ability to switch host.</p> <p>1.2 The shining guest ant has been recorded from all of the main regions where wood ants occur in Britain, apart from north and west Wales and Northern Ireland. There are, however, few records in total (around 40 ten km squares) and these are widely distributed from Devon to the Highlands. When intensively searched for, this unobtrusive species is often found in many more wood ant nests than originally expected and it is almost certainly under-recorded. The shining guest ant is found across the Palaearctic, probably wherever wood ants and allied species are established. It does, however, appear to be less prevalent in warmer Mediterranean climates.</p> <p>1.3 In Great Britain this species is classified as Local. It is classified by the IUCN (1996) as globally Vulnerable.</p> | <p>2.2 Inappropriate woodland management.</p> <p>3. Current action</p> <p>3.1 Many sites supporting populations of the shining guest ant are already SSSIs, NNRs, or are under sympathetic FC, RSPB, local Wildlife Trust or private ownership.</p> <p>4. Objective for the species</p> <p>4.1 Maintain the current range of shining guest ant.</p> <p>5. Proposed action</p> <p>5.1 Monitoring only. The requirements of the species should be considered in the delivery of the action plans for <i>Formica aquilonia</i> and <i>F. lugubris</i>, lowland wood pastures and parklands, lowland beechwoods, upland oakwoods and native pine woodlands.</p> |
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## Southern wood ant ( *Formica rufa* )

### Species Statement

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| <p><b>1. Current status</b></p> <p>1.1 Nests of the southern wood ant are usually located along woodland rides and clearings where they can intercept the spring and early summer sunshine. This in isolation appears to be critical to initiating colony activity and brood development after winter. Nests will also encroach from woodland onto more open heath and scrub. Each nest may contain over 100,000 workers, several queens and, from May to July, winged gynes and males. Different nests can be interlinked by trails to form huge colonies. The workers also form long trails to trees bearing honeydew-producing Homoptera, which they tend. They will also scavenge and take invertebrate prey. Honeydew forms a key component of their diet and the presence of suitable trees and Homoptera may be a limiting factor on populations. The southern wood ant is found across the Palaearctic from southern Europe and the Caucasus to approximately 63° north.</p> <p>1.2 The southern wood ant is a conspicuous ant of southern British woodlands with large aggressive workers and a prominent nest mound. As such it is relatively well recorded and studied. Populations occur locally in Wales and England as far north as Cumbria and Northumberland. It is, however, most common in southern England, particularly in south Devon, south Dorset, Hampshire, Berkshire, Surrey, Sussex and Kent. Suitable woodlands in such areas may support strong, and even increasing, populations of the species. However, there is also evidence of a contraction of its range, particularly in northern and eastern England, the Midlands and North Wales, where a number of smaller isolated populations have reportedly become extinct. In North Wales and northern England the range of the southern wood ant overlaps with that of the hairy wood ant, <i>F. lugubris</i>, so care should be taken in determining specimens from these areas.</p> <p>1.3 In Great Britain this species is classified as Local. It is classified by the IUCN (1996) as globally Near Threatened.</p> | <p><b>3. Current action</b></p> <p>3.1 Many southern wood ant sites are currently SSSIs, NNRs or are under sympathetic FC, RSPB, NT, local Wildlife Trust or private ownership.</p> <p>3.2 CCW has undertaken surveys of all known Welsh populations of the southern wood ant in recent years and has produced a review of its status and ecology.</p> <p><b>4. Objective for the species</b></p> <p>4.1 Maintain a network of viable populations across the range of the southern wood ant in England and Wales.</p> <p><b>5. Proposed action</b></p> <p>5.1 Monitoring only. The requirements of the species should be considered in the delivery of the action plans for lowland wood pasture and parkland, upland oakwoods and lowland beech and yew woodland.</p> |
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- 2. Current factors causing loss or decline**
- 2.1 Loss of suitable scrub and woodland habitat through agricultural clearance, urban or industrial development and unsympathetic afforestation.
- 2.2 Inappropriate woodland management, particularly through: changes in traditional management (e.g. neglect of coppice and reductions in aphid-bearing tree species); overgrowth of woodland rides and clearings leading to excessive shading of nests; intensive afforestation with conifers and destructive felling operations.
- 2.3 Repeated disturbance by livestock or human activities.

# Lepidoptera



## Waved carpet ( *Hydrelia sylvata* )

### Action Plan

<b>1.</b>	<b>Current status</b>	<b>4.2</b>	Enhance the overall population size in each occupied area by 2010.
1.1	The waved carpet occurs in coppiced woods with a long history of active coppice, such as the sweet chestnut plantations in the Blean Woods, and in open sunny areas with younger growth of the larval foodplants present. The foodplants are alder, birch, sallow, blackthorn and, in Kent, sweet chestnut. The adult moths fly in June and July, resting by day among bushes and occasionally on tree-trunks. The larvae feed between July and August in most years and pupate in September to overwinter as a pupa in an earthen cell until emergence the following July.	5.	<b>Proposed action with lead agencies</b>
1.2	In Britain the waved carpet is a highly localised species with post-1980 records concentrated in five main areas: Devon, Cornwall and Dorset; the borders of Hampshire, Sussex and Surrey; East Sussex and Kent; Gloucestershire; and Monmouthshire. There are also scattered records from south-west Wales and single localities in Cumbria and south Northumberland. Historically this species was recorded over much of England and Wales but the species has declined following the widespread cessation of active coppice management. The moth appears to exist at low density over much of its range and is likely to be under-recorded. For instance, it probably occurs more widely in Wales than records suggest. It extends through Europe to the Chinese/Russian border and Japan. It occurs from central southern Scandinavia to the Alps and is thought to be declining in several European countries.	5.1	<b>Policy and legislation</b>
1.3	In Great Britain the waved carpet is classified as Nationally Scarce.	5.1.1	Where appropriate, include the requirements of the species when preparing or revising prescriptions for woodland grant schemes. (ACTION: FC)
<b>2.</b>	<b>Current factors causing loss or decline</b>	<b>5.2</b>	<b>Site safeguard and management</b>
2.1	The loss of young regrowth due to the decline of coppicing in the lowlands.	5.2.1	Where possible, ensure that occupied habitat is appropriately managed by 2010, for example through SSSI or woodland grant scheme management agreements. (ACTION: CCW, EN, FC)
2.2	The loss of broadleaved woodland due to replanting with conifers.	5.2.2	Where possible, increase the available habitat at known sites and attempt to link up existing fragments of habitat. (ACTION: CCW, EN, FC)
<b>3.</b>	<b>Current action</b>	5.2.3	Ensure that the species is included in site management documents for all relevant SSSIs. (ACTION: CCW, EN)
3.1	The Forestry Commission's Coppice for Butterflies Challenge (Woodland Improvement Grant) scheme has targeted five areas where the waved carpet is present: the Wye Valley, Sussex/Surrey/Hampshire Western Greensand, Southern High Weald, Morecambe Bay Limestone and East Kent.	5.2.4	Consider notifying as SSSIs sites holding key populations of the species where this is necessary to secure their long-term protection and appropriate management. (ACTION: CCW, EN)
3.2	The moth occurs on several nature reserves and SSSIs.	5.3	<b>Species management and protection</b>
<b>4.</b>	<b>Action plan objectives and targets</b>	5.3.1	None proposed.
4.1	Maintain the range of this species, concentrating particularly on strong populations within the core areas.	5.4	<b>Advisory</b>
		5.4.1	Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation. (ACTION: CCW, EN, FC)
		5.5	<b>Future research and monitoring</b>
		5.5.1	Undertake surveys to determine the status of this species. (ACTION: CCW, EN)
		5.5.2	Conduct targeted autecological research to inform habitat management, including the age of coppice after cutting which is preferred by the moth, the length of

- time such cut areas remain suitable, mobility and population structure. (ACTION: CCW, EN)
- 5.5.3 Establish a regular monitoring programme for the species. (ACTION: CCW, EN)
- 5.5.4 Assess the impact of Coppice for Butterflies Challenge on this species. (ACTION: FC)
- 5.5.5 Pass information gathered during survey and monitoring of this species to a central database for incorporation in national and international databases. (ACTION: CCW, EN)
- 5.6 Communications and publicity
- 5.6.1 Promote opportunities for the appreciation of the species and the conservation issues associated with its habitat. This should be achieved via articles within appropriate journals as well as by a publicity leaflet. (ACTION: CCW, EN, FC)
- 5.7 Links with other action plans
- 5.7.1 It is likely that implementation of this action plan will benefit other species of lowland coppiced woodlands, including the drab looper *Mino amurinata*, the orange upperwing *Jodia croceago*, the clay fan-foot *Paracolax tristalis*, the argent and sable *Rheumaptera hastata*, the square-spotted clay *Xestia rhomboidea* and the common fan-foot *Pechipogo strigilata*.
- 5.7.2 This plan should be considered in conjunction with that for lowland beech and yew woodland.

## Belted beauty ( *Lycia zonaria britannica* ) Action Plan

1. Current status
  - 1.1 The belted beauty is restricted to base-rich coastal grasslands on the west coast of Britain, such as the machair grasslands of the Hebrides and dune grassland in Lancashire and north Wales. The larvae feed primarily on the flowers of bird's-foot trefoil *Lotus corniculatus*, with kidney vetch *Anthyllis vulneraria* being an important foodplant at English localities. They have also occasionally been recorded feeding on a range of other plants including clovers, plantains, burnet rose *Rosa pimpinellifolia*, yarrow *Achillea millefolium*, yellow flag *Iris pseudacorus* and creeping willow *Salix repens*. In England, larvae are found on early successional areas, where kidney vetch grows in association with sand or moss, and not in the more stable, grassy areas of the adjacent dunes. At the single Welsh locality, stronger populations occur in semi-fixed dune grassland, although smaller numbers are found in more stable areas. In March and April adults of both sexes can be found at rest on the vegetation by day. The females are wingless, while males have been recorded at night but also fly on warm afternoons. The larvae can be seen feeding in May and June before pupating to emerge the following year, although it is believed that emergence may be delayed until the following year if weather conditions are unsuitable.
  - 1.2 The belted beauty is very localised, being confined to the west coast of Scotland and the coasts of north Wales and north-west England. In Britain there are two subspecies, with Welsh and English populations known as *L.z.britannica*, and Scottish populations known as *L.z.atlantica*. Scottish populations are widespread in the Hebrides and on the Ardnamurchan peninsula on the Scottish mainland. Historically, the subspecies was also recorded from Flintshire and Glamorgan. *L.z.brittanaica* is found at Sunderland Point and Formby in Lancashire, on the Wirral in Cheshire, and at Morfa Conwy, Caernarvonshire. The English/Welsh subspecies has declined markedly due to loss of habitat and is the focus of this action plan. The species occurs from western Europe to Russia and Armenia, and from the southern part of central Scandinavia to the Alps, where it inhabits dry, often sandy, uncultivated fields and is not confined to the coast. In northern Europe it occurs, but has declined, in the Netherlands, Denmark, Sweden, Germany and Poland.
  - 1.3 In Great Britain the subspecies *Lycia zonaria brittanica* is classified as Rare.
2. Current factors causing loss or decline
  - 2.1 Successional changes in vegetation.
  - 2.2 Land development (golf courses, car parking, etc).
  - 2.3 Trampling pressure from increased access to sensitive dune systems may be a problem.
  - 2.4 Low dispersal ability precludes the recolonisation of fragmented areas of suitable habitat.
3. Current action
  - 3.1 Some of the colonies are on SSSIs.
  - 3.2 CCW undertakes annual monitoring of adult populations at Morfa Conwy.
  - 3.3 Annual counts of adults at the Wirral site are carried out by local lepidopterists.
  - 3.4 Introductions of the moth at two coastal sites in Cheshire near to the existing colony took place in 1994 but these appear to have been unsuccessful.
4. Action plan objectives and targets
  - 4.1 Maintain existing populations.
  - 4.2 Enhance the population size at all known English and Welsh sites by 2010.
5. Proposed action with lead agencies

The objectives of the plan will be achieved by encouraging appropriate grassland management on existing sites, undertaking surveys, and establishing a regular monitoring programme for the species. These actions will be supported by research, particularly on habitat management and the mobility and population structure of the moth.

  - 5.1 Policy and legislation
  - 5.1.1 None proposed.
  - 5.2 Site safeguard and management
    - 5.2.1 Where possible, ensure that all occupied and potential nearby habitat is appropriately managed by 2005. (ACTION: CCW, EN, LAs)
    - 5.2.2 Ensure that the habitat requirements of the belted beauty are taken into account in relevant development policies, plans and proposals. (ACTION: CCW, EN, LAs)
    - 5.2.3 If possible, increase the available habitat on known sites and adjacent sites and attempt to link up existing fragments of habitat. (ACTION: CCW, EN)

- 5.2.4 Ensure that the belted beauty is listed on site management documents for all relevant SSSIs.  
(ACTION: CCW, EN)
- 5.3 Species management and protection
  - 5.3.1 None proposed
- 5.4 Advisory
  - 5.4.1 Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation. (ACTION: CCW, EN)
- 5.5 Future research and monitoring
  - 5.5.1 Conduct targeted autecological research to inform habitat management. (ACTION: CCW, EN)
  - 5.5.2 Establish a regular monitoring programme for the species. (ACTION: CCW, EN)
  - 5.5.3 Pass information gathered during survey and monitoring of this species to a central database for incorporation in national and international databases. (ACTION: CCW, EN)
- 5.6 Communications and publicity
  - 5.6.1 Promote opportunities for the appreciation of the species and the conservation issues associated with its habitat.  
(ACTION: CCW, EN)
- 5.7 Links with other action plans
  - 5.7.1 This action plan should be considered in conjunction with that for coastal sand dunes.

## Lunar yellow underwing ( *Noctua orbona* ) Action Plan

<b>1.</b>	<b>Current status</b>	management and the mobility and population structure of the moth.
1.1	The lunar yellow underwing is a scarce moth which is now mainly associated with open, sandy, heathy or calcareous sites and open grassy areas within woodland. Most former sites were in open woodland. The larvae feed on a range of grasses and small herbaceous plants, including cock's-foot <i>Dactylis glomerata</i> , couch <i>Elymus (Agropyron) repens</i> , reed canary-grass <i>Phalaris arundinacea</i> , meadow buttercup <i>Ranunculus acris</i> , creeping cinquefoil <i>Potentilla reptans</i> , cowslip <i>Primula veris</i> and chickweed <i>Stellaria media</i> . They feed mainly at night in mild weather throughout the winter, but in humid conditions can be swept by day from grass stems. Pupation occurs below ground in a flimsy cocoon. The adults are nocturnal, coming to light in late June to September and are occasionally seen at flowers of heather <i>Calluna vulgaris</i> .	5.1 Policy and legislation  5.1.1 None proposed.
1.2	The lunar yellow underwing was once widespread in Britain but has been steadily declining. There are post-1980 records from about 40 ten km squares, with most records in Breckland. Outside Breckland the records are mainly from sandy sites (Lincolnshire, north Wales, north Northumberland and Fife), mudstone sites (Somerset and Leicestershire), clay sites (Essex), and calcareous sites (Dorset, south Wiltshire, north Hampshire, Bedfordshire, Pembrokeshire). It is a Mediterranean-Asiatic species, occurring locally throughout Europe, with the exception of Ireland, the extreme south-west of Spain and Portugal, and southern Greece. It reaches southern Scandinavia but is absent from the whole of northern Russia. It has also been recorded in north Africa, the Middle East and central Asia.	5.2 Site safeguard and management  5.2.1 Ensure that the habitat requirements of this species are taken into account in relevant development policies, plans and proposals. (ACTION: CCW, EN, LAs, SNH)  5.2.2 Where possible, ensure that all occupied and potential nearby habitat is appropriately managed. (ACTION: CCW, EN, SNH)  5.2.3 Ensure that the lunar yellow underwing is included in site management documents for all relevant SSSIs. (ACTION: CCW, EN, SNH)
1.3	In Great Britain this species is classified as Nationally Scarce.	5.3 Species management and protection  5.3.1 None proposed.
2.	<b>Current factors causing loss or decline</b>	5.4 Advisory  5.4.1 Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation. (ACTION: CCW, EN, SNH)
2.1	None known.	5.5 Future research and monitoring  5.5.1 Undertake surveys to determine the status of this species. (ACTION: CCW, EN, SNH)
3.	<b>Current action</b>	5.5.2 Conduct targeted autecological research to elucidate the causes of the decline of this species and to inform habitat management. (ACTION: CCW, EN, SNH)
3.1	Some populations are on SSSIs.	5.5.3 Establish a regular monitoring programme for the species. (ACTION: CCW, EN, SNH)
4.	<b>Action plan objectives and targets</b>	5.5.4 Pass information gathered during survey and monitoring of this species to a central database for incorporation in national and international databases. (ACTION: CCW, EN, SNH)
4.1	Maintain the natural range of this species in Britain.	5.6 Communications and publicity  5.6.1 Promote opportunities for the appreciation of the species and the conservation issues associated with its habitat. This should be achieved via articles within appropriate journals as well as by a publicity leaflet. (ACTION: CCW, EN, SNH)
5.	<b>Proposed action with lead agencies</b>	5.7 Links with other action plans
	The objectives of the plan will be achieved by encouraging appropriate management on existing sites, undertaking surveys and establishing a regular monitoring programme for the species. These actions will be supported by research, particularly on habitat	

5.7.1 It is likely that implementation of this action plan will benefit other species of lowland heaths and grasslands, including *Coleophora tricolor*.

5.7.2 This plan should be considered in conjunction with those for lowland heathland, lowland calcareous grassland and lowland dry acidic grassland.

## Argent and sable ( *Rheumaptera hastata* ) Action Plan

<b>1.</b>	<b>Current status</b>	<b>4.1</b>	Maintain existing populations.
1.1	The argent and sable breeds in woodland with birch regrowth and in open moorland and bogs, particularly those at higher altitudes or in coastal areas. Many of the populations that survive are in the rides and edges of conifer plantations established from the 1950s onwards, where a weed growth of birch is still available though often diminishing. The larva of this species feeds on birches <i>Betula pendula</i> (and probably <i>B. pubescens</i> ) and bog myrtle <i>Myrica gale</i> . On birch it spins two or three leaves together and feeds from within the chamber, eating just the inner surface when small and later eating right through the leaf. It feeds among the terminal leaves of bog myrtle in the same way. The moth flies by day in warm sunny weather between May to early July, with moorland populations flying later in the year. Eggs are found on birch regrowth less than 30 cm tall in full sun, and in woodland the larvae are mostly found on low birch coppice. The argent and sable overwinters as pupae, which have been found in moss at the base of trees in woodland and bog myrtle on moorland.	4.2	Enhance population size at key sites by 2010.
1.2	The argent and sable occurs throughout most of England, except East Anglia, eastern Wales, and the southern uplands, the Hebrides, and the far north-west of Scotland. It has declined throughout much of England and is now only thinly scattered. In Wales and north-west Scotland its status is less clear as the species is probably under-recorded. It is an holarctic species which is widespread in Europe (including Spain, the Alps, and north Scandinavia) and is known from Siberia, Amur, China, Korea, Japan and North America.	5.	<b>Proposed action with lead agencies</b>
1.3	In Great Britain this species is classified as Nationally Scarce.		The objectives of the plan will be achieved by encouraging appropriate woodland and moorland management on existing sites, undertaking surveys, and establishing a regular monitoring programme for the species. These actions will be supported by research on habitat management, particularly concerning the relationship between coppice management and habitat suitability, and the mobility and population structure of the moth.
2.	<b>Current factors causing loss or decline</b>	5.1	Policy and legislation
2.1	Lack of birch regeneration at wood edges and on rides in high forest systems due to the decline of coppicing and other active woodland management.	5.1.1	Where appropriate, include the requirements of the species when preparing or revising prescriptions for agri-environment and woodland grants schemes. (ACTION: CCW, EN, FC, MAFF, NAW, SE, SNH)
2.2	Over-grazing by sheep on moorlands, preventing birch regeneration and impacting on bog myrtle stands.	5.2	Site safeguard and management
3.	<b>Current action</b>	5.2.1	Where possible, ensure that occupied habitat is appropriately managed by 2010, for example through SSSI or agri-environment/woodland grant scheme management agreements. (ACTION: CCW, EN, FC, MAFF, NAW, SE, SNH)
3.1	Some populations are on SSSIs.	5.2.2	Where possible, increase the available habitat at known sites and in adjacent areas, and attempt to link up existing fragments of habitat. (ACTION: CCW, EN, FC, MAFF, NAW, SE, SNH)
3.2	The Forestry Commission's Coppice for Butterflies Challenge (Woodland Improvement Grant) scheme has targeted three areas where the argent and sable is present: the Wye Valley, Wessex/Hampshire Chalk, and the Morecambe Bay Limestone.	5.2.3	Ensure that the species is included in site management documents for all relevant SSSIs. (ACTION: CCW, EN, SNH)
4.	<b>Action plan objectives and targets</b>	5.2.4	Consider notifying as SSSIs sites holding key populations of the species where this is necessary to secure their long-term protection and appropriate management. (ACTION: CCW, EN, SNH)
		5.3	Species management and protection
		5.3.1	None proposed.
		5.4	Advisory
		5.4.1	Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation. (ACTION: CCW, EN, SNH)
		5.4.2	As far as possible, ensure that all relevant agri-environment project officers and members of regional agri-environment consultation groups are advised of

locations of this species, its importance and the management needed for its conservation. (ACTION: CCW, EN, MAFF, NAW, SE, SNH)

5.5 Future research and monitoring

5.5.1 Undertakes surveys to determine the status of the species. (ACTION: CCW, EN, SNH)

5.5.2 Conduct targeted autecological research, including on the age of coppice after cutting preferred by the moth, the length of time such cut areas remain suitable, mobility and population structure, to inform habitat management. (ACTION: CCW, EN, SNH)

5.5.3 Establish a regular monitoring programme for the species. (ACTION: EN, CCW, SNH)

5.5.4 Assess the impact of Coppice for Butterflies Challenge on this species. (ACTION: FC)

5.5.5 Pass information gathered during survey and monitoring of this species to a central database for incorporation in national and international databases. (ACTION: CCW, EN, SNH)

5.6 Communications and publicity

5.6.1 Promote opportunities for the appreciation of the species and the conservation issues associated with its habitat. This should be achieved via articles within appropriate journals as well as by a publicity leaflet. (ACTION: CCW, EN, SNH)

5.7 Links with other action plans

5.7.1 It is likely that implementation of this action plan will benefit other species of lowland coppiced woodlands, including the drab looper *Minoia murinata*, the orange upperwing *Jodia croceago*, the clay fan-foot *Paracolax tristalis*, the waved carpet *Hydrelia sylvata*, the square-spotted clay *Xestia rhamboidea* and the common fan-foot *Pechipogo strigilata*.

5.7.2 This plan should be considered in conjunction with those for lowland beech and yew woodland, upland oakwoods and upland heathland.

## Barred tooth-striped ( *Trichopteryx polycommata* ) Action Plan

	1. Current status	5. Proposed action with lead agencies
1.1	The barred tooth-striped occurs in woodland clearings and rides on chalk, limestone or clay soils, and on chalk downland where the larval foodplant, wild privet <i>Ligustrum vulgare</i> , grows in full sunlight. Ash <i>Fraxinus excelsior</i> may be an alternative foodplant. The adults fly between mid March and late April, and are occasionally seen flitting along hedgerows and around bushes at dusk. They come to light occasionally, but usually remain among the bushes and are best found by searching with a torch. Some populations are quite large but the majority are small. The larvae feed between May and June before pupating until the following March.	The objectives of the plan will be achieved by encouraging appropriate woodland or scrub management on existing sites, undertaking surveys and establishing a regular monitoring programme for the species. These actions will be supported by research to inform habitat management, particularly concerning the use of ash as a foodplant and the mobility and population structure of the moth.
1.2	In Britain the barred tooth-striped is a widespread but local species. Current strongholds are Sussex, the north Hampshire/Wiltshire area, Breckland on the Norfolk/Suffolk border, and south Cumbria. There are scattered populations elsewhere in central southern England, including post-1980 records from Gloucestershire, Warwickshire, Oxfordshire, Northamptonshire and Staffordshire. The moth has been recorded on the Ardnamurchan peninsula, Argyll, during the last 20 years and surveys at the right time of year may prove it to be a widespread resident on ash in this area. There are a few old records from Inverness-shire and single records from Kirkcudbrightshire, Arran and Canna. This is an Eurasian species which occurs from western Europe through Russia to the Caucasus regions and from the northern part of central Scandinavia to the Alps.	<p>5.1 Policy and legislation</p> <p>5.1.1 Where appropriate, include the requirements of the species when preparing or revising prescriptions for agri-environment and woodland grants schemes. (ACTION: EN, FC, MAFF, SE, SNH)</p>
1.3	In Great Britain the barred tooth-striped is classified as Nationally Scarce.	<p>5.2 Site safeguard and management</p> <p>5.2.1 Where possible, ensure that all occupied woodland habitat is appropriately managed by 2010, for example through SSSI or woodland grant scheme management agreements. (ACTION: EN, FC, SNH)</p> <p>5.2.2 Where possible, ensure that chalk downland sites are sensitively managed to provide a mosaic of scrub and grassland. (ACTION: EN, MAFF)</p> <p>5.2.3 Ensure that the species is included in site management documents for all relevant SSSIs. (ACTION: EN, SNH)</p> <p>5.2.4 Consider notifying as SSSIs sites holding key populations of the species where this is necessary to secure their long-term protection and appropriate management. (ACTION: EN, SNH)</p>
2.	Current factors causing loss or decline	<p>5.3 Species management and protection</p> <p>5.3.1 None proposed.</p>
2.1	Loss of downland habitat.	<p>5.4 Advisory</p> <p>5.4.1 Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation. (ACTION: EN, SNH)</p>
2.2	Inappropriate scrub control on downland.	<p>5.4.2 As far as possible, ensure that all relevant agri-environment project officers and members of regional agri-environment consultation groups are advised of locations of this species, its importance and the management needed for its conservation. (ACTION: EN, MAFF, SE, SNH)</p>
2.3	Inappropriate management of woodland, including removal of the foodplant during ride-widening associated with commercial extraction of timber, and neglect leading to shading out of the foodplant.	<p>5.5 Future research and monitoring</p>
3.	Current action	
3.1	The moth occurs on several nature reserves and SSSIs.	
4.	Action plan objectives and targets	
4.1	Maintain existing populations.	
4.2	Enhance population size at all known sites by 2010.	

5.5.1 Undertake surveys, particularly in under-recorded areas of Scotland and Cumbria, to determine the status of the species. (ACTION: EN, SNH)

5.5.2 Conduct targeted autecological research to inform habitat management, particularly mobility, population structure, and the use of ash as an alternative foodplant. (ACTION: EN, FC, SNH)

5.5.3 Establish a regular monitoring programme for the species. (ACTION: EN, SNH)

5.5.4 Pass information gathered during survey and monitoring of this species to a central database for incorporation in national and international databases. (ACTION: EN, SNH)

5.6 Communications and publicity

5.6.1 Promote opportunities for the appreciation of the species and the conservation issues associated with its habitat. This should be achieved via articles within appropriate journals as well as by a publicity leaflet. (ACTION: EN, FC, SNH)

5.7 Links with other action plans

5.7.1 This action plan should be considered in conjunction with those for lowland beech and yew woodland, upland mixed ash woodland and lowland calcareous grassland.

## Square-spotted clay ( *Xestia rhomboidea* ) Action Plan

<b>1.</b>	<b>Current status</b>	<b>4.2</b>	Enhance population size at all known sites by 2010.
1.1	The square-spotted clay occurs in broad-leaved and mixed woodland where the undergrowth is sparse and contains patches of scrub and bare ground. The larval foodplant is unclear but several species have been suggested, usually after captive rearing, including chickweed <i>Stellaria media</i> , dock, <i>Rumex</i> spp, sallows <i>Salix caprea</i> , primrose <i>Primula vulgaris</i> , birch <i>Betula</i> spp, bramble <i>Rubus fruticosus</i> agg and ribwort plantain <i>Plantago lanceolata</i> . The moth overwinters as a small larva. When fully grown, the larva burrows into the earth where it remains for several weeks before pupating. The nocturnal adults fly in August and have been recorded visiting the flowers of burdock <i>Arctium</i> spp, rosebay willowherb <i>Epilobium angustifolium</i> , wood-sage <i>Teucrium scorodonia</i> and ragwort <i>Senecio</i> spp.	5.	<b>Proposed action with lead agencies</b>
1.2	In Great Britain the square-spotted clay is a widespread but local species, extending throughout England, into western Wales, and north to the southern uplands as far as Morayshire. Since 1980 the main areas for this moth have been: the Chiltern beechwoods of Oxfordshire, Buckinghamshire and Berkshire; acidic, thin-soiled areas around Guildford and Reading; the Brecklands of Norfolk and Suffolk; and the North Yorkshire Moors. Although the species has been recorded from widely scattered locations throughout its former range it has been lost from the west of England, including Hampshire, Dorset, Devon and Cornwall. The moth is not hard to find and the decline is thought to be real. It is an Eurasian species, occurring in hilly country from the Pyrenees through France to the Ardennes, becoming commoner northwards. The European distribution extends south into Italy, Sicily and Greece, where it is generally confined to woodlands. It also reaches northern Turkey and northern Iran.		The objectives of the plan will be achieved by encouraging appropriate woodland management on existing sites, undertaking surveys and establishing a regular monitoring programme for the species. These actions will be supported by research on habitat management, particularly concerning the relationship between coppice management and habitat suitability, and the mobility and population structure of the moth.
1.3	In Great Britain the square-spotted clay is classified as Nationally Scarce.	5.1	Policy and legislation
<b>2.</b>	<b>Current factors causing loss or decline</b>	5.1.1	Where appropriate, include the requirements of the species when preparing or revising prescriptions for agri-environment and woodland grants schemes. (ACTION: CCW, EN, FC, MAFF, NAW, SE, SNH)
2.1	These are difficult to assess in view of the scant knowledge of the ecological requirements of this species. In woodland the decline may be due to the cessation of coppicing and neglect of broadleaved woodlands generally and the consequent loss of open areas with sparse undergrowth.	5.2	Site safeguard and management
<b>3.</b>	<b>Current action</b>	5.2.1	Where possible, ensure that all occupied habitat is appropriately managed by 2010, for example through SSSI or woodland grant scheme management agreements. (ACTION: CCW, EN, FC, MAFF, NAW, SE, SNH)
3.1	The moth occurs on several nature reserves and SSSIs.	5.2.2	Where possible, increase the available habitat at known sites and in adjacent areas, and attempt to link up existing fragments of habitat. (ACTION: CCW, EN, FC, MAFF, NAW, SE, SNH)
<b>4.</b>	<b>Action plan objectives and targets</b>	5.2.3	Ensure that the species is included in site management documents for all relevant SSSIs. (ACTION: CCW, EN, SNH)
4.1	Maintain existing populations.	5.2.4	Consider notifying as SSSIs sites holding key populations of the species where this is necessary to secure their long-term protection and appropriate management. (ACTION: CCW, EN, SNH)
		5.3	Species management and protection
		5.3.1	None proposed.
		5.4	Advisory
		5.4.1	Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation. (ACTION: CCW, EN, FC, SNH)
		5.4.2	As far as possible, ensure that all relevant agri-environment project officers and members of regional agri-environment consultation groups are advised of locations of this species, its importance and the management needed for its conservation. (ACTION: CCW, EN, MAFF, NAW, SE, SNH)

5.5 Future research and monitoring

5.5.1 Conduct targeted autecological research to inform habitat management, including the age of coppice after cutting which is preferred by the moth, the length of time such cut areas remain suitable, mobility and population structure. (ACTION: CCW, EN, SNH)

5.5.2 Establish a regular monitoring programme for the species. (ACTION: CCW, EN, SNH)

5.5.3 Pass information gathered during survey and monitoring of this species to a central database for incorporation in national and international databases. (ACTION: CCW, EN, SNH)

5.6 Communications and publicity

5.6.1 Promote opportunities for the appreciation of the species and the conservation issues associated with its habitat. This should be achieved via articles within appropriate journals as well as by a publicity leaflet. (ACTION: CCW, EN, FC, SNH)

5.7 Links with other action plans

5.7.1 This action plan should be considered in conjunction with those for lowland beech and yew woodland and upland oakwoods.

## Scarce black-neck ( *Lygephila craccae* ) Species Statement

### 1 . Current status

- 1.1 Scarce black-neck is found on coastal cliffs where the underlying geology encourages periodic slippages. These provide early successional habitat which is suitable for the larval foodplant, wood vetch *Vicia sylvatica*. However, populations of the scarce black-neck can be lost locally through landslips or as a result of rank vegetation crowding out the foodplant.
- 1.2 This moth is widely distributed and often common in Europe from the Scandinavian countries southwards to Crete, becoming increasingly coastal in the north. In the UK it is entirely confined to a few isolated populations on the coasts of north Cornwall, north Devon and Somerset. There are records from only three sites since 1990 and since 1960 it has been recorded from only 4 of 11 ten km squares where it was previously known. Populations are isolated and locally vulnerable to extinction.
- 1.3 In Great Britain this species is classified as Rare.

### 2. Current factors causing loss or decline

- 2.1 Collection of larvae in some well-known populations.
- 2.2 Stabilisation of coastal cliffs.

### 3. Current action

- 3.1 Many of the known sites are SSSIs and lie within the Tintagel-Marsland-Clovelly candidate SAC. One site is a Devon Wildlife Trust nature reserve and other sites are owned by the National Trust.
- 3.2 The moth is regularly monitored on the Devon Wildlife Trust reserve.

### 4. Objective for the species

- 4.1 Maintain existing populations of scarce black-neck.

### 5. Proposed action

- 5.1 Monitoring only. The requirements of the species should be considered in the delivery of the action plan for maritime cliff and slopes.

## White-line snout ( *Schränkia taenialis* ) Species Statement

### 1. Current status

- 1.1 The white-line snout has been recorded from a wide range of habitats, including open moorland, conifer plantations, sunken lanes with shady, wet woodlands and shady, calcareous woodlands. The larval foodplant of this species is unknown, but several suggestions have been made, including the flowers of heathers, thyme, cow parsley *Anthriscus sylvestris* or hogweed *Heracleum sphondylium*, depending on the habitat the species was recorded in. The adults fly in July and early August, being seen flying at dusk and coming to light, but little is known about any stage in the life cycle of this small moth.
- 1.2 Prior to 1980 this species was recorded locally in England south of the Wash, from Cornwall to Kent, as far north as Cambridgeshire in the east and Gloucestershire in the west, and from south Wales. Since 1980 the moth has been recorded at further sites in south Wales but only at a scattering of about 30 sites throughout the rest of its former range. It is not known if this reflects a genuine decline or simply a lack of systematic recording of this obscure species. The white-line snout is a Eurasian species which occurs in western and central Europe through to southern Turkey, Transcaucasia, Israel and Korea.
- 1.3 In Great Britain the white-line snout is classified as Nationally Scarce.

### 2. Current factors causing loss or decline

- 2.1 Not known.

### 3. Current action

- 3.1 None known

### 4. Objective for the species

- 4.1 Maintain the current range of the white-line snout.

### 5. Proposed action

- 5.1 Monitoring only.

## Chalk carpet ( *Scotopteryx bipunctaria* ) Species Statement

### 1. Current status

- 1.1 The chalk carpet occurs on chalk and limestone grasslands. The main habitats occupied are short-grazed areas that have bare ground, including embankments, cliffs, quarries and sheep tracks. Populations can be quite large and persist for decades. The larvae feed at night on bird's-foot trefoil *Lotus corniculatus* and other trefoils and clovers, such as black medick *Medicago lupulina*, horse-shoe vetch *Hippocrepis comosa*, red clover *Trifolium pratense* and white clover *T. repens*. The pupa is formed in a cocoon on the ground. The adults are nocturnal but can be readily disturbed from the vegetation by day during July and August. The moth overwinters as a larva.
- 1.2 The chalk carpet occurs on calcareous sites in southern England and Wales. This includes the carboniferous limestone in north Derbyshire, the coastal chalk in Yorkshire, particularly around Flamborough Head, and chalk and Magnesian limestone sites in County Durham. It is local in the Midlands and Wales. There are old records from the limestone around Arnside Knott, Cumbria and from the Northumberland coast. This species is generally considered to have declined on downland and is unlikely to be under-recorded as it is noticeable by day. The species occurs through central and southern Europe to Asia Minor.
- 1.3 In Great Britain the chalk carpet is classified as Nationally Scarce.

### 2. Current factors causing loss or decline

- 2.1 Inappropriate grazing management.
- 2.2 Loss of unimproved calcareous grasslands and fragmentation of remaining habitat.

### 3. Current action

- 3.1 Conservation management is being implemented on several nature reserves and SSSIs, and under agri-environment schemes.

### 4. Objective for the species

- 4.1 Maintain the range of the chalk carpet.

### 5. Proposed action

- 5.1 Monitoring only. The requirements of the species should be taken into account in the delivery of the action plan for lowland calcareous grassland.

## Essex emerald ( *Thetidia smaragdaria maritima* ) Species Statement

### 1. Current status

- 1.1 The Essex emerald moth occurred on coastal saltmarshes. In Britain sea wormwood *Artemisia maritima* was the only recorded larval foodplant. The site of the last known colony, in Kent, was a south-east facing earthen sea wall at the foot of which sea wormwood grew in clumps with much adjacent bare, sun-baked soil. There was a thriving rabbit population on site which created much of the bare soil. The foot of the sea wall was occasionally inundated by seawater but larvae were found much further from the strandline at other former sites, where inundation is not an annual event. At the last Essex colony most larvae were found on broken ground only recently colonised by sea wormwood growing in a almost pure stand, though a few larvae were found on plants growing amongst grasses. The eggs were laid singly on the younger upper shoots of sea wormwood and the young larvae usually fed on this new growth. The larvae took up lower positions on the plant for hibernation, feeding on new shoots in the spring but spinning loose cocoons lower down again on the older stems. The adults could be found by day among the larval foodplant. Larval counts on former sites were often several hundred but since the 1970s the last two populations never had larval counts exceeding a hundred.
- 1.2 The British population was recognised as a distinct subspecies, *Thetidia smaragdaria maritima*, in 1935. *T.s.maritima* has been recorded only from the coastlines of Essex and Kent, where it is now believed extinct. It was formerly recorded from at least 10 ten km squares. The last populations died out in 1985 and 1990/91 in Essex and Kent respectively. The Essex emerald occurs in Japan, Amur and northern China through Siberia and central Asia to western Europe and from southern Scandinavia to the Mediterranean.
- 1.3 In Great Britain the Essex emerald is classified as Extinct.

### 2. Current factors causing loss or decline

Factors which are implicated in the extinction of the Essex emerald, and which may act as constraints to recovery, include:

- 2.1 Inappropriate grazing management.
- 2.2 Inappropriate management such as cutting the vegetation on sea walls and too frequent fires.
- 2.3 Large-scale reconstruction and subsequent maintenance of sea walls.

2.4 Loss and fragmentation of habitat due to agricultural improvement of upper saltmarsh and industrial development of the Thames estuary.

2.5 Loss of genetic variability due to the small size of the remaining populations may have been a factor.

2.6 Although collecting is not considered the main cause of extinction, small populations were almost certainly vulnerable.

### 3. Current action

3.1 Major surveys of Essex and Kent in 1987 and 1988 found larvae in only one saltmarsh system, in Kent. This site was monitored annually up to 1993.

3.2 Captive stock survived to 1996 as the result of a captive breeding programme initiated in 1987.

3.3 Between 1990 and 1993 five attempts, at three sites, were made to try and establish wild colonies from captive stock, initially by the Nature Conservancy Council and then as part of the Species Recovery Programme, without long-term success.

### 4. Objective for the species

4.1 Maintain any re-discovered populations.

### 5. Proposed action

5.1 Search only. The requirements of the species should be taken into account in the delivery of the action plan for saltmarsh.

## Ashworth's rustic ( *Xestia ashworthii* ) Species Statement

### 1. Current status

- 1.1 Ashworth's rustic occurs on limestone and slate grasslands in north Wales, primarily, but not exclusively, on south facing slopes. The larva is polyphagous on plants such as common rock-rose *Helianthemum nummularium*, wild thyme *Thymus praecox*, sheep's sorrel *Rumex acetosella*, harebell *Campanula rotundifolia*, salad burnet *Poterium sanguisorba*, bell heather *Erica cinerea*, golden rod *Solidago virgaurea*, few-leaved or wall hawkweed *Hieracium murorum*, lady's bedstraw *Galium verum*, creeping willow *Salix repens*, foxglove *Digitalis purpurea* and heather *Calluna vulgaris*. Small isolated patches of foodplant growing on steep, rocky ground and scree are favoured. The larvae bask and feed intermittently by day but mostly at night. The species overwinters as a small larva. The pupa is formed in a flimsy cocoon under moss or just below ground. The adults occur during mid June to August and are nocturnal, hiding by day among loose rocks and vegetation and occasionally taking flight in hot weather if disturbed.
- 1.2 Ashworth's rustic is restricted to north-west Wales, but here it is widespread over large areas of suitable habitat, occasionally in large numbers. Although under-recorded, it is known to occur over much of its historical range. The species occurs throughout Europe, from southern Scandinavia to Turkey, Transcaucasia and the Caucasus.
- 1.3 In Great Britain Ashworth's rustic is classified as Nationally Scarce.

### 2. Current factors causing loss or decline

- 2.1 Over-grazing by sheep may be adversely affecting populations.

### 3. Current action

- 3.1 The moth occurs on several nature reserves and SSSIs.

### 4. Objective for the species

- 4.1 Maintain the range of the Ashworth's rustic.

### 5. Proposed action

- 5.1 Monitoring only. The requirements of the species should be considered in the delivery of the action plans for upland calcareous grassland and upland heathland.

# Other invertebrates



# ***Brachyptera putata* (a stonefly)**

## **(Order: Plecoptera)**

### **Action Plan**

<b>1.</b>	<b>Current status</b>	Following surveys to clarify the distribution of this species it will be necessary to liaise with landowners and occupiers within relevant catchments in order to improve water quality. Autecological research will be necessary to determine habitat requirements before management of specific river conditions can be implemented.
1.1	Brachyptera putata is found in the middle and lowland sections of large and medium-sized rivers with good water quality. In Scotland, it is not found in the acidic upland sections of rivers but it does occur lower down in sections which become neutral or basic during the summer. The larvae of this stonefly are usually found in shallows or riffles which may comprise some bedrock but usually possess large boulders, cobbles and smaller material. The larvae are not predatory and are thought to feed on algae and detritus attached to the substrata. Sites where larvae have been recorded in the middle sections of rivers usually have aquatic mosses and surface algae; these plus macrophytes are recorded from sites in the lowland sections of the rivers. Adults usually emerge between late February and mid April during low-running conditions.	5.1 Policy and legislation 5.1.1 Address the requirements of the species in the LEAP process and in relevant catchment management plans and WLMPs. (ACTION: EA, IDBs, LAs, MAFF, NAW, SE, SEPA) 5.1.2 Where appropriate, take into account the requirements of this species when preparing or revising plans for agri-environment schemes. (ACTION: CCW, NAW, SE, SNH) 5.1.3 Take into account the requirements of this species when reviewing water abstraction policies within areas where the species occurs. (ACTION: EA, SWAs)
1.2	Most of the recent, post-1980, records for Brachyptera putata have come from the catchments of the Dee, Don, Spey and Deveron in north-east Scotland. Further records come from catchments of the rivers Mudale, Halladale, Forss Water and Brora in the Highlands. There are several post-1980 records for the River Wye in Herefordshire and one from the River Usk at Llantrisant in Gwent. There are historical records from the River Clyde, Lanarkshire; Rannoch in mid Perthshire; and Strath Oykell in Sutherland. It is not known to occur outside Britain.	5.2 Site safeguard and management 5.2.1 Ensure that the species is included in site management documents for all relevant SSSIs. (ACTION: CCW, EN, SNH) 5.2.2 Where possible, ensure that all occupied sites are appropriately managed by 2010. (ACTION: CCW, EA, EN, SEPA, SNH)
1.3	In Great Britain this species is classified as Endemic and Nationally Scarce.	5.3 Species management and protection 5.3.1 None proposed.
<b>2.</b>	<b>Current factors causing loss or decline</b>	5.4 Advisory 5.4.1 Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation. (ACTION: CCW, EA, EN, SEPA, SNH)
2.1	Acidification in headwaters and upland lakes.	5.5 Future research and monitoring 5.5.1 Undertake surveys to determine the current status of this species. (ACTION: CCW, EA, EN, SEPA, SNH)
2.2	Agricultural pollution from modern insecticides used in sheep and cattle farming.	5.5.2 Establish a regular monitoring programme for this species. (ACTION: CCW, EA, EN, SEPA, SNH)
2.3	Decline in water quality due to eutrophication from sewage and agricultural run-off.	5.5.3 Pass information gathered during survey and monitoring of this species to a central database so that it can be incorporated in national databases. (ACTION: CCWEA, EN, SEPA, SNH)
<b>3.</b>	<b>Current action</b>	
3.1	None known.	
<b>4.</b>	<b>Action plan objectives and targets</b>	
4.1	Maintain the natural range of this species in all known river systems.	
<b>5.</b>	<b>Proposed action with lead agencies</b>	

5.5.4 Conduct targeted autecological research to inform habitat management. (ACTION: CCWEA, EN, SEPA, SNH)

5.6 Communications and publicity

5.6.1 Promote opportunities for the appreciation of this species and the conservation issues associated with its habitat. This should be achieved by articles within appropriate journals as well as by a publicity leaflet. (ACTION: CCW, EA, EN, SEPA, SNH)

5.7 Links with other action plans

5.7.1 It is likely that implementation of this action plan will benefit other river inhabitants, including the white-clawed crayfish *Austropotamobius pallipes*, the depressed river mussel *Pseudanodonta complanta* and the freshwater pearl mussel *Margaritifera margaritifera*.

# ***Odontomyia hydroleon* (a soldierfly)**

## **(Order: Diptera)**

### **Action Plan**

<b>1.</b>	<b>Current status</b>	The objectives of this plan will be achieved by securing sympathetic management of the sites. This includes the establishment of appropriate grazing regimes at both current sites, minimisation of the impact of the adjacent sand quarry on the hydrology of the Welsh site, and the safeguarding of the hydrology at the English site. Surveys will be necessary to clarify the status of this species, followed by autecological research to investigate its habitat requirements.
1.1	Odontomyia hydroleon is associated with open, calcareous seepages in which its larvae are aquatic or semi-aquatic. Adults visit the flowers of umbels, such as hogweed <i>Heracleum sphondylium</i> , for nectar. The ecology of this species is poorly understood and the reasons for its extreme rarity are unknown.	
1.2	This species has recently been found at one site in Cardiganshire, south-west Wales, and one within the North York Moors National Park. Some publications in the first half of the 19th century include Odontomyia hydroleon as a British species, although this was treated as dubious thereafter. The only surviving early specimen, from Reading in about 1840, is damaged and identification is inconclusive. The species has a wide distribution in Europe but its status in most countries is largely unspecified: much information is based on old records.	5.1 Policy and legislation
1.3	In Great Britain this species is currently classified as Endangered.	5.1.1 Address the requirements of this species in the LEAP process and in relevant WLMPs. (ACTION: EA, IDBs, LAs)
<b>2.</b>	<b>Current factors causing loss or decline</b>	5.1.2 Take account of the requirements of this species in response to applications for water abstraction. (ACTION: EA)
2.1	The effects of quarrying and groundwater abstraction on site hydrology, making occupied seepages more drought prone.	5.1.3 Where possible, ensure mineral abstraction planning permission minimises hydrological impact and that any restoration or after-use is compatible with maintaining Odontomyia hydroleon. (ACTION: CCW, LAs)
2.2	Reductions in grazing levels, resulting in ranker, more enclosed, seepages.	5.1.4 Take account of the requirements of this species within the North York Moors National Park plan. (ACTION: NYMNP Authority)
<b>3.</b>	<b>Current action</b>	5.2 Site safeguard and management
3.1	Both known sites are notified as SSSIs.	5.2.1 Ensure that all sites are appropriately managed by 2005, for example through site management agreements. (ACTION: CCW, EN, FC)
3.2	The English site is owned and managed by Forest Enterprise.	5.2.2 Ensure that the species is included in site management documents for relevant SSSIs. (ACTION: CCW, EN)
3.3	A Section 15 management agreement in force at the Welsh site specifies a grazing regime which should maintain an open structure to the seepages.	5.3 Species management and protection
3.4	The Welsh population is the subject of a monitoring programme coordinated by CCW and the West Wales Wildlife Trust.	5.3.1 None proposed.
<b>4.</b>	<b>Action plan objectives and targets</b>	5.4 Advisory
4.1	Maintain populations at all extant sites.	5.4.1 Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation. (ACTION: CCW, EN)
4.2	Enhance the population size at all known sites by 2010.	5.5 Future research and monitoring
<b>5.</b>	<b>Proposed action with lead agencies</b>	5.5.1 Undertake surveys to determine the status of this species. (ACTION: CCW, EN)
		5.5.2 Conduct targeted autecological research to inform habitat management. (ACTION: CCW, EN)
		5.5.3 Establish a regular monitoring programme for this species. (ACTION: CCW, EN)

5.5.4 Pass information gathered during survey and monitoring of this species to a central database so that it can be incorporated in national databases. (ACTION: CCW, EN)

5.6 Communications and publicity

5.6.1 Promote opportunities for the appreciation of this species and the conservation issues associated with its habitat. This should be achieved via articles within appropriate journals. (ACTION: CCW, EN)

5.7 Links with other action plans

5.7.1 This action plan should be considered in conjunction with that for fens.

***Spiriverpa (Thereva) lunulata* (a stiletto fly)**  
**(Order: Diptera)**  
**Action Plan**

1.	Current status	5.1.2	Take account of the requirements of this species in response to applications for water abstraction or sand extraction from rivers. (ACTION: EA, SEPA, SWAs)
1.1	Spiriverpalunulata is a species of depositional stretches of rivers in northern and western Britain. Adults are associated with sandy river banks, especially where sand shoals have built up at flood level. Open conditions free of shading trees are needed. The exact ecological requirements are very poorly understood. Larvae of stiletto flies are mainly terrestrial soil predators so those of Spiriverpalunulata are assumed to live in loose sand.	5.2	Site safeguard and management
1.2	This species is recorded from only a few sites in Scotland, northern England, and south and west Wales. Despite greatly increased recording effort in recent years, few new localities have been found and some localities are threatened or have already suffered from river modification. The species has a wide distribution in Europe but its status in most countries is largely unspecified.	5.2.1	Where possible, ensure that all occupied sites are appropriately managed by 2010. (ACTION: CCW, EA, EN, SEPA, SNH)
1.3	In Great Britain Spiriverpalunulata is classified as Rare.	5.2.2	Ensure that the species is included in site management documents for all relevant SSSIs. (ACTION: CCW, EN, SNH)
2.	Current factors causing loss or decline	5.2.3	Consider notifying as SSSIs sites holding key populations of the species, where this is necessary to secure their long-term protection and appropriate management. (ACTION: CCW, EN, SNH)
2.1	The removal of sandy sediment from rivers and river banks for aggregate extraction.	5.3	Species management and protection
2.2	The deepening and canalisation of water courses.	5.3.1	None proposed.
3.	Current action	5.4	Advisory
3.1	Some Scottish and Welsh sites are notified as SSSIs. The Rivers Usk and Tywi in Wales are candidate SACs.	5.4.1	Advise landowners and managers of the presence of this species and the importance of beneficial management for its conservation. (ACTION: CCW, EA, EN, SEPA, SNH)
4.	Action plan objectives and targets	5.5	Future research and monitoring
4.1	Maintain populations on all currently occupied rivers.	5.5.1	Undertake surveys to determine the status of this species. (ACTION: CCW, EA, EN, SEPA, SNH)
5.	Proposed action with lead agencies	5.5.2	Conduct targeted autecological research to inform habitat management. (ACTION: CCW, EA, EN, SEPA, SNH)
	The objective of this plan will be achieved by securing sympathetic management of sandy river margins and by maintaining natural hydrological and geomorphological processes on occupied rivers. Surveys will be necessary to clarify the status of this species, followed by autecological research to investigate its habitat requirements.	5.5.3	Establish a regular monitoring programme for this species. (ACTION: CCW, EA, EN, SEPA, SNH)
5.1	Policy and legislation	5.5.4	Pass information gathered during survey and monitoring of this species to a central database so that it can be incorporated in national databases. (ACTION: CCW, EA, EN, SEPA, SNH)
5.1.1	Address the requirements of this species through the LEAP process and in relevant catchment management plans and WLMPs. (ACTION: EA, IDBs, LAs, MAFF, NAW, SE, SEPA)	5.6	Communications and publicity
		5.6.1	Promote opportunities for the appreciation of this species and the conservation issues associated with its habitat. This should be achieved via articles within appropriate journals as well as by a publicity leaflet. (ACTION: CCW, EA, EN, SEPA, SNH)
		5.7	Links with other action plans

5.7.1 It is likely that implementation of this action plan will benefit other species of exposed riverine sediments, including the cranefly *Rhabdomastix laeta*, the stiletto fly *Cliorismia rustica*, the ground beetles *Bembidion testaceum*, *Lionychus quadrillum* and *Perileptus areolatus*, the diving beetle *Bidessus minutissimus*, and the rove beetles *Meotica anglica* and *Thinobius newberyi*.

# Tadpole shrimp ( *Triops cancriformis* ) (Order: Notostraca)

## Action Plan

1.	<b>Current status</b>	4.2	Maintain captive populations for research, public appreciation and, if appropriate, reintroduction.
1.1	The tadpole shrimp occurs in seasonally flooded ponds which dry out completely in summer, eliminating predators and competitors. It has a rapid development and is able to mature from egg to adult in two to three weeks following wetting. The tadpole shrimp is omnivorous, feeding on small aquatic invertebrates, aquatic plants and microscopic particles extracted from sediment. There appears to be a need for nutrient input in the form of herbivore dung. As with other aquatic crustacea, veterinary compounds excreted in livestock dung are potentially highly toxic.	5.	<b>Proposed action with lead agencies</b>
1.2	It is currently found in a single ephemeral pond in the north of the New Forest (Hampshire) where it has been regularly recorded since 1934. The only other 20th century records are from the Kirkcudbrightshire coast, but its pond was recorded as lost to coastal erosion in the 1960s. There are 18th and 19th century records from north Kent (now Greater London), Bristol, Christchurch and Glanvilles Wootton in Dorset, Powick and Tewkesbury in Worcestershire. The tadpole shrimp is found across Europe to Russia and the Balkans and from the Middle East to India. However, the taxonomy of the group is in need of revision and the British population may prove to be internationally significant.	5.1	Policy and Legislation
1.3	In Great Britain this species is classified as Endangered. It is specially protected under Schedule 5 of the Wildlife and Countryside Act 1981.	5.1.1	Where appropriate, include the requirements of the species when preparing or revising prescriptions for agri-environment schemes. (ACTION: EN, MAFF)
2.	<b>Current factors causing loss or decline</b>	5.2	Site safeguard and management
2.1	Potential threats include the introduction of predators (eg fish or ducks), pollution, colonisation of the pond by alien aquatic plants, and exposure to veterinary compounds.	5.2.1	Ensure that occupied habitat continues to be appropriately managed. (ACTION: EN, FE)
3.	<b>Current action</b>	5.2.2	Ensure that the species is included in site management documents for relevant SSSIs. (ACTION: EN, FE)
3.1	The New Forest is a SSSI, SPA, Ramsar site and candidate SAC. The land and pond is Crown property managed by Forest Enterprise and is grazed by commoners' livestock, regulated through the Court of Verderers under the New Forest Acts 1877, 1949, 1964 and 1970.	5.3	Species management and protection
3.2	Research into the species, its ecology and the management of captive populations is being promoted by the <i>Triops</i> Conservation Group, guided by English Nature's Species Recovery Programme.	5.3.1	Continue to support a programme of captive breeding. (ACTION: EN)
4.	<b>Action plan objectives and targets</b>	5.3.2	Investigate the appropriateness and feasibility of reintroductions and, if appropriate and feasible, reintroduce the species to former localities. (ACTION: EN)
4.1	Maintain the New Forest population in a healthy, dynamic state.	5.4	Advisory
		5.4.1	Advise landowners, managers and commoners of the presence of this species and the importance of beneficial management for its conservation. (ACTION: EN, MAFF)
		5.5	Future research and monitoring
		5.5.1	Conduct targeted autecological research to inform habitat management, and to elucidate the effects of veterinary compounds on the habitat of the species. (ACTION: EN, FE)
		5.5.2	Survey suitable ephemeral ponds, including locations of former populations, throughout the historic range of the tadpole shrimp. (ACTION: EN, SNH)
		5.5.3	Establish a regular monitoring programme for the species. (ACTION: EN, FE, SNH)
		5.5.4	Pass information gathered during survey and monitoring of this species to a central database for incorporation in national and international databases. (ACTION: EN, SNH)
		5.6	Communications and publicity

5.6.1 Promote opportunities for the appreciation of the species and the conservation issues associated with its habitat.  
(ACTION: EN)

5.7 Links with other action plans

5.7.1 It is likely that implementation of this action plan will benefit other species of ephemeral ponds, including the dung beetle *Aphodius niger*.

**Aphrodes duffieldi (a leafhopper)**  
**(Order: Hemiptera)**  
**Species Statement**

**1. Current status**

- 1.1 Aphrodes duffieldi occurs on vegetated coastal shingle and is presumed to feed on grasses. It probably lives close to or below ground level. It appears to prefer older, vegetated shingle ridges with a higher humus content. Adults are present from July to September, and the species probably overwinters as eggs laid within the tissues of the host plants. There is only one generation each year.
- 1.2 Aphrodes duffieldi has been recorded only from Dungeness in Kent. A pitfall trap survey in 1988 caught it in moderate numbers, but nothing is known about population densities or trends. Surveys of other coastal shingle habitats in Britain (Orford Ness, Suffolk, and Rye Harbour, East Sussex) have failed to locate other populations. It is possibly endemic to Britain, but there is some doubt about its taxonomic status. It may be conspecific with *A. alpinus*, a species which is known only from the Alps. Differentiation of *A. duffieldi* from other *Aphrodes* spp in Britain depends on examination of the male genitalia.
- 1.3 In Great Britain this species is classified as Insufficiently known.

**2. Current factors causing loss or decline**

- 2.1 It is not known whether the species is declining, although any loss or degradation of vegetated shingle habitat within the local range of the species would be detrimental to the overall population. The habitat is vulnerable to vehicle access on the shingle, including military activities within MoD land, further gravel extraction, and possible extension of the nuclear power station or Lydd airport.

**3. Current action**

- 3.1 Dungeness is a SSSI and a candidate SAC, SPA and Ramsar site. *A. duffieldi* occurs within Dungeness RSPB Reserve, where it is to be monitored as part of the RSPB Biodiversity Monitoring Programme.

**4. Objective for the species**

- 4.1 Maintain the known population and local range of *Aphrodes duffieldi*.

**5. Proposed action**

- 5.1 Monitoring and clarification of taxonomic status. The requirements of the species should be taken into account in the delivery of the action plan for coastal vegetated shingle.

**Euophrys browningi (a jumping spider)**  
**(Order: Araneae)**  
**Species Statement**

**1. Current status**

1.1 Euophrys browningi is a small jumping spider which is confined to shingle beaches in the south-east of England.

1.2 This spider has been found at Shingle Street (Suffolk), Colne Point, Bradwell, and Walton-on-the-Naze (Essex), Blakeney Point (Norfolk), Havergate (Suffolk), Lydd Ranges, near Faversham (Kent) and Rye Harbour (East Sussex). It is numerous at some sites. The female was described as a new species in 1955 from a specimen captured at Shingle Street, Suffolk. The male was later found at the same site and described in 1958. However, there is a degree of uncertainty about the taxonomy of this species and some specimens are difficult to separate from mid-European specimens of *Euophrys obsoleta* Simon. If a truly distinct species it may be endemic to Britain.

1.3 In Great Britain this species is classified as Rare.

**2. Current factors causing loss or decline**

2.1 Habitat destruction from recreational pressure or military vehicles.

**3. Current action**

3.1 All records are from within SSSIs. Blakeney Point is owned by the National Trust. Bradwell Cockle Spit, Colne Point and Walton-on-the-Naze are Essex Wildlife Trust Reserves. Havergate is a RSPB Reserve. Bradwell Cockle Spit and Colne Point are also NNRs. Lydd Ranges lie within the Dungeness SSSI, whilst Rye Harbour is a SSSI and, in part, a LNR.

**4. Objective for the species**

4.1 Maintain the range of Euophrys browningi.

**5. Proposed action**

5.1 Monitoring and clarification of taxonomic status only. The requirements of the species should be taken into account in the delivery of the action plan for coastal vegetated shingle.

***Heptagenia longicauda* (a mayfly)  
(Order: Ephemeroptera)  
Species Statement**

**1. Current status**

- 1.1 Very little is known about the ecology of *Heptagenia longicauda* in Britain as only three records exist. Subimagoes emerge late in the afternoon and imagos fly at dusk during May and June. The nymphs are known to inhabit the riffles and shallows in lowland sections of mainly large clean rivers. They are classified as scraper/collector-gatherers and feed on periphyton and organic detritus.
- 1.2 *Heptagenia longicauda* was first recorded in 1868 in Britain near Reading (Berkshire) on the Kennet and Holybrook Canal, and then in 1904 at Staines in Middlesex. The last record in Britain was from the River Wey, between Tilford and Elstead, in Surrey in 1933. There have been no further records despite searches in the River Wey and the Thames catchment. The species has been widely recorded in Europe but not from Fennoscandia.
- 1.3 In Great Britain this species is classified as Endangered.

**2. Current factors causing loss or decline**

- 2.1 Not known.

**3. Current action**

- 3.1 None known.

**4. Objective for the species**

- 4.1 Maintain any discovered populations.

**5. Proposed action**

- 5.1 Search only.

**Orthotylus rubidus (a plant bug)**  
**(Order: Hemiptera)**  
**Species Statement**

**1. Current status**

- 1.1 Nymphs and adults of *Orthotylus rubidus* live on annual sea-blite *Suaeda maritima* and glasswort *Salicornia europaea* agg on open, sandy silt in sheltered areas of saltmarshes and in saline seepages behind sea defences or banks from June to October. The egg probably overwinters in the tissue of the host-plant.
- 1.2 There are scattered records on accreting coastlines from all coastal counties from Norfolk to Devon, although some early records are confused with *Orthotylus moncreaffi*. *O. rubidus* appears to have declined during the 20th century, as there are few modern records. Current sites are: Poole Harbour in Dorset; Brancaster, Salthouse Marshes and Breydon Water, Norfolk; and Thorney Island, Sussex. It is widely distributed in southern Europe.
- 1.3 In Great Britain this species is classified as Rare.

**2. Current factors causing loss or decline**

- 2.1 The species may be vulnerable to flooding by exceptionally high tides in summer. Long-term trend to higher tides in south-east England may reduce the available habitat.
- 2.2 Sites adjacent to sea-walls or shingle banks are vulnerable to destruction or disturbance by flood protection maintenance works.

**3. Current action**

- 3.1 All known existing sites are either in NNRs, SSSIs, LNRs or County Wildlife Trust reserves.

**4. Objective for the species**

- 4.1 Maintain the known range of *Orthotylus rubidus*.

**5. Proposed action**

- 5.1 Monitoring only. The requirements of the species should be taken into account in the delivery of the action plan for coastal saltmarsh.

# Fungus



## ***Boletopsis leucomelaena* (a poroid fungus)**

### **Species Statement**

#### **1. Current status**

- 1.1 Although it is a polypore, *Boletopsis leucomelaena* produces fruit bodies with the habit of a mushroom, having a distinct cap and central stem. It fruits in the autumn singly or in groups, on the ground under conifers (with which it exists in an ectomycorrhizal association). In Scotland, it occurs in a single area of native pinewood where it is associated with *Pinus sylvestris*. In Europe it is found characteristically in forests dominated by spruce (*Picea abies*).
- 1.2 The fungus is known from only one location in the British Isles - Loch an Eileann, in the Rothiemurchus Forest NNR, near Aviemore in Inverness-shire. It was first recorded there in 1876 and again in 1901, 1906 and 1938. The last record was in September, 1963. Although it is large and conspicuous, it has not been recorded elsewhere in the Rothiemurchus Forest nor in similar habitats in Deeside or Speyside. It is widely distributed in Europe, but is everywhere described as rare and as failing to appear for several years. Its world distribution includes the USA and Japan.
- 1.3 In Great Britain *Boletopsis leucomelaena* is currently classified as Vulnerable, but a re-assessment for a final Red List is likely to cite it as Endangered. It receives general protection under the Wildlife and Countryside Act 1981.

#### **2. Current factors causing loss or decline**

- 2.1 Not known.

#### **3. Current action**

- 3.1 The only known site is within a NNR.

#### **4. Objective for the species**

- 4.1 If rediscovered at its single known site, maintain the population.

#### **5. Proposed action**

- 5.1 Search only. It is likely that this species will benefit by its inclusion by SNH in the 1998-2000 survey of pinewood priority fungi (tooth fungi in the genera *Bankera*, *Hydnellum*, *Phellodon* and *Sarcodon*). The species should be considered in the delivery of the action plans for native pinewoods and tooth fungi (stipitate hydnoid fungi).

# Lichens



## ***Chaenotheca phaeocephala* (a lichen) Action Plan**

### **1. Current status**

1.1 *Chaenotheca phaeocephala* is a distinctive, pin-head lichen which is relatively easily identified when well-developed on the flat surface of old worked timber. However, when growing on old bark or lignum it tends to be more difficult to distinguish. It grows on old wood, particularly untreated, worked timber, such as on old boarded buildings and on fencing which has not been treated with preservatives, or on old lignum. It can form quite extensive patches. At its only known extant British site it grows in a crevice in the bark of an ancient oak tree in parkland.

1.2 In 1991 the species was recorded from timber on an ancient, oak-clad barn at Parham Park in West Sussex, where it occurred with *Cyphellium tigillare* and *Thelotrema ocellatum*. This was the first record for this species in Britain this century. However, it was lost when the building collapsed suddenly in 1996. The site has subsequently been visited by lichenologists but the lichen could not be relocated and no suitable habitat was found to remain. The only other recent record is of a small quantity of the lichen on a single oak tree near Welshpool, Powys, although a search in 1998 failed to relocate it. In the 18th and 19th centuries it was previously also recorded from another four sites in Norfolk, Suffolk, Shropshire and elsewhere in Sussex. All of these old records were from worked timber. Elsewhere, this species is quite widely distributed in the northern hemisphere. In Europe it is known from Italy, north to Swedish Lapland, and elsewhere from Nepal, Japan, USA and Canada.

1.3 In Great Britain *Chaenotheca phaeocephala* is classified as Critically Endangered. It receives general protection under the Wildlife and Countryside Act 1981.

### **2. Current factors causing loss or decline**

2.1 The reasons for the decline of this species in the past were the lack of dead wood for this species to colonise, the change in use of traditional building materials and the extensive use of timber preservatives on fences and farm buildings.

2.2 A further threat to this species is from eutrophication from the use of inorganic fertilisers. It was reported as declining as a result of such eutrophication at the Sussex site before the collapse of the barn, and is particularly vulnerable in its last remaining parkland situation.

### **3. Current action**

3.1 The owners of the Powys site have been made aware of the conservation requirements of the species.

### **4. Action plan objectives and targets**

4.1 Maintain the existing population and increase the abundance of the species if appropriate and feasible.

4.2 Establish an additional population by 2010, if no further populations are discovered.

### **5. Proposed action with lead agencies**

The action plan focuses on the maintenance and enhancement of appropriate habitat conditions at the single remaining site, and search for additional sites. An introduction is proposed if there are no further discovered populations.

#### **5.1 Policy and legislation**

5.1.1 None proposed.

#### **5.2 Site safeguard and management**

5.2.1 Ensure that the remaining host tree and other suitable trees in the immediate vicinity are protected. If in the interests of amenity, apply Tree Preservation Orders to protect host and surrounding trees. (ACTION: CCW, LA)

5.2.2 Consider a planting programme or the provision of suitable hardwood substrate in an area adjacent to the host tree to enhance the quantity of suitable habitat. (ACTION: CCW)

5.2.3 Assess the threat to the extant population from eutrophication. If considered to be significant, consider providing mechanisms (e.g. agri-environment scheme management agreement on land around the site) to address the problem. (ACTION: CCW, NAW)

#### **5.3 Species management and protection**

5.3.1 If further populations are not discovered, attempt an introduction to a suitable old worked timber site (e.g. barn in a conservation area). (ACTION: EN)

#### **5.4 Advisory**

5.4.1 Advise landowners and managers of the presence and importance of *Chaenotheca phaeocephala*, specific management for its conservation, and any potentially damaging actions. Landowners and managers should have access to specialist advice if needed. (ACTION: CCW, EN)

5.4.2 Ensure that relevant agri-environment project officers are advised of the locations for this species, its importance and management needed for its conservation. (ACTION: CCW, NAW)

5.5 Future research and monitoring

5.5.1 Carry out a survey of the host tree for signs of decay and structural weakness and remedy if possible, providing that this will not be detrimental to the lichen. (ACTION: CCW)

5.5.2 Monitor the remaining colony regularly to assess the size of the population and any potential threats. (ACTION: CCW)

5.5.3 Survey adjacent suitable habitat to seek additional populations of the species. (ACTION: CCW)

5.6 Communications and publicity

5.6.1 Liaise with specialist societies to increase the awareness and identification skills of lichenologists and other naturalists in relation to this species, through the publication of articles or the provision of specialist workshops. (ACTION: CCW)

5.6.2 Encourage lichenologists to pass all records of *Chaenotheca phaeocephala*, including ecological information, to a national database. (ACTION: CCW, JNCC)

5.7 Links with other action plans

5.7.1 This action plan should be considered with that for lowland wood pasture and parkland.

## Gyalideopsis scotica (a lichen) Action Plan

<b>1.</b>	<b>Current status</b>	<b>5.1</b>	<b>Policy and legislation</b>
1.1	Gyalideopsis scotica is a newly described crustose lichen with a varnish-like thallus which grows to a diameter of c1.5 cm. It is an oceanic montane species which grows on decomposing bryophytes (eg <i>Marsupella emarginata</i> ) growing over slightly base-rich (micaschist, epidiorite) mountain soils, and seems able to tolerate either wet or dry situations. At one site in Wales it occurs with a number of other montane calcicole species including <i>Polyblastia efflorescens</i> and <i>Protothelenella sphinctrinoides</i> . In Ireland, it grows on metamorphosed limestone. Although it is restricted to the mountains, it occurs at a variety of altitudes from 200 m upwards.	5.1.1	Consider Gyalideopsis scotica for inclusion on Schedule 8 of the Wildlife and Countryside Act 1981, if it fulfils the relevant criteria and should this species be considered under serious threat from botanical collection. (ACTION: DETR, JNCC)
1.2	This species is thought to be endemic to Britain and Ireland. In Britain, it is known from 8 ten km squares; three mountains in central Scotland (Ben Alder, Ben Hope and Ben Lawers), three sites in Wales (Cwm Idwal, Cwm Glas Mawr and Llyn Glas) and from one site in the mountains of Cumbria. On at least two of the Scottish hills it occurs in several places. It is otherwise known only from County Donegal, Ireland, although it is thought to be under-recorded in Ireland.	5.2	<b>Site safeguard and management</b>
1.3	In Great Britain Gyalideopsis scotica is classified as Lower Risk (Near Threatened). It receives general protection under the Wildlife and Countryside Act 1981.	5.2.1	Ensure that management agreements on all sites where Gyalideopsis scotica occurs are sympathetic to the conservation of this species. (ACTION: CCW, EN, SNH)
2.	<b>Current factors causing loss or decline</b>	5.2.2	Where necessary, control the encroachment of scrub and other coarse vegetation on extant sites for this species. (ACTION: CCW, EN, SNH)
2.1	No immediate threats to this species have been identified, although it is vulnerable, particularly to botanical collection and recreational pressures, because of the small size of the populations and its endemic status. This species may also be vulnerable to the effects of global warming.	5.3	<b>Species management and protection</b>
3.	<b>Current action</b>	5.3.1	Seek to minimise the effects of recreational pressure where this is a threat. (ACTION: CCW, EN, SNH)
3.1	All sites for this species are protected either within SSSIs or NNRs.	5.4	<b>Advisory</b>
4.	<b>Action plan objectives and targets</b>	5.4.1	Advise landowners and managers of the presence and importance of Gyalideopsis scotica, specific management for its conservation, and any potentially damaging actions. Landowners and managers should have access to specialist advice if required. (ACTION: CCW, EN, SNH)
4.1	Maintain all extant populations at their current levels or increase populations if appropriate and feasible.	5.5	<b>Future research and monitoring</b>
5.	<b>Proposed action with lead agencies</b>	5.5.1	Survey all known and potential sites for this species, to determine its current status at each and to assess the current threats to all extant populations. (ACTION: CCW, EN, SNH)
	Because of the small size of populations and the endemic status of this species, it may be vulnerable to botanical collection and it is proposed that specific legislative protection is considered. Regular monitoring of sites should be undertaken to assess the population size and current threats.	5.5.2	Undertake regular monitoring at all extant sites to assess changes in the population size and the habitat quality. (ACTION: CCW, EN, SNH)
		5.6	<b>Communications and publicity</b>
		5.6.1	Liaise with specialist societies to increase the awareness and identification skills of lichenologists and other naturalists in relation to this species, through the publication of articles or the provision of specialist workshops. (ACTION: CCW, EN, SNH)
		5.6.2	Encourage lichenologists to pass all records of Gyalideopsis scotica, including ecological information, to a national database. (ACTION: CCW, EN, JNCC, SNH)
		5.7	<b>Links with other action plans</b>

- 5.7.1 It is likely that implementation of this action plan will benefit the lichen *Halecania hypodiza*.

## ***Halecania hypodiza (a lichen)*** **Action Plan**

1.	Current status	5.1.1	Consider <i>Halecania hypodiza</i> for inclusion on Schedule 8 of the Wildlife and Countryside Act 1981, if it meets relevant criteria and if legal protection will help safeguard extant populations. (ACTION: DETR, JNCC)
1.1	<i>Halecania hypodiza</i> is an inconspicuous lichen with a black, minutely granular thallus. It occurs on minor outcrops of calcareous mica-schist, at an altitude of about 610 m.	5.2	Site safeguard and management
1.2	The lichen is endemic to Scotland, and is only known from two sites: Ben Lawers in Perthshire and Caenlochan in Angus.	5.2.1	Ensure that management agreements on all sites where <i>Halecania hypodiza</i> occurs are sympathetic to the conservation of this species. (ACTION: SNH)
1.3	In Great Britain <i>Halecania hypodiza</i> is classified as Vulnerable. It receives general protection under the Wildlife and Countryside Act 1981.	5.3	Species management and protection
2.	Current factors causing loss or decline	5.3.1	Seek to minimise the effects of recreational pressure where this is a threat. (ACTION: SNH)
2.1	This species does not appear to have declined within the last 25 years, although it is vulnerable because of the restricted number of sites, small size of the populations and its endemic status.	5.4	Advisory
2.2	Botanical collection and recreational pressure are both potential threats.	5.4.1	Advise landowners and managers of the presence and importance of this species, specific management for its conservation, and any potentially damaging actions. Landowners and managers should have access to specialist advice if required. (ACTION: SNH)
2.3	This species may be vulnerable to the effects of global warming.	5.5	Future research and monitoring
3.	Current action	5.5.1	Undertake a thorough survey of all sites for this species to determine its current status and to assess any threats to the populations. (ACTION: SNH)
3.1	Both sites for this species are protected within NNRs.	5.5.2	Undertake regular monitoring at all known sites to assess any changes in the population size or changes in habitat quality. (ACTION: SNH)
4.	Action plan objectives and targets	5.6	Communications and publicity
4.1	Maintain populations at all extant sites and increase their extent where appropriate and feasible.	5.6.1	Liaise with specialist societies to increase the awareness and identification skills of lichenologists and other naturalists in relation to this species, through the publication of articles or the provision of specialist workshops. (ACTION: SNH)
5.	Proposed action with lead agencies	5.6.2	Encourage lichenologists to pass all records of <i>Halecania hypodiza</i> , including ecological information, to a national database. (ACTION: JNCC, SNH)
	A review of information on the current distribution and status of this lichen should be undertaken by 2004, to assess its rarity. This should include a thorough survey of other potential sites in the vicinity. Populations should be monitored regularly in order that future management decisions can be better informed. Site managers should be made aware of the presence of this species and should be advised of any specific management requirements. Protection by legislation should be considered if botanical collection becomes a serious threat.	5.7	Links with other action plans
5.1	Policy and legislation	5.7.1	It is likely that implementation of this action plan will have benefits for <i>Gyalideopsis scotica</i> .

## Opegrapha paraxanthodes (a lichen) Action Plan

1.	Current status	5.1.1	None proposed
1.1	Opegrapha paraxanthodes is a crustose species with a thin, finely cracked, inconspicuous or immersed, pale greenish-yellow thallus. It grows in crevices on base-rich cliffs and rock outcrops, in deeply shaded situations, often in the wooded bottoms of river valleys. It is restricted to base-rich rock such as limestone, epidiorite and calcareous sandstone, and mainly occurs in the uplands. The taxonomy of this and other members of the Opegrapha varia group requires critical study.	5.2	Site safeguard and management
1.2	This lichen is thought to be endemic to Britain and Ireland. It has a scarce but widespread distribution in the UK, being recorded in 79 ten km squares in England (from Devon to Durham), Wales (Powys) and Scotland (predominantly Tayside). It was formerly also known from two further sites in Gwent and Cumbria, but it has not been seen at either site for over 50 years. The reasons for the loss of this species from these two sites is not known. It also occurred at one site in County Galway in the Republic of Ireland in the 19th century but is now considered extinct at this location.	5.2.1	Consider notifying as ASSI/SSIs sites with viable populations of the species where this is consistent with selection guidelines and where it is necessary to ensure their long-term protection and appropriate management. (ACTION: CCW, EN, SNH)
1.3	In Great Britain Opegrapha paraxanthodes is classified as Lower Risk (Near Threatened). It receives general protection under the Wildlife and Countryside Act 1981.	5.2.2	Where possible, establish sympathetic management at sites for this species. Particular emphasis should be given to protecting this species from inappropriate management of the surrounding woodland, which would result in increased levels of light and a reduction in levels of humidity. (ACTION: CCW, EN, FC, SNH)
2.	Current factors causing loss or decline	5.3	Species management and protection
2.1	No immediate threats to this species have been identified. The reasons for its historical decline are not known.	5.3.1	None proposed
3.	Current action	5.4	Advisory
3.1	The Powys site is within a NNR.	5.4.1	Advise landowners and managers on extant and restored sites of the presence and importance of this species, specific management for its conservation, and any potentially damaging actions. Landowners and managers should have access to specialist advice if needed. (ACTION: CCW, EN, SNH)
4.	Action plan objectives and targets	5.5	Future research and monitoring
4.1	Maintain populations at all extant sites and increase their extent where appropriate and feasible.	5.5.1	Undertake a thorough taxonomic review of the Opegrapha varia group. (ACTION: RBGE)
5.	Proposed action with lead agencies	5.5.2	Undertake a thorough survey of all known sites, including those sites where it was recorded in the past, to determine the current status of this species at each, and to assess the threats to extant populations. (ACTION: CCW, EN, SNH)
	A thorough taxonomic review of Opegrapha paraxanthodes and other members of the Opegrapha varia group is required before any conservation action is undertaken. Once the taxonomy of this species is established, and if it is still considered to be threatened, a thorough survey of all sites should be undertaken to enable the status of this lichen to be determined. A monitoring programme should then be established to monitor population size and to identify potential threats. One site is known to be protected within a NNR; details of site protection at other sites are not known.	5.5.3	Monitor all extant sites regularly to assess changes in population size and habitat quality. (ACTION: CCW, EN, SNH)
5.1	Policy and legislation	5.6	Communications and publicity
		5.6.1	Liaise with specialist societies to increase the awareness and identification skills of lichenologists and other naturalists in relation to this species, through the publication of articles or the provision of specialist workshops. (ACTION: CCW, EN, SNH)
		5.6.2	Encourage lichenologists to pass all records of Opegrapha paraxanthodes, including ecological information, to a national database. (ACTION: CCW, EN, JNCC, SNH)
		5.7	Links with other action plans

5.7.1 None proposed.

## **Hypogymnia intestiniformis (a lichen) Species Statement**

### **1. Current status**

- 1.1 Hypogymnia intestiniformis is a shiny, pale grey-brown, rosette-forming, foliose lichen. It is an arctic-alpine species which grows on exposed, acid rocks and boulders at altitudes above 900 m.
- 1.2 In the 19th century this species had a scattered distribution in the Cairngorm Mountains and was also known from one site on Ben Lawers, Perthshire. However it has only been recorded from one site in recent years, on Ben Avon in the Cairngorm Mountains, where it was last seen in 1964. Elsewhere it has an arctic-alpine distribution and is widely distributed in Europe from Scandinavia to the Mediterranean, and the British Isles to the Balkans. Within this range it generally occurs in the mountainous areas, but descends to sea-level in the boreal region, avoiding the Atlantic coast.
- 1.3 In Great Britain Hypogymnia intestiniformis is classified as Critically Endangered. It receives general protection under the Wildlife and Countryside Act 1981.

### **2. Current factors causing loss or decline**

- 2.1 The reasons for the losses of Hypogymnia intestiniformis in the 19th century are not clear. However, more latterly this species is thought to have been vulnerable to habitat disturbance through recreational pressure, botanical collection and the effects of climatic change.

### **3. Current action**

- 3.1 A survey was undertaken in 1996 as part of SNH's slower plant conservation project, but the species was not re-found.
- 3.2 All the recorded sites for this species are protected as a SSSI or NNR.

### **4. Objective for the species**

- 4.2 If re-discovered, maintain the population.

### **5. Proposed action**

- 5.1 Search only. A further thorough survey of the last recorded site and other potential sites should be undertaken to establish the current status of this species.
- 5.2 If re-discovered, this species should be monitored periodically to assess the population size and to monitor potential threats.

# Bryophytes



## Tiny fern-moss ( *Fissidens exiguus* ) Action Plan

### 1. Current status

- 1.1 Tiny fern-moss is a very small moss that grows on wet or submerged, acidic sandstone in lowland streams and small rivers, usually where shaded in ravines and woodlands.
- 1.2 Most of its British localities are in the eastern part of the Weald in East Sussex and Kent, with populations elsewhere widely isolated in south Devon, north Somerset, Powys, Warwickshire and Cumbria. There is a single Irish locality, in County Tipperary. It often occurs in small quantity and it sometimes grows intermixed with larger species of *Fissidens*, so that it may sometimes be overlooked, but it is undoubtedly rare in Britain. Occurrence of this species in Britain (and Europe) was not definitely established until 1952 and hence there is little information regarding changes in its status. Its world range is also rather uncertain because of differing taxonomic treatments and mis-identification of specimens. In continental Europe there are reports from Denmark, Germany and the former Czechoslovakia southwards to Sicily and Crete and eastwards to western Russia, although one expert only accepts the German and Danish records. It is also known in North and Central America and reported from the West Indies and north Africa
- 1.3 In Great Britain, this species is classified as Near Threatened. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

These are not well known although are thought to include the following:

- 2.1 Decreased discharge in streams and small rivers due to water abstraction.
- 2.2 Eutrophication, silting and other pollution of streams and small rivers.
- 2.3 Decrease in shading of sites due to loss or removal of streamside trees.

### 3. Current action

- 3.1 One site is a SSSI and owned by the National Trust.

### 4. Action plan objectives and targets

- 4.1 Ensure that populations are maintained in all its UK sites.
- 4.2 Establish by 2005 ex situ stocks of this species to safeguard extant populations.

### 5. Proposed action with lead agencies

A survey of all known sites should be the first action taken for this species. This will establish its current status and provide information to allow targeting of the other measures recommended. The priorities will include beneficial management of all extant sites based on a better understanding of the plant's ecological requirements and protection for each population from water pollution, excessive water abstraction and removal of waterside trees.

- 5.1 Policy and legislation
- 5.1.1 None proposed.
- 5.2 Site management and protection
- 5.2.1 Where possible, ensure that the best sites for this species are protected from damaging activities and inappropriate management. (ACTION: CCW, EN)
- 5.2.2 Consider notifying as SSSIs sites with viable populations of this species where this is consistent with selection guidelines and where it is necessary to ensure their long-term protection and appropriate management. (ACTION: CCW, EN)
- 5.2.3 On streams with populations of tiny fern-moss, ensure that existing stream discharges and water quality are maintained. (ACTION: CCW, EA, EN)
- 5.2.4 Assess the threat to the extant population from eutrophication. If considered to be significant, consider providing mechanisms (e.g. agri-environment scheme management agreement on and around the site) to address the problem. (ACTION: CCW, EN, MAFF, NAW)
- 5.2.5 Where possible, ensure that waterside trees are not removed from alongside those parts of streams with populations of tiny fern-moss. (ACTION: CCW, EA, EN)
- 5.2.6 Ensure that local planning policies take into account the requirements of this species. (ACTION: CCW, EN, LAs)
- 5.3 Species management and protection
- 5.3.1 Depending on the results of 5.5.4, establish ex situ stocks of this species from material derived from British populations. (ACTION: CCW, EN, RBG Kew)
- 5.4 Advisory
- 5.4.1 Advise landowners and managers of the presence and importance of this species, specific management for its

conservation, and any potentially damaging actions. Landowners and managers should have access to specialist advice if needed. (ACTION: CCW, EN)

5.4.2 Ensure that relevant waterways managers and agri-environment project officers are advised of locations for this species, its importance and the management needed for its conservation. (ACTION: CCW, EA, EN)

5.5 Future research and monitoring

5.5.1 Re-survey all known extant and historic sites for this species to determine its current distribution and status, and to assess possible threats to remaining populations. (ACTION: CCW, EN)

5.5.2 Undertake regular monitoring and ecological research on selected viable sites for this species to determine more precisely its requirements and the management techniques which should be employed for its conservation. (ACTION: CCW, EN)

5.5.3 Encourage international research on the distribution, status and ecology of this species, and use the information and expertise gained towards its conservation in the UK. (ACTION: CCW, EN, JNCC)

5.5.4 Undertake pilot studies to develop and refine ex situ conservation techniques for this species and other threatened bryophytes. (ACTION: CCW, EN, RBG Kew)

5.6 Communications and publicity

5.6.1 Liaise with specialist societies to increase awareness and identification skills of bryologists and other naturalists in relation to this species, through publishing articles or holding identification workshops. (ACTION: CCW, EN)

5.6.2 Encourage bryologists to pass all records of tiny fern-moss, including ecological information, to a national database. (ACTION: CCW, EN, JNCC)

5.7 Links with other action plans

5.7.1 This action plan should be considered with that for the otter.

## Beaked beardless-moss ( *Weissia rostellata* ) Action Plan

<b>1.</b>	<b>Current status</b>	understanding of the plant's ecological requirements, and protection for each colony.
1.1	Beaked beardless-moss is most often recorded from mud or gravelly surfaces exposed when water levels of reservoirs fall in late summer and autumn. It has also been found in similar situations beside rivers and occasionally as a colonist of bare, clayey or humic substrates on banks of ditches, woodland rides and bare patches in fields.	5.1 Policy and legislation 5.1.1 None proposed.
1.2	Recent UK reports of the species are thinly scattered from Lothian to Anglesey and Dorset, but there are old records from County Antrim and in Sussex and Kent. It has probably declined in the UK since it has not been re-found recently at over one-third of the localities with pre-1950 records. There is a single locality known in western Ireland and confirmed records in continental Europe at scattered localities from southern Norway and southern Sweden southwards to western France, Italy and Slovenia, and eastwards to western Ukraine.	5.2 Site management and protection 5.2.1 Ensure that the best sites for this species in each region are protected from inappropriate management. (ACTION: CCW, EHS, EN, SNH) 5.2.2 Consider notifying as ASSIs/SSIs sites with viable populations of beaked beardless-moss where this is consistent with selection guidelines and where it is necessary to ensure their long-term protection and appropriate management. (ACTION: CCW, EHS, EN, SNH)
1.3	This species is classified as Near Threatened in Great Britain and Vulnerable in the provisional Bryophyte Red List for Ireland. It receives general protection under the Wildlife and Countryside Act 1981.	5.2.3 On sites where the moss is thriving, ensure that current management practices (especially current water-level management) are continued. On other sites where it has declined, undertake experimental management with the aim of enhancing the populations. (ACTION: CCW, EA, EHS, EN, SEPA, SNH, SWAs)
2.	<b>Current factors causing loss or decline</b>  These are not well known although they are thought to include the following:	5.2.4 Where appropriate, target relevant agri-environment schemes on land with populations of beaked beardless-moss so as to ensure that these populations are not threatened by changing land-use practices (including herbicide and fertiliser use). (ACTION: CCW, DANI, EHS, EN, MAFF, NAW, SE, SNH) 5.2.5 Where relevant, ensure that extant sites for the species are not threatened by land drainage activities or through increases in water abstraction. The requirements of this species should be considered when setting limits on water abstraction. (ACTION: CCW, EA, EHS, EN, IDBs, SE, SEPA, SNH, SWAs)
3.	<b>Current action</b>	5.3 Species management and protection 5.3.1 None proposed.
3.1	Several sites for the species are within SSSIs.	5.4 Advisory 5.4.1 Advise landowners and managers of extant and restored sites of the presence and importance of this species, specific management for its conservation, and any potentially damaging actions. Landowners and managers should have access to specialist advice if needed. (ACTION: CCW, EHS, EN, SNH)
4.	<b>Action plan objectives and targets</b>	5.4.2 Ensure that all relevant reservoir and waterways managers, drainage engineers, agri-environment project officers and members of regional agri-environment consultation groups are advised of locations for this species, its importance and management needed for its
4.1	Ensure that populations are maintained on extant sites throughout its UK range.	
5.	<b>Proposed action with lead agencies</b>  A survey of all known extant and historic sites should be undertaken to establish the current status of the species and facilitate targeted action. The priorities will include beneficial management of extant sites based on a better	

conservation. (ACTION: CCW, DANI, EA, EHS, EN, IDBs, LAs, MAFF, NAW, SE, SEPA, SNH, SWAs)

5.5 Future research and monitoring

5.5.1 When water-levels are sufficiently low, re-survey all known extant and historic sites for this species in order to determine its current distribution and status, and assess possible threats to remaining populations. (ACTION: CCW, EHS, EN, SNH)

5.5.2 Undertake regular monitoring and ecological research on selected viable sites for this species in order to determine more precisely its requirements and appropriate management techniques. (ACTION: CCW, EHS, EN, SNH)

5.5.3 Encourage international research on the distribution, status and ecology of this species, and use the information and expertise gained towards its conservation in the UK. (ACTION: CCW, EHS, EN, JNCC, SNH)

5.6 Communications and publicity

5.6.1 Liaise with specialist societies to increase awareness and identification skills of bryologists and other naturalists in relation to this species, through publishing articles or holding identification workshops. (ACTION: CCW, EHS, EN, JNCC, SNH)

5.6.2 Encourage bryologists to pass all records of beaked beardless-moss, including ecological information, to a national database. They should be encouraged in particular to search exposed lake and reservoir margins. (ACTION: CCW, EHS, EN, JNCC, SNH)

5.7 Links with other action plans

5.7.1 It is likely that implementation of this action plan will benefit *Ephemerum cohaerens* and *Micromitrium tenerum* (surveys of lake and reservoir edges for these two species could be combined with surveys for beaked beardless-moss), and *Weissia squarrosa*.

## Lesser smoothcap ( *Atrichum angustatum* ) Species Statement

### 1. Current status

- 1.1 Lesser smoothcap grows mainly on damp, acidic, sandy and gravelly soil of rides, tracks and paths in ancient woodland. There are also old records from heaths and commons.
- 1.2 In the UK this moss occurs mainly in the High Weald of Sussex and Kent, but with two modern records in Northern Ireland and scattered old records that include one in each of southern Scotland and south Wales. The lack of modern records at numerous of its old sites in Surrey and Sussex implies that it has declined. It is unclear whether the prevalence of old records in other regions results from casual occurrences or a decline. The species is widespread across most of Europe and into western Asia. It is also locally common in eastern North America and recorded in Iceland, the Azores and Madeira.
- 1.3 Lesser smoothcap is classified as Endangered in Great Britain and Insufficiently known in the provisional Bryophyte Red List for Ireland. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

These are not well understood, but are thought to include the following:

- 2.1 The resurfacing, and increase or decrease in usage of woodland tracks (rides).
- 2.2 Decline in coppicing of woodlands and growth of planted conifers, both resulting in increased shading of woodland rides.

### 3. Current action

- 3.1 Several of the occupied sites are within SSSIs.

### 4. Objective for the species

- 4.1 Maintain populations of lesser smoothcap at its strongholds in Sussex and Kent, and at any localities elsewhere in the UK where the species is well established.

### 5. Proposed action

- 5.1 Monitoring of populations in Kent and Sussex, and survey to establish present status at the localities in Northern Ireland.

## Matted bryum ( *Bryum calophyllum* ) Species Statement

### 1. Current status

- 1.1 Matted bryum is a moss of damp calcareous sand in dune-slacks, less often found beside estuaries or in gravel-pits near the sea.
- 1.2 The sparse British records of matted bryum are almost all coastal, from north Devon, western Wales and Lancashire northwards to Scotland. The species has apparently declined since it has not been re-found at several of its old localities. The moss has a wide range in North America and northern and central Asia, occurring both inland and on coasts. In Europe it is mainly northern and coastal, occurring from the Netherlands northwards to Iceland and Svalbard, but also in Sardinia and Romania.
- 1.3 In Great Britain matted bryum is classified as Vulnerable. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

These are not well known, but are thought to include the following:

- 2.1 Destruction of dune-slacks due to coastal development and creation of golf courses.
- 2.2 Loss of areas with short vegetation in dune-slacks resulting from reduced grazing pressure, falling water tables, or natural vegetation succession.

### 3. Current action

- 3.1 Several of the occupied sites are within SSSIs.

### 4. Objective for the species

- 4.1 Maintain all extant populations of matted bryum.

### 5. Proposed action

- 5.1 Monitor populations at three sites with post-1980 records and survey continued occurrence at all historic sites. The requirements of this species should be considered in the delivery of the action plans for coastal sand dunes and the liverwort *Petalophyllum ralfsii*. This species is a good candidate for ex situ conservation.

## Pear-fruited bryum ( *Bryum turbinatum* ) Species Statement

### 1. Current status

- 1.1 Pear-fruited bryum forms green to pinkish patches on damp, basic soil at inland sites such as beside streams, and occasionally in coastal dune-slacks.
- 1.2 British records of the moss were from Rum and widely scattered sites in England and Wales. However, it has been recorded only three times since 1930, the latest record being in 1947. The species is dioecious and is only identifiable when sporophytes are produced; it is thus possible that rarity of sporophyte production might nowadays mask its true status. The species has a wide range that includes South America (Argentina, Chile, mountains of Peru and Ecuador), possibly North America, north-west Africa, Ethiopia, southern Africa, Asia southwards to Kashmir and Sikkim, and many European countries from Iceland and Scandinavia southwards.
- 1.3 In Great Britain pear-fruited bryum is classified as Data Deficient and is rare nationally. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

There is no detailed information on current factors, but the following are likely to be involved:

- 2.1 Loss of areas of damp sandy ground to drainage and agricultural intensification.
- 2.2 Destruction of dune slacks for golf courses and other coastal developments.

### 3. Current action

- 3.1 None known.

### 4. Objective for the species

- 4.1 Ascertain whether pear-fruited bryum survives at any site in the UK and, if it does, maintain its populations.

### 5. Proposed action

- 5.1 Include pear-fruited bryum among lists of rare bryophytes to be sought in surveys of dune-slacks and other appropriate habitats. It will be important to ascertain whether this species can be identified reliably using characters of the gametophyte. The species is a good candidate for ex situ conservation.

## Cernuous bryum ( *Bryum uliginosum* ) Species Statement

### 1. Current status

- 1.1 Cernuous bryum is a moss that grows in patches on damp soil, mainly inland such as beside streams, sometimes also in coastal dune-slacks.
- 1.2 The moss was formerly widespread over much of the UK from Oxfordshire northwards, with numerous records in northern England. There have been only two British records since 1950 and none since 1970. The species is regarded as being identifiable only when ripe capsules are present, so it is possible that rarity of sporophyte production might nowadays mask its real status. Cernuous bryum has a wider range that includes North America, Chile, Argentina, South Georgia, New Zealand, Greenland, northern Asia and many European countries from Iceland and Finland southwards to Spain and northern Italy.
- 1.3 This moss is classified as Data Deficient in Great Britain and Critically Endangered in the provisional Bryophyte Red List for Ireland. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

These are poorly understood, although the following are likely to be involved:

- 2.1 Loss of open, damp ground to drainage and agricultural intensification.
- 2.2 Destruction of dune-slacks due to creation of golf courses and other coastal developments.

### 3. Current action

- 3.1 None known.

### 4. Objective for the species

- 4.1 Maintain any re-discovered populations.

### 5. Proposed action

- 5.1 Include the species in surveys of bryophytes of dune-slacks and other appropriate habitats. It will be important to ascertain the extent to which the moss is identifiable using characters of the gametophyte. The species is a good candidate for ex situ conservation.

## Silky swan-neck moss ( *Campylopus setifolius* ) Species Statement

### 1. Current status

- 1.1 Silky swan-neck moss is a robust moss that forms loose, deep tufts in varied moist or wet, acidic to mildly basic habitats, including turf on slopes, rock ledges, block scree, edges of streams, flushes and sometimes mires, from near sea-level to 800 m.
- 1.2 The range of the species is confined to oceanic districts within which it is restricted to sites with a humid microclimate. Its British range is in north-western Wales (Gwynedd), the Lake District (Cumbria), and western Scotland (locally in Dumfries & Galloway and Isle of Arran, more widespread further north). In Ireland it is widespread in the west but very local in the east, with recent records in Northern Ireland only from County Down. There is no evidence of a decline within its limited range, but information from much of its range is too sparse to adequately document the likely loss of some historic sites. Male plants are known only from the Isle of Skye and all records of sporophytes are dubious. The species may therefore lack the ability to colonise or recolonise sites by spores and thus it may be especially susceptible if existing sites are lost or damaged. However, the absence of recent records locally can probably be attributed to paucity of bryological recording. Outside the British Isles it has been reported only from a locality in Asturias in north-western Spain, although the Spanish material has smaller leaves and might differ taxonomically.
- 1.3 In Great Britain this species is classified as Nationally Scarce. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

These are not well known although they are thought to include the following:

- 2.1 Muirburning.
- 2.2 Excessive grazing by sheep or deer.
- 2.3 Afforestation with conifers.
- 2.4 Peat digging and other alterations to mires.
- 2.5 Eutrophication as a result of 'improvement' of hill pastures.

### 3. Current action

- 3.1 Several sites are within SSSIs in England, Wales and Scotland and some are managed as NNRs. The County Down site is an ASSI and candidate SAC.

### 4. Objective for the species

4.1 Maintain the range of silky swan-neck moss.

### 5. Proposed action

5.1 Monitoring only. The requirements of the species should be considered in the delivery of the action plans for other priority bryophytes, including *Acrobolbus wilsonii*, *Hamatocaulis vernicosus*, *Jamesoniella undulifolia*, and *Lejeunea mandonii*.

## Clustered earth-moss (*Ephemerum cohaerens* ) Species Statement

### 1. Current status

- 1.1 Clustered earth-moss is a tiny ephemeral moss that grows as a colonist of soil on banks and fine-textured, non-calcareous mud at the edge of reservoirs.
- 1.2 The three recent British records of the species are from Leicestershire, Hertfordshire and West Sussex. The species has only been found a few times and so it is believed to be sporadic in appearance, with several recent attempts to re-find it at the same localities having been unsuccessful. The moss occurs in eastern North America from Ontario southwards to Florida and Texas, in Europe from Ireland, Germany and Poland southwards to Sardinia and the former Yugoslavia, and in Turkey.
- 1.3 In Great Britain clustered earth-moss is classified as Critically Endangered. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

These are not well known, but are thought to include the following:

- 2.1 Maintenance of higher or more stable water-levels in reservoirs leading to less exposure of mud in autumn.
- 2.2 Reduced occurrence of moist, bare ground, such as at pond edges.

### 3. Current action

- 3.1 One of the sites with modern records is protected as part of a SSSI and a NNR.

### 4. Objective for the species

- 4.1 Maintain the British range of clustered earth-moss.

### 5. Proposed action

- 5.1 Re-survey of the known sites and other potentially suitable reservoirs should be carried out in autumn of a year when water-levels in reservoirs are low. If populations are found, management practices that provide habitats that suit the species should be developed, including the management of the water-levels if appropriate. The species should be considered in the delivery of the action plan for *Weissia rostellata*.

## Crozals' frillwort ( *Fossombronia crozalsii* ) Species Statement

### 1. Current status

- 1.1 Crozals' frillwort is a small liverwort that has been recorded in Britain only from disturbed, moist, sandy soil in ruts in woodland rides.
- 1.2 This rare, predominantly Mediterranean species is known only from Algeria, Spain, southern France and two sites in southern England, but it might be synonymous with the tropical west African *F. occidento-africana*. Reports from the Canary Islands and Germany are now discounted. It has not been recorded recently at either of its British sites, the record from Berkshire (Tubney Wood) dating from 1938 and those from Wiltshire (Chisbury Wood) from 1918 and 1972. More recent searches, including an investigation of the Wiltshire site in 1998, have failed to relocate the species.
- 1.3 In Great Britain Crozals' frillwort is classified as Critically Endangered. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

These are not well known but are thought to include the following:

- 2.1 Either the increase or decrease in usage by vehicles of woodland tracks (rides).
- 2.2 The loss of rutted rides as a result of the decline in use of horse-drawn vehicles, and the surfacing of tracks.
- 2.3 Increased shading of woodland rides as planted conifers mature.

### 3. Current action

- 3.1 None known.

### 4. Objective for the species

- 4.1 If re-discovered, maintain extant populations.

### 5. Proposed action

- 5.1 Assess the possibility of introducing management to promote growth of buried, dormant spores that may still be present at the Wiltshire locality. Small-scale disturbance of the ground surface along rides and reduction of shading may be required.

## Stabler's rustwort ( *Marsupella stableri* ) Species Statement

### 1. Current status

- 1.1 This small leafy liverwort forms reddish-purple to brownish mats on rocks and gravelly soil in the mountains at 300-1160 m. It grows mainly on acidic substrates in places that are periodically flushed with water, often in gullies and other areas with late lying snow.
- 1.2 Because of taxonomic confusion with *Marsupella boeckii*, the range of Stabler's rustwort outside Britain is not well understood, although it has been reported from western Norway and Canada (British Columbia). In Britain it has numerous localities in Scotland, several in the Lake District and two in north Wales. There is no evidence of any widespread or substantial loss of its British populations over the past century, although localised losses have doubtless occurred.
- 1.3 In Great Britain this species is classified as Nationally Scarce. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

Although there is little information, the following factors may have caused losses locally:

- 2.1 Building of ski lifts and other structures on mountains.
- 2.2 Erosion of vegetation by walkers and climbers.

### 3. Current action

- 3.1 A considerable number of the occupied sites are within SSSIs and some are within NNRs.

### 4. Objective for the species

- 4.1 Maintain viable populations throughout the present British range of the species.

### 5. Proposed action

- 5.1 Monitoring only. The requirements of this species should be considered in the delivery of the upland heathland action plan and in relation to development proposals in mountain regions.

## Millimetre moss ( *Micromitrium tenerum* ) Species Statement

### 1. Current status

- 1.1 Millimetre moss is a tiny, ephemeral moss that colonises non-calcareous, sometimes peaty, drying mud at edges of ponds, lakes and reservoirs.
- 1.2 In Britain, the moss has been recorded from Anglesey, Surrey, Sussex and west Kent. Although it is often plentiful when found, the only modern records are from Anglesey and West Sussex, suggesting that there has been a marked decline. The world range of millimetre moss comprises western Canada (British Columbia), Asia (Assam, China, Korea, Japan) and several European countries (France, Belgium, northern Spain, southern Sweden, Germany and the former Czechoslovakia), although it appears to be scarce everywhere.
- 1.3 Millimetre moss is classified as Critically Endangered in Great Britain. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

These are not well known, but are thought to include the following:

- 2.1 Maintenance of higher or more stable water-levels in reservoirs, leading to less exposure of mud in autumn.
- 2.2 Destruction of ponds.

### 3. Current action

- 3.1 None known.

### 4. Objective for the species

- 4.1 Maintain the current range of millimetre moss in Britain.

### 5. Proposed action

- 5.1 Re-survey of the known sites should be carried out in autumn of a year when water-levels in pools and reservoirs are low. If populations are found, develop management practices that provide habitats that suit the species, including the management of the water-levels if appropriate. The species should be considered in the delivery of the action plan for *Weissia rostellata*.

## Aspen bristle-moss ( *Orthotrichum gymnostomum* ) Species Statement

### 1. Current status

- 1.1 Aspen bristle-moss is an epiphytic moss known in Britain only on bark of a single aspen (*Populus tremula*) in open pine-birch woodland. It occurs mainly on aspen in Scandinavia.
- 1.2 There is one record in Britain, of a single tuft found in 1966 in Rothiemurchus Forest in east Inverness. Recent attempts to re-find it in the same area have been unsuccessful, so there is a possibility that the species was only of casual occurrence. The moss is known from a few collections from Canada (Newfoundland). In continental Europe it is recorded from Fennoscandia southwards to France and Italy and eastwards to Russia and the Ukraine. In south-western Asia it is known in Turkey and Afghanistan, but reports of it from Japan are no longer accepted.
- 1.3 In Great Britain aspen bristle-moss is now classified as Extinct.

### 2. Current factors causing loss or decline

- 2.1 Not known. It is possible that the species was only of casual occurrence in Britain.

### 3. Current action

- 3.1 None: the species is thought to be extinct in Britain.

### 4. Objective for the species

- 4.1 Maintain any newly discovered populations.

### 5. Proposed action

- 5.1 Undertake targeted survey of aspen stands in the Spey Valley.

## Spruce's bristle-moss ( *Orthotrichum sprucei* ) Species Statement

### 1. Current status

- 1.1 Spruce's bristle-moss is an epiphyte that grows on the bark of trees within the flood-zones of streams and rivers, at levels that remain dry for much of each year but which are inundated at times of peak discharge.
- 1.2 In the UK the moss is widely but rather sparsely distributed in Wales and over much of England except for East Anglia. There is a single record in Scotland (Stirlingshire) and a single old record in Northern Ireland (County Down). The species has not been re-found at numerous old sites in central and southern England or at its only locality in Northern Ireland. Outside Britain, the species is only known in western Europe, with a few records each from Ireland, France, Belgium and the Netherlands. An old record from North America (Washington State) is now discounted.
- 1.3 Spruce's bristle-moss is classified as Nationally Scarce in Great Britain and Vulnerable in the provisional Bryophyte Red List for Ireland. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

- 2.1 Removal of trees from the edges of rivers and streams.
- 2.2 Alteration of river discharge patterns so that tree bases are no longer or less regularly inundated. This may result from flood prevention schemes, canalisation of river channels or creation of reservoirs.

### 3. Current action

- 3.1 Several of the occupied sites are within SSSIs.

### 4. Objective for the species

- 4.1 Maintain strong populations throughout the present UK range of the species.

### 5. Proposed action

- 5.1 Undertake surveys of Spruce's bristle-moss, concentrating on Northern Ireland. Trees at edges of rivers and streams that support populations of this species should be maintained. The species should be considered in the delivery of the action plan for *Cryphaea lamyana*.

## Pict-moss ( *Pictus scoticus* ) Species Statement

### 1. Current status

- 1.1 Pict-moss is a small pleurocarpous moss known only as an epiphyte from a single small tree, probably a rowan (*Sorbus aucuparia*), growing on a dry limestone outcrop at 500 m.
- 1.2 The original gathering of the species was made in Glen Shee, Perthshire (Tayside), Scotland. The type collection was made in 1979 and subsequent searches at the same locality have not relocated the plant. It has been suggested that the species should be treated as a taxonomic synonym of *Hygrohypnum luridum*, but no discussion of this has been published.
- 1.3 In Great Britain pict-moss is classified as Data Deficient.

### 2. Current factors causing loss or decline

- 2.1 Not known.

### 3. Current action

- 3.1 The type-locality is within a SSSI.

### 4. Objective for the species

- 4.1 If confirmed as a valid species, and re-discovered, maintain all known populations.

### 5. Proposed action

- 5.1 Investigate the systematic position of pict-moss, taking full account of the variability of *Hygrohypnum luridum* around the Glen Shee locality and making full use of all available morphological and if possible biochemical and genetic data.

## Hair silk-moss ( *Plagiothecium piliferum* ) Species Statement

### 1. Current status

- 1.1 Hair silk-moss is a pleurocarpous moss that forms patches on shaded montane rock-ledges and among boulders at about 800 m.
- 1.2 In Britain the moss has been recorded only from two localities in Scotland, on Ben Lawers (Perthshire, now Tayside) and in Caenlochan Glen (Angus, now Tayside). The last British record was from Caenlochan Glen in 1939. It has not been re-found during recent fieldwork at its historic localities but it might nevertheless still persist in Scotland. It is known in western North America, eastern Asia, Siberia, northern and central Europe, the Pyrenees, Corsica, Sardinia and Italy (Tuscany).
- 1.3 Hair silk-moss is classified as Critically Endangered in Great Britain. It is specially protected under Schedule 8 of the Wildlife and Countryside Act 1981 (as amended).

### 2. Current factors causing loss or decline

- 2.1 Not known.

### 3. Current action

- 3.1 Both of the locations with historic records are within SSSIs.

### 4. Objective for the species

- 4.1 Maintain any British populations of hair silk-moss that still survive.

### 5. Proposed action

- 5.1 Undertake targeted searches of former sites to determine whether the species is still extant.

## English rock-bristle ( *Seligeria calycina* = *paucifolia* ) Species Statement

### 1. Current status

- 1.1 English rock-bristle is a small moss that invariably grows on fragments of chalk, usually on the ground in woodland, but also in old quarries and occasionally in grassland.
- 1.2 The species is widespread in the chalklands of south-eastern England, extending westward to south Devon and northwards to Humberside. The only recent record in Ireland is from a locality in County Londonderry, but there is also an old record from County Antrim. It is a European endemic and reported to be very rare outside Britain, with records only from Belgium, France and Italy.
- 1.3 This species is classified as Lower Risk in Great Britain and Vulnerable in the provisional Bryophyte Red List for Ireland. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

The following factors may be operating against populations of the species, or have done so in the past:

- 2.1 Loss of habitat to building developments, roads, or arable conversion.
- 2.2 Growth of scrub and saplings in old chalk pits producing excessive shade.
- 2.3 Destruction or inappropriate management of woodlands.

### 3. Current action

- 3.1 The species is present in a large number of SSSIs in England.

### 4. Objective for the species

- 4.1 Maintain the range of English rock-bristle.

### 5. Proposed action

- 5.1 Monitoring only.

## Skye bog-moss ( *Sphagnum skyense* ) Species Statement

### 1. Current status

- 1.1 Skye bog-moss is a reddish bog-moss that grows in wet heathland with other mosses and heathers.
- 1.2 It is known only from one locality in Strath Suardal on the Isle of Skye. It was discovered here in 1987 but has not been re-found inspite of searching. However, the precise locality needs to be determined. It is probably the same species as *Sphagnum junghuhnianum*, which occurs in Asia from the tropics northwards to Sikkim, Japan and China, and which has also been found in western North America (British Columbia and probably Aleutian Islands).
- 1.3 In Great Britain Skye bog-moss is classified as Data Deficient.

### 2. Current factors causing loss or decline

- 2.1 Not known.

### 3. Current action

- 3.1 None known.

### 4. Objective for the species

- 4.1 If it is confirmed as a separate species, and re-discovered, maintain all extant populations.

### 5. Proposed action

- 5.1 Ascertain the range, taxonomic status and habitats of Skye bog-moss on Skye.

## Small four-tooth moss ( *Tetraphis pellucens* ) Species Statement

### 1. Current status

- 1.1 Small four-tooth moss is a minute moss that grows on the underside of overhanging, moist, sandstone or gritstone rocks.
- 1.2 The species has only been found a few times in Britain, most recently in 1958. The two confirmed British records were from localities in north-east Yorkshire and East Sussex. Subsequent attempts to re-find it have been unsuccessful, but since it is minute and it might persist as a very inconspicuous leafless protonema, the plant might nevertheless still be present at or near its old sites. It has a wide range in western North America, Newfoundland, China, Japan, the Caucasus, Jan Mayen, and in Europe in Fennoscandia, France and central Europe.
- 1.3 In Great Britain small four-tooth moss is classified as Critically Endangered.

### 2. Current factors causing loss or decline

- 2.1 Not known.

### 3. Current action

- 3.1 None known.

### 4. Objective for the species

- 4.1 Maintain any populations of small four-tooth moss that still survive in Britain.

### 5. Proposed action

- 5.1 Because the species is inconspicuous, further attempts should be made to relocate it at the old British sites.

## Spreading-leaved beardless-moss ( *Weissia squarrosa* ) Species Statement

### 1. Current status

- 1.1 Spreading-leaved beardless-moss is an acrocarpous moss that grows on moist, exposed, non-calcareous clay, loam and mud, occurring in the lowlands in fields, beside ditches and pools and in woodland rides.
- 1.2 British records for the moss extend from south-east Scotland (Fife) to the Isle of Wight, but it has not been recorded over most of northern England, and all of south-west England and East Anglia, and the only Welsh record was from Monmouthshire (now Gwent). Old records considerably out-number recent finds in Britain, pointing to a marked decrease, with modern records only from the southern part of the range (from the former Huntingdonshire to Isle of Wight). The moss has a rather sparse distribution in southern Scandinavia and across Central Europe from France eastwards to Romania.
- 1.3 In Great Britain this species is classified as Endangered. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

These are poorly understood, but are thought to include the following:

- 2.1 Drainage of farmland and infilling of ponds, reducing the availability of habitat.
- 2.2 Agricultural intensification on grasslands, especially through increased fertiliser applications, leading to reduced availability of partly bare, acidic and nutrient poor substrates.
- 2.3 Changes in agricultural practice on arable land, including fields less often being left fallow through the winter.

### 3. Current action

- 3.1 None known.

### 4. Objective for the species

- 4.1 Maintain viable populations throughout the current British range of the species.

### 5. Proposed action

- 5.1 Re-survey allocations with recent (post-1950) records to establish the present status of the species and its habitat requirements. The species should be considered in the delivery of the action plan for *Weissia rostellata*.

## Sterile beardless-moss ( *Weissia sterilis* ) Species Statement

### 1. Current status

- 1.1 Sterile beardless-moss is an acrocarpous moss of dry calcareous soil, occurring mainly on partly bare patches in turf on south-facing chalk and limestone slopes, but with an isolated locality on dolerite in Wales.
- 1.2 British records are mainly confined to southern England, from the former Worcestershire and Cambridgeshire southwards to south Devon and Kent, but with an isolated locality in east-central Wales (Powys). The species has not been re-found recently at a number of sites in southern England for which there are old records. It is known outside Britain only in north-eastern France.
- 1.3 In Great Britain this species is classified as Near Threatened. It receives general protection under the Wildlife and Countryside Act 1981.

### 2. Current factors causing loss or decline

These are poorly understood, but the following are thought to be involved:

- 2.1 Loss of grassland through conversion to arable farmland and through residential and other building developments.
- 2.2 Loss of short grasslands due to encroachment of scrub.

### 3. Current action

- 3.1 Several of the occupied sites are within SSSIs and NNRs.

### 4. Objective for the species

- 4.1 Maintain the current British range of sterile beardless-moss.

### 5. Proposed action

- 5.1 Re-survey the Welsh site and all English sites that are within SSSIs, to ascertain the current status of the species and to provide details of its habitat requirements.

# Vascular plant



## Scottish scurvygrass ( *Cochlearia scotica* ) Species Statement

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 5. Proposed action                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Current status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 1.1 Scottish scurvygrass, which is a biennial or perhaps a short-lived perennial, is endemic to Britain and has been reported from a variety of northern coastal habitats. These include cliff-top grasslands (especially when heavily rabbit-grazed), mature dune grasslands and coastal rocks and shingle. In Shetland it is found on peat now subject to tidal inundation. It is also found on rather open stony shores with little competition, and it often grows in soil-filled crevices in rocks near the upper tidal level. Additionally it has been recorded from the serpentine debris field on the Keen of Hamar on Unst. Opinions differ greatly on its taxonomic status, although the consensus at present appears to be against recognising it as a species in its own right. The main cause of taxonomic difficulty lies in the great variability of the scurvygrasses which is caused by environmental factors such as water and nutrient stress. | 5.1 Clarify the taxonomy, range and abundance of Scottish scurvygrass. If confirmed as an endemic species, populations should be monitored, and the requirements of the species considered in the delivery of the action plan for maritime cliff and slopes. Its importance as a distinct variant of a commoner species should otherwise be recognised in the protection and management of the sites on which it occurs. |
| 1.2 Scottish scurvygrass appears to be restricted to the British Isles with the majority of records coming from Lochaber, Wester Ross, Sutherland, Caithness, the Inner and Outer Hebrides, Orkney and Shetland. Additional records exist for Easter Ross, Ireland and the Isles of Scilly. Most records are from before 1970 but it is possible that this is a result of loss of confidence in the existence of this taxon as a separate species rather than any real change in status, and it has been recorded as very common locally in suitable sites.                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 1.3 Scottish scurvygrass is currently classified as Taxonomically Uncertain.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 2. Current factors causing loss or decline                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 2.1 Coastal pollution, coastal development, and the effects of climate change may all affect suitable habitats.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 3. Current action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 3.1 Some of the known sites for the taxon are SSSIs or NNRs. These include Inverpolly NNR in Sutherland, Handa Island SSSI off the shore of north-west Sutherland, Northton Bay SSSI and Luskentyre Banks and Saltings SSSI in the Outer Hebrides, and the Keen of Hamar NNR and Hermaness NNR in Shetland.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 4. Objective for the species                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 4.1 If Scottish scurvygrass is confirmed as an endemic species, maintain its current range.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                          |

# Priority Habitat Action Plans



# Lowland raised bog Habitat Action Plan

## 1. Current status

### 1.1 Biological status

- 1.1.1 Lowland raised bogs are peatland ecosystems which develop primarily, but not exclusively, in lowland areas such as the head of estuaries, along river flood-plains and in topographic depressions. In such locations drainage may be impeded by a high groundwater table, or by low permeability substrata such as estuarine, glacial or lacustrine clays. The resultant waterlogging provides anaerobic conditions which slow down the decomposition of plant material which in turn leads to an accumulation of peat. Continued accrual of peat elevates the bog surface above regional groundwater levels to form a gently-curving dome from which the term 'raised' bog is derived. The thickness of the peat mantle varies considerably but can exceed 12 metres.
- 1.1.2 In the UK lowland raised bogs are a particular feature of cool, rather humid regions such as the north-west lowlands of England, the central and north-east lowlands of Scotland, Wales and Northern Ireland, but remnants also occur in some southern and eastern localities, for example Somerset, South Yorkshire and Fenland.
- 1.1.3 Lowland raised bogs may develop from a preceding phase often via successional processes or, if the climate is sufficiently wet, by peat formation directly onto a bare substrate, a process known as 'paludification'. Accumulation of peat separates the bog surface from the influence of groundwater, so that it becomes irrigated exclusively by precipitation. This type of ecosystem is known as an 'ombrotrophic' (or 'rain-fed') bog. Consequently, the surface of a 'natural' lowland raised bog is typically waterlogged, acidic and deficient in plant nutrients. This gives rise to a distinctive suite of vegetation types, which although low in overall diversity, support specialised plant assemblages dominated by a colourful range of mosses of the genus *Sphagnum*, as well as vascular plants adapted to waterlogged conditions such as the cotton grasses *Eriophorum* spp. Lowland raised bogs also support rarer plant species such as the bog mosses *Sphagnum pulchrum* and *Sphagnum imbricatum* as well as a number of higher plants which have become increasingly scarce in the lowlands including bog rosemary *Andromeda polifolia*, great sundew *Drosera anglica* and cranberry *Vaccinium oxycoccos*.
- 1.1.4 The raised bog surface may support a patterned mosaic of pools, hummocks and lawns, a microtopography created in part by the growth of the plants themselves. This provides a range of water regimes which support different species assemblages. *Sphagnum* mosses are the principal peat forming species on natural UK lowland raised peat bogs, and their dominance in the living vegetation layer gives a bog its characteristically 'spongy'

surface. The ability of this layer to store water is thought to be important in keeping the bog surface wet during the summer.

### 1.1.5

A number of plant communities defined by the National Vegetation Classification can be found on raised bogs. Plant communities that are typical of natural raised bogs include the bog pool communities M1 to M3 and M18 *Erica tetralix* - *Sphagnum papillosum* raised and blanket mire. In addition a number of communities, including M15 *Scirpus cespitosus* - *Erica tetralix* wet heath, M19 *Calluna vulgaris* - *Eriophorum vaginatum* blanket mire, M20 *Eriophorum vaginatum* blanket and raised mire, M25 *Molinia caerulea* - *Potentilla erecta* mire and W4 *Betula pubescens* - *Molinia caerulea* woodland, can be found on raised bogs which have been subject to some disturbance such as drainage or peat-cutting.

### 1.1.6

Lowland raised bogs also support a distinctive range of animals including a variety of breeding waders and wildfowl and invertebrates. Rare and localised invertebrates such as the large heath butterfly *Coenonympha tullia*, the bog bush cricket *Metrioptera brachyptera*, and mire pill beetle *Curimopsis nigrita* are found on some lowland raised bog sites.

### 1.1.7

Peat accumulation preserves a unique and irreplaceable record of plant and animal remains and some atmospheric deposits from which it is possible to assess historical patterns of vegetation and climate change and human land-use.

### 1.1.8

As elsewhere across north-west Europe there has been a dramatic decline in the area of lowland raised bog habitat since around the start of the nineteenth century. The area of lowland raised bog in the UK retaining a largely undisturbed surface is estimated to have diminished by around 94% from an original c95,000 ha to c6,000 ha at the present day (England 37,500 ha reduced to 500 ha, Scotland 28,000 ha to 2,500 ha, Wales 4,000 ha to 800 ha, Northern Ireland 25,000 ha to 2,000 ha). Historically, the greatest decline has occurred through agricultural intensification, afforestation, and commercial peat extraction. Future decline is most likely to be the result of the gradual desiccation of bogs damaged by a range of drainage activities and/or a general lowering of groundwater tables.

### 1.2

Links with species action plans

#### 1.2.1

Lowland raised peat bogs are an important habitat for a number of priority species covered by species action plans, including Baltic bog moss *Sphagnum balticum* and the mire pill beetle *Curimopsis nigrita*. Their

	requirementsshouldalsobetakenintoaccountduringtheimplementationofthisplan.	2.1.9	Atmospheric nitrogen deposition and climate change could have management implications for lowland raised peat bogs. In recent years more winter rain has fallen in the UK and bogs have become more subject to summer drought stress, particularly in the south and east.
2.	<b>Current factors affecting the habitat</b>	3.	<b>Current action</b>
2.1	There are three key conditions which have to be maintained if lowland raised bogs are to retain their characteristic features. Firstly, they are waterlogged systems so alterations to the rate of water loss will destabilise them. Secondly, water inputs are from precipitation alone and are therefore low in solutes, so significant increases in the base or nutrient status of the system will alter the vegetation cover in favour of non-bog species. Thirdly, the living layer of vegetation acts as a 'natural' regulator for water loss so destruction or alteration of the vegetation will have significant implications for the long-term stability of the ecosystem as a whole. Factors which either disrupt the balance of these conditions, or which lead more immediately to the destruction of raised bog habitats and their remnants, include:	3.1	<b>Legal status</b>
2.1.1	Peat extraction - the extraction of peat and/or underlying mineral deposits both in existing and proposed new areas.	3.1.1	Statutory site designation plays an important part in the conservation of this habitat type. In 1994 the JNCC published revised Guidelines for the selection of raised and blanket bog SSSIs. Notification as SSSIs or ASSIs provides protection for around 120 lowland raised bogs. Many of the most important areas are managed by the statutory conservation agencies through agreements with site owners. Some 17 UK lowland raised bogs are managed as NNRs by the statutory nature conservation agencies. Nonetheless, there are certain key bogs where commercial peat extraction continues despite statutory notification.
2.1.2	Landfill development – utilisation of cut-over bogs for landfill.	3.1.2	Annex 1 of the EC Habitats Directive includes two lowland raised bog habitats. The active raised bog category is afforded priority habitat status and includes areas which still support a significant area of vegetation that is normally peat forming, as well as those where active formation is temporarily at a standstill, such as after fire or during a natural climatic cycle. Degraded raised bogs are regarded as areas where there has been widespread disruption to the hydrology of the peat body, leading to pronounced surface desiccation or peat wastage and the loss of species or changes to the composition of species assemblages. The UK Government has proposed 24 active and 2 degraded raised bog sites as Special Areas of Conservation under the terms of the Directive. A number of areas and their supporting interest features are already covered by the Special Protection Area designation, under the EC Birds Directive, or as Ramsar sites under the Ramsar Convention. The UK Government has also undertaken to implement the actions described in the Recommendations and Resolutions (particularly Recommendation 6.1. Conservation of Peatlands) and in the five-year Strategic Plan which emerged from the 6th Ramsar Conference of Parties. Many of these have direct or indirect value for lowland raised bogs and there is a plan to identify under-represented Ramsar sites and in particular peatlands. The development of a forward programme of targets for designation will be carried out, and reviewed annually, once the list is agreed.
2.1.3	Forestry - in addition to the direct impacts of existing plantations on deep peat, successive rotations dry out neighbouring areas and act as an invasive seed source.	3.1.3	Other important lowland raised bogs receive additional site protection and management. They form part of a network of 28 Wildlife Trust Reserves, and the RSPB is restoring damaged raised bogs at two of its nature reserves. Local Nature Reserves, Wildlife Sites (also known as Sites of Biological Importance and Biological Heritage Sites) are designations afforded to sites of local interest by local planning authorities. Forest Service in
2.1.4	Regional drainage pressures - lowland raised bogs frequently occur in drained agricultural landscapes. Perimeter drainage and water abstraction from underlying aquifers may limit therewetting potential of certain sites.		
2.1.5	Pollution - contamination from adjacent landfill, opencast or agricultural drainage. Current deposition of atmospheric pollutants, fertiliser drift during its application, or the legacy of past deposition, may be significant at certain sites.		
2.1.6	Dereliction - bogs drained either directly or indirectly (eg via historical domestic peat cutting) degenerate without conservation management. The conservation potential of such areas is frequently constrained by complex tenure and imperfect funding mechanisms.		
2.1.7	Livestock and game management (such as pheasant rearing and rough grazing) - frequently accompanied by drainage, trampling, burning and surface contamination with feed and droppings.		
2.1.8	Built development - linear developments and other land reclamation for built development affect many areas. Such developments have long-term repercussions on the stability of the ecosystem.		

- Northern Ireland has also designated some sites as Forest Nature Reserves.
- 3.2 Management, research and guidance
- 3.2.1 There is a wealth of information available on the lowland raised bog resource. In 1996 SNH (on behalf of the GB statutory conservation agencies) published a report An inventory of lowland raised bogs in Great Britain. The inventory is maintained by SNH and provides an assessment of the condition and conservation of lowland raised peat bog sites and an estimate of the area of land covered by this habitat. It also records the status of sites in terms of SSSI or NNR designations. Two of the main condition classes recognised by the inventory, primary and secondary, have been used in formulating the biological targets in this plan. Primary raised bogs present an unbroken profile of peat, undisturbed by peat cutting or agricultural tillage, and range from bogs supporting natural or near-natural vegetation to bogs exhibiting varying degrees of degradation as a consequence of fire, drainage and scrub encroachment. Secondary bogs are those which have been subject to partial peat removal, usually through peat cutting for fuel or horticultural usage. The third main condition class of archaic bog includes land which has been claimed for agricultural cropping or built development.
- 3.2.2 The Scottish Wildlife Trust, with EU Life funding for a three-year project, accrued survey data for many of Scotland's lowland raised bogs.
- 3.2.3 Management/rehabilitation plans exist for all NNRs and the statutory conservation agencies and The Wildlife Trusts also maintain an active programme of conservation management on NNRs and on other SSSI/ASSI land where management agreements have been achieved.
- 3.2.4 Peatland Policy Statements are available or in preparation for EHS, SNH and EN. Common objectives include opposition to exploitation of lowland raised bogs of 'conservation importance', encouragement for the use of peat alternatives in horticulture, increased public awareness, and establishment of favourable management regimes through greater co-operation with owners/occupiers and other partners in the voluntary and private sectors.
- 3.2.5 The EN Lowland Peatland Programme, launched in 1992, focused particular attention on the conservation of lowland raised bogs in England. Outcomes of this programme have included acquisition and after-use agreement on land worked by a major peat cutting company, declaration of three large raised bog NNRs, resource assessment of English lowland raised bogs and prioritisation of sites for conservation and rehabilitation, production of rehabilitation management plans for priority sites, a review of monitoring and development of a computer database for data storage and interrogation. To date 23 costed site rehabilitation plans have been produced and a programme of vegetation control and hydrological recovery work is now in progress at 15 sites throughout England.
- 3.2.6 The new Wales Agri-environment Scheme (Tir Gofal) becomes operational in 1999 and incorporates specific environmental objectives and prescriptions for the management of lowland raised bogs. In Scotland, payments are available under the Countryside Premium Scheme for the enhancement of raised bog.
- 3.2.7 The Scottish Wildlife Trust, as part of their EU Life funded project, held an international Peatland Convention in 1995 the proceedings of which (Conserving Peatlands) were published in 1997. The project also published Conserving Bogs: The Management Handbook, a best-practice guide on management and rehabilitation of lowland raised bogs.
- 3.2.8 In 1996 the Royal Commission on Environmental Pollution published its nineteenth report in which it made over 90 recommendations on soil protection, management and policy. Many of these recommendations were highly relevant to peatlands, directly and indirectly, and 10 recommendations related specifically to peatlands. In its response to the recommendations the UK Government accepted the need for strict protection of lowland raised bogs and restated its policy in relation to compensation arrangements for permissions which are likely to have a significant effect on European sites.
- 3.2.9 DETR has recently reconvened its Peat Working Group to consider the current position on peat extraction and the uses of alternatives. A key outcome affecting current action was the publication of revised Planning Policy (PPG9 and PPG16) and Mineral Planning (MPG13) Guidance notes. These advocate careful consideration for the protection of lowland raised peat bog habitat and the palaeoecological archive, and the conservation after-use of peat extraction sites. They set targets for increased usage of peat alternatives. DoE guidelines for Restoration of Damaged Peatlands were published in 1995. Local Authorities also have a statutory duty under the 1995 Environment Act (Town and Country Planning (Scotland) Act 1997 in Scotland) to update operational controls and after-use plans on old permissions to benefit nature conservation with guidance from MPG13 or Scottish Office Circular 34/1996). Compensation is only required where there are restrictions on working rights. Conflicts over compensation only arise where the Mineral Planning Authority wishes to revoke a permission or impose more restrictive conditions. However, in practice LAs are unlikely to be able to afford compensation claims from land owners and so changes to peat extraction conditions have been limited to those not invoking compensation liability.
- 3.2.10 The Forestry Commission has prepared a policy Guideline Note (in press) on forestry and bogs which signals a presumption against new planting on active raised bog and degraded raised bog capable of restoration. It also describes the criteria which the FC will use to consider supporting the restoration of

- lowland raised bog from existing woodlands. In Northern Ireland, the 1993 environmental policy statement by Forest Service (DANI) provides a presumption against afforestation of undisturbed raised bog and cut-over raised bog capable of natural regeneration.
- 3.2.11 Drainage Authorities (including EA, IDBs and LAs) are preparing Water Level Management Plans for sites, identified by EN and CCW, which incorporate lowland raised bog SSSIs, as encouraged by government guidelines.
- 3.2.12 Major restoration projects are underway at the two largest Welsh raised bog sites, Cors Fochno and Cors Caron, and at Fenns and Whixall and Bettisfield Mosses which straddle the Wales-England border. CCW's Life sponsored demonstration project to link monitoring protocols to habitat management objectives on candidate SACs has included case studies of the first two sites.
- 3.2.13 Visitor facilities, including boardwalks, paths, leaflets and education packs for schools, exist for some lowland raised bog sites such as Peatlands Park in Northern Ireland, Cors Caron and Cors Fochno (Wales) and Thorne Moors in South Yorkshire. Guided tours are also occasionally given at these and other lowland raised bog NNRs. Statutory agencies also provide an advisory and inquiries service to the public.
- #### 4. Action plan objectives and proposed targets
- 4.1 The objectives and targets of this plan address both primary (uncut) lowland raised mire ecosystems, as well as a significant proportion of the secondary UK raised mire resource affected by peat extraction and agriculture. The first two objectives seek to secure favourable conditions for the long-term maintenance or re-establishment of regenerating and self-sustaining bog ecosystems across some 13,000 ha of the primary UK lowland raised mire resource. This area target has been chosen as the best estimate of the surviving primary resource which remains in either a near natural or degraded state. The third and fourth objectives seek to identify the opportunities and timescales, and quantify a target, for the restoration of lowland raised bog significantly damaged by human activity, and initiate management schemes as a result. Such long-term restoration projects would include securing favourable after-use management for lowland raised bog subject to commercial peat extraction. Attaining favourable condition may take many years so the priority under this plan is to establish the appropriate management conditions, especially hydrological, which will help achieve favourable condition. One of the immediate steps for plan implementation will be to determine the specific condition classes which relate to each of the targets (action 5.2.1). The plan targets and deadlines should then be kept under review and adjusted to take account of natural ecological processes.
- 4.1.1 Maintain the current distribution and extent (c6,000 ha) of primary near-natural lowland raised peat bog in the UK, and ensure that the condition of this resource is maintained where favourable or enhanced through appropriate management.
- 4.1.2 Establish by 2005 appropriate hydrological and management regimes at those areas which have been damaged but still retain nature conservation interest (ie primary degraded and drained; c7,000 ha), and aim to achieve favourable condition of these areas by 2015.
- 4.1.3 By 2002 identify areas, timescales and targets for restoration or improvement of significantly altered raised bog areas, including those used for agriculture, peat workings and woodlands.
- 4.1.4 Initiate by 2005 improvement or restoration management on areas which have been identified in 4.1.3, according to the agreed timescales.
- #### 5. Proposed action with lead agencies
- 5.1 Policy and legislation
- 5.1.1 Review and modify livestock support mechanisms in the Less Favourable Areas (LFAs) through further lobbying for reform of Common Agricultural Policy (CAP) to promote sustainable agricultural management of lowland raised bog. Promote a more integrated approach to environmental, agricultural and socio-economic policy through CAP reform. Continue to reduce overgrazing by implementing the environmental cross-compliance conditions. (ACTION: CCW, DANI, DETR, EHS, EN, MAFF, NAW, SE, SNH)
- 5.1.2 Reviews of Policy Planning Guidance (Scotland and Wales) and Planning Policy Statements (Northern Ireland) should take account of experiences in producing and implementing guidance in England, especially Planning and Policy Guidance (PPG9 and PPG16) and Mineral Planning Guidance (MPG13). Consistent UK-wide conservation measures for lowland raised bogs should be sought. (ACTION: DETR, DoE(NI), LAs, SE)
- 5.1.3 Review by 2003 the effectiveness of existing countryside and agri-environment measures and site management agreements and, where necessary, take opportunities to modify these by 2005 to improve, and create the conditions necessary for, the appropriate management of lowland raised bogs. In many instances this will require sympathetic management of adjacent land. (ACTION: CCW, DANI, EHS, EN, FC, MAFF, NAW, SE, SNH)
- 5.1.4 Initiate the development of Water Level Management Plans in Scotland by 2002, building on experiences gained in England and Wales (ACTION: SE, SEPA, SNH)
- 5.1.5 Implement the policies in the (1993) DANI environmental policy statement and the FC Guideline

	Note (para 3.2.9) on bogs. Develop further guidance on restoration on a regional basis, where this is necessary to support policy delivery and help target fiscal incentives. (ACTION: CCW, DANI, DETR, EHS, EN, FC, SE, SNH)	areas of lowland raised bog which will be targeted for restoration work; then clarify and begin measures to secure favourable management. (ACTION: CCW, DANI, EHS, EN, FC, LAs, MAFF, NAW, SE, SNH).
5.1.6	Ensure the importance of lowland raised bogs is recognised and site protection policies are included in Local Plans, Structure Plans, Mineral Strategies, Indicative Forest Strategies, and other strategic land-use plans. (ACTION: CCW, DANI, DETR, DoE(NI), EHS, EN, FC, LAs, LECs, NAW, SE, SNH)	5.2.2 Seek to ensure all lowland raised bogs in the UK meeting the JNCC guidelines for selection as SSSIs/ASSIs are notified by 2004. Through periodic reviews ensure that the full natural and geographic range is maintained. (ACTION: CCW, EHS, EN, SNH)
5.1.7	Produce regional guidelines on the requirements for lowland raised bog conservation, including issues of regional land use and drainage, in a wider landscape context. Prepare and agree these through a cross-sectoral steering group by 2005. (ACTION: CCW, DANI, DETR, DoE(NI), EHS, EN, FC, JNCC, MAFF, NAW, SE, SNH)	5.2.3 Complete the current programmes for designation of SPA, Ramsar and SACs for lowland raised bog by 2004. (ACTION: CCW, DETR, EHS, EN, NAW, SE, SNH)
5.1.8	Review and where necessary amend or develop policies on the consumption of peat by 2002, with the aim of achieving a reduction in peat consumption in all sectors and for all purposes. A minimum of 40% of total market requirements to be based on non-peat materials by 2005. (ACTION: CCW, DANI, DETR, DoE(NI), EHS, EN, FC, LAs, LECs, NAW, SE, SNH)	5.2.4 Review the coverage of the existing programme of Water Level Management Plans to ensure that all SSSIs are covered and to determine whether it should be extended to non-SSSIs and to other parts of the UK. Ensure that condition objectives for lowland raised peat bogs are integrated into Water Level Management Plans by 2006. (ACTION: ADA, CCW, DANI, EA, EHS, EN, FC, LAs, SE, SEPA, SNH)
5.1.9	Where suitable alternatives exist, consumptive use of peat by central and local government and statutory agencies, including contracted work, should cease by 2003. (ACTION: CCW, DANI, DETR, DoE(NI), EHS, EN, FC, LAs, LECs, NAW, SE, SNH)	5.2.5 Complete conservation management plans, and where appropriate rehabilitation plans, to develop and promote the use of long-term management with the owners of lowland raised bog and adjoining land, aimed at creating or maintaining favourable condition (appropriate water levels and cover of bog species, especially Sphagnum spp.) on all SSSIs/ASSIs by 2004. (ACTION: CCW, DANI, EHS, EN, FC, LAs, NAW, SE, SNH)
5.1.10	Consider introducing fiscal measures to benefit peat alternatives. (ACTION: DETR, Treasury)	5.2.6 Establish by 2005 management plans for all existing and future extraction consents to encourage appropriate conservation after-use options. Ideally, this would lead to the re-establishment of lowland raised peat bog vegetation (as first priority), or other wetland ecosystems. (ACTION: CCW, DETR, DoE(NI), EA, EN, EHS, LAs, SE, SNH)
5.1.11	Encourage community composting or anaerobic digestion facilities and promote use of these and other products as alternatives to peat. (ACTION: DANI, DETR, LAs, NAW, SE)	5.2.7 Ensure application of FC and DANI policies (5.1.5) to sites managed by FC and DANI Forest Service through the further development and implementation of FC's Endangered Habitat Action Plans and Design Plans for individual forests. (ACTION: DANI, FC)
5.1.12	By 2002 review and consider common land legislation to ensure appropriate management of lowland raised bog in England and Wales. (ACTION: CA, CCW, DETR, EN, MAFF, NAW)	5.2.8 Contribute to the implementation of relevant action plans for rare and declining species associated with lowland raised bogs in conjunction with the appropriate species steering groups. (ACTION: CCW, DANI, DoE(NI), EHS, EN, MAFF, NAW, SE, SNH).
5.1.13	Assess existing peat extraction operations affecting SSSIs/ASSIs by 2001 to: identify the effects of extraction on each bog; identify priority cases for action; determine the key obstacles to achieving nature conservation management; and, taking account of the financial implications, to bring forward proposals to secure the long-term nature conservation value. (ACTION: CCW, DANI, DETR, DoE(NI), EHS, EN, FC, LAs, NAW, SE, SNH)	5.3 Advisory
5.2	Site safeguard and management	5.3.1 Develop and promote training on the conservation, management and rehabilitation of lowland raised bogs, targeting these at representatives from all key agencies, landowners and voluntary bodies. (ACTION: CCW, EHS, EN, SNH)
5.2.1	By 2000 determine the specific condition classes relating to each of these targets and, using these, establish the	5.3.2 Encourage and provide advice on the development and marketing of peat alternatives to reduce amateur and

- professional demand for peat-based horticultural products, to achieve the long-term safeguard of peatlands. (ACTION: DANI, DETR, DoE(NI), NAW, SE)
- 5.3.3 Encourage applications from potential partners to obtain funding to bring areas of lowland raised bog into favourable management. (ACTION: CCW, EHS, EN, SNH)
- 5.4 International
- 5.4.1 Develop links with European and international organisations and programmes to promote the exchange of information and experience in research, management techniques, and conservation strategies. (ACTION: DETR, JNCC)
- 5.4.2 Seek to influence EC funding policy in order to discourage the afforestation of lowland raised mires and encourage the development of restoration programmes throughout the EU. (ACTION: DETR)
- 5.4.3 Continue to promote within the EU, through schemes such as eco-labelling, an understanding of the threat of peat extraction to mid- and long-term conservation of lowland raised bogs and encourage, with targets, the development and use of peat alternatives in both amateur and professional markets. (ACTION: DETR, FCO)
- 5.5 Monitoring and research
- 5.5.1 Develop methods for defining and assessing the condition of lowland raised bogs and the effectiveness of conservation management. Seek to incorporate these into site management plans by 2004. (ACTION: CCW, DANI, EHS, EN, FC, SNH)
- 5.5.2 Undertake NVC and related survey work to ensure that any remaining gaps in knowledge about the character of the remaining primary near-natural resource are filled. (ACTION: CCW, EHS, EN, SNH)
- 5.5.3 Encourage the dissemination and use of ongoing and past research results, and commission further research where necessary, to improve understanding of the ecology of lowland raised mires. Key research topics will include vegetation dynamics and long-term vegetation change, hydrology (particularly inter-relations with regional water tables), palaeoecology and the ecology and management requirements of invertebrate communities and species. (ACTION: CCW, DANI, EA, EHS, EN, SEPA, SNH)
- 5.5.4 Contribute information to the National Biodiversity Network WWW-based catalogue of survey information as a means of improving access to current information on UK lowland raised bogs. (ACTION: CCW, DANI, DETR, EHS, EN, MAFF, NAW, SE, SNH)
- 5.5.5 Review research requirements on the effects of atmospheric nutrient deposition and climate change on lowland raised bog and promote research needs accordingly. (ACTION: CCW, DETR, DoE(NI), EHS, EN, JNCC, NAW, SE, SNH)
- 5.5.6 Undertake and promote research and development of sustainable alternatives to peat to speed up reduction of peat used in both amateur and professional markets. Aim for a minimum of 40% of total market requirements to be peat-free by 2005 and 90% by 2010. Monitor and review take-up and if feasible accelerate the programme of reduction. (ACTION: DANI, DETR, NAW, SE)
- 5.5.7 Develop and implement appropriate surveillance and monitoring programmes to assess progress towards achieving action plan targets. (ACTION: CCW, DANI, EHS, EN, JNCC, MAFF, NAW, SE, SNH)
- 5.6 Communications and publicity
- 5.6.1 Produce simple, attractive information packages particularly aimed at capturing the interest and co-operation of site owners and managers towards favourable management. (ACTION: CCW, EHS, EN, FC, SNH)
- 5.6.2 Develop and promote a suite of demonstration sites across the UK to reflect the range of ecological variation and applied management techniques. (ACTION: CCW, EHS, EN, FC, SNH)
- 5.6.3 Encourage the establishment of a network of improved visitor facilities at significant lowland raised bog sites in UK by 2010 as a means of achieving increased public awareness and appreciation of lowland raised bogs. (ACTION: CCW, EHS, EN, SNH)
- 5.6.4 Produce a simple and attractive booklet for the public and schools which explains the intricacies and conservation importance of lowland raised bogs. (ACTION: CCW, EHS, EN, SNH)
- 5.6.5 Generate ongoing information and publicity to encourage amateur and professional peat users to adopt alternatives, highlighting the threat to peatland conservation of continued peat use. (ACTION: CCW, DANI, DETR, EHS, EN, MAFF, NAW, SE)
6. Costings
- 6.1 The successful implementation of this habitat action plan will have resource implications for both the public and private sectors. The data in the table overleaf provide an estimate of the current expenditure on the habitat, primarily through agri-environment schemes, and the likely additional resource costs to the public and private sectors. These additional resource costs are based on the annual average over 5 and 10 years. The total expenditure for these time periods is also given. Three-quarters of the additional resources are likely to fall to the public sector.
7. Key references

- Bain, C. 1997. Legislative protection for bogs: does the British approach work? In *Conserving Peatlands*, Eds.: L. Parkyn, R.E. Stoneman & H.A.P. Ingram. CAB International, Wallingford, pp 343-347.
- Corbett, P. & Seymour, G.R. 1997. The conservation of peatland in Northern Ireland. In *Conserving Peatlands*, Eds.: L. Parkyn, R.E. Stoneman & H.A.P. Ingram. CAB International, Wallingford, pp 348-356.
- Cruickshank, M.M. & Tomlinson, R.W. 1988. Northern Ireland Peatland Survey. Report to Countryside and Wildlife Branch, DoE (NI), Belfast.
- DoE. 1994. *Biodiversity: The UK Action Plan*. HMSO, London.
- Department of Agriculture for Northern Ireland (Forest Service). 1993. Afforestation - The DANI statement on Environmental Policy. DANI, Belfast.
- Forestry Commission. 1999 (in press). *Forestry and Bogs*. FC Guideline Note Forestry Commission, Edinburgh.
- Joint Nature Conservation Committee. 1994. Guidelines for selection of biological SSSIs: bogs. JNCC, Peterborough.
- Lindsay, R.A. 1995. Bogs: the ecology, classification and conservation of ombrotrophic mires. Scottish Natural Heritage, Edinburgh.
- Lindsay, R.A. & Immirzi, C.P. 1996. An inventory of lowland raised bogs in Great Britain. Scottish Natural Heritage Research, Survey and Monitoring Report No. 78. SNH, Edinburgh.
- MAFF. 1994. Water level management plans – a procedural guide for operating authorities. MAFF, London.
- Money, R.P. & Wheeler, B.D. 1996. Prioritisation of lowland peat programme resources. English Nature Research Report No. 179. English Nature, Peterborough.
- Parkyn, L., Stoneman, R.E. & Ingram, H.A.P. (Eds.). 1997. *Conserving Peatlands*. CAB International, Wallingford.
- Raeymaekers, G.L.M. 1997. The Habitats Directive: centrepiece of the European Union's nature conservation policy. Its implications for peatland conservation. In *Conserving Peatlands*; Eds.: L. Parkyn, R.E. Stoneman & H.A.P. Ingram. CAB International, Wallingford, pp 357-368.
- Rodwell, J.S. (Ed.). 1991. *British plant communities. Volume 2. Mires and Heaths*. Cambridge University Press, Cambridge.
- Royal Commission on Environmental Pollution. 1996. Sustainable Use of Soils 19th Report. CM3165. RCEP, London.
- Scottish Wildlife Trust. 1995. A conservation strategy for Scotland's raised bogs – draft consultative document. Unpublished report. Scottish Wildlife Trust, Edinburgh.
- Stoneman, R. and Brooks, S. (Eds.). 1997. *Conserving bogs: the management handbook*. The Stationery Office, Edinburgh.
- UK Biodiversity Steering Group. 1995. *Biodiversity: The UK Steering Group Report, Volume 2: Action Plans*. HMSO, London.
- Ward, A.E., Donald, G. & Simpson, T. 1997. Legislation and policies for peatlands in Britain with particular reference to England. In *Conserving Peatlands*; Eds.: L. Parkyn, R.E. Stoneman & H.A.P. Ingram. CAB International, Wallingford, pp 335-342.
- Wheeler, B.D. & Shaw, S.C. 1995. Restoration of damaged peatlands with particular reference to lowland raised bogs affected by peat extraction. DoE, London.

Costings for lowland raised bog

	Current expenditure	First 5 yrs to 2004/2005	Next 10 yrs to 2014/2015
Current expenditure /£000/Yr	290		
Total average annual cost /£000/Yr		5516.7	15539.7
Total expenditure to 2005/£000		27583.5	
Total expenditure 2005 to 2014/£000			155397

## Blanket bog Habitat Action Plan

### 1. Current status

#### 1.1 Biological status

1.1.1 The term blanket 'bog' strictly applies only to that portion of a blanket 'mire' which is exclusively rain-fed. However, for the purposes of this plan the terms 'bog' and 'mire' will be regarded as more or less synonymous. 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 habitats in the UK and ranges from Devon in the south to Shetland in the north. Peat depth is also very variable, with an average of 0.5-3 m being fairly typical but depths in excess of 5 m not unusual. There is no agreed minimum depth of peat which can support blanket bog vegetation. It includes the EC Habitats Directive priority habitat 'active' blanket bog, the definition of active being given as 'still supporting a significant area of vegetation that is normally peat forming'.

1.1.2 Although most widespread in the wetter west and north, blanket bog also occurs in eastern upland areas. Blanket bog peat accumulates in response to the very slow rate at which plant material decomposes under conditions of waterlogging. It is not, however, confined to areas of poor drainage but rather can cloak whole landscapes, even developing on slopes of up to 30°. The period over which blanket peat has been accumulating and the depth it can attain are very variable and not necessarily related. Studies indicate that most blanket peat development began 5000-6000 years ago, but the range extends from 9000-1500 years ago. There is evidence to suggest that some areas of blanket bog began to form following clearance of the original forest cover by early man, but the relative significance of this activity and changing climate on the historical and contemporary extent of the resource has yet to be determined.

1.1.3 The principal vegetation (NVC) types covered by this plan are M1, M2, M3, M15, M17, M18, M19, M20 and M25, together with their intermediates. Other communities, such as flush, fen and swamp types, also form an integral part of the blanket bog landscape. Many of the typical blanket mire species, such as heather *Calluna vulgaris*, cross-leaved heath *Erica tetralix*, deer grass *Trichophorum cespitosum*, cotton grass *Eriophorum* species and several of the bog moss *Sphagnum* species, occur throughout much of the range of the habitat, although their relative proportions vary across the country. Thus criteria for the assessment of habitat condition based on species assemblage and relative abundance must be determined locally. Some other species have requirements which limit their distribution more dramatically. For example, cloudberry *Rubus chamaemorus* is typically, although not exclusively, confined to high altitude bogs, alpine bearberry *Arctostaphylos alpinus* to northern bogs, and

black bog rush *Schoenus nigricans*, as an ombrotrophic species, to western bogs. Even the various bog moss *Sphagnum* species, which are a constant element of most blanket bog communities, are not entirely cosmopolitan and indeed are largely replaced by woolly hair moss *Racomitrium lanuginosum* over extensive areas in the north and west, particularly in the Western Isles. Recent research suggests that *Racomitrium* may be an entirely natural component of blanket bog in the west.

1.1.4 This plan encompasses all areas of blanket bog supporting semi-natural blanket bog vegetation, whether or not it may be defined as 'active'. It excludes areas which no longer support such vegetation, except where the restoration of such areas is necessary for the protection and/or enhancement of adjacent bog. The total extent of blanket peat in the UK amounts to just under 1.5 million ha. There is no agreed figure for the extent of blanket bog vegetation. In terms of national cover of blanket peat soil (in the main >0.5 m deep) England supports some 215,000 ha, Scotland approximately 1,060,000 ha, and Wales has around 70,000 ha. Northern Ireland has approximately 140,000 ha of blanket bog vegetation. Significant proportions of peat soil, probably in excess of 10%, no longer support blanket bog vegetation.

1.1.5 Comprehensive data for changes to the total UK resource are lacking, but studies in Scotland (where most of the resource lies and where it accounts for some 13% of the land area) suggest a 21% reduction in the extent of blanket mire between the 1940s and the 1980s. The greatest single cause of this reduction (51%) is afforestation, and substantial losses to forestry are reported from Wales. Further losses of extent and condition can be attributed to drainage and heavy grazing, peat cutting and atmospheric pollution, resulting in significant habitat change in, for example, mid and south Wales and the Pennines.

1.1.6 The presence, extent and type of surface patterning is another important feature of blanket bogs. This can range from a relatively smooth surface, with the only irregularities being those created by vegetation features (eg *Eriophorum vaginatum* tussocks and *Sphagnum* hummocks) to the extreme patterning associated with suites of bog pools and the intervening ridges. As with floristic composition, there would appear to be a relationship between geographical location and the nature of the surface pattern. In general, the intensity and complexity of patterning increases towards the north and west. The range of erosion features associated with many areas of blanket bog is another aspect of this structural diversity and an as yet unknown extent of this appears to be natural in origin.

- 1.1.7 Blanket bogssupport a very wide range of terrestrial and aquatic vertebrates and invertebrates. As with plant species, some of these are widespread and common, some are much more local, and quite a number are of international interest for either their rarity or for the densities of their breeding populations on blanket bogs, for example red-throated diver *Gavia stellata* and Eurasian golden plover *Pluvialis apricaria*. Studies of the invertebrate fauna of blanket bogs are extremely patchy and merit collation and synthesis. Blanket bogs also fulfil an important role as repositories of archaeological and palaeoecological material and have functional values as agricultural rough grazing, sporting estate and water catchments. In the context of climate change the role of blanket bogs as a carbon store is also now considered significant.
- 1.1.8 The extensive nature of blanket bog is such that certain other habitats, although distinctive, are probably most appropriately considered as integral components of the wider blanket bog assemblage of habitats for management purposes. This would include some areas classed as 'intermediate bog' (ie sharing features of both raised and blanket bog) together with examples of spring, flush and poor fen, a range of oligotrophic water bodies whose catchment is largely or entirely blanket bog, and those relatively small areas of heath and grassland which occur on better drained slopes and by the many streams and rivers which drain areas dominated by blanket bog. Not only are all such areas in hydrological connection with the surrounding peat mass, they frequently contribute to the overall habitat requirements of the peatland fauna. Several of these habitats are also the subject of their own habitat action plans.
- 1.2 Links with species action plans
- 1.2.1 Blanket bogs are an important habitat for a wide range of species, as indicated above. However, none of the priority species listed under the Biodiversity Action Plan are principally associated with this habitat type. Where any such species, for example common scoter *Melanitta nigra* and Baltic bog-moss *Sphagnum balticum*, do occur their requirements should be taken into account during the implementation of this plan.
2. Current factors affecting the habitat
- 2.1 The potential threat from climate change could over-ride many of the following factors. However, it is precisely because of the unknown effects climate change could have that it is important that as much of the resource as possible, representing its full biogeographical extent, is brought into, or maintained at, favourable condition. Pollution, from sulphate and nitrate deposition, may also be significant in certain areas, such as the Southern Pennines.
- 2.1.1 Drainage - extensive tracts of blanket bog have been drained in the past in attempts to improve the quality of the grazing. New drains continue to be dug and old drains cleaned in some areas. Even without maintenance most drains continue to lower the adjacent water table and some initiate erosion.
- 2.1.2 Heavy grazing (by sheep, red deer, cattle and horses) - especially if accompanied by supplementary feeding, burning, fencing and drainage, has a significant impact on vegetation. This is a particular concern on common land.
- 2.1.3 Burning - agricultural and sporting management both involve the use of fire to modify moorland vegetation for the benefit of livestock, grouse and deer in particular. Poorly managed and/or accidental fires can be particularly damaging to blanket bog.
- 2.1.4 Forestry - although new planting may be relatively small scale, some existing plantations are having an impact on the hydrology and species composition of adjacent areas of blanket bog, notably as the trees mature. Aerial application of fertilisers and pesticides can also result in drift onto adjacent bog.
- 2.1.5 Peat extraction - commercial extraction, though relatively limited in extent (some 2000 ha in Scotland), can have important local effects. Domestic cutting, most of which occurs on common land, is locally extensive (some 50,000 ha in Scotland) and, particularly where mechanical methods are employed, can have a significant impact, especially in Northern Ireland where the distinction between commercial and domestic activity can be difficult to determine.
- 2.1.6 Agricultural improvement - drainage, fertiliser application and conversion to pasture has occurred frequently in the past and can be of local significance.
- 2.1.7 Recreation - many popular walking routes, some of which are also used by cyclists and horse-riders, traverse blanket bog areas which are very sensitive to such pressure. The increased use of all-terrain vehicles for recreational, agricultural and sporting activities can also result in local erosion.
- 2.1.8 Planning developments - wind farms and communication masts, together with their associated infrastructure, are increasingly being proposed on areas of blanket bog, especially those at high altitude. There are also threats from hydro-electric schemes in Scotland.
- 2.1.9 Erosion - high altitude bogs in particular, especially those in the Pennines and south Wales, are losing habitat through constant erosion of the peat mass. Some of this may be due to natural processes.
- 2.1.10 Watercourse liming - where lime is added to lochs, lakes and rivers as a treatment for acidification, there may be detrimental implications for adjacent areas of blanket bog. Sometimes the bogs themselves have had lime applied.
3. Current Action

- 3.1 Legal status
- 3.1.1 Extensive areas of blanket mire are given legal protection by being designated as SSSIs or ASSIs. Precise UK-wide data on the extent protected are lacking because on many sites blanket mire is part of the general upland interest, rather than being a specific interest in its own right. Current estimates suggest that SSSIs/ASSIs which include blanket mire as part of the designated interest, extend to around 160,000 ha in England, 350,000 ha in Scotland and 12,000 ha in Northern Ireland. In Wales, some 15,700 ha of blanket mire vegetation occur within SSSIs notified for that interest. Thirty-two of these sites have also been proposed by the UK Government as Special Areas of Conservation (SACs) under the EC Habitats Directive. In addition, some are either proposed or already designated as Ramsar sites and some as Special Protection Areas (SPAs) under the EC Birds Directive.
- 3.1.2 Revised guidelines for the selection of blanket bog SSSIs were published by JNCC in 1994.
- 3.1.3 A relatively small number of sites and parts of sites are managed as NNRs by the statutory agencies. Many other areas are subject to management agreements between land managers and the statutory agencies.
- 3.1.4 Many areas of blanket mire are common land with associated peat cutting and grazing rights. Any proposals for changes in management must recognise and address the implications of this form of legal tenure.
- 3.1.5 The UK Government has undertaken to implement the actions described in the Recommendations and Resolutions (particularly Recommendation 6.1 Conservation of Peatlands) and in the five-year Strategic Plan, which emerged from the 6th Ramsar Conference of Parties. Many of these have a direct or indirect bearing on blanket mire conservation, and there is a plan to identify wetland types currently under-represented within the Ramsar site series and in particular peatlands. The development of a forward programme of targets for designation will be carried out, and reviewed annually, once the list is agreed.
- 3.2 Management, research and guidance
- 3.2.1 There is a significant amount of survey information currently available for some parts of the blanket mire resource, although its considerable extent has so far prevented comprehensive survey and evaluation. SNH recently published An inventory of lowland raised bogs in Great Britain which includes outline information on the distribution and extent of blanket peat. SNH is also currently undertaking an assessment of the resource in Scotland (Scottish Blanket Bog Inventory - SBBI) using satellite imagery to extrapolate from ground-referenced sample plots. CCW have completed a systematic vegetation survey of Wales and have comprehensive data on the extent and distribution of blanket mire there.
- 3.2.2 The statutory conservation agencies, as part of their commitment under the UK Biodiversity Action Plan, are preparing management plans for those sites designated as SSSIs/ASSIs, or proposed as SACs and SPAs. Plans should be completed by 2004.
- 3.2.3 Significant areas of blanket bog are managed as nature reserves by NGOs (eg RSPB 14,500 ha) and Forest Enterprise manages extensive areas of the habitat.
- 3.2.4 The Forestry Commission has prepared a policy Guideline Note (in press) on forestry and bogs. It describes the criteria which FC will use in considering whether to support either the planting of trees on blanket bog or restoration of the habitat. In Northern Ireland, the DANIForest Service environmental policy statement on afforestation (1993) provides guidance on the acceptability of new planting on blanket bog.
- 3.2.5 Funding from the EC Life programme has enabled RSPB to buy an area of blanket mire in Sutherland with a view to restoring damaged areas and managing the site to achieve its full nature conservation potential. A number of blanket mire restoration projects have been established throughout Caithness and Sutherland, including a major collaboration with FC to look at methods of restoring afforested peatlands. As part of this project, which also has education and 'green tourism' elements, Fermanagh District Council is working with local farmers to safeguard areas of blanket mire in the Cuilcagh Natural History Park.
- 3.2.6 SNH operates a Peatland Management Scheme in Caithness and Sutherland to encourage sympathetic land management. In some parts of Wales significant areas of blanket bog are subject to Tir Cymen or ESA management agreements. These schemes have now been replaced by a new whole-farm agri-environment scheme, Tir Gofal, which includes prescriptions aimed at maintaining, and where appropriate enhancing, blanket bog vegetation. National Parks promote policies to encourage responsible management of the resource, as do certain ESAs. For example the Lake District, North Peak, the Cambrian Mountains and Dartmoor have mire management element as a component of moorland management. Numerous studies in the Peak District National Park have investigated the causes and consequences of erosion as well as a variety of stabilisation techniques.
- 3.2.7 In 1996, EN and CCW published a review on the effects of burning and grazing wet heath and blanket mire. SNH and EN have recently published guidance on the assessment of blanket mire condition.
- 3.2.8 CCW have reviewed available information on blanket mire degradation and are commissioning research on recent vegetation changes on degraded blanket mires in Wales. The EHS (Northern Ireland) commissioned and published research on the effects of peat extraction and afforestation on blanket mire and commissioned the Northern Ireland Peatland Survey.

4.	Action plan objectives and proposed targets	5.1.1	Review and modify livestock support mechanisms in the Less Favoured Areas (LFAs) through further lobbying for reform of Common Agricultural Policy (CAP) to promote sustainable agricultural management of blanket mire. Promote a more integrated approach to environmental, agricultural and socio-economic policy through CAP reform. Continue to reduce overgrazing by implementing the environmental cross-compliance conditions. (ACTION: CCW, DANI, DETR, EHS, EN, MAFF, NAW, SE, SNH)
4.1	Within the total blanket peat resource it is possible to recognise four broad classes of habitat condition: favourable; degraded but readily restored; degraded but less readily restored; and degraded and probably beyond restoration. These classes are based on current knowledge and experience of restoration techniques. It should be noted that none of these classes is synonymous with the Habitats Directive term 'active'. Few data are available to help quantify these different condition classes. However, sample data from Scotland and Wales suggest that, as a guide some 375,000 ha (25%), including many afforested, reseeded and severely eroded areas, may be too degraded to merit restoration. The remaining 75% (1,125,000 ha) is potentially amenable to improvements in its condition. Of this, some 30% of the resource (ie around 340,000 ha) may already be in favourable condition or require relatively little restoration effort to bring it into this condition (target 4.1.2 and 4.1.3). The remaining 70%, some 785,000 ha, should be amenable to some improvement in its condition over a range of time scales (target 4.1.4 and 4.1.5). It is worth noting that some areas of blanket mire in unfavourable condition, with respect to their vegetation, can be important for certain bird species.	5.1.2	When reviewing management prescriptions in agri-environment schemes and woodland initiatives consider whether additional measures are needed to maintain and/or improve the condition of blanket bog. Consider extending existing schemes and/or developing new schemes to help achieve the targets outlined in Section 4 of this plan. (ACTION: CCW, DANI, DETR, EHS, EN, MAFF, NAW, SE, SNH)
4.1.1	All habitat interests should be acknowledged in determining appropriate management activities. One of the first steps for plan implementation will be to define and then quantify the extent of the different condition classes. The targets and deadlines below should therefore be regarded as indicative. They should be kept under review and adjusted to take account of growing knowledge of ecological processes and management activities. There are four specific provisional targets.	5.1.3	Monitor and review the effectiveness of FC and DANI policies on forestry and peatland, and, if required, further develop policy guidance on restoration of bogs from forestry. This should include the preparation of regional guidelines to support policy delivery and should make appropriate linkages with the targeting of forestry incentives. (ACTION: DANI, DETR, FC, NAW, SE)
4.1.2	Maintain the current extent and overall distribution of blanket mire currently in favourable condition.	5.1.4	Initiate the development of Water Level Management Plans in Scotland (as soon as the legislative framework is in place) and complete production of Local Environment Agency Plans (LEAPS) in England and Wales by 2000. Ensure the importance of maintaining or restoring blanket mire is recognised in the development and implementation of catchment management plans. (ACTION: DANI, EA, EHS, SE, SEPA)
4.1.3	Improve the condition of those areas of blanket mire which are degraded but readily restored, so that the total area in, or approaching, favourable condition by 2005 is 340,000 ha (ie around 30% of the total extent of restorable blanket mire).	5.1.5	By 2004 review, and modify where necessary, muirburn legislation to ensure appropriate management of blanket bog. (ACTION: CCW, DANI, EHS, EN, MAFF, NAW, SE, SNH)
4.1.4	Introduce management regimes to improve to, and subsequently maintain in, favourable condition a further 280,000 ha of degraded blanket mire by 2010.	5.1.6	By 2002 review and consider common land legislation with a view to improving the sympathetic management of upland commons. (ACTION: DETR, DoE(NI), LAs, NAW, NPAs, SE)
4.1.5	Introduce management regimes to improve the condition of a further 225,000 ha of degraded blanket mire by 2015, resulting in a total of 845,000 ha (ie around 75% of the total extent of restorable blanket mire) in, or approaching, favourable condition.	5.1.7	Review, by 2000, and amend as appropriate, Policy Planning Guidance in Wales, Scotland and Northern Ireland to enable consistent guidance to be issued to local authorities across the UK. Encourage the UK-wide adoption of common Planning Policy Guidelines in line with PPG9, PPG16 and MPG13 by 2002. (ACTION: DETR, DoE(NI), LAs, NAW, SE)
5.	Proposed action with lead agencies	5.1.8	Ensure the importance of blanket mire is recognised in Local Plans, Structure Plans, Unitary Development Plans, Mineral Strategies, Indicative Forest Strategies and other strategic plans for forestry at all levels, and in the disbursement of structural funds. (ACTION: DANI, DETR, DoE(NI), FC, LAs, LECs, MAFF, NAW, SE)
5.1	Policy and legislation		

5.1.9	Review, and where necessary clarify, distinction in planning law between 'domestic' and 'commercial' peat cutting operations and determine appropriate level of activity for which planning permission is required. (ACTION: DETR, DoE(NI), LAs, NAW, SE)	5.3.2	Develop and promote training in the conservation, management and restoration of blanket mire, targeting this at representatives from all key agencies and at appropriate land managers. (ACTION: CCW, DANI, EHS, EN, LAs, MAFF, NPAs, NAW, SAC, SE, SNH)
5.1.10	Ensure appropriate consultation mechanisms, for example Environmental Assessment, exist for proposed changes in land-use (eg conversion to pasture, growing of Christmas trees) even where no grant aid is sought from public bodies. (ACTION: DETR, NAW, SE, DoE(NI), LAs)	5.3.3	Develop and promote appropriately targeted guidance and advisory material. (ACTION: CCW, DANI, EHS, EN, FC, MAFF, NAW, SE, SNH)
5.1.11	Develop by 2005 regional strategies to reduce red deer numbers in Scotland to levels where blanket mire is maintained in favourable condition. (ACTION: DCS, SE, SNH)	5.3.4	Encourage and promote advice on the use of alternatives to peat, particularly as a fuel. (ACTION: DETR, DoE(NI), SE)
5.2	<b>Site safeguard and management</b>	5.3.5	Establish a suite of sites across the UK, reflecting the range of variation of the habitat, to demonstrate best management practice. (ACTION: CCW, DANI, EHS, EN, FC, LAs, MAFF, NAW, NPAs, SE, SNH)
5.2.1	Review by 2005 the coverage of blanket mires within the SSSI/ASSI series, and consider notifying any additional areas of blanket bog required to safeguard the full range of variation. (ACTION: CCW, EHS, EN, SNH)	5.3.6	Encourage applications from potential partners to obtain funding to bring areas of blanket bog into favourable management. (ACTION: CCW, EHS, EN, SNH)
5.2.2	By 2004 designate as Special Areas of Conservation (SACs) those areas of blanket mire approved by the EC under the EC Habitats Directive and classify, as appropriate, as Special Protection Areas (SPAs) under the EC Birds Directive. (ACTION: CCW, DETR, EHS, EN, JNCC, NAW, SE, SNH)	5.4	<b>International</b>
5.2.3	Prepare and implement management plans for all SSSIs/ASSIs and Natura 2000 areas by 2004. (ACTION: CCW, EHS, EN, SNH)	5.4.1	Promote exchange of restoration and other management expertise and practices in relation to common issues (eg peat cutting and overgrazing) with other European partners. (ACTION: CCW, DANI, DETR, EHS, EN, JNCC, SE, SNH)
5.2.4	Promote the uptake of positive management with owners and occupiers of SSSIs/ASSIs and of other land of nature conservation interest, particularly those areas in public ownership or management. (ACTION: CCW, EHS, EN, SNH)	5.4.2	Continue to influence the EU to review livestock support mechanisms and to make greater use of European funding (see 5.1.1). (ACTION: CCW, DANI, DETR, EHS, EN, JNCC, MAFF, NAW, SE, SNH)
5.2.5	Ensure the protection and, as appropriate, restoration of blanket mire under management by FE/DANI Forest Service through the further development of FE's Endangered Habitat Action Plans and Design Plans for individual forests. (ACTION: CCW, DANI, EHS, EN, FC, SNH)	5.4.3	Participate in initiatives, such as EU Biodiversity and Forestry strategies, to develop and strengthen measures for the conservation of blanket mire in Europe. (ACTION: CCW, DETR, EHS, EN, JNCC, SNH)
5.2.6	Contribute to the implementation of relevant action plans for rare and declining species associated with blanket mire in conjunction with the appropriate species steering groups. (ACTION: CCW, DANI, EHS, EN, FC, MAFF, NAW, SE, SNH)	5.4.4	Encourage other countries to determine the extent and nature of blanket mire and promote a co-operative approach to its conservation. (ACTION: DETR, JNCC)
5.3	<b>Advisory</b>	5.5	<b>Monitoring and research</b>
5.3.1	By 2000, develop guidelines which identify those circumstances under which blanket mire restoration should be actively encouraged, to improve the prioritisation of sites for future restoration/enhancement. (ACTION: CCW, DANI, DETR, EHS, EN, FC, NAW, SE, SNH)	5.5.1	Establish a national inventory of blanket mire habitats by 2004 using agreed methodologies and with agreed definitions for determining the extent and condition of the habitat. (ACTION: CCW, DANI, EHS, EN, JNCC, NAW, SE, SNH)
		5.5.2	Improve access to, and exchange of information on, UK blanket mires, including the use of the World Wide Web, by 2000. (ACTION: CCW, DANI, DETR, EHS, EN, JNCC, MAFF, NAW, SE, SNH)
		5.5.3	Encourage research to determine and subsequently monitor the nature and extent of diversity within the habitat throughout its range, especially studies of vegetation, hydrology, vertebrate and invertebrate populations and the peat archive, and take any necessary

- action to arrest, and if possible reverse, any negative trends. (ACTION: CCW, DANI, DETR, EHS, EN, FC, JNCC, NAW, SE, SNH)
- 5.5.4 Commission and undertake cross-disciplinary research into the impact of the major land and freshwater uses on the condition of the blanket bog resource. Determine management practices which are either sustainable or do not compromise the sustainability of adjacent areas of bog. (ACTION: CCW, DANI, DETR, DoE(NI), EA, EHS, EN, FC, MAFF, NAW, SE, SEPA, SNH)
- 5.5.5 Commission and undertake research to establish the impact on blanket mires of peat extraction for fuel and horticultural purposes. (ACTION: DETR, DoE(NI), SE)
- 5.5.6 Commission and undertake research on the conservation management of blanket bog, the causes of degradation and appropriate restoration techniques. (ACTION: CCW, DANI, DETR, DoE(NI), EA, EHS, EN, FC, JNCC, SNH, MAFF, NAW, SE, SEPA)
- 5.5.7 Review research requirements on the effects of pollution and climate change on blanket bog and promote research needs accordingly. (ACTION: CCW, DETR, DoE(NI), EA, EHS, EN, FC, JNCC, MAFF, NAW, SE, SEPA, SNH)
- 5.5.8 Develop and implement appropriate surveillance and monitoring programmes to assess progress towards action plan targets. (ACTION: CCW, DANI, EHS, EN, JNCC, MAFF, NAW, SE, SNH)
- 5.6 Communications and publicity
- 5.6.1 Produce information packages aimed particularly at capturing the interest and co-operation of site owners towards favourable management. (ACTION: CCW, EHS, EN, SNH)
- 5.6.2 Encourage appropriate public access for observation and enjoyment of blanket mire. (ACTION: CCW, CA, DANI, DETR, EHS, EN, MAFF, NAW, SE, SNH)
- 5.6.3 Encourage the establishment of a network of interpretive facilities throughout the UK by 2010 as a means of achieving increased public awareness, understanding and appreciation of blanket mires. (ACTION: CCW, DANI, EHS, EN, FC, LAs, LECs, MAFF, NAW, NPAs, SE, SNH)

## 6. Costing

The successful implementation of this habitat action plan will have resource implications for both the public and private sectors. The data in the table opposite provide an estimate of the current expenditure on the habitat, primarily through agri-environment schemes, and the likely additional resource costs to the public and private sectors. These additional resource costs are based on the annual average over 5 and 10 years. The total expenditure for these time periods is also given. Three-quarters of the additional resources are likely to fall to the public sector..

## 7. Key references

- Blackstock, T.H., Stevens, D.P. & Howe, E.A. 1996. Biological components of Sites of Special Scientific Interest in Wales. *Biodiversity and Conservation*, 5, 897 - 920.
- Cruickshank, M.M. & Tomlinson, R.W. 1988. Northern Ireland Peatland Survey. Report to Countryside and Wildlife Branch, Department of Environment (NI), Belfast.
- Department of Agriculture for Northern Ireland (Forest Service). 1993. Afforestation - The DANI statement on environmental policy. Department of Agriculture (NI), Belfast.
- European Commission. 1996. Interpretation Manual of European Union Habitats. European Commission, Brussels.
- Forestry Commission. 1999 (in press). Forestry and Bogs. FC Guideline Note. Forestry Commission, Edinburgh.
- Irish Peatland Conservation Council. 1992. Irish Peatland Conservation Council Policy Statement and Action Plan 1992-1997. IPCC, Dublin.
- Lindsay, R.A. 1995. Bogs: The ecology, classification and conservation of ombrotrophic mires. Scottish Natural Heritage, Battleby.
- Lindsay R.A. & Immirzi, C.P. 1996. An inventory of lowland raised bogs in Great Britain. Scottish Natural Heritage, Battleby.
- Macdonald, A., Stevens, P., Armstrong, H., Immirzi, P. & Reynolds, P. 1998. A guide to upland habitats. Surveying land management impacts. Scottish Natural Heritage, Battleby.
- Quarmby, N.A., Everingham, F. & Reid, E. 1997. Scottish Blanket Bog Inventory: Lewis and Harris - characterisation of blanket bogs using Landsat Thematic Mapper. Scottish Natural Heritage, Edinburgh.
- Mackey, E. 1998. The Natural Heritage of Scotland: changes in Scotland's land cover from 1940s reconstruction to 1980s stewardship. Scottish Natural Heritage, Edinburgh.
- Reid, E., Quarmby, N. & Thompson, D.B.A. 1997. Characterisation of blanket bogs using satellite imagery. Information and Advice Note No.67. Scottish Natural Heritage, Battleby.

Shaw, S.C., Wheeler, B.D., Kirby, P., Philipson, P. & Edmunds R. 1996. Literature review of the historical effects of burning and grazing of blanket bog and upland wet heath. English Nature Research Reports, No.172. English Nature, Peterborough.

Stoneman, R. and Brooks, S. 1997. Conserving bogs. The management handbook. The Stationery Office, Edinburgh.

Tallis, J.H., Meade, R. & Hulme, P.D. 1997 Blanket mire degradation - causes consequences and challenges. Mires Research Group & MLURI, Aberdeen.

UK Biodiversity Steering Group. 1995. Biodiversity: The UK Steering Group Report. Vol 2: Action Plans. HMSO, London.

#### Costings for blanket bog

	Current expenditure	First 5 yrs to 2004/2005	Next 10 yrs to 2014/2015
Current expenditure /£000/Yr	3021		
Total average annual cost /£000/Yr		13973.9	45614.9
Total expenditure to 2005/£000		69869.3	
Total expenditure 2005 to 2014/£000			456149

## Upland calcareous grassland Habitat Action Plan

### 1. Current Status

#### 1.1 Biological status

1.1.1 Upland calcareous grasslands occur on lime-rich soils situated above the upper limit of agricultural enclosure, both in the sub-montane and montane zones. Most examples occur above 250-300 m altitude, but the habitat is also found within unenclosed moorland at lower elevations, and descends to sea level in north-west Scotland. Upland calcareous grassland typically occur as components of habitat mosaics, which are generally managed as rough grazing land for domestic livestock. These are relatively rare upland vegetation types which support a wide range of uncommon species. Lowland calcareous grasslands are covered by a separate habitat action plan.

1.1.2 Upland calcareous grasslands are generally restricted to shallow soils derived from a variety of lime-rich bedrocks. The most widely distributed and locally extensive calcareous rock in the uplands is Carboniferous Limestone, which forms major exposures in north and south Wales, the North Pennines and Northern Ireland. Other limestones support calcareous grassland in Scotland and northern England, while certain shales and sandstones are locally important. Basic igneous rocks provide another source of calcareous substrates, including the Borrowdale Volcanics in Cumbria, dolerites and pumice tuffs in north Wales, and Tertiary basalts in western Scotland and Northern Ireland. In Scotland especially, upland calcareous grasslands also occur on calcium-rich metamorphic rocks, such as the schists of the southern central and eastern Highlands.

1.1.3 This habitat comprises various forms of grassland characterised by the prominence of calcicolous ('calcium-loving') grasses and herbs. Six communities defined in the National Vegetation Classification are represented (CG9 to CG14). These include upland forms of *Sesleria albicans* grassland (CG9), *Festuca ovina*-*Agrostis capillaris* swards (CG10, CG11 and CG12), and *Dryas octopetala* communities (CG13 and CG14). Swards tend to be much more species-rich than upland grasslands on acidic substrates, and may contain over 60 species/4m<sup>2</sup>. Montane forms of calcareous grassland are often enriched by a distinctive assemblage of Arctic-Alpine plants, such as *Alchemilla alpina*, *Polygonum viviparum* and *Silene acaulis*.

1.1.4 It is estimated that there are 10,000 ha of upland calcareous grassland in England, 10,000-13,000 ha in Scotland, 800 ha in Wales, and 1,100 ha in Northern Ireland. There is thus an estimated total of approximately 22,000-25,000 ha of upland calcareous grassland in the UK. Particularly important areas for the habitat include the North Pennines and Cumbria in England and Breadalbane in Scotland.

1.1.5 There are good data holdings on the extent and distribution of around two-thirds of the total area of upland calcareous grassland in the UK. However, few data are available regarding changes in either the extent or floristic composition of the habitat.

#### 1.2 Links with species action plans

1.2.1 Upland calcareous grassland is an important habitat for a number of priority species including the mason bees *Osmia inermis* and *O. parietina*, the ruby-tailed wasp *Chrysura hirsuta*, the snails *Vertigo geyeri* and *V. genesii*, and the alchemilla *Alchemilla minima*. The requirements of these species should be taken into account when implementing this plan.

### 2. Current factors affecting the habitat

2.1 A number of factors currently adversely affect upland calcareous grassland, and reduce the extent of the habitat as well as diminishing the quality of the vegetation.

2.2 Agricultural intensification in the form of fertiliser use, herbicide application, ploughing and re-seeding may still be damaging and destroying some grasslands.

2.3 Heavy grazing by sheep, cattle and horses, especially during the summer, can cause soil erosion and may adversely affect species-richness and structural diversity, with a loss of tall herbs in particular.

2.4 Very light or absent grazing with subsequent scrub encroachment, although more a problem of lowland calcareous grasslands, can also be a localised problem in the uplands and may be deleterious if it leads to a decline in species-richness.

2.5 Quarrying of limestone and other calcareous bedrocks is a local but significant factor resulting in the loss of calcareous grasslands. Conversely, the in-filling of abandoned limestone quarries where calcareous grasslands have become established is a threat at some localities.

2.6 Acidification and nitrogen enrichment caused by atmospheric deposition, and climate change, may have a deleterious effect on upland calcareous grassland, but potential impacts have not been fully assessed.

### 3. Current action

#### 3.1 Legal status

3.1.1 Upland calcareous grassland is well represented in the SSSI/ASSI series, with approximately 4,000 ha in England, 4,000 ha in Scotland, 500 ha in Wales and 100 ha in Northern Ireland (with further ASSI declarations

- planned). Approximately 35-40% of the total UK extent of upland calcareous grassland is therefore included within designated sites. Upland calcareous grasslands are found within a large number of National Nature Reserves (NNRs), including Ben Lawers in Perthshire, Cwm Idwal in Gwynedd, Upper Teesdale in County Durham, Malham in North Yorkshire, and Crossmurrin in County Fermanagh. Extensive areas of upland calcareous grassland are registered as common land in England and Wales.
- 3.1.2 A number of upland calcareous grassland types are listed on Annex I of the EC Habitats Directive, including alpine calcareous grassland, semi-natural dry grassland and scrubland facies on calcareous substrates (*Festuco-Brometalia*), and species-rich *Nardus* grasslands. The UK Government has proposed 20 sites as Special Areas of Conservation (SACs) for these habitats.
- 3.2 Management, research and guidance
- 3.2.1 Some SSSIs/ASSIs are positively managed through management agreements, including targeted schemes such as the Craven Limestone Wildlife Enhancement Scheme in the Yorkshire Dales which includes 3,400 ha of upland calcareous grassland.
- 3.2.2 The Pennine Dales, Lake District, Breadalbane, and West Fermanagh and Erne Lakeland ESAs include significant areas of calcareous grassland which may be entered into extensive management options aimed at the maintenance and enhancement of species-rich grassland. The Countryside Premium (Scotland) and Countryside Stewardship (England) Schemes include payment rates for managing species-rich upland calcareous grasslands to agreed prescriptions. Countryside Premium Scheme payments only apply to upland calcareous grassland on inbye ground. In England several thousand hectares of upland calcareous grassland were covered by Countryside Stewardship Scheme agreements in 1997. In Wales, some areas of upland calcareous grassland are subjected to Tir Cymen or ESA management agreements. These schemes have now been replaced by a new whole-farm agri-environment scheme, Tir Gofal, which includes prescriptions aimed at maintaining and enhancing areas of calcareous grassland in the uplands.
- #### 4. Action plan objectives and proposed targets
- 4.1 The objectives and targets cover habitat maintenance, restoration and expansion. Emphasis is placed on maintaining the current distribution and extent of upland calcareous grassland, as well as reducing fragmentation, where appropriate, by linking small, vulnerable areas. The targets set for achieving favourable condition and for habitat expansion are at this stage a judgement based on current, but incomplete, information. It should be recognised that opportunities for large-scale re-creation of this habitat type are very limited.
- 4.2 The targets will require review and adjustment during the course of the plan, and as an early step in plan implementation more comprehensive assessments of the extent and quality of the habitat will need to be obtained.
- 4.2.1 Maintain the current distribution and extent (ca 22,000-25,000 ha) of upland calcareous grassland in the UK.
- 4.2.2 Achieve favourable condition for at least 75% of upland calcareous grassland (7,000 ha in England, 7,000-9,750 ha in Scotland, 500 ha in Wales and 500 ha in Northern Ireland) through sympathetic management by 2005 or as soon as biologically practical thereafter.
- 4.2.3 Initiate pilot attempts to re-create at least 200 ha of upland calcareous grassland by 2005, with a particular emphasis on reducing fragmentation through linking small, vulnerable and discontinuous sites.
- #### 5. Proposed action with lead agencies
- 5.1 Policy and legislation
- 5.1.1 Review and modify livestock support mechanisms in the Less Favoured Areas (LFAs) through further lobbying for reform of the Common Agricultural Policy (CAP) to promote sustainable agricultural management of upland calcareous grassland. Promote a more integrated approach to environmental, agricultural and socio-economic policy through CAP reform. Continue to reduce overgrazing by implementing the environmental cross-compliance conditions. (ACTION: CCW, DANI, DETR, EHS, EN, MAFF, NAW, SE, SNH)
- 5.1.2 Consider extending existing agri-environment schemes and/or develop new schemes to help achieve favourable conservation status for upland calcareous grassland across the UK. Review and modify where necessary existing agri-environment schemes to conserve upland calcareous grassland and to reduce fragmentation and inappropriate grazing. (ACTION: CCW, DANI, DETR, EHS, EN, MAFF, NAW, SE, SNH)
- 5.1.3 Develop by 2002 a strategy identifying target areas, especially improved grassland and disused quarries, suitable for the re-creation and expansion of upland calcareous grassland with an emphasis on reducing fragmentation. (ACTION: CCW, DANI, EHS, EN, MAFF, NAW, SE, SNH)
- 5.1.4 Protect disused quarries and other sites supporting upland calcareous grassland from inappropriate development by identification in relevant development plans, and encourage the restoration of worked out quarries to semi-natural grassland. (ACTION: DETR, DoE(NI), LAs, NAW, NPAs, SE)

5.1.5	By 2002 review and consider common land legislation with a view to improving the sympathetic management of upland commons. (ACTION: DETR, DoE(NI), LAs, NAW, NPAs, SE)	for the conservation of upland calcareous grassland in Europe. (ACTION: CCW, DETR, EHS, EN, JNCC, SNH)
5.2	<b>Site safeguard and management</b>	<b>5.5 Monitoring and research</b>
5.2.1	Review by 2005 the extent of SSSI/ASSI coverage, and if significant gaps are identified consider notifying further sites as necessary. Also notify additional sites, if required, to ensure that populations of scarce species associated with upland calcareous grassland are accommodated within conservation sites over their natural ranges in the UK. (ACTION: CCW, EHS, EN, SNH)	5.5.1 By 2001 review vegetation survey coverage of upland calcareous grassland and initiate a programme of work to fill major gaps. (ACTION: CCW, EHS, EN, SNH)
5.2.2	By 2004, prepare and implement management plans for all SSSIs/ASSIs and Natura 2000 sites containing upland calcareous grassland. (ACTION: CCW, EHS, EN, SNH)	5.5.2 Develop guidance on defining favourable condition for upland calcareous grassland by 2000. By 2002 undertake a sampled condition assessment of the habitat throughout the UK (covering up to 25% of the total extent), using standardised and repeatable methodologies. (ACTION: CCW, EHS, EN, JNCC, MAFF, SNH)
5.2.3	Promote the uptake of positive management with owners and occupiers of SSSIs/ASSIs and other wildlife areas. (ACTION: CCW, EHS, EN, SNH)	5.5.3 Continue to commission applied research to help develop beneficial and practical management techniques (including appropriate stocking levels) for the conservation of different forms of upland calcareous grassland. (ACTION: CCW, DANI, EHS, EN, JNCC, MAFF, NAW, SE, SNH)
5.2.4	By 2004 designate those areas of upland calcareous grasslands approved by the EC as SACs under the EC Habitats Directive. (ACTION: CCW, DETR, EHS, EN, JNCC, NAW, SE, SNH)	5.5.4 Continue to support applied research to develop techniques for the re-creation of upland calcareous grasslands, and the restoration of degraded stands. Identify by 2002 former sites that are suitable for re-creation of upland calcareous grassland, and draw up a strategy to meet the target for re-creation. (ACTION: CCW, EHS, EN, JNCC, SNH)
5.2.5	Contribute to the implementation of relevant action plans for rare and declining species associated with upland calcareous grassland in conjunction with the appropriate species steering groups. (ACTION: CCW, DANI, EHS, EN, MAFF, NAW, SE, SNH)	5.5.5 Commission and encourage conservation studies on scarce animals and plants associated with upland calcareous grassland and develop appropriate management techniques. (ACTION: CCW, DANI, EHS, EN, JNCC, NAW, SE, SNH)
5.3	<b>Advisory</b>	<b>5.5.6 Promote research into the best ways of integrating agriculture and conservation of upland calcareous grassland in upland farm systems. (ACTION: CCW, DANI, EHS, EN, JNCC, MAFF, NAW, SE, SNH)</b>
5.3.1	Encourage the use and establishment of public and private demonstration sites, with special linkage to agri-environment schemes, to develop and exhibit best-practice management techniques. (ACTION: CCW, DANI, EHS, EN, LAs, MAFF, NAW, NPAs, SE, SNH)	<b>5.5.7 Review research requirements on the effects of air pollution and climate change on upland calcareous grassland and promote research needs accordingly. (ACTION: CCW, DANI, DETR, EHS, EN, MAFF, JNCC, NAW, SE, SNH)</b>
5.3.2	Provide advice and information on land management through the production, promotion and dissemination of literature, including technical handbooks and leaflets, and the use of IT. (ACTION: CCW, DANI, EHS, EN, LAs, MAFF, NAW, NPAs, SE, SNH)	<b>5.5.8 Develop and implement appropriate surveillance and monitoring programmes to assess progress towards action plan targets. (ACTION: CCW, DANI, EHS, EN, JNCC, MAFF, NAW, SE, SNH)</b>
5.3.3	Encourage applications from potential partners to obtain funding to bring areas of upland calcareous grassland into favourable management. (ACTION: CCW, EHS, EN, SNH)	<b>5.6 Communications and publicity</b>
5.4	<b>International</b>	<b>5.6.1 Promote the conservation of upland calcareous grassland through the scientific press and popular media. (ACTION: CCW, EHS, EN, SNH)</b>
5.4.1	Continue to influence the EU to review livestock support mechanisms and to make greater use of European funding (see 5.1.1). (ACTION: CCW, DANI, DETR, EHS, EN, MAFF, JNCC, NAW, SE, SNH)	<b>5.6.2 Encourage appropriate public access for observation and enjoyment of upland calcareous grasslands. (ACTION:</b>
5.4.2	Participate in initiatives, such as EU Biodiversity and Forestry strategies, to develop and strengthen measures	

CCW, CA, DANI, DETR, EHS, EN, MAFF,  
NAW, SE, SNH)

## 6. Costings

- 6.1 The successful implementation of this habitat action plan will have resource implications for both the public and private sectors. The data in the table below provide an estimate of the current expenditure on the habitat, primarily through agri-environment schemes, and the likely additional resource costs to the public and private sectors. These additional resource costs are based on the annual average over 5 and 10 years. The total expenditure for these time periods is also given. Three-quarters of the additional resources are likely to fall to the public sector.

## 7. Key references

Backshall, J., Manley, J. & Rebane, M. (Eds) 1999 (in press). The Upland Management Handbook. English Nature, Peterborough.

Cooper, A. & McCann, T. 1994. The botanical composition of grassland land cover types in Northern Ireland. Contract report to Environment Service, DoE(NI), Belfast.

MacDonald, A., Stevens, P., Armstrong, H., Immirzi, P. & Reynolds, P. 1998. A guide to upland habitats. Surveying land management impacts. Scottish Natural Heritage, Battleby.

Rodwell, J.S. (Ed.) 1992. British plant communities, volume 3: grasslands and montane communities. Cambridge University Press, Cambridge.

### Costings for upland calcareous grassland

	Current expenditure	First 5 yrs to 2004/2005	Next 10 yrs to 2014/2015
Current expenditure /£000/Yr	1637.2		
Total average annual cost /£000/Yr		402.1	454.2
Total expenditure to 2005/£000		2010.7	
Total expenditure 2005 to 2014/£000			4541.7

# Upland heathland Habitat Action Plan

## 1. Current Status

### 1.1 Biological status

- 1.1.1 Heathland vegetation occurs widely on mineral soils and thin peats (<0.5 m deep) throughout the uplands and moorlands of the UK. It is characterised by the presence of dwarf shrubs at a cover of at least 25%. Blanket bog vegetation may also contain substantial amounts of dwarf shrubs, but is distinguished from heathland by its occurrence on deep peat (>0.5 m).
- 1.1.2 For the purposes of this plan upland heathland is defined as lying below the alpine or montane zone (at about 600-750 m) and usually above the upper edge of enclosed agricultural land (generally at around 250-400 m, but descending to near sea-level in northern Scotland).
- 1.1.3 Lowland heathland occurs below the upper limit of agricultural enclosure and supports a range of birds, reptiles and invertebrates not found on upland heath; this habitat is covered by a separate habitat action plan. Montane heaths, restricted to high-altitude mountain summits and ridges, are also excluded from the upland heathland plan. Blanket bog and other mires, grassland, bracken, scrub, trees and woodland, freshwater and rock habitats frequently form intimate mosaics with heathland vegetation in upland situations. This plan recognises the importance of this habitat mosaic. Habitat action plans have been produced for some elements of this complex, for example, blanket bog and upland calcareous grassland.
- 1.1.4 Upland heath in 'favourable condition' is typically dominated by a range of dwarf shrubs such as heather *Calluna vulgaris*, bilberry *Vaccinium myrtillus*, crowberry *Empetrum nigrum*, bell heather *Erica cinerea* and, in the south and west, western gorse *Ulex gallii*. In northern areas juniper *Juniperus communis* is occasionally seen above a heath understorey. Wet heath is most commonly found in the wetter north and west and, in 'favourable condition', should be dominated by mixtures of cross-leaved heath *Erica tetralix*, deer grass *Scirpus cespitosus*, heather and purple moor-grass *Molinia caerulea*, over an understorey of mosses often including carpets of *Sphagnum* species. This habitat is distinct from blanket mire which occurs on deeper peat and which usually contains frequent occurrence of hare's-tail cotton-grass *Eriophorum vaginatum* and characteristic mosses. High quality heaths are generally structurally diverse, containing stands of vegetation with heather at different stages of growth. Upland heath in 'favourable condition' also usually includes areas of mature heather.
- 1.1.5 Upland heathland encompasses a range of National Vegetation Classification (NVC) plant communities.

*Ulex gallii* - *Agrostis curtisii* (H4) and *Calluna vulgaris* - *U. gallii* (H8) are restricted to southern Britain. *Calluna* - *V. myrtillus* (H12) is particularly widespread in the east. *Calluna* - *E. cinerea* (H10), *Calluna* - *V. myrtillus* - *Sphagnum capillifolium* (H21), and *Scirpus cespitosus* - *E. tetralix* (M15) are especially characteristic of western margins. *Vaccinium myrtillus* - *Deschampsia flexuosa* (H18) is generally widespread in the uplands but other communities are more local in distribution, notably *Calluna* - *D. flexuosa* (H9), *Calluna* - *Arctostaphylos uva-uri* (H16) and *E. tetralix*-*Sphagnum compactum* (M16). The distribution of these communities is influenced by climate, altitude, aspect, slope, maritime influences and management practices including grazing and burning.

### 1.1.6

An important assemblage of birds is associated with upland heath, including red grouse *Lagopus lagopus*, black grouse *Tetrao tetrix*, merlin *Falco columbarius* and hen harrier *Circus cyaneus*. Some forms of heath also have a significant lower plant interest, including assemblages of rare and local mosses and liverworts that are particularly associated with the wetter western heaths. The invertebrate fauna is especially diverse.

### 1.1.7

This habitat type is present on an estimated 270,000 ha in England, 80,000 ha in Wales, up to 69,500 ha in Northern Ireland and between 1,700,000 and 2,500,000 ha in Scotland. The total upland heath resource in the UK thus amounts to between 2 and 3 million hectares. Dwarf shrub heaths are recognised as being of international importance because they are largely confined within Europe to the British Isles and the western seaboard of mainland Europe.

### 1.1.8

There have been considerable losses of heather moorland in recent times. For example, 27% of heather moorland is estimated to have been lost in England and Wales between 1947 and 1980. On the Berwyn mountains in north-east Wales there was a 44% decline in the extent of heather-dominated vegetation between 1946 and 1984, whereas other upland sites in Wales have shown much smaller losses over similar periods. An estimated 18% was lost in Scotland between the 1940s and 1970s and the trend continued throughout the 1980s with a further estimated loss of 5%. Much of this loss is attributed to agricultural land improvements, heavy grazing by sheep (and, in certain areas, red deer and cattle), and afforestation.

### 1.1.9

It has also been estimated that 440,000 ha of land in the uplands in England and Wales have less than 25% cover of heather (ie grassland containing suppressed dwarf shrubs). There is likely to be further significant loss of heather moorland to acid grassland if current grazing levels and pressures continue. However, the conversion of heathland to acid grassland is not a purely recent phenomenon. On some sites in Wales (and elsewhere in

- UK) the major decline in heathland cover probably took place in the 19th century or even earlier.
- 1.2** Links with species action plans
- 1.2.1** Upland heathland is an important habitat for a number of species. Priority species identified as part of the Biodiversity Action Plan programme currently include black grouse *Tetrao tetrix*, a cranefly *Tipula (Savtshenkia) serrulifera*, the moths *Semiothisa carbonaria*, *Xestia alpicola* and *alpina* and *Xylena exsoleta* and juniper *Juniperus communis*. Their requirements should also be taken into account in the implementation of this plan
- 2.** Current factors affecting the habitat
- 2.1** Although upland heathland is dependent on management of grazing and burning to prevent succession to scrub or woodland, many upland heaths suffer from overgrazing and environmentally damaging burning regimes. Some of the problems caused by these management practices are described below. As well as direct loss of habitat, many areas of upland heathland are characterised by limited structural diversity with few natural transitions from open heath into scrub and woodland. Current management and other factors are continuing to prevent development of these features in most areas. Undergrazing occurs but is generally only of local significance.
- 2.2** Agriculture is the dominant land use in the uplands. Most of the upland heathland resource falls within the Less Favoured Areas (LFAs). Livestock subsidies have led to a substantial increase in stocking rates (especially of sheep) in many upland areas. For example, the number of ewes in the Severely Disadvantaged Area of England increased by 40% between 1976 and 1993. Within the LFA boundary, financial assistance is available to farmers which is additional to the market support and structural incentives of the Common Agricultural Policy (CAP). Livestock quotas were introduced in 1993 to control the amount of meat production and the overall cost to the CAP, and environmental conditions are now also attached to all the main livestock subsidy schemes, although overgrazing is still a problem and losses of upland heathland habitat continue.
- 2.2.1** High stocking levels of sheep, and to a lesser extent cattle, lead to heavy grazing of heather and other dwarf shrubs. High numbers of red deer *Cervus elaphus* are a problem in parts of the Scottish Highlands. Inappropriate methods of supplementary feeding and the absence or minimal use of shepherding also contribute to the problem of overgrazing.
- 2.2.2** Heavy grazing by sheep, cattle or deer can prevent regeneration by native woodland and scrub, notably along upland heathland margins and stream sides where such habitat additions would be likely to enhance biodiversity value.
- 2.2.3** Difficulties in negotiating agreements with commoners are hampering take-up of agri-environment schemes on common land.
- 2.2.4** Conversion to grassland occurs through ploughing, reseeding, liming and fertilisation for agricultural purposes, particularly at lower elevations. Drainage and moorland 'gripping' also reduce the interest of wet heath. These factors have become less significant over the past ten years.
- 2.3** Afforestation (mainly by non-native conifers) leads to direct loss of dwarf-shrub habitat, although temporary and permanent areas of heathland are now being created within some existing forests by restructuring after the first rotation.
- 2.4** Poorly managed muirburn (ie large-scale and too frequent in operation) reduces the habitat quality of upland heath by causing a simplification of structure, loss of lower plant assemblages and erosion of peat.
- 2.5** Encroachment by bracken can lead to a loss of biodiversity; this is a significant problem in some upland areas.
- 2.6** Quarries, windfarms, communication masts, access tracks and certain other planning developments can impact directly on wildlife interest.
- 2.7** Acidification, tropospheric ozone and nitrogen enrichment caused by atmospheric deposition can lead to vegetation changes including a reduction in the lichen and bryophyte interest. Nitrogen deposition can increase the likelihood of insect defoliation of upland heathland.
- 2.8** Climate change could potentially lead to changes in vegetation composition and structure, although any increase in temperature may also be accompanied by possible increases in rainfall and windspeeds. The future position is still unclear but one of the dominant heathland species, heather, does have a relatively wide tolerance of temperature and rainfall, providing the overall climate remains oceanic. It is likely that within the time span of this plan other factors, notably high stocking levels, will have by far the greatest impact on upland heathland vegetation and species.
- 2.9** Localised damage and threats from other forms of land use in the uplands, such as military use and recreation, are a concern.
- 2.10** The interaction of two or more of the factors listed above often greatly increases the overall impact on upland heathland vegetation. For example, poorly managed burning followed by heavy grazing will result in the loss of dwarf shrubs more rapidly than would either factor in isolation. It is possible that grazing pressures interact with pollution to influence vegetation change.

3. Current action
- 3.1 Legal Status
- 3.1.1 Large tracts of upland heath are notified as SSSIs/ASSIs, including at least 42,000 ha in England, 34,000 ha in Wales, 7,000 ha in Northern Ireland and 152,000 ha in Scotland. The upland heath habitats listed under Annex 1 of the EC Habitats Directive are Juniperus communis formations on heaths, northern Atlantic wet heaths with *Erica tetralix*, and dry heaths (all sub-types). The UK Government has put forward areas that it considers qualify as Special Areas of Conservation (SAC) for these habitats. Some areas of upland heath are also classified as Special Protection Areas (SPA) under the EC Birds Directive, including the Bowland Fells and the North Pennines. Upland heathland is also represented within the National Nature Reserve (NNR) network.
- 3.1.2 Extensive areas of upland are registered as common land in England and Wales. The Department of the Environment, Transport and the Regions (DETR) research project Biological Survey of Common Land in England and Wales will assist in estimating the amount of upland heathland registered as common land. Rights to graze livestock on common land can be held by a number of individuals, and overgrazing is a specific problem on many upland commons in England and Wales. Substantial areas of heathland are also publicly owned or managed, for example by Scottish Office Agriculture, Environment and Fisheries Department (SOAEFD), the National Parks, and Forest Enterprise, and many areas lie in countryside designated as National Park, National Scenic Area (NSA) or Area of Outstanding Natural Beauty (AONB).
- 3.1.3 The date and conditions under which heather can be burnt are defined by law. Codes of good practice are published by the relevant Agricultural departments. The burning regulations restrict the burning of heather and associated vegetation to specific times of the year.
- 3.2 Management, research and guidance
- 3.2.1 Most upland heath is privately owned, often as part of large estates which are commonly managed for the grouse-shooting interest. Large areas are also owned or managed by water companies as part of their water catchment plans. A small proportion is owned or managed specifically for nature conservation.
- 3.2.2 Many of the current projects to develop and improve the management of upland heath are described in the UK Biodiversity Steering Group Report. projects include the SNH Guide to Upland Habitats (1998), SNH research on the impacts of muirburn, a National Trust for Scotland project to develop grazing management plans for upland sites, and a pilot project by the Brecon Beacons National Park and CCW to develop an integrated approach to common land management in upland Wales. In 1999, English Nature will publish the Upland Management Handbook which describes best practice. This is a major publication covering moorland and all other associated habitats and will form the basis for delivering management advice and guidance in England. Much of its content will also be appropriate in certain situations in other countries. DETR have recently produced management guidelines for common land in England and Wales.
- 3.2.3 The country agencies are currently preparing management plans for SACs and SSSIs/ASSIs, and many upland heath SSSIs/ASSIs receive beneficial management through management agreements. For example, the North Pennines Wildlife Enhancement Scheme in England includes 56 agreements covering 20,842 ha of moorland. Common monitoring standards are also being established to assess the condition of upland heath in the context of 'favourable conservation status'.
- 3.2.4 Recently, agri-environment and other schemes have been established with the objective of protecting and improving heather moorland habitats through encouraging lower stocking levels and more appropriate management practices. These include Environmentally Sensitive Areas (ESAs) such as the Lake District, North Peak, South West Peak, Exmoor, Dartmoor, the Shropshire Hills, the Central Southern Uplands and Western Southern Uplands of Scotland and the Sperrins in Northern Ireland. Within ESAs 103,057 ha of moorland is under agreement, of which 71,612 ha is dwarf shrub heath. The Countryside Stewardship Scheme in England provides management agreements for the regeneration of grazing-suppressed heather with 13,432 ha of upland heath covered by such agreements. Similarly, the Scottish Countryside Premium Scheme extends to all areas outside ESAs in Scotland and provides incentives for stock reduction and controlled muirburn. In England and Wales, the Moorland Scheme was introduced to enhance the moorland environment by compensating farmers for reducing stock numbers and instituting appropriate management. The take up of the Moorland Scheme has been disappointing (11,000 ha of dwarf shrub heath) and in England an enhanced upland component of the Countryside Stewardship Scheme has been launched by MAFF to offer a more attractive package of incentives. MAFF is also looking at the integration of structural funding and agri-environment funding in two pilot areas in upland England: Forest of Bowland and Bodmin Moor. In some parts of Wales significant areas of upland heathland are subject to Tir Cymen or ESA management assessments. These schemes have been replaced by a new whole-farm agri-environment scheme, Tir Gofal, which includes mandatory prescriptions to maintain existing stands of upland heath, as well as optional prescriptions to encourage heathland expansion and re-creation.

4.	Action plan objectives and proposed targets	implementing the environmental cross-compliance conditions. (ACTION: CCW, DANI, DETR, EHS, EN, MAFF, NAW, SE, SNH)
4.1	In addition to maintaining the current distribution and extent of the majority of the upland heathland resource, targets have also been set for habitat enhancement and re-establishment in order to increase the total extent of the upland heathland resource by approximately 5%. Targets include the restoration of dwarf shrub heath on upland acid grasslands as well as on areas lost to agricultural improvement and afforestation. The emphasis is on reducing fragmentation and creating and maintaining blocks of upland heathland greater than 10 km <sup>2</sup> . Dwarf shrub heath will also be encouraged in temporary and permanent open ground and in mature open canopy phases within existing woods. Upland heathlands may be enhanced through the development of native woodland and scrub. This should be considered in circumstances which benefit upland biodiversity, such as on heathland margins and streamsides.	5.1.2 By 2002 review and consider common land legislation with a view to improving the sympathetic management of upland commons. (ACTION: DETR, DoE(NI), LAs, NAW, NPAs, SE)
4.2	Achievement of the targets outlined below will depend to a significant degree on major reform of the CAP, which is favoured by the UK Government, and other relevant policy and legislative changes. The targets will require review and adjustment during the course of the plan. As an early step in plan implementation, more precise estimates of total extent, distribution, composition and change will need to be determined.	5.1.3 By 2004, review, and modify where necessary, muirburn legislation to ensure appropriate management of upland heathland. (ACTION: CCW, DANI, EHS, EN, MAFF, NAW, SE, SNH)
4.2.1	Maintain the current extent and overall distribution of the upland heathland which is currently in unfavourable condition.	5.1.4 When reviewing management prescriptions in agri-environment schemes and woodland initiatives, consider whether additional measures are needed to maintain and/or improve the condition of upland heathland. Consider extending existing schemes and/or develop new schemes to help achieve the targets outlined in Section 4 of this plan. (ACTION: CCW, DANI, DETR, EHS, EN, FC, MAFF, NAW, SE, SNH)
4.2.2	Achieve favourable condition on all upland heathland SSSIs/ASSIs by 2010, and achieve demonstrable improvements in the condition of at least 50% of semi-natural upland heath outside SSSI/ASSIs by 2010 (compared with their condition in 2000).	5.1.5 Protect upland heathland from inappropriate development, such as windfarms and quarrying, including by identification in relevant development plans. (ACTION: DETR, DoE(NI), LAs, NAW, NPAs, SE)
4.2.3	Seek to increase dwarf shrubs to at least 25% cover where they have been reduced or eliminated due to inappropriate management. A target for such restoration of between 50,000 and 100,000 ha by 2010 is proposed.	5.1.6 Consider the adequacy of existing planning guidance on the impacts of certain developments on upland heathlands, for example wind farms, and revise if required. (ACTION: CCW, DETR, DoE(NI), EHS, EN, LAs, NAW, NPAs, SE, SNH)
4.2.4	Initiate management to re-create 5,000 ha of upland heath by 2005 where heathland has been lost due to agricultural improvement or afforestation, with a particular emphasis on reducing fragmentation of existing heathland.	5.1.7 Acknowledge the importance of upland heathland in country, regional or other forestry strategies. (ACTION: FC, LAs, SE)
5.	Proposed action with lead agencies	5.1.8 Develop by 2005 regional strategies to reduce red deer numbers in Scotland to levels where upland heathland is maintained in favourable condition. (ACTION: DCS, SE, SNH)
5.1	Policy and legislation	5.2 Site safeguard and management
5.1.1	Review and modify livestock support mechanisms in the Less Favourable Areas (LFAs) through further lobbying for reform of Common Agricultural Policy (CAP), to promote sustainable agricultural management of upland heathland. Promote a more integrated approach to environmental, agricultural and socio-economic policy through CAP reform. Continue to reduce overgrazing by	5.2.1 Review by 2005 the extent of SSSI/ASSI coverage and notify further sites as necessary to fill significant gaps. (ACTION: CCW, EHS, EN, SNH)
		5.2.2 Prepare and implement management plans for all SSSIs/ASSIs and Natura 2000 areas by 2004. (ACTION: CCW, EHS, EN, SNH)
		5.2.3 Review the effectiveness of the SSSI/ASSI network in delivering favourable management for this habitat by 2004. (ACTION: CCW, EHS, EN, SNH)
		5.2.4 Promote the uptake of positive management with owners and occupiers of SSSIs/ASSIs and of other land of nature conservation interest, particularly those areas in public ownership or management. (ACTION: CCW, EHS, EN, SNH)

5.2.5	By 2004 designate the upland heath areas approved by the EC as SACs under the Habitats Directive, and classify appropriate areas as SPAs under the EC Birds Directive. (ACTION: CCW, DETR, EHS, EN, JNCC, NAW, SE, SNH)	5.5	Monitoring and research
5.2.6	Develop by 2002 proposals for enhancing biodiversity by encouraging and managing moorland mosaics, incorporating upland heathland, marginal hillground, woodland and scrub and other farmed land. (ACTION: CCW, DANI, EHS, EN, FC, MAFF, NAW, SE, SNH)	5.5.1	Develop national inventories, with agreed definitions, to determine the extent, distribution and composition of upland heathland by the year 2004. Make this information available through a World Wide Web based catalogue of survey information. (ACTION: CCW, DANI, EHS, EN, JNCC, MAFF, NAW, SE, SNH)
5.2.7	Contribute to the implementation of relevant action plans for rare and declining species associated with upland heathland in conjunction with the appropriate species steering groups. (ACTION: CCW, DANI, EHS, EN, FC, MAFF, NAW, SE, SNH)	5.5.2	Develop agreed definitions and methods by 2000 for describing and assessing the condition of upland heathland, and complete condition assessments for all SSSIs/ASSIs by the year 2006. (ACTION: CCW, EHS, EN, JNCC, MAFF, SNH)
5.3	Advisory	5.5.3	By 2004 undertake a sample survey (covering 5-10% of the resource) using standardised and repeatable methodology of vegetation condition of upland heath throughout the UK and consider the need for repeat surveys as part of a monitoring programme. (ACTION: CCW, EHS, EN, JNCC, SNH)
5.3.1	Consider encouraging the use and establishment of public and private demonstration sites, with special linkage to agri-environment schemes, to develop and exhibit best-practice management techniques. (ACTION: CCW, DANI, EHS, EN, FC, LAs, MAFF, NAW, NPAs, SE, SNH)	5.5.4	Continue to support applied research to develop methods for the enhancement, restoration and re-creation of upland heath and populations of associated characteristic species through practical management. (ACTION: CCW, DANI, EHS, EN, FC, JNCC, MAFF, SE, SNH)
5.3.2	Provide advice and information on land management through the production, promotion and dissemination of literature, including technical handbooks and leaflets, and use of IT. (ACTION: CCW, DANI, EHS, EN, LAs, MAFF, NAW, NPAs, SE, SNH)	5.5.5	Compile by 2002 an inventory of priority sites for upland heathland restoration and expansion, including grasslands containing suppressed dwarf shrubs and potential areas of heathland within forests (particularly areas known to have lost heather cover in the last 50 years). (ACTION: CCW, EHS, EN, FC, SNH)
5.3.3	Provide training, where appropriate, for those organisations/individuals involved in the delivery of advice to farmers and land managers on the environmental land management objectives and opportunities offered through agri-environmental and integrated rural schemes. (ACTION: CCW, DANI, EHS, EN, LAs, MAFF, NAW, NPAs, SAC, SE, SNH)	5.5.6	Commission and undertake research on the environmental impacts of reducing or removing burning (especially wet heath) and grazing management from upland heath to allow vegetation succession. (ACTION: CCW, CA, EHS, EN, HS, JNCC, MAFF, SNH)
5.3.4	Encourage applications from potential partners to obtain funding to bring areas of upland heathland into favourable management. (ACTION: CCW, EN, EHS, SNH)	5.5.7	Review research requirements on the effects of air pollution and climate change on upland heathland and promote research needs accordingly. (ACTION: CCW, DANI, DETR, EHS, EN, JNCC, MAFF, NAW, SNH)
5.4	International	5.5.8	Continue to promote research to explore the most effective ways of integrating agriculture, other rural economies and social needs, and recreation with nature conservation objectives. (ACTION: CA, CCW, DANI, DoE(NI), DETR, EHS, EN, FC, JNCC, LAs, MAFF, NAW, NPAs, SNH)
5.4.1	Continue to influence the EU to review livestock support mechanisms and to make greater use of European funding (see 5.1.1). (ACTION: CCW, DANI, DETR, EHS, EN, MAFF, JNCC, NAW, SE, SNH)	5.5.9	Develop and implement appropriate surveillance and monitoring programmes to assess progress towards action plan targets. (ACTION: CCW, DANI, EHS, EN, JNCC, MAFF, NAW, SE, SNH)
5.4.2	Participate in initiatives, such as EU Biodiversity and Forestry strategies, to develop and strengthen measures for the conservation of upland heathland in Europe. (ACTION: CCW, DETR, EHS, EN, JNCC, NAW, SE, SNH)	5.6	Communications and publicity
5.4.3	Promote the international significance of the UK's upland heathland resource. (ACTION: CCW, EHS, EN, JNCC, SNH)		

5.6.1 Promote conservation of upland heathland through the scientific press and popular media, particularly targeted at landowners and managers, rural communities, and visitors to upland heathland areas. (ACTION: CCW, EHS, EN, SNH)

5.6.2 Encourage appropriate public access for observation and enjoyment of upland heathland. (ACTION: CCW, CA, DANI, DETR, EHS, EN, MAFF, NAW, SE, SNH)

## 6. Costings

6.1 The successful implementation of this habitat action plan will have resource implications for both the public and private sectors. The data in the table opposite provide an estimate of the current expenditure on the habitat, primarily through agri-environment schemes, and the likely additional resource costs to the public and private sectors. These additional resource costs are based on the annual average over 5 and 10 years. The total expenditure for these time periods is also given. Three-quarters of the additional resources are likely to fall to the public sector.

## 7. Key references

Backshall, J., Manley, J. & Rebane, M. (Eds). 1999. The Upland Management Handbook. English Nature, Peterborough.

Bardgett, R.D., Marsden, J.H., & Howard, D.C. 1995. The extent and condition of heather on moorland in the uplands of England and Wales. Biological Conservation, 71, 155-161

Cooper, A. & McCann, T. 1995. The botanical composition of upland heath and mire land cover types in Northern Ireland. Contract report to Environment and Heritage Service, DoE(NI), Belfast.

Cooper, A., Murray, R. & McCann, T. 1997. Northern Ireland Countryside Survey. Environment and Heritage Service, DoE(NI), Belfast.

Department of the Environment, Transport and the Regions. 1998. Good Practice Guide on managing the use of Common Land. DETR, London.

Felton, M. & Marsden, J.H. 1990. Heather regeneration in England and Wales. A feasibility study for the Department of the Environment. Nature Conservancy Council, Peterborough.

Hester, A. 1996. Overgrazing in upland habitats: a literature review. CCW contract science report No.152. Countryside Council for Wales, Bangor.

Huntings Surveys. 1986. Monitoring landscape change. Vol. 1. Main report. Huntins Surveys, Borehamwood.

Macaulay Land Use Research Institute. 1988. Land Cover of Scotland. Final Report & Executive Summary. MLURI, Aberdeen.

MacDonald, A., Stevens, P., Armstrong, H., Immirzi, P. & Reynolds, P. 1998. A guide to upland habitats: surveying land management impacts. Scottish Natural Heritage, Battleby.

Mackey, E., Shewry, M.C. & Tudor, G.J. 1998. Land Cover Change: Scotland from the 1940s to 1980s. The Stationery Office, Edinburgh.

Moorland Working Group. 1998. Good practice for grouse moor management. Scottish Natural Heritage, Battleby.

Murray, R., McCann, T. & Cooper, A. 1992. A land classification and landscape ecological study of Northern Ireland. Contract report to Environment and Heritage Service, DoE(NI), Belfast.

Scottish Natural Heritage. 1994. National Countryside Monitoring Scheme Scotland: Main report of findings. Scottish Natural Heritage, Battleby.

Scottish Natural Heritage. 1993. A Muirburn Code. Scottish Natural Heritage, Battleby.

Stevenson, A.C & Thompson, D.B.A. (1993). Long-term changes in the extent of heather moorland in upland Britain and Ireland: palaeoecological evidence for the importance of grazing. The Holocene, 3(1), 70-76.

Thompson, D.B.A., MacDonald, A.J., Marsden, J.H., & Galbraith, C.A. 1995. Upland heather moorland in Great Britain: a review of international importance, vegetation change and some objectives for nature conservation. Biological Conservation, 71, 163-178.

Thompson, D.B.A., Hester, A.J., Usher, M.B. (Eds.). 1995. Heaths and moorland: cultural landscapes. HMSO, Edinburgh.

UK Biodiversity Steering Group. 1995. Biodiversity: The UK Steering Group Report. Vol. 2: Action Plans. HMSO, London.

Costings for upland heathland

	Current expenditure	First 5 yrs to 2004/2005	Next 10 yrs to 2014/2015
Current expenditure /£000/Yr	3514		
Total average annual cost /£000/Yr		9353.5	18652.2
Total expenditure to 2005/£000		46767.7	
Total expenditure 2005 to 2014/£000			186522.3

## **Annex 1. List of abbreviations and acronyms**

ASSI	Area of Special Scientific Interest (Northern Ireland)
CC	County Council
0CCW	Countryside Council for Wales
DANI	Department of Agriculture for Northern Ireland
DETR	Department of the Environment, Transport and the Regions
EA	Environment Agency
EC	European Community
EH	English Heritage
EHS	Environment and Heritage Service (Northern Ireland)
EN	English Nature
ESA	Environmentally Sensitive Area
FC	Forestry Commission
FE	Forest Enterprise
GCT	Game Conservancy Trust
HA	Highways Agency
IDB	Internal Drainage Board
IUCN	International Union for the Conservation of Nature
JNCC	Joint Nature Conservation Committee
LA	Local Authority
LEC	Local Enterprise Company
MAFF	Ministry of Agriculture, Fisheries and Food
MoD	Ministry of Defence
NAW	National Assembly for Wales
NGO	Non-governmental organisation
NNR	National Nature Reserve
NTS	National Trust for Scotland
RBG Kew/Edinburgh	Royal Botanic Gardens
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SE	Scottish Executive
SEPA	Scottish Environmental Protection Agency
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SSC	Species Survival Commission (IUCN)
SSSI	Site of Special Scientific Interest (Britain)
SWAs	Scottish Water Authorities
WGS	Woodland Grant Scheme



## Annex 2. Action plan costings

Summary table showing estimated additional costs in £K per year for the first and second five years of each Species Action Plan

		1st five years	2nd five years
<b>Vertebrates</b>			
<i>Tetrao tetrix</i>	black grouse	101.0	64.5
<i>Lota lota</i>	burbot	23.6	0
<b>Coleoptera</b>			
<i>Bidessus minutissimus</i>	a diving beetle	12.2	11.5
<i>Gastrallus immarginatus</i>	a beetle	11.7	3.1
<i>Gnorimus nobilis</i>	a chafer	12.4	9.0
<i>Harpalus froelichii</i>	a ground beetle	11.5	11.1
<i>Synaptis filiformis</i>	a click beetle	15.7	16.0
	river shingle beetles	24.7	11.7
<b>Hymenoptera</b>			
<i>Anergates atratulus</i>	dark guest ant	16.7	8.6
<b>Lepidoptera</b>			
<i>Hydrelia sylvata</i>	waved carpet	16.7	7.2
<i>Lycia zonaria britannica</i>	belted beauty	13.5	6.7
<i>Noctua orbona</i>	lunar yellow underwing	12.9	4.5
<i>Rheumaptera hastata</i>	argent and sable	16.3	6.7
<i>Trichopteryx polycommata</i>	barred tooth-striped	22.1	12.6
<i>Xestia rhomboidea</i>	square-spotted clay	12.9	12.6
<b>Other invertebrates</b>			
<i>Brachyptera putata</i>	a stonefly	12.1	3.7
<i>Odontomyia hydroleon</i>	a soldierfly	13.7	6.4
<i>Spiriverpa lunulata</i>	a stiletto fly	11.6	3.7
<i>Triops cancriformis</i>	tadpole shrimp	2.6	1.4
<b>Lichens</b>			
<i>Chaenotheca phaeocephala</i>	a lichen	10.5	10.8
<i>Gyalideopsis scotica</i>	a lichen	6.5	3.8
<i>Halecania rhytidiza</i>	a lichen	2.0	0.8
<i>Opegrapha paraxanthodes</i>	a lichen	13.8	5.0
<b>Bryophytes</b>			
<i>Fissidens exiguus</i>	tiny fern-moss	7.2	5.2
<i>Weissia rostellata</i>	beaked beardless-moss	12.5	5.4
	Annual total (£K)	416.4	232.0
	Total five year cost (£K)	2082.0	1160.0

Costs exclude 10% administration, and the contribution of agri-environment schemes which is being estimated separately.

### Annex 3. List of species and habitats, with Contact Points, Lead Partners and Lead Agencies/Departments

Table 1, below, lists the Contact Points and Lead Partners for the species action plans published in this volume. Lead Partners for four species are still to be determined at the time of going to press. A list of species statements included in this volume is given in Table 2. Table 3 lists the Lead Agencies/Departments for the habitat action plans.

Table 1: Species Action Plans

Species	Contact Point	Lead Partner
Vertebrates		
<i>Tetrao tetrix</i> black grouse	Scottish Natural Heritage	Royal Society for the Protection of Birds and the Game Conservancy Trust
<i>Lota lota</i> burbot	English Nature	Environment Agency
Coleoptera		
<i>Bidessus minutissimus</i> a diving beetle	Countryside Council for Wales	Environment Agency
<i>Gastrallus immarginatus</i> a beetle	English Nature	CABI Bioscience
<i>Gnorimus nobilis</i> a chafer	English Nature	People's Trust for Endangered Species
<i>Harpalus froelichi</i> a ground beetle	English Nature	The Wildlife Trusts
<i>Synaptus filiformis</i> a click beetle	Environment Agency	to be determined
Single grouped plan for river shingle beetles: <i>Bembidion testaceum</i> <i>Lionychus quadrillum</i> <i>Hydrochus nitidcollis</i> <i>Meotica anglica</i> <i>Perileptus areolatus</i> <i>Thinobius newberyi</i>	Countryside Council for Wales	Environment Agency
Hymenoptera		
<i>Anergates atratulus</i> dark guest ant	English Nature	English Nature/Aculeate Conservation Working Group
Lepidoptera		
<i>Hydrelia sylvata</i> waved carpet	English Nature	Butterfly Conservation

Species	Contact Point	Lead Partner
<i>Lycia zonaria britannica</i> belted beauty	Countryside Council for Wales	Butterfly Conservation
<i>Noctua orbona</i> lunar yellow underwing	English Nature	Butterfly Conservation
<i>Rheumaptera hastata</i> argent and sable	English Nature	Butterfly Conservation
<i>Trichopteryx polycommata</i> barred tooth-striped	English Nature	Butterfly Conservation
<i>Xestia rhomboidea</i> square-spotted clay	English Nature	Butterfly Conservation
Other invertebrates		
<i>Brachyptera putata</i> a stonefly	Scottish Natural Heritage	to be determined
<i>Odontomyia hydroleon</i> a soldierfly	Countryside Council for Wales	Countryside Council for Wales
<i>Spiriverpa lunulata</i> a stiletto fly	Countryside Council for Wales	Environment Agency
<i>Triops cancriformis</i> tadpole shrimp	English Nature	Forest Enterprise
Lichens		
<i>Chaenotheca phaeocephala</i> a lichen	Countryside Council for Wales	Countryside Council for Wales
<i>Gyalideopsis scotica</i> a lichen	Scottish Natural Heritage	Scottish Natural Heritage
<i>Halecania rhypodiza</i> a lichen	Scottish Natural Heritage	National Trust for Scotland
<i>Opegrapha paraxanthodes</i> a lichen	Countryside Council for Wales	to be determined
Bryophytes		
<i>Fissidens exiguus</i> tiny fern-moss	Environment Agency	Plantlife
<i>Weissia rostellata</i> beaked beardless-moss	Environment Agency	to be determined

Table 2: Species Statements

Species name	Common name
Vertebrate	
<i>Coregonus oxyrhynchus</i>	houting
Coleoptera	
<i>Amara strenua</i>	a ground beetle
<i>Anisodactylus nemorivagus</i>	a ground beetle
<i>Badister peltatus</i>	a ground beetle
<i>Bembidion humerale</i>	a ground beetle
<i>Bembidion nigropiceum</i>	a ground beetle
<i>Ceutorhynchus insularis</i>	a weevil
<i>Cicindela maritima</i>	dune tiger beetle
<i>Cryptocephalus decemmaculatus</i>	a leaf beetle
<i>Dromius quadrisignatus</i>	a ground beetle
<i>Dromius sigma</i>	a ground beetle
Joint statement for <i>Harpalus cordatus</i> and <i>Harpalus parallelus</i>	ground beetles
<i>Harpalus dimidiatus</i>	a ground beetle
<i>Harpalus obscurus</i>	a ground beetle
<i>Harpalus punctatulus</i>	a ground beetle
<i>Octhebius poweri</i>	a water beetle
<i>Protapion ryei</i>	a weevil
<i>Psylliodes luridipennis</i>	Lundy cabbage flea beetle
<i>Tachys micros</i>	a ground beetle
Grouped statement for saproxylic beetles	wood boring beetles
Hymenoptera	
<i>Formica lugubris</i>	hairy wood ant
<i>Formicoxenus nitidulus</i>	shining guest ant
<i>Formica rufa</i>	southern wood ant
Lepidoptera	
<i>Lygephila craccae</i>	scarce black-neck
<i>Schrankia taenialis</i>	white-line snout

Species name	Common name
<i>Scotopteryx bipunctaria</i>	chalk carpet
<i>Thetidia smaragdaria maritima</i>	Essex emerald
<i>Xestia ashworthii</i>	Ashworth's rustic
Other invertebrates	
<i>Aphrodes duffieldi</i>	a leafhopper
<i>Euophrys browningi</i>	a jumping spider
<i>Heptagenia longicauda</i>	a mayfly
<i>Orthotylus rubidus</i>	a plant bug
Fungus	
<i>Boletopsis leucomelaena</i>	a poroid fungus
Lichen	
<i>Hypogymnia intestiniformis</i>	a lichen
Bryophytes	
<i>Atrichum angustatum</i>	lesser smoothcap
<i>Bryum calophyllum</i>	matted bryum
<i>Bryum turbinatum</i>	pear-fruited bryum
<i>Bryum uliginosum</i>	cernuous bryum
<i>Campylopus setifolius</i>	silky swan-neck moss
<i>Ephemerum cohaerens</i>	clustered earth-moss
<i>Fossombronia crozalsii</i>	Crozals' frillwort
<i>Marsupella stableri</i>	Stabler's rustwort
<i>Micromitrium tenerum</i>	millimetre moss
<i>Orthotrichum gymnostomum</i>	aspen bristle-moss
<i>Orthotrichum sprucei</i>	spruce's bristle-moss
<i>Pictus scoticus</i>	pict-moss
<i>Plagiothecium piliferum</i>	hair silk-moss
<i>Seligeria calycina</i>	English rock-bristle
<i>Sphagnum skyense</i>	Skye bog-moss
<i>Tetradontium repandum</i>	small four-tooth moss
<i>Weissia squarrosa</i>	spreading-leaved beardless-moss
<i>Weissia sterilis</i>	sterile beardless-moss

Vascular plant	
<i>Cochlearia scotica</i>	Scottish scurvygrass

Table 3: Lead Agencies for the Habitat Action Plans

Habitat Action Plan	Lead Agency
Lowland raised bog	English Nature
Blanket bog	Scottish Natural Heritage
Upland calcareous grassland	Countryside Council for Wales
Upland heathland	English Nature